Innovation in Motion
TSUBAKI

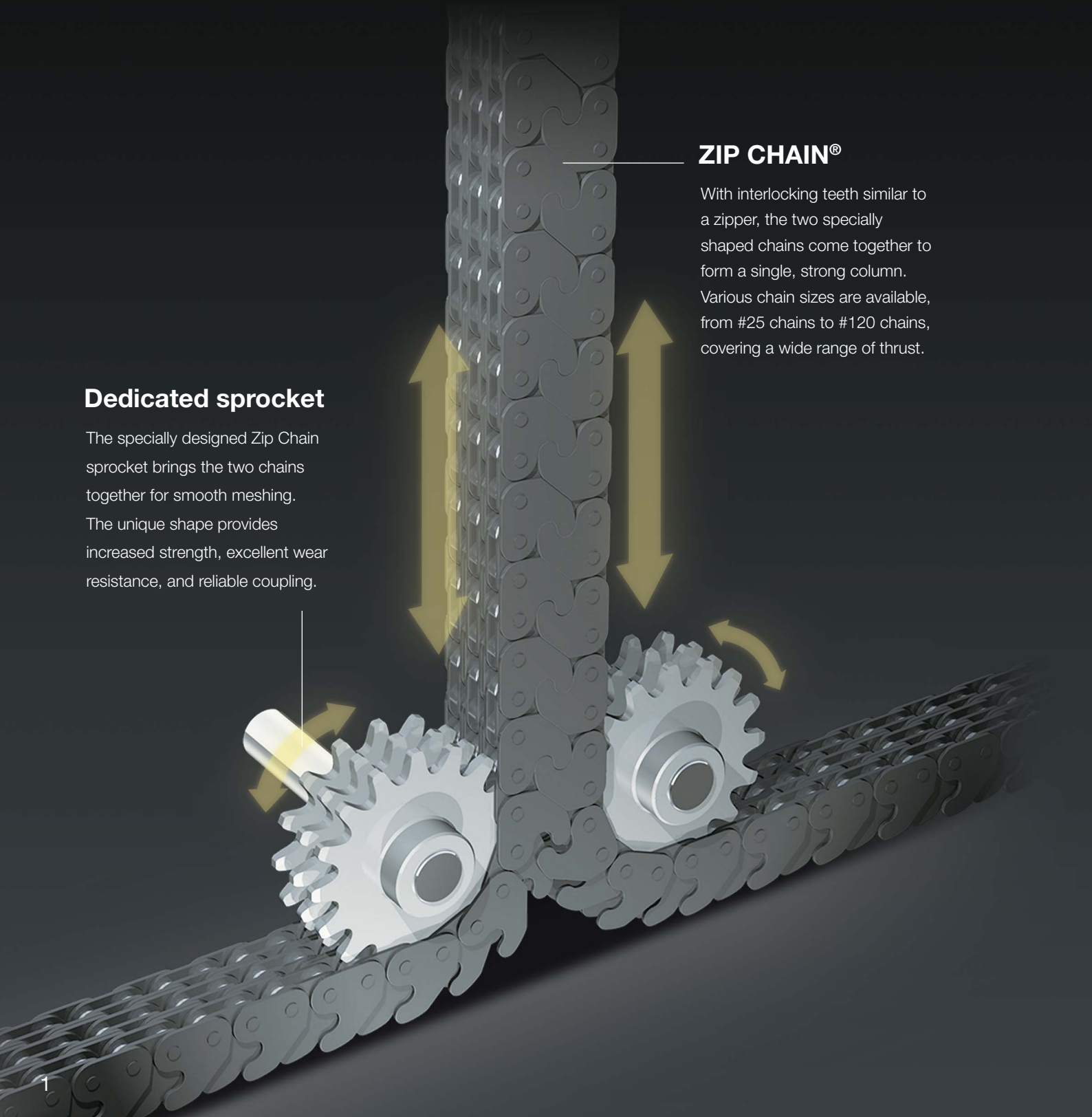
TSUBAKI
ZIP CHAIN LIFTER® / ZIP MASTER

Meshing chain linear motion

Embracing the distinct movement of Zip Chains

Superior Technology for Superior Equipment

Zip Chains enable push/pull operation through two interlocked chains.
The chains used are the culmination of proprietary Tsubaki technology and ensure high-speed operation in compact, energy-saving lifters and linear actuators.



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.

Dedicated sprocket

The specially designed Zip Chain sprocket brings the two chains together for smooth meshing. The unique shape provides increased strength, excellent wear resistance, and reliable coupling.

Comparing Conventional Linear Motion Mechanisms

Compared with screw jacks and hydraulic/pneumatic mechanisms, Zip Chain Lifters / Zip Masters offer incredibly superior performance.

Speed/frequency

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

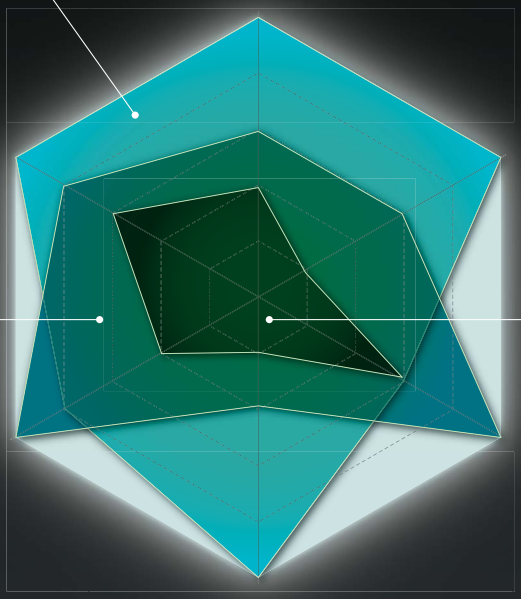
Zip Chain Lifter® / Zip Master

Durability

Zip Chains offer excellent wear resistance with no elongation of chains used in power transmission or transportation, ensuring a long service life and excellent maintainability.

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.



Screw jacks

Hydraulic/pneumatic mechanisms

Stopping accuracy

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

Low noise

Chains coupled together smoothly for low-noise operation.

Compactness

Chain stored individually in the chain cases allow impressive space-saving design, where conventional system eventually requires certain space according to the stroke length.

Tsubaki Zip Chain Products

ZIP CHAIN LIFTER®

See page 3

ZIP MASTER

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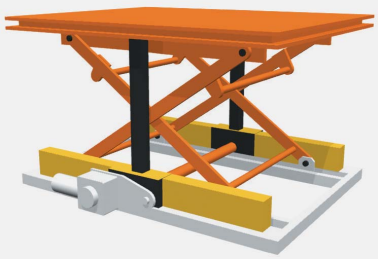
ZIP CHAIN LIFTER®

The Zip Chain Lifter realizes an innovative table lifter that directly transmits lifting thrust through Zip Chains. It operates 3 to 10 times faster than hydraulic lifters and supports high-frequency operation, which provides a maximum of 50% energy savings.

Comparison with other lifting methods

ZIP CHAIN LIFTER®



Efficient transmission drive

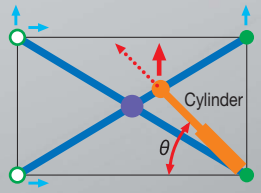
The Zip Chain pushes the top plate directly, ensuring the motor torque is transmitted efficiently.

Exceptional durability

With a Zip Chain Lifter, the mass and thrust of the lifting mechanism is supported directly by the 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 diagonal direction and require a large amount of power (1/sin θ times the lifting thrust).



Ex.: At θ = 10°,
a thrust of 5.8 times the thrust force is required.

Features

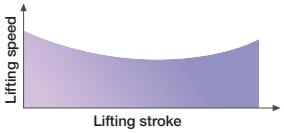
Speed

Zip Chain lifters 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

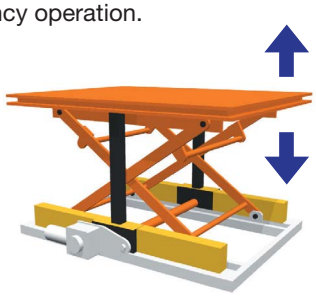


The speed varies throughout the stroke. It slows down in the middle.

High-frequency operation

Unlike with hydraulic lifters, the Zip Chain Lifter does not need to increase the tank capacity of hydraulic units for higher-frequency operation.

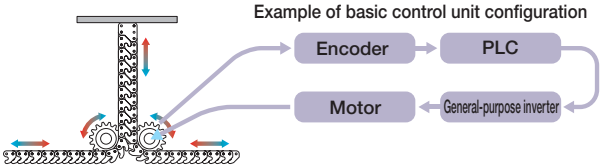
Supports high-speed operation such as continuous lifting at a rate of one lift cycle per minute thanks to its efficient operation.



Stopping accuracy

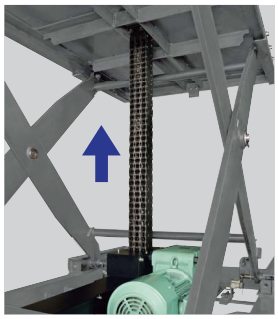
The simple control structure easily realizes multi-point stopping/multi-level positioning.

Example of basic control unit configuration



Expected life

The 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 raise	Difficulty with intermediate stops	100,000 round trips

Standard 1,000kg Zip Chain Lifter®

Standardized the 1,000kg lifting weight model in two different speeds.

Specifications

Lifting weight	1,000 kg
Stroke	1,000 mm (Single-stage pantograph)
Speed	5.5 m/min and 11 m/min

Features

Speed	11 m/min	2.5 times faster than hydraulic competitor lifters
Operation cycle	13.5 seconds	4.5 times faster than hydraulic competitor lifters
Stopping accuracy	±1 mm	Hydraulic competitor lifters are not suitable where accuracy is required.
Expected life	More than 1 million cycles	10 times longer than hyadraulic competitor lifter

APPLICATIONS

Zip Chain Lifters provide ideal work flow for the conveyance process in production lines.

The 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.

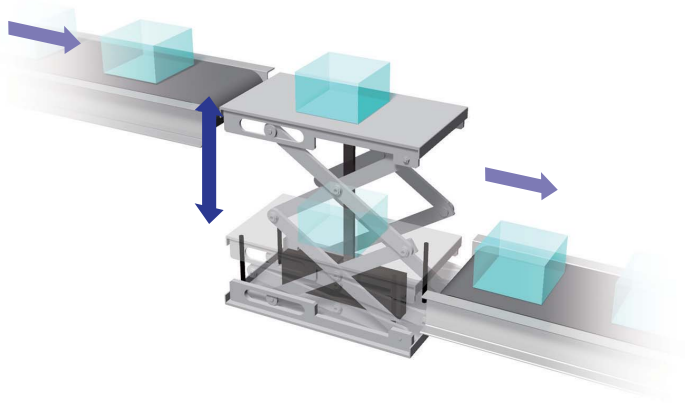
Eliminate height differences

High speed
High frequency
Longer life

Conveyed items can slip off a sloped belt conveyor. The Zip Chain Lifter provides stable conveyance thanks to its lifting function.

