

TSUBAKI ZIP CHAIN LIFTER ZIP MASTER

Meshing chain linear motion devices



Embracing the distinct movement of ZIP CHAIN

Superior Technology for Superior Equipment

ZIP CHAIN enables push/pull operation through two interlocking chains.

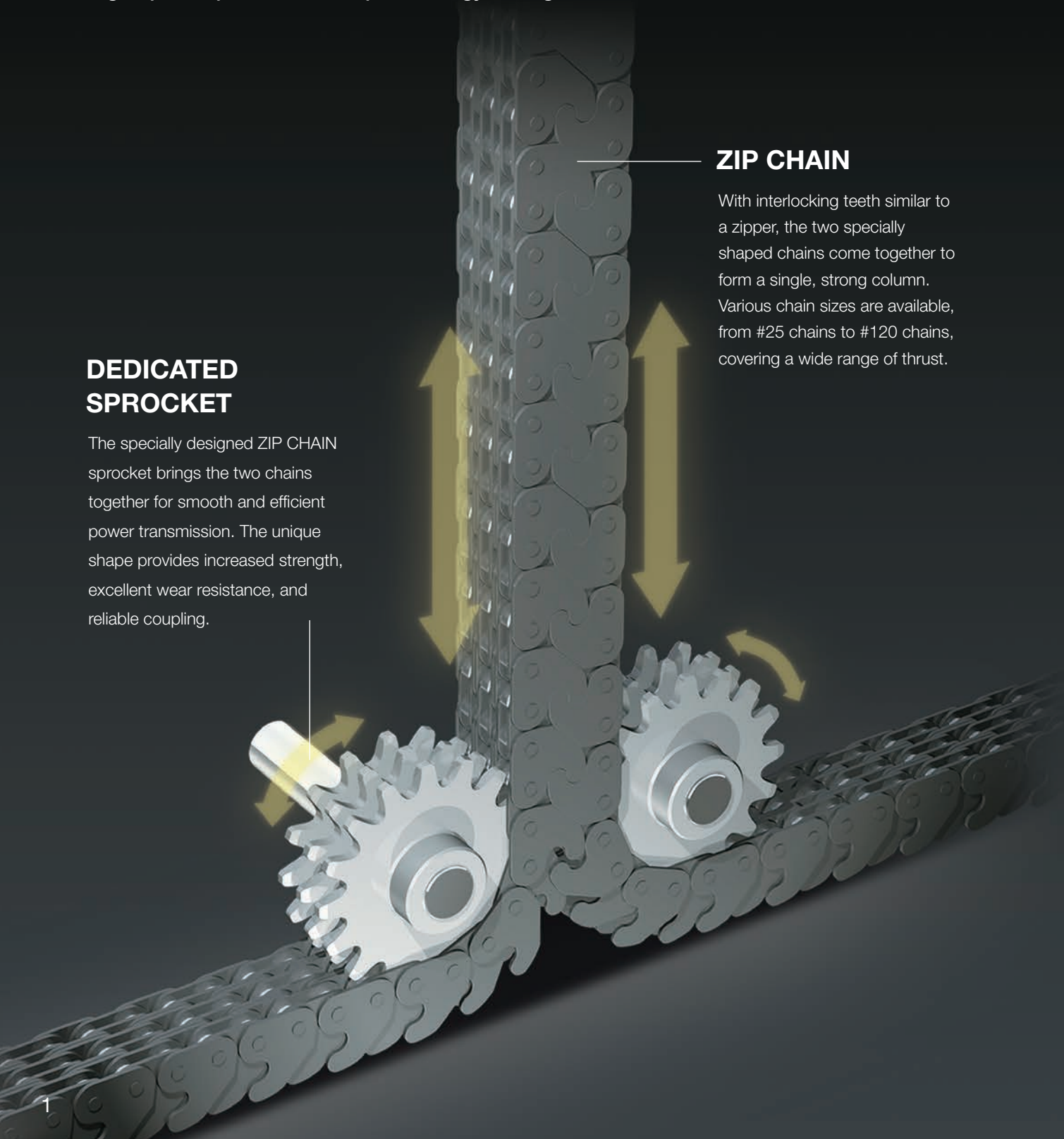
ZIP CHAIN is the culmination of proprietary Tsubaki technology and perfects high-speed operation in compact, energy-saving lifters and linear actuators.

DEDICATED SPROCKET

The specially designed ZIP CHAIN sprocket brings the two chains together for smooth and efficient power transmission. The unique shape provides increased strength, excellent wear resistance, and reliable coupling.

ZIP CHAIN

With interlocking teeth similar to a zipper, the two specially shaped chains come together to form a single, strong column. Various chain sizes are available, from #25 chains to #120 chains, covering a wide range of thrust.



COMPARING CONVENTIONAL LINEAR MOTION MECHANISMS

Compared with screw jacks and hydraulic/pneumatic mechanisms, ZIP CHAIN LIFTER / ZIP MASTER offer superior performance.

ZIP CHAIN LIFTER / ZIP MASTER

Durability

ZIP CHAIN offers excellent wear resistance with no elongation of chains used in power transmission or transportation, ensuring a long service life and excellent maintainability.

Screw jacks

Stopping accuracy

A compressive load is constantly applied to the lifter, ensuring highly precise positioning.

Speed/frequency

Even during high-speed operation, the chains mesh together smoothly, and expansion/retraction speeds of 1,000 mm/s are possible. Even during high-frequency operation, heat generation is minimal, no duty factor restrictions are applied, and continuous operation is possible.

Ease of use

Adjusting the length is as easy as changing the number of links in the chain, and compact storage is possible even with long strokes, making transportation and installation easy.

Hydraulic/pneumatic mechanisms

Low noise

Chains couple together smoothly for low-noise operation.

Compact

Chains are stored individually in respective chain cases. This allows for a unique space-saving design, where conventional systems are generally limited.

TSUBAKI ZIP CHAIN PRODUCTS



ZIP CHAIN LIFTER

See page 3



ZIP MASTER

See page 7

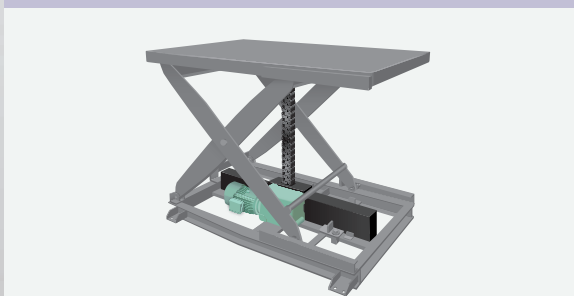
ZIP CHAIN LIFTER



ZIP CHAIN LIFTER provides an innovative table lifter that directly transmits lifting thrust through ZIP CHAIN. It operates 3 to 10 times faster than hydraulic lifters and supports high-frequency operation, which provides energy savings as high as 50%.

COMPARISON WITH OTHER LIFTING METHODS

ZIP CHAIN LIFTER



● Efficient transmission drive

ZIP CHAIN pushes the top plate directly, ensuring the motor torque is transmitted efficiently.

● Exceptional durability

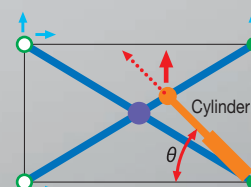
With ZIP CHAIN LIFTER, the mass and thrust of the lifting mechanism is supported directly by ZIP CHAIN, preventing excessive force from being applied to the scissor arm hinges, rollers, and bearings.

Electric and hydraulic lifters



When lifting from the lowest position, electric and hydraulic cylinders push the lifter in a diagonal direction and require a large amount of power ($1/\sin \theta$ times the lifting thrust).

Ex.: At $\theta = 10^\circ$,
a thrust of 5.8 times the thrust force is required.



FEATURES

Speed

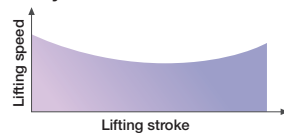
ZIP CHAIN LIFTER achieves high-speed operation at a maximum lifting speed of 100m/min. This lifter works through a mechanism that directly pushes up the lift table at a stable speed in proportion to motor rpm, enabling lifting operation at a constant speed. Synchronized operation of multiple lifters is also possible.

● ZIP CHAIN LIFTER



It maintains a stable speed through the entire stroke range.

● Hydraulic lifter

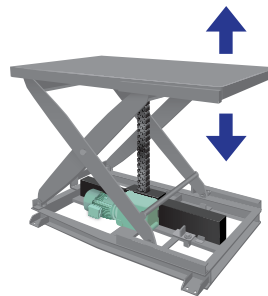


The speed varies throughout the stroke. It slows down in the middle.

High-frequency operation

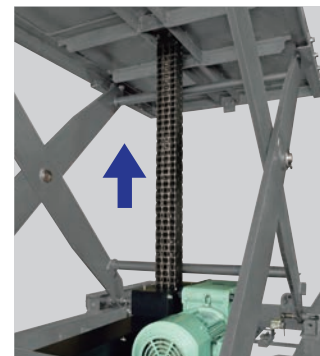
In the case of a hydraulic lifter, it is necessary to increase the tank capacity of hydraulic units during high-frequency operation. Since ZIP CHAIN LIFTER is an electric high-speed lifter, there is no tank and high-frequency operation is possible.

Supports high-speed operation such as continuous lifting at a rate of one lift cycle per minute thanks to its efficient operation.



Expected life

ZIP CHAIN LIFTER has a mechanism that directly pushes the lift table, which places a smaller load on the hinges/rollers and enables longer life (over one million strokes).



Comparison with other devices

	Speed	High frequency	Stopping accuracy	Expected life
ZIP CHAIN LIFTER	good	good	good	good
	Max. 100 m/min	Continuous operation	With servomotor	More than 1 million complete round trips
Electric screw-jack lifter	poor	poor	good	poor
	Max. 15 m/min	Intermittent operation only	With servomotor	100,000 round trips
Hydraulic lifters	poor	poor	poor	poor
	Max. 15 m/min	Oil temperature rise	Difficulty with intermediate stops	100,000 round trips

Standard 1,000kg ZIP CHAIN LIFTER

Standard 1,000kg lifting weight models in two different speeds.

● Specifications

Lifting weight	1,000 kg	
Stroke	1,000 mm (Single-stage pantograph)	1,600 mm (Dual-stage pantograph)
Speed with three-phase motor	5.5 m/min	11 m/min
Speed with servomotor	19 m/min	

● Features

Operation cycle	13.5 seconds
Stopping accuracy	±1 mm
Expected life	More than 1 million cycles

APPLICATIONS

ZIP CHAIN LIFTER provides ideal work flow for conveyance process in production lines.

ZIP CHAIN LIFTER greatly contributes to higher productivity in each manufacturing process, such as automotive equipment. In addition, it can reduce maintenance costs and other running costs.

Eliminate height differences

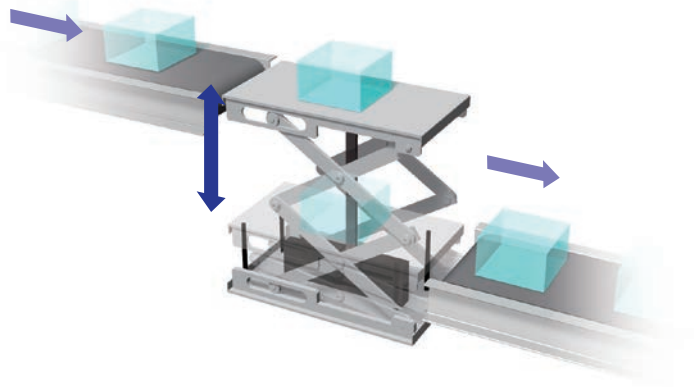
High speed

High frequency

Long life

Conveyed items can slip off a sloped belt conveyor. ZIP CHAIN LIFTER provides stable conveyance thanks to its lifting function.

Lifting weight	100 kg
Speed	50 m/min
Stroke	900 mm 7 s/cycle
Motor	Servomotor



Automated guided vehicle (AGV)

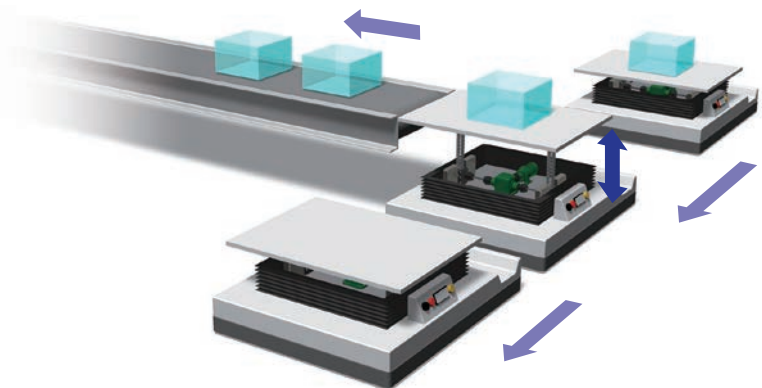
High speed

Stopping accuracy

Compact

ZIP CHAIN LIFTER can be installed on an AGV without hydraulic tanks. This lifter can accurately lift the product thanks to its high stopping accuracy and transfer it to conveyors.

Lifting weight	300 kg
Speed	25 m/min
Stroke	1,250 mm 50 s/cycle
Motor	DC power supply



Using ZIP CHAIN LIFTER together with ZIP MASTER

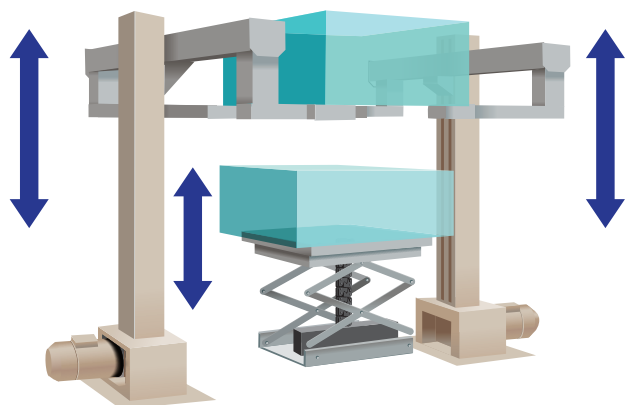
Stopping accuracy

Compact

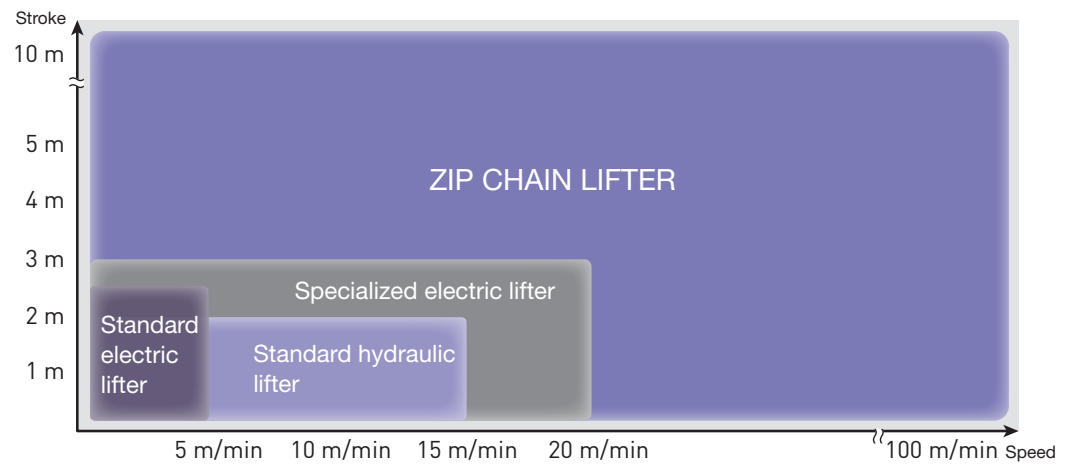
Longer stroke

ZIP CHAIN LIFTER is used to mount parts on the bottom surface of the product lifted by two ZIP MASTER. It enables accurate lifting at any position to match the product height.

