NEW TYPE
POWER CYLINDER

Power Cylinder

U series

New flagship power cylinder (Successor model of T series Power Cylinders with more than 6 tons rated thrust)

Thrust：58.8kN to 313kN {6000kgf to 32000kgf}

Power cylinder that succeeds in providing a smaller, lighter unit with better cost performance while maintaining the same performance of the previous model (T series).

● Lightweight and compact

Thanks to newly developed special ball screws and bearings, we succeeded in reducing the total length by a max. of 11% and the mass 40% compared with the previous model (T series). The smaller size and lighter weight make it easy to replace hydraulic cylinders.

● Complete line-up available

We added a model with a 32 ton rated thrust that we did not have previously. We can now replace hydraulic cylinders in the large thrust range.

● Better cost performance

In addition to achieving cost reductions compared to previous models thanks to smaller and lighter parts, the power cylinder is electrical so it has much better power savings than hydraulic types, greatly reducing power consumption.

● Two easy-to-select types

U series have two types which are different in safety mechanisms from each other. The UB type incorporates a wet slip clutch. UC type is equipped with a thrust detection unit.

● Abundance of options

The stroke adjusting limit switch includes two types of the external type and internal type, and the stroke sensor includes two types of the potentiometer method and rotary encoder method. Control by a sequencer becomes simpler. For a stroke sensor with potentiometer, an option not only indicating stroke but also allowing for control by a meter relay is also available.

Model No. designation

LP UB 6000 L 5 V T1 LPUJ

Power cylinder

U series

LPUB with: Wet slip clutch
LPUC with: Thrust detection unit

Thrust

6000 : 58.8kN {6000kgf}
8000 : 78.4kN {8000kgf}
12000: 117kN {12000kgf}
16000: 156kN {16000kgf}
22000: 215kN {22000kgf}
32000: 313kN {32000kgf}

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

Nominal stroke

5 : 500mm
10: 1000mm
15: 1500mm
20: 2000mm

*The above values are examples of indication.

Voltage code

No code: 200V class
200/200/220V 50/60/60Hz
V: 400V class
400/400/440V 50/60/60Hz
V1: 380V/50Hz
V2: 380V/60Hz
V3: 415V/50Hz
V4: 460V/60Hz

Motor Option

See page 160 to 162.

Option code

L : With two external limit switches for stroke adjustment*1
L3 : With three external limit switches for stroke adjustment*2
K2,K4 : Position detecting internal limit switch
P : Potentiometer
R : Rotary encoder
C : Clevis*3
U : U type end fitting (blank: standard)*4
J : Bellows*5

*1: This cylinder may be damaged during overstrokes. At minimum, we recommend attaching this OP (for position control).
*2: Please specify 4 or more mountings separately.
*3: Cannot combine with clevises and K2, K4, P, and R.
*4: I type end fittings are standard for the U series.
*5: The stroke is the same.

* Please order the trunnion mounting adaptor separately from the Power Cylinder.
* Manually-operated handle is available as an option.

Standard model list

Power cylinder type			Rated thrust N	Rated thrust {kgf}	Nominal speed 50/60Hz mm/s	Motor capacity kW	Rod movement per one turn of manual shaft mm	Rod torque N·m	Rod torque {kgf·m}	Nominal stroke mm	Brake specifications
LPUB LPUC	6000	S	58.8k	6000	6.5/7.8	0.75	1.0	124	12.7	500 1000 *1 1500 (Rated thrust is 33.3kN)	● DC brake ● Brake external wiring is available
		L			18/22	1.5	0.7				
		M			26/31	2.2	1.0				
		H			42/50	3.7	1.7				
LPUB LPUC	8000	S	78.4k	8000	10/12	1.5	1.2	166	17.0	500 1000 1500	
		L			20/24	2.2	0.8				
		M			30/36	3.7	1.2				
		H			43/52	5.5	1.7				
LPUB LPUC	12000	L	117k	12000	10/12	2.2	1.2	333	34.0	500 1000 1500 *1 2000 (Rated thrust is 68.6kN)	
		M			18/22	3.7	2.2				
		H			30/36	5.5	1.2				
LPUB LPUC	16000	L	156k	16000	14.5/17.5	3.7	1.7	444	45.3	500 1000 1500 2000	
		M			20/24	5.5	2.3				
		H			30/36	7.5	1.2				
LPUB LPUC	22000	L	215k	22000	14.5/17.5	5.5	2.9	915	93.5	500 1000 1500 2000	
		M			20/24	7.5	3.2				
		H			30/35	11	3.5				
LPUB LPUC	32000	L	313k	32000	10/12	5.5	2.1	1109	113	500 1000 1500 2000	
		M			15/18	7.5	2.4				
		H			20/24	11	2.4				

*1: The rated thrust is limited.

Motor specifications

Capacity	0.75kW to 3.7kW	5.5kW to 11kW
Model	Totally enclosed self cooling type with brake	All enclosed fancooled 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	B	
Time rating	S2 30min	S1
Protection	Fully sealed outdoor model (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 29.

Painting color

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

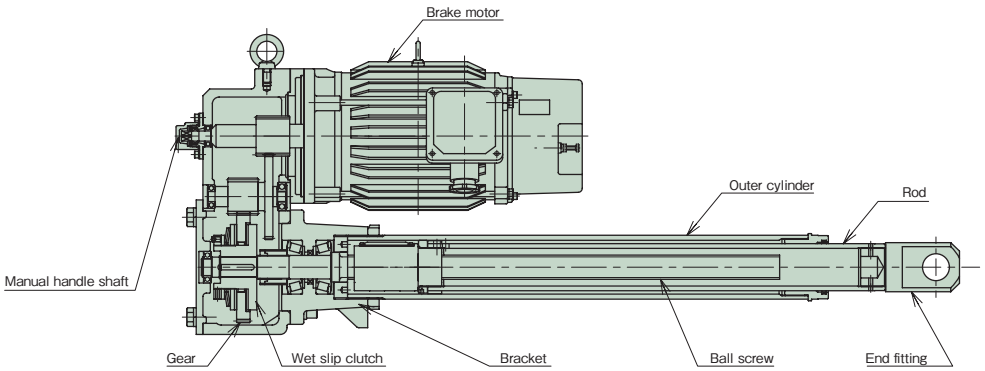
Operating environment standards

Environment / Model	Ambient temperature	Relative humidity	Shock resistance rating	Installation altitude	Atmosphere
Outdoor type	−15℃ ' 40℃	85% or less (no condensation)	1G or less	No more than 1,000 m above sea level	Normally outdoors

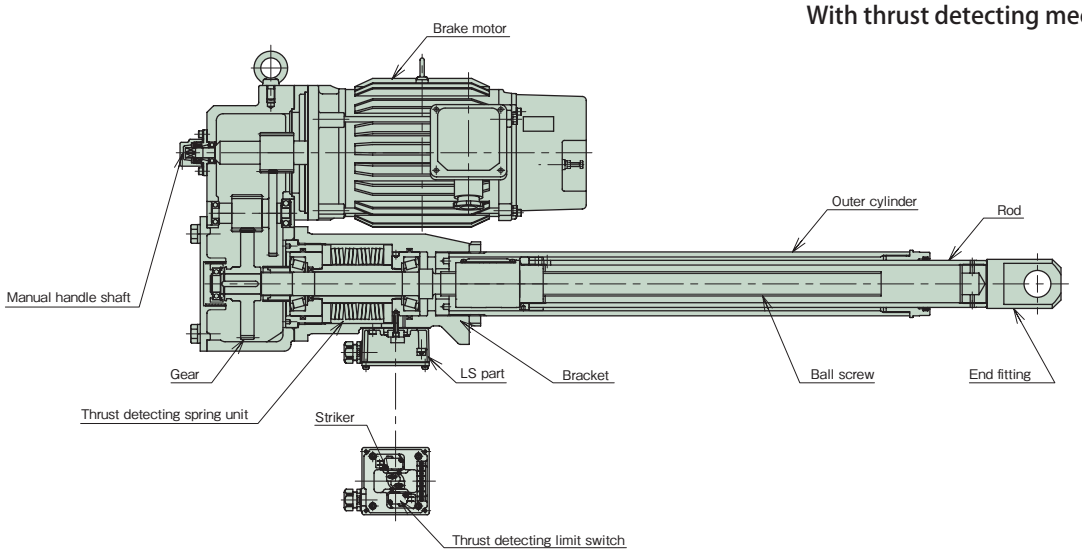
1) The bellows option is recommended in dusty areas.
2) Units can treated with paint or protective coating for use in areas subject to sea winds and salt. Contact us for more information.
3) All models have fully sealed construction for use in normal outdoor conditions. However, protective covering must be furnished in harsh environments that are subject to constant water, steam, or snowfall.
For use in environments that reach 40°C or more, furnish an insulation cover.
Never use in flammable environments. There is a risk of explosions and fire hazards.
Do not use in areas subject to vibration or shock of 1 G or more.
4) Contact us for use in mist-filled atmospheres.

Structure

UB type — With wet slip clutch protection device



UC type — With thrust detecting mechanism



* The structure slightly varies depending on the model.

Brake motor — Fully sealed construction for use in normal outdoor conditions. This brake action holds load while the power cylinder stops and reduces coasting during stoppage, and of increases stop accuracy. All of the brake motors are outdoor types.

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

Actuation part — The actuation part is with a ball screw and nut which converts a rotating force into linear motion. In addition 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 working stroke is the same even with bellows equipped.
The sealed rod also endures outdoor use.

Classification of usage for LPUB and LPUC 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.

UB type

● With wet slip clutch

[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.

UC type

● Thrust detecting mechanism type
● This type exerts its effect in the following cases.

① For push/pull press stop

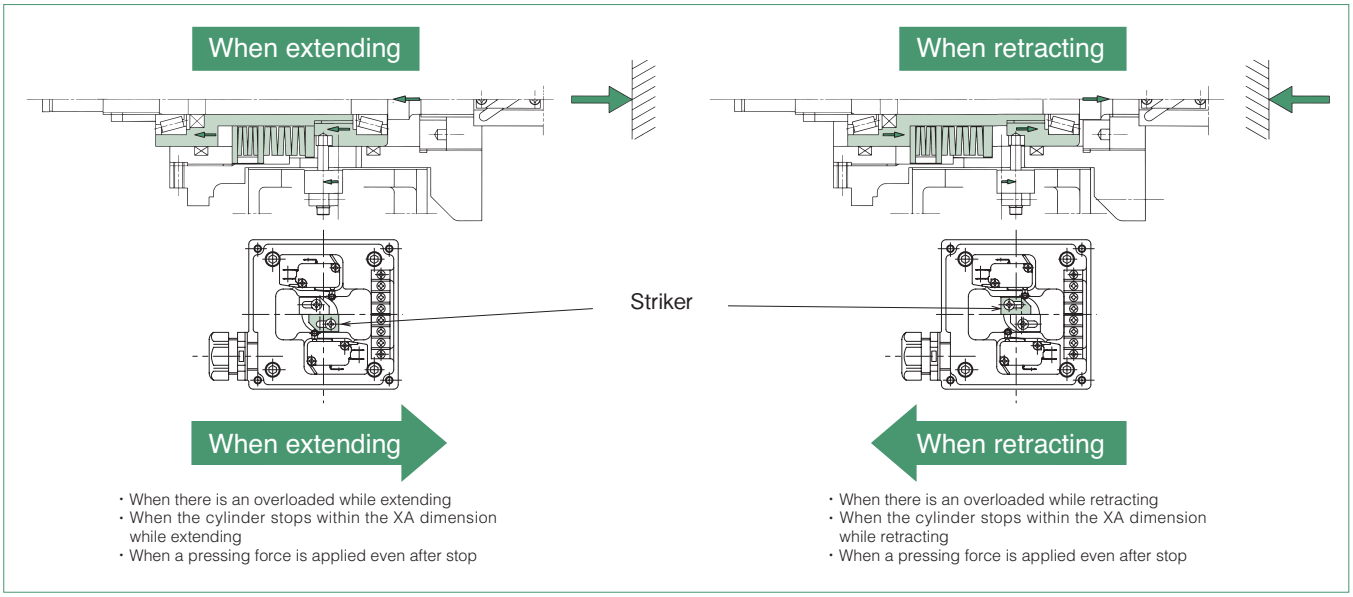
② When requiring an electric signals during overload

③ When an overload is applied from the load side during power cylinder stops

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

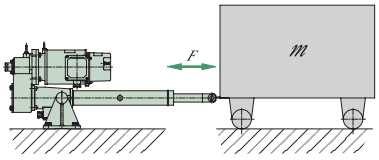
[Thrust detecting mechanism]

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.