● Lifting

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



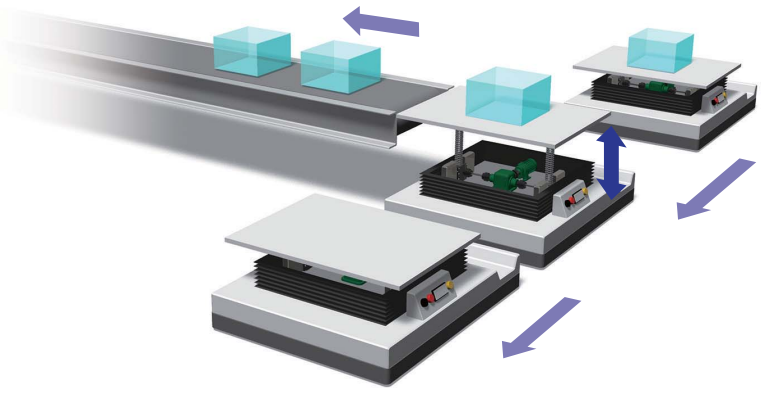
Installed on an automatic guided vehicle (AGV)

High speed
Stopping accuracy
Compact

The Zip Chain Lifter can be installed on an AGV without hydraulic tanks. This lifter can accurately lift the work thanks to its high stopping accuracy and transfer it to conveyors.

● Lifting

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

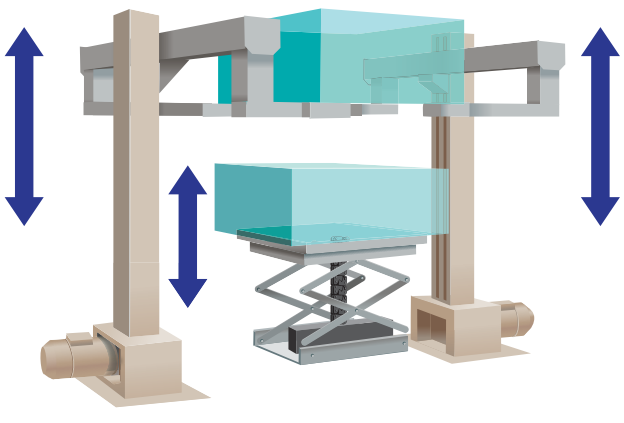


Using the Zip Chain Lifter together with the Lift Master

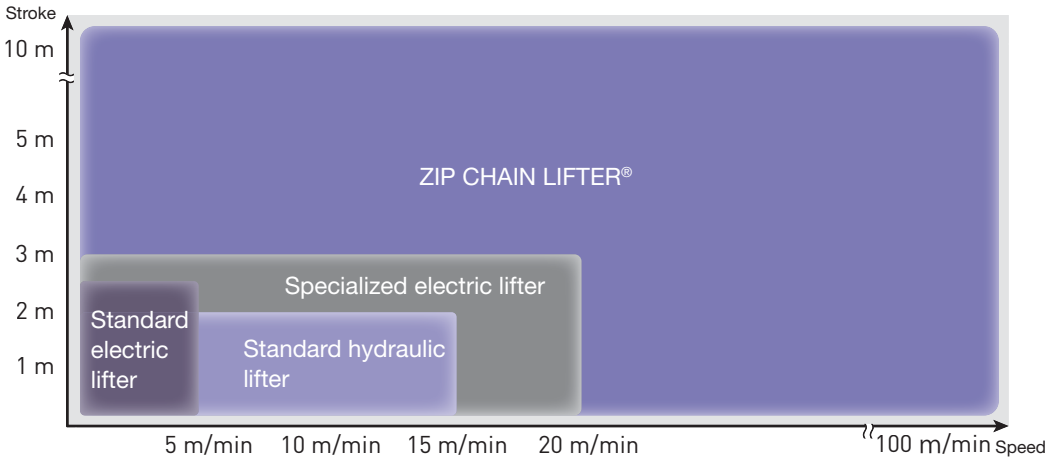
Stopping accuracy
Compact
High lift

The Zip Chain Lifter is used to mount parts on the bottom surface of the work lifted by two Lift Masters. It enables accurate lifting at any position to match the work height.

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



Speed/stroke compatibility range

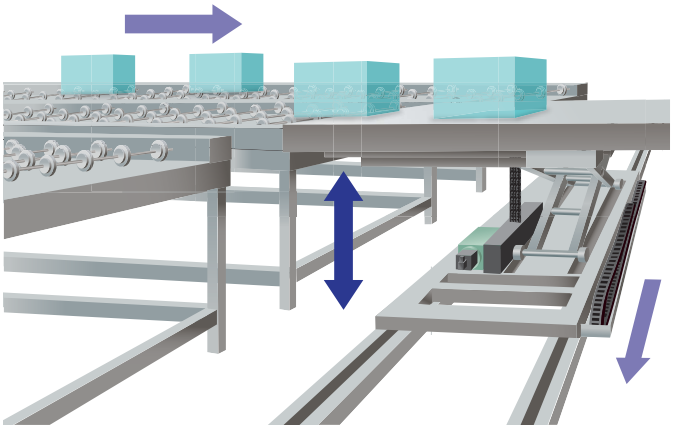


High-speed sorting

High speed
High frequency
Stopping accuracy
Longer life

The Zip Chain Lifter mounted on a cart sorts the work onto multiple conveyors. High-speed/frequency operation improves productivity.

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

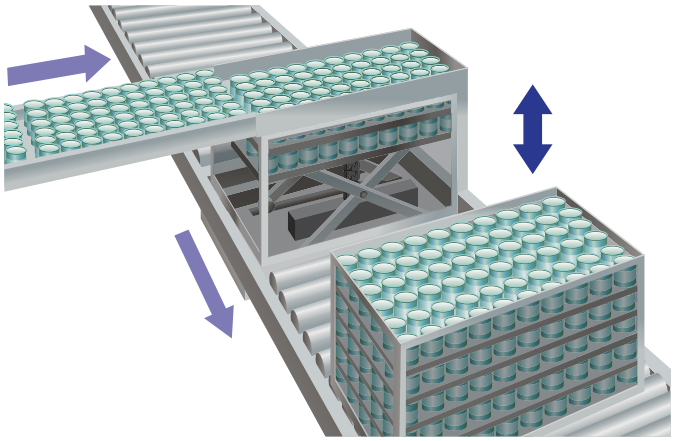


Stacking operation

High speed
High frequency
Stopping accuracy
Longer life

The Zip Chain Lifter is used to stack the work conveyed from the top as the lifter lowers to each fixed pitch. It enables lifting operation with high-frequency and high-stopping accuracy.

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

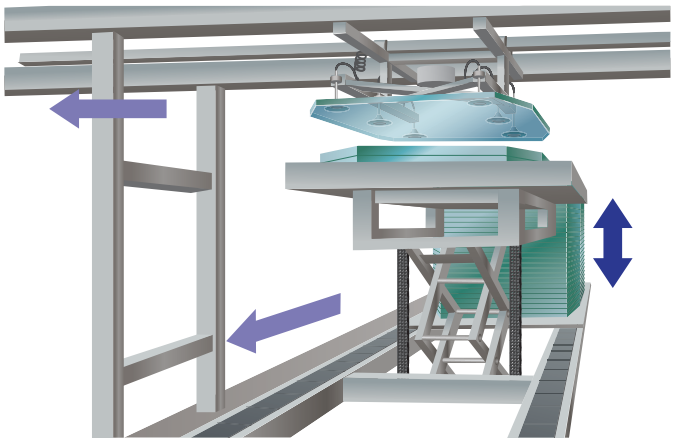


Unstacking operation

High speed
High frequency
Stopping accuracy
Longer life

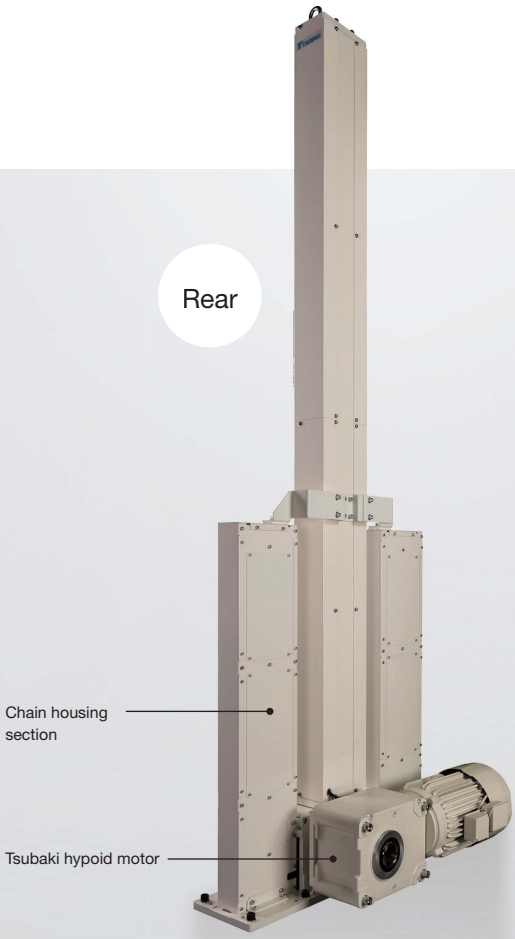
The Zip Chain Lifter is used to transfer piled up steel plates to traversers. It easily enables fine multi-point stopping.

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



ZIP MASTER

Electric lifter with support for long strokes and a wide range of applications.



Zip Master is a cantilever-type electric high-speed lifter that combines a Zip Chain, linear guides, and a motor. Unlike conventional lifting mechanism requiring extensive assembly time, Zip Masters adopt 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

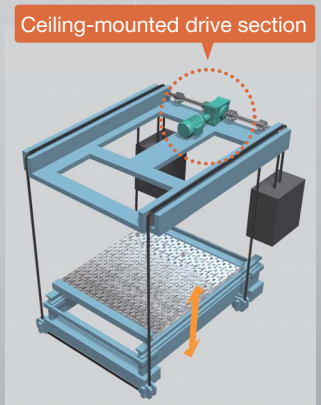
Simply attach an arm suitable for the workpiece to the Zip Master.

- 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.

The 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.

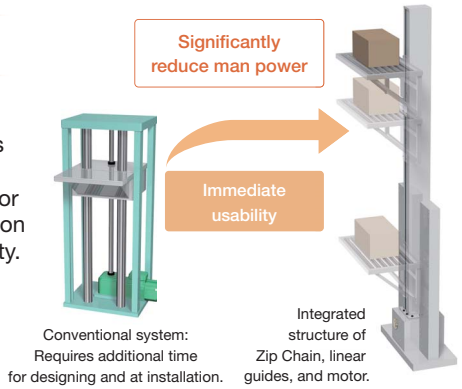


Features

Plug-and-play design

The Zip Master adopts an integrated structure that includes the 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**

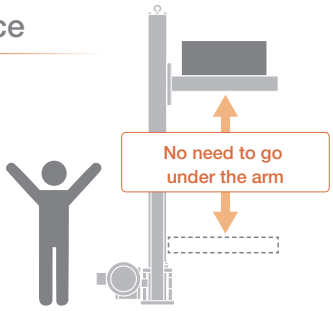


Space-saving design

The Zip Master contribute to minimize installation area with narrower design.

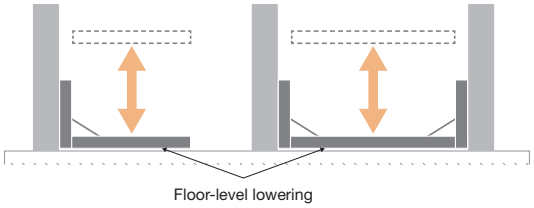
Easy maintenance

Layout the drive section at floor level helps ensure safety during maintenance and inspection.



Lowest table height

The table can be lowered to floor level.



Comparing with screw jack system

		Zip Master		Lift Master	
Cantilever-type electric lifters		 High speed / High frequency / High lift		 Compact / High precision / Wide variations	
Driving method		Chain type  Zip Chain		Screw-and-nut type  Ball screw / Trapezoidal screw	
Allowable load	good	10 kN (up to 30 kN upon request)	good	10 kN (up to 20 kN upon request)	
Allowable speed	good	**1,000 mm/sec (60 m/min)**	fair	150 mm/sec (9 m/min)	
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	
Model variations	good	Wide range of long strokes and high load	good	**Various specifications available (low floor, clean, etc.)**	
Compact	good	Slim, self standing design	good	**The narrowest in the area and self standing design.**	

APPLICATIONS

Optimal installation offeres you ideal conveyor layout

Roller conveyor lifting [Positioning]

High speed
High frequency
Longer life

Zip Masters can lift and lower roller conveyors at multiple positions in high speed, high-frequency, and accurately.

