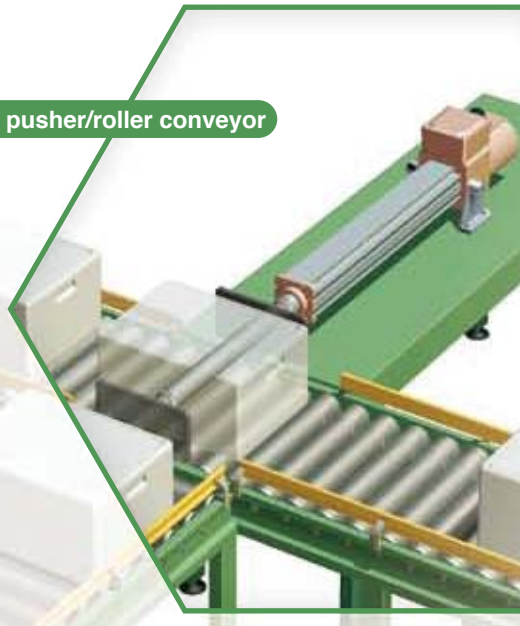
Innovation in Motion
TSUBAKI

TSUBAKI
POWER CYLINDER
T-Series

Power Cylinder

Application Solution

TSUBAKI E&M Power Cylinders were born over 40 years ago, and have been used across a variety of industries by a wide range of customers.
By taking advantage of our accumulated experience, we have continued to develop new products as well as upgrade technologies, and proactively address environmental issues to create our present series.
We will continue to create products which are customer-friendly, taking the environment into consideration.



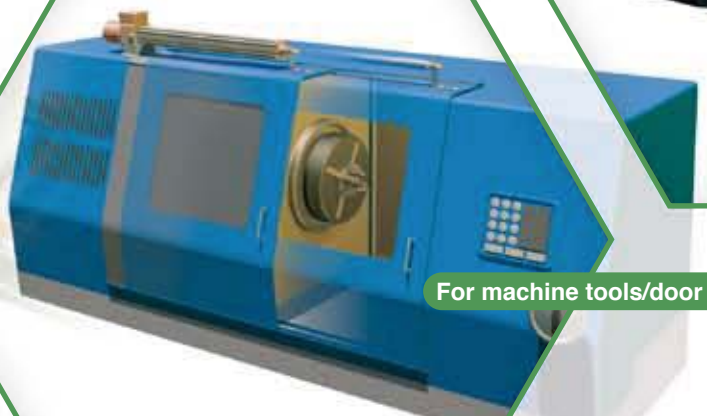
For pusher/roller conveyor

For heat treatment furnace/door opening and closing

LCD TVs

For lifters/pin insertion to fix

For CT scanning/bed elevation



For machine tools/door opening and closing

Power Cylinder is “ecologically-

**Compared to hydraulic or pneumatic cylinders,
our Power Cylinder is more economical because it needs less electricity.**

• Clean operation

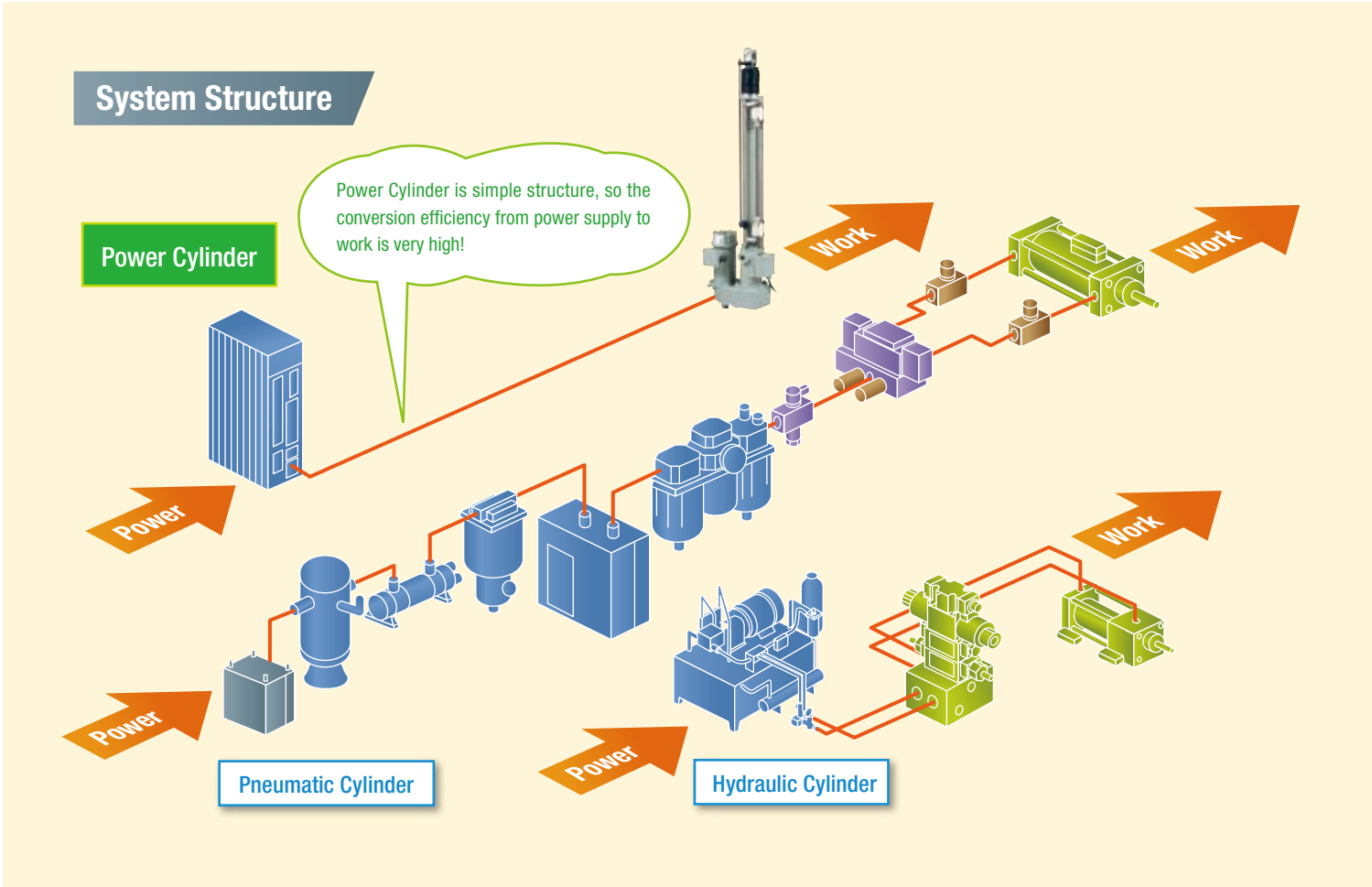
Clean operation is possible because there is oil leak.

• Easy installation

Unlike hydraulic cylinders, operation at a high place and under adverse environment is easier, because Power Cylinder does not require unit installation.

• Operable only by electrical wiring

All you need for operation is electrical wiring.



friendly”

User’s voice

Compared to Pneumatic Cylinder & Hydraulic Cylinder…

All area

■ We wanted energy saving products for future power shortage.
Oil/air leak maintenance frequency is reduced.
Easy speed control.
No more labor shortage for maintenance of oil system.

Shipbuilding, Hydraulic power, Sewer processing

■ It can avoid water & sea pollution by oil leak.

Medical

■ It is clean because of no oil leak.

Steel plant

■ The number of remote controls (long distance line) and pipe fittings is reduced.
■ Oil leak is a fire hazard at high temperature area.

Metalworking machine

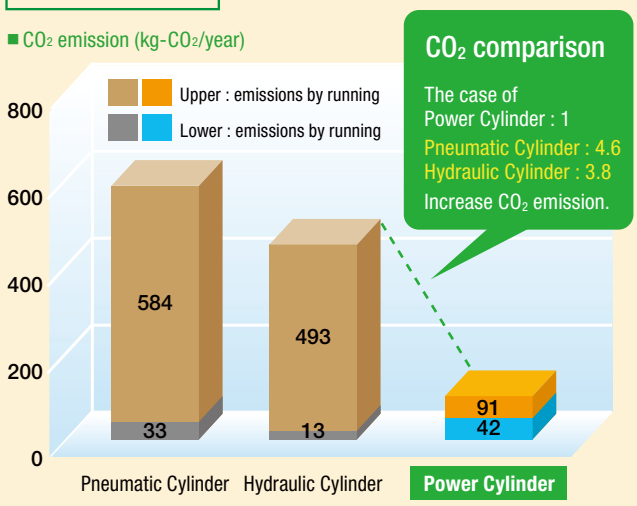
■ The positioning accuracy is better than Pneumatic Cylinder.
■ Several Power Cylinders can be synchronized.

LCA assessment of Power Cylinder

CO_2 emission

The comparison result by Shinko Research Co.,

■ CO_2 emission (kg-CO_2/year)

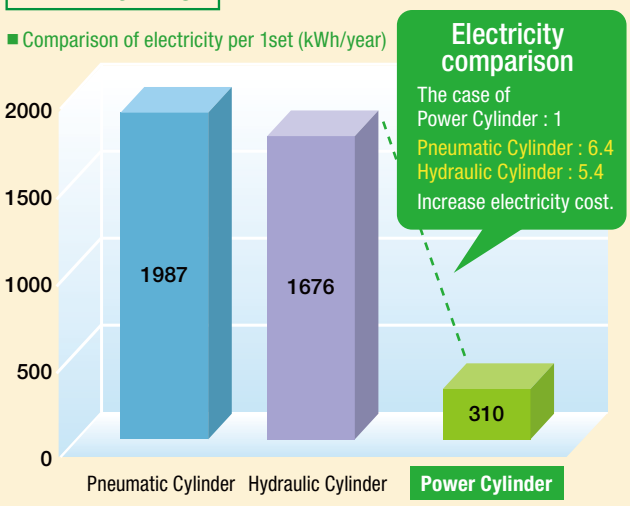


＜relation condition＞
■ thrust 3000N ■ speed 200mm/s ■ stroke 500mm ■ 1RT/min x 12hrs/day x 250days/year
■ included each drive (servo motor, hydraulic unit)

The data omits distribution, disposal, recycle “as equivalent” from LCA for comparison.
Reference : MiLCA ver1.0 by JEMAI, and other catalogs

Electricity usage

■ Comparison of electricity per 1set (kWh/year)



■ electric JPY22/kWH ■ 50cylinders usage

Electricity cost/ Plant

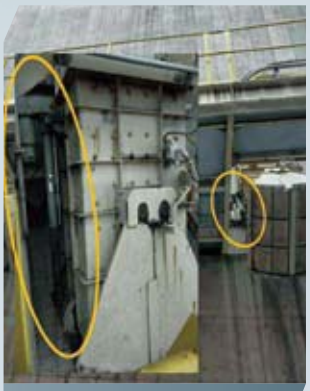
vs. Pneumatic Cylinder	▲1.85miilion yen/year	84% reduction
vs. Hydraulic Cylinder	▲1.5million yen/year	82% reduction

Power Cylinder T series

Motor Adapter type

High Performance linear actuators offering efficient, Clean and Quite drive... Environmental consciousness.

APPLICATION EXAMPLES



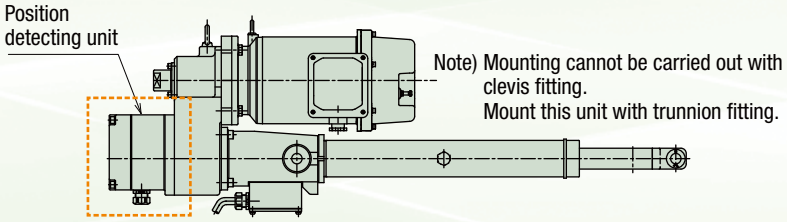
HOPPER GATE

HOPPER GATE

DIVERTER GATE

Customer can mount your desired motor on side. see page 11

We can also provide the unit equipped three phase motor with brake. see page 13



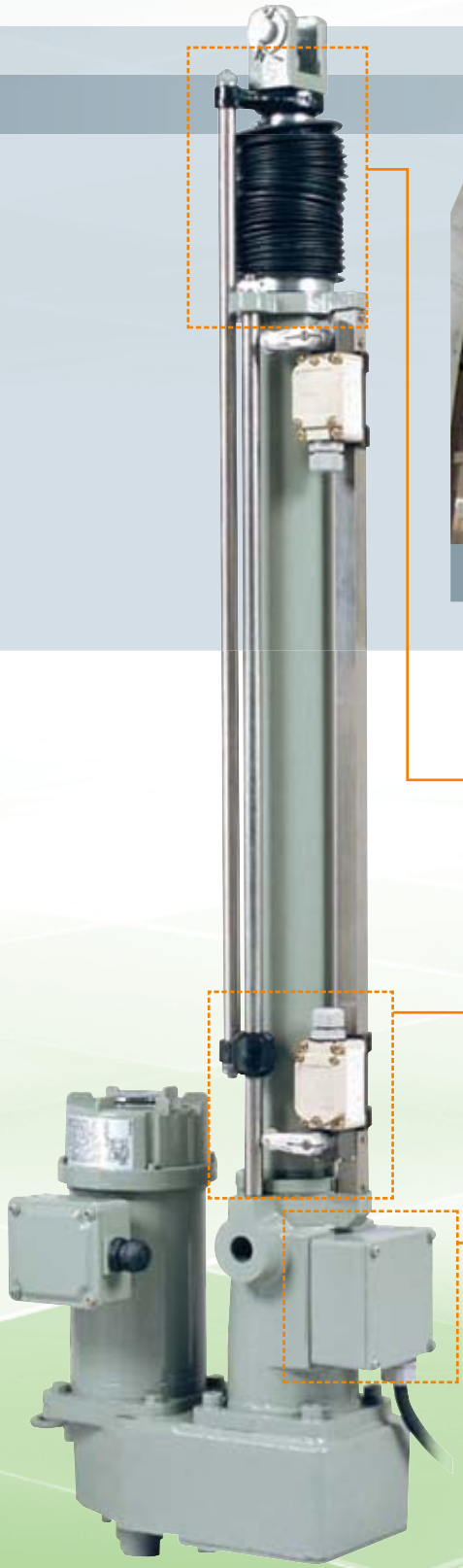
Internal Position sensor; Limit switch type: K2, K4

Available at your choice for signaling the position of the stroke. see page 34

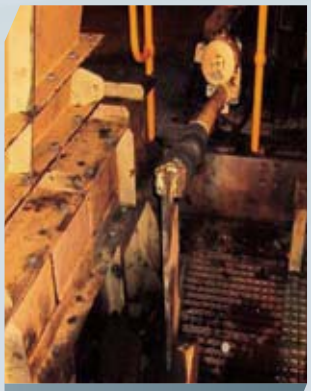
Positionmeter (Analog): P
Rotary Encoder (Digital): R

Available at your choice for remote control operation. see page 34

-Tough
-Extremely Durable
-Will exceed your expectations



SLIDE GATE



GATE SWITCHING

SHIP LOADER

Bellows: J

To be used in dusty areas
when needed.

External Limit switches: L

Available at your choice for adjusting the stroke
of the acuator.

Press Loaded Stopping Device; (LPTC type)

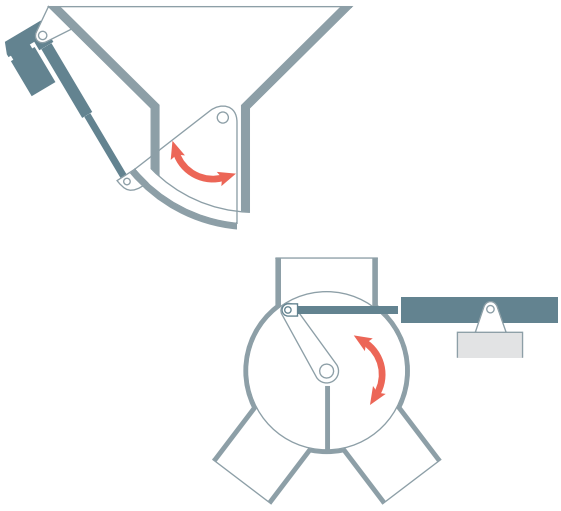
For safety and thrust sensing.
A combination of disk springs and limit switches is used to provide thrust sensing and press loaded stopping.

Examples of use

Opening and closing

Various types of opening and closing can be performed by changing the linear motion of power cylinders into turning force through link mechanisms or by using the linear motion as it is. The G series (GC type) and T series (TC type) that can press at the end are suitable. Those with a position detecting unit are used to indicate the degree of opening.

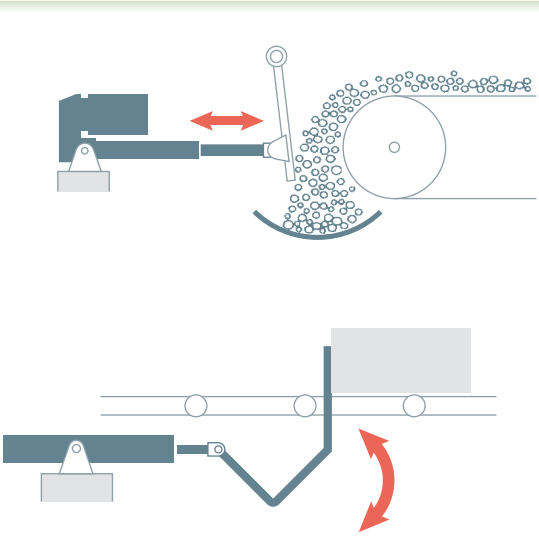
- Opening and closing of hopper gates
- Opening and closing of switching dampers
- Opening and closing of the lids of drying furnaces, incinerators, various kilns, etc.



Stopper

Conveyed objects can be stopped or changed in direction mainly through the link mechanisms in addition to the linear motion of power cylinders. Also, they can be stopped directly by power cylinders.

- Directional adjustments of the flows of conveyed objects on belt conveyors
- Stopper for conveyed objects on roller conveyors
- Stopper for materials in material cutting machines



Turnover

Conveyed objects can be turned over and transferred by the linear motion of power cylinders and simple supporting arrangements. Smooth operation can be performed with little backlash.

- Turnover devices for steel materials and packaged goods
- Lateral turning of wire bobbins
- Turnover of furnaces

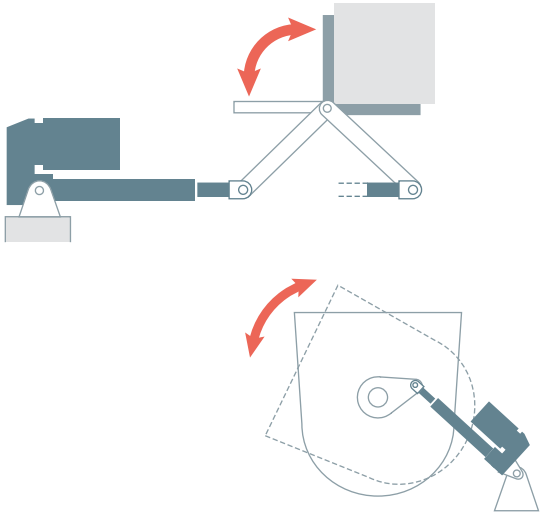


Table of Contens

Model No. designation

LP TB 1000 L 4 A LPCIJF

Power cylinder

T series

- **LPTB** : Wet slip clutch type
- **LPTC** : Thrust detection mechanism type

Thrust

250	: 2.45kN {250k g f}
500	: 4.90kN {500k g f}
1000	: 9.80kN {1000k g f}
2000	: 19.6kN {2000k g f}
4000	: 39.2kN {4000k g f}
6000	: 58.8kN {6000k g f}
8000	: 78.4kN {8000k g f}
12000	: 117kN {12000kgf}
16000	: 156kN {16000kgf}
32000	: 313kN {32000kgf}

Speed : **S, L, M, H**

Nominal stroke

2	: 200mm
3	: 300mm
5	: 500mm
10	: 1000mm

*The above values are examples of indication.

Motor Adapter type

With motor type; Refere to page 11

Options

L	: With two stroke adjusting external LSs
L3 *2	: With three stroke adjusting external LSs
K2,K4	: Position detecting internal LS
P	: Potentiometer
R	: Rotary encoder
C	: With clevis fitting *3
I	: I-shaped end fitting (no symbol for standard) *4
J	: With bellows *5
F	: Motor terminal box and external LS mirror image specifications

*2 When four or more clevises are installed, indicate this to us separately.
*3 The clevis fitting cannot be combined with K2, K4, P or R.
*4 For LPT6000 and above, the I-type end fitting is standard (no symbol).
*5 The stroke is not changed.

* The Trunnion fitting is not included in the body model number. Please separately specify a Trunnion model number.
* Manual operating handles are also available.

Standard model list

Power cylinder model			Rated thrust N	Rated thrust {kgf}	Nominal speed 50/60Hz mm/s	Motor output kW	Rod movement per one turn of manual shaft mm	Rod rotating force N•m	Rod rotating force {kgf•m}	Nominal stroke mm	Brake specifications
LPTB LPTC	250	S	2.45k	250	12.5/15	0.1	2.0	2.60	0.27	200, 300, 400 500, 600	(Note) With motor type ● DC brake ● Brake external wiring is available
		L			25/30	0.1	1.0				
		M			50/60	0.2	2.0				
		H			100/120	0.4	4.0				
LPTB LPTC	500	S	4.90k	500	12.5/15	0.1	2.0	5.20	0.53	200, 300, 400 500, 600, 800	
		L			25/30	0.2	1.0				
		M			50/60	0.4	2.0				
		H			100/120	0.75	3.9				
LPTB LPTC	1000	S	9.80k (7.84k)	1000 (800)	12.5/15	0.2	2.0	13.8	1.41	200, 300, 400 500, 600, 800 ※1000 (Rated thrust is 7.84kN)	
		L			25/30	0.4	1.0				
		M			50/60	0.75	2.0				
		H			100/120	1.5	4.0				
LPTB LPTC	2000	S	19.6k (15.6k) (12.2k)	2000 (1600) (1250)	12.5/15	0.4	2.0	34.7	3.54	200, 300, 400 500, 600, 800 ※1000 (Rated thrust is 15.7kN) ※1200 (Rated thrust is 12.2kN)	
		L			25/30	0.75	1.0				
		M			50/60	1.5	2.0				
		H			75/90	2.2	3.0				
LPTB LPTC	4000	S	39.2k (33.3k)	4000 (3400)	9/11	0.75	1.4	83.2	8.49	200, 300, 400 500, 600, 800 1000, 1200 ※1500 (Rated thrust is 33.3kN)	
		L			25/30	1.5	1.0				
		M			35/42	2.2	1.4				
		H			60/72	3.7	2.4				
LPTB LPTC	6000	S	58.8k	6000	6.3/7.6	0.75	1.0	124	12.7	500 1000 1500	
		L			17.5/21	1.5	0.7				
		M			25/30	2.2	1.0				
		H			42/50	3.7	1.7				
LPTB LPTC	8000	S	78.4k	8000	10/12	1.5	1.2	222	22.6	500 1000 1500	
		L			20/24	2.2	0.8				
		M			30/36	3.7	1.2				
		H			43/52	5.5	1.7				
LPTB LPTC	12000	L	117k	12000	10/12	2.2	1.2	333	34.0	500 1000 1500 2000	
		M			18/22	3.7	2.2				
		H			30/36	5.5	1.2				
LPTB LPTC	16000	L	156k	16000	14.5/17.5	3.7	2.9	666	67.9	500 1000 1500 2000	
		M			20/24	5.5	3.2				
		H			31/37	7.5	3.7				
LPTB LPTC	32000	L	313k	32000	10/12	5.5	0.4	1330	136	500 1000 1500 2000	
		M			15/18	7.5	0.6				
		H			20/24	11	0.8				

Note) The numerical value in parentheses on rated thrust is for the long stroke type.