Lifting weight	200 kg
Speed	11 m/min
Stroke	2,000 mm



SPEED/STROKE COMPATIBILITY RANGE



High-speed sorting

High speed

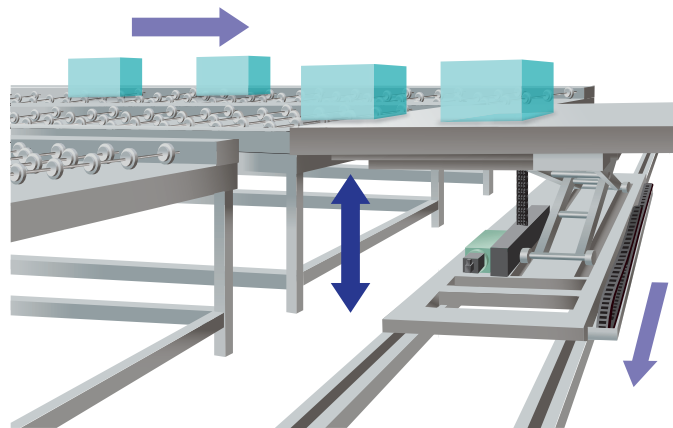
High frequency

Stopping accuracy

Long life

ZIP CHAIN LIFTER mounted on a cart sorts the product onto multiple conveyors. High-speed/frequency operation improves productivity.

Lifting weight	400 kg
Speed	20 m/min
Stroke	800 mm



Stacking operation

High speed

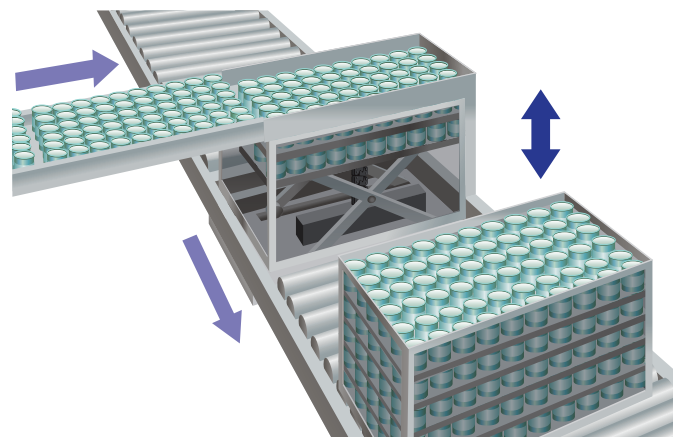
High frequency

Stopping accuracy

Long life

ZIP CHAIN LIFTER is used to stack the product conveyed from the top as the lifter lowers to each fixed location. It enables lifting operation with high frequency and high stopping accuracy.

Lifting weight	350 kg
Speed	30 m/min
Stroke	1,000 mm



Unstacking operation

High speed

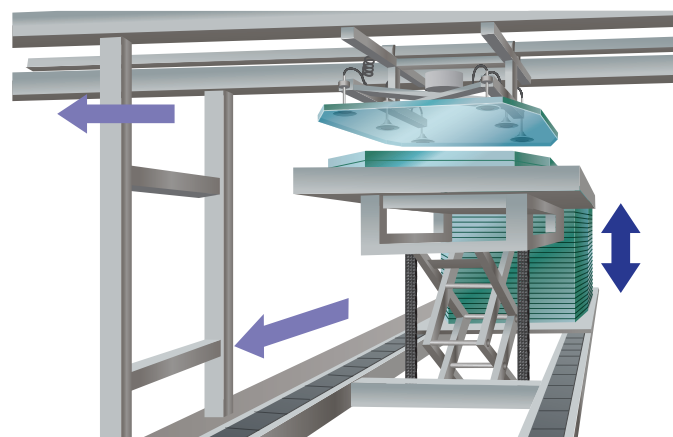
High frequency

Stopping accuracy

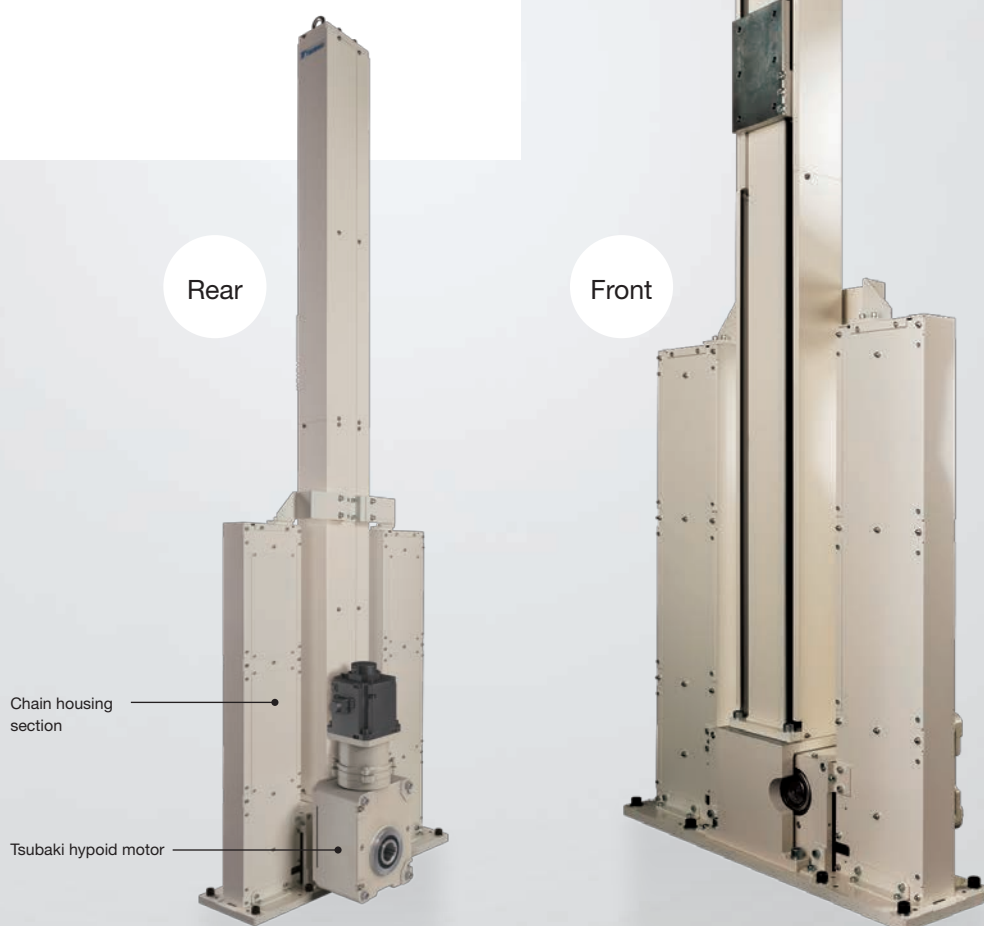
Long life

ZIP CHAIN LIFTER is used to transfer piled up steel plates to traversers. It easily enables precise multi-point stopping.

Lifting weight	1,000 kg
Speed	5 m/min
Stroke	1,000 mm



ZIP MASTER

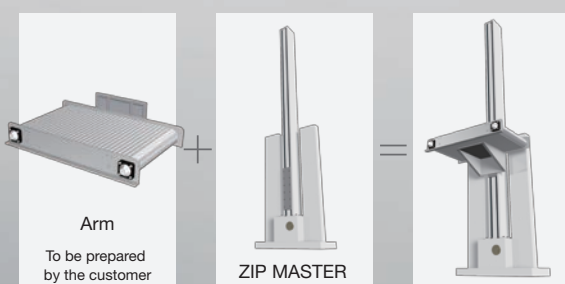


ZIP MASTER is a cantilever-type electric high-speed lifter that combines ZIP CHAIN, linear guides, and a motor. Unlike conventional lifting mechanism requiring extensive assembly time, ZIP MASTER adopts a “plug-and-play” design that can be used simply by placing the device. In addition, the high-speed, high-frequency, high-lift capabilities mean the device can be used in a wide range of applications.

HOW TO USE

Simply attach an arm suitable for the application to ZIP MASTER.

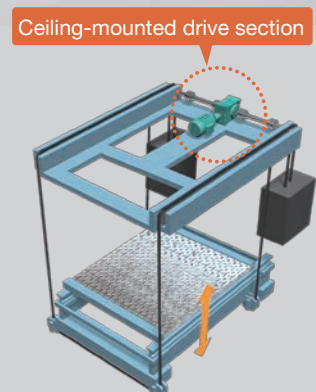
- No additional assembly is required. Just place the device on the floor.
- Plug-and-play
- Easy maintenance



COMPARISON WITH DROP LIFTERS

Conventional vertical transfer lifters require on-site equipment assembly as well as scaffolding on the top for installing and inspecting the drive section.

ZIP MASTER's integrated structure simplifies assembly and installation. In addition, the drive section is located on the bottom, enabling safe and simple inspection and maintenance.

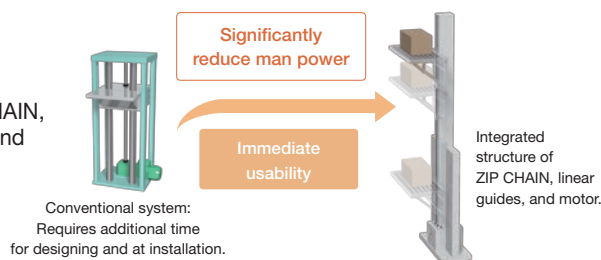


FEATURES

Plug-and-play design

ZIP MASTER utilizes an integrated structure that includes ZIP CHAIN, linear guides, and motor. This eliminates the need for assembly and simplifies installation while ensuring immediate usability.

Save time **No assembly** **Easy installation**



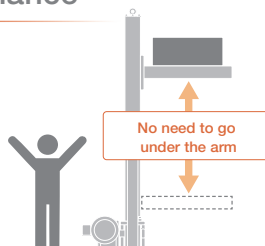
Space-saving design

ZIP MASTER can minimize installation area with narrower design.



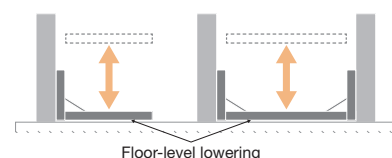
Easy maintenance

The drive section laid out at floor level helps ensure safety during maintenance and inspection.



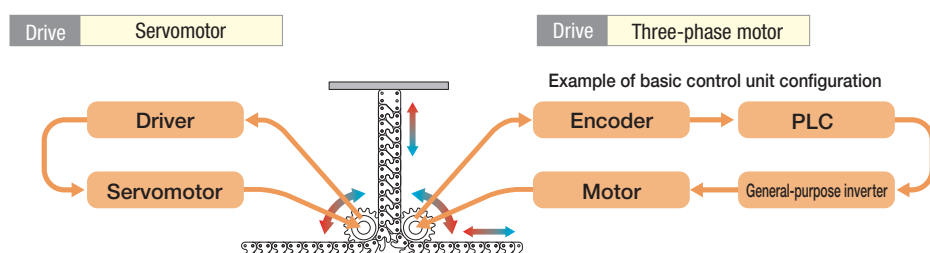
Lowest table height

The table can be lowered to floor level.



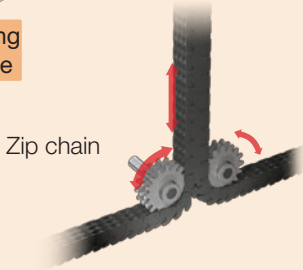



Stopping accuracy

The simple control structure easily allows multi-point stopping/multi-level positioning.



COMPARING WITH SCREW JACK SYSTEM

Cantilever-type electric lifters	ZIP MASTER			LIFT MASTER		
	 High speed High frequency Longer stroke			 Compact High precision Wide variations		
Driving method	Interlocking chain drive 			Ball/trapezoidal screw drive 		
Allowable load	good	10 kN (up to 30 kN upon request)		good	10 kN (up to 20 kN upon request)	
Allowable speed	good	60 m/min (1,000 mm/s)		fair	9.96 m/min (166 mm/s)	
Stroke	good	Up to 2,000 mm (up to 4 m upon request)		fair	400 mm to 1,500 mm (up to 2,000 mm upon request)	
Allowable frequency	good	High-frequency operation		good	Within the allowable duty factor of screw	
Stopping accuracy/controllability	fair	Positioning control even with high-speed operation		good	High-precision positioning when using high-precision screws	
Service life	good	1 million lifts		good	Predictable service life with ball screw types	
Low noise	fair	Low-noise operation with smooth chain meshing		good	Quiet with screw drive	

APPLICATIONS

ZIP MASTER can be installed to offer an optimal conveyor layout.

ZIP MASTER greatly contributes to higher productivity in each manufacturing process, such as automotive equipment. In addition, it can reduce maintenance costs and other running costs.

Roller conveyor lifting

[Positioning]

High speed

ZIP MASTER can lift and lower roller conveyors at multiple positions in high speed, high frequency, and accurately.

High frequency

Lifting weight	300 kg
Stroke	2,000 mm
Speed	500 mm/s

Long life



Benefits

- The plug-and-play design helps reduce construction time.
- The space-saving design includes a drive section on the floor for less required space for installation.

Frame lifting

[Synchronized operation]

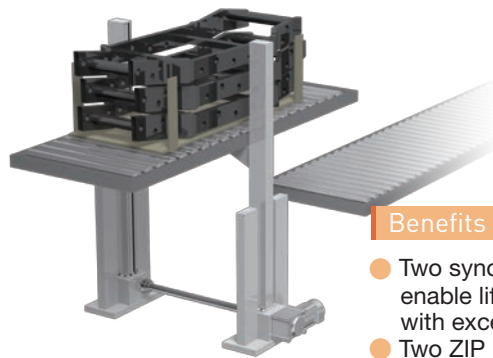
High speed

ZIP MASTER can be used for transferring frames to painting booths. Using two ZIP MASTER makes it possible to prevent the arm tip sinking with large overhung loads, ensuring smooth transferring.

High accuracy

High rigidity

Lifting weight	300 kg
Stroke	2,300 mm
Speed	500 mm/s



Benefits

- Two synchronized ZIP MASTER enable lifting large workpieces with excessive overhung loads.
- Two ZIP MASTER can be synchronized with one motor.

Vehicle lifting

[Synchronized operation]

High speed

Using four ZIP MASTER synchronized together makes it possible to adjust the height of lifted vehicles. Each unit can be operated individually, enabling adjustment at any height.

High rigidity

High accuracy

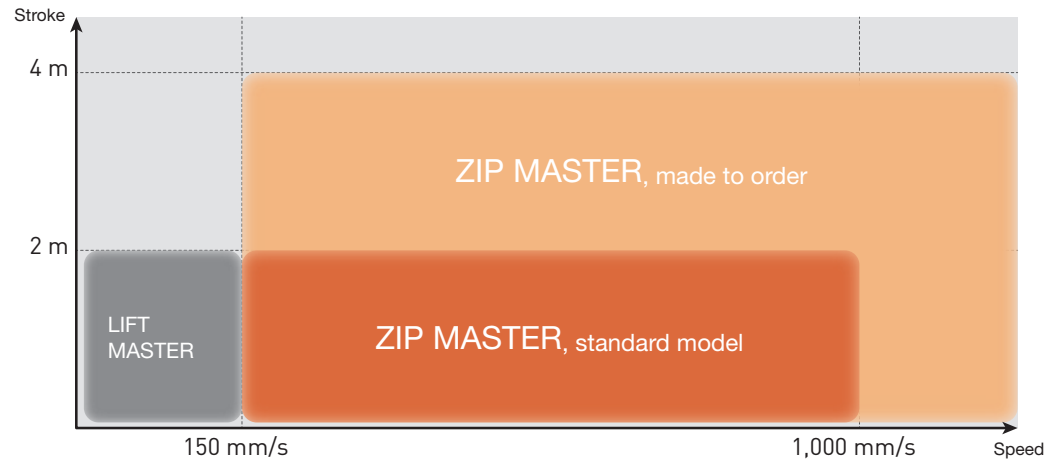
Lifting weight	1,200 kg (with four units)
Stroke	3,000 mm
Speed	500 mm/s



Benefits

- Linking four ZIP MASTER enables lifting and lowering large workpieces accurately.

SPEED AND STROKE RANGE



Paint container lifting

[Long stroke]

Longer stroke

Two synchronized ZIP MASTER enable high lifts even with a large overhung load.