Preset thrust for safety device

For both UB and UC type, the thrust for the safety device is set at approximately 150% to 200% of the rated thrust. The safety device will 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 16.



Trolley weight: m kg
Coefficient of friction: μ
Trolley traveling resistance:
$F = \mu m \leqq$ Rated thrust

Cautions for use

● When push/pull 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 type in the following table.

Type	LPUC6000 to LPUC22000		
Speed	S,L	M	H
Reference total stop times ($\times 10^4$times)	10	3	※

Note 1 When the power cylinder is used for push stopping either push or pull, brake external wiring is recommended.
2 When the power cylinder is used more frequent turn in above table, it is recommended to stop with the stroke adjusting LS.
3 When the power cylinder is used with press stop, strength of the mating equipment shall be 250% or more of the rated thrust.
4 When press stop is required with H speed, reduce the speed before stop with inverter.

● When multiple operation or stroke position control is performed

① When installing rotary encoder or potentiometer

For the UC type, a spring mechanism is integrated in the system. The spring slightly deform at press and stop, or when overload occurs, the signal amount deviates by the deflection. For the UB type, even if the safety device is tripped, signal amount does not deviate. However, the UC 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 whole the power cylinder stops

For the UC type, a spring mechanism is integrated in the system, therefore, when a large load is applied from the load side, the spring deform and the rod moves by the deflection.
When the load is eliminated, the rod returns to the original position.

● Please read the cautions on page 33

Selection 1

Conditions 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 per day, and number of operating days per year
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 (UB or UC) according to the application and operation method.

Determination of model No. STEP 2

1. Calculate 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 operating days/year x 10^{-3}

2. Calculate 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 from the standard model list (page 11) based on the stroke, speed, power supply voltage and frequency.

Characteristics check STEP 3

1. Use the power cylinder within a frequency of operation below (Table 2).
2. Check the load time ratio.
3. Positioning accuracy varies depending on the stopping method. Refer to table 3 (page 15).

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, and please apply the appropriate factor depending on actual condition.

Table 2 Allowable frequency of operation

	LPUB•LPUC						
Power cylinder type	6000S	6000L 8000S	6000M 8000L 12000L	6000H 8000M 12000M 16000L	8000H 12000H 16000M 22000L 32000L	16000H 22000M 32000M	22000H 32000H
Number of starting times (Number of times/min)	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 U 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.

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

Guide for life

Use the number of operation times of the brake and the traveling distance of the cylinder (nut) as guide to select the power cylinder U series with expected life.

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 case of great impact or where lubrication or maintenance is not performed properly, the expected traveling distance becomes substantially shorter.

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 fomula.

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

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

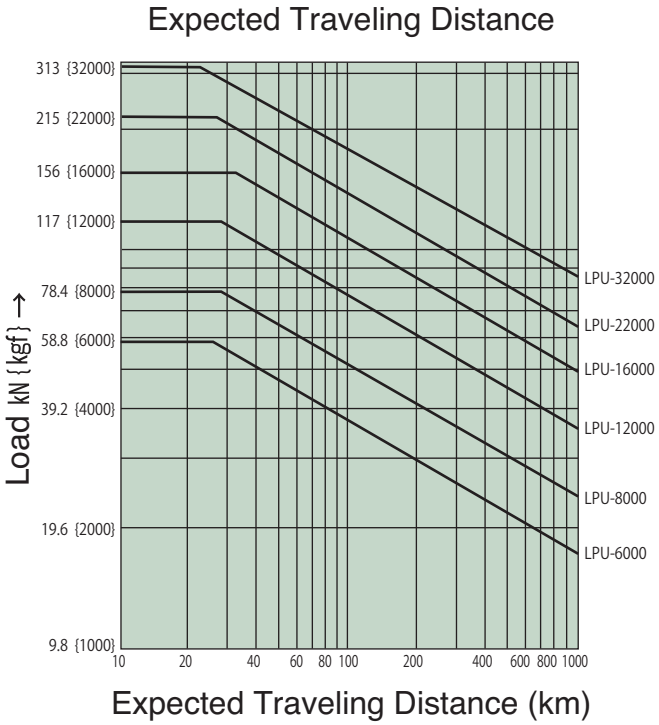
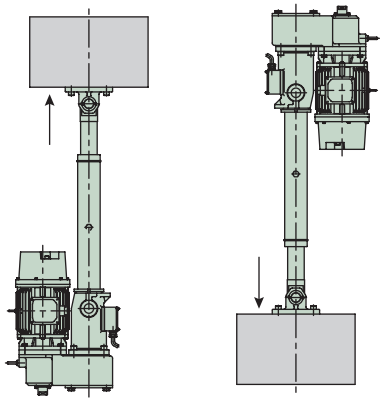


Table 3 Coasting distance and stop accuracy (Reference value)

Unit: mm

Type		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
LPUB LPUC	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
LPUB LPUC	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
LPUB LPUC	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
LPUB LPUC	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
LPUB LPUC	22000	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
LPUB LPUC	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



Vertical operation

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

Brake holding force

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

Stoppage by Brake

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 to set the limit switch position 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 H speed, refer to the cautions for selecting on page 14.
* 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**：Hoppergate open/close (Stop at middle two points, press and stop at both end)
2. **Required thrust**：41.2kN {4200kgf}
3. **Stroke**：1000mm
4. **Speed**：1000mm/s in approximately 45 seconds
5. **Frequency of operation**：One reciprocation/60 minutes (1 reciprocations/hour)
6. **Operating time**：8 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, dusty, temperature 0℃ to 35℃
9. **Power source**：380V 50Hz

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

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

2. Corrected thrust：41.2kN {4200kgf} ×1.3＝53.6kN {5460kgf}

3. Model No.：LPUC 6000L10 K2 J V1
Stop at two middle points — K2
With bellows (much dust) — J
380V 50Hz — V1

<Characteristics check>: **1. Number of starting times**

● **Number of starting**：2 times/60min＜4 times/min

● **Load time ratio**：$\frac{\frac{1000}{22}\times 2}{10\times 60}\times 100 = 2.5\% < 25\%$

2. Number of total press (pull) stop times：2 times/1 reciprocation, durable years: 5 years (250 days/year)
$2\times1\times8\times250\times5 = 2\times10^4$ times $< 10\times10^4$ times

<Life check>: **1. Annual traveling distance**：1.0×2×1 times/hour×8 hours/day×250 days/year×10^{-3}＝4km

2. Expected traveling life：4km×5 years＝20km

3. Equivalent load：$P_M = \frac{53.6+2\times53.6}{3} = 53.6$kN {5460kgf}

This calculated value satisfies the expected traveling life of LPUC 6000 according to the load-life diagram on page 14.

Selection 2

Table 4 Allowable mass in consideration of inertia in horizontal installation

Unit: kg

Power cylinder model	LPUB LPUC : 6000			LPUB LPUC : 8000			LPUB LPUC : 12000			LPUB LPUC : 16000			LPUB LPUC : 22000			LPUB LPUC : 32000		
	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H
Allowable mass *m*	42000	35000	25000	51000	40000	32000	170000	123000	74000	204000	160000	100000	305000	230000	307000	680000	490000	670000

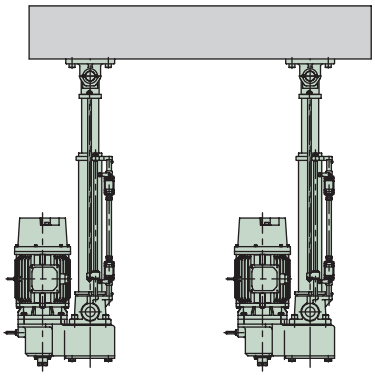
Note) No consideration required at low (s) speed.

Selection 3

Multiple operation

As shown in Fig. 2, transfer or elevation can be carried out by sharing load on multiple power cylinders with less speed fluctuation due to variation in load. For selection, please read carefully on following.

Fig. 2 Linkage operation by multiple power cylinders



Control method

Turn on the power for all of the cylinders at sametime, and stop with the limit switches installed on each power cylinder. Do not control with single limit switch only for all cylinder for an example of the control circuit, refer to example of the multiple circuit (page 30).

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 3. When synchronizing power cylinders, use the multi-series. (Page 66)

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

Table 5 Multiple factor

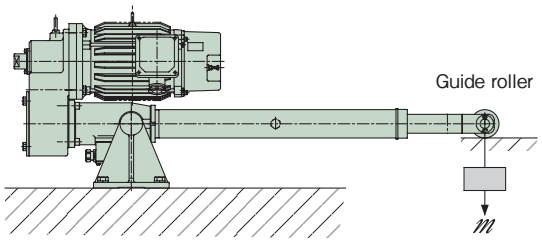
Number of power cylinders used	2 cylinders	3 cylinders	4 cylinders	5 cylinders	6 cylinders
Multiple factor	0.8	0.7	0.6	0.55	0.5

Cautions for layout

When the radial load work on the cylinder or unbalanced load on the rod, take the following countermeasures.

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

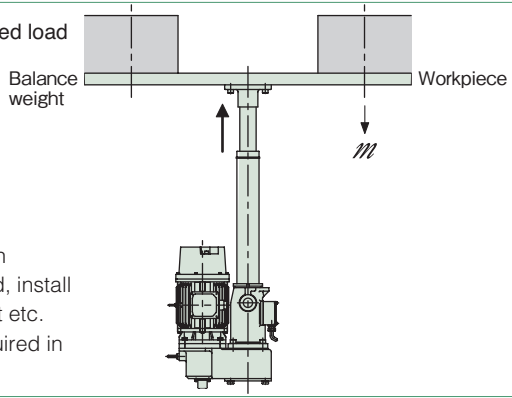
Fig. 3 radial load



install a guide roller and avoid directly a lateral load on rods.

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

Fig. 4 Unbalanced load

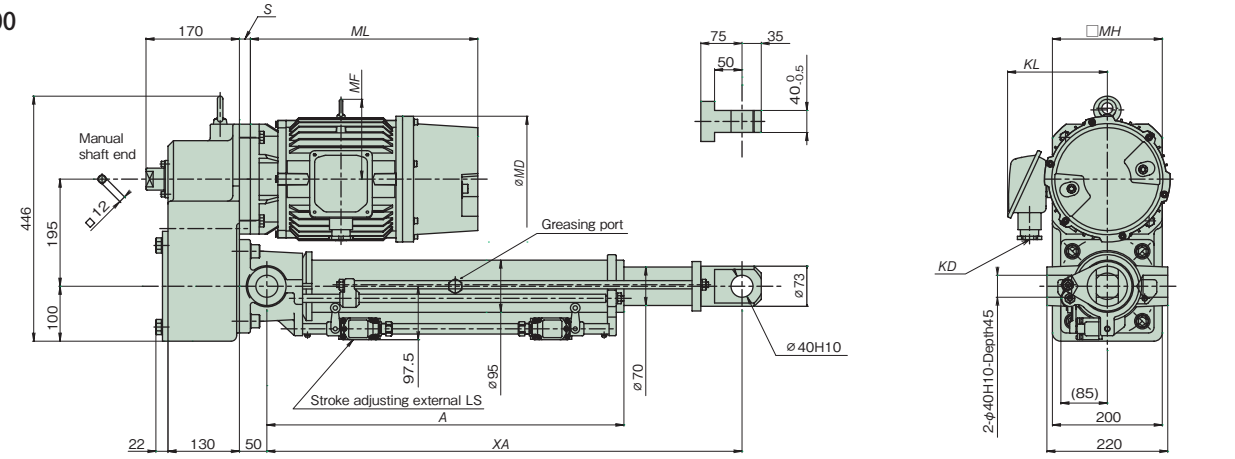


There is when an unbalanced load, install a counter weight etc.