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

Benefit

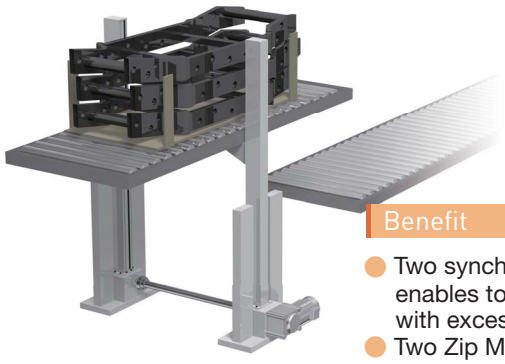
- The plug-and-play design helps reduce construction time.
- The space-saving design includes a drive section on the floor for less required space for installation.

Frame lifting [Synchronized-operation]

High speed
High accuracy
High rigidity

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

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



Benefit

- Two synchronized Zip Masters enables to lift large workpieces with excessive overhang loads.
- Two Zip Masters can be synchronized with one motor.

Vehicle lifting [Synchronized-operation]

High speed
High rigidity
High accuracy

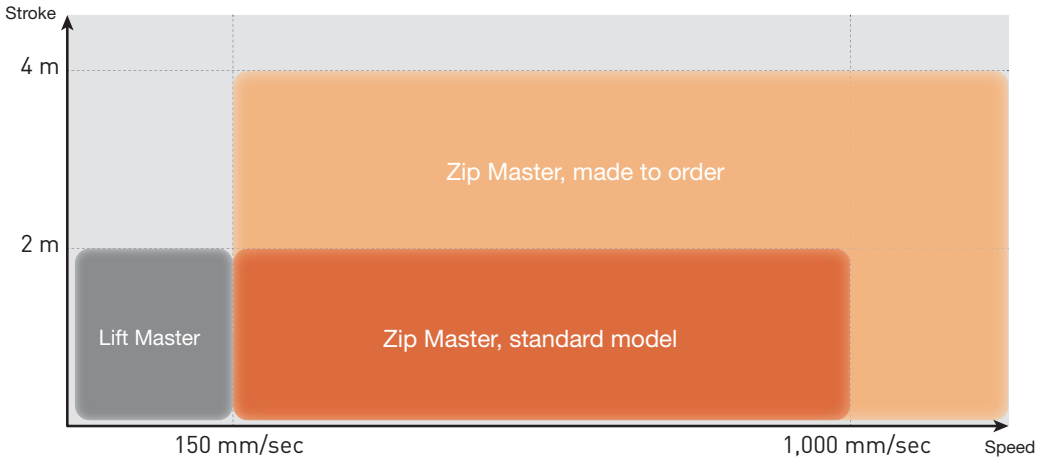
Using four Zip Masters synchronized together makes it possible to adjust the height of lifted vehicles. Each unit can be operated individually, enabling adjustment at any height.

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

Benefit

- Linking four Zip Masters enables to lift and lower large workpieces accurately.

Speed and stroke range



Paint container lifting [Long stroke]

High lift
High speed
Longer life

Two synchronized Zip Masters enables high lifts even with a large overhand load.

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

Benefit

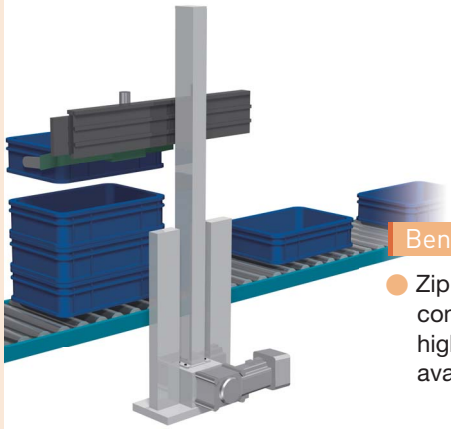
- Longer strokes are available upon request.
- Easier maintenance by arranging two Zip Masters side by side.

Case stacking [High frequency]

High rigidity
High speed
High frequency

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

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



Benefit

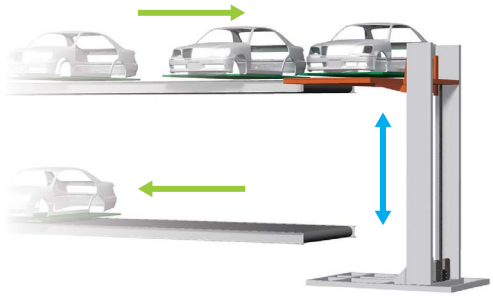
- Zip Chains can be used for continuous operation, and higher-frequency operation is available with adequate drives.

Body lifting [High load]

High rigidity
High lift
High frequency

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

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



Benefit

- Zip Masters enables to lift the large workpieces for long stroke and drive can be layout at floor side for easy maintenance

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.

Eco-friendly

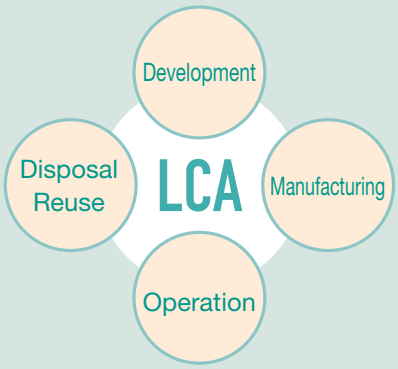
LCA-approved ZIP CHAIN ACTUATOR®

Tsubaki's Zip Chain Actuators offer 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?

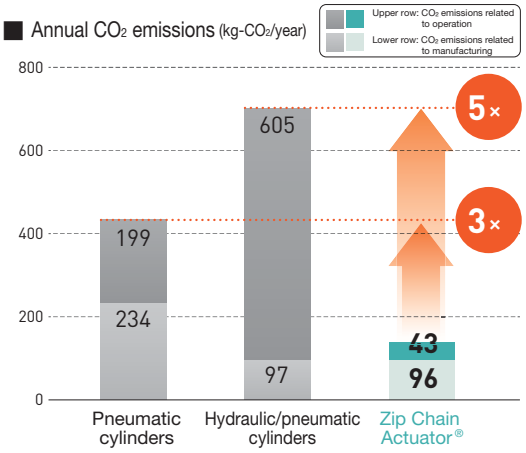
Life Cycle Assessment

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

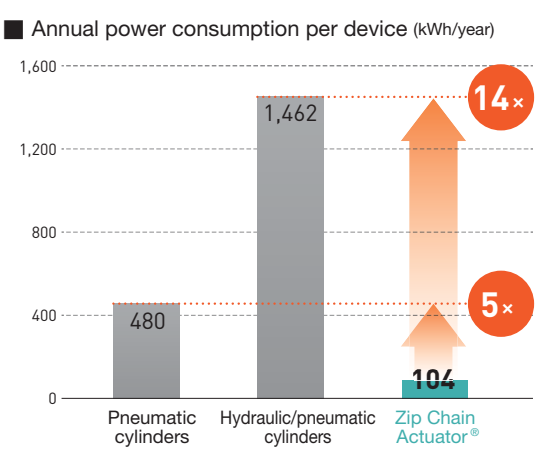


Comparing with hydraulic and pneumatic cylinders * Calculated using Tsubaki's internal LCA evaluation.

CO_2 emissions



Electricity consumption



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

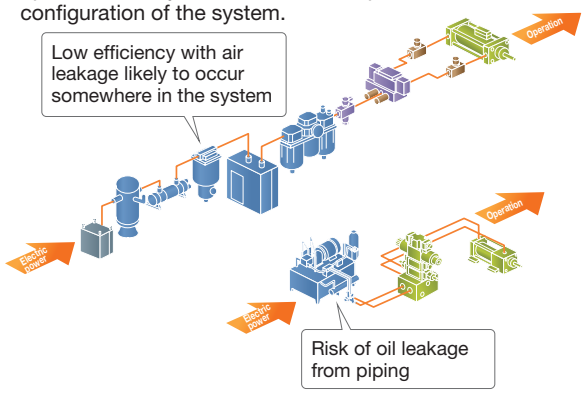
Simple and Easy to Maintain

Grease is used as the lubricant for the 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, facilitating maintenance by eliminating hydraulic piping.

Comparison of system configuration

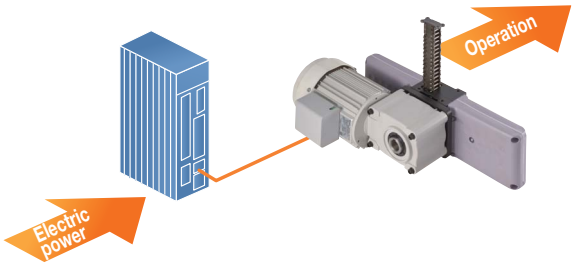
Hydraulic/pneumatic cylinders

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®

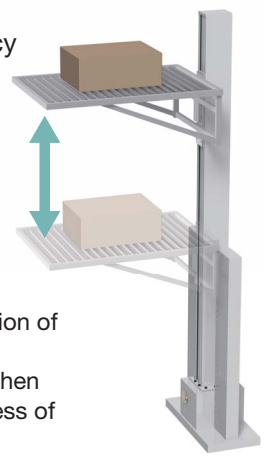
With Zip Chain Actuators, the system conversion efficiency from the power supplied to operation is very high due to the simple system.



Speed Control/Stopping Accuracy and Reliable Load Retention

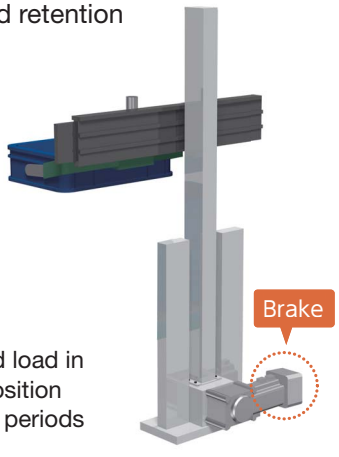
Motorized devices are able to stop at any position using a built-in position detection sensor and a brake motor. In addition, using an inverter makes operation at a specific lifting speed possible. Servomotors can also be used as the drive section.
Using a brake motor helps to save energy by no electricity 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

CONTENTS

ZIP CHAIN LIFTER®

ZIP MASTER

ZIP CHAIN LIFTER®

Model

ZSL 1000 S 10 G 1 - J

ZSL: Series
1000: Allowable lifting weight
S: Speed
10: Stroke
G: Drive
1: Number of pantograph stages
J: 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

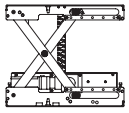
10	1,000 mm
5	500 mm
3	300 mm

Drive style

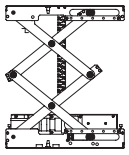
G	Three-phase motor
K	Servomotor
X	Others

Number of pantograph stages

1	Single-stage

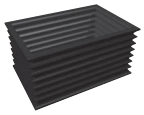


2	Dual-stage



Option

J	Bellows



T	Tap washer (Available for 1,000kg type)

The tap washer will be used when the tap hole for fixing is required on the table surface. Specify mounting locations separately if you need it.