1) The rated thrust is limited for the stroke marked with an*.
2) The speeds indicate a value at the motor synchronized rotating speed.

Motor specifications

Model	Totally enclosed self cooling type with brake
Output	Refer to Standard model dimensions list
Number of poles	4 poles
Voltage	3ϕ 200V/200V/220V
Frequency	50Hz/60Hz/60Hz
Heat resistance class	E (B for 1.5kW or less)
Time rating	S2 30min.
Protection method	Totally enclosed outdoor type (IP55)

1) 400/440V, different voltage specifications other than the above voltages are also available.
2) For motor current value and brake current value, refer to page 41.

Painting color

TSUBAKI olive gray (Munsell 5GY6/0.5 or approximate color)

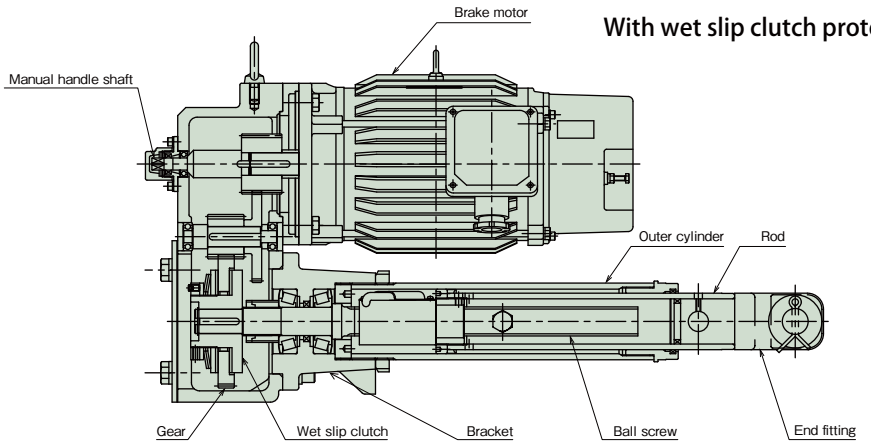
Standard use environment

Environment / Model	Ambient temperature	Relative humidity	Impact resistance value	Installation altitude	Atmosphere
Outdoor type	−15℃ ～ 40℃	85% or less (no dew condensation)	1G or less	1000m or lower above sea level	Normally outdoors

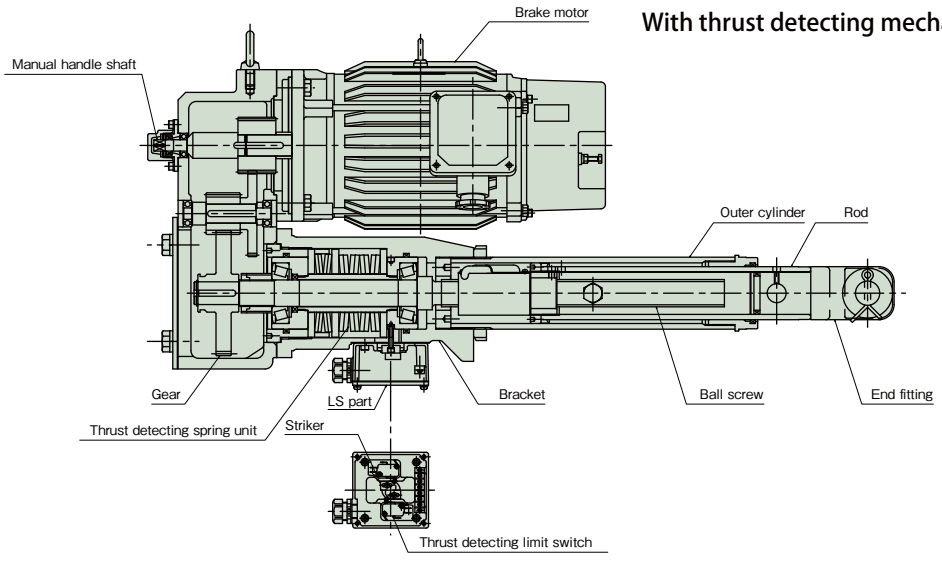
1) Cylinders with bellows are recommended in an excessively dusty location.
2) Special painting is available for locations exposed to sea breezes and salt. Consult us.
3) All models are totally enclosed structures so that they can be used normally outdoors, however, under adverse conditions exposed to constant water and steam etc., and snow accumulation, although they are an outdoors type, an appropriate cover is required. When using at 40℃ or higher, always protect with a heat insulating cover, etc. Never use in a flammable atmosphere, otherwise it may cause an explosion and fire. In addition, avoid using it in a location where vibration or shock exceeding 1G is applied.
4) For use in a misty atmosphere, contact us.

Structure

TB type — With wet slip clutch protection device (Basic type)



TC type — With thrust detecting mechanism (Basic type)



* The structure slightly varies depending on the model.

Brake motor

This motor adopts a deenergization operation type (spring close type), and the brake is applied while the cylinder stops. This brake action holds load while the power cylinder stops and reduces coasting during stoppage, and serves the purpose of increasing stop accuracy. All of the brake motors adopt outdoor types.

Reduction part

The reduction part adopts a combination of a helical gear on the high speed side and a spur gear on the low speed side.
The lubrication method is grease bath type, and has a quiet operating specification. Furthermore, a manual handle shaft is provided, and the structure of the speed reducer facilitates operation at power failure and adjustment for installation.
As options, various position detecting devices can be installed.

Actuation part

The actuation part is provided with a ball screw and nut which converts a rotating force into linear motion. Further, external limit switches for stroke adjustment can be mounted.
A high precision ball screw and nut have advantages such as high transmission efficiency, less wear, long life and easy lubrication.
The external limit switches for stroke adjustment are structured to freely adjust the stroke and endure outdoor use. The bellows are excellent in weatherproofing, and the stroke does not change even if the bellows are mounted.
The seal for the rod also endures outdoor use.

Motor Adapter type

Features

- Power Cylinder Motor Adapter types are cylinder on which you can easily mount a motor with a brake, such as **your regional standard motor, global standard motor (e.g. UL, CE, CCC), or pressure-resistant explosion-proof motor.**
- Available for **IEC standard flange motor.**
- Motor Adaptor type cylinder which is for a NEMA motor, a servo motor, and a special shaft-end motor is also available.
  Please contact us for detail.

This cylinder can be installed to motors conforming to the "IEC" standard.

Model No. indication

LPTB500L6AL -TK

Motor spec

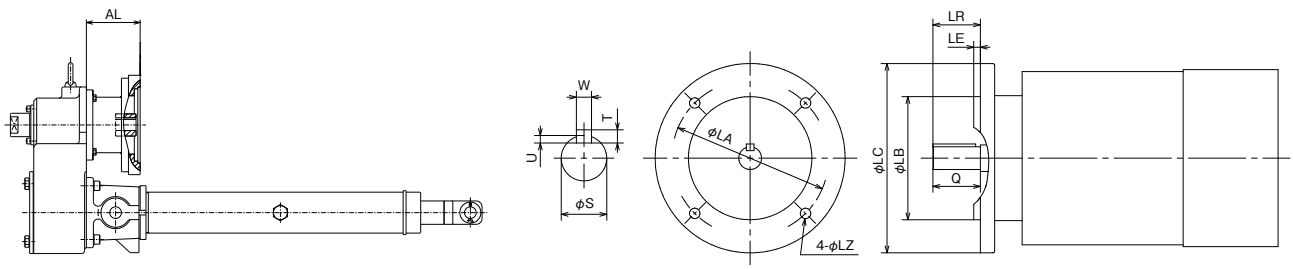
In order to exert the same capacity as those of the Power Cylinder T series.
The motor start torque should be "**200%**" of the rated torque or more
and the brake torque should be "**150%**" of the rated torque or more.

Dimensions of input section

(mm)

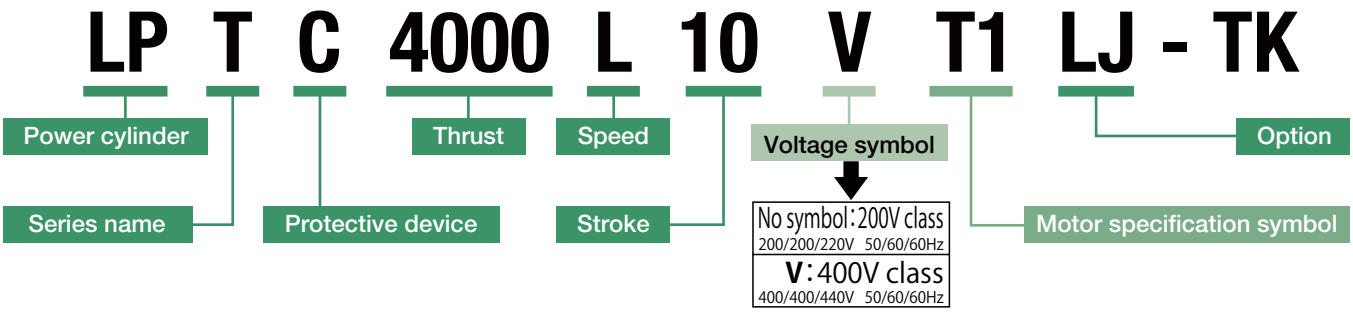
Model	Speed	Motor output 4P-(kW)	Motor size	Dimension AL
LPTB LPTC 250	S	0.1	63	80
	L	0.1	63	72
	M	0.2	63	72
	H	0.4	71M	72
LPTB LPTC 500	S	0.1	63	80
	L	0.2	63	72
	M	0.4	71M	72
	H	0.75	80M	92
LPTB LPTC 1000	S	0.2	63	80
	L	0.4	71M	72
	M	0.75	80M	92
	H	1.5	90L	92
LPTB LPTC 2000	S	0.4	71M	85
	L	0.75	80M	72
	M	1.5	90L	72
	H	Please contact us		
LPTB LPTC 4000	S	0.75	80M	90
	L	1.5	90L	72
	M	2.2	100L	116
	H	3.7	112M	116
LPTB LPTC 6000	S	0.75	80M	90
	L	1.5	90L	75
	M	2.2	100L	116
	H	3.7	112M	116
LPTB LPTC 8000	S	1.5	90L	137
	L	2.2	100L	96
	M	3.7	112M	96
	H	5.5	132S	121
LPTB LPTC 12000	L	2.2	100L	145
	M	3.7	112M	145
	H	5.5	132S	121
LPTB LPTC 16000	L	3.7	112M	145
	M	5.5	132S	170
	H	7.5	132M	170
LPTB LPTC 32000	L,M,H	Please contact us		

IEC flange	IEC flange dimension										
	LA	LB	LC	LE	LR	LZ	Q	S	W	T	U
FF130	130	110 j6	160	3.5	23	10	23	11 h6	4	4	2.5
FF130	130	110 j6	160	3.5	23	10	23	11 h6	4	4	2.5
FF130	130	110 j6	160	3.5	23	10	23	11 h6	4	4	2.5
FF130	130	110 j6	160	3.5	30	10	30	14 j6	5	5	3
FF130	130	110 j6	160	3.5	23	10	23	11 h6	4	4	2.5
FF130	130	110 j6	160	3.5	23	10	23	11 h6	4	4	2.5
FF130	130	110 j6	160	3.5	30	10	30	14 j6	5	5	3
FF165	165	130 j6	200	3.5	40	12	40	19 j6	6	6	3.5
FF130	130	110 j6	160	3.5	23	10	23	11 h6	4	4	2.5
FF130	130	110 j6	160	3.5	30	10	30	14 j6	5	5	3
FF165	165	130 j6	200	3.5	40	12	40	19 j6	6	6	3.5
FF165	165	130 j6	200	3.5	50	12	50	24 j6	8	7	4
FF130	130	110 j6	160	3.5	30	10	30	14 j6	5	5	3
FF165	165	130 j6	200	3.5	40	12	40	19 j6	6	6	3.5
FF165	165	130 j6	200	3.5	50	12	50	24 j6	8	7	4
Please contact us											
FF165	165	130 j6	200	3.5	40	12	40	19 j6	6	6	3.5
FF165	165	130 j6	200	3.5	50	12	50	24 j6	8	7	4
FF215	215	180 j6	250	4	60	14.5	60	28 j6	8	7	4
FF215	215	180 j6	250	4	60	14.5	60	28 j6	8	7	4
FF165	165	130 j6	200	3.5	40	12	40	19 j6	6	6	3.5
FF165	165	130 j6	200	3.5	50	12	50	24 j6	8	7	4
FF215	215	180 j6	250	4	60	14.5	60	28 j6	8	7	4
FF215	215	180 j6	250	4	60	14.5	60	28 j6	8	7	4
FF165	165	130 j6	200	3.5	50	12	50	24 j6	8	7	4
FF215	215	180 j6	250	4	60	14.5	60	28 j6	8	7	4
FF215	215	180 j6	250	4	60	14.5	60	28 j6	8	7	4
FF265	265	230 j6	300	4	80	14.5	80	38 k6	10	5	8
FF215	215	180 j6	250	4	60	14.5	60	28 j6	8	7	4
FF215	215	180 j6	250	4	60	14.5	60	28 j6	8	7	4
FF265	265	230 j6	300	4	80	14.5	80	38 k6	10	5	8
FF215	215	180 j6	250	4	60	14.5	60	28 j6	8	7	4
FF215	265	230 j6	300	4	80	14.5	80	38 k6	10	5	8
FF215	265	230 j6	300	4	80	14.5	80	38 k6	10	5	8
Please contact us											



With Motor type

Model No. designation



Special Brake motor

1 Heat resistance specification: T

Compared with conventional products, substantial reductions in delivery time and price reduction have been realized. Also, heat resistance class "H", which would conventionally be unavailable, can be met.

<Common specifications>
- Adaptable motor capacity: 0.1kW – 1.5kW
- Totally outdoor type (IP55) with brake (The heat resistance class of the brake is B.)

Heat resistance class "F" supported

40°C

■Model No.: T1 (200V class), VT1 (400V class),
V1T1 (380V, 50Hz), V2T1 (380V, 60Hz),
V3T1 (415V, 50Hz), V4T1 (460V, 60Hz)
Usable temperature range: 0 – 40°C (non-condensing)
Duty factor: 25%ED
Rating: S2 30min.
Brake power supply module: Built into the terminal box

60°C

■Model No.: T2 (200V class), VT2 (400V class),
V1T2 (380V, 50Hz), V2T2 (380V, 60Hz),
V3T2 (415V, 50Hz), V4T2 (460V, 60Hz)
Usable temperature range: 0 – 60°C (non-condensing)
Duty factor: 15%ED
Rating: S2 15min.
Brake power supply module: Separate placement (standard DC module)
* Install in a 40°C or lower environment.
* If being built into the terminal box is desired, contact us.

80°C

■Model No.: T3 (200V class), VT3 (400V class), V1T3 (380V, 50Hz), V2T3 (380V, 60Hz), V3T3 (415V, 50Hz), V4T3 (460V, 60Hz)
Usable temperature range: 0 – 80°C (non-condensing)
Duty factor: 5%ED
Rating: S2 5min.
Brake power supply module: Separate placement (standard DC module)
* Install in a 40°C or lower environment.
* If being built into the terminal box is desired, contact us.

Heat resistance class "H" supported

■Model No.: T4 (200V class), VT4 (400V class), V1T4 (380V, 50Hz), V2T4 (380V, 60Hz), V3T4 (415V, 50Hz), V4T4 (460V, 60Hz)
Usable temperature range: 0 – 80°C (non-condensing) * We will confirm the duty factor and rating in each case.
Duty factor: 15%ED
Rating: S2 15min.
Brake power supply module: Separate placement (special DC module)
* Install in a 40°C or lower environment.
* The motor terminal is a lug type.

2 Different voltage specification: V

We will deliver conventionally-available different voltage motors in a short period of time. Also, an estimation request and arrangements can be made smoothly through model-numbering of each voltage.

<Common specifications>
- Adaptable motor capacity: 0.1kW – 1.5kW
- Totally outdoor type (IP55) with brake
- Heat resistance class B

Different voltage supported

Reference delivery time + one week

■Model No.: V1 (380V, 50Hz), V2 (380V, 60Hz), V3 (415V, 50Hz),
V4 (460V, 60Hz)
Usable temperature range: -15 – 40°C (non-condensing)
Duty factor: 25%ED
Rating: S2 30min.
Brake power supply module: Built into the terminal box

■Note
- For using the brakes by external wiring, contact us.

3 Inverter specification: Z

Compared with conventional products, substantial reduction in delivery time and price reduction have been realized. The controllability of power cylinders has been improved as speed control including acceleration and deceleration and speed variations can be performed easily. Also, outdoor type with brake is standard.

<Common specifications>
- Adaptable motor capacity: 0.1kW – 1.5kW
- Totally outdoor type (IP55) with brake (The heat resistance class of the brake is B.)
- Heat resistance class F
- Constant torque operation can be performed in the range of 6 – 60Hz.

Inverter drive supported

■Model No.: Z (200V class), ZV (400V class)
Usable temperature range: 0 – 40°C (non-condensing)
Duty factor: 25%ED
Rating: S2 30min.
Brake power supply module: Built into the terminal box

* Apply not inverter output but normal power supply voltage to the brake power supply module. Applicable power supply voltage is 200 – 220V for 200V class and 400 – 440V for 400V class.

4 Global specification: N

Power cylinders conforming to worldwide directives, standards and systems (CE, UL and CCC) are available. They can be used for equipment to be exported abroad.

<Common specifications>
- Adaptable motor capacity: 0.1kW – 0.4kW
- Usable temperature range: -15 – 40°C (non-condensing)
- Totally indoor type with brake

■Note
- Only brake motors are compliant with the standards. If limit switches, etc., are required, contact us.

CE-compliant

■Model No.: Z (200V class), VN (400V class)
■Specifications (both N and VN)
Protection class: IP20
Heat resistance class: B

Target directive and standard
Target directive: Low Voltage Directive 73/23/EEC
Target standard: EN60034-1 (general motor regulations)

Products to be exported to the European market must be CE-marked to prove conformity with safety requirements provided by EC Directives. (Being “CE-compliant” is to affix a “CE mark” to products to prove conformity with EC Directives.)

UL-compliant

■Model No.: N2 (230/240V, 60/60Hz),
VN2 (460V, 60Hz)
■Specifications (both N2 and VN2)
Protection class: IP20
Heat resistance class: A

Target standard and file No.
Target standard: UL1004
UL file No.: E225995

UL is an abbreviation for “Underwriters Laboratories” which represents safety standards for testing in the U.S. (Being “UL-compliant” is to affix a “UL mark” to products to prove UL standard certification with use of UL-standard-accredited motors.) Our certification in C-UR model conforms with both UL and CSA standards.

CCC-compliant

■Model No.: N3 (200/220/200/220V, 50/50 60/60Hz)
* Only 200/220V, 50/60Hz for 0.4kW.
VN3 (380V/50Hz)
■Specifications (both N3 and VN3)
Protection class: IP23
Heat resistance class: E

National standard: GB12350

CCC is the China Compulsory Certification system, and for exporting 1.1kW or smaller motors to China, it is necessary to indicate a “CCC mark” to prove compulsory certification.
We have received certification from the CQC (China Quality Certification Center).

5 Explosion-proof specification: D

Power cylinders adaptable to explosion-proof structures, which can be used in class 1 and class 2 hazardous locations, can be delivered in a short period of time. A vessel having an explosion-proof structure withstands the pressure of an explosion of explosive gas, if caused inside the vessel, and poses no danger of catching fire with external explosive gas.

<Common specifications>
- Adaptable motor capacity: 0.2kW – 1.5kW
- Totally outdoor type (IP44) with brake
- Heat resistance class B

■Note
- Inverters cannot be used.
- Stroke adjusting external limit switches are available. Contact us.
- LPTC (thrust detection mechanism type) and the position detecting unit part cannot be explosion-proof.
- Brakes cannot be used by external wiring.

d2G4-compliantd

■Model No.: D (200V class), VD (400V class)
Usable temperature range: -10 – 40°C (non-condensing)
Duty factor: 25%ED
Rating: S3 40%.
Brake power supply module: None (AC brake)

Classification of usage for LPTB and LPTC types

Both types of the power cylinders have the same basic functions (thrust, speed, stroke), however, each has its feature as regards the mechanism. Read the following to select the optimum type.

TB type

● Wet slip clutch type (simple type)

[Wet slip clutch]

The screw shaft end of the reduction part incorporates a slip clutch which operates stably in grease as a safety device.
Adoption of special lining exerts a protective function even at the time of overload or stroke overextension.
* When overload is electrically detected, use in combination with our shock relay is recommended.

TC type

● Thrust detecting mechanism type

This type exerts its effect in the following cases.

① When performing press (pull) stop

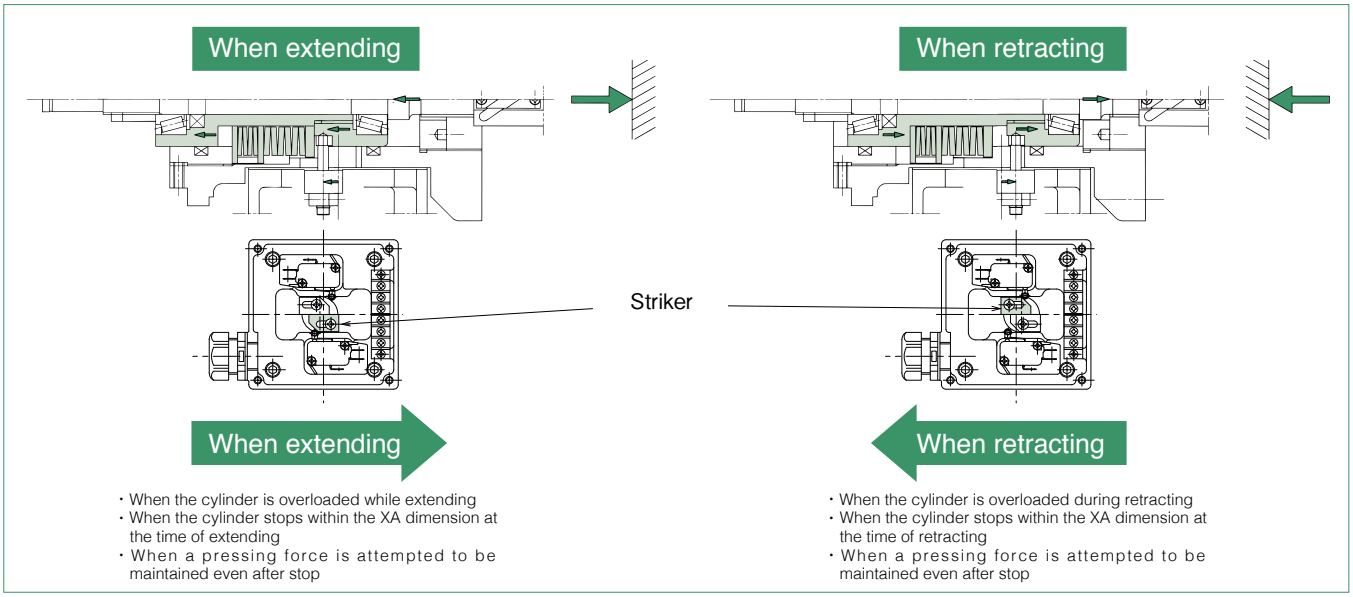
② When requiring an electric signal at the time of overload

③ When an overload is possibly applied from the load side during stop

When an overload is impulsively applied, the incorporated spring absorbs the impact load.

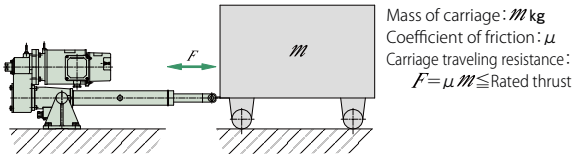
[Thrust detecting mechanism]

This is a thrust detecting mechanism which combines two types of pre-loaded disc springs whose spring constants are different from each other and limit switches. The combined effect of these disc springs also allows for press and stop of the high speed type. (There is only one type for the 6000 type and larger.)