High speed

Lifting weight	1,000 kg
Stroke	4,500 mm
Speed	200 mm/s

Long life



Benefits

- Longer strokes are available upon request.
- Easier maintenance by arranging two ZIP MASTER side by side.

Case stacking

[High frequency]

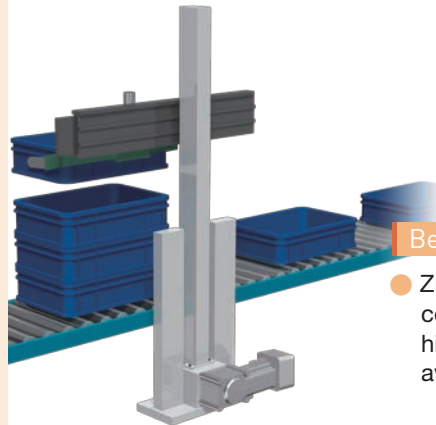
High rigidity

ZIP MASTER can stack cases transported on conveyors. This makes it possible to handle applications requiring high-frequency operation.

High speed

High frequency

Lifting weight	200 kg
Stroke	2,000 mm
Speed	600 mm/s



Benefits

- ZIP CHAIN can be used for continuous operation, and higher-frequency operation is available with adequate drives.

Body lifting

[High load]

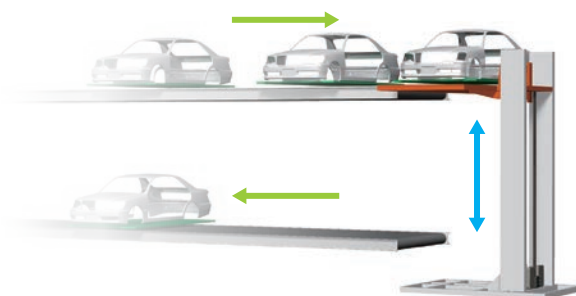
High rigidity

ZIP MASTER can be used as a post-type drop lifter in painting and assembly lines.

Longer stroke

Lifting weight	1,500 kg
Stroke	4,000 mm
Speed	300 mm/s

High frequency



Benefits

- ZIP MASTER enables lifting large workpieces over long strokes. The drive section can be laid out at floor level for easy maintenance.

CONVERT

CONVERSION FROM HYDRAULIC/ PNEUMATIC MECHANISMS

Compared with hydraulic and pneumatic drive systems, motorized models are environmentally friendly with a simple design, and easy to maintain while providing significantly improved performance.

Other ZIP CHAIN products are available.

ZIP CHAIN ACTUATOR

ZIP CHAIN was uniquely developed by Tsubaki. Two chains lock together like a zipper to form a single, strong column for pushing and pulling applications.



ECO-FRIENDLY

LCA-approved ZIP CHAIN ACTUATOR

Tsubaki's ZIP CHAIN ACTUATOR offers significantly reduced power consumption compared to hydraulic and pneumatic cylinders. These environmentally friendly linear motion devices have been recognized for their power-saving effectiveness.

What is LCA?

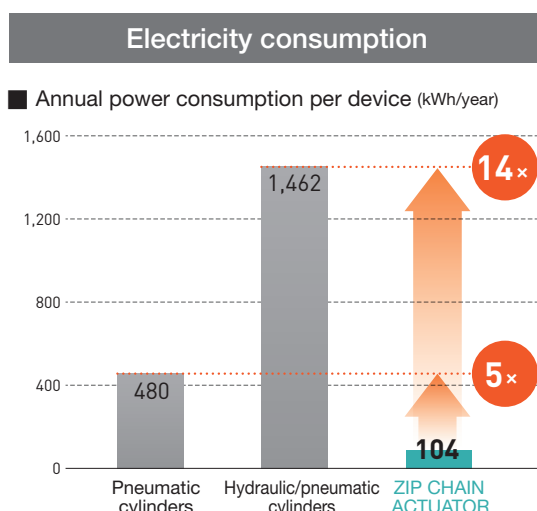
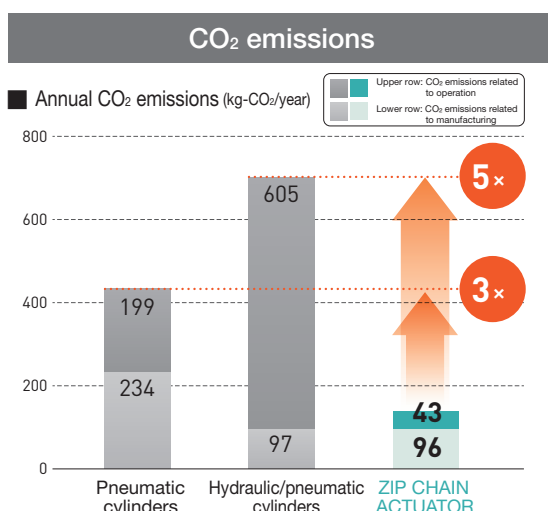
Life Cycle Assessment

Life Cycle Assessment is a comprehensive method for evaluating the environmental impact at all stages, including manufacturing, operation, and disposal.



Comparing with hydraulic and pneumatic cylinders

* Calculated using Tsubaki's internal LCA evaluation.



Comparison conditions

- Thrust: 1 kN ■ Speed: 200 mm/s ■ Stroke: 500 mm ■ 1 cycle/min. × 12 hrs × 250 days/year
- Includes various drives (induction motor, pneumatic/hydraulic units)

For comparison purposes, disposal/recycling are considered equal and have been omitted from the LCA evaluation.
Reference: Japan Environmental Management Association for Industry MILCA Ver. 1.20; catalogs from various companies

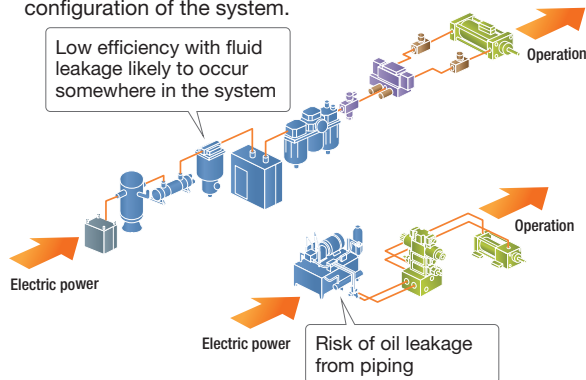
SIMPLE AND EASY TO MAINTAIN

Grease is used as the lubricant for ZIP CHAIN, eliminating the risk of oil leaking from the main unit or piping, as with hydraulic cylinders. In addition, the drive source is connected only by cables, simplifying maintenance by eliminating hydraulic piping.

COMPARISON OF SYSTEM CONFIGURATION

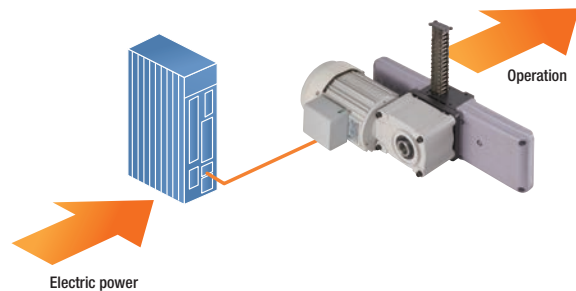
Hydraulic/pneumatic cylinders

With hydraulic and pneumatic cylinders, the system conversion efficiency from the power supplied to operation is very low due to the complicated configuration of the system.



ZIP CHAIN ACTUATOR

With ZIP CHAIN ACTUATOR, the system conversion efficiency from the power supplied to operation is very high due to the simple system.



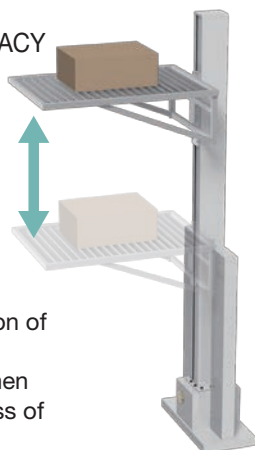
SPEED CONTROL/STOPPING ACCURACY AND RELIABLE LOAD RETENTION

Motorized devices are able to stop at any position using a built-in position detection sensor and a brake motor. In addition, using an inverter makes operation at a specific lifting speed possible. Servomotors can also be used as the drive source.

Using a brake motor helps to save energy by eliminating energy consumption while holding the load and also reduces the risk of power failure and accidents caused by high-pressure pipe failures.

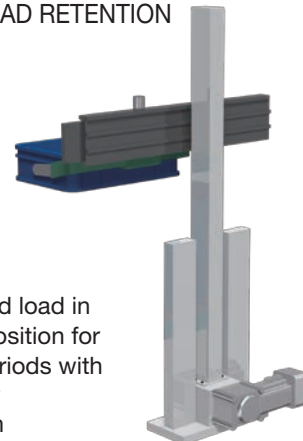
● SPEED CONTROL, STOPPING ACCURACY

- Synchronized operation of multiple devices
- Stable speed even when descending, regardless of load condition



● HEAVY LOAD RETENTION

- Ability to hold load in a stopped position for extended periods with no electricity consumption



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ZIP MASTER

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TECHNICAL SHEET

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ZIP CHAIN LIFTER

Model Numbering

ZSL 1000 S 10 G 1 - J
ZSL 1000 M 16 K 2 - E

Series
Allowable lifting weight
Speed
Stroke
Drive
Number of pantograph stages
Option

Allowable lifting weight

1000	1,000 kg
0050	50 kg

Speed

S	Up to 6 m/min
L	6 to 12 m/min
M	12 to 30 m/min

Stroke

16	1,600 mm
10	1,000 mm
05	500 mm
03	300 mm

Drive style

G	Three-phase motor
K	Servomotor

Number of pantograph stages

1	Single-stage
2	Dual-stage

Option

J	Bellows
T	Tap plate (Available for 1,000kg type)
V	400V class
E	Rotary encoder

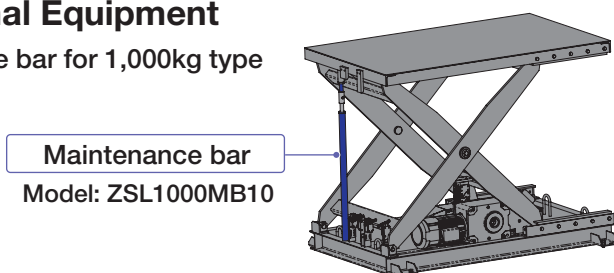
Table dimensions will differ when using bellows. Contact a Tsubaki representative for more information.

Contact us for the mounting position and number of tap plates that need to be mounted.

380/400/400/440V
50/50/60/60Hz
Note: Contact a Tsubaki representative for voltages other than those listed above.

Optional Equipment

Maintenance bar for 1,000kg type

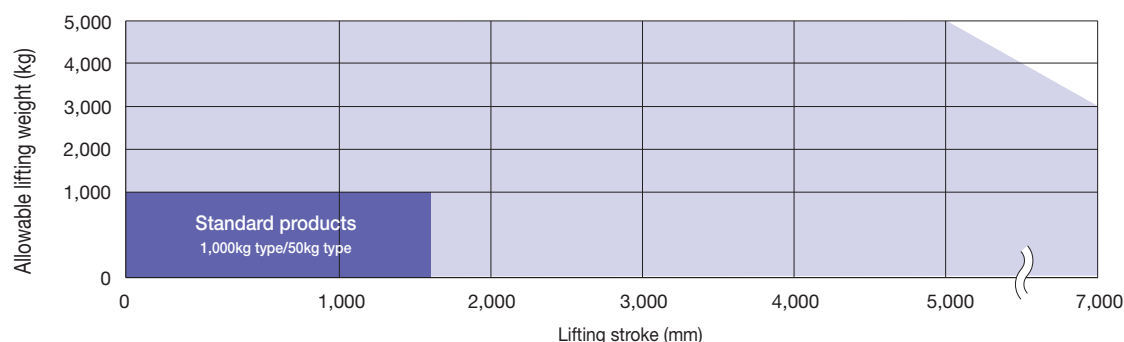


Maintenance bar
Model: ZSL1000MB10

Note: Always use the maintenance bar for safety during maintenance.
The maintenance bar is to be used with a 1,000 mm stroke. Contact a Tsubaki representative if you need to use it with other strokes.

Available ZIP CHAIN LIFTER Range

Allowable lifting weight and lifting stroke



Ambient Conditions

Installation place	Indoor not exposed to dust or water	
Ambient temperature	ZSL1000: 0 to 40°C	ZSL0050: 5 to 35°C
Relative humidity	ZSL1000: 35 to 85% RH	ZSL0050: 5 to 85% RH
Altitude	1,000 m or less	
Shock resistance value	Less than 1G	
Atmosphere	Free from corrosive gases, explosive gases, and steam	
Mounting direction	Horizontal	

Specifications

1. With three-phase motor

Model	ZSL1000S10G1	ZSL1000L10G1	ZSL1000S16G2	ZSL1000L16G2	ZSL0050S03G1	ZSL0050S05G2
Allowable lifting weight (kg)	1,000				50	
Nominal speed (m/min)	5.5	11	5.5	11	4.8	
Pulses per motor revolution (mm)	3.18	6.35	3.18	6.35	2.86	
Operating time (s)	13.5	7.5	20	11.5	4.6	7.5
Nominal stroke (mm)	1,000		1,600		300	500
Minimum height (mm)	420		600		200	
Table size (mm)	1,100×1,800				400×580	
Weight (kg)	720	750	1,020	1,050	55	60
Motor	Three-phase/four-pole high-efficiency motor with non-excitation type brake				Three-phase/four-pole motor with non-excitation type brake	
Motor size (kW)	2.2kW	3.7kW	2.2kW	3.7kW	0.1kW	
Power supply voltage	200V AC class*1					
Lubrication	Chain: Grease (No. 2)					
Coating	Acrylic lacquer-based, grey (Munsell N5)				Phthalic acid-based, grey (Munsell N5)	

*1 400V AC class is also available. Contact a Tsubaki representative for more information.

2. With servomotor

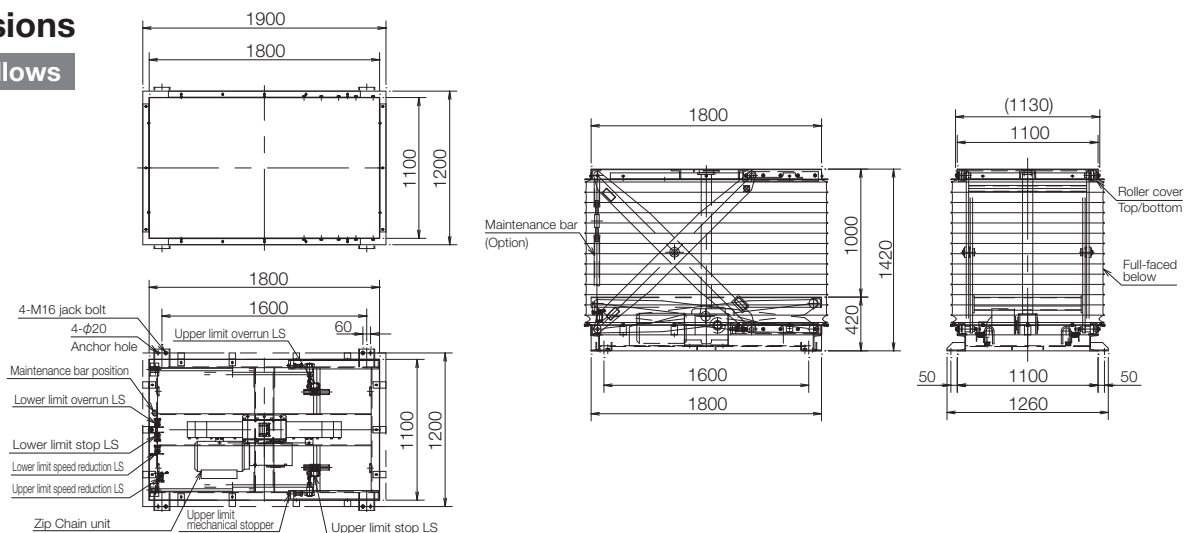
Model	ZSL1000M10K1	ZSL1000M16K2	ZSL0050M03K1	ZSL0050M05K2
Allowable lifting weight (kg)	1,000		50	
Nominal speed (m/min) (Input motor rpm)	19 (2,500 r/min)		28.6 (5,000 r/min)	
Pulses per motor revolution (mm)	7.62		5.72	
Operating time (s)	5	8.55	0.85	1.25
Nominal stroke (mm)	1,000	1,600	300	500
Minimum height (mm)	420	600	200	
Table size (mm)	1,100×1,800		400×580	
Weight (kg)	750	1,050	50	55
Motor	Servomotor (with brake)*1		Servomotor (with brake)*1	
Motor size (kW)	5.0kW		400W	
Power supply voltage	200V AC class*2			
Lubrication	Chain: Grease (No. 2)			
Coating	Acrylic lacquer-based, grey (Munsell N5)		Phthalic acid-based, grey (Munsell N5)	

*1 Servomotor driver, motor cable, brake cable, and encoder cable are not included. They need to be prepared by the customer.