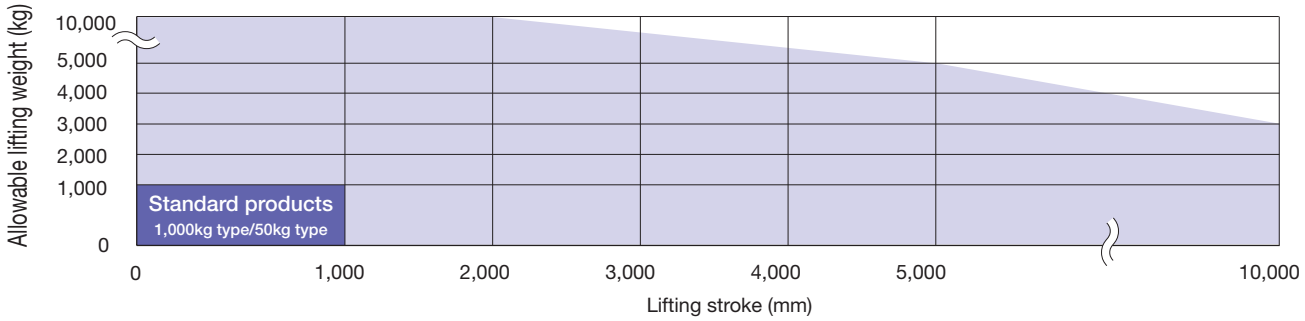
Maintenance bar for 1,000kg type

Model: ZSL1000S10-MB

* Always use the maintenance bar for safety during maintenance.
See page. 22 for more information.

Available Zip Chain Lifter Range

Allowable lifting weight and lifting stroke



Specifications

Model		1,000kg type		50kg type			
		ZSL1000S10G1	ZSL1000L10G1	ZSL0050S3G1	ZSL0050S5G2	ZSL0050M3K1	ZSL0050M5K2
Allowable lifting weight (kg)		1,000		50			
Nominal speed (m/min)		5.5	11	4.8		28.6	
Nominal stroke (mm)		1,000		300	500	300	500
Minimum height (mm)		420		200			
Table size (mm)		1,100 × 1,800		400 × 580			
Motor		Three-phase, four-pole Induction motor with brake		Three-phase, four-pole Induction motor with brake		Servomotor with brake	
Motor size (kW)		2.2 kW	3.7 kW	0.1 kW		400 W	
Power supply voltage		200 VAC class*1		200 VAC class*1			
Lubrication		Chain: Grease (No. 2)		Chain: Grease (No. 2)			
Coating		Acrylic lacquer-based grey (Munsell N5)		Acrylic lacquer-based grey (Munsell N5)			
Ambient conditions	Environment	Indoor environment with no corrosive gas, debris, etc. present		Indoor environment with no corrosive gas, debris, etc. present			
	Ambient temperature	0 to 40°C (no freezing)		0 to 40°C (no freezing)			
	Relative humidity	85% RH (no condensation)		85% RH (no condensation)			
	Shock resistance value	Less than 1G		Less than 1G			
Maintenance bar		Options		Included			

*1 AC400 V class is also available. Contact a Tsubaki representative for more information.

1,000kg Type

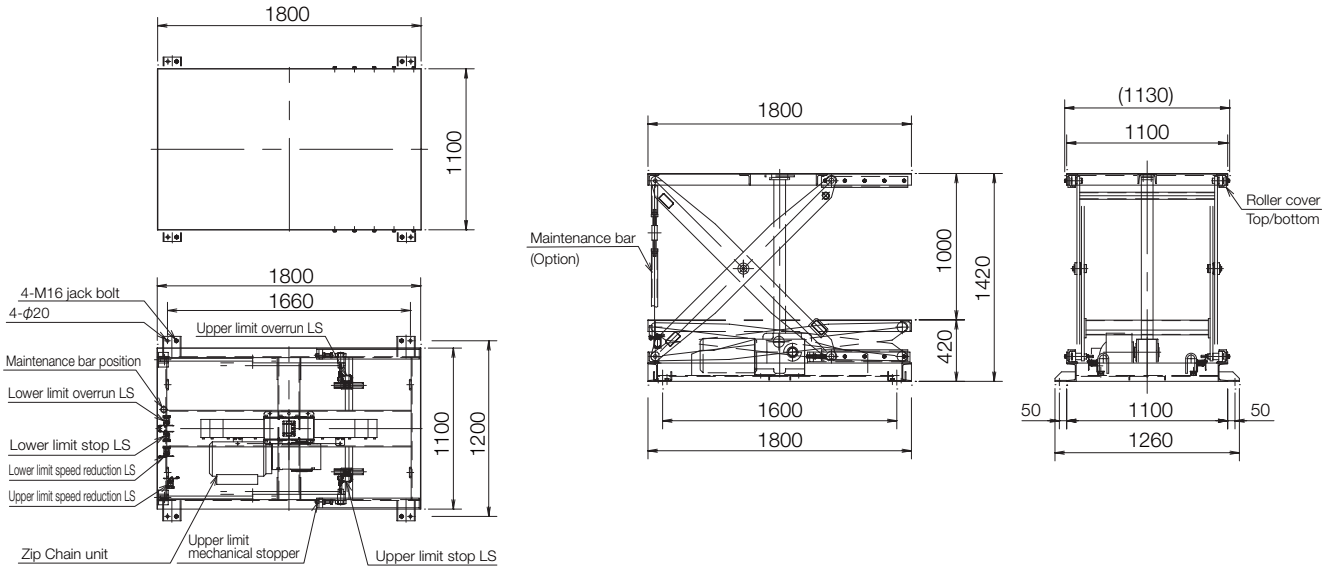
Specifications

	ZSL1000S10G1	ZSL1000L10G1
Allowable lifting weight (kg)	1,000	
Nominal speed (m/min)	5.5	11
Stroke (mm)	1,000	
Motor	Induction motor with brake	
Motor size	2.2 kW	3.7 kW
Weight (kg)	720	750

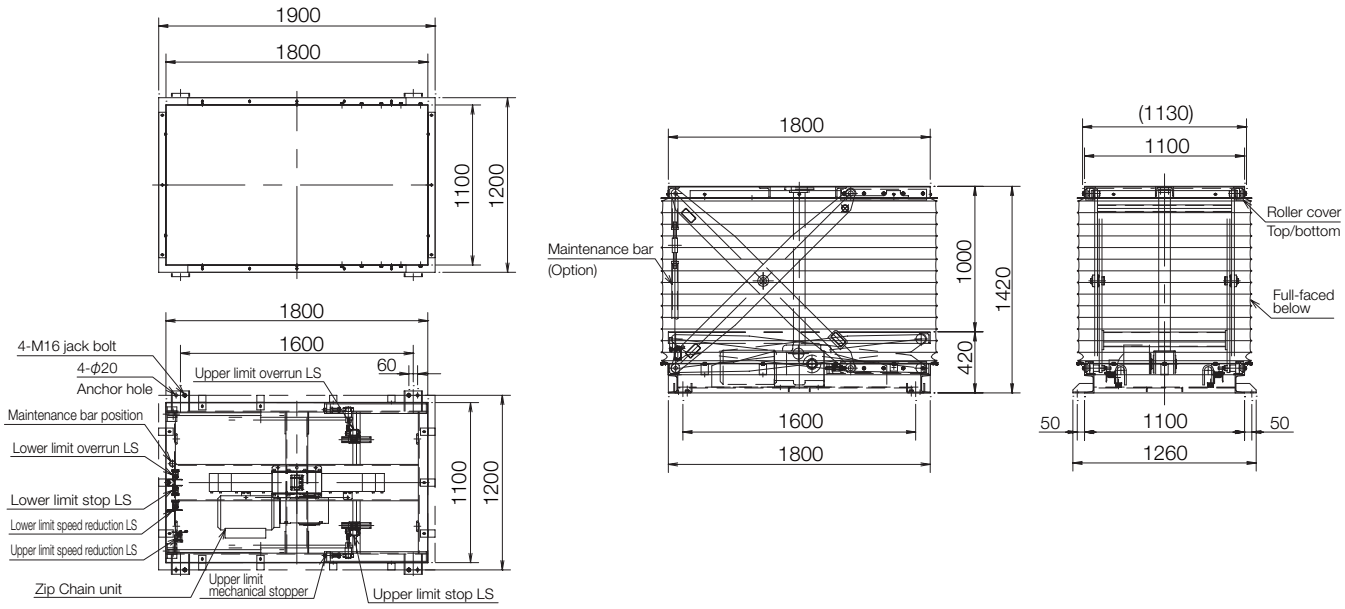
Contact a Tsubaki representative when tap washer is required on the table surface.

Dimensions

Without options



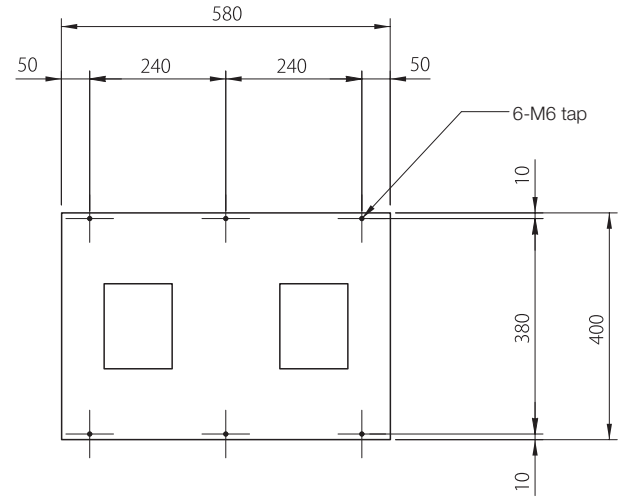
With bellows

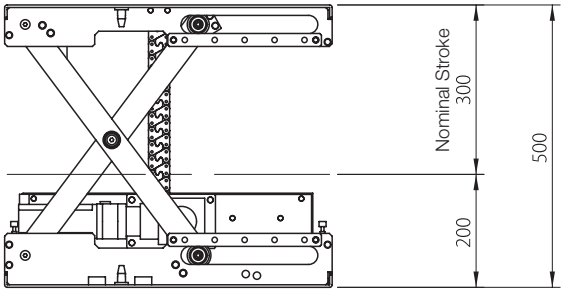


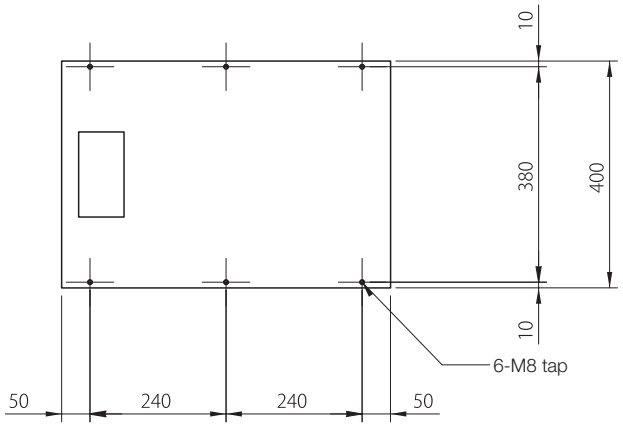
50kg Type with 300mm Stroke

Dimensions

Without options



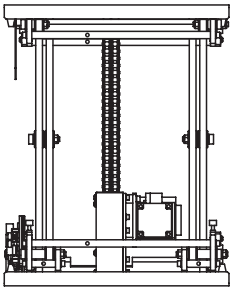


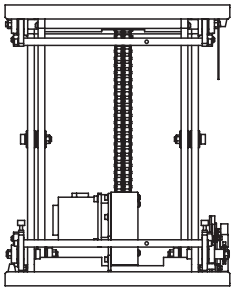


Specifications

	ZSL0050S3G1	ZSL0050M3K1
Allowable lifting weight (kg)	50	
Nominal speed (m/min)	4.8	28.6
Stroke*1 (mm)	300	
Motor	Induction motor with brake	Servomotor with brake*2
Motor size	0.1 kW	0.4 kW
Weight (kg)	55	50

*1 Install an external intermediate stop sensor.
*2 Servo driver, motor cable, brake cable, and encoder cable are not included.

