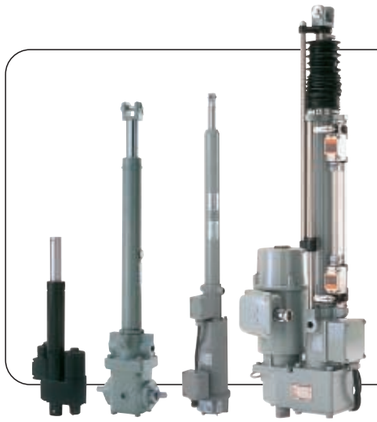
TSUBAKI

TSUBAKI POWER CYLINDER

HIGH PERFORMANCE LINEAR ACTUATORS OFFERING EFFICIENT, CLEAN AND QUIET DRIVE····· ENVIRONMENTAL CONSCIOUSNESS



Easy and economical to combine with your equipment

The mechanical type motor driven actuator reduces the need for compressors, piping valves or hydraulic units, making the equipment simpler and more economical. The device can be treated as a motor and allows for simple remote control. Furthermore, the simple construction and long life grease provide for more economical maintenance.

Ready for outdoor use

T series, G series ,
Ultra heavy duty series,
F series,
Battery series

With Electromagnetic brake motor

T series, G series,
Ultra heavy duty series

Battery powered actuator

DC motor type

Battery series,
F series

Three phase motor with brake

for precise positioning, and rigid load holding

T series, G series ,
Ultra heavy duty series

Internal position sensor; Limit switch type

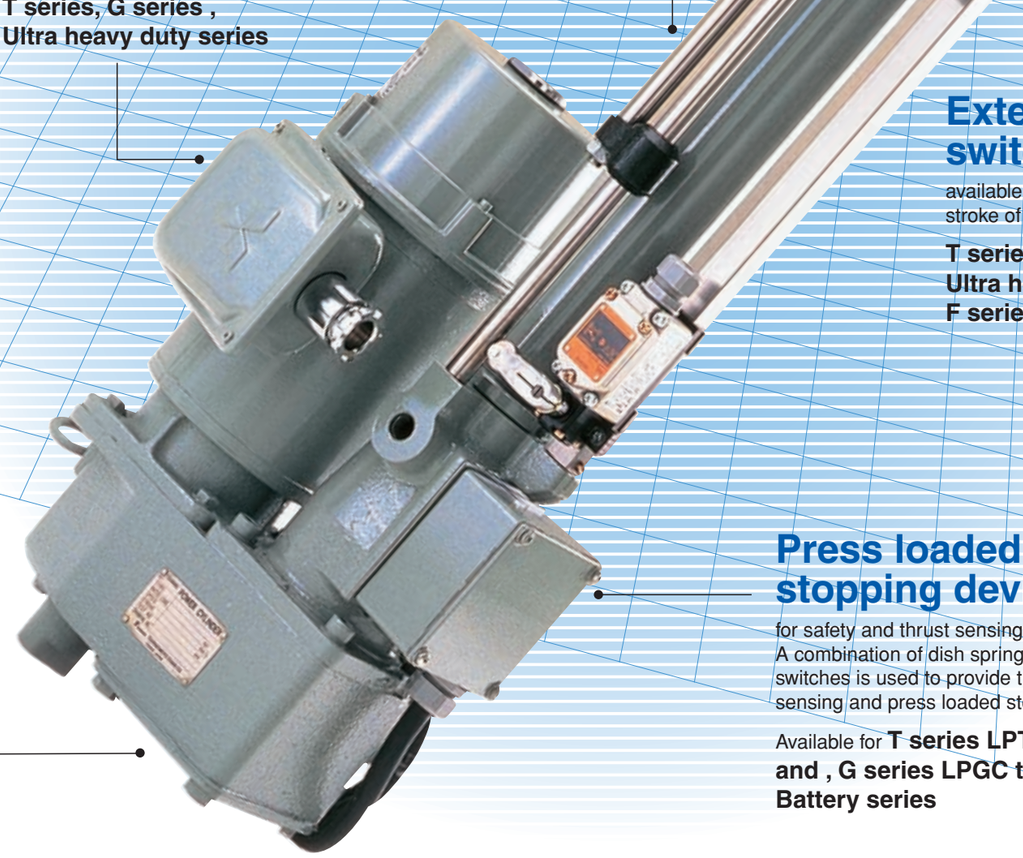
available at your choice for signaling the position of the stroke

T series, G series ,
F series

Potentiometer or Rotary encoder

available at your choice for remote control operation

T series, G series ,
Ultra heavy duty series



Rod anti-rotation device

available as made -to-order
If the actuator rod end is free or connected to wire rope, anti-rotation device for a rod is needed.

T series, G series ,
Ultra heavy duty series

External limit switches

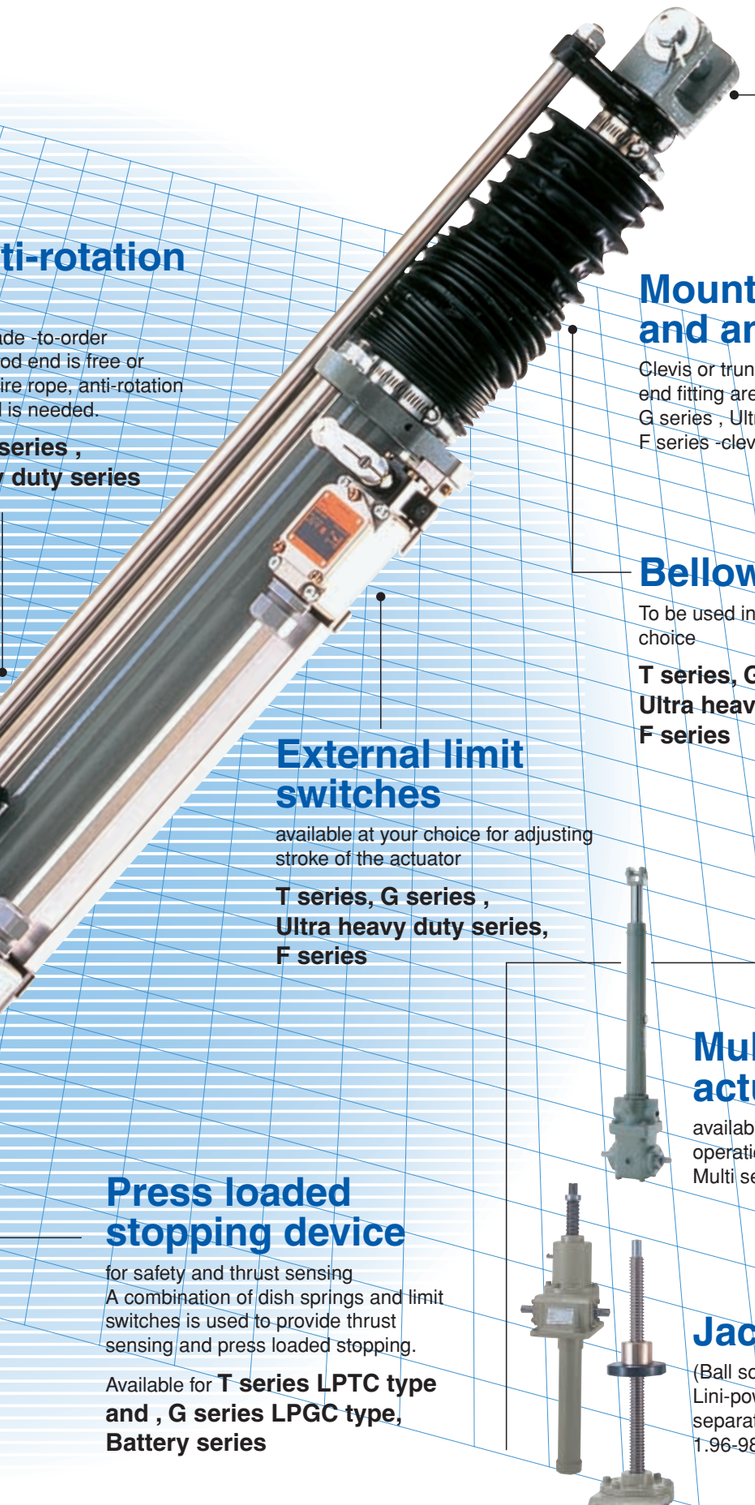
available at your choice for adjusting stroke of the actuator