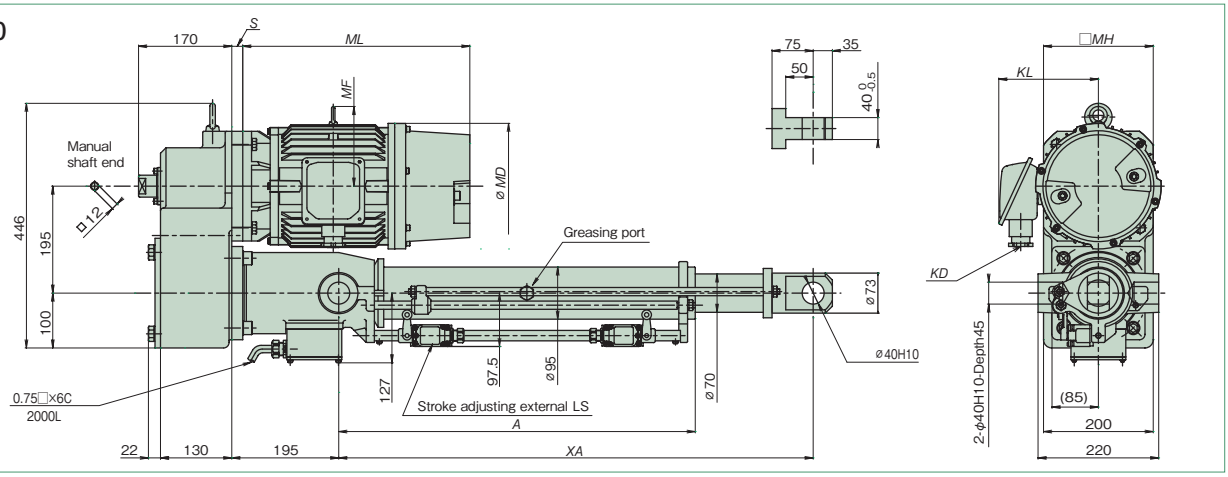
* A guide is required in this layout.

Dimensions Table U Series 6000

LPUB6000



LPUC6000



Unit: mm

Type	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPUB6000S LPUC6000S	6.5/7.8	0.75	180	289	—	166	A20C	170	90
LPUB6000L LPUC6000L	18/22	1.5	194	351	—	178			46
LPUB6000M LPUC6000M	26/31	2.2	194	340	128	178	A25C	200	46
LPUB6000H LPUC6000H	42/50	3.7	229	414	146	187			20

Unit: mm

Nominal stroke	Thrust		A	XA	
	kN	{kgf}		MIN	MAX
500	58.8	6000	750	910	1410
1000			1250	1450	2450
1500	33.3	3400	1750	1995	3495

Approximate mass of main body

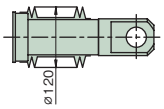
Unit: kg

Type \ Nominal stroke	500	1000	1500
LPUB6000S	103	120	138
LPUC6000S	118	135	153
LPUB6000L	107	124	142
LPUC6000L	122	139	157
LPUB6000M	102	119	137
LPUC6000M	117	134	152
LPUB6000H	129	146	164
LPUC6000H	144	161	179

1. This drawing shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a extra margin of approximately 10mm on both sides for the nominal stroke.
3. Same dimensions with bellows equipped.
4. UC type brake should be controlled separately.
5. When the model of the UC 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 29.
7. Read cautions on page 33.

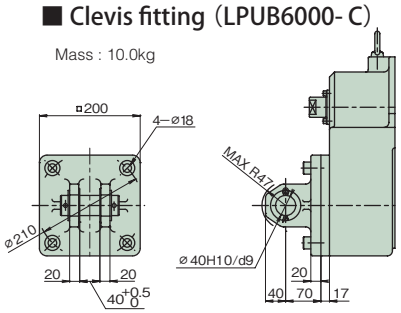
Options

■ Bellows (-J)



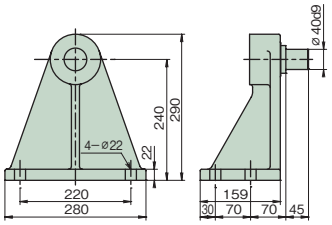
■ Clevis fitting (LPUB6000-C)

Mass : 10.0kg



Note) Attached to the main body, when shipped.

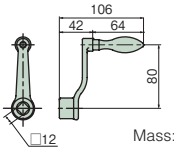
■ Trunnion fitting (LPUB6000-T)



Mass: 39.0kg/set

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

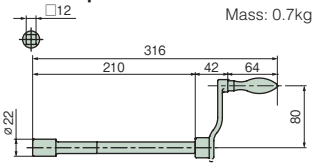
■ Manual handle (LPTB4000-H)



Mass: 0.4kg

■ Manual handle for control unit options (LPTB4000-HC)

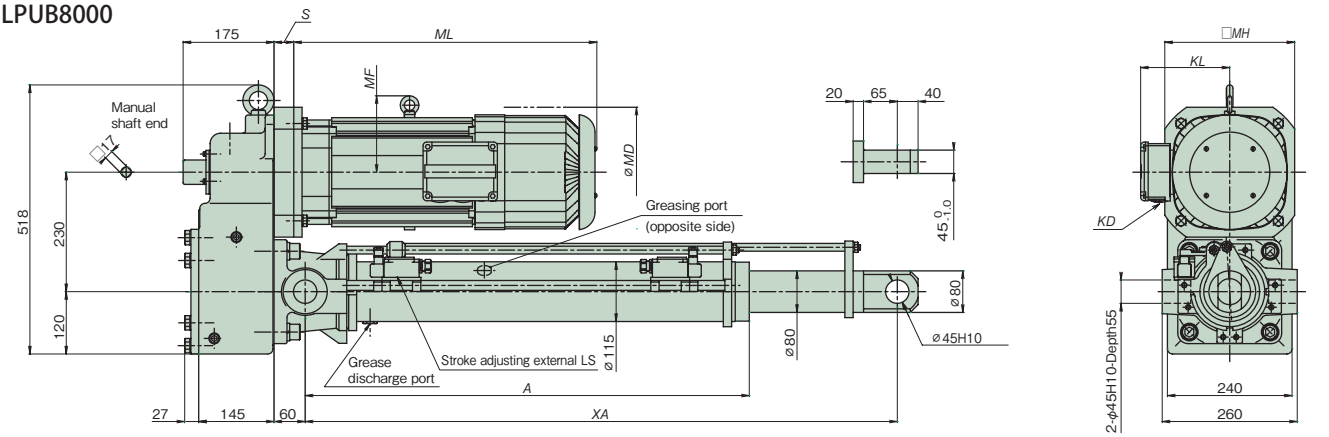
Mass: 0.7kg



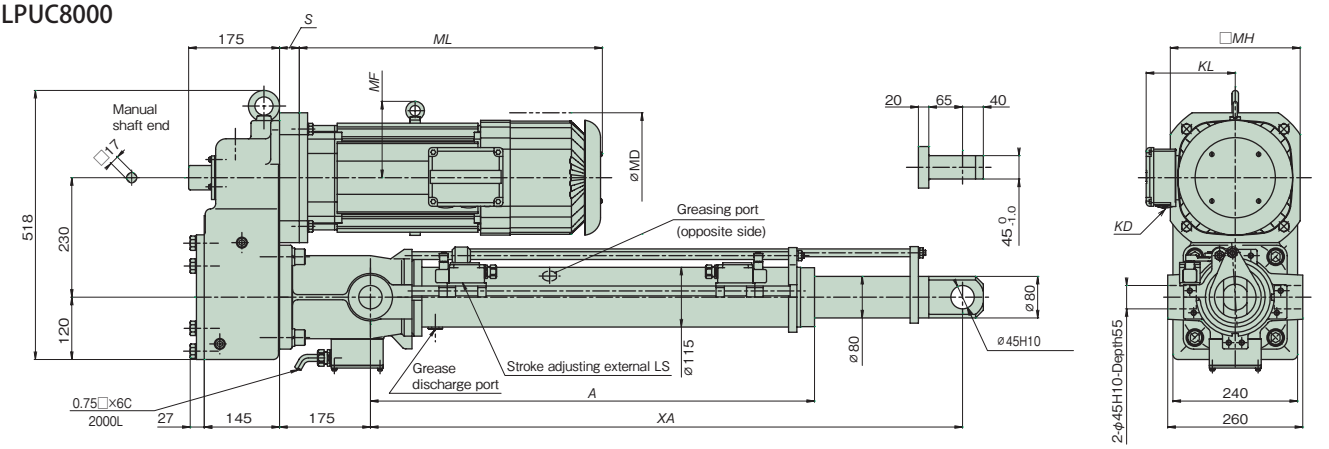
* Dimensions with no tolerance described have general tolerance, and sizes are larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table U Series 8000

LPUB8000



LPUC8000



Unit: mm

Type	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPUB8000S LPUC8000S	10/12	1.5	194	351	—	178	A20C	170	100
LPUB8000L LPUC8000L	20/24	2.2	194	340	128	178	A25C	200	46
LPUB8000M LPUC8000M	30/36	3.7	229	414	146	187			20
LPUB8000H LPUC8000H	43/52	5.5	250	584	147	172	2XM32X1.5 1XM16X1.5	250	38

Unit: mm

Nominal stroke	Thrust		A	XA	
	kN	{kgf}		MIN	MAX
500	78.4	8000	855	1010	1510
1000			1355	1560	2560
1500			1955	2210	3710

Approximate mass of main body

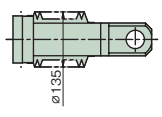
Unit: kg

Type \ Nominal stroke	500	1000	1500
LPUB8000S	162	187	212
LPUC8000S	185	210	235
LPUB8000L	172	197	222
LPUC8000L	195	220	245
LPUB8000M	177	202	227
LPUC8000M	199	224	249
LPUB8000H	200	225	250
LPUC8000H	223	248	273

1. This drawing shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a extra margin of approximately 10mm on both sides for the nominal stroke.
3. Same dimensions with bellows equipped.
4. UC type brake should be controlled separately.
5. When the model of the UC 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 29.
7. Read cautions on page 33.

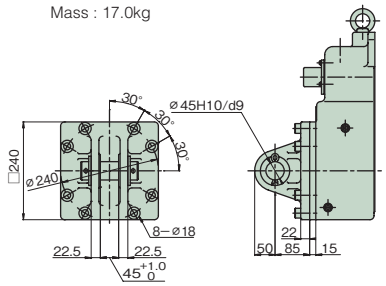
Options

■ Bellows (-J)



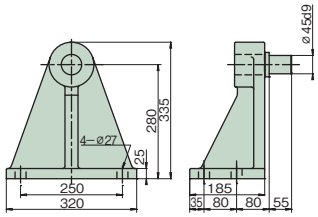
■ Clevis fitting (LPUB8000-C)

Mass : 17.0kg



Note) Attached to the main body, when shipped.