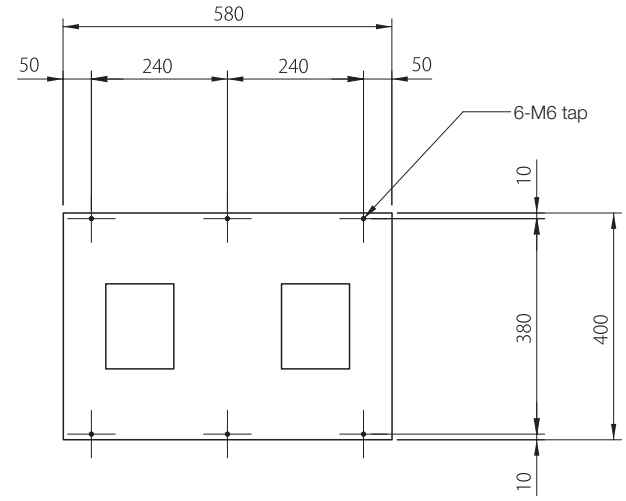


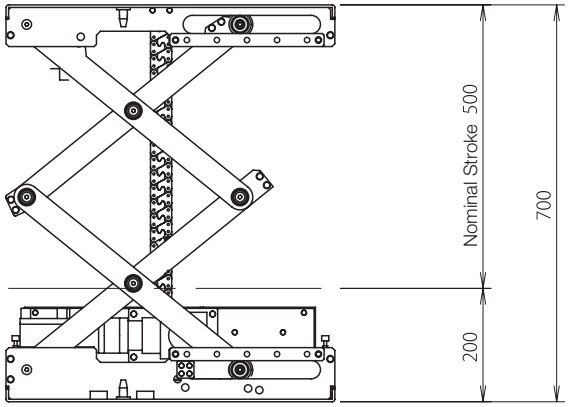


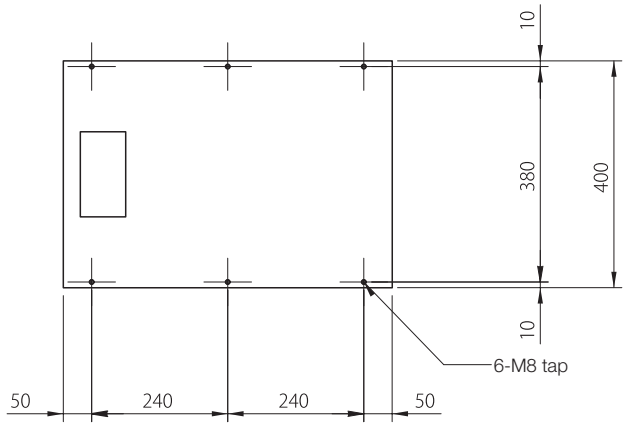
50kg Type with 500mm Stroke

Dimensions

Without options



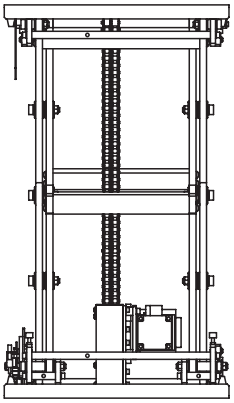


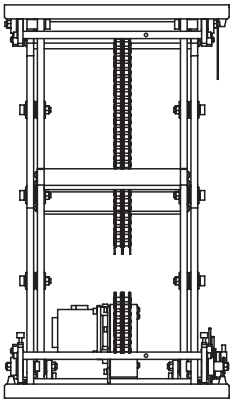


Specifications

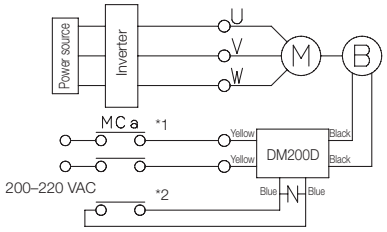
	ZSL0050S5G2	ZSL0050M5K2
Allowable lifting weight (kg)	50	
Nominal speed (m/min)	4.8	28.6
Stroke*1 (mm)	500	
Motor	Induction motor with brake	Servomotor with brake*2
Motor size	0.1 kW	0.4 kW
Weight (kg)	60	55

*1 Install an external intermediate stop sensor.
*2 Servomotor driver, motor cable, brake cable, and encoder cable are not included.





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

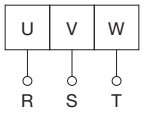
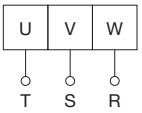
Ⓜ: Motor, Ⓑ: Brake, MC: Magnetic contactor, MCa: Auxiliary relay, DM200D: rectifire, -N-: Protection element (varistor)

*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 on the left. 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

	
ZSL1000S10G1 : Up ZSL1000L10G1 : Up ZSL0050S3G1 : Up ZSL0050S5G2 : Up	ZSL1000S10G1 : Down ZSL1000L10G1 : Down ZSL0050S3G1 : Down ZSL0050S5G2 : Down

Cautions for Product Selection

●Acceleration/deceleration times

▶The 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 to the stopping accuracy or shake 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 the 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 in 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. The large regenerative current would be generated during lowering. Consult the inverter supplier 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.

●Fall prevention

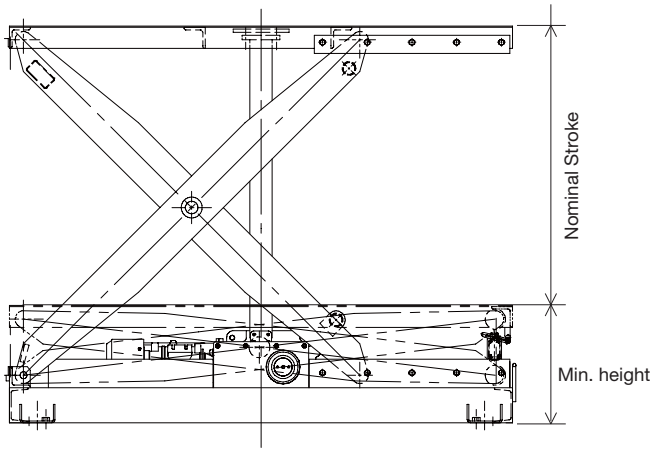
▶The Zip Chain Lifter uses an induction motor with brake. When a servo motor is prepared by customer, make sure to select a brake type with a keyway on the shaft. In addition, be sure to always use the maintenance bar during maintenance.

●Servomotor control

▶Do not use the built-in mechanical brake for positioning control stops, brake should be used only for holding. Be sure to use the mechanical brake after deceleration by the dynamic brake of motor control. For details, refer to the motor manufacturer's instruction manual.

Stroke Control

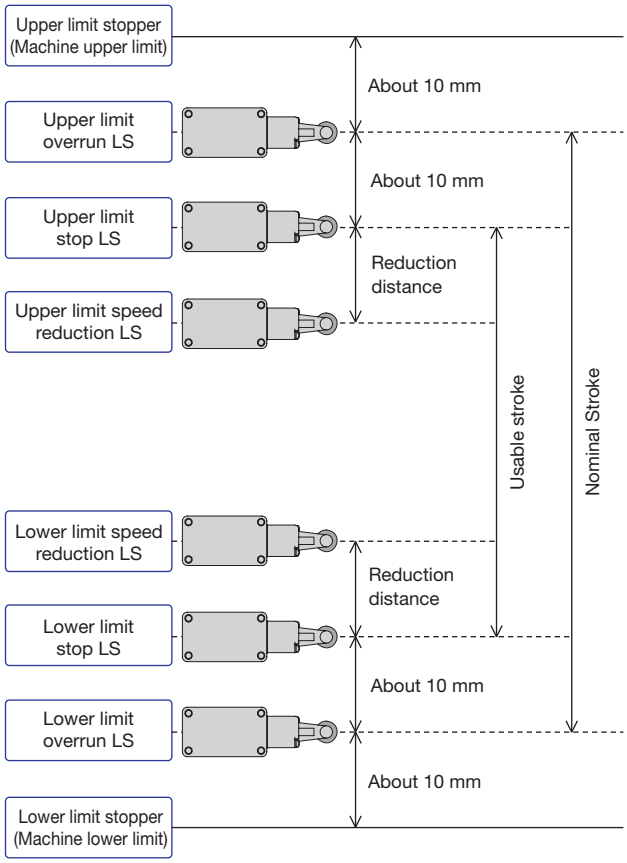
Use the lifter within the nominal stroke.
(Nominal stroke ≧ Operating stroke)



▶Position detection sensor specifications

	Stroke adjustment limit switch
Limit switch model	WLCA2-N (OMRON) or equivalent
Electrical capacity	250 VAC / 10 A (cos ϕ = 0.4) 5 VDC / 1 mA (minimum applicable load)
Contact arrangement	1a 1b NC 1 — ● ○ — 4 NO NC 2 — ● ○ — 3 NO
Connector (outer diameter of supported cable)	SCS-10B (⌀8.5 to ⌀10.5) PF1/2

Limit Switch (LS)



▶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.

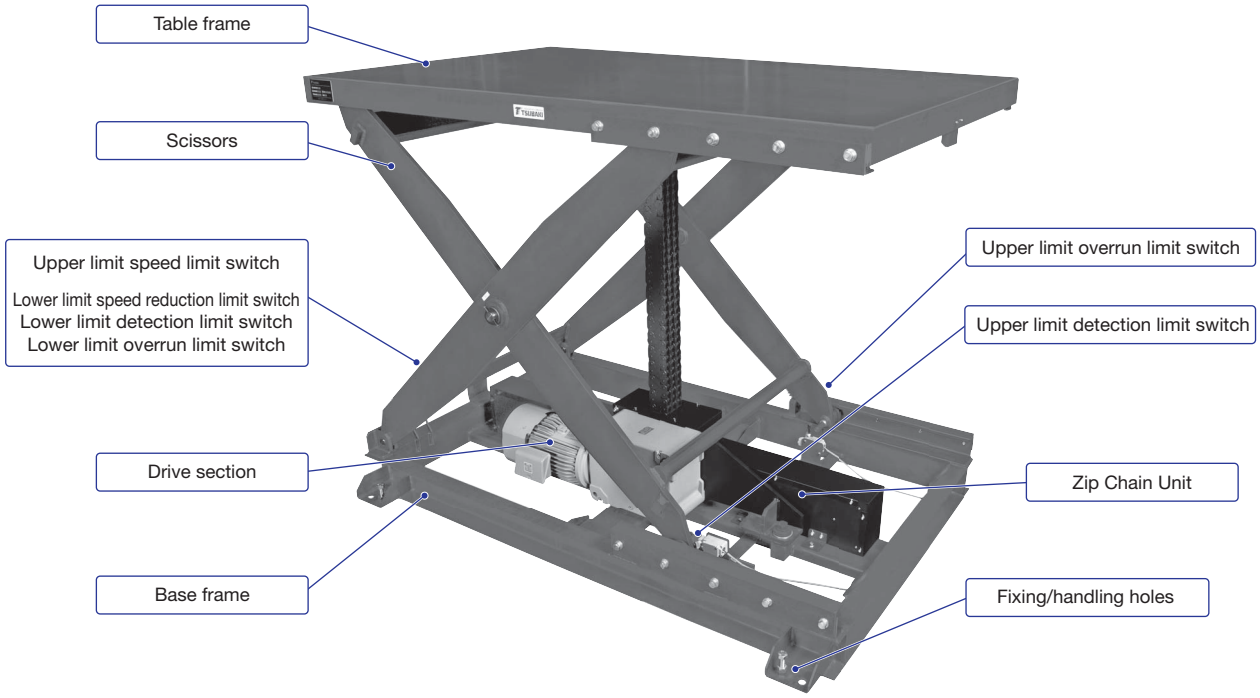
▶Wire the brake in DC separate power supply and settle sequence control circuit so that you can sudden brake the lifter in case the upper or lower overrun LS has been activated. Do not operate the lifter at higher than maximum speed or wire the brake at AC cut off. This will cause longer brake time and overrun distance, and the lifter may hit the end stopper.
Do not touch 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.