T series, G series ,
Ultra heavy duty series,
F series

Press loaded stopping device

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

Available for **T series LPTC type and , G series LPGC type,**
Battery series



Mounting type and an end fitting

Clevis or trunnion mount and I type end fitting are available for T series, G series , Ultra heavy duty series
F series -clevis mount only

Bellows

To be used in dusty area at your choice

T series, G series ,
Ultra heavy duty series,
F series

Multi type actuator

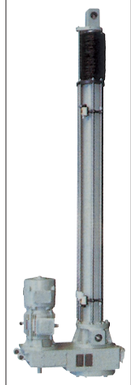
available for synchronized operation with one motor
Multi series

Jack type

(Ball screw or trapezoidal screw)
Lini-power jack available by a separate catalog
1.96-980KN (0.2-100tf)

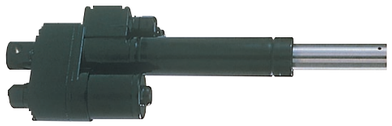
●: Fitted on the standard units ○: Multi series available as optional parts
*Note: Potentiometer cannot be used with Clevis mounting type
△: Available on made-to-order basis

		Battery Series				F Series			G Series								T Series				
		Small		Mid.					GA-$^{T}_{K}$ type				GC-$^{T}_{K}$ type				TB type				
																					
		• Compact and light • DC 12V or 24V							• For general industrial use, hopper gate & dumper • High grade series with various optional parts				GB-K type available								
Thrust	N	98.0	392	980	1.47k	98.0	196	392	700	1.00k	1.50k	3.00k	700	1.00k	1.50k	3.00k	2.45k	4.90k	9.80k	19.6k	39.2k
	{kgf}	10	40	100	150	10	20	40	71.4	102	153	306	71.4	102	153	306	250	500	1000	2000	4000
Speed (mm/sec.) 50/60Hz	Slow																12.5/15	12.5/15	12.5/15	12.5/15	9/11
	Low		15		17			15	25/30	25/30	25/30	25/30	25/30	25/30	25/30	25/30	25/30	25/30	25/30	25/30	25/30
	Medium	50		27			24		75/90	75/90	75/90	50/60	75/90	75/90	75/90	50/60	50/60	50/60	50/60	50/60	35/42
	High					54			100/120 200/240	100/120 200/240	100/120	67/80	100/120 200/240	100/120 200/240	100/120	67/80	100/120	100/120	100/120	75/90	60/72
Stroke	3000mm																				
	2000mm																				
	1500mm																				⬆
	1200mm								⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆				⬆	⬆
	1000mm								⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆			⬆	⬆	⬆
	800mm								⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆		⬆	⬆	⬆	⬆
	600mm								⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆
	500mm								⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆
	400mm								⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆
	300mm					⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆
	200mm	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆
	150mm	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆					
	100mm	⬆	⬆	⬆	⬆	⬆	⬆	⬆													
	50mm	⬆	⬆	⬆	⬆	⬆	⬆	⬆													
Environment		Outdoor				Outdoor			Outdoor								Outdoor				
Brake									●	●	●	●					●				
Shaft for manual operation									●	●	●	●					●				
Anti-rod rotation									△	△							△				
Limit switch for stroke adjusting						○			○	○	○	○					○				
Built-in L.S. for positioning						○				○		○					○				
Potentiometer*						○				○		○					○				
Rotary encoder										○		○					○				
End fitting (type U)									●	●	●	●					●				
End fitting (type I)									○	○	○	○					○				
Bellows						○			○	○	○	○					○				
Clevis*										○		○					○				
Trunnion mounting adapter									○	○	○	○					○				
Press contact stopping		●									●	●									

		T Series															Ultra Heavy Duty Series			Multi Series										
		TB type					TC type													TB type					TC type					
																													
		• For general industrial use, hopper gate & dumper • High grade series with various optional parts															• Ultra heavy duty			• Synchronized operation of multiple units										
Thrust	N	58.8k	78.4k	118k	157k	314k	2.45k	4.90k	9.80k	19.6k	39.2k	58.8k	78.4k	118k	157k	314k	617k	882k	1230k	4.90k	9.80k	19.6k	39.2k	58.8k	78.4k	118k	157k	314k
	{kgf}	6000	8000	12000	16000	32000	250	500	1000	2000	4000	6000	8000	12000	16000	32000	63000	90000	125000	500	1000	2000	4000	6000	8000	12000	16000	32000
Speed (mm/sec.) 50/60Hz	Slow	6.3/7.6	10/12				12.5/15	12.5/15	12.5/15	12.5/15	9/11	6.3/7.6	10/12							Depending upon the type and input r.p.m.. See Max. Input r.p.m. on page 55.									
	Low	17.5/21	20/24	10/12	14.5/17.5	10/12	25/30	25/30	25/30	25/30	25/30	17.5/21	20/24	10/12	14.5/17.5	10/12	7.5/9	7.5/9	7.5/9									
	Medium	25/30	30/36	18/22	20/24	15/18	50/60	50/60	50/60	50/60	35/42	25/30	30/36	18/22	20/24	15/18	10/12	10/12										
	High	42/50	43/52	30/36	31/37	20/24	100/120	100/120	100/120	75/90	60/72	42/50	43/52	30/36	31/37	20/24	15/18											
Stroke	3000mm																⬆	⬆	⬆									
	2000mm			⬆	⬆	⬆								⬆	⬆	⬆	⬆	⬆	⬆							⬆	⬆	⬆
	1500mm	⬆	⬆	⬆	⬆	⬆				⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆						⬆	⬆	⬆	⬆
	1200mm								⬆	⬆													⬆					
	1000mm	⬆	⬆	⬆	⬆	⬆		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆				⬆	⬆	⬆	⬆	⬆	⬆
	800mm						⬆	⬆	⬆	⬆											⬆	⬆	⬆					
	600mm						⬆	⬆	⬆	⬆										⬆	⬆	⬆	⬆					
	500mm	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆				⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆
	400mm						⬆	⬆	⬆	⬆										⬆	⬆	⬆	⬆					
	300mm						⬆	⬆	⬆	⬆										⬆	⬆	⬆	⬆					
	200mm						⬆	⬆	⬆	⬆										⬆	⬆	⬆	⬆					
	150mm																											
	100mm																											
	50mm																											
Environment		Outdoor															Outdoor			Outdoor									
Brake		●					●										●												
Shaft for manual operation		●					●										●												
Anti-rod rotation		△															△			△									
Limit switch for stroke adjusting		○					○										○			○					○				
Built-in L.S. for positioning		○					○										△												
Potentiometer*		○					○										△												
Rotary encoder		○					○										△												
End fitting (type U)		●					●										△			●					●				
End fitting (type I)		○					○										●			○					○				
Bellows		○					○										○			○					○				
Clevis*		○					○										○												
Trunnion mounting adapter		○					○										○			○					○				
Press contact stopping							●										△								●				

Battery Cylinder

D.C. MOTOR SERIES



FEATURES

1. Compact and clean electro-mechanical drive for linear movement.
2. No piping for hydraulic fluid or compressed air.
3. Maintenance-free.
4. Ball type overload clutch is equipped for overload protection.
5. Weatherproof for indoor and outdoor operation.
6. Press contact stopping is available for LPA010M & LPA040L.