Preset thrust for safety device

For both of the TB type and TC type, the thrust for the safety device has been set to approximately 150% to 200% of the rated thrust. The safety device does not work at the start for opening/closing of the damper or the hopper gate, normal reverse, inclination and elevation, however, when a load inertia is large due to horizontal movement of carriage, the safety device may work to impair smooth operation at the start. For the allowable mass m of each model, see Table 4 on page 18.



Cautions for use

● When pressing (pulling) and stopping at high frequency

When using the power cylinder at a frequency of ten or more times a day, refer to the total stop times for every model in the following table.

Type	LPTC250～LPTC4000			LPTC6000～LPTC32000		
Speed	S,L	M	H	S,L	M	H
Reference total stop times (×10⁴times)	30	10	5	10	3	1

Note) When the power cylinder is used for press (pull) contact stopping, external wiring is recommended for the wire connection of the brake.
Note) When the power cylinder is used exceeding the values on the above table, it is recommended to stop with the stroke adjusting LS.
Note) When the power cylinder is used with press (pull) stop, strength of the mating equipment shall be 250% or more of the rated thrust.

● When multiple operation or stroke position control is performed

① When installing rotary encoder or potentiometer

For the TC type, a spring mechanism is built in the operating part. The spring slightly deflects at press (pull) and stop, or when overload occurs, the signal amount deviates by the deflection. For the TB type, even if the safety device is tripped, signal amount does not deviate. However, the TC type can be used at normal stroke operation.

② When there is a problem with movement of the rod even if overload is applied from load side during stop

For the TC type, a spring mechanism is built in the operating part, therefore, when a large load is applied from the load side, the spring deflects and the rod moves by the deflection.
When the load is eliminated, the rod returns to the original position.

Selection 1

Conditions of use required for selection

1. Machine to be used and application
2. Thrust or load N { kgf }
3. Stroke mm
4. Speed mm/s
5. Frequency of operation, cycles/min.
6. Hours of operation and annual number of operating days
7. Type of load of machine used
8. Environment of use
9. Power voltage, frequency

Selection procedures

Determination of model STEP 1

Determine the type (TB or TC) according to the use environment and method of operation.

Determination of model No. STEP 2

1. Obtain annual traveling distance from the stroke, frequency of operation and hours of operation.

   Annual traveling distance km = Actual stroke m
   x Frequency of use/day x number of operating days x 10^{-3}

2. Obtain the operation factor from the characteristics of load and the machine used, referring to Table 1.
3. Multiply thrust or load by operation factor to obtain a corrected thrust.
4. Determine the frame No. from the "Expected Traveling Distance" shown below on this page according to the corrected thrust and annual traveling distance, and select an applicable model No. from the standard model list (page 9) based on the stroke, speed, power supply voltage and frequency.

Characteristics check STEP 3

1. Use the power cylinder at a frequency of operation below the allowable frequency of operation (Table 2).
2. Check the load time ratio.
3. Positioning accuracy varies depending on the stopping method. Refer to the stopping method (page 17).

Table 1 Operation factor

Characteristics of load	Example of machine used	Operation factor
Smooth operation without impact Small inertia	Damper, opening/closing of valve, conveyor changeover device	1.0～1.3
Operation with light impact Intermediate inertia	Opening/closing of hopper gate, various transfer equipment, various lifter elevation	1.3～1.5
Operation with large impact and vibration Large inertia	Heavy object conveyance by carriage, buffer for belt conveyor, inversion opening/closing device for large lid	1.5～3.0

Note) The above operation factor table shows general guidelines.
Therefore, make a determination in consideration of operating conditions.

Table 2 Allowable frequency of operation

Type	LPTB・LPTC	LPTB・LPTC	LPTB・LPTC	LPTB・LPTC	LPTB・LPTC	LPTB・LPTC	LPTB・LPTC	LPTB・LPTC	LPTB・LPTC	LPTB・LPTC
Power cylinder model	250S 250L 500S	250M 500L 1000S	250H 500M 1000L 2000S	500H 1000M 2000L 4000S 6000S	1000H 2000M 4000L 6000L 8000S	2000H 4000M 6000M 8000L 12000L	4000H 6000H 8000M 12000M 16000L	8000H 12000H 16000M 32000L	16000H 32000M	32000H
Number of starting times (Number of times/min)	5	5	5	4	4	4	4	3	3	2
Load time ratio(%ED)	25%ED									

Note) The above frequencies of operation are values determined by heat generation of the motor. They are not values taking life of the cylinder body into consideration.

Allowable frequency of operation for the power cylinder T series is within a range which satisfies the number of starting times and load time ratio in the above table. The load time ratio is expressed by the following equation.

$$\text{Load time ratio (\%ED)} = \frac{\text{Operation time of one cycle}}{\text{(Operation time of one cycle + dwell time)}} \times 100\%$$

Guide for life

Use the number of operation times of the brake and the traveling distance of the cylinder (nut) as a guide for product life of the power cylinder T series to select the cylinder (nut).

1. Number of operation times of brake
   Expected life 2 million times

2. Traveling distance of cylinder (nut)

The life of a ball screw is determined by flaking of the rolling surface caused by its fatigue. Check the rough life with this chart of expected traveling distance. However, in the case of great impact or in the case where lubrication or maintenance is not performed properly, the expected traveling distance becomes substantially short.

Expected traveling distance (km) = actual load stroke (m) × frequency of use (times/day) × number of operating days × 10^{-3} × expected number of years

The chart on the right-hand side is based on L10 life. L10 life expresses in traveling distance a life that can be reached by 90% or more of all ball screws. If you select a power cylinder based on the life, select model No. from this chart.
If the load greatly fluctuates in the middle of stroke, calculate the equivalent load (P_M) by the following equation.

$$P_M = \frac{P_{MIN} + 2 \times P_{MAX}}{3}$$

P_M : Equivalent load N { kgf }
P_{MIN} : Minimum load N { kgf }
P_{MAX} : Maximum load N { kgf }

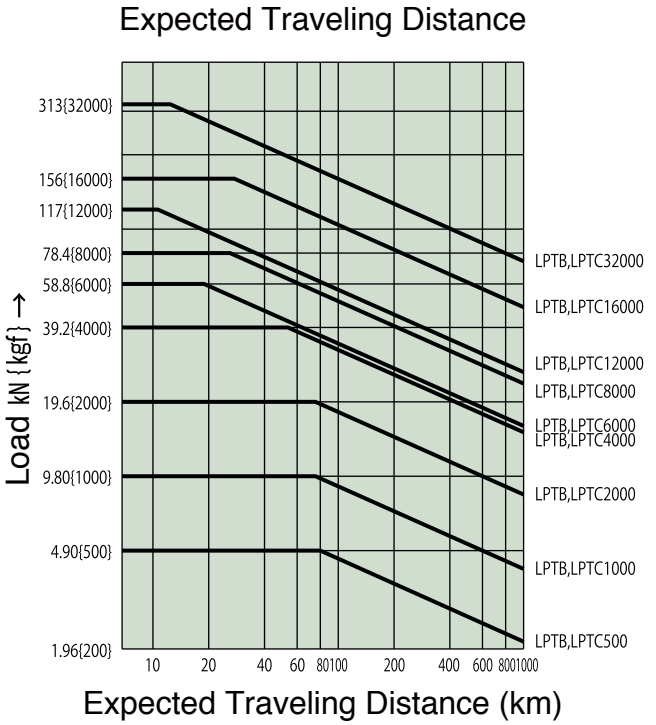
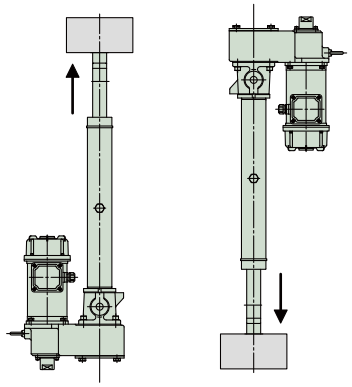


Table 3 Coasting distance and stop accuracy (Reference value)

Unit: mm

Model	Usage	Brake internal connection				Brake external connection			
		Lifting load		Suspended load		Lifting load		Suspended load	
		Coasting distance	Stop accuracy	Coasting distance	Stop accuracy	Coasting distance	Stop accuracy	Coasting distance	Stop accuracy
LPTB LPTC 250	S	2.2	±0.4	3.0	±0.6	1.9	±0.3	2.7	±0.5
	L	4.3	±0.8	8.5	±2.1	3.7	±0.6	7.8	±1.9
	M	6.9	±1.4	12.4	±3.2	6.0	±1.1	11.4	±2.9
	H	13.7	±2.7	27.3	±7.3	12.5	±2.4	26.1	±6.9
LPTB LPTC 500	S	2.1	±0.4	3.7	±0.9	1.8	±0.3	3.3	±0.8
	L	3.6	±0.7	6.1	±1.6	3.1	±0.6	5.6	±1.4
	M	6.5	±1.3	11.4	±2.9	5.9	±1.2	10.8	±2.7
	H	12.7	±2.7	22.3	±5.9	10.2	±2.0	19.6	±5.2
LPTB LPTC 1000	S	1.7	±0.4	2.8	±0.7	1.5	±0.3	2.5	±0.6
	L	3.2	±0.7	5.4	±1.4	2.9	±0.6	5.1	±1.2
	M	6.3	±1.4	10.2	±2.6	5.0	±1.0	8.8	±2.2
	H	15.6	±3.3	27.6	±7.7	10.4	±2.0	22.1	±6.3
LPTB LPTC 2000	S	1.7	±0.4	2.7	±0.7	1.5	±0.3	2.5	±0.6
	L	3.2	±0.7	5.0	±1.3	2.5	±0.5	4.2	±1.0
	M	7.7	±1.7	12.7	±3.4	5.2	±1.0	10.0	±2.7
	H	13.3	±2.9	22.8	±6.4	8.0	±1.6	17.1	±4.9
LPTB LPTC 4000	S	1.2	±0.3	1.6	±0.4	0.9	±0.2	1.3	±0.3
	L	3.8	±0.8	5.9	±1.5	2.5	±0.5	4.5	±1.1
	M	6.4	±1.4	9.9	±2.6	3.8	±0.8	7.2	±1.9
	H	10.9	±2.4	16.9	±4.4	6.6	±1.3	12.3	±3.2
LPTB LPTC 6000	S	0.6	±0.2	0.8	±0.2	0.5	±0.1	0.6	±0.1
	L	2.7	±0.6	4.4	±1.2	1.8	±0.4	3.4	±0.9
	M	4.5	±1.0	7.4	±2.0	2.7	±0.5	5.5	±1.5
	H	7.6	±1.7	12.2	±3.2	4.6	±0.9	9.0	±2.4
LPTB LPTC 8000	S	1.9	±0.4	2.9	±0.7	1.3	±0.2	2.2	±0.5
	L	3.6	±0.8	5.8	±1.6	2.2	±0.4	4.3	±1.1
	M	5.6	±1.2	8.4	±2.1	3.4	±0.7	6.1	±1.5
	H	—	—	—	—	5.4	±1.0	8.7	±2.0
LPTB LPTC 12000	L	2.1	±0.5	3.0	±0.8	1.3	±0.2	2.2	±0.5
	M	3.5	±0.8	5.1	±1.3	2.1	±0.4	3.6	±0.9
	H	—	—	—	—	3.6	±0.7	5.9	±1.4
LPTB LPTC 16000	L	2.8	±0.6	4.0	±1.0	1.7	±0.3	2.8	±0.7
	M	—	—	—	—	2.6	±0.5	4.0	±0.9
	H	—	—	—	—	3.9	±0.7	8.6	±2.4
LPTB LPTC 32000	L	—	—	—	—	1.3	±0.3	2.0	±0.4
	M	—	—	—	—	2.0	±0.4	4.2	±1.1
	H	—	—	—	—	2.7	±0.5	4.4	±1.0

Fig. 1 Type of load



Note) Anti-rod rotation is required for actual operation.

Brake holding force

Load holding force while the power cylinder stops is generated more than the rated thrust, therefore, it can be used for holding load of the rated thrust.
This holding force is generated by the braking operation of the brake motor. The brake is of a spring braking type that always performs braking operation by spring force during stoppage, and brake torque has a holding force of 150% or more of the motor rated torque.

Stoppage

This method operates and stops the brake by the limit switch or operation of the stop button, and allows for positioning on multi-stages such as the upper limit, lower limit and middle of the stroke. Coasting distance and stop accuracy vary depending on operating speed and load. When accurate positioning is required, low operation speed or brake individual turnoff is recommended. Take coasting distance into consideration to set the limit switch and the output stop signal. Reference values are shown in Table 3.

Coasting distance: This indicates a distance from a time when the limit switch or the stop button is operated until the cylinder stops. This coasting distance varies depending on how the load is applied and the operation circuit.
Stop accuracy: This indicates variation of the stop position when stop is repeated.

* When selecting the H speed, refer to the cautions for selecting on page 44.
* Select a power cylinder of a sufficient thrust, allowing for a safety rate so that the loads used (static and dynamic) do not exceed the rated thrust.

Example of selection

1. Operation method：Opening degree adjustment type damper open/close (Stop at middle two points, press and stop at extend limit and retract limit)
2. Required thrust：12.7kN {1300kgf}
3. Stroke：600mm
4. Speed：600mm/s for approximately 20 seconds
5. Frequency of operation：One reciprocation/10 minutes (6 reciprocations/hour)
6. Operating time：10 hours/day, 250 days operation/year, durable years approximately 5 years
7. Characteristics of load：Operation with light impact, loaded when extend and retract
8. Use environment：Outdoor installation, much dust, temperature 0℃～35℃
9. Power source：220V 60Hz

<Determination of type>: With press and stop, internal stop → Select TC type

<Determination of model No.>: 1. Operation factor：1.3

2. Corrected thrust：12.7kN {1300kgf} ×1.3＝16.5kN {1680kgf}

3. Model No.：LPTC 2000L6 K2 J
Stop at two middle points — With bellows (much dust)

<Characteristics check>: 1. Number of starting times

● Number of starting：2 times/10min＜4 times/min

●Load time ratio：$\frac{\frac{600}{30}\times 2}{10\times 60}\times 100=6.7\%<25\%$

2. Number of total press (pull) stop times：2 times/1 reciprocation, durable years: 5 years (250 days/year)
$2\times 6\times 10\times 250\times 5=15\times 10^4$ times＜30×10^4 times

<Life check>: 1. Annual traveling distance：$0.6\times 2\times 6$ times/hour×10 hours/day×250 days/year×10^{-3}＝18km

2. Expected traveling life：18km×5 years＝90km

3. Equivalent load：$P_M=\frac{16.5+16.5\times 2}{3}=16.5$kN {1680kgf}
This calculated value satisfies the expected traveling life of LPTC 2000 according to the load-life diagram on page 16.

Selection 2

Table 4 Allowable mass in consideration of inertia at time of horizontal drive

Unit: kg

Power cylinder model	LPTB LPTC : 250			LPTB LPTC : 500			LPTB LPTC : 1000			LPTB LPTC : 2000			LPTB LPTC : 4000		
	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H
Allowable mass *m*	4300	1500	850	5500	2650	950	10000	3200	2200	12300	8400	7100	31800	26000	16800

Power cylinder model	LPTB LPTC : 6000			LPTB LPTC : 8000			LPTB LPTC : 12000			LPTB LPTC : 16000			LPTB LPTC : 32000		
	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H
Allowable mass *m*	73000	60000	39000	106000	69000	86000	271000	158000	200000	274000	344000	189000	1368000	761000	860000

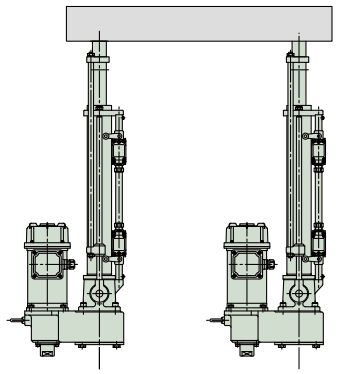
Note) There is no problem with low speed S.

Selection 3

Multiple operation method

As shown in Fig. 2, transfer or elevation can be carried out by sharing load on some power cylinders.
This is because there is less speed fluctuation due to variation in load. For selection, pay attention to the items at the right.

Fig. 2 Linkage operation by some power cylinders



Control method

To start, turn on the power for all of the cylinders, and stop them with the limit switches installed on each power cylinder. When all of the cylinders are controlled with one limit switch, stroke error is accumulated, therefore, avoid controlling with one limit switch.
For an example of the control circuit, refer to example of the multiple circuit (page 42).

Multiple accuracy

Variation in speed of each power cylinder during operation is generated due to variation in load, and is generally approximately 5%. For variation at stop, refer to the stop accuracy in Table 4. When synchronizing power cylinders, use the multi-series.

$$\text{Thrust per one cylinder} = \frac{\text{Required thrust N \{kgf\}}}{\text{Number of power cylinders to be used} \times \text{Multiple factor}}$$

Table 5 Multiple factor

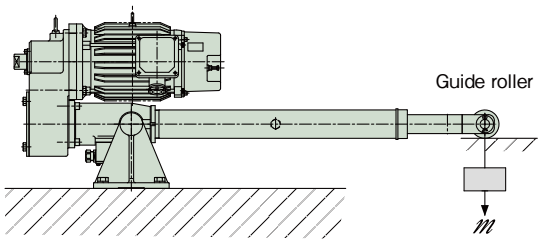
Number of power cylinders used	2 cylinders	3 cylinders	4 cylinders	5 cylinders	6 cylinders
Multiple factor	0.8	0.7	0.6	0.55	0.5

Cautions for layout

When the load is in the right angle direction (lateral load) or load of which direction is biased (biased load) is applied on the rod, take the following countermeasures.

① Lateral load Install guide roller etc., on the rod part. (Fig. 3)

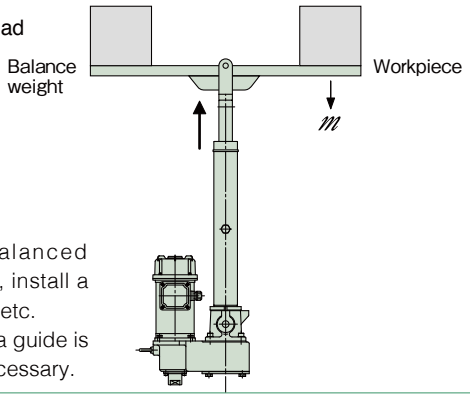
Fig. 3 Lateral load



Avoid directly applying a lateral load and install a guide roller.

② Biased load Install balance weight etc. (Fig. 4)

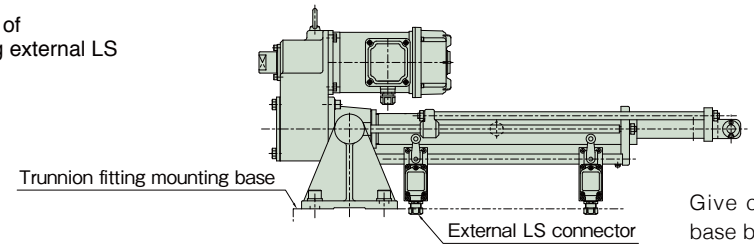
Fig. 4 Biased load



When an unbalanced load is applied, install a balance weight etc.
* In this layout, a guide is separately necessary.

③ Anti-rod rotation --- A rotating force is generated on the rod with thrust (page 9), therefore, prevent rotation on the equipment side.
④ Vertical installation of stroke adjusting external LS (stroke 300mm or less) --- The connector portion of the external LS appears below the trunnion mounting base surface. (Fig. 5)

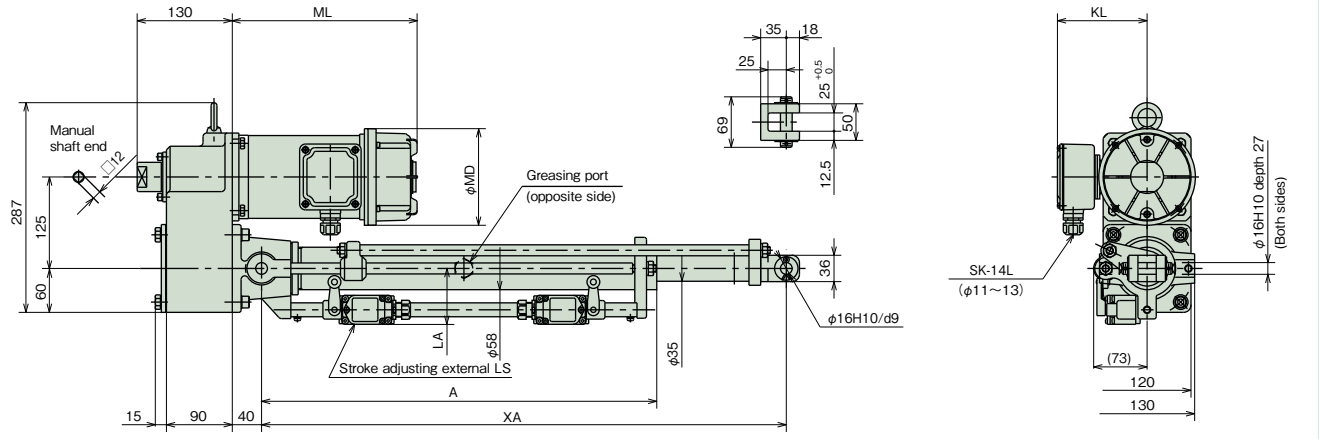
Fig. 5 Vertical installation of the stroke adjusting external LS



Give consideration to the mounting base because cabling is required.