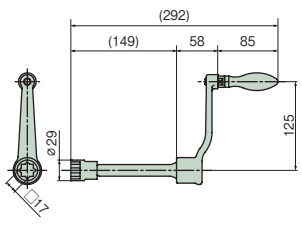
■ Trunnion fitting (LPUB8000-T)



Mass: 70.6kg/set

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

■ Manual handle (LPTB12000-H)

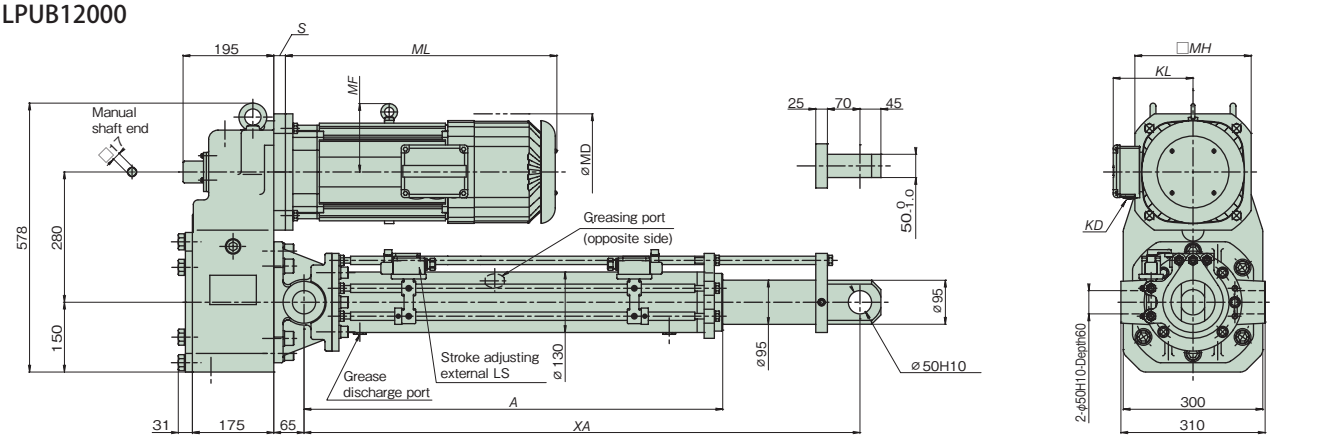


Mass : 1.1kg

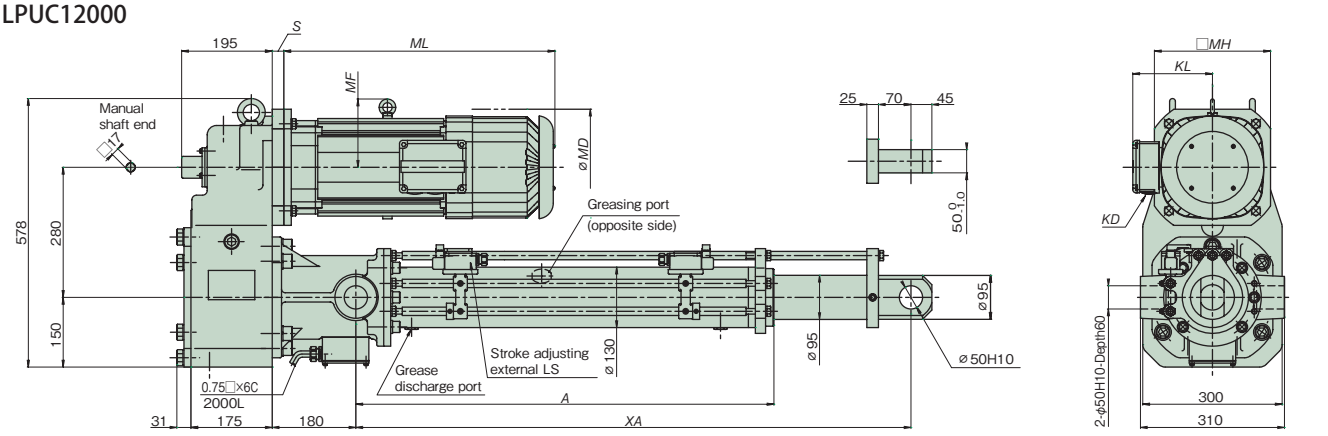
* Dimensions with no tolerance described have general tolerance, and sizes are larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table U Series 12000

LPUB12000



LPUC12000



Unit: mm

Type	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPUB12000L LPUC12000L	10/12	2.2	194	340	128	178	A25C	200	145
LPUB12000M LPUC12000M	18/22	3.7	229	414	146	187			145
LPUB12000H LPUC12000H	30/36	5.5	250	584	147	172	2XM32X1.5 1XM16X1.5	250	25

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX
500	117	12000	900	1065	1565
1000			1400	1615	2615
1500			1900	2165	3665
2000	68.6	7000	2400	2715	4715

Approximate mass of main body

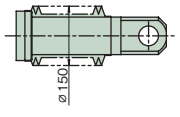
Unit: kg

Type \ Nominal stroke	500	1000	1500	2000
LPUB12000L	238	268	298	328
LPUC12000L	269	299	329	359
LPUB12000M	262	292	322	352
LPUC12000M	293	323	353	383
LPUB12000H	241	271	301	331
LPUC12000H	272	302	332	362

1. This drawing shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a extra margin of approximately 10mm on both sides for the nominal stroke.
3. Same dimensions with bellows equipped.
4. UC type brake should be controlled separately.
5. When the model of the UC 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 29.
7. Read cautions on page 33.

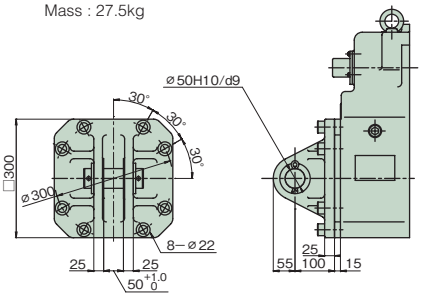
Options

■ Bellows (-J)



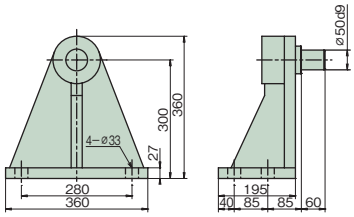
■ Clevis fitting (LPUB12000-C)

Mass : 27.5kg



Note) Attached to the main body, when shipped.

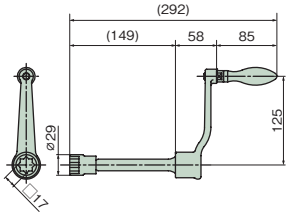
■ Trunnion fitting (LPUB12000-T)



Mass: 84.4kg/set

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

■ Manual handle (LPTB12000-H)

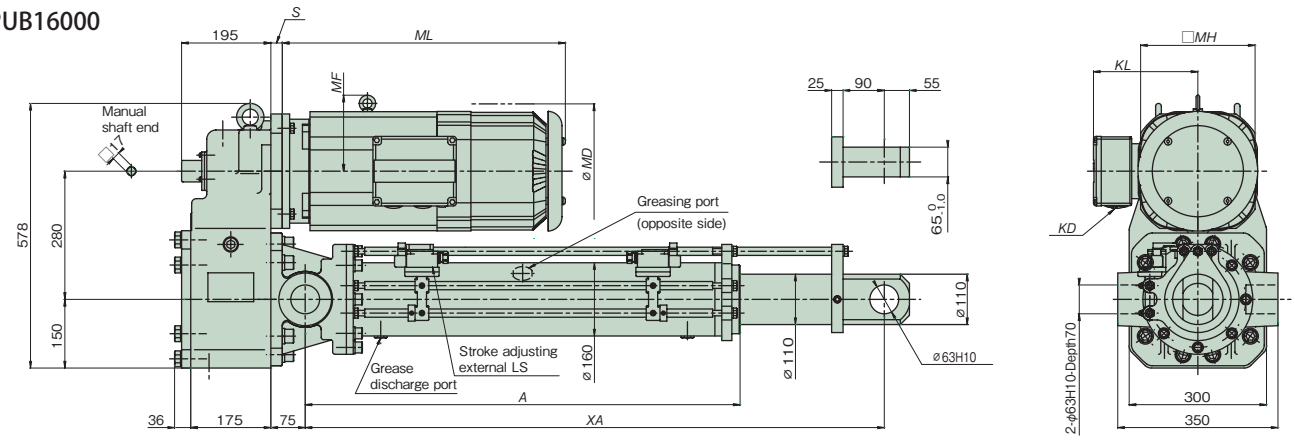


Mass : 1.1kg

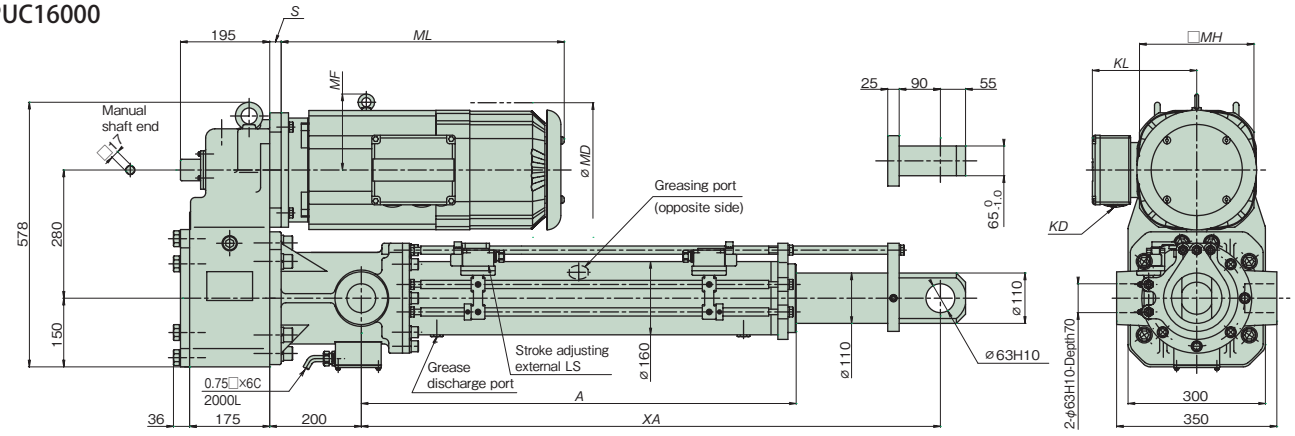
* Dimensions with no tolerance described have general tolerance, and sizes are larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table U Series 16000

LPUB16000



LPUC16000



Unit: mm

Type	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPUB16000L LPUC16000L	14.5/17.5	3.7	229	414	146	187	A25C	200	145
LPUB16000M LPUC16000M	20/24	5.5	250	584	147	172	2XM32X1.5 1XM16X1.5	250	170
LPUB16000H LPUC16000H	30/36	7.5	294	619	166	228	2XM32X1.5 2XM16X1.5		25

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX
500	156	16000	1005	1190	1690
1000			1505	1740	2740
1500			2005	2290	3790
2000			2505	2840	4840

Approximate mass of main body

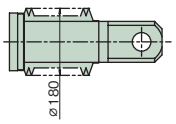
Unit: kg

Type \ Nominal stroke	500	1000	1500	2000
LPUB16000L	303	345	387	429
LPUC16000L	344	386	428	470
LPUB16000M	327	369	411	453
LPUC16000M	368	410	452	494
LPUB16000H	324	366	408	450
LPUC16000H	365	407	449	491

1. This drawing shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a extra margin of approximately 10mm on both sides for the nominal stroke.
3. Same dimensions with bellows equipped.
4. UC type brake should be controlled separately.
5. When the model of the UC 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 29.
7. Read cautions on page 33.

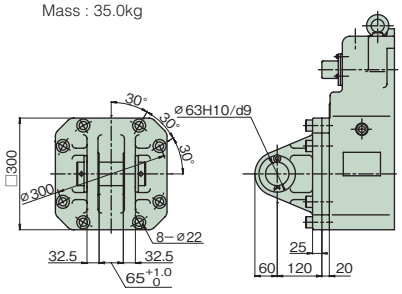
Options

■ Bellows (-J)



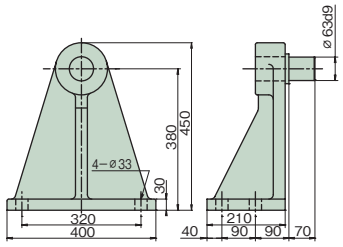
■ Clevis fitting (LPUB16000-C)

Mass : 35.0kg



Note) Attached to the main body, when shipped.