TYPICAL APPLICATIONS

1. Agricultural Equipment
   Silage chutes, conveyors, cutter bar control transmission shifters, tractor accessory lifts.
2. Industrial Equipment
   Belt speed and tension controls, flue and draft controls, table lifts, hatch covers, ventilator controls.
3. Medical Equipment
   Dental chairs, hospital beds, examination tables, X-ray equipment, invalid lifts, patient handlers.
4. Material Handling Equipment
   Container tippers, dump chute doors, elevators, container positioners, conveyor switching, and trip devices.
5. Recreational Equipment
   Satellite systems, trailer actuators.

SPECIFICATIONS

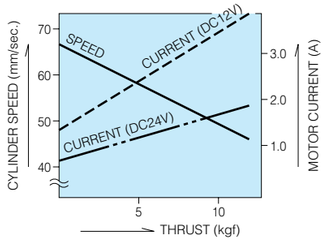
Model No.	Rated Load (kgf)	Stroke (mm)	Speed (mm/sec.)	Voltage	Current (A)
LPA010M (V)	10	50	50 (at full load)	DC12V (DC24V)	3.4 (1.7) (at full load)
		100			
		150			
		200			
LPA040L (V)	40	50	15 (at full load)	DC12V (DC24V)	3.0 (1.5) (at full load)
		100			
		150			
		200			

Model No.	Rated Load (kgf)	Stroke (mm)	Speed (mm/sec.)	Voltage	Current (A)
LPA100M	100	50	27 (at full load)	DC12V (DC24V)	13 (at full load)
		100			
		150			
		200			
LPA150L	150	50	17 (at full load)	DC12V (DC24V)	13 (at full load)
		100			
		150			
		200			

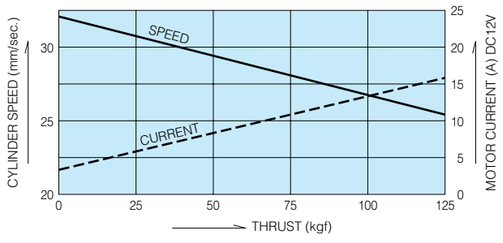
1. Use the battery cylinder below the rated load and speed in the table.

2. Speed and motor current vary depending upon the load applied.

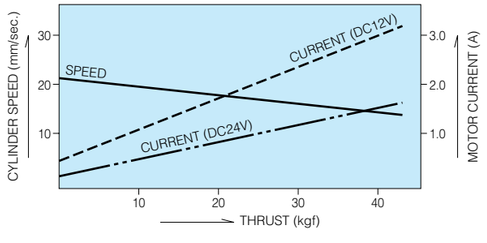
LPA010M



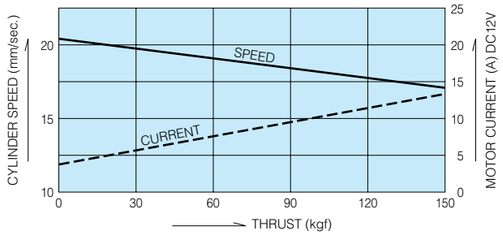
LPA100M



LPA040L



LPA150L

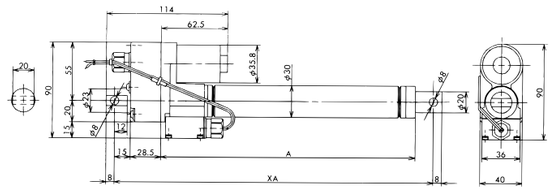


3. The battery cylinder should be used for intermittent operation only. For applications where frequent and continuous operation is required, please consult Tsubaki.

DIMENSIONS/ENGINEERING INFORMATION

DIMENSIONS

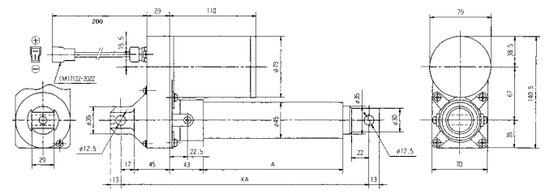
LPA010M
LPA040L



Model No.	Stroke (mm)	Dimensions (mm) A	XA MIN.	XA MAX.	Approx. Weight (kg)
LPA010M0.5 (V)	50	129.5	190	240	0.8
LPA040L0.5 (V)					
LPA010M1.0 (V)	100	179.5	240	340	0.9
LPA040L1.0 (V)					
LPA010M1.5 (V)	150	229.5	290	440	1.0
LPA040L1.5 (V)					
LPA010M2.0 (V)	200	279.5	340	540	1.1
LPA040L2.0 (V)					

DIMENSIONS

LPA100M
LPA150L

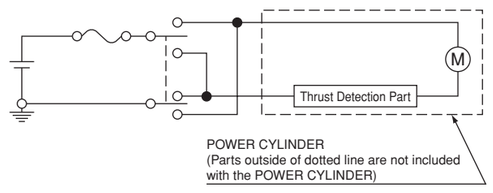


Model No.	Stroke (mm)	Dimensions (mm) A	XA MIN.	XA MAX.	Approx. Weight (kg)
LPA100M0.5	50	77	205	255	3.6
LPA150L0.5					
LPA100M1.0	100	127	255	355	3.9
LPA150L1.0					
LPA100M1.5	150	177	305	455	4.2
LPA150L1.5					
LPA100M2.0	200	227	355	555	4.5
LPA150L2.0					

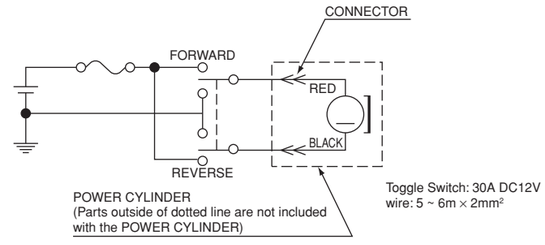
ENGINEERING INFORMATION

(1) Wiring
For normal inching operation, please refer to the circuit below;

LPA010M
LPA040L



LPA100M
LPA150L



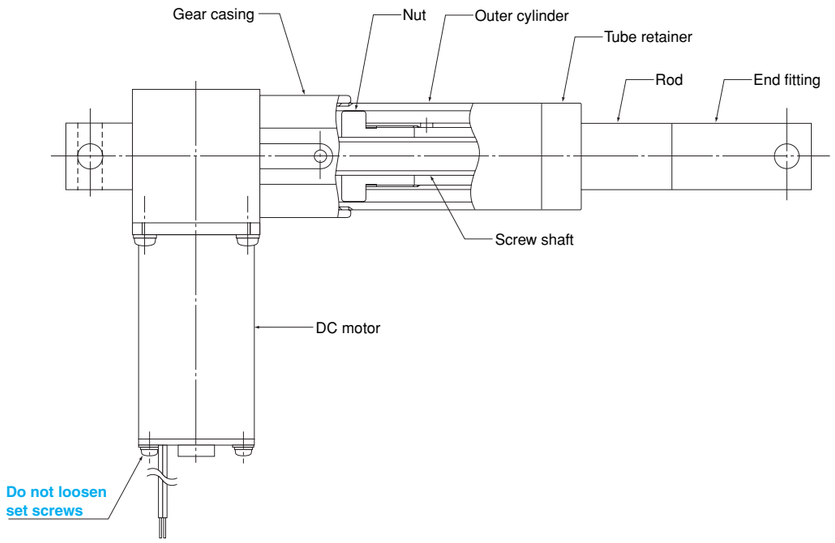
(2) Installation
When installing, don't apply radial force to the Power Cylinder rod or external forces other than thrust force.