Dimensions Table T Series 250

LPTB250



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	KL
LPTB250S	12.5/15	0.1	132	296	125
LPTB250L	25/30			231	
LPTB250M	50/60	0.2			
LPTB250H	100/120	0.4		253	

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX	LA
200	2.45	250	340	435	635	161
300			440	545	845	
400			540	655	1055	76.5
500			640	765	1265	
600			740	870	1470	

Approximate mass of main body

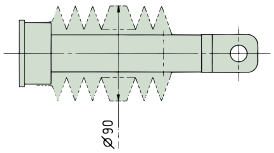
Unit: kg

Model \ Nominal stroke	200	300	400	500	600
LPTB250S	35	36	37	38	39
LPTB250L	32	33	34	35	36
LPTB250M	32	33	34	35	36
LPTB250H	34	35	36	37	38

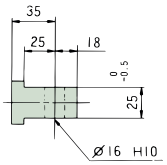
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)

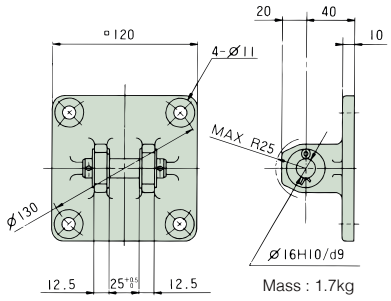


■ I-type end fitting (-I)



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

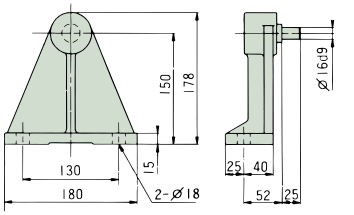
■ Clevis fitting (-C)



Mass : 1.7kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB500-T)



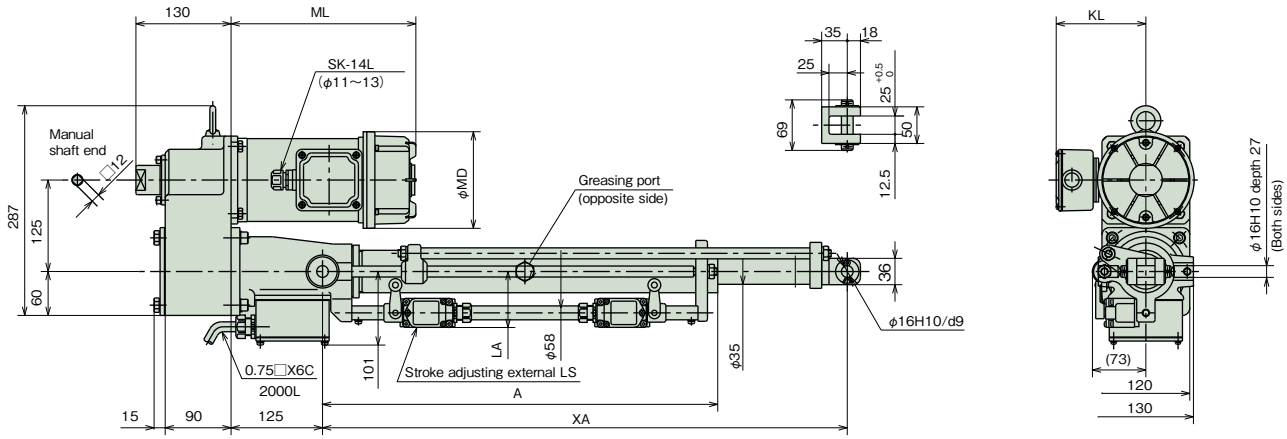
Mass: 7.0kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 250

LPTC250



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	KL
LPTC250S	12.5/15	0.1	132	296	125
LPTC250L	25/30			231	
LPTC250M	50/60	0.2			
LPTC250H	100/120	0.4		253	

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX	LA
200	2.45	250	340	435	635	161
300			440	545	845	
400			540	655	1055	76.5
500			640	765	1265	
600			740	870	1470	

Approximate mass of main body

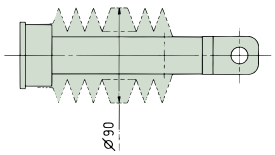
Unit: kg

Model \ Nominal stroke	200	300	400	500	600
LPTC250S	39	40	41	42	43
LPTC250L	36	37	38	39	40
LPTC250M	36	37	38	39	40
LPTC250H	38	39	40	41	42

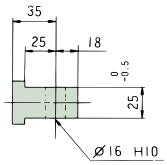
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. Use TC type model in brake individual turnoff.
6. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)

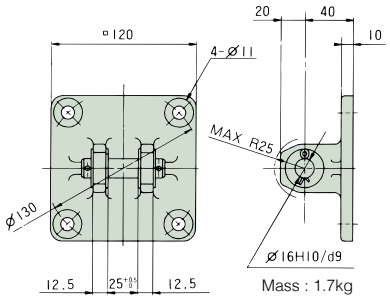


■ I-type end fitting (-I)



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

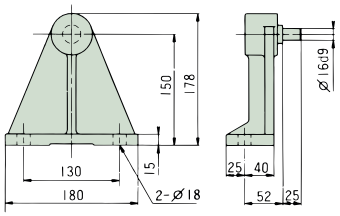
■ Clevis fitting (-C)



Mass : 1.7kg

Note) Shipped attached to the main body. If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB500-T)



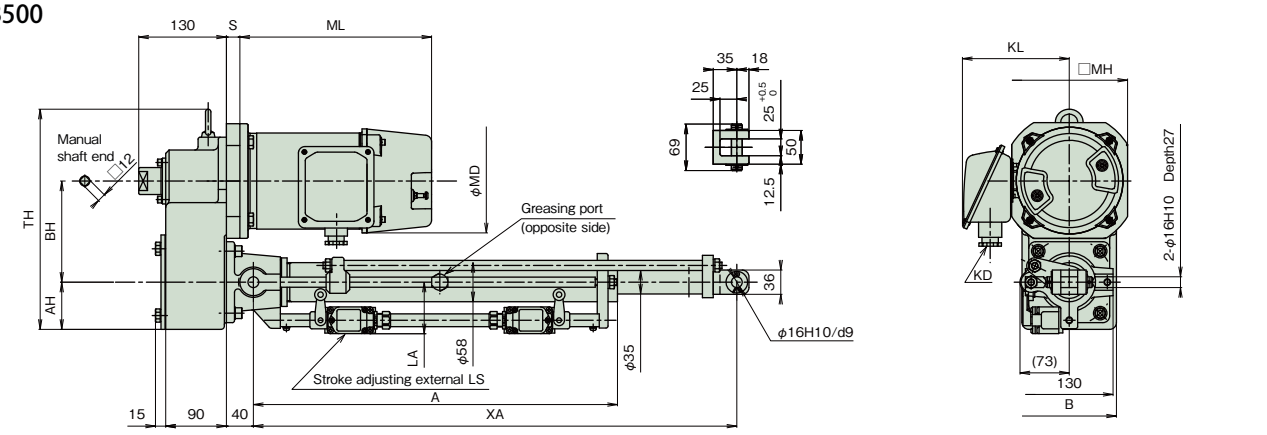
Mass: 7.0kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 500

LPTB500



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	KL	KD	MH	AH	BH	TH	S	B	C	E	F	G	H	J	K	L
LPTB500S	12.5/15	0.1	132	231	125	SK-14L	120	60	125	287	65	120	12.5	25	20	40	10	130	25	16
LPTB500L	25/30	0.2									—									
LPTB500M	50/60	0.4		253																
LPTB500H	100/120	0.75	180	289	166	A20C	170	70	150	327	20	140	15	30	25		12	140	31	20

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX	LA
200	4.90	500	340	435	635	161
300			440	545	845	
400			540	655	1055	76.5
500			640	765	1265	
600			740	870	1470	
800			940	1090	1890	

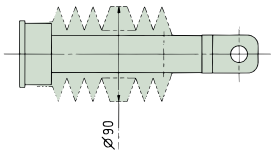
Approximate mass of main body Unit: kg

Model \ Nominal stroke	200	300	400	500	600	800
LPTB500S	35	36	37	38	39	41
LPTB500L	32	33	34	35	36	38
LPTB500M	34	35	36	37	38	40
LPTB500H	43	44	45	46	47	49

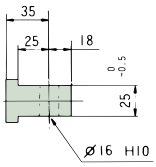
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)

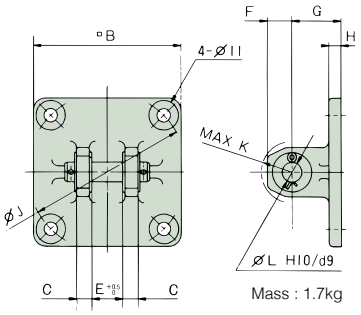


■ I-type end fitting (-I)



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

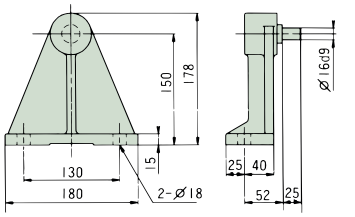
■ Clevis fitting (-C)



Mass : 1.7kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB500-T)



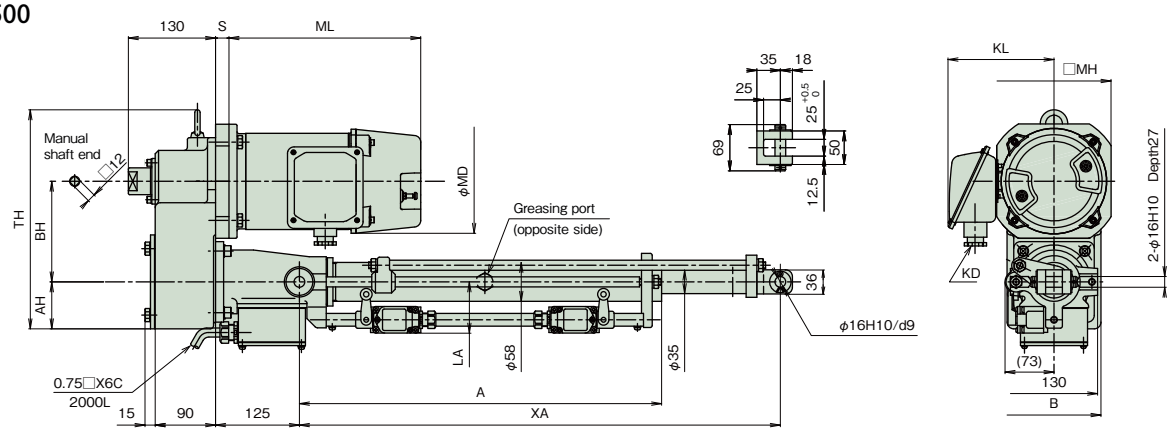
Mass: 7.0kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 500

LPTC500



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	KL	KD	MH	AH	BH	TH	S	B	C	E	F	G	H	J	K	L
LPTC500S	12.5/15	0.1	132	231	125	SK-14L	120	60	125	287	65	120	12.5	25	20	40	10	130	25	16
LPTC500L	25/30	0.2									—									
LPTC500M	50/60	0.4		253																
LPTC500H	100/120	0.75	180	289	166	A20C	170	70	150	327	20	140	15	30	25		12	140	31	20

Unit: mm

Nominal stroke	Thrust kN	Thrust { kgf }	A	XA MIN	XA MAX	LA
200	4.90	500	340	435	635	161
300			440	545	845	
400			540	655	1055	76.5
500			640	765	1265	
600			740	870	1470	
800			940	1090	1890	

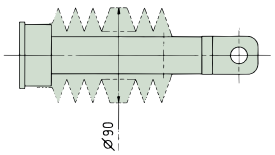
Approximate mass of main body Unit: kg

Model \ Nominal stroke	200	300	400	500	600	800
LPTC500S	39	40	41	42	43	45
LPTC500L	36	37	38	39	40	42
LPTC500M	38	39	40	41	42	44
LPTC500H	47	48	49	50	51	53

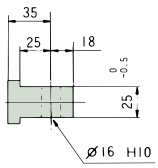
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. Use TC type model in brake individual turnoff.
6. For connector part dimensions of the motor terminal box, refer to page 41.
7. The terminal box lead-out direction in this diagram is for the H speed.
   For the S, L, and M speeds, the direction is the same as the LPTC250 type.

Options

■ Bellows (-J)

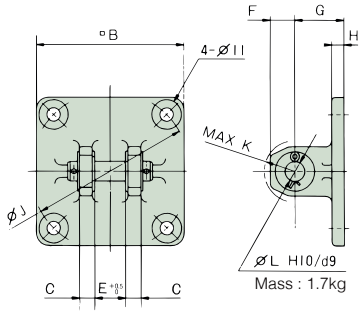


■ I-type end fitting (-I)



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

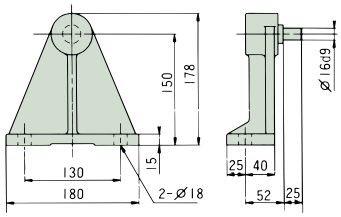
■ Clevis fitting (-C)



Mass : 1.7kg

Note) Shipped attached to the main body. If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB500-T)



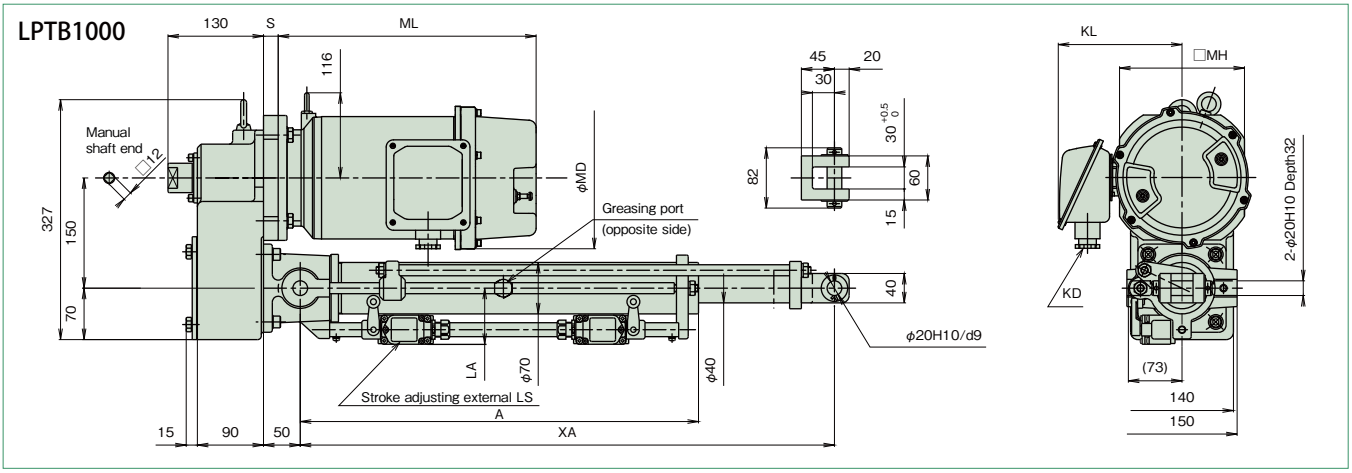
Mass: 7.0kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table　T Series 1000

LPTB1000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	KL	KD	MH	S
LPTB1000S	12.5/15	0.2	132	231	125	SK-14L	120	65
LPTB1000L	25/30	0.4		253				—
LPTB1000M	50/60	0.75	180	289	166	A20C	170	20
LPTB1000H	100/120	1.5	194	351	178			

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX	LA
200	9.80	1000	360	465	665	161
300			460	575	875	
400			560	685	1085	76.5
500			660	795	1295	
600			760	900	1500	
800			960	1120	1920	
1000	7.84	800	1160	1340	2340	

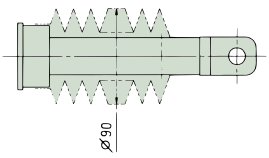
Approximate mass of main body　Unit: kg

Model \ Nominal stroke	200	300	400	500	600	800	1000
LPTB1000S	42	44	45	47	48	51	54
LPTB1000L	40	42	43	45	46	49	52
LPTB1000M	46	48	49	51	52	55	58
LPTB1000H	50	52	53	55	56	59	62

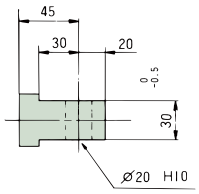
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows（　- J）

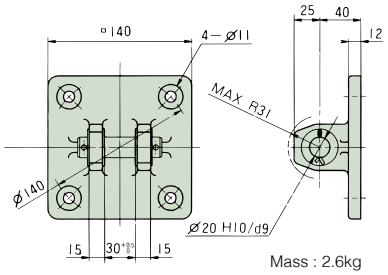


■ I-type end fitting（　- I）



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

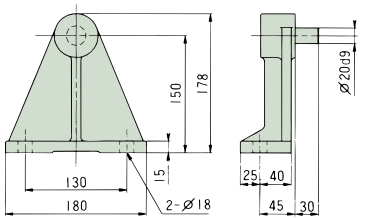
■ Clevis fitting（　- C）



Mass : 2.6kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting（LPTB1000-T）

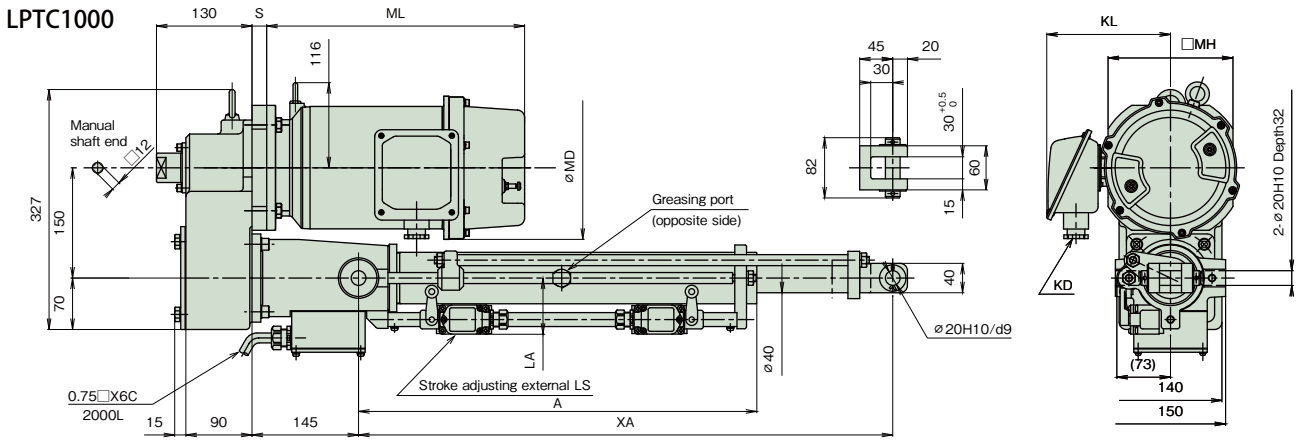


Mass: 7.0kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 1000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	KL	KD	MH	S
LPTC1000S	12.5/15	0.2	132	231	125	SK-14L	120	65
LPTC1000L	25/30	0.4		253				—
LPTC1000M	50/60	0.75	180	289	166	A20C	170	20
LPTC1000H	100/120	1.5	194	351	178			

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX	LA
200	9.80	1000	360	465	665	161
300			460	575	875	
400			560	685	1085	76.5
500			660	795	1295	
600			760	900	1500	
800			960	1120	1920	
1000	7.84	800	1160	1340	2340	

Approximate mass of main body

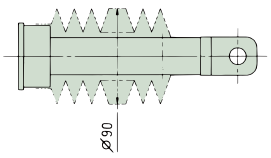
Unit: kg

Model \ Nominal stroke	200	300	400	500	600	800	1000
LPTC1000S	48	50	51	53	54	57	60
LPTC1000L	46	48	49	51	52	55	58
LPTC1000M	52	54	55	57	58	61	64
LPTC1000H	56	58	59	61	62	65	68

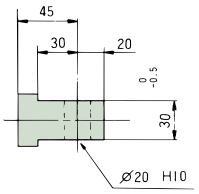
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. Use TC type model in brake individual turnoff.
6. When the model of the TC type nominal stroke 1000mm is used, press and stop cannot be carried out near the maximum stroke in terms of buckling strength.
7. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)

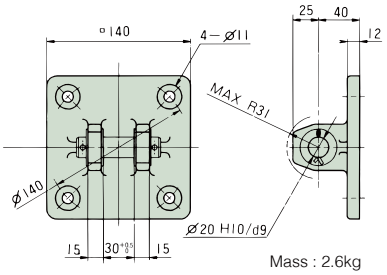


■ I-type end fitting (-I)



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

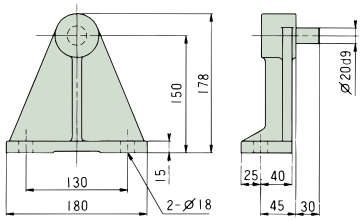
■ Clevis fitting (-C)



Mass : 2.6kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB1000-T)



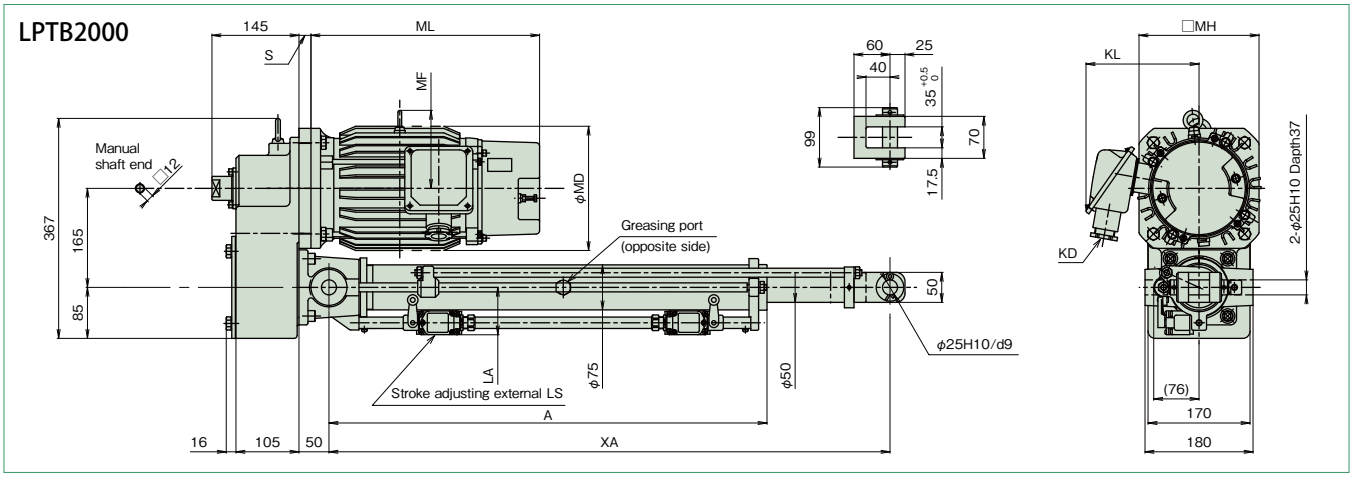
Mass: 7.0kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 2000

LPTB2000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPTB2000S	12.5/15	0.4	132	253	—	125	SK-14L	120	70
LPTB2000L	25/30	0.75	180	289		166	A20C	170	—
LPTB2000M	50/60	1.5	194	351		178			
LPTB2000H	75/90	2.2	207	381	130	190	A25C	200	20

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX	LA
200	19.6	2000	400	520	720	164
300			500	630	930	
400			600	740	1140	79
500			700	850	1350	
600			800	955	1555	
800			1000	1175	1975	
1000	15.6	1600	1200	1395	2395	
1200	12.2	1250	1400	1615	2815	

Approximate mass of main body

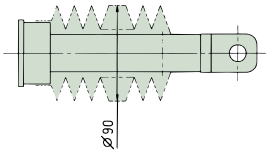
Unit: kg

Model \ Nominal stroke	200	300	400	500	600	800	1000	1200
LPTB2000S	56	58	60	62	64	68	72	76
LPTB2000L	55	57	59	61	63	67	71	75
LPTB2000M	59	61	63	65	67	71	75	79
LPTB2000H	70	72	74	76	78	82	86	90

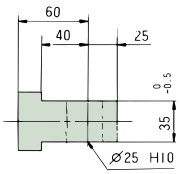
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)

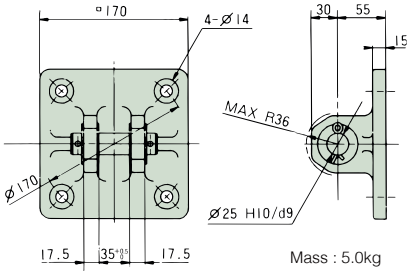


■ I-type end fitting (-I)



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

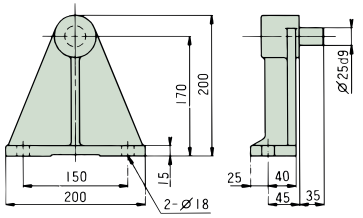
■ Clevis fitting (-C)



Mass : 5.0kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB2000-T)