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 press stop especially at the lower limit of the lifter, apply impact load on the table frame or scissor links, or block the table frame when lowering down, and always operate the unit within the nominal stroke range. These may break the chain and cause severe damage to the equipment.

Handling

Basic Structure



Transporting

Secure the Zip Chain Lifter using the four holes on the base frame corners, and transport using a crane.
When transporting by a forklift, carry the 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

Make sure that the base frame of the lifter is evenly installed on enough leveled ground, and securely fix the lifter in place.
The fixing/handling holes are located on the four corners of the base frame. (See the above equipment overview.)

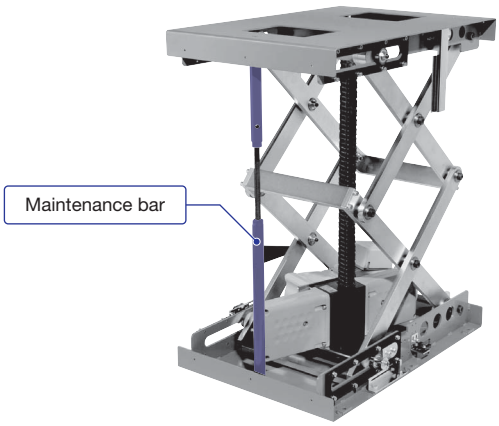
Operation

- Always use the 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 the 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 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.
- Do not use the built-in mechanical brake for braking even stopping 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.
*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 the 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.

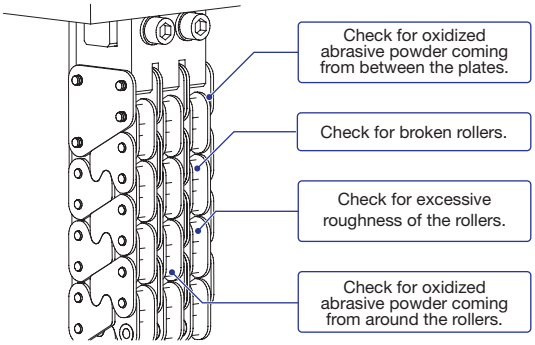
(3) Check the entire length of the Zip Chain for the following.

- ▶Oxidized abrasive powder (reddish-brown) coming from between the plates
- ▶Oxidized abrasive 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.

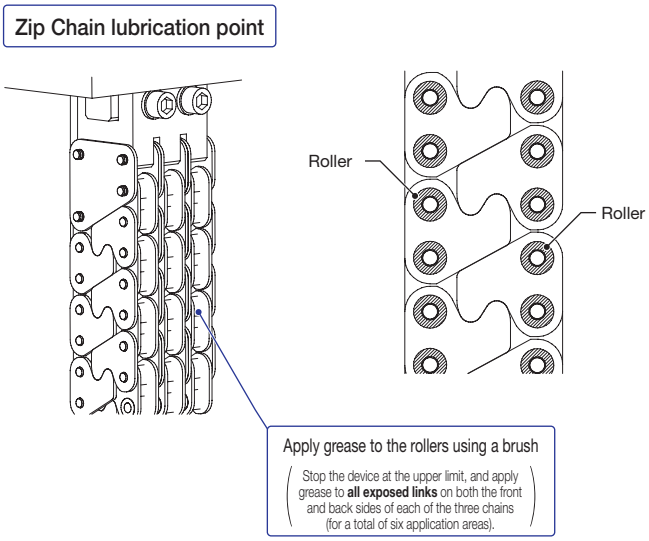
Section to apply	Lubrication method	Recommended lubricant name	Lubrication cycle
Zip Chain	Brush on about 10 to 15 g of lubricant onto chain every 100 mm of stroke	Class 1 No. 2 high-load grease or equivalent Daphne Eponex SR No.2 (Idemitsu Kosan Co., Ltd.)	Every 3 months or 100,000 trips
Roller travel rails	Brush on appropriate amount of lubricant		
Roller	Apply appropriate amount of lubricant using grease gun		

(Lubricating the Zip Chain)

Follow the steps below to lubricate the 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)

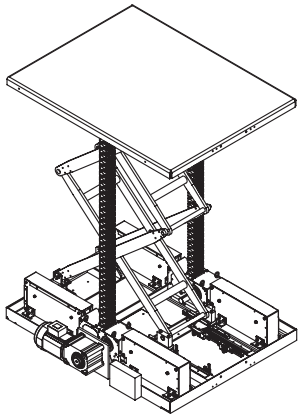
Apply grease to the traveling surfaces of the rail (both top and bottom).
After lubricating, run in the chain and remove any excess grease before starting operation.



Examples of made to order products and use.

400kg dual-stage pantograph type

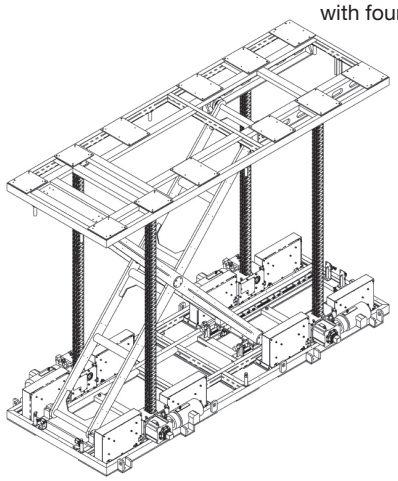
External motor
with two Zip Chains



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

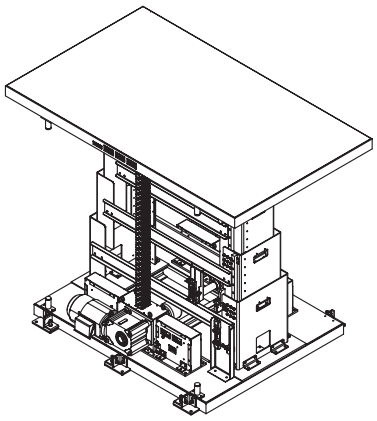
External motor
with four Zip Chains



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

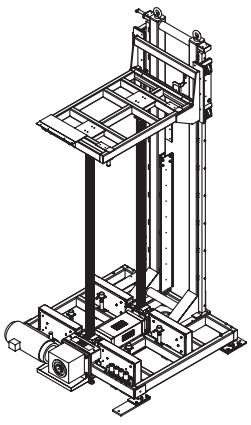
External motor
with two Zip Chains



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 Chains



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

ZIP MASTER

Model

ZME L 0500 H 20 G

Series | Linear guide | Rated load | Speed | Stroke | Drive

Rated load

0200	1.96 kN
0500	4.90 kN
1000	9.80 kN

Speed

U	1,000 mm/sec
H	800 mm/sec
M	330 mm/sec

Stroke

15	1,500 mm
20	2,000 mm

Drive style

G	Gear motor
X	Servomotor, etc.

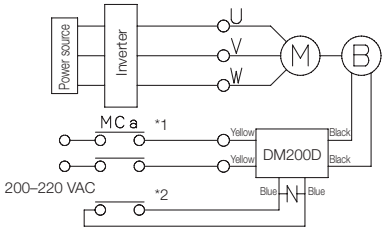
Specifications

Model		ZMEL0200U	ZMEL0500H	ZMEL1000M
Rated load (kN) {kgf}		1.96 {200}	4.90 {500}	9.80 {1000}
Allowable OHL (N•m) {kg f•m}		588 {60}	1,960 {200}	4,900 {500}
Nominal speed (mm/sec) (frequency)		1,000 (70 Hz)	800 (82 Hz)	330 (60 Hz)
Stroke (mm)		1,500 • 2,000 *1		
Motor		Three-phase, four-pole high efficient motor with brake		
Output (kW)		3.7	5.5	5.5
Power supply voltage*2		200 VAC class		
Reduction ratio		1/10	1/15	1/40
Lubrication		Chain, guides: Grease (No. 2)		
Coating		Acrylic lacquer-based, cream (B27-90B)		
Ambient conditions	Environment	Indoor use with no corrosive gas, debris, etc.		
	Ambient temperature	0 to 40°C (no freezing)		
	Relative humidity	85% RH or less (no condensation)		
	Shock resistance value	1 G or less		

*1 Special strokes also available. Contact a Tsubaki representative for more information.
*2 A 400 V class unit is also available. Contact a Tsubaki representative for more information.

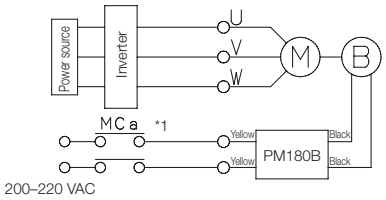
Motor Wiring (for inverter only)

3.7 kW



Set the base frequency at 60 Hz.

5.5 kW



Set the base frequency at 60 Hz.

Ⓜ: 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

Motor Wiring and Lifting Direction

U V W / R S T	U V W / T S R
ZMEL0200U : Extending ↑ ZMEL0500H : Extending ↑ ZMEL1000M : Retracting ↓	ZMEL0200U : Retracting ↓ ZMEL0500H : Retracting ↓ ZMEL1000M : Extending ↑

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 to the stopping accuracy or cause the workpiece vibration. When the 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 to fix the upper end of the Zip Master to reduce the workpiece vibration.
- The nominal speed of the 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 reductions in 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.
- One size larger capacity of inverter than motor kW 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 servo motor is prepared by customer, make sure to select a brake type with a keyway on the shaft. Please add fail safe system against falls. Also prepare a fall prevention mechanism to protect against falls. Fall prevention pins are available upon request.

4. Servomotor control

- Do not use the built-in mechanical brake for positioning control brake, it should be used only for holding. Be sure to use the mechanical brake after deceleration by the dynamic brake by motor control. For details, refer to the motor manufacturer's instruction manual.

Product Selection

●Operating conditions

1. Application and required number of Zip Master(s); 2. Lifting weight; 3. Speed; 4. Stroke; 5. Overhang load; 6. Operation frequency; 7. Ambient conditions.
See the Zip Master inquiry form on page 35 for more information.

●Selection procedure

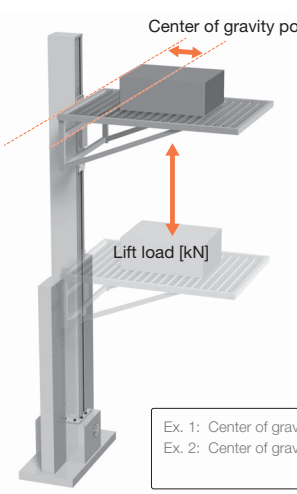
1. Make sure that the application, the method of use, and the ambient condition are suitable for Zip Master.
2. From the specification list on page 25, select a model with a rated load that satisfies the required lifting load.
   * Consider using multiple synchronized units if the lifting load will exceed 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 overhang load.