F Series

FEATURES

1. Compact design with right angled connection between motor and actuator.
2. Right angled two-way clevis holes make four position of mounting.
3. Press stopping is available with overload detecting unit (Option).
4. Both DC (12V or 24V) and AC (100V or 200V with AC adapter) are applicable for power source.
5. Variety of options are available such as stroke adjustment external LS, bellows, position detecting unit. AC adapter, overload detecting unit and so on.

Structure



MODEL No.

LPF 040 L 2.0 V L K2 P J

- Power Cylinder F Series
- Thrust 010 : 100N {10.2kgf} / 020 : 200N {20.4kgf} / 040 : 400N {40.8kgf}
- Speed (L : Low M : Mid H : High)
- Stroke (2.0 : 200mm)
- V : DC 24V (No mark : DC 12V)
- L : LS for Stroke adjustment (Can't be installed onto the model with 50 mm stroke)
- K2 : Internal LS for positioning (Can't be used together with potentiometer)
- P : Potentiometer (Can't be used together with K2)
- J : Bellows

STANDARD SPECIFICATIONS

Model No.		Rated Thrust		Stroke	Speed	Voltage	Rated load current	Locked current
		N	{kgf}	mm	mm/s	V	A	A
LPF010H0.5	LPF010H0.5 V	100	10.2	50	54	DC12 or DC24	3.2 (1.6)	16.7 (7.5)
LPF010H1.0	LPF010H1.0 V			100				
LPF010H1.5	LPF010H1.5 V			150				
LPF010H2.0	LPF010H2.0 V			200				
LPF010H3.0	LPF010H3.0 V			300				
LPF020M0.5	LPF020M0.5 V	200	20.4	50	24		3.2 (1.6)	16.7 (7.5)
LPF020M1.0	LPF020M1.0 V			100				
LPF020M1.5	LPF020M1.5 V			150				
LPF020M2.0	LPF020M2.0 V			200				
LPF020M3.0	LPF020M3.0 V			300				
LPF040L0.5	LPF040L0.5 V	400	40.8	50	15		3.7 (1.8)	16.7 (7.5)
LPF040L1.0	LPF040L1.0 V			100				
LPF040L1.5	LPF040L1.5 V			150				
LPF040L2.0	LPF040L2.0 V			200				
LPF040L3.0	LPF040L3.0 V			300				

Note: 1. Model No. should be selected in consideration of locked current.
2. Figures in ( ) are shown as current for DC 24V models.

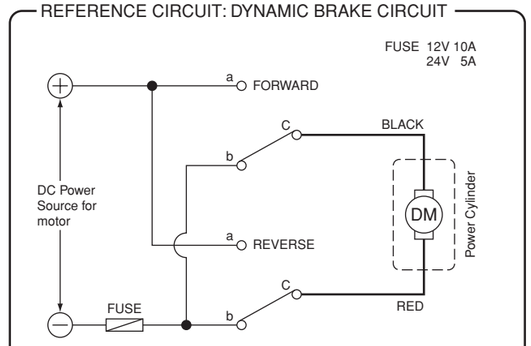
MOTOR SPECIFICATIONS

Model No.	Voltage	Output	Rating
	V	W	
LPF010H	12	29	5 Minutes
LPF010H V	24		
LPF020M	12		
LPF020M V	24		
LPF040L	12		
LPF040L V	24		

AMBIENT CONDITIONS

Type		Outdoor type
Atmosphere	Ambient temp.	–15°C ~ 40°C
	Humidity	Less than 85%
	Shock	Less than 1G
	Altitude	Less than 1000m
	Environment	Outdoor use

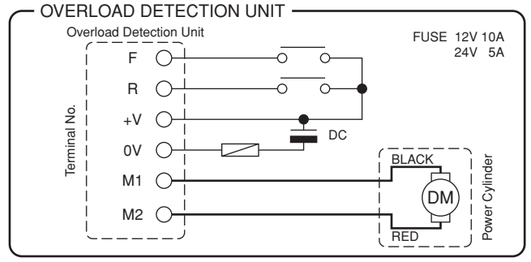
WIRING DIAGRAMS

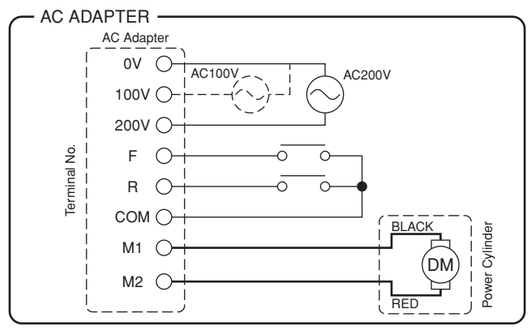


When connecting the black wire to + and red wire to –, the rod goes forward

Use the following capacity of the relay
DC 12V Model: 30A or greater (14VDC)
DC 24V Model: 30A or greater (28VDC)

Note: Diameter of electric cable should be greater than 2 mm² when distance between motor ~ overload detecting unit and DC power source is within 3 m.





SELECTION AND INSTRUCTION FOR OPERATION

SELECTION

The following information is necessary for the selection of F series.

1. Application
2. Required Thrust or Load N (kgf)
3. Stroke mm
4. Speed mm/sec
5. Frequency of operation cycle/min
6. Voltage of power source

SELECTION PROCEDURE

1. **Selection of Model No.**
   Select the suitable model number from the chart of standard specification (page 8) based on Thrust (N or kgf), Stroke (mm), Speed (mm/sec.) and so on.

2. **Confirmation of special features**
   Frequency of operation must be kept at the following:
   Allowable number of motor starts : 2 times/min. or less
   Allowable working time rate : 25% ED or less

INSTRUCTION FOR OPERATION

1. **Performance**
   Operative speed and motor current varies depending on actual load applied to the rod. Refer to the characteristics graph at page 10 for the detail.
   F series Power Cylinders cannot be operate in synchronicity due to change of speed by applied load as a characteristic of DC motor. Life is approximately 15,000 times rod's reciprocating motion.

2. **Power source**
   When using AC power source by transformer in stead of DC battery power source, capacity of transformer should be large enough to avoid dropping of voltage. (AC adapter for output voltage DC 24V is available as optional parts.)

3. **Voltage**
   DC 12V type (10 ~ 14V) and DC 24V (20 ~ 28V) are available. Operative speed may change depending on actual voltage.

4. **Maintenance**
   Actuator portion and reducer portion are pre-greased. Greasing is not required.

5. **Press stopping operation**
   Press stopping is available with overload detecting unit. (overload detection unit must be used with Power Cylinder in this case)
   CAUTION: Press stopping is not available for the standard model because it doesn't have any overload detecting units.

6. **Rod rotating prevention**
   It is necessary to prevent rod rotating because rotating torque as shown below applies to the rod when operating.
   LPF010H: Max 0.14 Nm
   LPF020M: Max 0.28 Nm
   LPF040L: Max 0.55 Nm

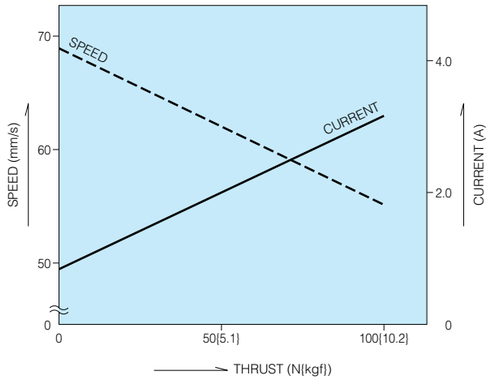
7. **Frequency of operation**
   F series Power Cylinder is designed for low frequency of operation, however it can be also used for inching operation if frequency of operation is less than 10 times/min.