*2 400V AC class is also available. Contact a Tsubaki representative for more information.

Dimensions

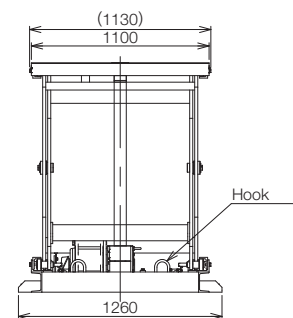
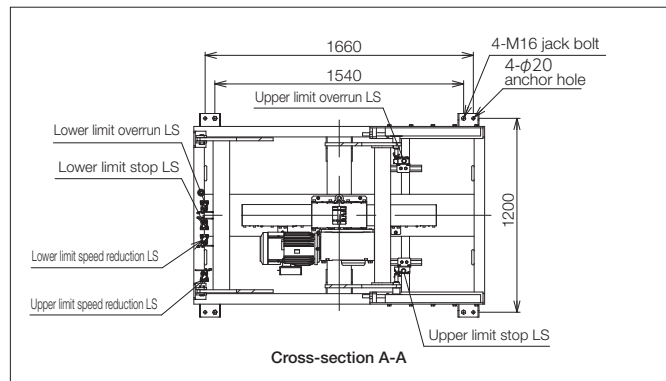
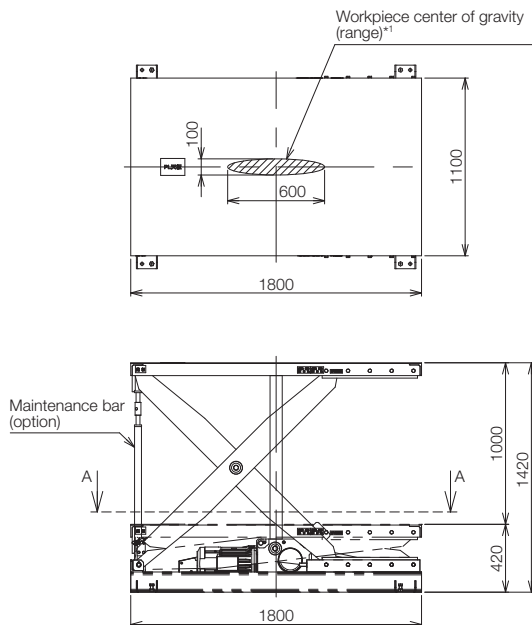
With bellows



Outline Dimensions: Allowable Lifting Weight 1,000 kg

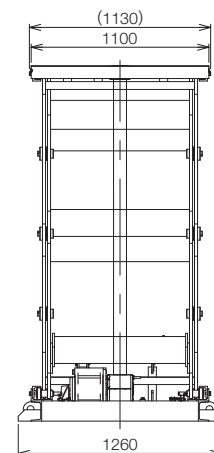
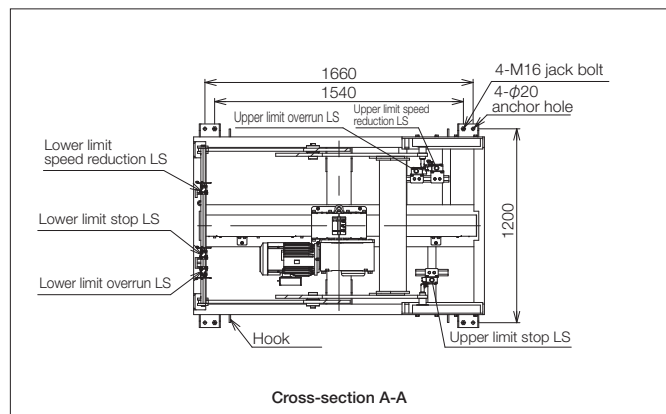
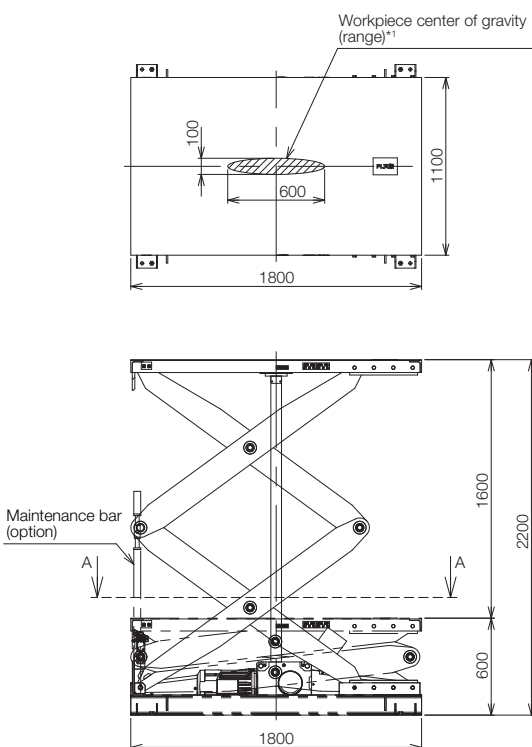
Three-phase motor, 1,000 mm stroke

Model **ZSL1000S10G1**
ZSL1000L10G1



Three-phase motor, 1,600 mm stroke

Model **ZSL1000S16G2**
ZSL1000L16G2

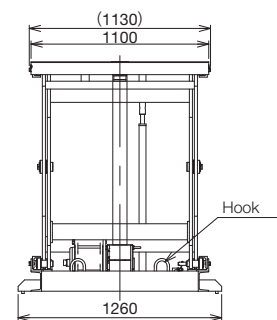
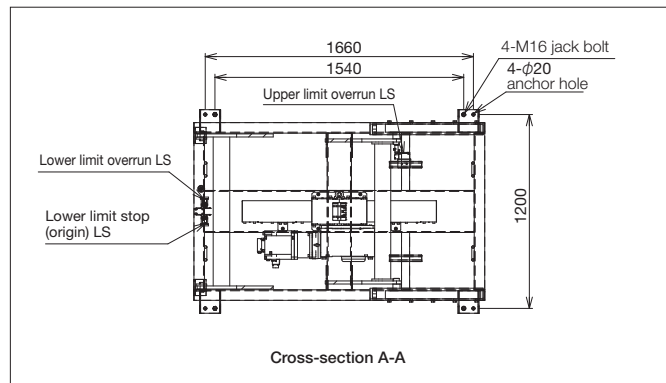
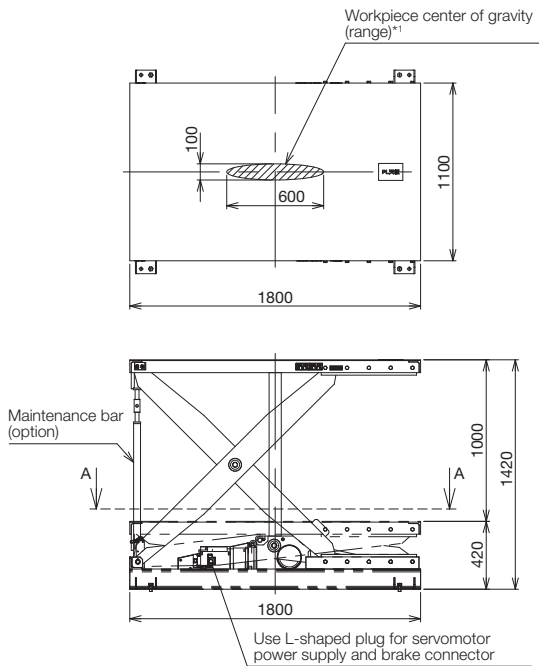


*1 The center of gravity of the workpiece should be within this range. If the workpiece center of gravity is outside this range, contact a Tsubaki representative for customization.

*2 Dimensions shown without tolerances will have general tolerances and may be 2 to 5 mm larger than the dimensions shown. Please allow a margin when designing your machinery.

Servomotor, 1,000 mm stroke

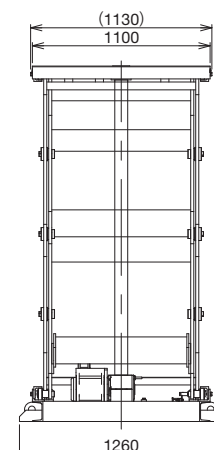
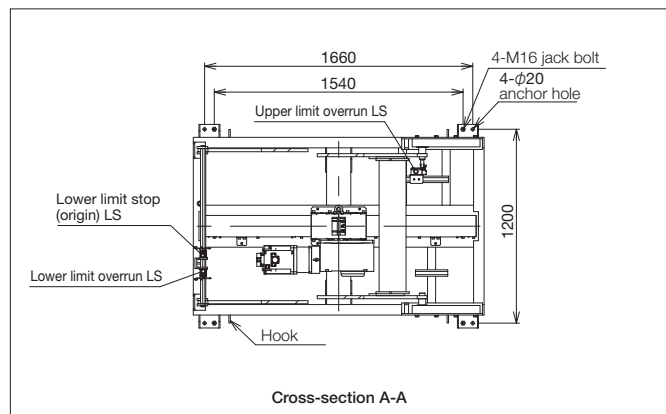
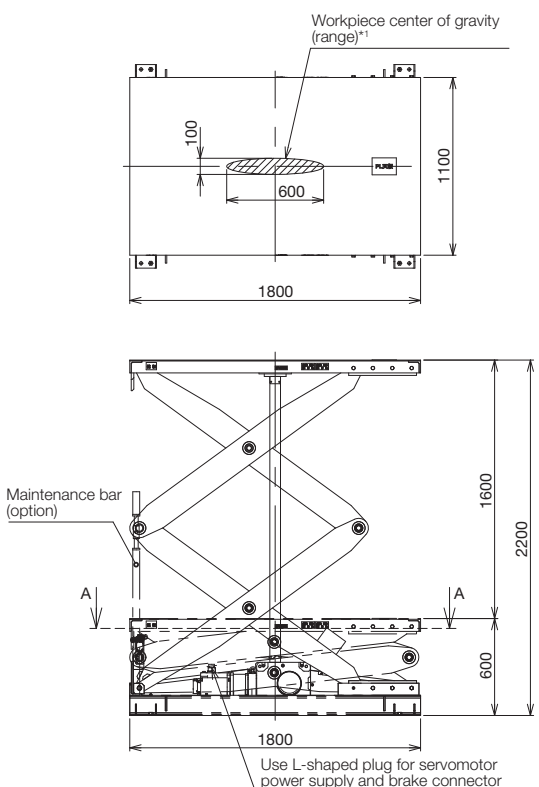
Model ZSL1000M10K1



Note: Servomotor driver, motor cable, brake cable, and encoder cable are not included. They need to be prepared by the customer.

Servomotor, 1,600 mm stroke

Model ZSL1000M16K2

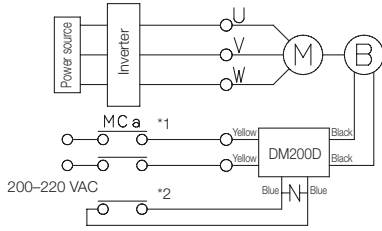


Note: Servomotor driver, motor cable, brake cable, and encoder cable are not included. They need to be prepared by the customer.

*¹ The center of gravity of the workpiece should be within this range. If the workpiece center of gravity is outside this range, contact a Tsubaki representative for customization.

*² Dimensions shown without tolerances will have general tolerances and may be 2 to 5 mm larger than the dimensions shown. Please allow a margin when designing your machinery.

■ Three-phase Motor Wiring (for inverter only)



Set the base frequency at 60 Hz.

Product name	Manufacturer	Model number
Surge Absorber	Panasonic	ERZV14D471
Zetrap	Fuji Electric Device Technology	ENE471D-14A
Ceramic Varistor	Nippon Chemi-Con	TND14V-471KB00AAA0

Ⓜ: Motor, ⓑ: Brake, MC: Magnetic contactor, MCa: Auxiliary relay, DM200D: Rectifier, -N-: Protection element (varistor)

*1 The brake voltage is 90 VDC. (When inputting 200 VAC to DM200D)

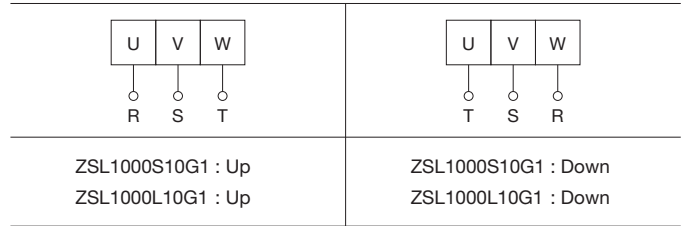
*2 The brake power supply module can be damaged depending on the wiring length, wiring method, relay type, or other factors. Connect a varistor between the separate DC switching terminals. Connecting closer to the brake power supply module (blue lead wire) will be most effective. The specific model numbers of the varistors are as shown above. Select a varistor voltage of 470 V for DM200D.

*3 For *1 in the diagram, use an auxiliary relay (MCa) with a contact capacity of 200 VAC / 7 A or more (resistive load).

When using an MC auxiliary contact or auxiliary relay for *2 in the diagram, use a device with a contact capacity of 200 VAC / 10 A or more (resistive load).

*3 Use a supply voltage of 200–254 VAC at 0.1 kW, 200–230 VAC at 2.2 kW, or 200–220 VAC at 3.7 kW for the brake shown in the marked section.

■ Motor Wiring and Lifting Direction



■ Cautions for Product Selection

- Acceleration/deceleration times

- ▶ ZIP CHAIN LIFTER achieves high-speed operation, and inverter drives are required. Please make sure to operate with sufficient acceleration and deceleration time. Rapid acceleration and quick stop may affect stopping accuracy or resonate the workpiece. When the lifter shakes depending on the load condition, take a longer acceleration and deceleration time when starting or stopping the operation.
- ▶ The nominal speed of ZIP CHAIN LIFTER is the maximum speed. Make sure to consider the acceleration/deceleration time when calculating lifting/lowering time.
- ▶ Using a servomotor drive is recommended when faster lifting time, higher-frequency operation, multi-point positioning, or synchronized operation are required. Contact a Tsubaki representative for more information.

- Inverter control

- ▶ Provide an inverter regenerative resistor with sufficient capacity according to the operating conditions to handle the large regenerative current generated during lowering. Consult the inverter manufacturer for regenerative resistor capacity.
- ▶ Use of an inverter with a capacity larger than that of the motor is recommended.
- ▶ System controls should be designed such that the brake is activated in the event of an inverter trip.

- Fall prevention

- ZIP CHAIN LIFTER uses an induction motor with brake. When a servomotor is prepared by the customer, make sure to select a brake type with a keyway on the shaft. In addition, be sure to always use the maintenance bar during maintenance.

- Servomotor control

- ▶ Provide a regenerative resistor with sufficient capacity according to the operating conditions to handle the large regenerative current generated during lowering. Consult the servomotor manufacturer for regenerative resistor capacity.
- ▶ Do not use any lifter hard stops as the travel limits for the lifter. Never apply an impact load or obstruction from raising or lowering the table frame. Always operate the lifter within the nominal stroke and load ranges. Any deviation can result in severe damage to the equipment.