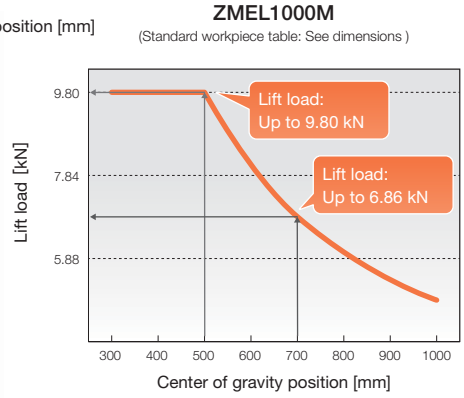
Verification of allowable overhang load (OHL)

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 overhang load equals the point where the lift load intersects the center of gravity position.
See page 27 and 28 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 affect more at longer strokes, but also on the arm and table rigidity.
- Fix the Zip Master top to reduce the arm bend or Zip Master vibration.
- Contact a Tsubaki representative for more information.

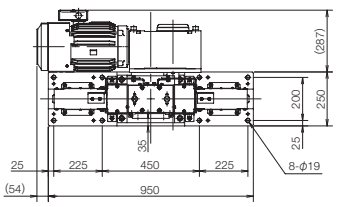


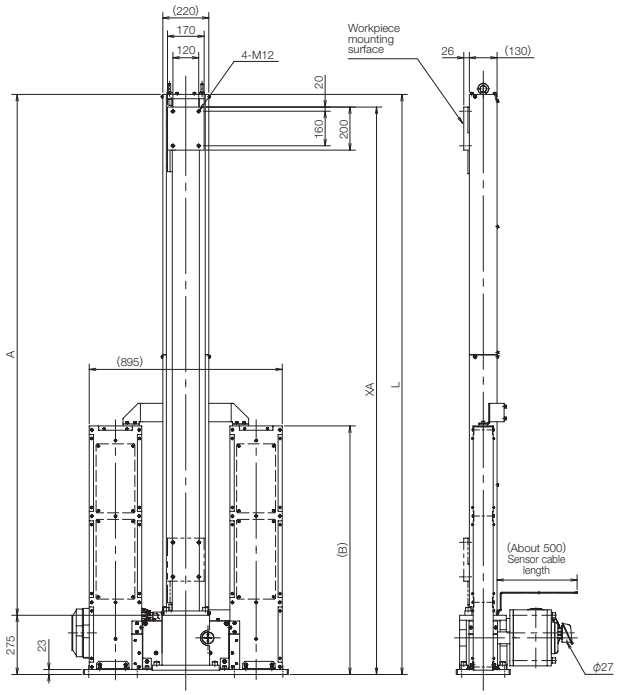


Ex. 1: Center of gravity position = 500mm position → max. lift load = 9.80kN
Ex. 2: Center of gravity position = 700mm position → max lift load = 6.86kN

ZMEL0200U

Dimensions

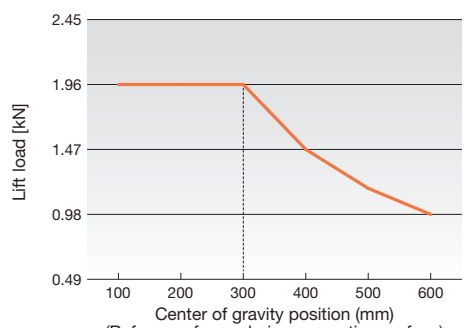




Unit: mm

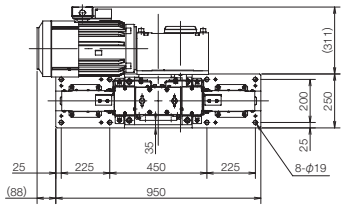
Nominal Stroke	A	B	XA		L
			Min	Max	
1,500	1,916	903	633	2,133	2,191
2,000	2,416	1,153		2,633	2,691

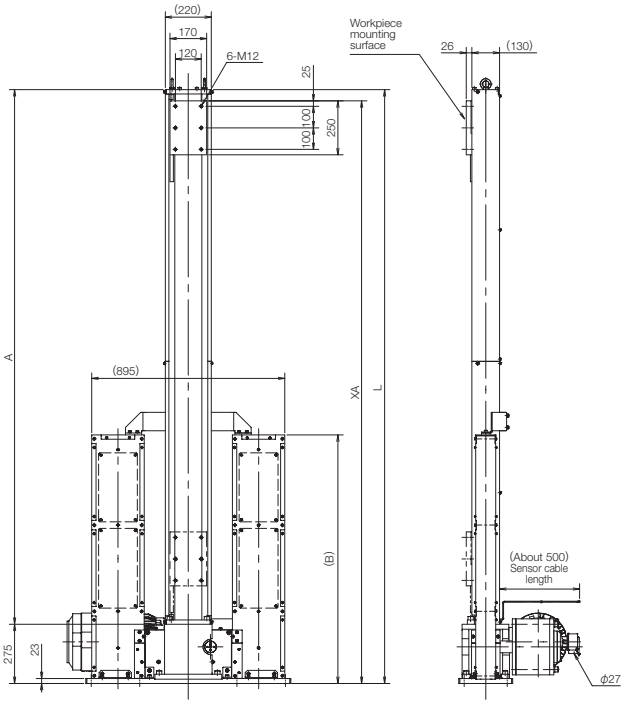
Allowable overhang load **ZMEL0200U**



ZMEL0500H

Dimensions

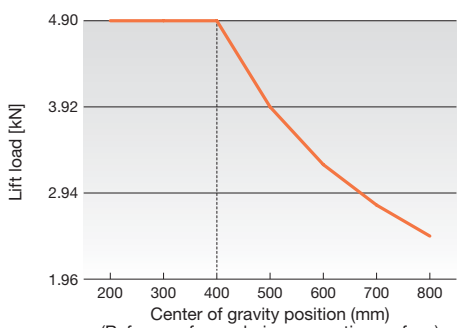




Unit: mm

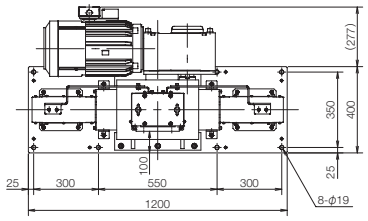
Nominal Stroke	A	B	XA		L
			Min	Max	
1,500	1,980	903	703	2,203	2,255
2,000	2,480	1,153		2,703	2,755

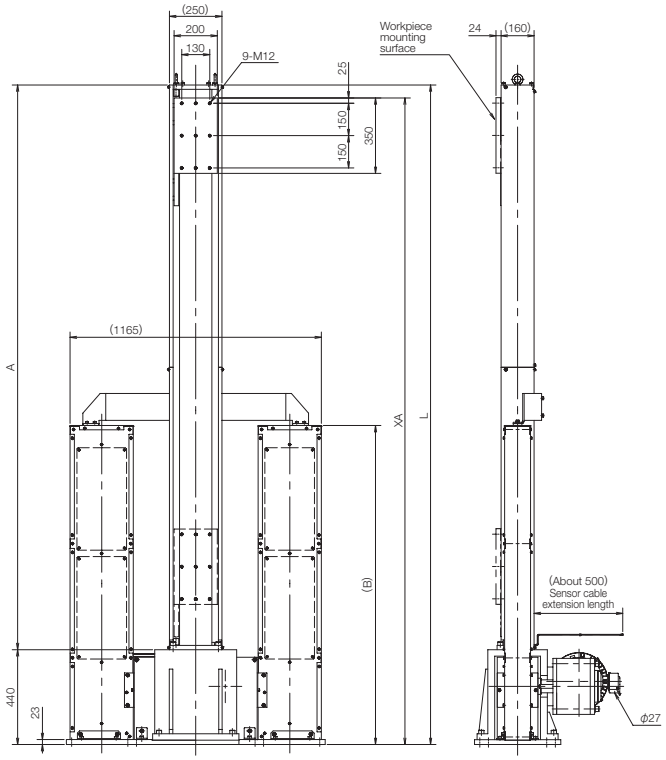
Allowable overhang load **ZMEL0500H**



ZMEL1000M

Dimensions

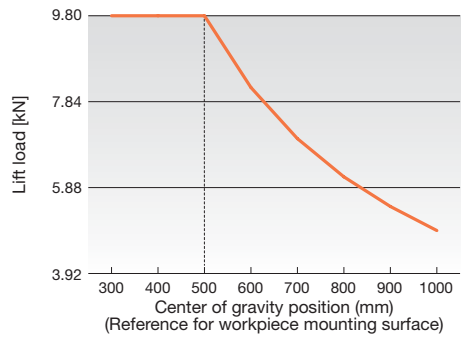




Unit: mm

Nominal Stroke	A	B	XA		L
			Min	Max	
1,500	2,120	1,230	1,000	2,500	2,560
2,000	2,620	1,480		3,000	3,060

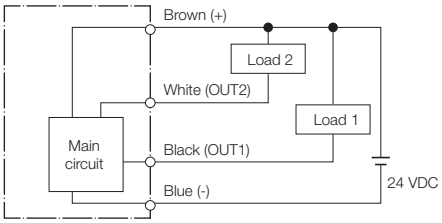
Allowable overhang load **ZMEL1000M**



Position Detect 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.
Be sure to connect the host sequence signal lines as required.

▸Position detect sensor specifications

Model	EE-SX972-C1 (Made by OMRON)
Supply voltage	5 to 24 VDC ±10% (Load current: 100 mA or less)
Operation mode	NC, NO switchable
Output specifications	NPN open collector type
Electric circuit	

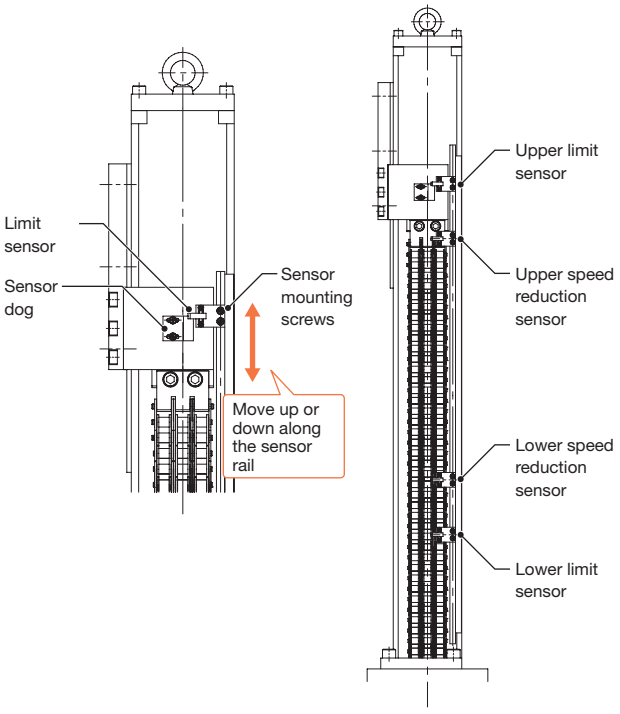
* OUT1: ON when light is on; OUT2: ON when light is off

Adjustment procedure

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

* See the inspection procedure on page 29 to remove the cover.

Limit sensor mounting position



Handling

Checking the Item Upon Arrival

Check for the following when the 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 screws or nuts.