8. **Outdoor use**
   F Series Power Cylinder itself is for outdoor use. Waterproof connector must be prepared and connected to the end of the motor cable.

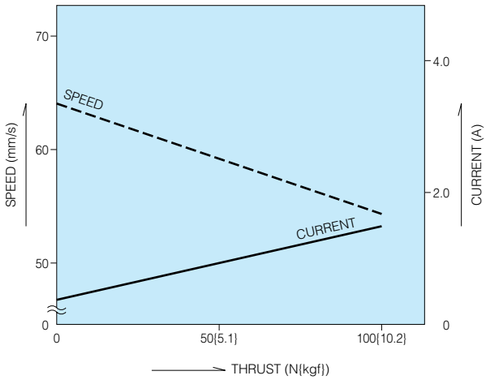
9. **Installation**
   When installing, do not apply radial force to the rod or external forces other than thrust force.
   Power Cylinder should be connected with connecting pins to the equipment. Both clevis pin and end fitting pin should be also adjusted in phase.

CHARACTERISTICS GRAPH

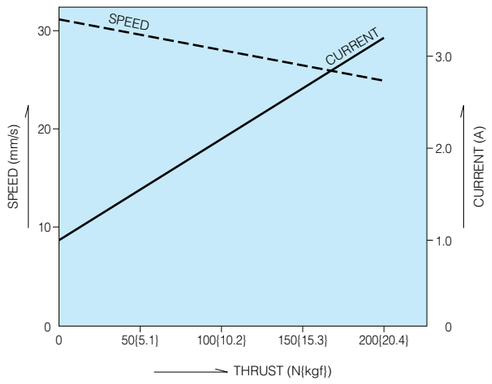
DC12V
LPF010H



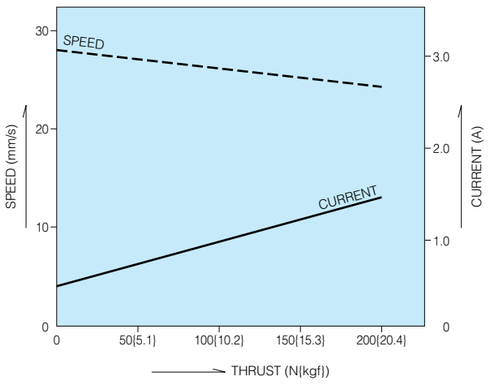
DC24V
LPF010H V



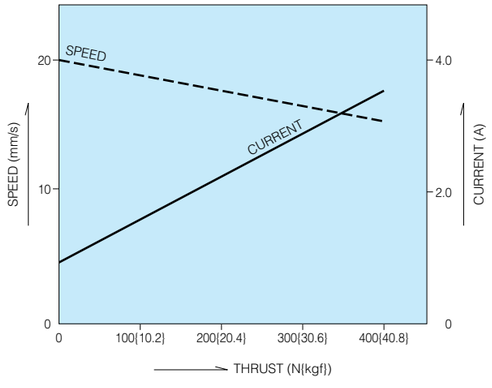
LPF020M



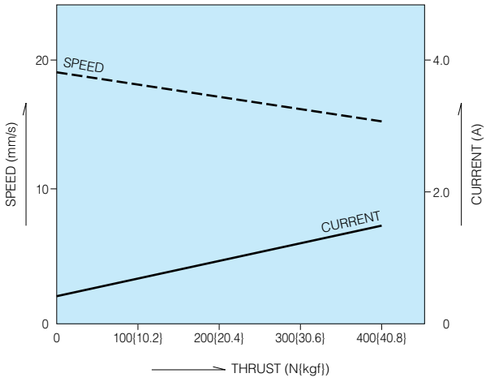
LPF020M V



LPF040L



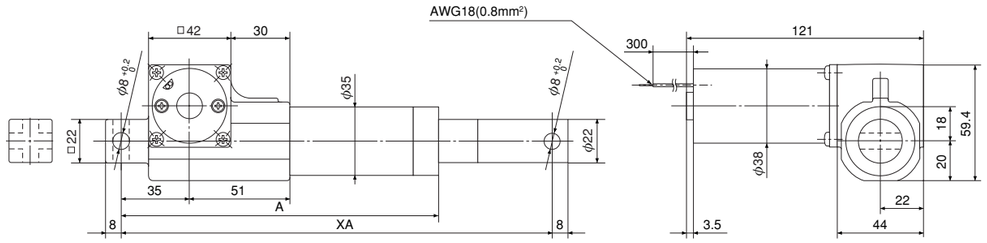
LPF040L V



Note: Data in the graphs is based on DC 12V/24V, ambient temp 20°C. Speed and motor current depend on conditions of power source and ambient temp.

DIMENSIONS

Basic type

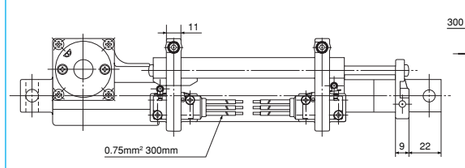


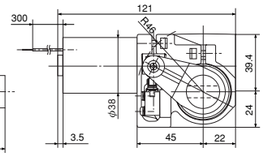
Model No.		Thrust		Stroke	Dimensions			Approx. weight
					A	XA		
		N	{kgf}	mm		MIN.	MAX.	kg
LPF010H0.5	LPF010H0.5 V	100	10.2	50	162	220	270	1.0
LPF010H1.0	LPF010H1.0 V			100	212	270	370	1.2
LPF010H1.5	LPF010H1.5 V			150	262	320	470	1.4
LPF010H2.0	LPF010H2.0 V			200	312	370	570	1.6
LPF010H3.0	LPF010H3.0 V			300	412	480	780	2.0
LPF020M0.5	LPF020M0.5 V	200	20.4	50	162	220	270	1.0
LPF020M1.0	LPF020M1.0 V			100	212	270	370	1.2
LPF020M1.5	LPF020M1.5 V			150	262	320	470	1.4
LPF020M2.0	LPF020M2.0 V			200	312	370	570	1.6
LPF020M3.0	LPF020M3.0 V			300	412	480	780	2.0
LPF040L0.5	LPF040L0.5 V	400	40.8	50	162	220	270	1.0
LPF040L1.0	LPF040L1.0 V			100	212	270	370	1.2
LPF040L1.5	LPF040L1.5 V			150	262	320	470	1.4
LPF040L2.0	LPF040L2.0 V			200	312	370	570	1.6
LPF040L3.0	LPF040L3.0 V			300	412	480	780	2.0

Note: In case of DC 24V, symbol “V” is added to the end of the model number.

WITH LIMIT SWITCH FOR STROKE ADJUSTMENT

Note: Limit switch for stroke adjustment cannot be installed onto the model with 50 mm stroke.