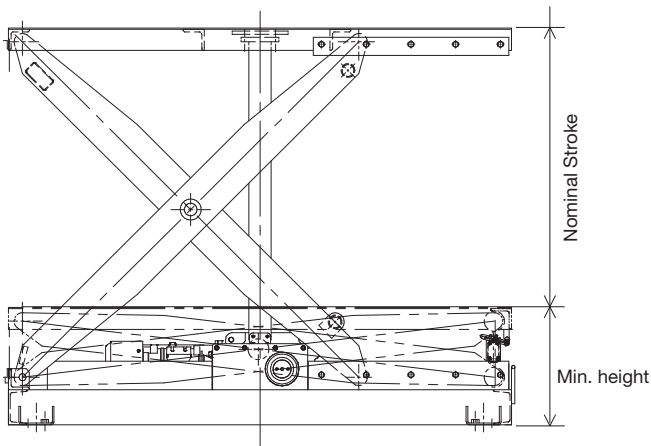
■ Caution

Do not use this product as a stopper or in any application where the impact load is applied to the lifting components of the table frame or the scissor arm links. Use the unit only within the nominal stroke range. Do not use the product as a stopper when lowering in particular, and do not prevent the table frame from descending in any way. Doing so may cause serious damage, including breakage of the chain.

Do not use any lifter hard stops as the travel limits for the lifter. Never apply an impact load or obstruction from raising or lowering the table frame. Always operate the lifter within the nominal stroke and load ranges. Any deviation can result in severe damage to the equipment.

Stroke Control

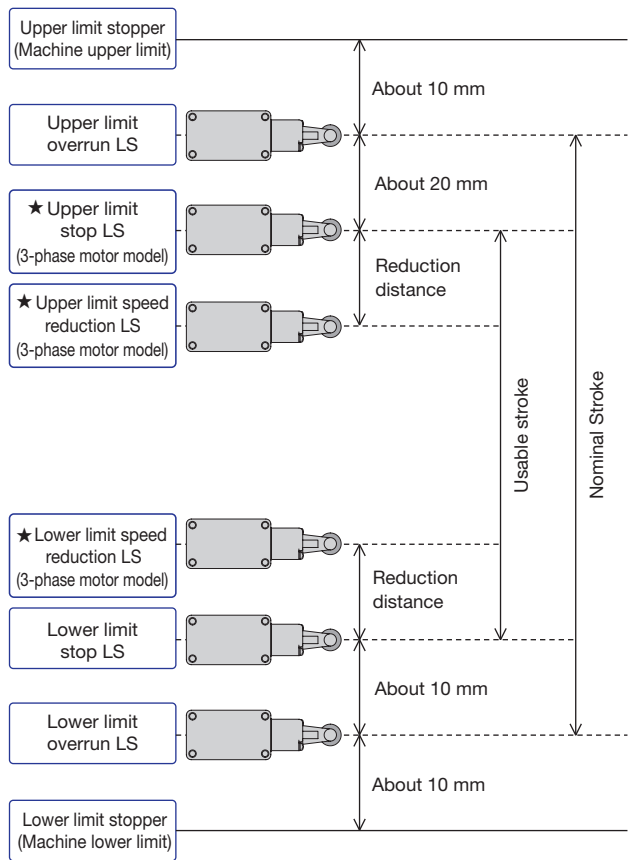
Use the lifter within the nominal stroke.
(Nominal stroke \geq Operating stroke)



Position Detection Sensor Specifications

	Stroke adjustment limit switch
Limit switch model	WLCA2-N (OMRON) or equivalent
Electrical capacity	250 VAC / 10 A ($\cos \phi = 0.4$) 5 VDC / 1 mA (minimum applicable load)
Contact arrangement	<div style="text-align: center;">1a 1b</div> <div style="display: flex; justify-content: space-around;"> <div>NC 1 — </div> <div>○ — 4 NO</div> </div> <div style="display: flex; justify-content: space-around;"> <div>NC 2 — </div> <div>○ — 3 NO</div> </div>
Connector (outer diameter of supported cable)	SCS-10B ($\varnothing 8.5$ to $\varnothing 10.5$) PF1/2

Limit Switch (LS) (ZSL1000)



- Sensors marked with a ★ in the above limit switch (LS) diagram are for models equipped with a three-phase motor.
There are no sensors in the locations shown above for models equipped with a servomotor or an encoder motor. Please refer to specification sheets for details.
- ▶ The upper and lower limits of the stroke are set by the upper and lower stop limit switches (LS). The upper and lower limit overrun LSs are provided in case the upper and lower limit stop LSs do not work.
- ▶ Wire the brake circuit with a DC external wiring and incorporate a sequence control circuit so that sudden braking of the lifter is possible if the upper or lower overrun limit switch has been activated.
- ▶ The braking distance may increase when operating the lifter at speeds higher than the maximum speed or if the brake is wired with an AC cut-off. Longer brake distance may cause the lifter to hit the stoppers at the upper or lower limits, resulting in damage.
Do not adjust the upper and lower limit stoppers, as these are set at mechanical limits. The table frame may hit the stoppers and cause severe damage or accident when loose.

Note: When you need to stop the lifter midway during operation, use a model equipped with a servomotor or a rotary encoder.

Handling

■ Checking the Item Upon Arrival

Check for the following when ZIP CHAIN LIFTER is delivered.

- ▶ Check the nameplate to verify the model number (1), manufacturing number (2), and drawing number (3) match the requested product (see Fig. 1).
- ▶ Verify that all of the peripheral components are included.
- ▶ Check for damage that may have occurred during transportation.
- ▶ Check for any loose bolts or nuts.

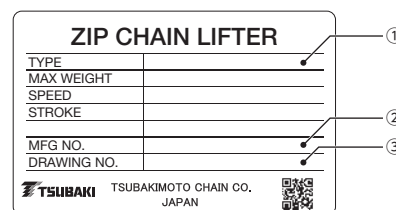
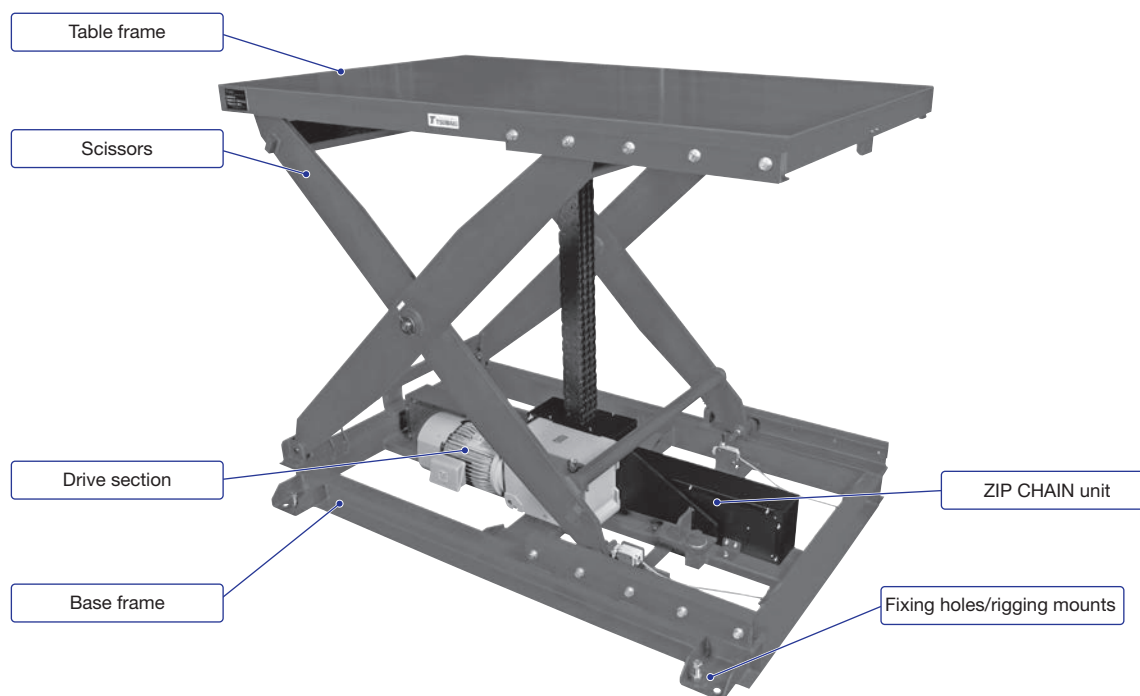


Fig. 1 – Reading the nameplate

Include the model number (1), manufacturing number (2), and drawing number (3) when contacting Tsubaki with any problems or questions.

■ Basic Structure



■ Transporting

Secure ZIP CHAIN LIFTER using the four holes on the base frame corners, and transport using a crane.

When transporting by a forklift, carry ZIP CHAIN LIFTER by balancing the entire device with the base frame on the forks.

* Do not carry the lifter by inserting the forks under the table frame.

■ Installation

Install the lifter on a flat and level surface. Secure the lifter in place before operation.

The fixing holes/rigging mounts are located on the four corners of the base frame. (See the above equipment overview.)

Operation

- ▶ The three-phase motor is supplied with temporary cable (for power and brake). When operating ZIP CHAIN LIFTER for the first time, do the actual wiring after raising the table frame by temporary cable. Do not use temporary cable for actual operation.
- ▶ Always use ZIP CHAIN LIFTER within the allowable load and the allowable lifting speed. Exceeding either of these ranges may damage the lifter.
- ▶ Under no circumstances should the lifter be used out of nominal stroke, even when operating with no load. Exceeding the nominal stroke range may damage the lifter. Do not subject the lifter to sudden impacts under any circumstances.
- ▶ Ensure that foreign substances such as dust and hot chips do not attach to or enter ZIP CHAIN or any other movable components or detection units. Such substances will accelerate wear in the unit and may lead to serious trouble such as chain fracture or damage to moving parts. Take appropriate measures to prevent foreign particles from entering the lifter.
In addition, use a safety fence around the lifter to prevent entry into the space under the table frame.
- ▶ Be sure to design the sequence circuit so that the holding brake of the motor operates to prevent the load from dropping when operation is stopped.
- ▶ Never use the lifter with contact stop. Using the lifter with contact stop may cause serious damage to the lifter.
- ▶ Some areas of the lifter may become hot. Keep hands or any other part of the body from coming in contact with such areas. Failure to do so may result in burn injuries.
- ▶ Stop operation immediately if an error occurs. Failure to do so may result in electrical shock, injury or fire.

(Servomotor control)

- ▶ Do not use the built-in mechanical brake for stopping even in an emergency. Be sure to use control logic that activates the mechanical brake after deceleration by the dynamic brake. For details, refer to the motor manufacturer's instruction manual.

Inspection

1. Ensure safety during maintenance and inspection, and always use the maintenance bar.

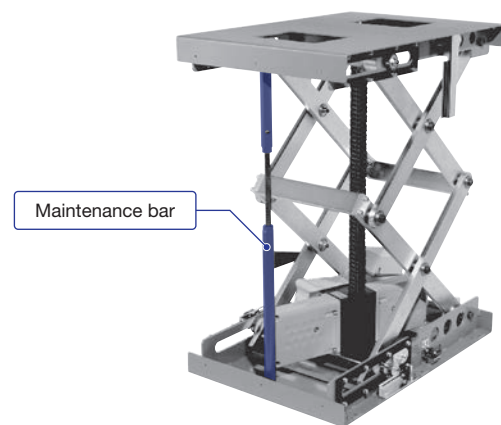
Always use the maintenance bar during maintenance or inspection below the table frame.

Failing to prevent the table frame from falling down may cause serious injury or death. Remove any load from the lifter.

Be sure to remove the maintenance bar when restarting operation.

Note: Never modify the maintenance bar. Modification may lead to serious accidents.

Holding the table frame using a crane will be a fail safe.

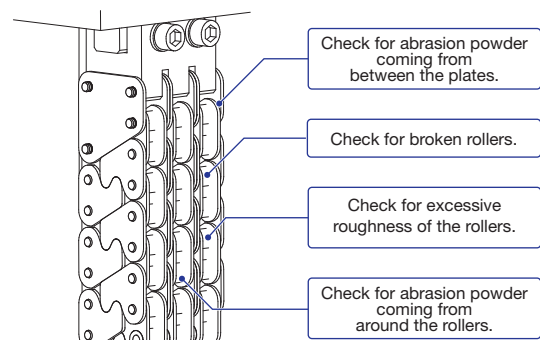


2. Inspect ZIP CHAIN (at least once a month).

- (1) Remove any objects being conveyed.
- (2) Implement fall prevention measures to ensure the lifted portions do not fall.
- (3) Check the entire length of ZIP CHAIN for the following.

- ▶ Abrasion powder (reddish-brown) coming from between the plates
 - ▶ Abrasion powder (reddish-brown) coming from around the chain rollers
- Lubricate the chain immediately if either of the above are found.
- ▶ Broken rollers
 - ▶ Chain roller roughness caused by wear, noticeable by touch

Discontinue use and contact a Tsubaki representative if either of the above are found.



3. Lubricate the components.

See the following table for detailed lubrication information.

Section to apply	Lubrication amount	Recommended lubricant name	Lubrication cycle
ZIP CHAIN	10 to 15g per 100mm of stroke	Class 1 No. 2 high-load grease or equivalent Daphne Eponex SR No.2 (Idemitsu Kosan Co., Ltd.)	Every 3 months or 100,000 trips
Roller travel rails	50 to 60g per 100mm of stroke		
Roller			

CAUTION ▶ Excessive amount of grease causes trouble.

(Lubricating ZIP CHAIN)

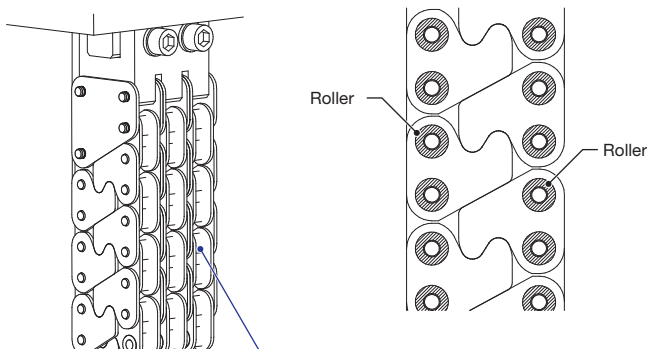
Follow the steps below to lubricate ZIP CHAIN.

- (1) Remove any objects being conveyed on the table frame.
- (2) Implement fall prevention measures to ensure the lifted portions cannot fall.
- (3) Lubricate all rollers as shown in the figure to the right.

(Lubricating the travel rails and rollers)

Apply grease to the traveling surfaces of the rail (both top and bottom).
After lubricating, run in the chain and remove any excess grease before starting operation.

ZIP CHAIN lubrication point



Apply grease to the rollers using a brush

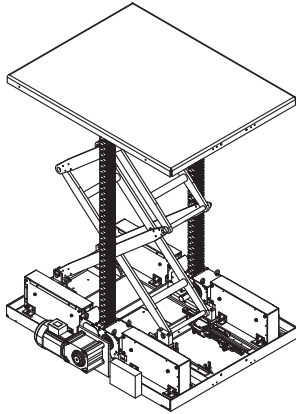
(Stop the device at the upper limit, and apply grease to **all exposed links** on both the front and back sides of each of the three chains (for a total of six application areas).

Note: We do not replace or sell only ZIP CHAIN parts.