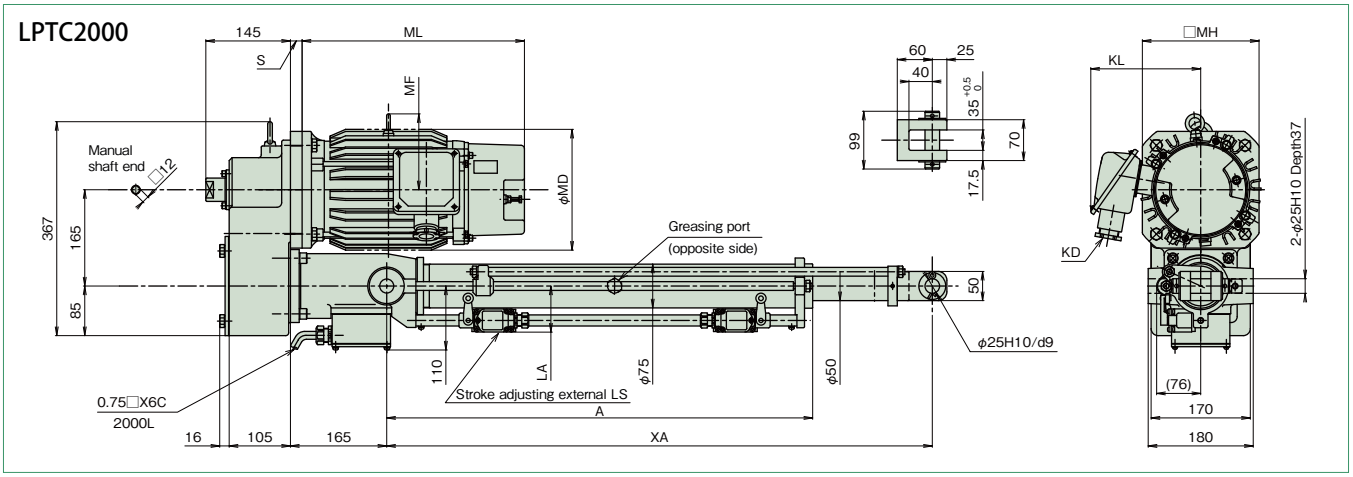
Mass: 9.2kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 2000

LPTC2000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPTC2000S	12.5/15	0.4	132	253	—	125	SK-14L	120	70
LPTC2000L	25/30	0.75	180	289		166	A20C	170	—
LPTC2000M	50/60	1.5	194	351		178			
LPTC2000H	75/90	2.2	207	381	130	190	A25C	200	20

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX	LA
200	19.6	2000	400	520	720	164
300			500	630	930	
400			600	740	1140	79
500			700	850	1350	
600			800	955	1555	
800			1000	1175	1975	
1000	15.6	1600	1200	1395	2395	
1200	12.2	1250	1400	1615	2815	

Approximate mass of main body

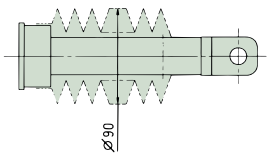
Unit: kg

Model \ Nominal stroke	200	300	400	500	600	800	1000	1200
LPTC2000S	64	66	68	70	72	76	80	84
LPTC2000L	63	65	67	69	71	75	79	83
LPTC2000M	67	69	71	73	75	79	83	87
LPTC2000H	78	80	82	84	86	90	94	98

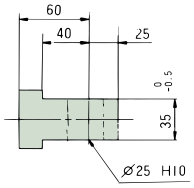
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. Use TC type model in brake individual turnoff.
6. When the model of the TC type nominal stroke 1000 or 1200mm is used, press and stop cannot be carried out near the maximum stroke in terms of buckling strength.
7. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)

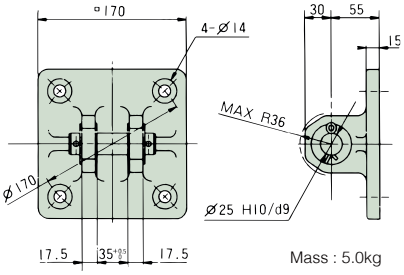


■ I-type end fitting (-I)



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

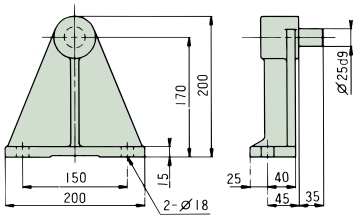
■ Clevis fitting (-C)



Mass : 5.0kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB2000-T)



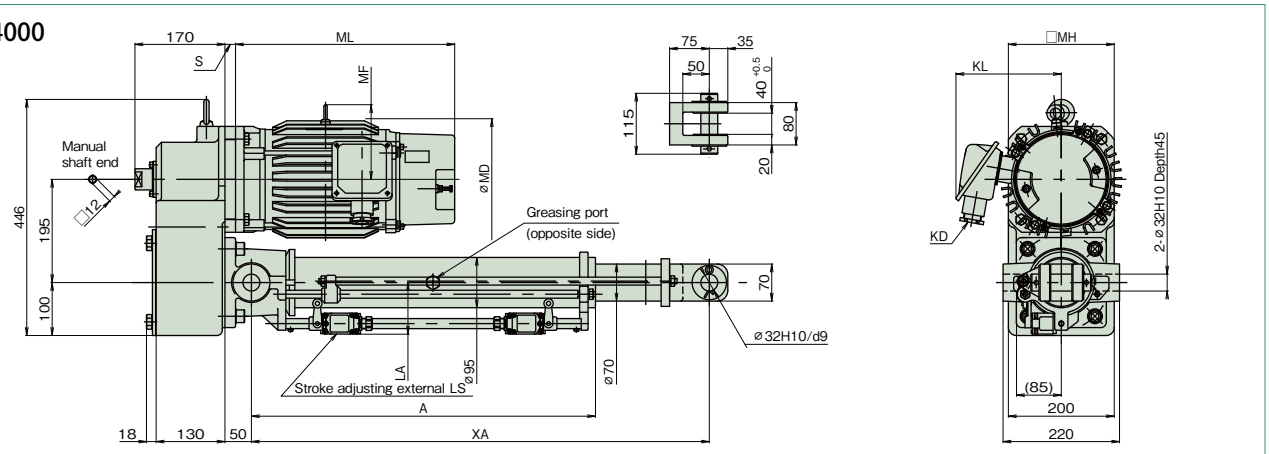
Mass: 9.2kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 4000

LPTB4000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPTB4000S	9/11	0.75	180	289	—	166	A20C	170	90
LPTB4000L	25/30	1.5	194	351		178			—
LPTB4000M	35/42	2.2	207	381	130	190	A25C	200	20
LPTB4000H	60/72	3.7	229	414	141	201			

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX	LA
200	39.2	4000	440	585	785	182
300			550	695	995	
400			650	805	1205	97.5
500			750	910	1410	
600			850	1020	1620	
800			1050	1235	2035	
1000			1250	1450	2450	
1200			1450	1670	2870	
1500	33.3	3400	1750	1995	3495	

Approximate mass of main body

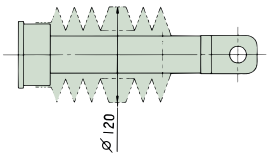
Unit: kg

Model \ Nominal stroke	200	300	400	500	600	800	1000	1200	1500
LPTB4000S	90	94	97	101	104	111	118	125	136
LPTB4000L	87	91	94	98	101	108	115	122	133
LPTB4000M	97	101	104	108	111	118	125	132	143
LPTB4000H	116	120	123	127	130	137	144	151	162

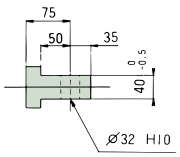
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)

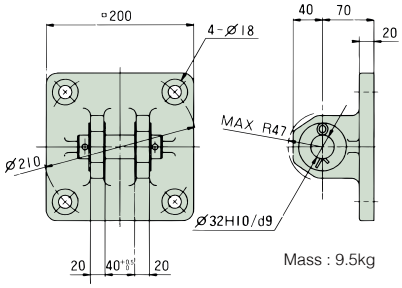


■ I-type end fitting (-I)



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

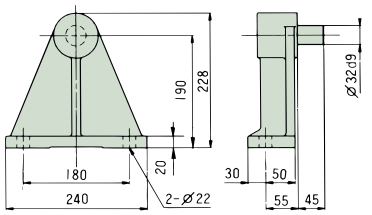
■ Clevis fitting (-C)



Mass : 9.5kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB4000-T)



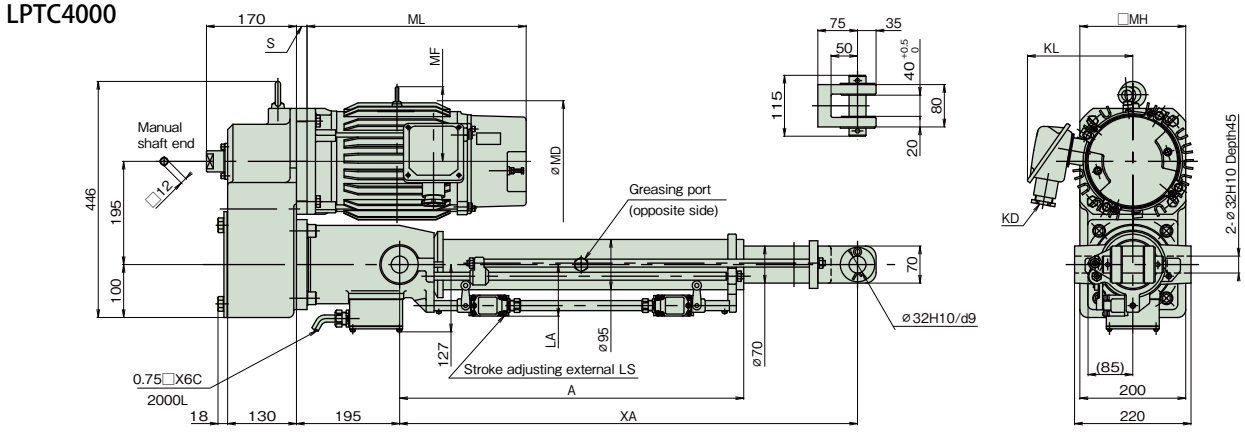
Mass: 16.4kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 4000

LPTC4000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPTC4000S	9/11	0.75	180	289	—	166	A20C	170	90
LPTC4000L	25/30	1.5	194	351		178			—
LPTC4000M	35/42	2.2	207	381	130	190	A25C	200	20
LPTC4000H	60/72	3.7	229	414	141	201			

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX	LA
200	39.2	4000	440	585	785	182
300			550	695	995	
400			650	805	1205	97.5
500			750	910	1410	
600			850	1020	1620	
800			1050	1235	2035	
1000			1250	1450	2450	
1200			1450	1670	2870	
1500	33.3	3400	1750	1995	3495	

Approximate mass of main body

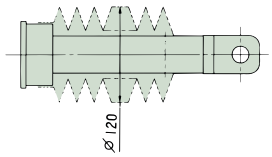
Unit: kg

Model \ Nominal stroke	200	300	400	500	600	800	1000	1200	1500
LPTC4000S	105	109	112	116	119	126	133	140	151
LPTC4000L	102	106	109	113	116	123	130	137	148
LPTC4000M	112	116	119	123	126	133	140	147	158
LPTC4000H	131	135	138	142	145	152	159	166	177

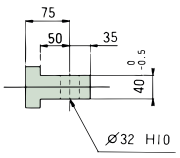
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. If the stroke is 300mm or less and a limit switch for stroke adjustment is equipped, the limit switch is vertically mounted. Note that the LA dimension becomes larger. (See ④ in Cautions for layout on page 18.)
3. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
4. For the cylinder with bellows, the stroke will also not change.
5. Use TC type model in brake individual turnoff.
6. When the model of the TC type nominal stroke 1500mm is used, press and stop cannot be carried out near the maximum stroke in terms of buckling strength.
7. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)

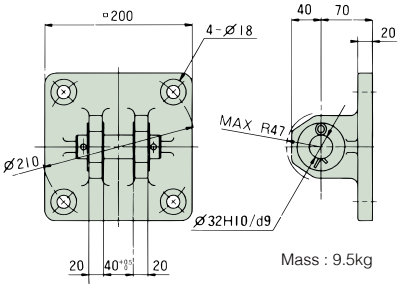


■ I-type end fitting (-I)



Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

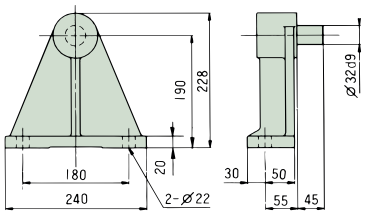
■ Clevis fitting (-C)



Mass : 9.5kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB4000-T)



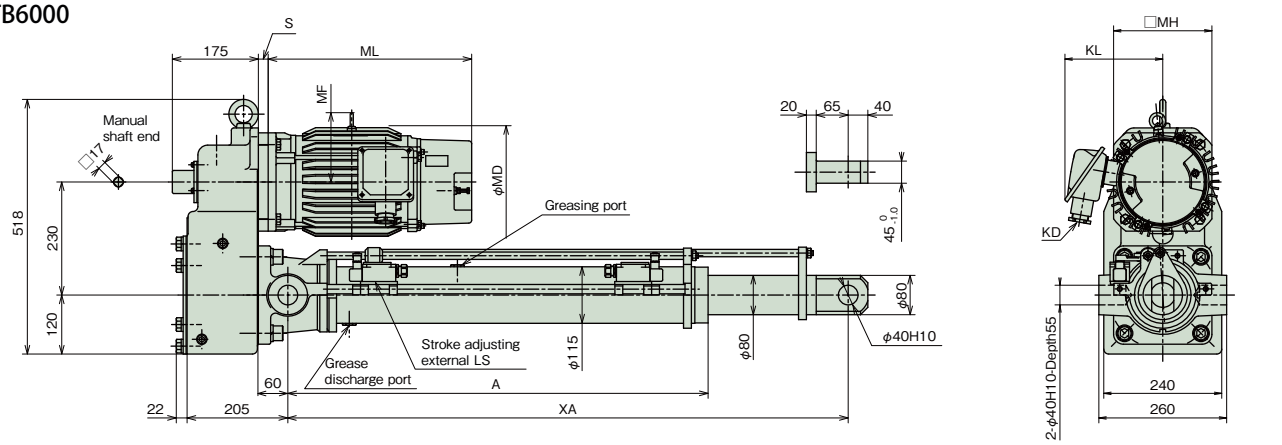
Mass: 16.4kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

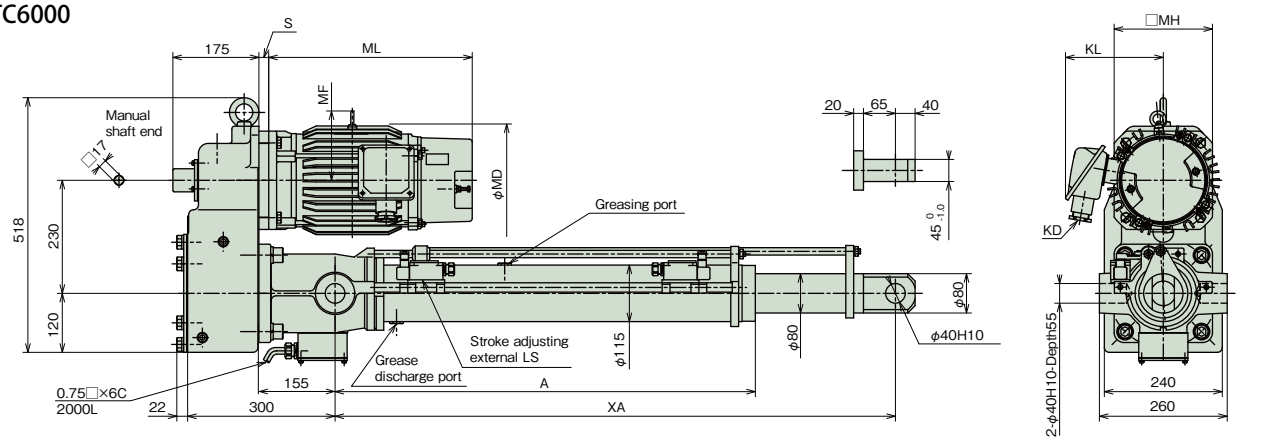
* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 6000

LPTB6000



LPTC6000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPTB6000S LPTC6000S	6.3/7.6	0.75	180	289	—	166	A20C	170	90
LPTB6000L LPTC6000L	17.5/21	1.5	194	351	—	178			—
LPTB6000M LPTC6000M	25/30	2.2	207	381	130	190	A25C	200	20
LPTB6000H LPTC6000H	42/50	3.7	229	414	141	201			

Unit: mm

Nominal stroke	Thrust kN	Thrust { kgf }	A	XA MIN	XA MAX
500	58.8	6000	855	1010	1510
1000			1355	1560	2560
1500			1955	2210	3710

Approximate mass of main body

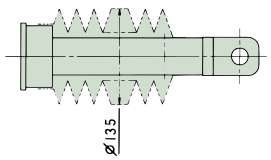
Unit: kg

Model \ Nominal stroke	500	1000	1500
LPTB6000S	143	168	193
LPTC6000S	165	190	215
LPTB6000L	151	176	201
LPTC6000L	173	198	223
LPTB6000M	157	182	207
LPTC6000M	179	204	229
LPTB6000H	172	197	222
LPTC6000H	194	219	244

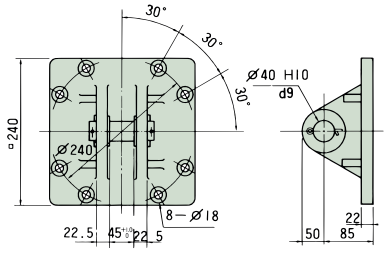
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
3. For the cylinder with bellows, the stroke will also not change.
4. Use TC type model in brake individual turnoff.
5. When the model of the TC type nominal stroke 1500mm is used, press and stop cannot be carried out near the maximum stroke in terms of buckling strength.
6. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)



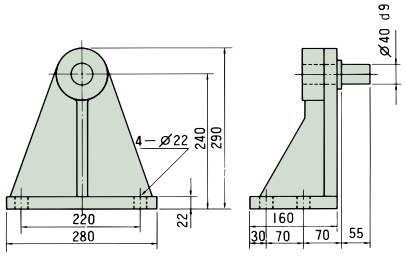
■ Clevis fitting (-C)



Mass : 16.5kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB6000-T)



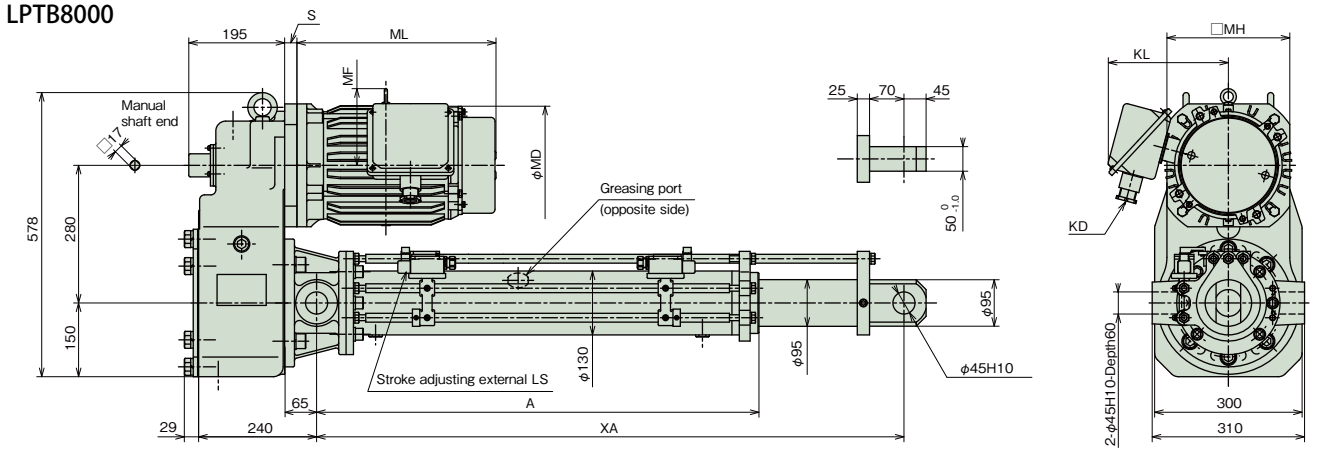
Mass: 39.0kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

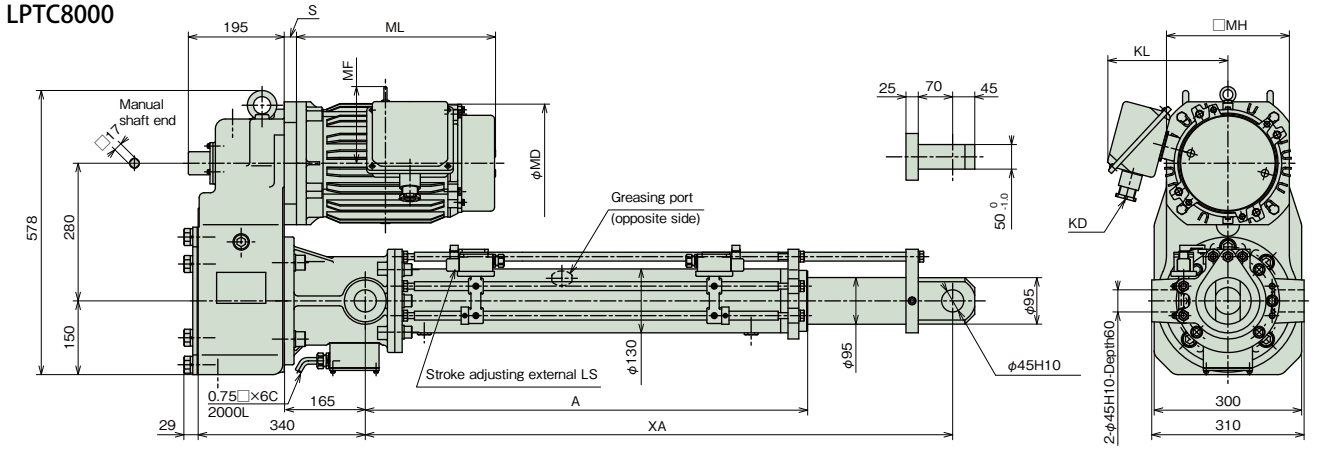
* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 8000

LPTB8000



LPTC8000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPTB8000S LPTC8000S	10/12	1.5	194	351	—	178	A20C	170	137
LPTB8000L LPTC8000L	20/24	2.2	207	381	130	190	A25C	200	—
LPTB8000M LPTC8000M	30/36	3.7	229	414	141	201			—
LPTB8000H LPTC8000H	43/52	5.5	265	403	156	245		250	25

Unit: mm

Nominal stroke	Thrust kN	Thrust { kgf }	A	XA MIN	XA MAX
500	78.4	8000	900	1065	1565
1000			1400	1615	2615
1500			1900	2165	3665

Approximate mass of main body

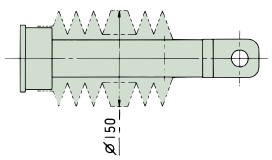
Unit: kg

Model \ Nominal stroke	500	1000	1500
LPTB8000S	224	254	284
LPTC8000S	254	284	314
LPTB8000L	212	242	272
LPTC8000L	242	272	302
LPTB8000M	230	260	290
LPTC8000M	260	290	320
LPTB8000H	241	271	301
LPTC8000H	271	301	331

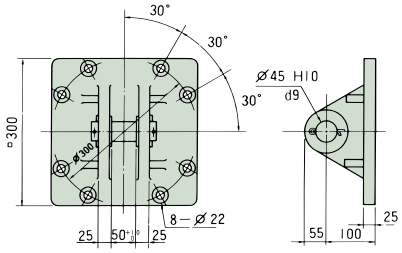
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
3. For the cylinder with bellows, the stroke will also not change.
4. Use TC type model in brake individual turnoff.
5. When the model of the TC type nominal stroke 1500mm is used, press and stop cannot be carried out near the maximum stroke in terms of buckling strength.
6. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)



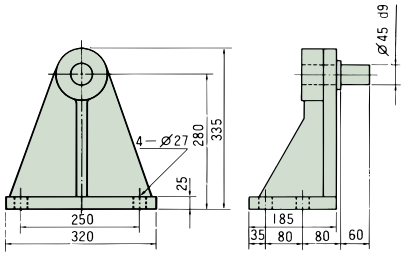
■ Clevis fitting (-C)