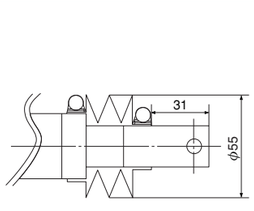




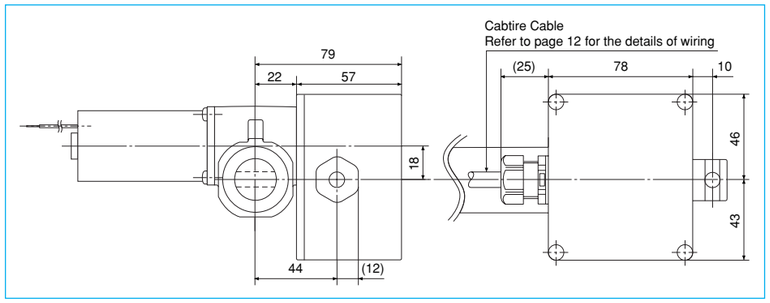
LS specifications

Model No.	D2VW-5L2A-1M OMRON
Contact configuration	Red, Blue, Black
Current	AC250V 4A (cos ϕ = 0.7)
Connection	0.75mm² × 3C Length 300mm Lead wire

WITH BELLOWS



WITH POSITION DETECTION UNIT

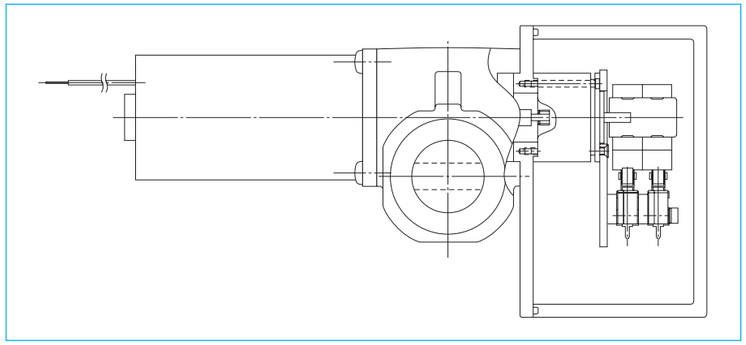


POSITION DETECTING UNIT

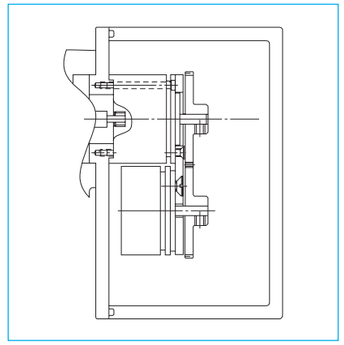
INTERNAL STRUCTURE

The following two built-in units are available for position detection.

1. INTERNAL LIMIT SWITCH FOR POSITION DETECTION



2. POTENTIOMETER



Note: Internal LS for position detection cannot be used together with potentiometer and vice versa.

SPECIFICATIONS OF POSITION DETECTING UNIT

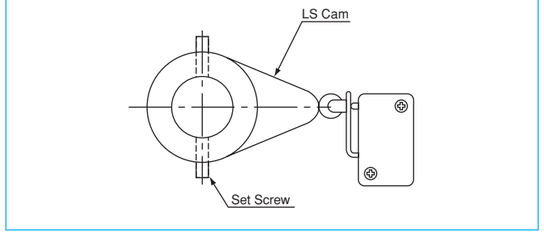
1. INTERNAL LIMIT SWITCH FOR POSITION DETECTION

For space saving or hard environments such as dust, corrosion etc.

Limit Switch Set-Up

1. Operate Power Cylinder to confirm direction of LS cam before installing the Power Cylinder.
2. Install the Power Cylinder, then adjust where the position of stroke is to be stopped or detected.
3. Rotate LS cam, then fix it at the position where the micro switch works by tightening set screws taking into consideration the coasting distance of the stroke.

Type	SS-5GL2 (OMRON)
Contact configuration	LS1: Black, Red; LS2: Green, Yellow; White; Brown
Capacity	AC 250V 2A (cosϕ=0.4)
Connection	0.5mm² × 6C, length 500mm Cabtire Cable



2. POTENTIOMETER

Potentiometer is a variable resister to output electrical signals by stroke.
Printed circuit board and stroke indication meter may be used together with the potentiometer.
Resister is preset by model of Power Cylinder before delivery.
If the actuator rod is rotated before installation, the stroke position will be out of phase with potentiometer. After installation adjust the phase correctly.

Type	CP-30 (Kyoei Tsushin Kogyo)
Total resistance	1kΩ
Power rating	0.75W
Insulation rating	AC1000V 1min.
Effective electrical angle	355° ±5°
Effective angle of rotation	360° (Infinite)
Connection	0.5mm² × 3C, length 500mm Cabtire Cable

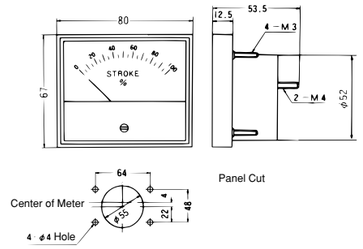
CONTROL OPTIONS

FOR POTENTIOMETER

STROKE INDICATION METER

Stroke is indicated by %.

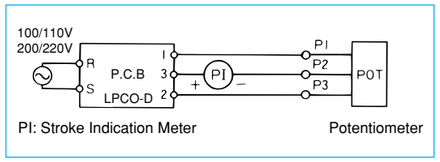
Model No.	RM80B (DC100μA)
Class	JIS C 1102 2.5 Class
External appearance	Black plastic
Scale specification	Full Stroke Indicated by 100%

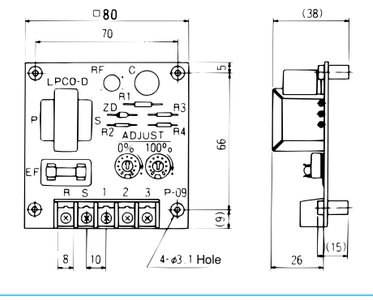


CIRCUIT BOARD

LPCO–D1 (100/110V 50/60Hz) LPCO–D2 (200/220V 50/60Hz)

The circuit board transforms output signals of voltage from the potentiometer to current.
To adjust the meter, use the potentiometer on the printed circuit board.
If the meter is required to read 100% at minimum stroke, reverse wire 1 and wire 2.

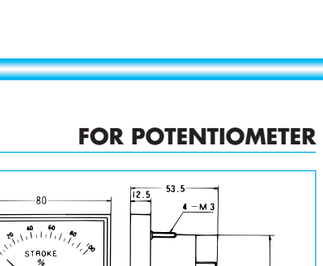




R CONTROLLER

The R Controller digitizes output signals of voltage from the potentiometer for stroke indication or stroke control. Scaling function is available for indicating actual stroke or stroke by %. The R Controller can be connected to the potentiometer directly.

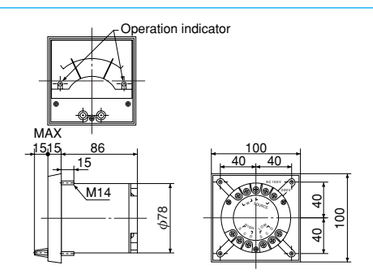
Model No.	RX–5455–NBAS (BURRUF)
Total resistance of input potentiometer	0.8kΩ~12kΩ
Display	4 digits 7 segment LED
External appearance	Black Plastic
Comparative output	HI, LO, GO (Relay output)
Comparative set value	0 – ±9999
Comparative output contact capacity	DC30V/1A AC250V/0.2A
Output contact configuration	1C for H1, LO and GO
Power source	200V AC ±10% 50/60Hz



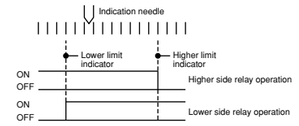
METER RELAY

P.C.B. for the Meter Relay is the same as P.C.B. for Stroke Indication Meter.
The Meter Relay controls stroke with built-in control panel.
Steel mounting panel is standard.
Aluminum mounting panel is also available.

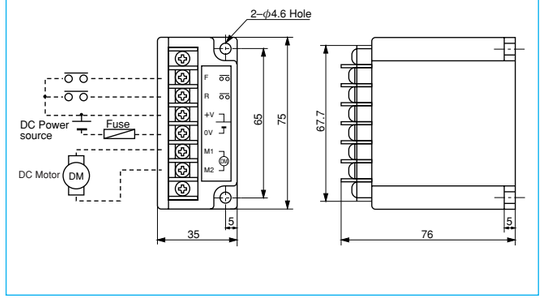
Model No.	NRP–100 (TSURUGA)
Class	JIS C 1102 2.5 Class
External appearance	Black Plastic
Scale specification	100% at full stroke
Power source	AC 100/100, 200/220V 50/60Hz
Input	Max. DC 100μA
Output contact configuration	1C for both High and Low (Refer to page 14)
Contact rating	AC250V3A (cosφ=1)



RELAY OPERATION
(NORMALLY CLOSED CONTACT)
The meter relay's wiring is the same as that of the stroke meter except that a separate power supply is necessary. Please use one of the other power sources. Direct connection of the output contact (normally closed) with the LS stroke adjustment normally closed, contact is simple.