Examples of Made-to-order Products and Use

400kg dual-stage pantograph type

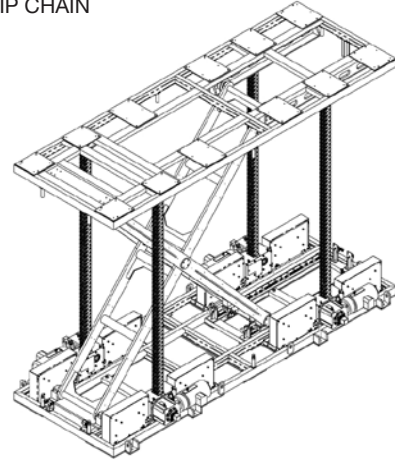
External motor
with two ZIP CHAIN



Allowable lifting weight	400 kg
Speed	20 m/min
Stroke	1,300 mm
Table size	1,000 × 1,300 mm
Minimum height	400 mm
Motor	3.7 kW induction motor
Weight	650 kg

2,000kg single-stage pantograph type

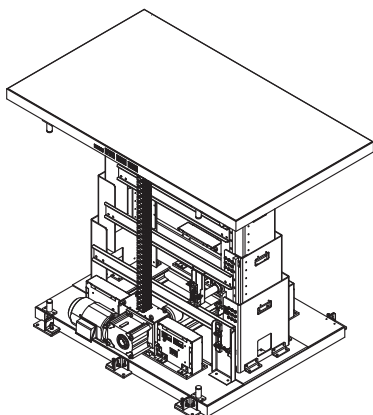
External motor
with four ZIP CHAIN



Allowable lifting weight	2,000 kg
Speed	21 m/min
Stroke	3,250 mm
Table size	1,900 × 5,400 mm
Minimum height	660 mm
Motor	7.5 kW induction motor
Weight	7,000 kg

300kg triple-stage telescopic type

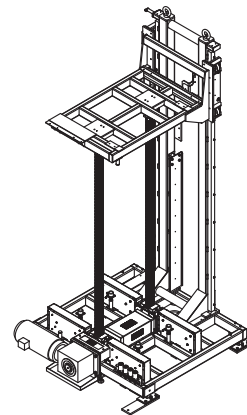
External motor
with two ZIP CHAIN



Allowable lifting weight	300 kg
Speed	13 m/min
Stroke	900 mm
Table size	1,200 × 1,700 mm
Minimum height	700 mm
Motor	1.5 kW servomotor
Weight	840 kg

600kg post type

External motor
with two ZIP CHAIN



Allowable lifting weight	650 kg
Speed	40 m/min
Stroke	2,500 mm
Table size	1,350 × 1,550 mm
Minimum height	550 mm
Motor	11 kW induction motor
Weight	1,400 kg

Model Numbering

With three-phase motor

ZME L 0500 H 15 G L1

With servomotor

ZME L 1000 M 20 K V

Series Linear guide Rated load Speed Stroke Drive Option

Rated load

Speed

Stroke

Drive style

Option

Lift load/speed code	Lift load	Speed
0200U	1.96kN	1,000mm/s
0500H	4.90kN	800mm/s
1000M	9.80kN	330mm/s

Code	Stroke
15	1,500mm
20	2,000mm

G	Gear motor
K	Servomotor, etc.

L1	1 additional position detection sensor
V	Motor voltage 400V class
E	With rotary encoder

Specifications

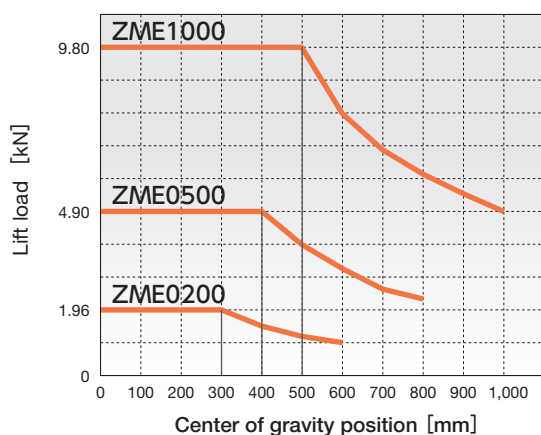
Model	With three-phase motor			With servomotor		
	ZMEL0200U□□G	ZMEL0500H□□G	ZMEL1000M□□G	ZMEL0200U□□K	ZMEL0500H□□K	ZMEL1000M□□K
Rated load (kN) {kgf}	1.96 {200}	4.90 {500}	9.80 {1,000}	1.96 {200}	4.90 {500}	9.80 {1,000}
Allowable OHL (N·m) {kg f·m}	588 {60}	1,960 {200}	4,900 {500}	588 {60}	1,960 {200}	4,900 {500}
Nominal speed (mm/sec) (Frequency or input motor rpm)	60 {1,000} (70Hz)	48 {800} (84Hz)	19.8 {330} (69Hz)	60 {1,000} (2,100r/min)	48 {800} (2,520r/min)	19.8 {330} (2,598r/min)
Pulses per motor revolution (mm)	28.58	19.05	9.53	28.58	19.05	9.53
Stroke (mm)	1,500, 2,000*1					
Motor	Three-phase/four-pole high-efficiency motor with non-excitation type brake			Mitsubishi Electric Corp. servomotor (with brake)*2		
				HG-SR352BK	HG-SR502BK	HG-SR502BK
Motor size (kW)	3.7	5.5	5.5	3.5	5.0	5.0
Power supply voltage*3	200V AC class					
Reduction ratio	1/10	1/15	1/40	1/10	1/15	1/50
Lubrication	Chain, guides: Grease (No. 2)					
Coating	Acrylic lacquer-based, cream (B27-90B)					

*1 Special strokes are also available. Contact a Tsubaki representative for more information.

*2 Servomotor driver, motor cable, brake cable, and encoder cable are not included. They need to be prepared by the customer.

*3 400V AC class is also available. Contact a Tsubaki representative for more information.

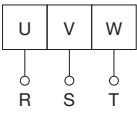
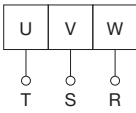
Allowable Overhung Load (Workpiece mounting surface: Refer to outline dimensions)



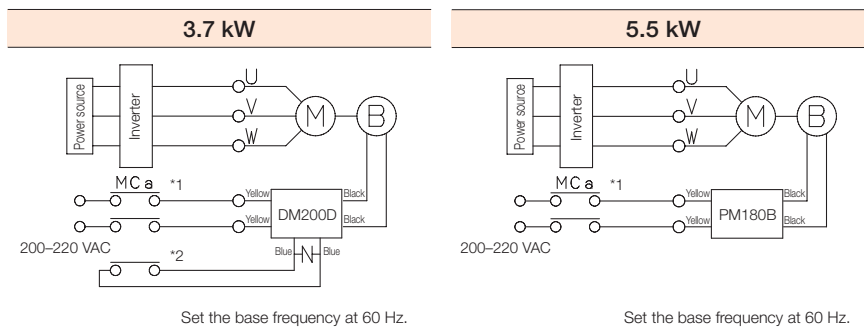
Ambient Conditions

Installation place	Indoor not exposed to dust or water
Ambient temperature	0 to 40°C
Relative humidity	85% RH (no condensation)
Altitude	1,000 m or less
Shock resistance value	Less than 1G
Atmosphere	Free from corrosive gases, explosive gases, and steam
Mounting direction	Horizontal

Three-phase Motor Wiring and Lifting Direction

	
ZMEL0200U : Extending ↑ ZMEL0500H : Extending ↑ ZMEL1000M : Retracting ↓	ZMEL0200U : Retracting ↓ ZMEL0500H : Retracting ↓ ZMEL1000M : Extending ↑

Three-phase Motor Wiring (for inverter only)



Ⓜ: Motor, ⓑ: Brake, MC: Magnetic contactor, MCa: Auxiliary relay, OCR: Overcurrent relay, DM200D/PM180B: DC module, -N-: Protection element (varistor)

- *1 The brake voltage is 90 VDC.
(When inputting 200 VAC to DM200D or PM180B)
- *2 When using a 3.7 kW motor, the brake power supply module can be damaged depending on the wiring length, wiring method, relay type, or other factors. Connect a varistor between the separate DC switching terminals.
- *3 For *1 in the diagram, use an auxiliary relay (MCa) with a contact capacity of 200 VAC / 7 A or more (resistive load). When using an MC auxiliary contact or auxiliary relay for *2 in the diagram, use a device with a contact capacity of 200 VAC / 10 A or more (resistive load).
- *4 Connecting closer to the brake power supply module (blue lead wire) will be most effective. The specific model numbers of the varistors are as follows. Select a varistor voltage of 470 V for DM200D.

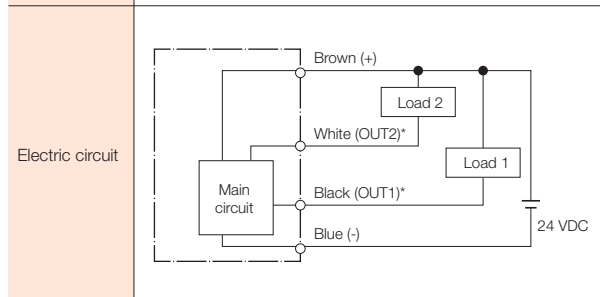
Product name	Manufacturer	Model number
Surge Absorber	Panasonic	ERZV14D471
Ceramic Varistor	Nippon Chemi-Con	TND14V-471KB00AAA0

Position Detection Sensor

A total of four limit sensors are installed, two for upper and lower limit stroke sensors, and two for upper and lower limit speed reduction sensors.

Position Detection Sensor Specifications

Manufacturer	OMRON Corporation
Model	EE-SX972-C1
Supply voltage	5 to 24 VDC $\pm 10\%$ (Load current: 50 mA or less)
Operation mode	NC, NO switchable
Output specifications	NPN open collector type

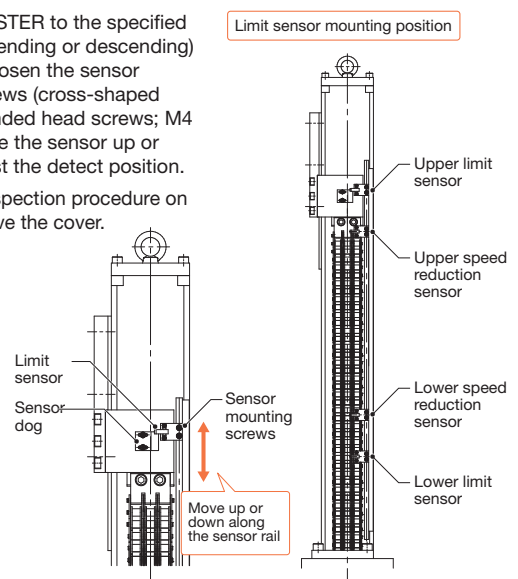


* OUT1: ON when light is on; OUT2: ON when light is off

Adjustment Procedure

1. Move ZIP MASTER to the specified position. (Ascending or descending)
2. Temporarily loosen the sensor mounting screws (cross-shaped recessed rounded head screws; M4 \times 8), and move the sensor up or down to adjust the detect position.

Note: See the inspection procedure on page 32 to remove the cover.



Outline Dimensions: Lift Load 200 kg

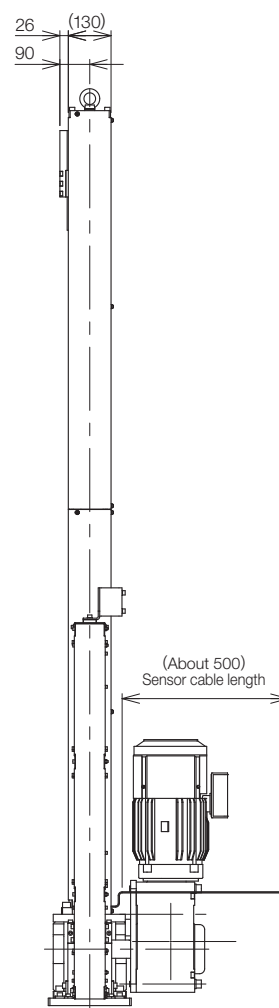
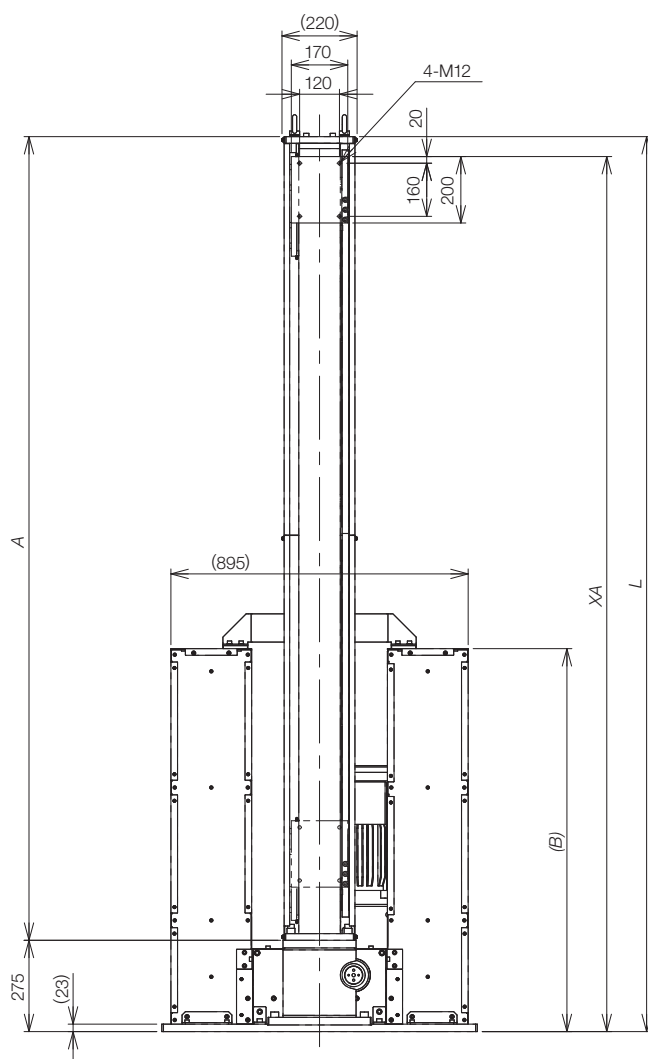
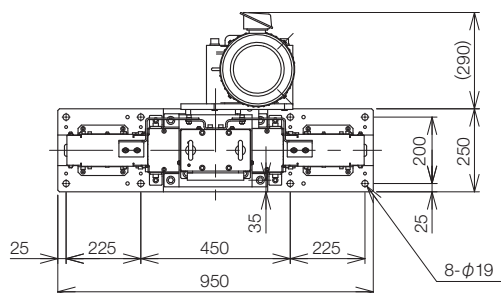
Three-phase motor, 1,500/2,000 mm stroke

Unit: mm

Model	ZMEL0200U15G	Approx. mass : 440kg
	ZMEL0200U20G	Approx. mass : 480kg

Model	Nominal stroke	A	B	XA		L
				Min	Max	
ZMEL0200U15G	1,500	1,955	903	635	2,135	2,230
ZMEL0200U20G	2,000	2,420	1,153		2,635	2,695

Note: Mechanical strokes have an extra capacity of 7 mm on both ends.



- Dimensions shown without tolerances will have general tolerances and may be 2 to 5 mm larger than the dimensions shown. Please allow a margin when designing your machinery.
- Models with servomotor are also available. Contact a Tsubaki representative for more information.