Mass : 27.0kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB8000-T)



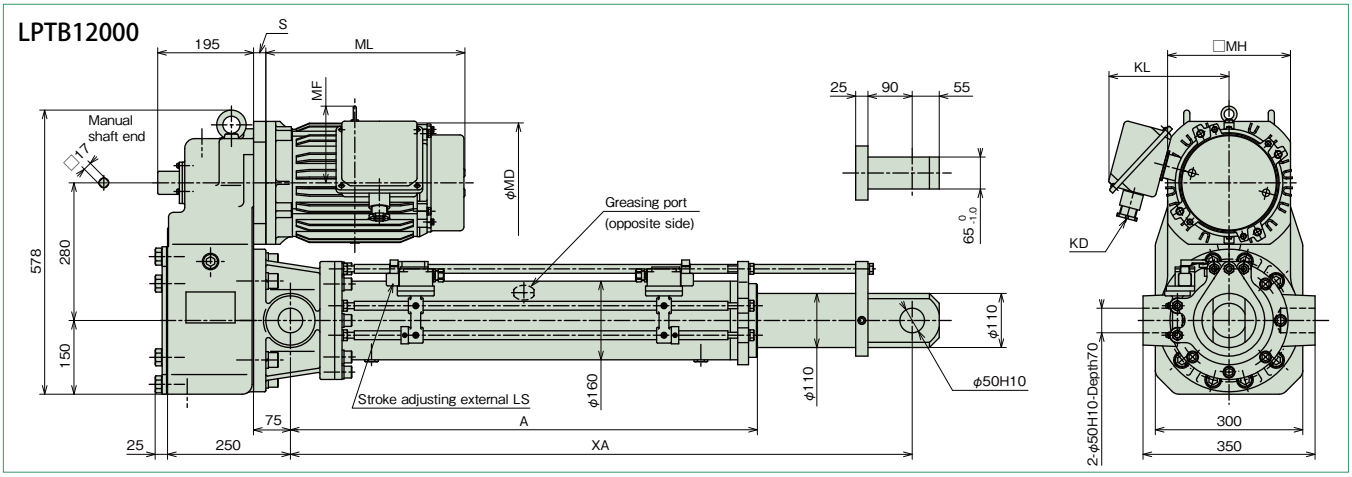
Mass: 70.6kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

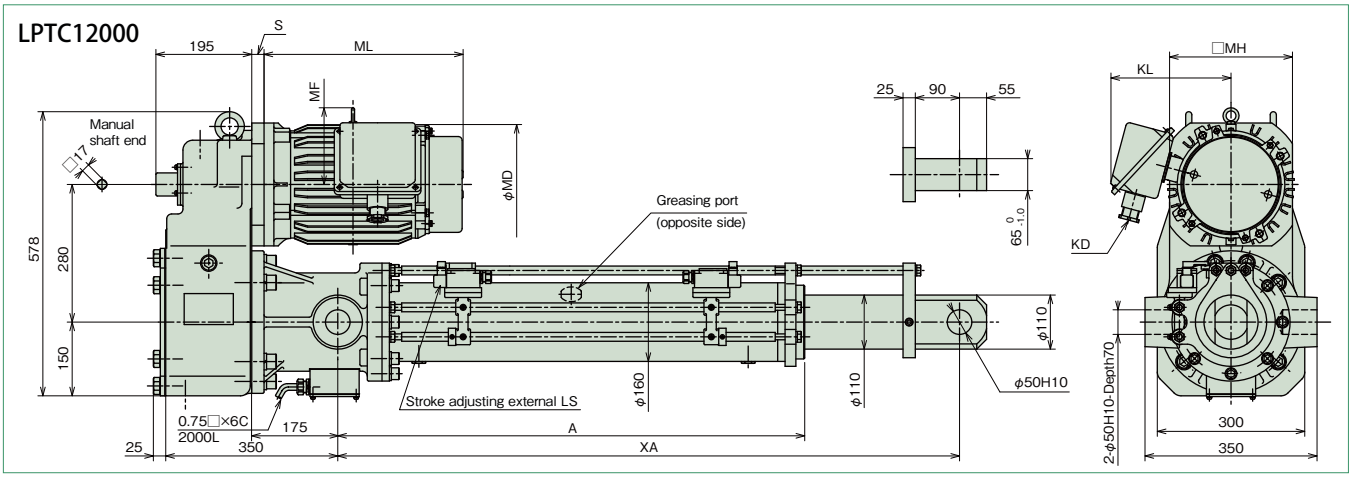
* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 12000

LPTB12000



LPTC12000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPTB12000L LPTC12000L	10/12	2.2	207	381	130	190	A25C	200	145
LPTB12000M LPTC12000M	18/22	3.7	229	414	141	201		250	145
LPTB12000H LPTC12000H	30/36	5.5	265	403	156	245		250	25

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX
500	117	12000	950	1135	1635
1000			1450	1685	2685
1500			1950	2235	3735
2000			2450	2785	4785

Approximate mass of main body

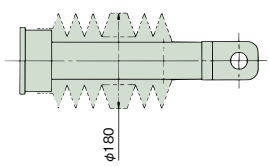
Unit: kg

Model \ Nominal stroke	500	1000	1500	2000
LPTB12000L	270	312	354	396
LPTC12000L	309	351	393	435
LPTB12000M	285	327	369	411
LPTC12000M	324	366	408	450
LPTB12000H	295	337	379	421
LPTC12000H	334	376	418	460

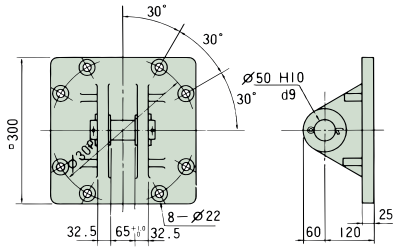
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
3. For the cylinder with bellows, the stroke will also not change.
4. Use TC type model in brake individual turnoff.
5. When the model of the TC type nominal stroke 2000mm is used, press and stop cannot be carried out near the maximum stroke in terms of buckling strength.
6. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)



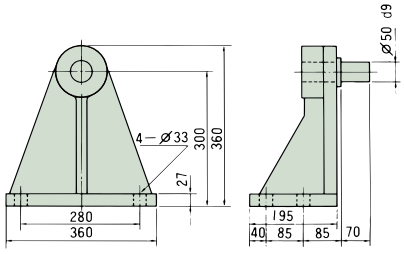
■ Clevis fitting (-C)



Mass : 33.0kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB12000-T)



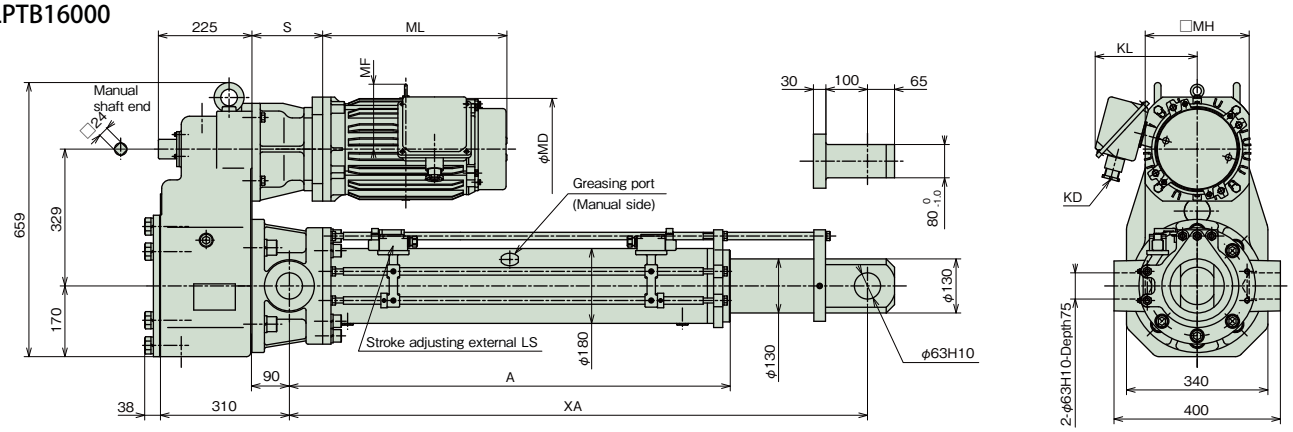
Mass: 84.4kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

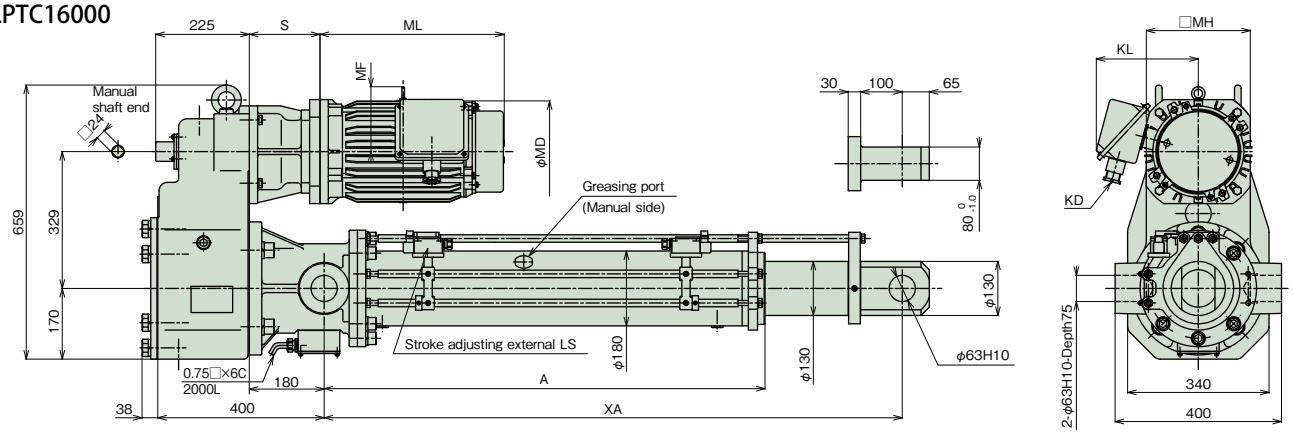
* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 16000

LPTB16000



LPTC16000



Unit: mm

Model	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPTB16000L LPTC16000L	14.5/17.5	3.7	229	414	141	201	A25C	250	145
LPTB16000M LPTC16000M	20/24	5.5	265	403	156	245			170
LPTB16000H LPTC16000H	31/37	7.5	265	441	156	245			170

Unit: mm

Nominal stroke	Thrust		A	XA	
	kN	{kgf}		MIN	MAX
500	156	16000	1060	1260	1760
1000			1560	1810	2810
1500			2060	2360	3860
2000			2560	2910	4910

Approximate mass of main body

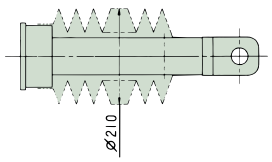
Unit: kg

Model \ Nominal stroke	500	1000	1500	2000
LPTB16000L	469	525	581	637
LPTC16000L	518	574	630	686
LPTB16000M	480	536	592	648
LPTC16000M	529	585	641	697
LPTB16000H	490	546	602	658
LPTC16000H	539	595	651	707

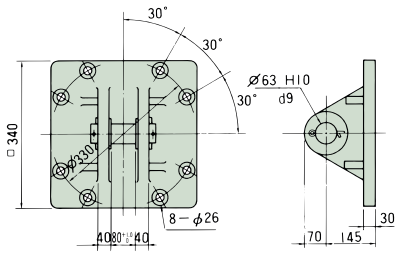
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
3. For the cylinder with bellows, the stroke will also not change.
4. Use TC type model in brake individual turnoff.
5. When the model of the TC type nominal stroke 2000mm is used, press and stop cannot be carried out near the maximum stroke in terms of buckling strength.
6. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)



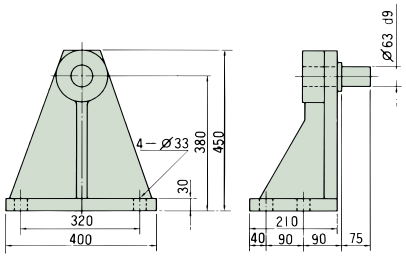
■ Clevis fitting (-C)



Mass : 54.0kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB16000-T)



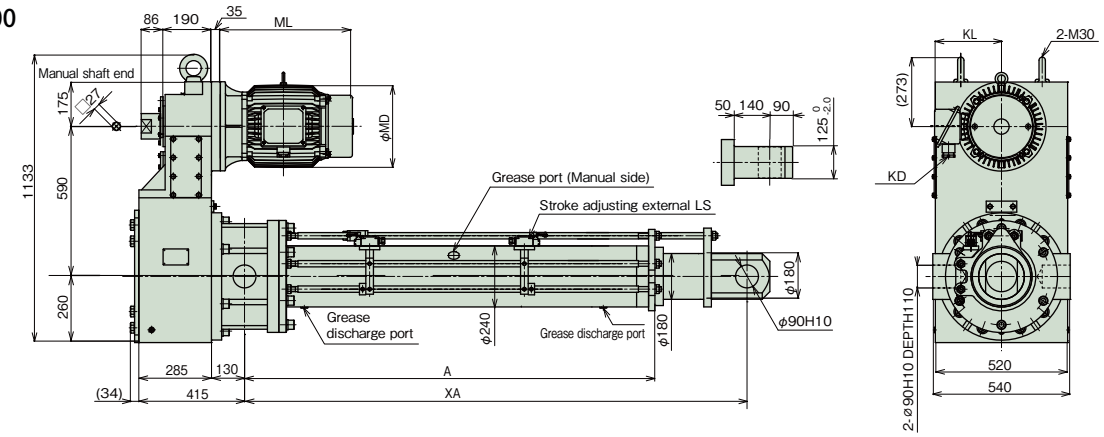
Mass: 124.6kg/set

Note) Apply grease to the trunnion pin and trunnion hole before mounting.

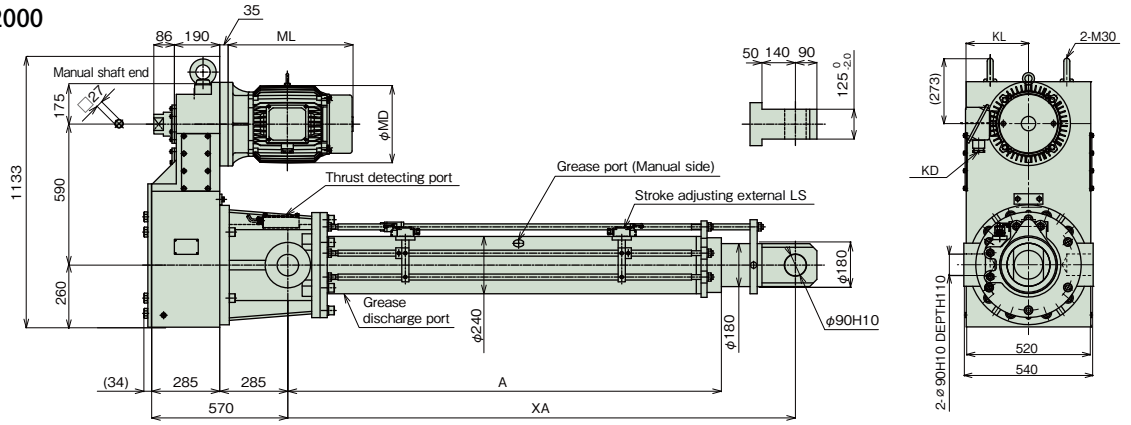
* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table T Series 32000

LPTB32000



LPTC32000



Unit: mm

Model	Thrust kN	Thrust {kgf}	Nominal speed mm/s	Motor kW	MD	ML	KL	KD
LPTB32000L LPTC32000L	313	32000	10/12	5.5	265	403	245	A25C
LPTB32000M LPTC32000M			15/18	7.5	265	441	245	A25C
LPTB32000H LPTC32000H			20/24	11	324	519	263	A30B

Unit: mm

Nominal stroke	A	XA MIN	XA MAX
500	1315	1575	2075
1000	1815	2125	3125
1500	2315	2675	4175
2000	2815	3225	5225

Approximate mass of main body

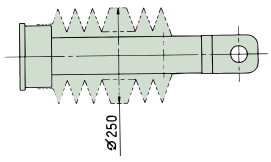
Unit: kg

Model \ Nominal stroke	500	1000	1500	2000
LPTB32000L	1215	1313	1411	1509
LPTC32000L	1305	1403	1501	1599
LPTB32000M	1225	1323	1421	1519
LPTC32000M	1315	1413	1511	1609
LPTB32000H	1294	1392	1490	1588
LPTC32000H	1384	1482	1580	1678

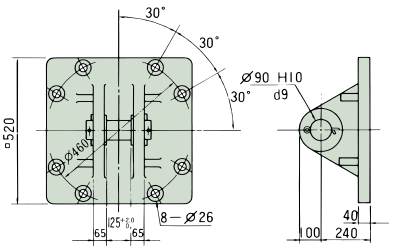
1. This diagram shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a margin of approximately 10mm on both sides for the nominal stroke.
3. For the cylinder with bellows, the stroke will also not change.
4. For connector part dimensions of the motor terminal box, refer to page 41.

Options

■ Bellows (-J)



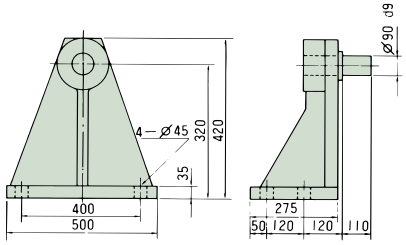
■ Clevis fitting (-C)



Mass : 185.0kg

Note) Shipped attached to the main body.
If it needs to be shipped individually, consult us.

■ Trunnion fitting (LPTB32000-T)



Mass: 149.2kg/set

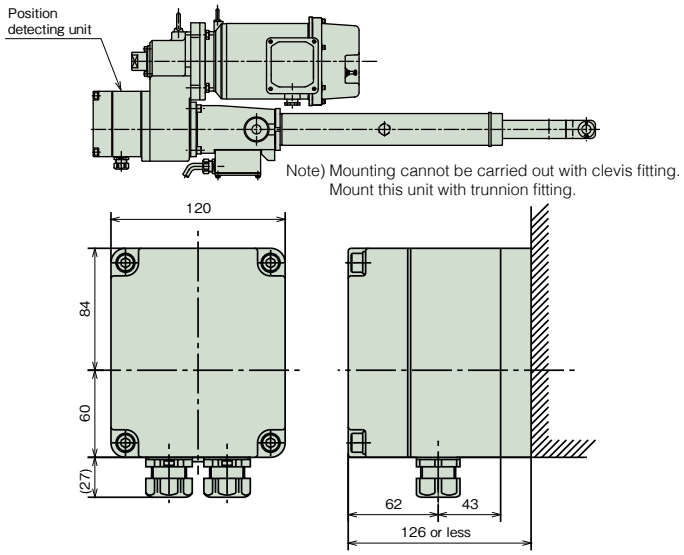
Note) Apply grease to the trunnion pin and trunnion hole before mounting.

* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

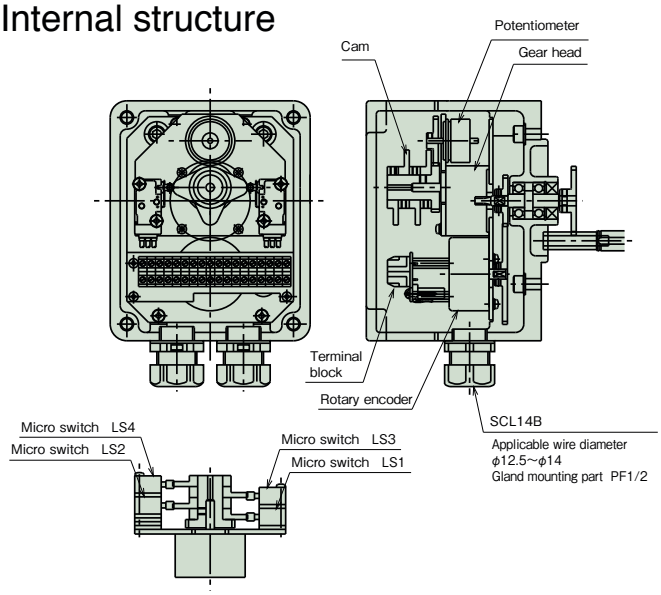
Position detecting unit

The following three types of position detecting devices can be built in as your requested.

1. Position detecting internal limit switch (with two or four switches)
2. Potentiometer
3. Rotary encoder



Internal structure



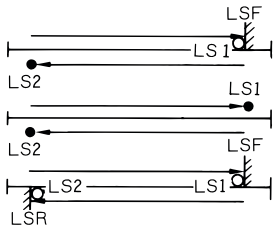
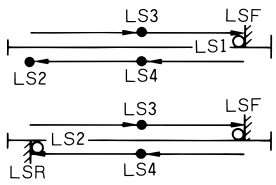
Mass of positional detecting unit Unit: kg

Frame no.	Mass
T500	7.3
T1000	7.6
T2000	8.0
T4000	9.0
T6000	12.2
T8000	13.3
T12000	13.3
T16000	14.5

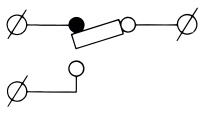
1. Position detecting internal limit switch (with two or four switches)

● With two switches (symbol K2) ····· Layout of micro switches LS_1 and LS_2 in the previous diagram

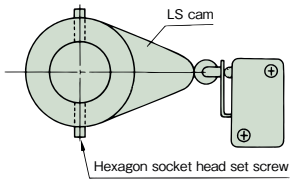
● With four switches (symbol K4) ····· Layout of micro switches LS_1, LS_2, LS_3 and LS_4 in the previous diagram

	Option symbol	Application example	
Position detecting internal LS	K2		Extend: External press stop, position detecting Retract: Determined position stop Both ends determined position stop Both ends external press stop, position detection
Position detecting internal LS	K4		Extend: Middle determined position stop, External press stop, position detection Retract: Two-determined position stop For both extend and retract: External press stop, position detection, Middle determined position stop

Micro switch specification

Model	D2VW-5L2A-1M (OMRON) Equivalent
Electric configuration	250V AC 4A (cos=0.7)
Contact configuration	1C  For terminal No., refer to page 110.

Note) In the table at the left
- Stops with operation of the micro switch for thrust detection.
- Stops with operation of the micro switch for position detection.
- Detects position with operation of the micro switch for position detection.



<Setting of LS>

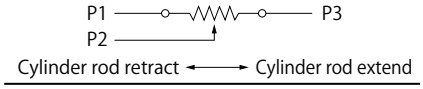
For adjustment of the operating position, operate the power cylinder to adjust the LS cam. Loosen the hexagon socket head set screws (2 pieces) on the LS cam with a hexagon bar wrench (nominal 1.5).

Position detecting unit

2. Potentiometer

This is a variable resistor to output electric signals depending on the stroke amount of the cylinder. Use this unit in combination with a printed board and a stroke indication meter. Resistance values according to the model have been adjusted before shipment.
Separately request preset values according to the model as they are described in the position detecting unit specification drawing. Pay strict attention to handling because correspondence between the stroke position and the resistance value will deviate by rotating the rod of the power cylinder.

Potentiometer specifications	
Model	CP-30 or equivalent
Manufacturer	SAKAE TSUSHIN KOGYO CO., LTD.
Total resistance value	1kΩ
Rated power	0.75W
Dielectric strength	1000V AC 1min.
Effective electric degree	355°±5°
Effective mechanical degree	360°endless
Connection	Connected to terminal block in position detecting unit



3. Rotary encoder

Rotary encoder specifications		
Model	TS5305N251	
Manufacturer	Tamagawa Seiki Co., Ltd.	
Output pulse number	600P/R	
Output waveform	90° phase difference two-phase square wave + home position output	
Output voltage	H	— Note 1)
	L	1V or less Note 1)
Power supply	5～24V DC	

The output signal of the standard specification is of an incremental type, however, an absolute type is also available.
The output type in standard specifications is open collector.
If voltage output type is required, see (Note 1) below.
If the specification of line driver output is required, contact us.