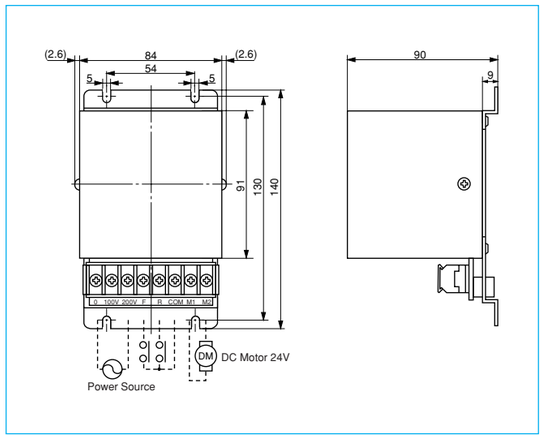


OVERLOAD DETECTION UNIT



Model No.		LPF–K12	LPF–K24
Applicable Power Cylinder		LPF010, LPF020, LPF040	
Power voltage		10 ~ 14VDC	20 ~ 28VDC
Rated current		3.7ADC	1.8ADC
Overload Protection function	Load current	7.0ADC (fixed)	4.0ADC (fixed)
	Starting time	0.3sec. (fixed)	
	Overloading time	0.1sec. or less (fixed)	
Operation specification		Switched on between F and + : forward Switched on between R and + : reverse Switched on both F – +, R – + : stop	
Ambient temp.		– 15 ~ 40°C	
Ambient humidity		45 ~ 85%RH (No condensation)	
Structure		Built in type for control box case: ABS	
Weight		0.2kg	

AC ADAPTER



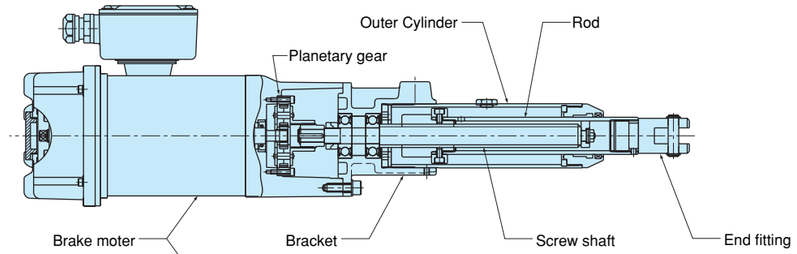
Model No.		LPF–A24
Applicable Power Cylinder		LPF010, LPF020, LPF040
Applicable motor		24VDC 29W
Power source		100VAC 50/60Hz 200/220VAC 50/60Hz
Rated current		1.8ADC
Overload Protection function	Load current	4.0ADC (fixed)
	Starting time	0.3sec. (fixed)
	Overloading time	less than 0.1sec. (fixed)
Operation specification		Switched on between F and Com : forward Switched on between R and Com : reverse Switched on both F – Com and R – Com : stop
Ambient temp.		–15 ~ 40°C
Ambient humidity		45 ~ 85%RH (No condensation)
Structure		Built in type for control box case: SPCC
Weight		2.5kg

STRUCTURE

LPGA type

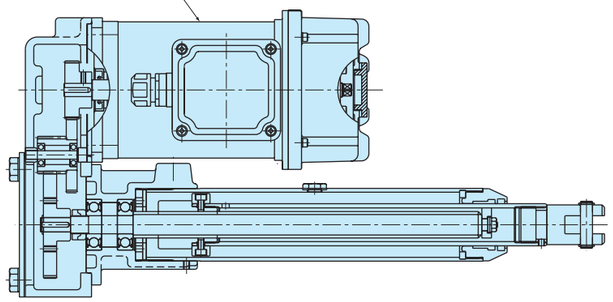
●Straight

T type



●Parallel

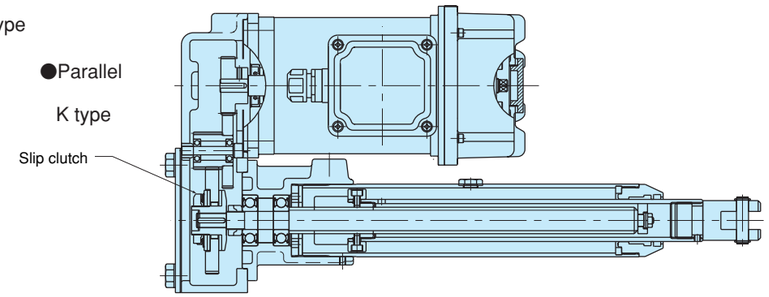
K type



LPGB type

●Parallel

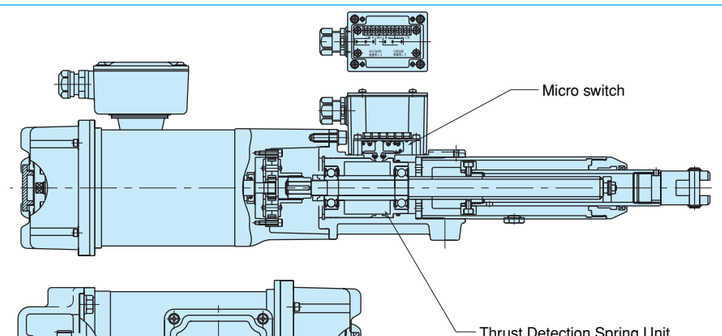
K type



LPGC type

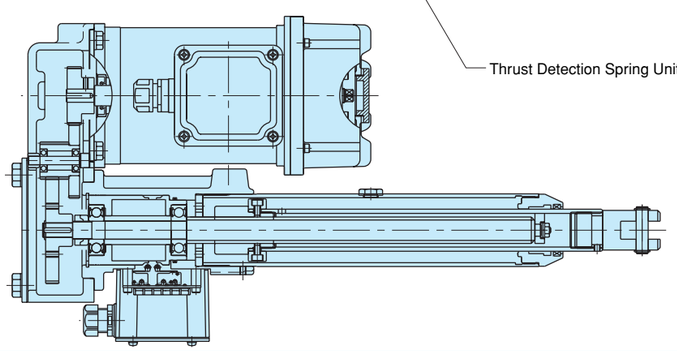
●Straight

T type



●Parallel

K type



TYPE (OVER LOAD PROTECTION DEVICE) SELECTION

There are 3 types of G series Power Cylinder. Select the type based on your application. Basic performances (Thrust, Speed and Stroke) are the same.

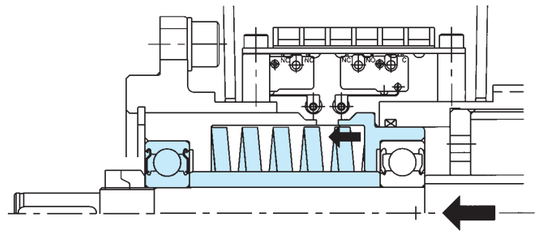
Basic type (LPGA)
This type has no Over Load Protection Device. It only has a brake for the brake motor. Please note that it can be used within their stroke. If you use it over the stroke, it may cause damage. Use LS for stroke control on your equipment or stroke adjusting. The LS unit is optional when you choose an LPGA type. We recommend using a Shock Relay or Shock Monitor for Overload Protection Device.