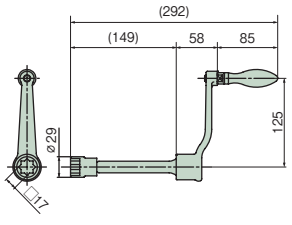
■ Trunnion fitting (LPUB16000-T)



Mass: 124.6kg/set

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

■ Manual handle (LPTB12000-H)

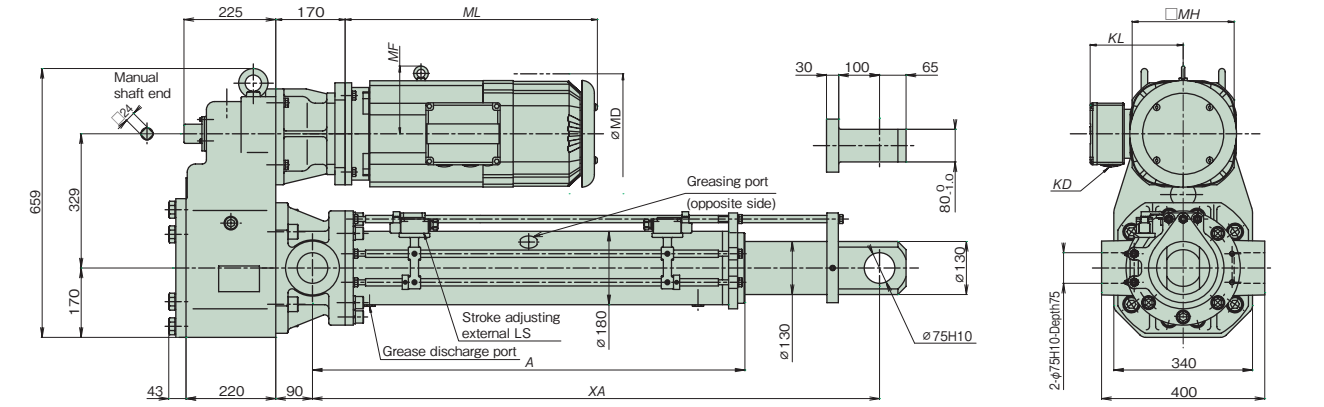


Mass : 1.1kg

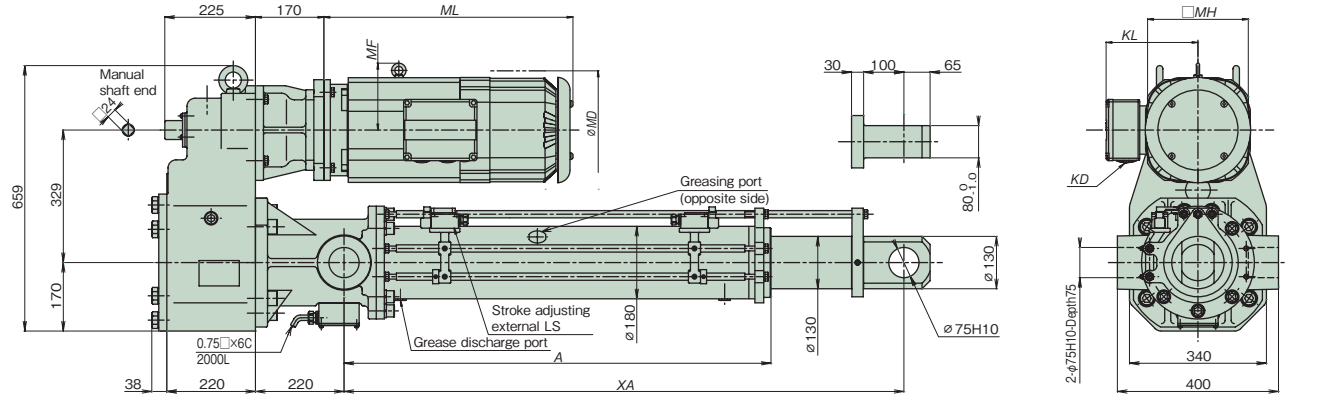
* Dimensions with no tolerance described have general tolerance, and sizes are larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table U Series 22000

LPUB22000



LPUC22000



Unit: mm

Type	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPUB22000L LPUC22000L	14.5/17.5	5.5	250	584	147	172	2XM32X1.5 1XM16X1.5	250	170
LPUB22000M LPUC22000M	20/24	7.5	294	619	166	228	2XM32X1.5 2XM16X1.5	250	170
LPUB22000H LPUC22000H	30/35	11	362	764	212	253	2XM40X1.5 2XM16X1.5	350	203

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX
500	215	22000	1060	1260	1760
1000			1560	1810	2810
1500			2060	2360	3860
2000			2560	2910	4910

Approximate mass of main body

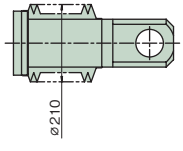
Unit: kg

Type \ Nominal stroke	500	1000	1500	2000
LPUB22000L	507	563	619	675
LPUC22000L	559	615	671	727
LPUB22000M	505	561	617	673
LPUC22000M	557	613	669	725
LPUB22000H	579	635	691	747
LPUC22000H	631	687	743	799

1. This drawing shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a extra margin of approximately 10mm on both sides for the nominal stroke.
3. Same dimensions with bellows equipped.
4. UC type brake should be controlled separately.
5. When the model of the UC 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 29.
7. Read cautions on page 33.

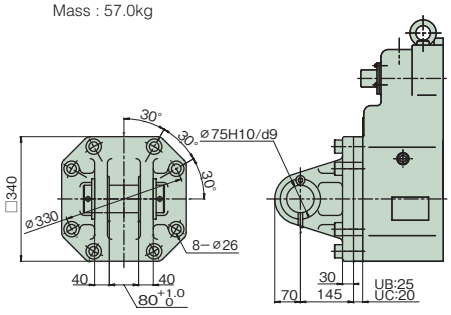
Options

■ Bellows (-J)



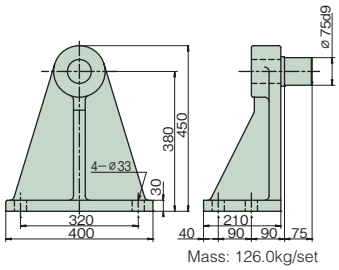
■ Clevis fitting (LPUB22000-C)

Mass : 57.0kg



Note) Attached to the main body, when shipped.

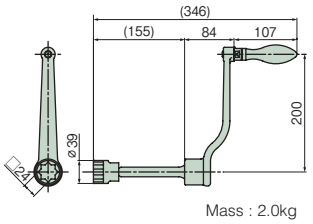
■ Trunnion fitting (LPUB22000-T)



Mass: 126.0kg/set

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

■ Manual handle (LPTB16000-H)

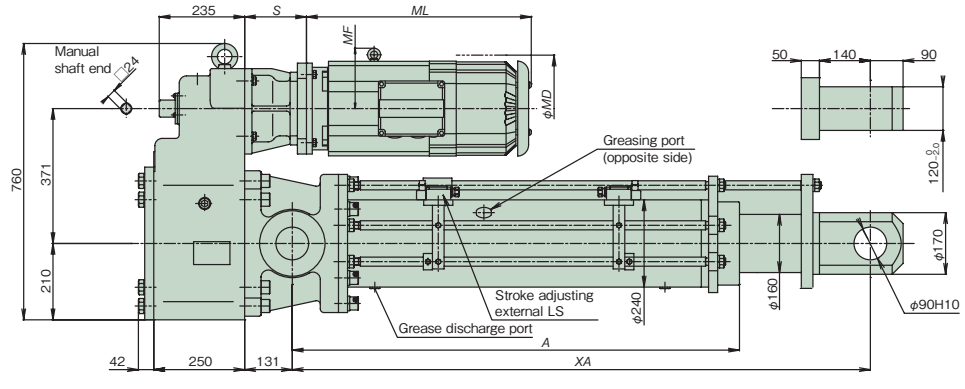


Mass : 2.0kg

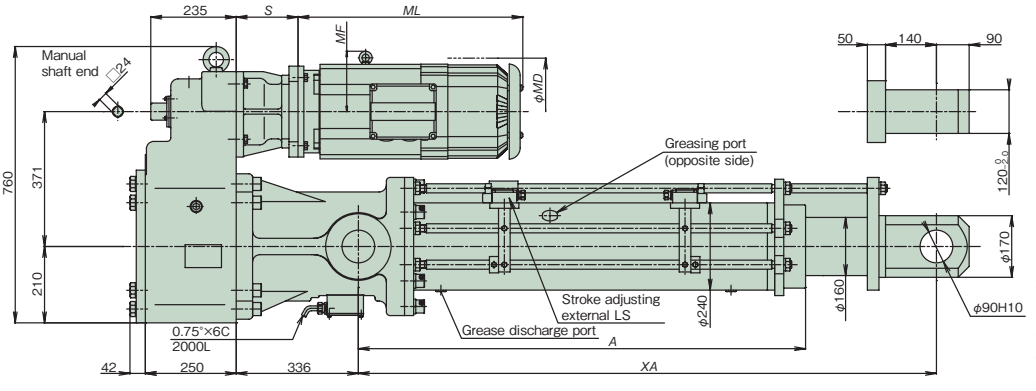
* Dimensions with no tolerance described have general tolerance, and sizes are larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take the margin into consideration.

Dimensions Table U Series 32000

LPUB32000



LPUC32000



Unit: mm

Type	Nominal speed mm/s 50/60Hz	Motor kW	MD	ML	MF	KL	KD	MH	S
LPUB32000L LPUC32000L	10/12	5.5	250	584	147	172	2XM32X1.5 1XM16X1.5	250	170
LPUB32000M LPUC32000M	15/18	7.5	294	619	166	228	2XM32X1.5 2XM16X1.5	250	170
LPUB32000H LPUC32000H	20/24	11	362	764	212	253	2XM40X1.5 2XM16X1.5	350	203

Unit: mm

Nominal stroke	Thrust kN	Thrust {kgf}	A	XA MIN	XA MAX
500	313	32000	1230	1490	1990
1000			1730	2040	3040
1500			2230	2590	4090
2000			2730	3140	5140

Approximate mass of main body

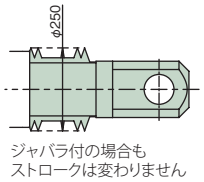
Unit: kg

Type \ Nominal stroke	500	1000	1500	2000
LPUB32000L	910	1000	1090	1180
LPUC32000L	1000	1090	1180	1270
LPUB32000M	930	1020	1110	1200
LPUC32000M	1020	1110	1200	1290
LPUB32000H	1000	1090	1180	1270
LPUC32000H	1090	1180	1270	1360

1. This drawing shows a power cylinder with an external limit switch for stroke adjustment.
2. Mechanical stroke has a extra margin of approximately 10mm on both sides for the nominal stroke.
3. Same dimensions with bellows equipped.
4. UC type brake should be controlled separately.
5. When the model of the UC 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 29.
7. Read cautions on page 33.

Options

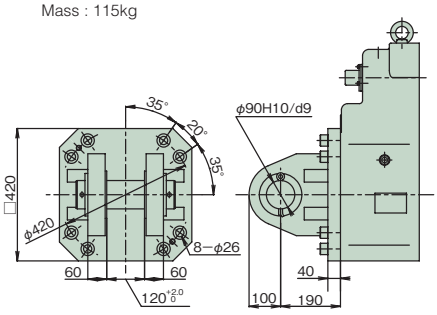
■ Bellows (-J)



ジャバラ付の場合も
ストロークは変わりません

■ Clevis fitting (LPUB32000-C)

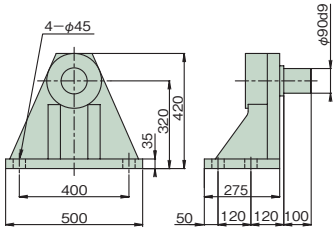
Mass : 115kg



Note) Attached to the main body, when shipped.

■ Trunnion fitting (LPUB32000-T)

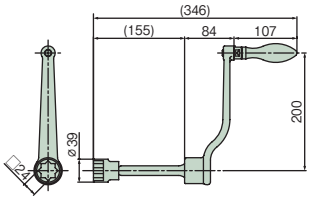
Mass : 250kg/set



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

■ Manual handle (LPTB16000-H)

Mass : 2.0kg



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

Stroke control for power cylinder

There are various positioning control methods 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.