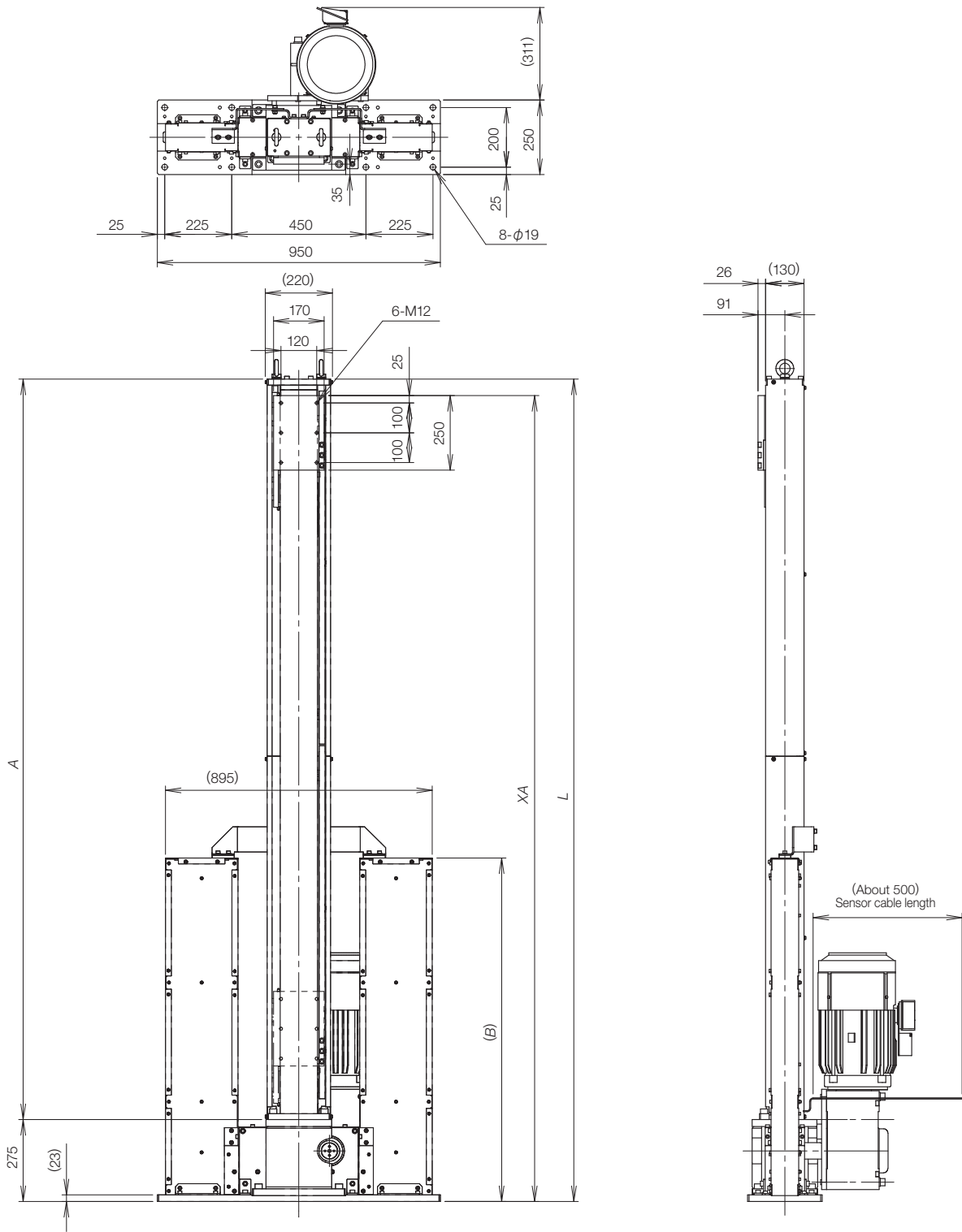
Three-phase motor, 1,500/2,000 mm stroke

Unit: mm

Model **ZMEL0500H15G** Approx. mass : 470kg
ZMEL0500H20G Approx. mass : 510kg

Model	Nominal stroke	A	B	XA		L
				Min	Max	
ZMEL0500H15G	1,500	2,035	903	705	2,205	2,310
ZMEL0500H20G	2,000	2,485	1,153		2,705	2,760

Note: Mechanical strokes have an extra capacity of 7 mm on both ends.



• Dimensions shown without tolerances will have general tolerances and may be 2 to 5 mm larger than the dimensions shown. Please allow a margin when designing your machinery.
• Models with servomotor are also available. Contact a Tsubaki representative for more information.

Outline Dimensions: Lift Load 1,000 kg

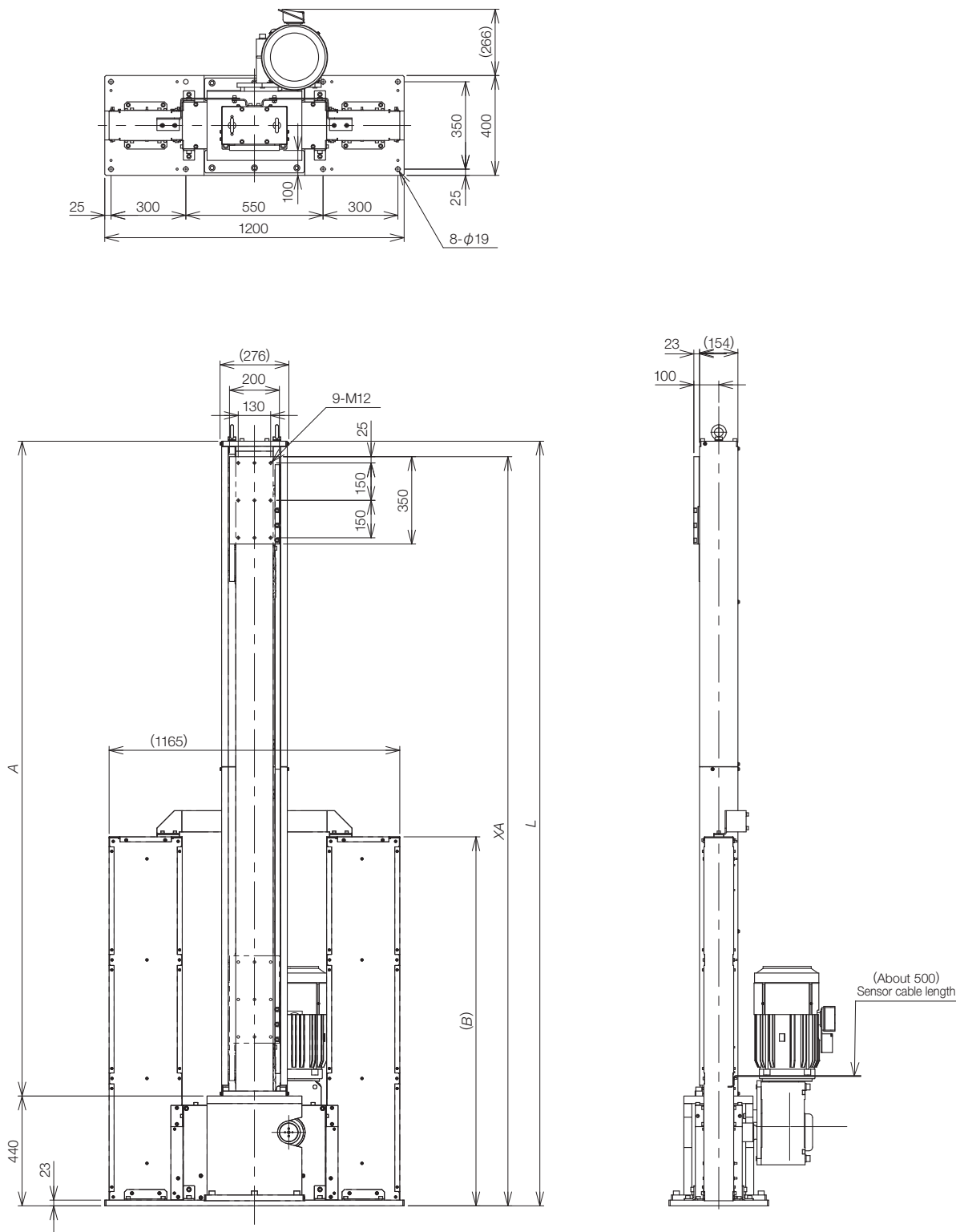
Three-phase motor, 1,500/2,000 mm stroke

Unit: mm

Model **ZMEL1000M15G** Approx. mass : 780kg
ZMEL1000M20G Approx. mass : 850kg

Model	Nominal stroke	A	B	XA		L
				Min	Max	
ZMEL1000M15G	1,500	2,124	1,230	1,002	2,502	2,564
ZMEL1000M20G	2,000	2,624	1,480		3,002	3,064

Note: Mechanical strokes have an extra capacity of 7 mm on both ends.



• Dimensions shown without tolerances will have general tolerances and may be 2 to 5 mm larger than the dimensions shown. Please allow a margin when designing your machinery.
• Models with servomotor are also available. Contact a Tsubaki representative for more information.

Cautions for Product Selection

1. Acceleration/deceleration times

- ▶ ZIP MASTER achieves high-speed operation, and inverter drives are essential. Please make sure to operate with sufficient acceleration and deceleration time. Rapid acceleration and quick stop may affect stopping accuracy or cause workpiece vibration. When ZIP MASTER shakes depending on the table or arm rigidity or the load condition, take a longer acceleration and deceleration time when starting or stopping the operation.
Consider fixing the upper end of ZIP MASTER to reduce workpiece vibration.
- ▶ The nominal speed of ZIP MASTER is the maximum speed. Make sure to consider the acceleration/deceleration time when calculating lifting/lowering time.
- ▶ Using a servomotor drive is recommended when faster lifting time, higher-frequency operation, multi-point positioning, or synchronized operation are required. Contact a Tsubaki representative for more information.

2. Inverter control

- ▶ Provide an inverter regenerative resistor with sufficient capacity according to the operating conditions to handle the large regenerative current generated during lowering. Consult the inverter manufacturer for regenerative resistor capacity.
- ▶ Use of an inverter with a capacity larger than that of the motor is recommended.
- ▶ Set up a sequence for activating the brake in the event the inverter trips.

3. Fall prevention

- ▶ ZIP MASTER is driven by an induction motor with brake. When a servomotor is prepared by the customer, make sure to select a brake type with a keyway on the shaft. Also prepare a fall prevention mechanism to protect against falls. Fall prevention pins are available upon request.

4. Servomotor control

- ▶ Provide a regenerative resistor with sufficient capacity according to the operating conditions to handle the large regenerative current generated during lowering. Consult the servomotor manufacturer for regenerative resistor capacity.
- ▶ Do not use the built-in mechanical brake for stopping even in an emergency. Be sure to use control logic that activates the mechanical brake after deceleration by the dynamic brake. For details, refer to the motor manufacturer's instruction manual.

Product Selection

Operating conditions

1. Application and required number of ZIP MASTER; 2. Lifting weight; 3. Speed; 4. Stroke; 5. Overhung load; 6. Operation frequency; 7. Ambient conditions.
- See the ZIP MASTER Technical Sheet on page 35 for more information.

Selection procedure

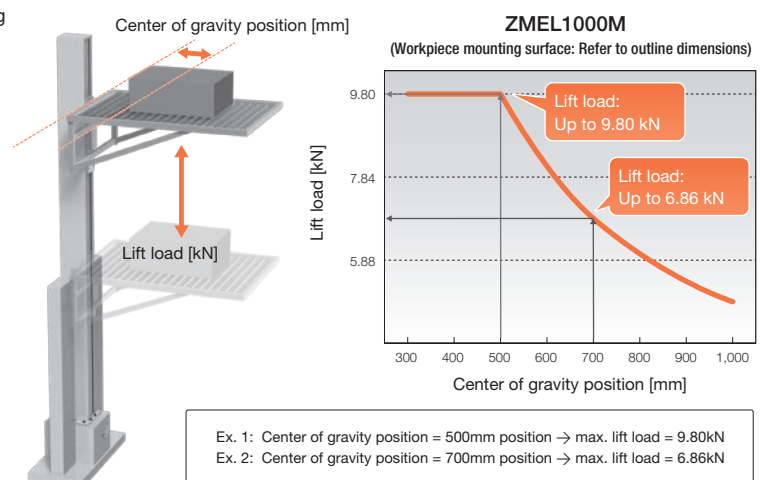
1. Make sure that the application, the method of use, and the ambient condition are suitable for ZIP MASTER.
2. From the specifications on page 25, select a model with a rated load that satisfies the required lifting load.
 - Consider using multiple synchronized units if the lifting load will exceed the rated load. Contact a Tsubaki representative for more information on selecting and controlling multiple synchronized units.
 - High load specifications are also available upon request. Contact a Tsubaki representative for more information.
3. Verify that the nominal speed of the selected model satisfies the required lifting speed.
 - Specifications with higher lifting speeds also available. Contact a Tsubaki representative for more information.
4. Verify the required stroke.
 - Specifications with a stroke exceeding 2,000 mm are available upon request. Contact a Tsubaki representative for more information.
5. Refer to the following to verify that the selected model satisfies the overhung load.

Verification of Allowable Overhung Load (OHL)

You can easily select the appropriate ZIP MASTER by verifying the lift load and the center of gravity position. As shown in the figure to the right, the allowable overhung load equals the point where the lift load intersects the center of gravity position. See page 25 for the OHL load curves of each model.

CAUTION

- ▶ ZIP MASTER arm end will bend toward the load direction when load is applied on the arm. This will not only apply more for longer strokes, but it will also affect arm and table rigidity.
- ▶ Fix ZIP MASTER upper end to reduce the arm bend or ZIP MASTER vibration.
- ▶ Contact a Tsubaki representative for more information on ZIP MASTER warping.



Handling

Checking the Item Upon Arrival

Check for the following when ZIP MASTER is delivered.

- ▶ Check the nameplate to verify the model number (1), manufacturing number (2), and drawing number (3) match the requested product (see Fig. 1).
- ▶ Verify that all of the peripheral components are included.
- ▶ Check for damage that may have occurred during transportation.
- ▶ Check for any loose bolts or nuts.

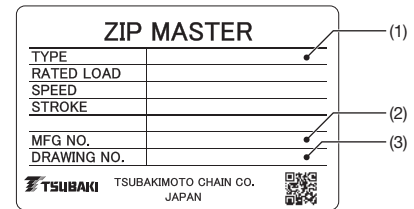
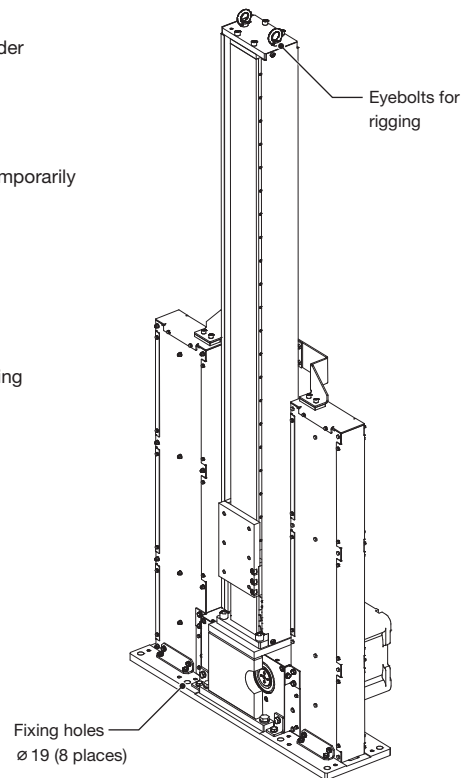


Fig. 1 – Reading the nameplate

Include the model number (1), manufacturing number (2), and drawing number (3) when contacting Tsubaki with any problems or questions.

Installation

- ▶ Install ZIP MASTER on a stand with high rigidity and sufficient mounting bolt pullout strength under maximum load. Also make sure that the installation surface remains horizontal.
- ▶ Lift the unit* using a nylon sling or other device to align it with the mounting position.
 - * Use the eyebolts on the top of ZIP MASTER and the fixing holes when suspending the unit.
- ▶ Use bolts* (M16 × 8; Strength grade: 10.9 or higher) with a thread length of 25 mm or more to temporarily fix the lifter.
 - * Mounting bolts to be prepared by the customer.
- ▶ Adjust the unit as necessary to make it level.
- ▶ After adjusting the level, tighten the mounting bolts. (Recommended tightening torque: 289 N·m)
- ▶ Check for any issues in the mounting bolt tightening condition before performing trial operation.
- ▶ When lifting the unit, verify the weight noted in the delivery diagrams, and use an appropriate lifting device.



Operation

- ▶ Always use ZIP MASTER within the allowable load, the allowable overhung load, and the allowable lifting speed. Exceeding any of these ranges may damage the lifter.
- ▶ Under no circumstances should the lifter be used outside the nominal stroke, even when operating with no load. Exceeding the nominal stroke range may damage the lifter. Do not subject the lifter to sudden impacts under any circumstances.
- ▶ Ensure that foreign substances such as dust and hot chips do not attach to or enter ZIP CHAIN or any other movable components or detection units. Such substances will accelerate wear in the unit and may lead to serious trouble such as chain fracture or damage to moving parts. Take appropriate measures to prevent foreign particles from entering the lifter.
 - In addition, use a safety fence around the lifter to prevent entry into the space under the table frame.
- ▶ Be sure to design the control circuit so that the holding brake of the motor operates to prevent the load from dropping when operation is stopped.
- ▶ Never use the lifter as a contact stopper. Using the lifter as a contact stopper may cause serious damage to the lifter.
- ▶ Some areas of the lifter may become hot. Keep hands or any other part of the body from coming in contact with such areas. Failure to do so may result in burn injuries.
- ▶ Stop operation immediately if an error occurs. Failure to do so may result in electrical shock, injury or fire.