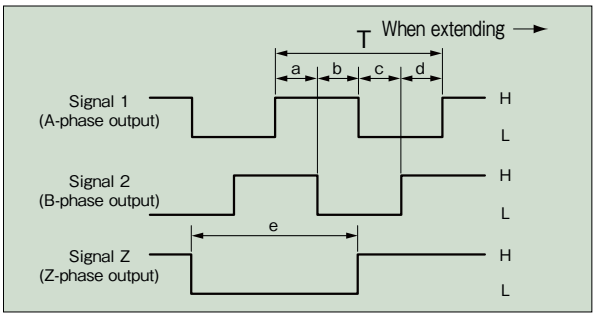
Note 1) Due to the open collector output, output signals are obtained when the pull-up resistor is connected.
Signal 1 and signal 2 are output voltages of H "(power supply voltage – 1)V or more" and L "1V or less."
For the Z-phase, negative logic applies.
<Reference resistance values> 5V: 220Ω, 12V: 470Ω, 24V: 1kΩ

Output connection

Signal 1	Signal 2	Signal Z	+5V to 24V	0V	Case
(9)	(10)	(11)	(12)	(13)	(14)

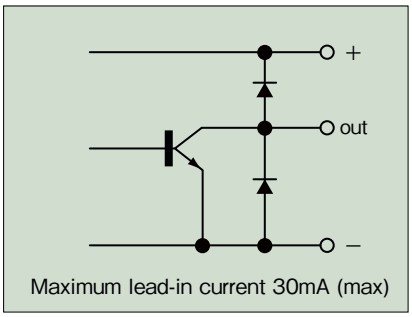
Figures in parentheses indicate terminal No.

Output waveform



a. b. c. d = T/4 ± T/8 T/2 ≦ e ≦ 3T/2

Output circuit



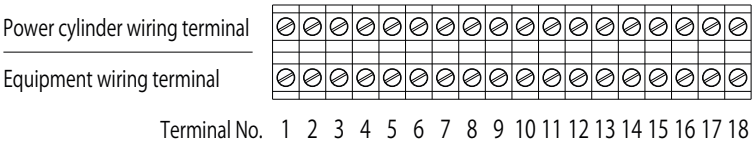
* Best suited to controlling the stroke by a sequencer or programmable controller, etc.
More accurate positioning control is possible in combination with motor speed control by an inverter, etc.

① The standard products incorporate an incremental type encoder.
② The rotary encoder has been set to output 10 pulse per stroke of 1mm.
③ It is possible to set an accurate home position of the machine in combination with a limit switch because home position output is read out every 600 pulses.
④ Do not apply vibration or impact to the rotary encoder because it is precision equipment.
⑤ Use shield wire for wiring to the rotary encoder.
⑥ As a guide for the distance between the rotary encoder and control panel, a collector current of 20mA should be able to be transmitted approximately 50m (12V pull-up).
For distances other than the above, consult with us.

Position detecting unit

Wire connection in position detecting unit

Use terminals provided in the unit for wire connection to the position detecting internal limit switch, potentiometer and rotary encoder.
COM on the internal LS means common use. (internally wire-connected)
Use shield wire for wiring to the rotary encoder.



Option	Internal LS (K2, K4)									Potentiometer			Rotary encoder					
Symbol	LS1		LS2		LS3		LS4		Common use	P			R					
Contact	a	b	a	b	a	b	a	b	c	1	2	3	1	2	Z	+5V~24V	0V	Case
Terminal No.	18	17	5	6	16	15	7	8	4	1	2	3	9	10	11	12	13	14

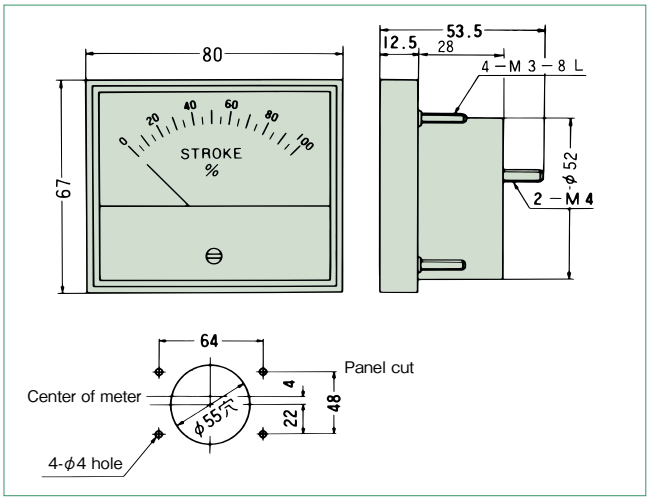
Control option

Stroke indication meter

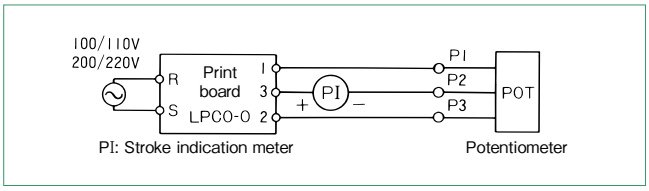
Model	RM-80B(100μA DC) or equivalent
Grade	JIS C 1102 2.5 class
Appearance	Frame・black
Scale specifications	Full stroke indicated by 100%

1. Special scale and wide angle gauge are also available at your request.
2. When you want to express scale in other than percentage, indicate this to us.

* A separate printed board is also required.

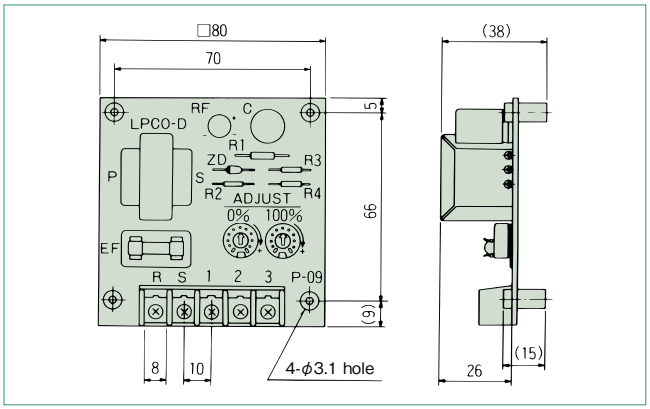


Printed board



Adjust the meter with an ADJUST volume on the printed board. Do not make a mistake with the stroke indication meter +, - . Replace the terminals 1 and 2 on the print board to set the indication meter to 100% when the stroke is MIN.

Model LPCO-D1 (Operation power source 100/110V 50/60Hz)
LPCO-D2 (Operation power source 200/220V 50/60Hz)



Control option

Meter relay

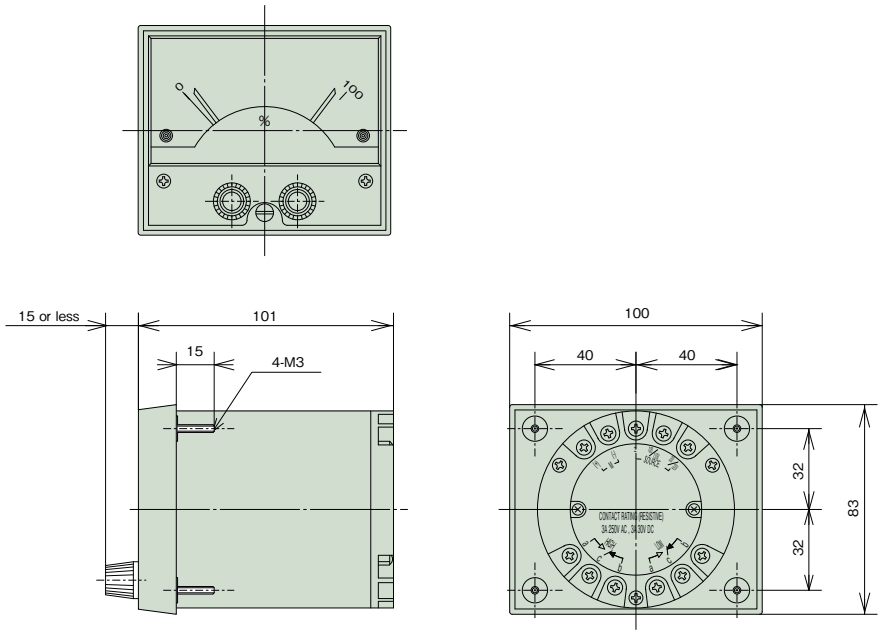
Used for simple adjustment of stroke on the operation panel.

(Iron panel installation is standard. Separately indicate to us when installing an aluminum panel.)

Note) For using 4 – 20mA output, designate as “for 4 – 20mA output.”
* A separate printed board is also required.

Meter relay specifications	
Model number	NRC-100HL (TSURUGA) or equivalent product
Class	JIS C 1102 2.5 class
Appearance	Frame・Black
Scale	Full stroke indicated by 100%
Power source	100/100V AC, 200/220V AC 50/60Hz
Input	100 μA DC maximum
Output contact configuration	1C for both HIGH, LOW sides (refer to the following Fig.)
Contact capacity	250V AC 3A (cos φ = 1)

(Described specifications and dimensions may be subject to change due to circumstances.)

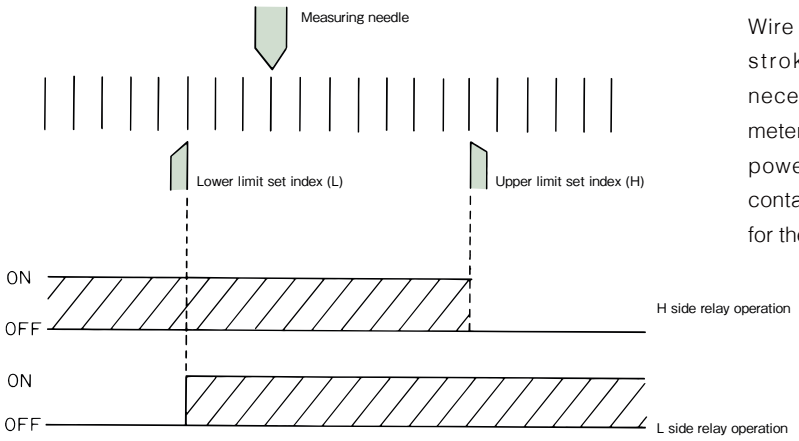


The main body of the power cylinder is provided with a potentiometer.
The phase of a stroke deviates if the rod is rotated before installation. Therefore, cylinders with a stroke adjusting limit switch are recommended.
Pre-set minimum and maximum strokes to be used with the stroke adjusting limit switch, then use the meter relay.

<Print board>

This is the same as the print board for the stroke indication meter.

<Relay operation> (In the case of b contact)



Wire connection is the same as that for the stroke indication meter, however, it is necessary to separately feed power to the meter relay. Supply power from the operating power supply. It is easy to connect the b contact as an output contact to the b contact for the stroke adjusting LS in series.

Shock relay

Our highly reliable shock relay is recommended as an electric safety device for the power cylinder of the TB type.
For details, refer to the “TSUBAKI E&M electric overload protection devices shock monitor shock relay catalogue.”

Stroke control for power cylinder

There are various methods of positioning control for the power cylinder. Positioning accuracy greatly varies depending on the speed of the power cylinder, the size of the load, the size of a load inertia, the operating direction (vertical, horizontal) and the wire connection method for the brake. Control methods may be limited depending on the operating condition. As such, what methods there are will be conceptually described here.

Limit switch method

① With stroke adjusting limit switch ····· Positioning of stroke upper and lower limit

② With position detecting limit switch·····Intermediate positioning Accuracy generally increases with lower cylinder speed.

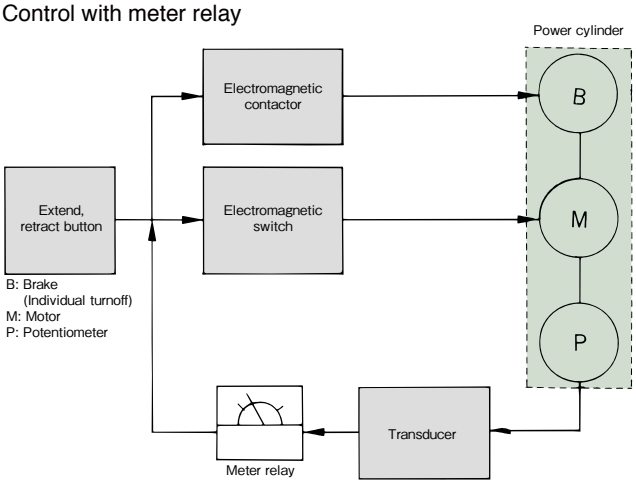
③ Press (pull) stop (Thrust detecting limit switch for T series TC type is used.)

This is a method that stoppers are mechanically provided on both ends of a stroke used for equipment driven by the power cylinder, and press, pull stop are carried out, and then a thrust detecting limit switch for the power cylinder is used. The stroke is mechanically regulated by the stoppers, therefore, accurate positioning is possible.

Method with potentiometer

This method is convenient when you want to change the stroke of the power cylinder on the control side. Accuracy generally increases as the cylinder speed decreases. For the power cylinder body, the method with a stroke adjusting limit switch is recommended to prevent stroke over.

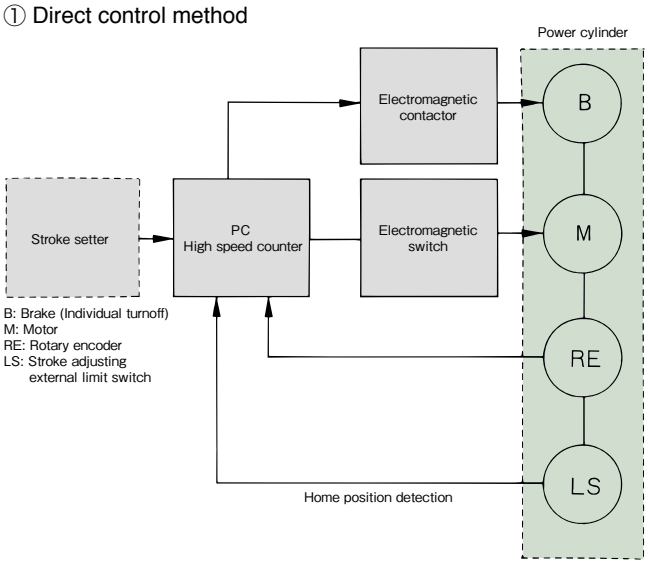
Control with meter relay



Method with rotary encoder (RE)

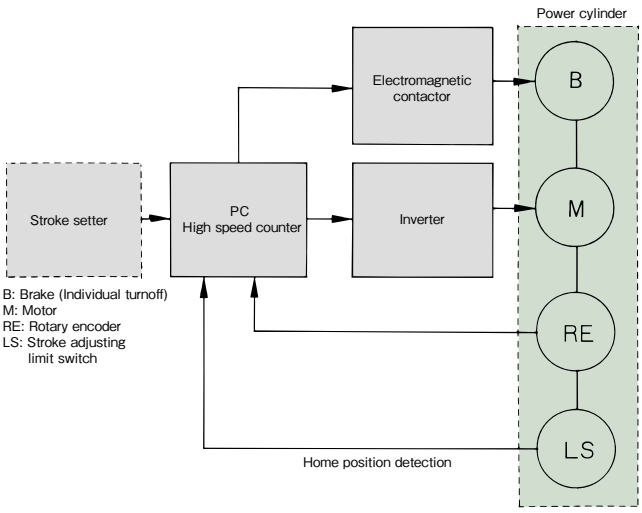
This method controls stroke by a programmable controller (PC). Use the PC with a counter. Use a limit switch to detect home position. (For the power cylinder body, the method with a stroke adjusting limit switch is recommended.)

① Direct control method



With this method, when OFF signals for the motor and the brake are not simultaneously outputted from the PC, and OFF signal for the motor is outputted earlier, the cylinder coasts while decelerating. Highly accurate positioning is possible because the power cylinder operates at a low speed such as output of an operation signal for the brake just before the stop position.

② Motor speed control method



Note that, when a heavy object is moved up or down, or a load with a large inertia is operated, it may not be sufficiently slowed down by any method.

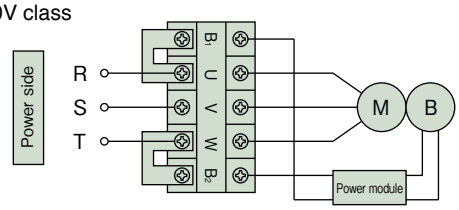
Wire connection

Wire connection for brake motor (Motor with DC brake)

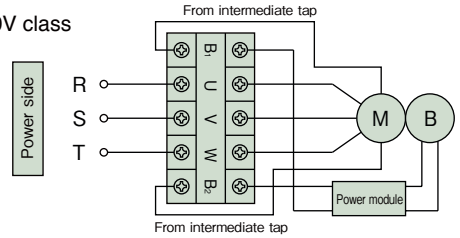
In the case of brake internal wiring

0.1～0.4kW

200V class

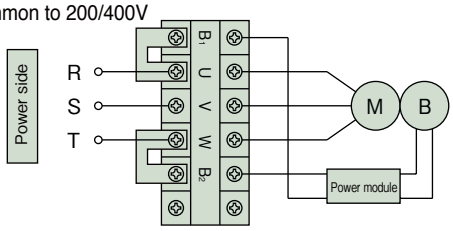


400V class



0.75～3.7kW

Common to 200/400V

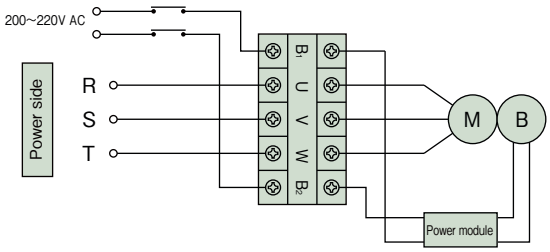


For 5.5kW or higher,
use brake external wiring.

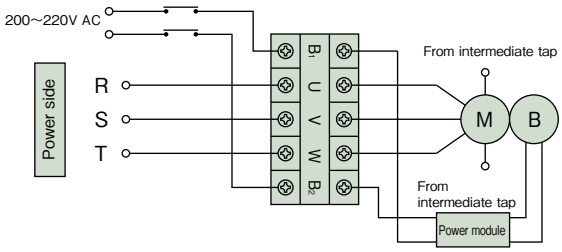
In the case of brake external wiring

0.1～0.4kW

200V class

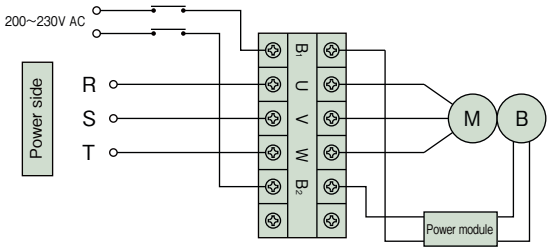


400V class

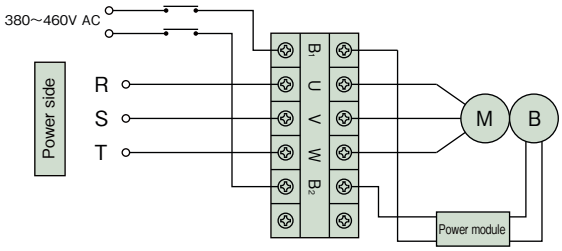


0.75～3.7kW

200V class

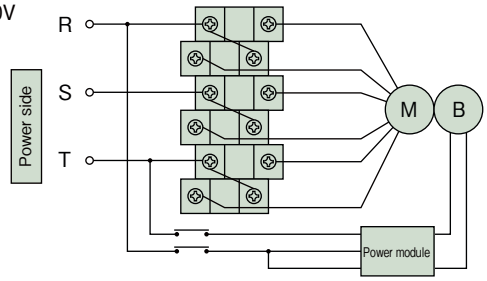


400V class



5.5kW or more

Common to 200/400V



Rod operating direction (In the case of connection on upper surface)	$LPTB_{LPTC}$250～$LPTB_{LPTC}$16000	$LPTB_{LPTC}$32000
	Rod extend	Rod retract

* Crimp contact bolt: M4

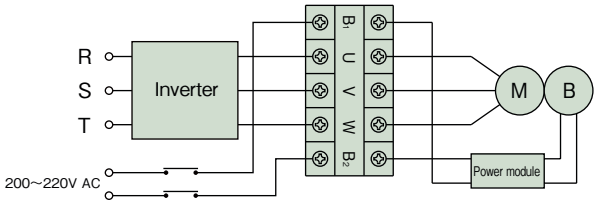
Wire connection

◎ Wire connection method when inverter is used or brake is used in individual turnoff

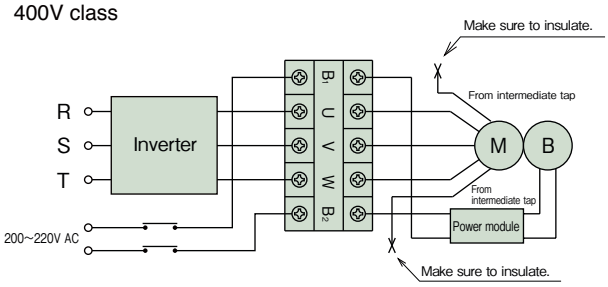
DC brake

- If the motor is operated by the inverter, it is necessary to individually turn off the brake. When individually turning off the brake, as shown in the following diagram, remove the short piece, and do not connect wire to the brake power module from the inverter output, apply a normal power voltage. Separately provide a power supply shown in the following diagram and apply power to the brake power module. If separate power cannot be provided, decrease the voltage by a transformer. Use a transformer whose the capacity is more than necessary, and check that there is no voltage drop. And if the motor voltage of 0.1 to 0.4kW is 400V class, also remove the wire from the motor intermediate tap and insulate it.
- If the motor voltage of 0.4kW or less is 400V class, remove the wire from the motor intermediate tap and insulate it, and separately provide a power supply of 200V to 220V and apply power to the brake power module. If there is no power source of 200V to 220V, decrease the voltage to 200V to 220V by a transformer. The capacity of the transformer shall be 90VA or more, and check that there is no voltage drop. Use an electromagnetic contactor for the brake of 200V class with a rated load of 250V AC, 7A or more. For the 400V class, use an electromagnetic contactor with a contact voltage of 400 to 440V AC, an induction load of 1A or more (e.g. electromagnetic contactor for AC motor 2.2kW). The power module includes a surge absorbing protection element. Add a protection element for the contact in each part if necessary.
- Do not put a relay contact on the output side of the standard power module (between the power module and brake coil). When carrying out [DC individual turnoff wiring] in which the relay contact is put into the position, contact us beforehand.