Limit switch

① External limit switch ··· ··· Positioning of stroke upper and lower limit

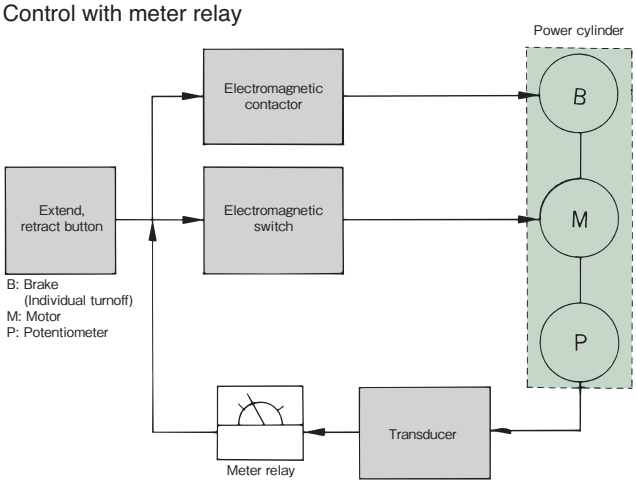
② Internal limit switch·····Intermediate positioning
Accuracy generally increases with lower cylinder speed.

③ Press (pull) stop (Thrust detecting mechanism)
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 over stroke.

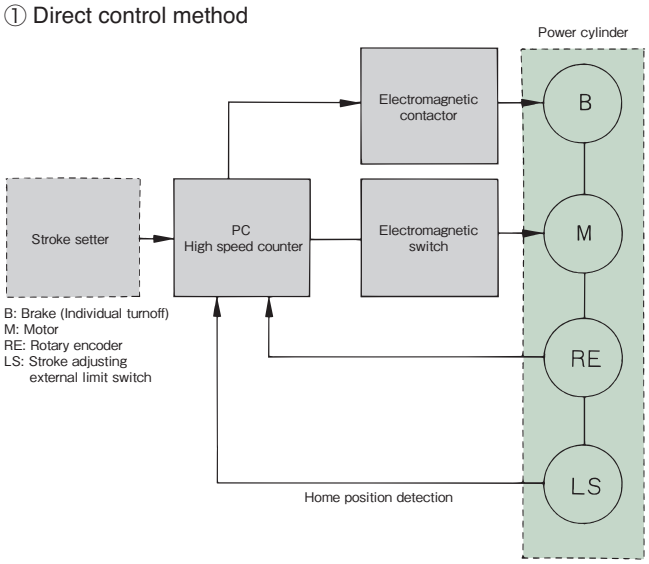
Control with meter relay



Rotary encoder (RE)

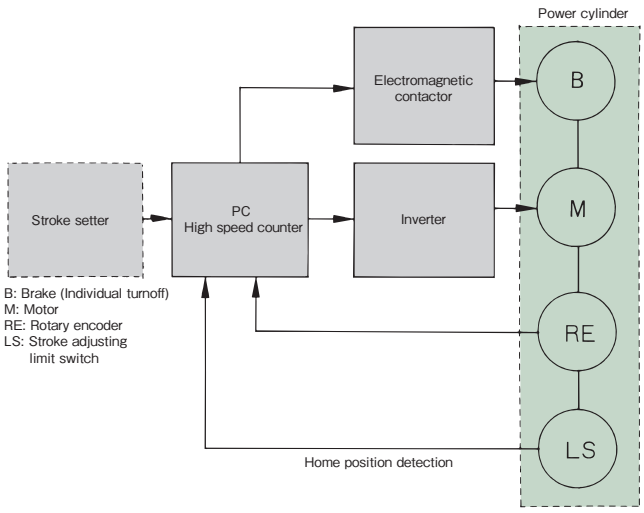
This method controls stroke by a programmable controller (PC) with a counter. Use a limit switch to detect home position. (For the power cylinder body, the method with a stroke adjusting limit switch is recommended.)

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

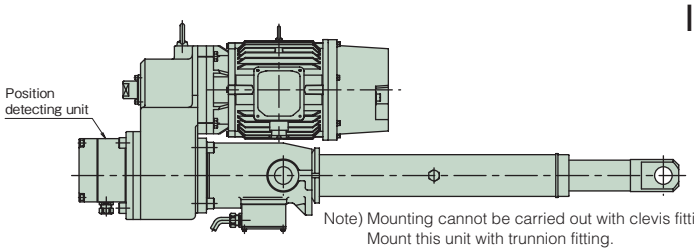


Note: when a heavy object is moved up or down, or operating a load with a large inertia, it may not be sufficiently slowed down.

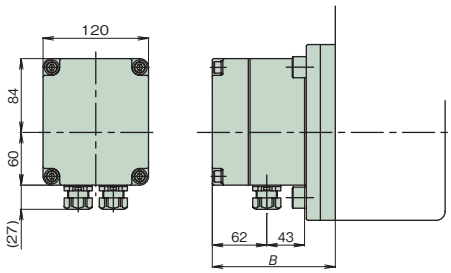
Position detecting unit

The following three types of position detecting devices can be built in upon request.

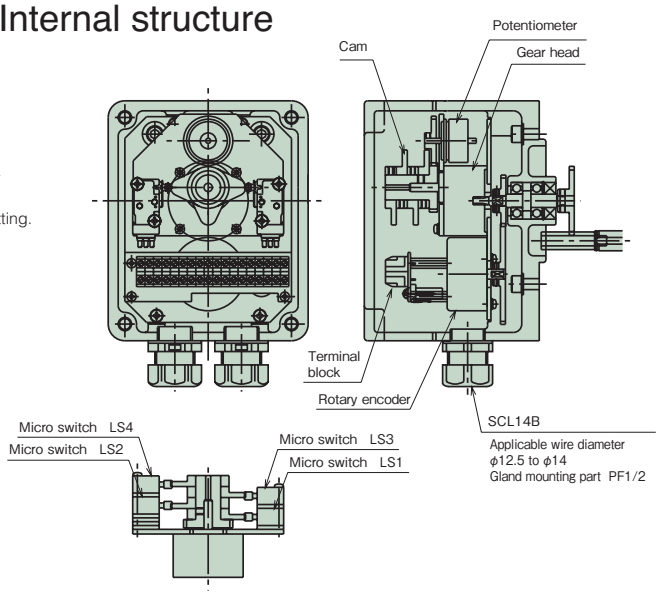
1. Position detecting internal limit switch (with two or four switches)
2. Potentiometer
3. Rotary encoder



Note) Mounting cannot be carried out with clevis fitting.
Mount this unit with trunnion fitting.



Internal structure



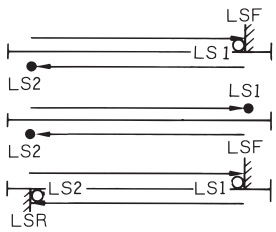
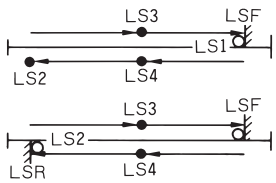
Mass of positional detecting unit

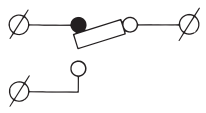
Frame no.	Mass (kg)	B (mm)
U6000	9	140
U8000	12.2	142
U12000	13.3	151
U16000	13.3	156
U22000	13.3	169
U32000	13.3	161

1. Internal limit switch (with two or four switches)

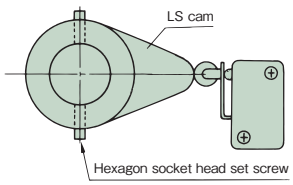
● With two switches (K2) ····· Layout of micro switches LS_1 and LS_2

● With four switches (K4) ····· Layout of micro switches LS_1, LS_2, LS_3 and LS_4

	Option symbol	Application example	
Position detecting internal LS	K2		Extend: Press stop at set position Retract: stop at set position Stop at both ends set position Both ends press stop at set position
Position detecting internal LS	K4		Extend: Middle position stop Press stop at set position Retract: Stop at two-set positions For both extend and retract: 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 26.

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>

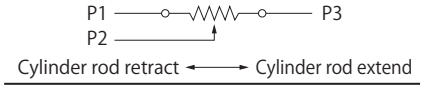
For adjustment of the operating position, operate the power cylinder to adjust the LS cam. Loosen the hexagon socket head set screws (2 pieces) on the LS cam with a hexagon bar wrench (nominal 1.5).

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
Brand	SAKAE TSUSHIN KOGYO CO., LTD.
Total resistance	1kΩ
Rated power	0.75W
Dielectric strength	1000V AC 1min.
Effective electric angle	355°±5°
Effective mechanical angle	360°endless
Connection	Connected to terminal block in position detecting unit



3. Rotary encoder

Rotary encoder specifications		
Model	TS5305N251	
Brand	Tamagawa Seiki Co., Ltd.	
Output pulse	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 to 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.

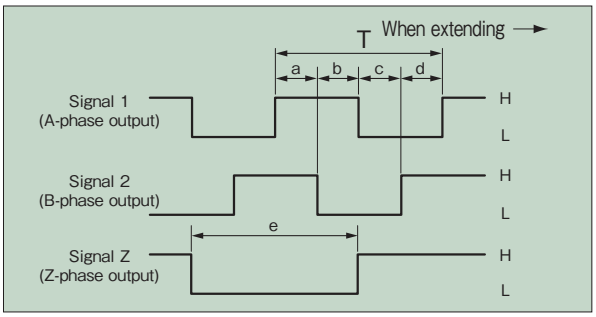
Note 1) Due to the open collector output, output signals are obtained when the pull-up resistor is connected.
Signal 1 and signal 2 are output voltages of H "(power supply voltage – 1)V or more" and L "1V or less."
For the Z-phase, negative logic applies.
<Reference resistance values> 5V: 220Ω, 12V: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

Output connection

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

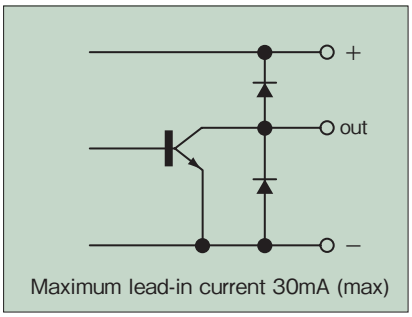
Figures in parentheses indicate terminal No.

Output waveform



a. b. c. d = T/4 ± T/8 T/2 ≦ e ≦ 3T/2

Output circuit



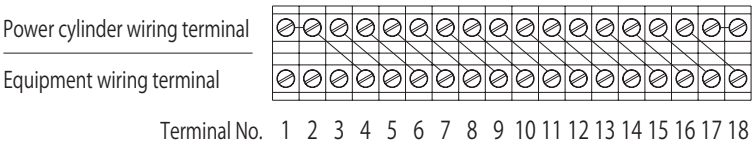
* Best suited to control the stroke by a sequencer or programmable controller, etc.
More accurate positioning control is possible in combination with motor speed control by an inverter, etc.

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 to 24V	0V	Case
Terminal No.	18	17	5	6	16	15	7	8	4	1	2	3	9	10	11	12	13	14

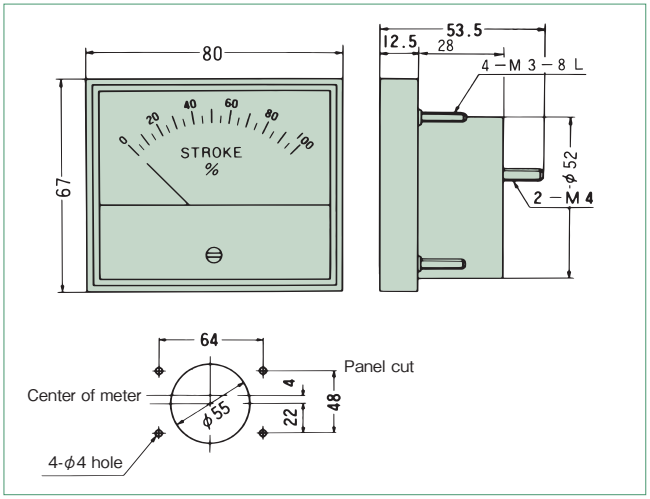
Control option

Stroke indication meter

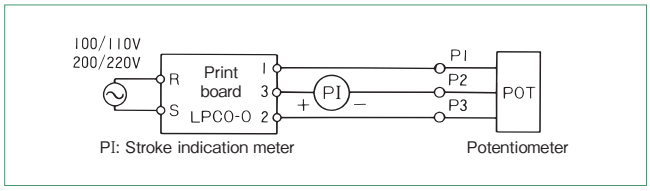
Model	RM-80B(100μA DC) or equivalent
Class	JIS C 1102 2.5 class
Appearance	Frame・black
Scale specifications	Full stroke indicated by 100%

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 printed board is required.