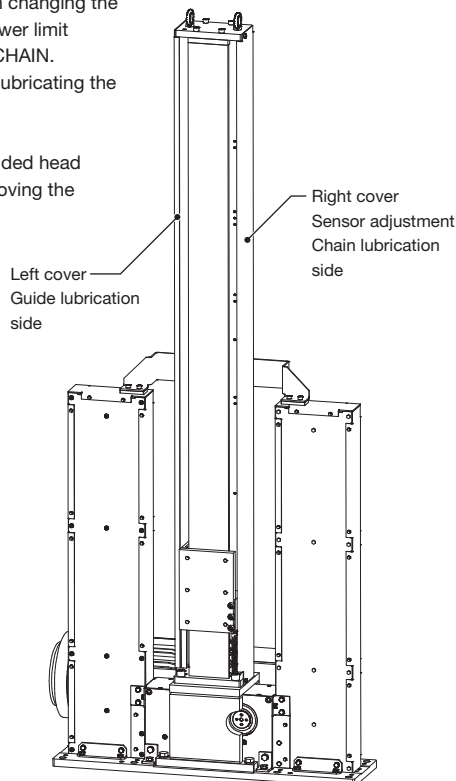
Inspection Procedure

1. Remove the cover.

Remove the right cover when changing the positions of the upper and lower limit sensors and lubricating ZIP CHAIN.

Remove the left cover when lubricating the guide.

Remove the mounting screw (cross-shaped recessed rounded head screws; M6 × 12) before removing the cover.



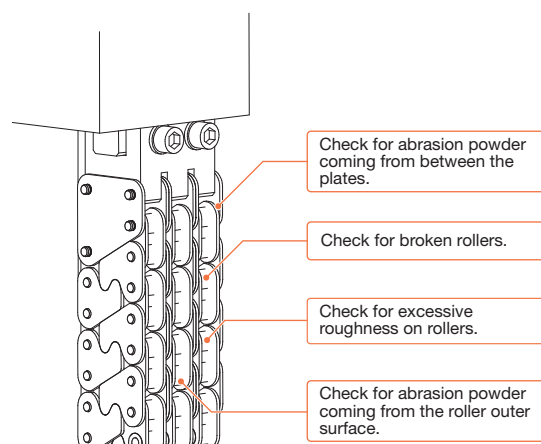
2. Inspect ZIP CHAIN (at least once a month).

(1) Remove any objects being conveyed.

(2) Implement fall prevention measures to ensure the lifted portions do not fall.

(3) Check the entire length of ZIP CHAIN for the following.

- ▶ Abrasion powder (reddish-brown) coming from between the plates
- ▶ Abrasion powder (reddish-brown) coming from around the chain rollers
- Lubricate the chain immediately if either of the above are found.
- ▶ Broken rollers
- ▶ Chain roller roughness caused by wear, noticeable by touch
- Discontinue use and contact a Tsubaki representative if either of the above are found.



3. Lubricate the components.

See the following table for detailed lubrication information.

Section to apply	Lubrication amount		Recommended lubricant name	Lubrication cycle
ZIP CHAIN	10 to 15g per 100mm of stroke		Class 1 No. 2 high-load grease or equivalent Daphne Eponex SR No.2 (Idemitsu Kosan Co., Ltd.)	Every 3 months or 100,000 trips
Linear guide	ZMEL0200U ZMEL0500H	4.5 to 6.5g (approximately 4.6 cc) per block		
	ZMEL1000M	9.0 to 13.5g (approximately 9.8 cc) per block		

CAUTION ▶ Excessive amount of grease causes trouble.

(Lubricating ZIP CHAIN)

Follow the steps below to lubricate ZIP CHAIN.

(1) Remove any objects being conveyed on the table frame.

(2) Implement fall prevention measures to ensure the lifted portions cannot fall.

(3) Lubricate all rollers as shown in the figure to the right.

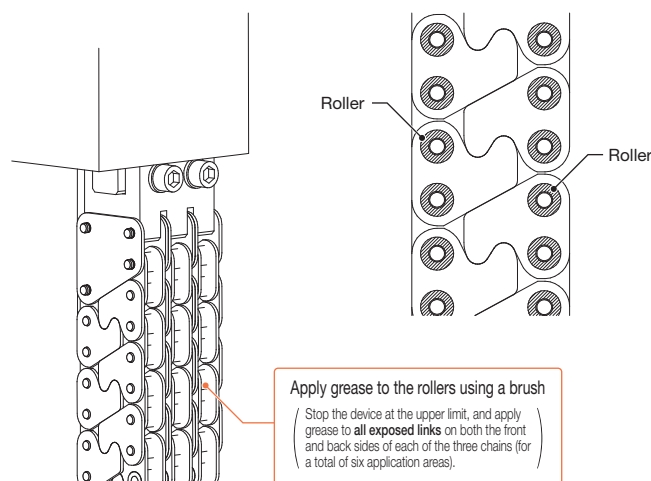
(Lubricating the guide)

Apply the specified amount of grease using the grease nipple.

After lubricating, run in the chain and remove any excess grease before starting operation.

Note: We do not replace or sell only ZIP CHAIN parts.

ZIP CHAIN lubrication point



ZIP CHAIN LIFTER Technical Sheet

Company: _____

Name: _____

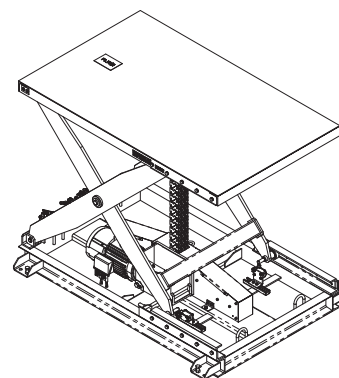
TEL: _____

FAX: _____

Email (required): _____

Address: _____

Application/equipment		
No. of required units		_____ units
Worker carrying function		<input type="checkbox"/> Will carry workers <input type="checkbox"/> Will not carry workers <small>(When lifter is to be used for carrying workers, you will need to confirm product liability laws and sign an MOU.)</small>
Table dimensions		Length _____ mm × Width _____ mm
		(Allowable min. height: _____ mm)
Load object	Fixed load	(Specific name) _____
		Load weight _____ kg ... A
	Movable load	Mass _____ kg × No. of items _____ = _____ kg ... B
		Name _____ · Size _____
		Total mass (A+B above) _____ kg
Center of gravity position	Center of top plate · Other	



Stroke/cycle time	Required total stroke _____ mm
	Total lift time per complete cycle _____ seconds
Operation cycle	_____ complete cycle/hour × _____ hours/day × _____ days/year
Speed	<input type="checkbox"/> _____ mm/s <input type="checkbox"/> _____ m/min
Drive motor	<input type="checkbox"/> Three-phase motor <input type="checkbox"/> Servomotor
	Preferred motor manufacturer (<input type="checkbox"/> None · <input type="checkbox"/> Yes [_____])
Power supply voltage	_____ V · _____ Hz
Usage environment	<input type="checkbox"/> Indoor <input type="checkbox"/> Other [_____]

Dust		<input type="checkbox"/> None	<input type="checkbox"/> Yes	
Ambient temperature		<input type="checkbox"/> 0 to 40°C	<input type="checkbox"/> Below 0°C or higher than 40°C (°C)	
Designation of paint color		<input type="checkbox"/> Unspecified	<input type="checkbox"/> Yes (Munsell or JPMA no.)	
Options	Bellows	<input type="checkbox"/> Installation required (or considering use) <input type="checkbox"/> Not needed		
	Tap plate	<input type="checkbox"/> 6 places	<input type="checkbox"/> 8 places	<input type="checkbox"/> Not needed <input type="checkbox"/> To specify location
	Rotary encoder	<input type="checkbox"/> Yes (or considering use) <input type="checkbox"/> Not needed		

Equipment operation and usage (Specify layout, operation, and other necessary information.)

ZIP MASTER Technical Sheet

Company: _____

Name: _____

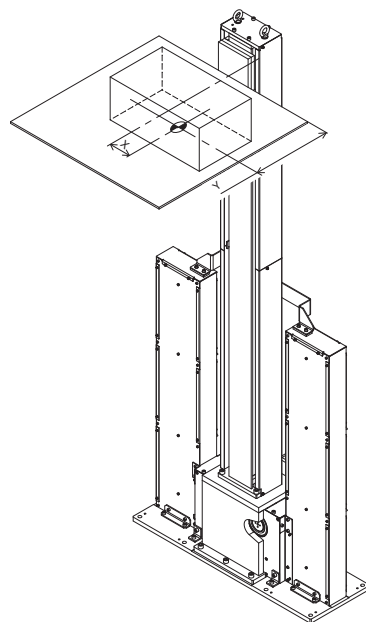
TEL: _____

FAX: _____

Email (required): _____

Address: _____

Application/equipment		_____
No. of required units		_____ units
Worker carrying function		<input type="checkbox"/> Will carry workers <input type="checkbox"/> Will not carry workers <small>(When lifter is to be used for carrying workers, you will need to confirm product liability laws and sign an MOU.)</small>
Table dimensions		Length _____ mm × Width _____ mm <small>Table for cantilevered lifter to be prepared by the customer. Also available upon request; contact a Tsubaki representative.</small>
		(Allowable min. height: _____ mm)
Load object	Fixed load	(Specific name) _____
	Movable load	Mass including table _____ kg ... A
		Mass _____ kg × No. of items _____ = _____ kg ... B
		Name _____ · Size _____
		Total mass (A+B above) _____ kg
	Center of gravity position	X direction _____ mm · Y direction _____ mm



Stroke/cycle time	Required total stroke _____ mm
	Total lift time per complete cycle _____ seconds
Operation cycle	_____ complete cycle/hour × _____ hours/day × _____ days/year
Speed	<input type="checkbox"/> _____ mm/s <input type="checkbox"/> _____ m/min
Drive motor	<input type="checkbox"/> Three-phase motor <input type="checkbox"/> Servomotor
	Preferred motor manufacturer (<input type="checkbox"/> None · <input type="checkbox"/> Yes [_____])
Power supply voltage	_____ V · _____ Hz
Usage environment	<input type="checkbox"/> Indoor <input type="checkbox"/> Other [_____]

Dust		<input type="checkbox"/> None	<input type="checkbox"/> Yes
Ambient temperature		<input type="checkbox"/> 0 to 40°C	<input type="checkbox"/> Below 0°C or higher than 40°C (°C)
Designation of paint color		<input type="checkbox"/> Unspecified	<input type="checkbox"/> Yes (Munsell or JPMA no.)
Options	Additional position detection sensor	<input type="checkbox"/> Yes (or considering addition)	<input type="checkbox"/> Not needed
	Rotary encoder	<input type="checkbox"/> Yes (or considering use)	<input type="checkbox"/> Not needed

Equipment operation and usage (Specify layout, operation, and other necessary information.)

For Safe Use of ZIP CHAIN LIFTER / ZIP MASTER



WARNING Observe the items below to prevent danger.

- Do not release the brake when a load is acting on the unit under any circumstances. If the brake is released while a load is acting on the unit, the supported object may fall or the moving sections may suddenly start to move.
- Do not use the unit in an explosive atmosphere. Doing so may cause the unit to become flammable, explode or catch fire, or result in personal injury.
- When using in equipment that will transport people, install a protection device on the equipment side to ensure safety. Operating the equipment recklessly may lead to accidents resulting in injury or death, or damage to the equipment.
- When using in lifting applications, install a safety device on the equipment side to prevent sudden drops. Sudden equipment drops may lead to accidents resulting in injury or death, or damage to the equipment.
- When using the unit in equipment hung from above, install safety fence to prevent entering the area beneath any suspended objects. A safeguard must also be installed just in case the chain breaks.
- Keep hands and any other part of the body, clothes or accessories away from any movable parts. 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. Doing so may result in electrical shock. Be sure to replace the cover after performing any work on the terminal box.
- When operating manually from a manual operation shaft, be sure to operate according to the instruction manual and with no load applied.
- Observe the general standards stipulated in Part 2, Chapter 1, Section 1 of the Ordinance on Industrial Safety and Health.
- For attachment/removal from equipment, 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.
 - During 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 grounded.
 - 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 appropriate protective gear (safety goggles, gloves, safety footwear, or other necessary safety equipment).
- Do not attempt to modify the unit.



CAUTION Observe the items below to prevent accidents.

The device details described in this catalog are intended primarily for model selection. Before using the device, read the instruction manual thoroughly, and ensure the device is used correctly.

- Do not use the unit outside of the specified ranges listed on the nameplate and external diagrams, and in the catalog. Doing so may result in injury and/or damage to the unit.
- Use the unit within the appropriate power supply voltage range. There is a risk of burning out the motor and of fire when using the unit outside this range.
- Make sure the limit switch wiring and stroke adjustment position are correct before energizing the unit.
- Check the rotational direction before incorporating the unit into any other equipment. Mounting the unit against the correct rotational direction may result in personal injury and/or damage to the unit.
- Do not insert your fingers or objects into any opening on the unit. Doing so may result in injury and/or damage to the unit.
- 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 operation, the unit, motor, or speed reducer may heat up to a high temperature. Keep hands and other body parts from coming into contact with these devices. Failure to do so may result in burn injuries.
- Do not operate the unit with an applied load that is higher than the rated load. Doing so may result in injury and/or damage to the unit.
- Do not remove the nameplate.
- Customer alterations of the unit are outside the scope of the Tsubaki warranty. Therefore, Tsubaki assumes no responsibility for such alterations.
- Before using the device, thoroughly read the instruction manual provided with the unit, and ensure the unit is used correctly. If no instruction manual is available, use the device name and model number to request an instruction manual from the distributor where the device was purchased, or from the Tsubaki sales office.
- Be sure to give the instruction manual to the end user.

Warranty

1. LIMITED WARRANTY

Products are covered by the Tsubaki warranty for up to 18 months from shipment from the factory or 12 months after the start of use (starting from the incorporation of the product into the customer's equipment), whichever is shortest. However, the warranty period may vary, depending on the usage conditions.

2. SCOPE OF WARRANTY

During the limited warranty period, a failure in a product installed, used, and maintained according to the catalog, instruction manual, or other appropriate documents, can be returned to Tsubaki for replacement or repair free of charge.

However, please note that the limited warranty covers only Tsubaki products. The following expenses will not be covered by the warranty. (Instruction manuals and other appropriate documents include any documents specially submitted to the customer.)

- (1) Expenses required for removal/installation of the product from/to the customer's equipment, or for replacement or repair, or for related construction costs.
- (2) Costs required to transport the customer's equipment to a repair shop.
- (3) Lost profits or other extended damages due to breakdown or repair.

3. REPAIR SERVICES

Tsubaki will accept and repair products that have failed due to the following items—regardless of whether the warranty period is in effect—for a fee.

- (1) The product was not installed correctly according to the

instruction manual.

- (2) The product was not sufficiently maintained or was handled incorrectly.
- (3) The product failed due to a failure between the product and a separate device.
- (4) The product structure was changed in any way, such as through modification.
- (5) The product was repaired by someone other than Tsubaki or a Tsubaki-designated factory.
- (6) The product was used outside the correct operating environment as stated in the instruction manual.
- (7) The product failed due to a force majeure such as a natural disaster or illegal actions by a third party.
- (8) The product failed due to a secondary failure resulting from a defect in a customer's device.
- (9) The product failed due to parts installed at the request of the customer or due to parts used per the customer's specifications.
- (10) The product failed due to a wiring failure or parameter setting error caused by the customer.
- (11) The product failed as a result of reaching its normal service life according to the conditions of use.
- (12) The product failed due to any damage for which Tsubaki is not responsible.

4. DISPATCHING OF TSUBAKI ENGINEERS

Service expenses such as those incurred when dispatching engineers to perform an investigation, adjustment, or trial operation of a Tsubaki product will be charged separately.



CAUTION

The device details described in this catalog are intended primarily for model selection. Before using the device, read the instruction manual thoroughly, and ensure the device is used correctly.

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China	Tsubakimoto Chain (Shanghai) Co., Ltd.	+85 21-53966651/2	http://tsubaki-sh.cn/
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