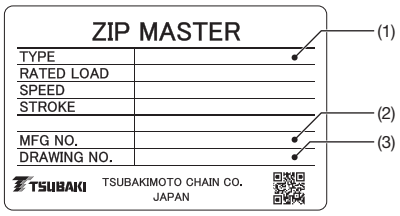
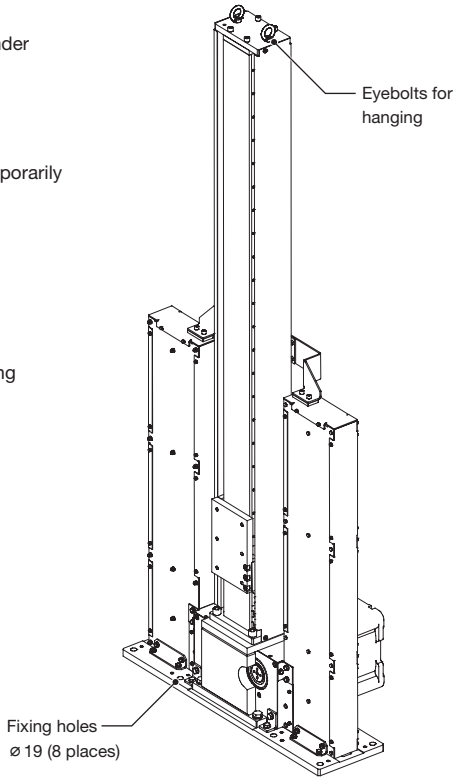


Fig. 1 – Reading the nameplate

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

Installation

- Install the 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 the 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.



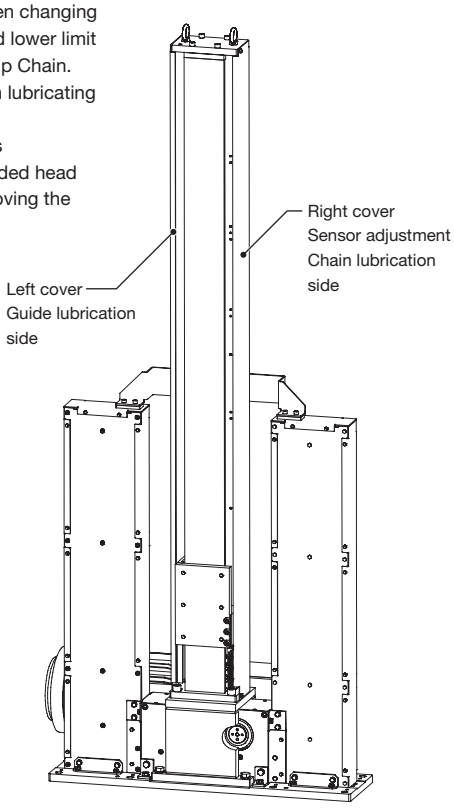
Operation

- Always use the Zip Master within the allowable load, the allowable overhang 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 the 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 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 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.

Removing the right cover when changing the positions of the upper and lower limit sensors and lubricating the Zip Chain.
Removing the left cover when lubricating the guide.
Remove the mounting screws (cross-shaped recessed rounded head screws; M6 × 12) before removing the cover.



2. Inspect the 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.

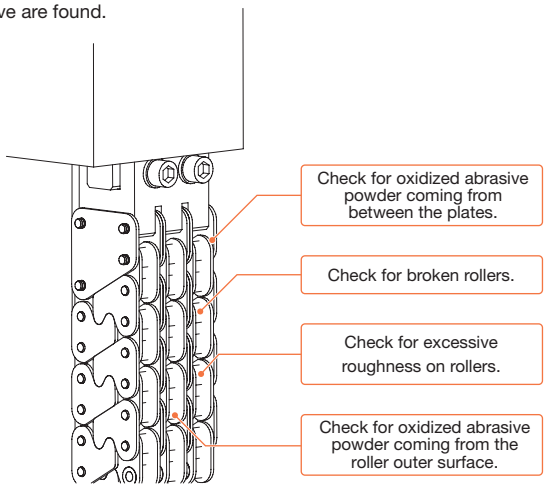
(3) Check the entire Zip Chain on following.

- ▶Oxidized abrasive powder (reddish-brown) coming from between the plates
- ▶Oxidized abrasive 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		

(Lubricating the Zip Chain)

Follow the steps below to lubricate the Zip Chain.

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

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

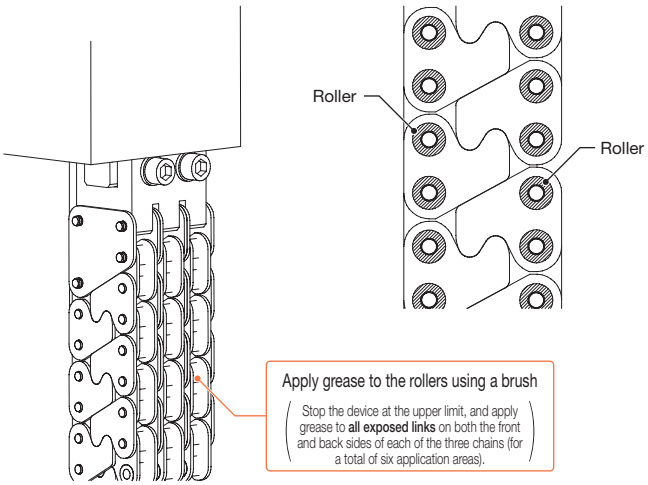
(3) Lubricate all rollers as shown in the figure to the right.

(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.

Zip Chain lubrication point



MEMO

Technical Sheet

Inquiry Sheet

ZIP CHAIN LIFTER® Technical Sheet

Please provide the following information when submitting an inquiry.

Company: Contact name:

Phone: E-mail:

1. Load object	(1) Fixed load	kg	Additional devices	☐ None ☐ Conveyor ☐ Jig ☐ Other
	(2) Movable load	kg	Name	
			Dimensions (mm)	Length × Width × Height
			Weight (kg)	kg No. of loaded objects
	Combined weight ((1) + (2))	kg	Center of gravity position	Center of top plate / Other ( )
2. Usable stroke (mm)			3. Desired storage height (minimum height) (mm)	
4. Table dimensions (mm)	Width		Length	
5. Stopping positions	☐ Two points (top + bottom)	☐ Multi-point (Lifting points / Lowering points)		

6. Operation cycle / lifting speed

• 2-point (top + bottom) stop

	Lifting	Stop	Lowering	Stop
Seconds				
mm				
Speed	m/min		m/min	

• Multi-point stop

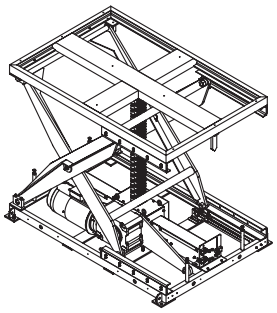
	Lifting	Stop	Lowering	Stop	
Seconds					(Repeated)
mm					
Speed	m/min		m/min		

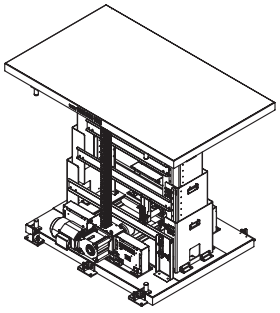
	Lifting	Stop	Lowering	Stop	
Seconds					(Repeated)
mm					
Speed	m/min		m/min		

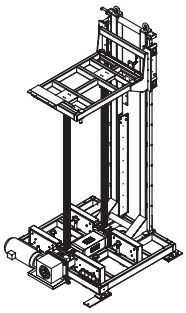
7. Drive style	☐ Servomotor ☐ Induction motor		Encoder	☐ Required · ☐ None
	Manufacturer specification	☐ None (subject to Tsubaki's discretion) ☐ Requested ( )	Power supply voltage	V Hz
8. Operation cycle	hours/day		days/year	
9. Stop mechanism	* Although a motor braking mechanism is included in all lifters, please indicate if you would also like a self-locking worm gear reducer or other safety device.			
	☐ Self-locking worm gear reducer ☐ Not required ☐ Other			
10. Options	Full-faced bellows	☐ Requested · ☐ None	➡ ☐ Black ☐ Transparent ☐ With fasteners	
	Control panel	☐ Requested · ☐ None		
	Top table conveyor	☐ Requested · ☐ None		
11. Worker carrying function	☐ Will be used to carry workers ☐ Will not be used to carry workers			

12. Lifter type

☐ Pantograph type ☐ Telescopic type ☐ Post type



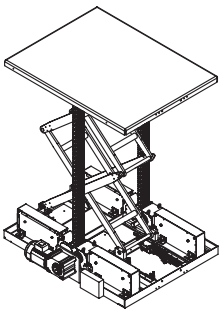


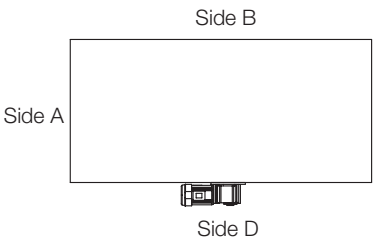


13. Motor arrangement ☐ Stored on the base plate ☐ No restriction

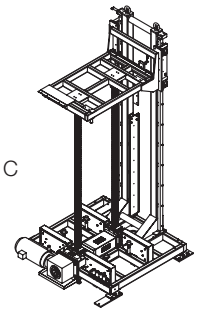
* Indicate possible attachment positions for the motor when selecting “Not required” above.

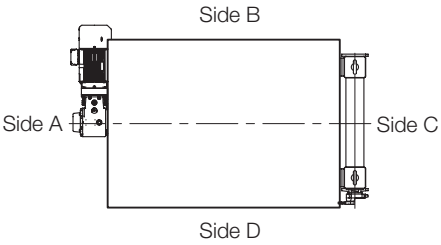
☐ Pantograph type ☐ Post type





* The figure shows the motor placed on the D side.





* The figure shows the motor placed on the A side.

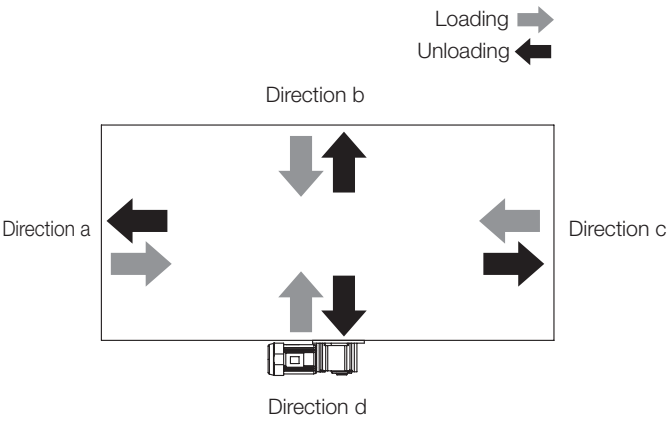
Side A		mm
Side B		mm

Side C		mm
Side D		mm

14. Will a person be on the top plate? ☐ Yes ☐ No

If yes, please fill in below when moving on and off the lift.

	Direction a · b · c · d	Lifting weight kg	Height mm
Loading			
Unloading			



ZIP MASTER Inquiry Sheet

Please provide the following information when submitting an inquiry.

TEL 0120-251-602　　FAX 0120-251-603

Company		Phone	
Contact name		E-mail	

Basic specifications	Application	
	No. of required units	_____ units (per equipment)　Total: _____ set
	Lifting weight	(1) Fixed load _____ kg (weight of arm, jig, etc.)
		(2) Movable load _____ kg/piece　No. of loaded objects _____ piece(s)　Dimensions (mm)　Length _____ × Width _____ × Height _____
	Overhang load	_____ mm (Provide specific position information)
	Stroke	_____ mm
	Speed	_____ mm／s
	Stopping positions	☐ Two points (top + bottom)　☐ Multiple points (_____ points during lifting / _____ points during lowering)
	Operation Cycle	_____ round trips / hour × _____ hours/day × _____ days/year
	Expected life	_____ Year
	Drive style	☐ Induction motor　☐ Servomotor
	Supply voltage	_____ V／_____ Hz
	Ambient conditions	☐ Indoor　☐ Other
	Ambient Temperature	_____ ℃
	Paint specifications	☐ None　☐ Other

Equipment operation and usage information (Please specify layout, operation, and other detailed information)

☐ Separate materials provided

MEMO

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For Safe Use of the 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.

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