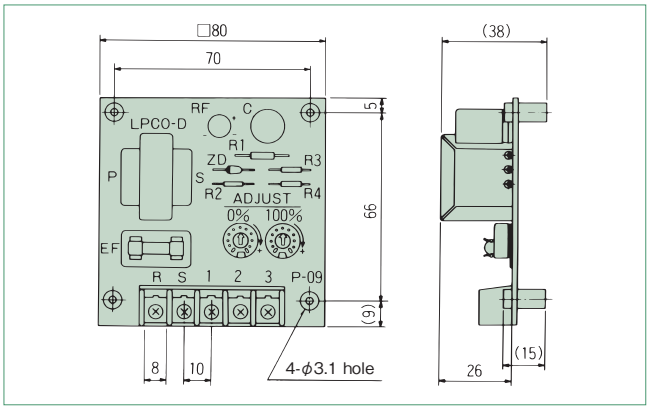


Print board



Adjust the meter with an ADJUST knobs on the print 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

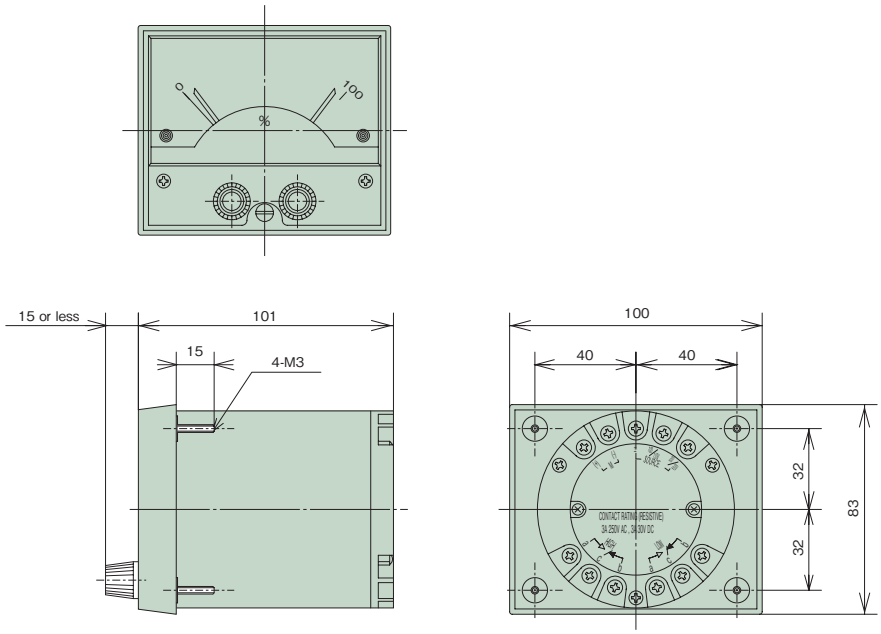
Meter relay

For simple stroke adjustment with a operation panel.

(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 printed board is 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)

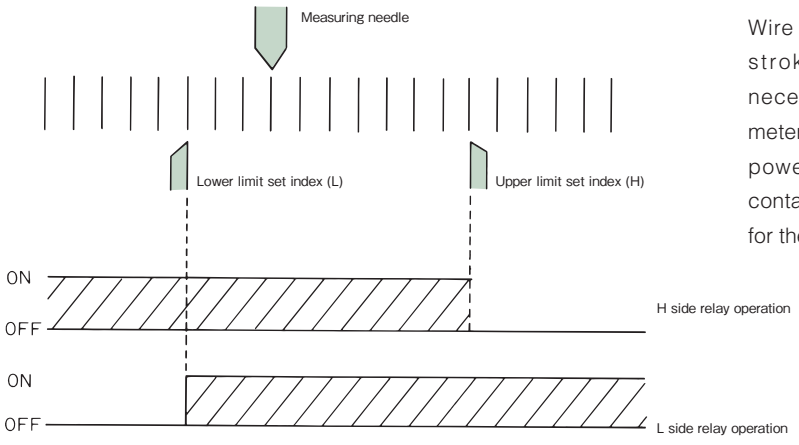


The power cylinder should have potentiometer option.
The phase of a stroke deviates if the rod is rotated before installation. Therefore, external limit switch is recommended.
Pre-set minimum and maximum strokes to be used with the stroke adjusting limit switch, then use the meter relay.

<Print board>

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 shock relay is recommended as an electric safety device for the power cylinder of the UB type.
For details, contact to Tsubaki.

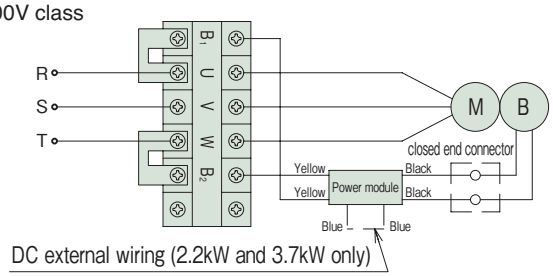
Wire connection

Wire connection for brake motor (Motor with DC brake)

0.75 to 3.7kW

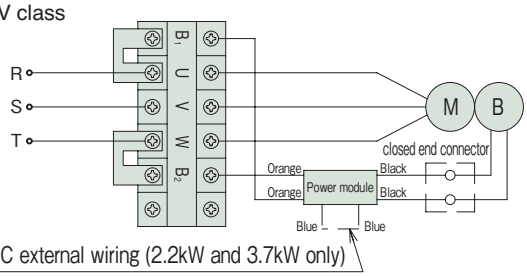
Brake internal wiring (standard)

200V class



DC external wiring (2.2kW and 3.7kW only)

400V class

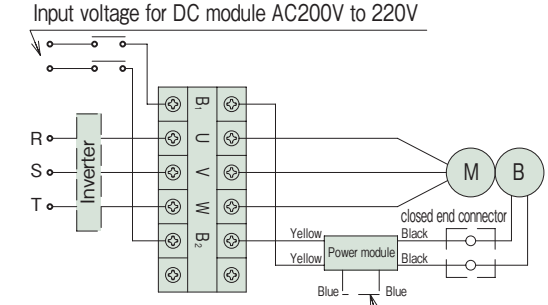


DC external wiring (2.2kW and 3.7kW only)

Brake AC extenal wiring

200V class

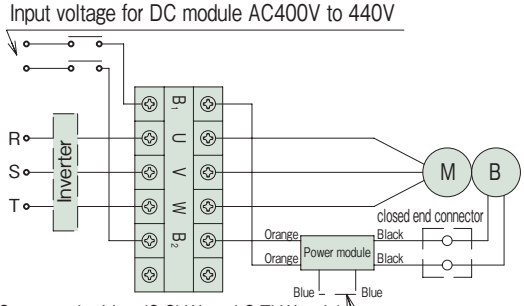
Input voltage for DC module AC200V to 220V



DC external wiring (2.2kW and 3.7kW only)

400V class

Input voltage for DC module AC400V to 440V

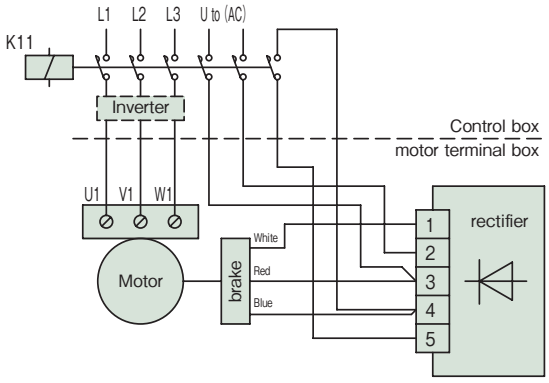


DC external wiring (2.2kW and 3.7kW only)

5.5 to 11kW

Brake AC, DC wiring (standard)

Common to 200/400V



Wire connection

Wire connection for brake motor (Motor with DC brake)

◎ Wire connection of brake and motor

In the case of connection above, the rod operating direction is as follows.
The rectifier is built in the terminal box

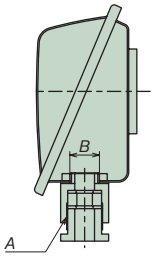
Rod operating direction	LPU6000S, L, M, H LPU8000S, L, M LPU12000M, L LPU16000L	LPU8000H LPU12000H LPU16000M, H LPU22000L, M, H LPU32000L, M, H
	Rod extend	Rod retract

◎ Wire connection when inverter control

- 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 diagram above, remove the short bar, and do not connect wire to the brake power module (rectifier) 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.
- 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.

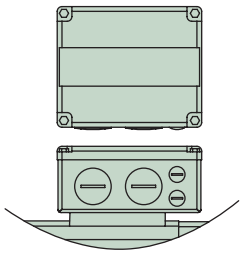
Wire connection

0.75kW to 3.7kW

Shape of terminal box	Motor capacity	Connector	Applicable cable outer diameter	Connector part mounting dimension A	Terminal box seat hole dimension B
	0.75kW to 1.5kW	A20C	ϕ14 to ϕ15	PF 3/4	ϕ28
	2.2kW to 3.7kW	A25C	ϕ19 to ϕ20	PF 1	ϕ35

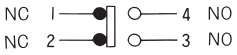
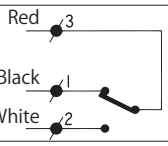
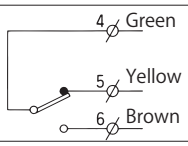
Note) A rubber plug or plate has been inserted into the connector to prevent water etc., from intruding before shipment.
Make sure to remove it when using.

5.5kW to 11kW

Shape of terminal box *	Motor capacity	Connector part mounting dimension
	5.5kW	2×M32×1.5 1×M16×1.5
	7.5kW	2×M32×1.5 2×M16×1.5
	11kW	2×M40×1.5 2×M16×1.5

* Connector specifications are also available, please, contact us for details.