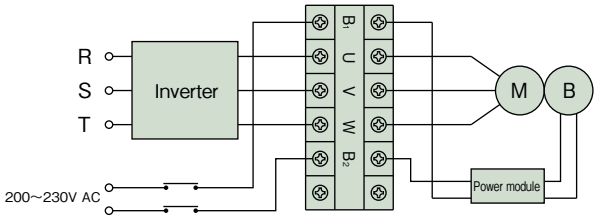
0.1～0.4kW
200V class



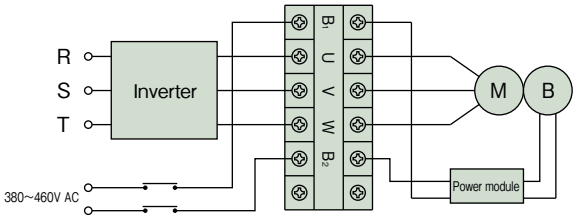
0.1～0.4kW
400V class



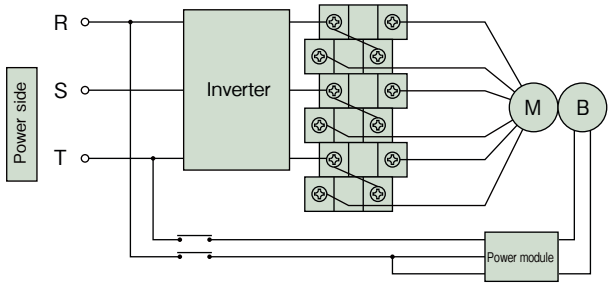
0.75～3.7kW
200V class



0.75～3.7kW
400V class

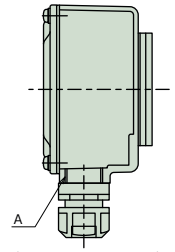
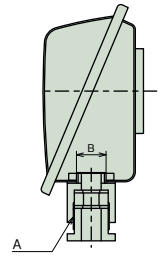


5.5kW or more
Common to 200/400V



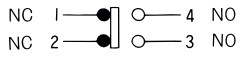
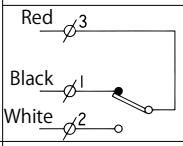
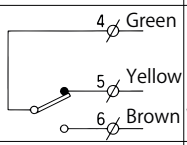
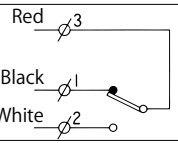
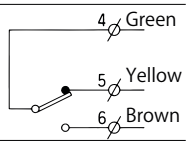
Wire connection

Dimensions of motor terminal, connector part

Shape of terminal box	Motor capacity	Shape of connector	Applicable cable outer diameter	Connector part mounting dimension A	Terminal box seat hole dimension B
 (0.4kW or less)	0.1kW～0.4kW	SK-14L	ϕ11～ϕ13	PF 1/2	—
 (0.75kW or more)	0.75kW～1.5kW	A20C	ϕ14～ϕ15	PF 3/4	ϕ28
	2.2kW～7.5kW	A25C	ϕ19～ϕ20	PF 1	ϕ35
	11kW	A30B	ϕ23～ϕ24	PF 1•1/4	ϕ42

Note) A rubber plug or plate has been inserted into the connector to prevent water etc., from intruding before shipment.
Make sure to remove it when using.

Limit switch specifications

	Stroke adjusting external LS	Thrust detecting LS (LPT16000 or smaller)		Thrust detecting LS	
Limit switch type	WLCA2(OMRON) or equivalent	V-165-1AR5(OMRON) or equivalent		Z-15GW22-B(OMRON) or equivalent	
Electric capacity	250V AC 10A ($\cos\phi$=0.4)	250V AC 10A ($\cos\phi$=0.4)		250V AC 10A ($\cos\phi$=0.4)	
Contact configuration	1a 1b 	For advancing	For retreating	For advancing	For retreating
					
Connector (Applicable cable outer diameter)	SCS-10B (ϕ8.5～ϕ10.5) PF1/2	SCL-14A (ϕ10.5～ϕ12.5) PF1/2		SCS-14A (ϕ10.5～ϕ12.5) PF1/2	

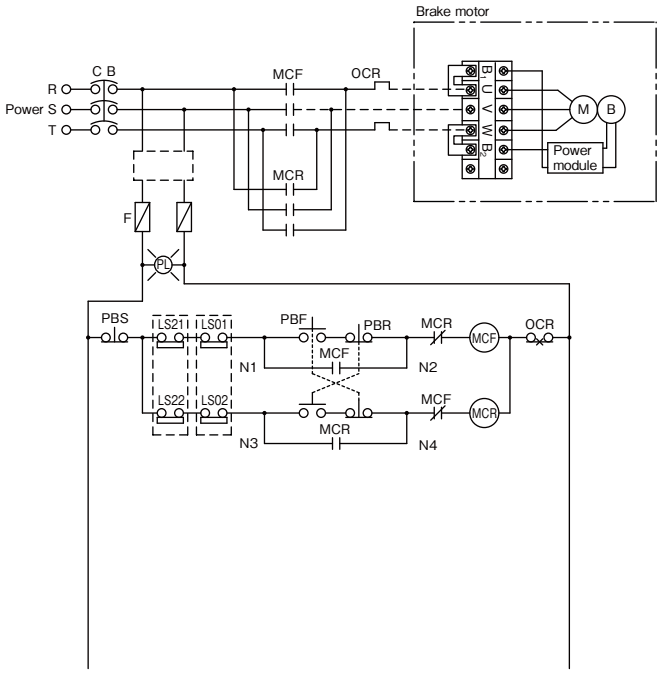
Motor current value • brake current value

Output frame No.	Motor current value (A)						Brake model No.	Brake current value (A)					
	200V 50Hz	200V 60Hz	220V 60Hz	400V 50Hz	400V 60Hz	440V 60Hz		200V 50Hz	200V 60Hz	220V 60Hz	400V 50Hz	400V 60Hz	440V 60Hz
4P - 0.1kW	0.72 (2.76)	0.62 (2.60)	0.65 (2.84)	0.36 (1.38)	0.31 (1.27)	0.32 (1.41)	SBH01LP	0.18 0.27	0.18 0.27	0.19 0.29	0.18 0.27	0.18 0.27	0.19 0.29
4P - 0.2 kW	1.3 (4.91)	1.1 (4.68)	1.1 (5.14)	0.63 (2.40)	0.55 (2.22)	0.56 (2.41)	SBH02LP	0.18 0.27	0.18 0.27	0.19 0.29	0.18 0.27	0.18 0.27	0.19 0.29
4P - 0.4 kW	2.4 (11.6)	2.1 (10.2)	2.1 (11.0)	1.2 (5.14)	1.1 (4.88)	1.1 (5.39)	SBH04LP	0.18 0.27	0.18 0.27	0.19 0.29	0.18 0.27	0.18 0.27	0.19 0.29
4P - 0.75 kW	3.9 (24.0)	3.5 (22.0)	3.4 (24.0)	1.9 (12.0)	1.7 (11.0)	1.7 (12.0)	SLB07LP	0.18 0.27	0.18 0.27	0.20 0.30	0.09 0.15	0.09 0.15	0.10 0.16
4P - 1.5 kW	6.5 (49.0)	6.1 (45.0)	5.8 (50.0)	3.2 (24.5)	3.1 (22.5)	2.9 (25.0)	SLB15LP	0.18 0.29	0.18 0.29	0.20 0.32	0.09 0.15	0.09 0.15	0.11 0.16
4P - 2.2 kW	9.6 (67.0)	9.0 (59.0)	8.6 (64.9)	4.8 (33.5)	4.5 (29.5)	4.3 (32.5)	TB-A2.2	0.25 0.34	0.25 0.34	0.25 0.34	0.13 0.17	0.13 0.17	0.13 0.17
4P - 3.7 kW	15.2 (122)	14.4 (104)	13.6 (114)	7.6 (61.0)	7.2 (51.8)	6.8 (57.0)	TB-A3.7	0.34 0.44	0.34 0.44	0.34 0.44	0.17 0.22	0.17 0.22	0.17 0.22
4P - 5.5 kW	22.4 (146)	21.0 (125)	19.8 (138)	11.2 (73.0)	10.5 (62.5)	9.9 (68.8)	TB-A7.5	1.5 2.0	1.5 2.0	1.5 2.0	3.0 4.0	3.0 4.0	3.0 4.0
4P - 7.5 kW	29.6 (215)	28.2 (185)	26.4 (204)	14.8 (108)	14.1 (92.5)	13.2 (102)	TB-A7.5	1.5 2.0	1.5 2.0	1.5 2.0	3.0 4.0	3.0 4.0	3.0 4.0
4P - 11 kW	42.5 (290)	41.0 (249)	38.0 (274)	21.5 (145)	20.5 (124)	19.0 (137)	TB-A15	1.3 1.7	1.3 1.7	1.3 1.7	2.6 3.4	2.6 3.4	2.6 3.4

Note) 1. The above values are rated current values of the motor and brake. A numerical value in parentheses is a start current value of the motor.
2. The rated current values and start current values do not include a brake current value.
3. A DC brake is used as a brake. The upper stage of the brake current value indicates a value on the primary side of the power module, and the lower stage indicates a value on the secondary side.
4. The above values are references because the rated current values for the power cylinder vary depending on operating conditions.
5. For simultaneous turnoff of 0.1kW to 0.4kW, 400V class, the voltage is converted to 200V through the motor intermediate tap to be input. For individual turnoff, decrease the voltage to 200 to 220V by a transformer. The capacity of the transformer capacity shall be 90VA or more.
6. For individual turnoff of 0.75kW or more, 400V class, the DC module is applicable for 400V class, therefore, it is unnecessary to decrease the voltage.
7. For 0.75kW and 1.5kW of 400V class, the brake model Nos. are “SLB07LPV” and “SLB15LPV,” respectively.

Reference circuit

0.75 to 3.7kW TC type reference circuit diagram



LS01: Stroke adjusting external limit switch for extending

LS21: Thrust detecting limit switch for extending

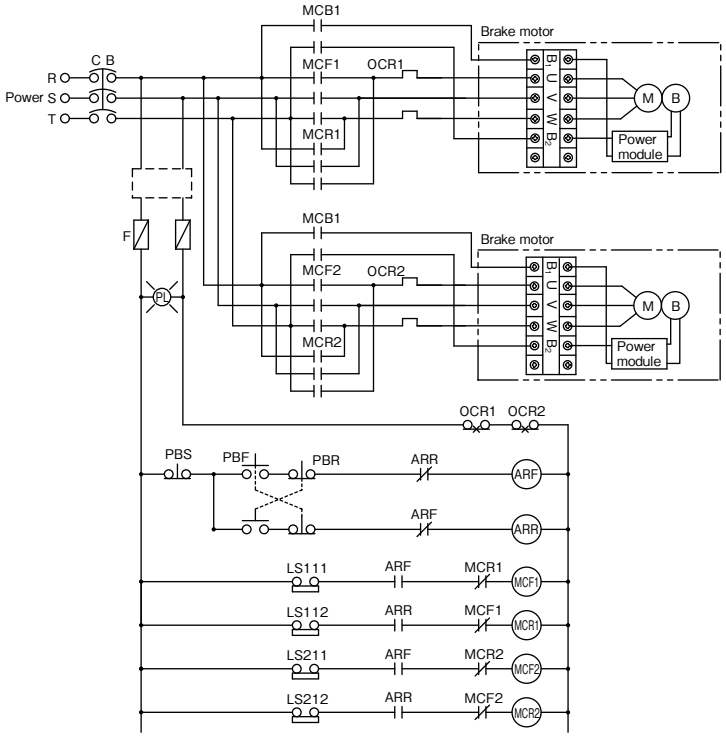
LS02: Stroke adjusting external limit switch for retracting

LS22: Thrust detecting limit switch for retracting

NOTE :

(1) This diagram is an example when the thrust detecting limit switch is used for overload protection.
(2) This diagram shows a single-acting circuit. When using in an inching circuit, remove wire connection between N1 and N2, N3 and N4 and short-circuit the PBS.
(3) If the power source voltage for the motor is different from the control voltage, place a transformer into a [ ] portion in the diagram.
(4) The lead wires B1 and B2 for the brake are connected to the motor terminal blocks U and W using short pieces.
(5) When individually turning off the brake, remove the short piece and apply a normal power source voltage other than inverter output to B1 and B2 from the outside.

0.75 to 3.7kW Brake individual turnoff two units multiple reference circuit diagram



LS111: LPNo.1 Stroke adjusting external limit switch for extending LS1

LS112: LPNo.1 Stroke adjusting external limit switch for retracting LS1

LS211: LPNo.2 Stroke adjusting external limit switch for extending LS2

LS212: LPNo.2 Stroke adjusting external limit switch for retracting LS2

NOTE :

(1) This diagram is an example of 0.75kW or more brake individual turnoff two units inching multiple circuit.
(2) If the power source voltage for the motor is different from the control voltage, place a transformer into a [ ] portion in the diagram.
(3) As the brake terminal blocks B1 and B2 are connected to the motor terminal blocks U and W using short pieces, remove the short pieces before use.
(4) Apply a normal power source voltage other than inverter output to B1 and B2 from the outside.

* For reference circuit for the type of 0.4kW or less.

Installation

Installation direction

Any of horizontal, vertical and inclined direction is allowed.

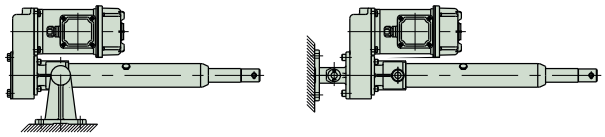
Installation method

For installation of the main body, use a trunnion mount or clevis mount (parallel only).

Apply grease to the trunnion pin and the bracket hole before mounting.

Install the end part with a U-type or I -type end fitting.

Fig. 1 Installation method



Trunnion mount　　Clevis mount

* For the mount fitting, refer to the item of options.

Manual operation

When manually adjusting the stroke, rotate the manual handle shaft on the reducer part with a monkey wrench or a socket wrench after releasing the brake for the brake motor.

⚠ WARNING

When load is applied to the rod, remove the load before releasing the brake.

For the amount of movement of the rod per one turn of the manual shaft, refer to the standard model list (page 9).

Anti-rod rotation

1. Anti-rod rotation is required because a rotating force is generated on the rod with thrust (refer to page 9). Generally, rotation can be mostly prevented by installing the rod end to a driven machine.
2. When operating with the end set free or in the case of application to install pulleys to pull a rope, a rod anti-rotation is normally required.

Lateral load on rod

Install the power cylinder so as to prevent bending load (lateral load) from acting on the rod.

Setting of stroke adjusting external LS

- Take a coasting amount into consideration for adjustment of the limit switch.
- When using the cylinder at the nominal stroke 100%, set the limit switch so that the cylinder stops within the XA dimension in the Dimensions Table.
- When simultaneously operating two or more power cylinders, install a limit switch at the upper limit and lower limit on each cylinder.

Maintenance

Lubrication on ball screw

Use the ball screw as it is because it has been lubricated with grease in advance. Refill grease with reference to Table 1-2 as a guide. To apply grease to the ball screw, remove the greasing port bolt on the outer cylinder and advance the rod in the full stroke and apply grease to the outer circumference of the screw with a grease gun, and then reciprocate the rod within the stroke to be used. Repeat this operation a few times.

⚠ WARNING

Never insert your finger into the greasing port.

If the cylinder operates with your finger inserted, your finger may be injured.

Table 1 Recommended grease

Use classification	Company name	Grease name
Screw shaft	TSUBAKI E&M	JWGS100G
	IDEMITSU KOSAN	*DAPHNE EPONEX SRNo.2
	NIPPON GREASE	NIGULUBE EP-2K
	EXXON MOBILE	MOBILUX EPNo.2
	COSMO OIL LUBRICANTS	COSMO GREASE DINAMX EPNo.2
	SHOWA SHELL	SHELL ALBANIA EP grease 2

* The above greases are filled before shipment.
Note) JWGS100G is separately sold in a container of 100g.

Table 2 Lubrication cycle

Operating frequency	Lubrication cycle
500 to 1000 times/day	Three to six months
100 to 500 times/day	Six months to one year
10 to 100 times/day	One to one and half year

Note) The above values are for longer use, and do not indicate the life.

Greasing on Reduction part

For the gear and the bearing in the reducer part, the gear case is filled with grease. Accordingly, it is not necessary to grease because they normally endure use for one year or longer. However, operation for a long time or use after long storage impairs the lubrication effect due to deterioration of grease. Therefore, inspect and grease.

Reducer part initial filled grease

Gear case: DAPHNE EPONEX SRNo.1 IDEMITSU KOSAN

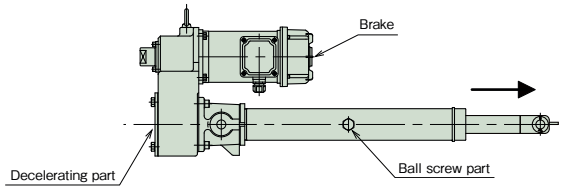
Planetary gear (straight type): Moly gear grease No. 1 SUMICO LUBRICANT CO., LTD.

Gap adjustment of brake

Although the electromagnet stroke (gap) of the brake has been adjusted to approximately 1.2 through 1.3mm (limit gap 1.5mm) for 0.4kW or less or to approximately 0.2mm (limit gap 0.5mm) for 0.75kW or more, re-adjust it before it exceeds the limit gap value.

For details, refer to the Operation Manual.

Fig. 2 Inspection location



⚠ WARNING

■ Cautions for selecting

- Anti-rod rotation is required because a rotating force is exerted on the rod with thrust. Rod rotating forces at the rated thrust are described in the model list. When operating with the end unconnected or when installing pulleys to pull rope, use an optional rod anti-rotation specification.
- When the cylinder operating stroke is short, a high speed type cylinder cannot be used because the operating time per one stroke becomes shorter and cannot be actually controlled. The following table shows minimum necessary strokes when motor energization time is 0.5s. Refer to this table to determine the speed.

Speed symbol	H
Nominal speed mm/s 50/60Hz	100/120
0.5s operation moving amount mm	50/60
Predicted maximum coasting amount mm (Reference)	24/33
Minimum necessary stroke mm	74/93 or more

■ Cautions for installation

- Apply grease to the trunnion pin and the trunnion hole for trunnion mounting.
- Also, apply grease to the connecting pin of the end fitting and the connecting pin for clevis mounting.
- When the main body greatly swings by operation of the cylinder, consider using a sliding bearing or a rolling bearing for the connecting part. Cylinders whose trunnion hole is provided with sliding bearing are available as MTO.
- When the trunnion pin or connecting pin for the clevis or the end fitting is directed in the vertical direction (when the cylinder is laid horizontally), and the main body swings, take countermeasures for wear such as inserting a bearing member into the trunnion hole, the clevis fitting, or the side part of the end fitting.
- All models are totally enclosed structures so that they can be used normally outdoors, however, under adverse conditions exposed to constant water and steam etc., and snow accumulation, although they are an outdoors type, an appropriate cover is required. The power cylinder can generally be used in a range of -15℃ to 40℃, although it varies depending on the use conditions. When using at 40℃ or higher, always protect with a heat insulating cover, etc. Never use in a flammable atmosphere, otherwise it may cause an explosion and fire. In addition, avoid using it in a location where vibration or shock exceeding 1G is applied.
- When using a cylinder of the cabtire cable lead wire specification outdoors, carry out waterproofing treatment sufficiently.

■ Cautions for use

- Regulate the both ends of the stroke by the limit switch. Select a type of option which allows the limit switch to be mounted on the power cylinder body.
- Use within the stroke range. If the stroke is exceeded, breakage may occur.
- As a high-speed type (H speed) of the power cylinder T series has a long coasting distance, the striker may override the limit switch. For this reason, make sure to allow a limit signal to be self-held on the control circuit.
- Megger testing is prohibited for this cylinder. It may break the built-in power module. Remove the brake wiring for the terminal block when conducting megger testing of the external circuits.
- Adjustment of the limit switch for thrust detection of the TC type must not be carried out by the customer. The preset value for thrust detection may greatly change.

Power Cylinder Inquiry Form

Inform TSUBAKI E&M of the following items when making an inquiry.

Company name: Your name:

TEL : FAX :

(〒 –)

Address:

Standar Specification	1. Application load (thrust)	Normal operation N{kgf} Max N{kgf}
	2. Speed	mm/s (at 50Hz, 60Hz)
	3. Stroke	Actual stroke mm Max stroke mm
Electric Motor	4. Power	3-phase 200V/50Hz、200V/60Hz、220V/60Hz 3-phase 400V/50Hz、400V/60Hz、440V/60Hz 〔Others〕
	5. Special Specification	Brake, Outdoors, Explosion-proof 〔Others〕
Operating Environment	6. Operation	times/min x min/hrs. x hrs./day x days/yr. (Back and forth count as 2)
	7. Ambient Temperature	℃
	8. Mounting Location	Indoor, Outdoors, Explosion-proof 〔Others〕
	9. Dust	Average, High
	10. Control Device	Stroke adjustment external LS, Thrust detection LS, Internal LS, Potentiometer, Rotary Encoder 〔Others〕
	11. Others	Trunnion fitting, crevice fitting, I-shape end fitting 〔Others〕

Layout Other information

SAFETY

Warning Observe the following safety precautions to prevent serious injuries.

●Do not release the brake while jack is loaded. If the brake is released under loaded conditions, suspended objects may fall and lead to accidents.
●Make sure the jack is not loaded when manually operated. Operate jack according to the instruction manual.
●During suspending operations, provide safety guards to prevent load from falling and never stand under the jack.
●Observe the Labor Safety & Hygiene Regulations, General Criteria, Paragraph 1, Chapter 1, Edition 2, or your local regulations.
●Installation, removal, maintenance and inspection:
- Carry out operation according to the instruction manual.
- While performing electrical wiring, observe laws and regulations such as Electricity Equipment Criteria and Extension Rules, as well as the cautions (e.g. direction, space, operating conditions, etc.) indicated in the manual. Be especially careful in following the instructions on grounding to prevent electric shocks.
- Turn off the power and make sure that it does not reconnect accidentally.
- Wear appropriate clothing and protective gears (safety glasses, gloves, safety shoes, etc.).

Caution Observe the following safety precautions to prevent accidents.

●Always operate within the allowable stroke range. Operating a jack outside its allowable stroke range may result in accidents.
●Before switching on the jack, make sure the limit switches have been wired correctly and the stroke has been adjusted appropriately.
●The motor must be driven within the correct electrical voltage range to prevent motor burnout or fire.
●Efficiencies of parts may decrease with wear and age. Carry out periodic inspections as set forth in the manual.
When the parts are no longer functioning or are ineffective, please contact a TSUBAKI E&M distributor for repair.
●Read the manual provided with the product thoroughly before operating and refer to it as necessary. If the instruction manual is misplaced, request a replacement copy from TSUBAKI E&M or your TSUBAKI E&M distributor, indicating the product name, series, and model number.
●The instruction manual must be delivered to the final user.

Warranty

1. Warranty period without charge

18 months effective the date of shipment or 12 months effective the first use of Goods, including installation of Goods to Buyer's equipment or machine - whichever comes first.

2. Warranty coverage

Should any damage or problem with the Goods arise within the warranty period, given that the Goods were operated and maintained according to the instructions provided in the manual, Seller will repair and replace at no charge once the Goods are returned to the Seller. This warranty does not cover the following:

1) Any costs related to removal of Goods from the Buyer's equipment or machine to repair or replace parts.
2) Cost to transport Buyer's equipment or machine to the Buyer's repair shop.
3) Costs to reimburse any profit loss due to any repair or damage and other consequential losses caused by the Buyer.

3. Warranty with charge

Seller will charge any investigation and repair of Goods caused by:

1) Improper installation by failing to follow the instruction manual.
2) Insufficient maintenance or improper operation by the Buyer.
3) Incorrect installation of Goods to other equipment or machine.
4) Any modifications or alterations of Goods by the Buyer.
5) Any repair by engineers other than the Seller or those designated by the Seller.
6) Operation in an inappropriate environment not specified in the manual.
7) Force Majeure or forces beyond the Seller's control such as natural disasters and injustices done by a third party.
8) Secondary damage or problem incurred by the Buyer's equipment or machine.
9) Defected parts supplied, or specified by the Buyer.
10) Incorrect wiring or parameter setting by the Buyer.
11) The end of life cycle of the Goods under normal usage.
12) Loss or damage not liable to the Seller

4. Dispatch service

Service to dispatch a Seller's engineer to investigate, adjust or trial test Seller's Goods is at the Buyer's expense.

Caution This catalog does not include operating instructions. Read the actual manual thoroughly before installing or operating the product.

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