Limit switch specifications

	Stroke adjusting external LS	Thrust detecting LS	
Limit switch type	WLCA2-N(OMRON) or equivalent	V-165-1A5(OMRON) or equivalent	
Electric capacity	250V AC 10A (cosϕ=0.4) DC5V 1mA	250V AC 10A (cosϕ=0.4) DC5V 160mA	
Contact configuration	1a 1b 	For advancing 	For retreating 
Connector (Applicable cable outer diameter)	SCS-10B (ϕ8.5 to ϕ10.5) PF1/2	SCL-14A (ϕ10.5 to ϕ12.5) PF1/2	

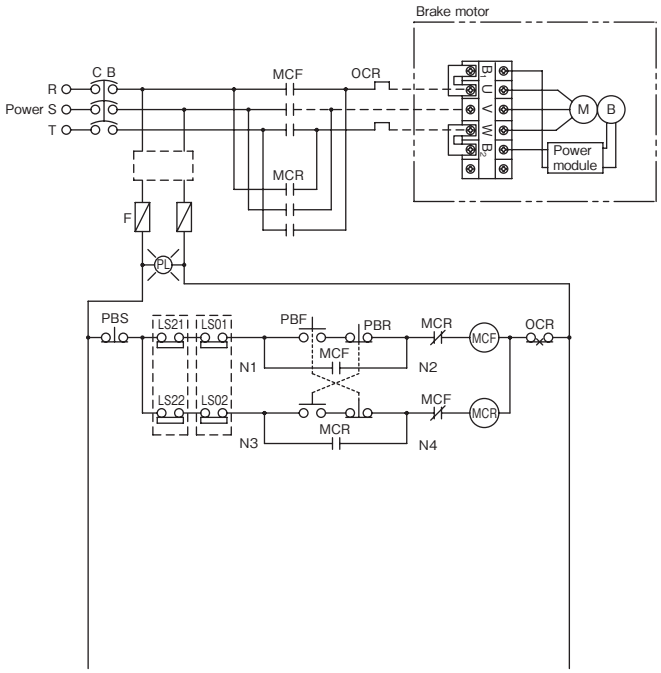
Motor current value • brake current value

Output frame No.	Motor current value (A)						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 - 0.75 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)	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)	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	9.4 (63.7)	8.9 (58.2)	8.3 (63.0)	4.7 (31.8)	4.4 (29.1)	4.2 (31.5)	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 - 3.7 kW	14.8 (104)	14.3 (87.9)	13.2 (98.0)	7.4 (52.0)	7.1 (43.9)	6.6 (49.0)	0.10 0.30	0.10 0.30	0.10 0.30	0.05 0.15	0.05 0.15	0.05 0.15
4P - 5.5 kW	21.0 (189)	20.5 (155)	18.9 (171)	10.5 (94.5)	10.3 (78.2)	9.5 (86.4)	3.9/0.59 —	3.9/0.59 —	3.9/0.59 —	1.96/0.30 —	1.96/0.30 —	1.96/0.30 —
4P - 7.5 kW	30.5 (237)	29.0 (200)	27.0 (216)	15.2 (118)	14.4 (99.3)	13.6 (108)	3.9/0.59 —	3.9/0.59 —	3.9/0.59 —	1.96/0.30 —	1.96/0.30 —	1.96/0.30 —
4P - 11 kW	42.0 (306)	41.0 (217)	38.0 (243)	21.0 (153)	20.5 (108)	19.0 (121)	5.40/0.72 —	5.40/0.72 —	5.40/0.72 —	2.70/0.37 —	2.70/0.37 —	2.70/0.37 —

Note) 1. The rated current and the starting current values do not include the brake current values.
2. The rated current value and start current values do not include a brake current value.
3. A DC brake is used. The upper limits of the brake current value indicates a value on the primary side of the power module, and the lower limits indicates a value on the secondary side.
Brake current values on 5.5kW + motors : accelerator current / holding current
4. The above values are reference only as the rated current values for the power cylinder may vary depending on the operating conditions.

Reference circuit

0.75 to 3.7kW UC type reference circuit diagram



LS01: Stroke adjusting external limit switch for extending

LS21: Thrust detecting limit switch for extending

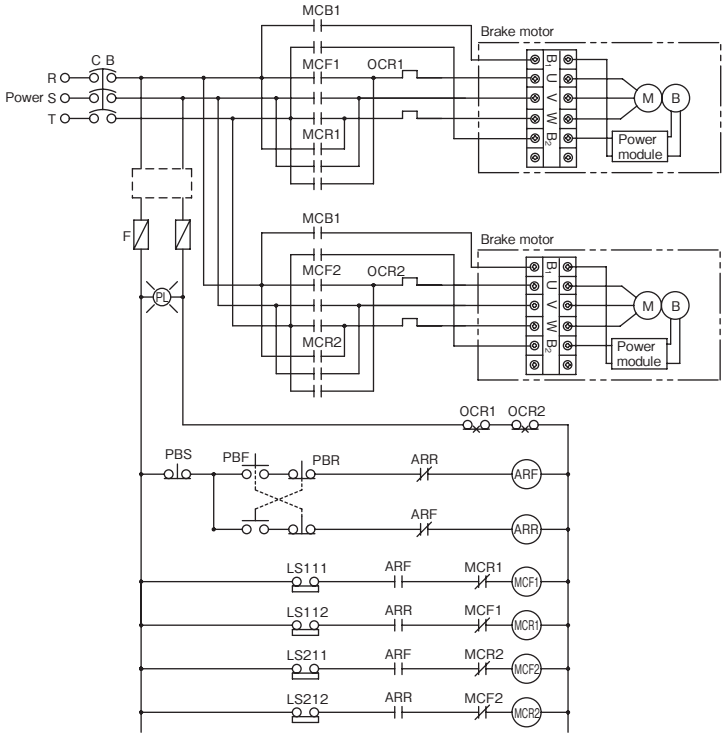
LS02: Stroke adjusting external limit switch for retracting

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.

Installation

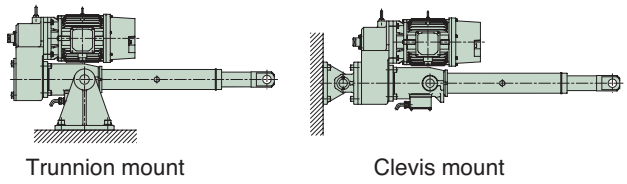
Installation direction

Any of horizontal, vertical and inclined direction is allowed.

Installation method

For installation of the power cylinder, use a trunnion mount or clevis mount. Apply grease to the trunnion pin and the bracket hole before mounting. Install either U-type or I -type end fitting.

Fig. 1 Installation method



* 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 wrench after releasing the brake.

⚠ WARNING

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

For the rod movement per one turn of the manual shaft, refer to the page 11.

Rod rotation

1. Anti-rod rotation is required because a rotating force is generated on the rod (refer to page 11). 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.

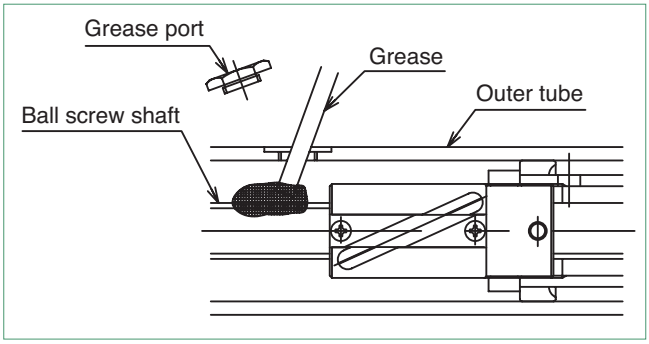
Setting of stroke adjusting external LS

- 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 operating two or more power cylinders, install a limit switch at the upper limit and lower limit on each unit.

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 and 2 as a tube guide. To apply grease to the ball screw, remove the greasing port bolt on the outer and extend the rod in the full stroke and apply grease to the outer circumference of the ball screw with a grease gun, and then retract the rod within the stroke to be used. Repeat this operation a few times.



Apply 10 to 15g of grease per 100mm stroke (U6000)
Apply 30 to 35g of grease per 100mm stroke (U8000 to U32000)
Apply 80 to 100g of grease per 100mm stroke (U32000)

⚠ WARNING

Never insert your finger into the grease port.
If the cylinder operates with your finger inserted, your finger may be injured.

Table 1 Designated grease

Use classification	Brand	Product name
Screw shaft	COSMO OIL LUBRICANTS	COSMO MOLYBDENUM GREASE SPECIALNo.2

* The above grease is filled before shipment.

Table 2 Lubrication cycle

Operating frequency	Lubrication cycle
1001 times/day or more	1 to 3 months
500 to 1000 times/day	3 to 6 months
100 to 500 times/day	6 months to 1 year
10 to 100 times/day	1 to 1.5 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. It is not necessary to grease refill.

Gear case: DAPHNE EPONEX SRNo.1 IDEMITSU KOSAN
Planetary gear (straight type): Moly gear grease No. 1 SUMICO LUBRICANT CO., LTD.

U Series Power Cylinder N type (For replacement of T-series)

When replacing T-series

U Series N type compatible with the T Series mounting dimensions are available. Since the N type more than triples the expected travel distance of the ball screw over previous models, it contributes to reduced cylinder replacement frequency.
note: Brake wirings are not always the same with T series, please refer to page 28.

Model No. designation

LP U B 6000 L N 5 V T1 LPUJ -TK

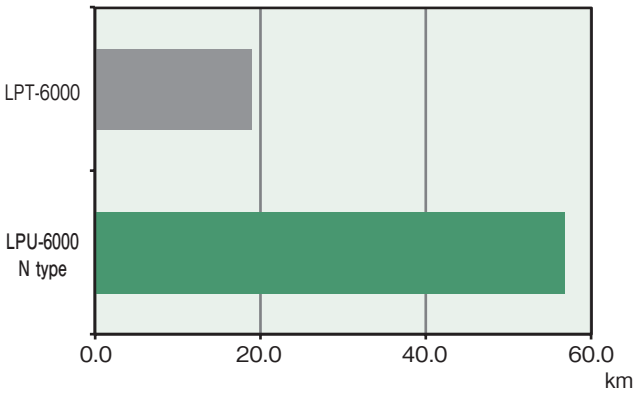
N type (for replacement of T-series)

Please add "TK" to the end of the model number.

Expected life time

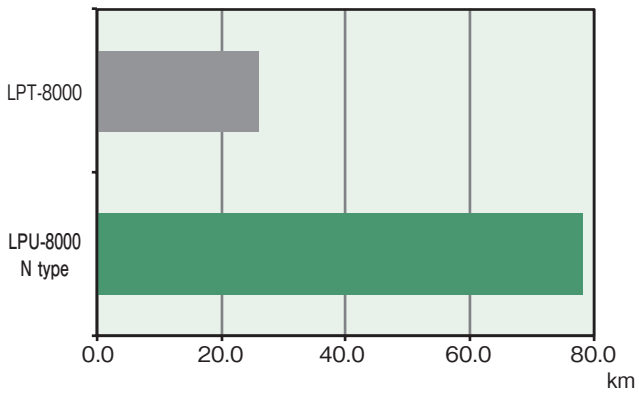
N type has 3 times longer Life under the same load.

6000 kgf (58.8kN) Expected life time



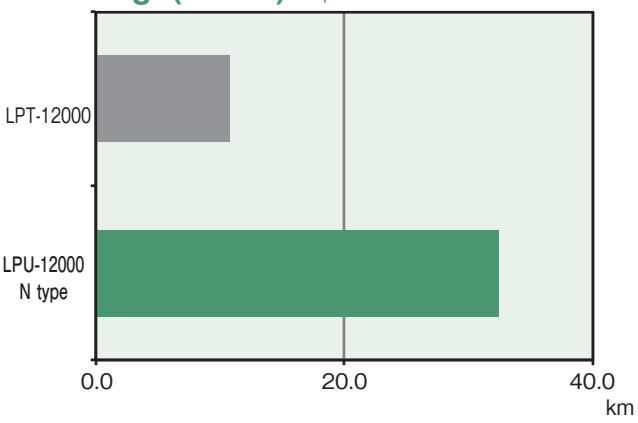
Load condition: 58.5kN{6000kgf}

8000 kgf (78.4kN) Expected life time



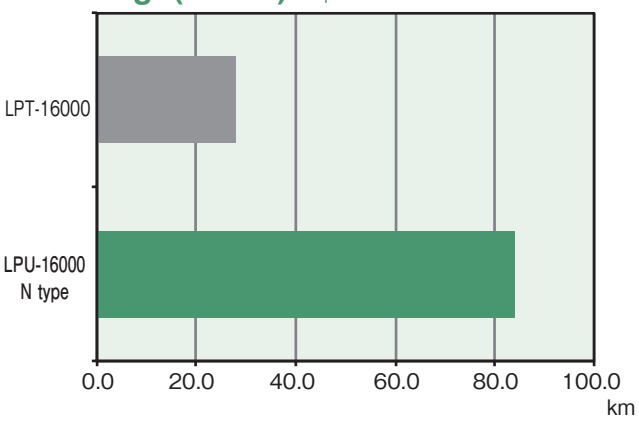
Load condition: 78.4kN{8000kgf}

12000 kgf (117kN) Expected life time



Load condition: 117kN{12000kgf}

16000 kgf (156kN) Expected life time



Load condition: 156kN{16000kgf}

⚠ 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.

■ 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 upon request.
- When the trunnion pin or connecting pin for the clevis or the end fitting is directed in the vertical direction (when the cylinder is installed 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) 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 UC type must not be carried out by the customer. Thrust detection the preset value. It may greatly change.

Innovation in Motion

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