Slip Clutch type (LPGB). Only Parallel type is available
The internal slip clutch is activated as Overload Protection Device when the thrust load exceeds pre-set thrust. However the slip clutch will wear quickly through continuous slipping and smooth operation may not be possible. Therefore we recommend using it with a Shock Relay.

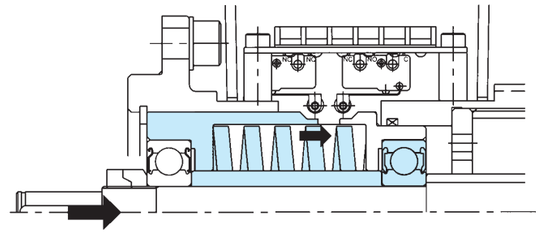
Thrust Detection Spring Unit type (LPGC)
The LPGC type features an internal thrust detection system that combines pressurizing disk springs with a micro switch. This system will operate effectively in cases shown below.
1. Press stopping and stopping by own motor power at min/max stroke end.
2. To require electrical signal when overload working.
3. Working of overload from load side during stopping.

When shock load working, the spring unit can absorb it.

THRUST DETECTION SYSTEM



Compression Load (Extension)
- Overload during extension
- Internal stopping at the forward stroke end
- Compression is required after stopping



Tension Load (Retraction)
- Overload during retracting
- Internal stopping at the backward stroke end
- Tension is required after stopping

INSTRUCTIONS

1. When using a rotary encoder or potentiometer.
   LPGC type Power Cylinder uses a spring unit. Therefore, electrical signal of rotary encoder or potentiometer will have some lag due to bending of spring unit when the spring unit is operating. LPGB type Power Cylinder can use rotary encoder or potentiometer without any lag when the slip clutch is operating. LPGC type Power Cylinder can use them when the spring unit does not operate.
2. Overload working during Power Cylinder stopping.
   LPGC type Power Cylinder cannot be used if the rod has to stop without any bending.
3. When you use LPGC type Power Cylinder for press/pull stopping, the equipment strength required must be more than 250% against the rated thrust of the Power Cylinder.

STANDARD SPECIFICATIONS

Model	Speed	Thrust N { kgf }	Speed mm/sec. 50/60Hz	Motor kw	Rod Travel per manual operated shaft revolution mm	Stroke mm	Type: Straight	Type: Parallel	Overload protection: None	Overload protection: Slip clutch	Overload protection: Thrust detection spring unit	Option: Bellows	Option: LS for stroke adjustment	Option: Position sensor unit	Option: I Type end fitting	Option: Clevis adaptor	Option: Rod anti-rotation protection
LPGA070 LPGB070 LPGC070	L	700 { 71.4 }	25/30	0.1	1	100 200 300 400 500 600 800 1000 1200	○	○	○	○ *1	○	○	○	○ *1	○	○ *1	○ *2
	M		75/90	0.2	3												
	H		100/120	0.4	4												
	U		200/240	0.4	8						○ *3						
LPGA100 LPGB100 LPGC100	L	1.00k { 102 }	25/30	0.1	1		○	○	○	○ *1	○	○	○	○ *1	○	○ *1	○ *2
	M		75/90	0.2	3												
	H		100/120	0.4	4												
	U		200/240	0.4	8						○ *3						
LPGA150 LPGB150 LPGC150	L	1.50k { 153 }	25/30	0.2	1		○	○	○	○ *1	○	○	○	○ *1	○	○ *1	○ *2
	M		75/90	0.4	3												
	H		100/120	0.4	4												
LPGA300 LPGB300 LPGC300	L	3.00k { 306 }	25/30	0.4	1		○	○	○	○ *1	○	○	○	○ *1	○	○ *1	○ *2
	M		50/60	0.2	2												
	H		67/80	0.4	2.67												

Note: LPGC070H & LPGC100H : Motor 0.2kw

*1. Only Parallel type is available.
*2. LPGC type is not available.
*3. Cannot do press stopping.

MOTOR SPECIFICATIONS

Type		Brake motor, Enclosed type, Self cooling type
KW		Refer to the above
Number of Poles		4 poles
Power Source	Voltage	3^{ϕ} 200V /200V /220V
	Frequency	50Hz/ 60Hz/ 60Hz
Insulation class		E
Rating		30min
Protection		(IP54)

Note: 400/440V and other voltages can be manufactured. Please consult Tsubaki.

AMBIENT CONDITIONS

Ambient Conditions / Model	Ambient temp.	Humidity	Shock	Altitude	Environment
Outdoor	−15°C ⇂ 40°C	below 85%	below 1G	less 1000m	Outdoor Use

1) In temperatures below zero, the characteristics of Power Cylinder (Ampere and speed) will change due to grease.
2) We recommend the Power Cylinder with bellows for dusty conditions.

PAINT

Paint: Munsell 5GY6/0.5 (Olive Gray)

MODEL No.

LPG C 300 L T 5 V ☐

- Power Cylinder G Series
- LPGA / LPGB (Only Parallel type is available) / LPGC
- Thrust 070: 700N {71.4kgf} / 100: 1.00kN {102kgf} / 150: 1.50kN {153kgf} / 300: 3.00kN {306kgf}
- Speed (L , M, H, U)
- Type T: Straight / K: Parallel
- Stroke 5 : 500mm
- Power Source No mark : 200V Class (200/200/220V, 50/60/60Hz) / V : 400V Class (400/400/440V, 50/60/60Hz) / Other Voltage : e.g. 380-415V, 50Hz
- Option No mark : Standard / M : Anti-rod rotation / L : Stroke adjuting / K2, K4 : LS for positioning / P : Potentiometer / R : Rotary encoder / C : Clevis adaptor / I : I type end fitting / J : Bellows

SELECTION

REQUIRED INFORMATION FOR SELECTION

1. Application
2. Thrust N{kgf}
3. Stroke mm
4. Speed mm/s
5. Frequency of operation Cycle/min
6. Power source Voltage & Hz
7. Ambient condition
8. Operation hours/day, Operating days/year

SELECTION PROCEDURE

1. Select the type of Power Cylinder to be used based on the operating environment, load conditions (N{kgf}) and speed (mm/s).
2. Based on an application, select straight or parallel type. Also select the Overload protection device and options.
3. Confirm that the frequency of operation and working time rate ED is allowable.

Allowable Frequency of Operation & Working time rate ED

Number of Motor Starts	Below 10 time/min
Working Time Rate ED (%ED)	25

Working time rate ED is a rate of working time per 10 minute and to be calculated as below.

$$\textit{Working time rate ED (\%)} = \frac{\textit{Working Time per cycle}}{\textit{Working Time per cycle + stopping time per cycle}} \times 100\ (\%)$$

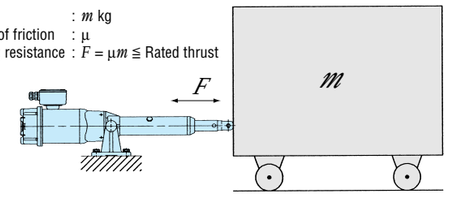
ESTIMATE LIFE TIME

Estimated life time of G series Power Cylinder is shown below.
- Based on brake operations: 2 million times (Need brake gap adjusting)
- Based on running distance of cylinder: 25 km

INERTIA LOAD FOR HORIZONTAL APPLICATIONS

Setting load of the overload protection device is from 140% to 200% against rated thrust of cylinder.
When starting with large inertia loads, there is possibility of not smooth operation because over protection device is activated. Refer to the following table for limits. If inertia load is larger than the following table, please use the inverter to start slowly.

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



Allowable car weight, considering inertia

(kg)

Speed \ Model	LPGA070 LPGB070 LPGC070	LPGA100 LPGB100 LPGC100	LPGA150 LPGB150 LPGC150	LPGA300 LPGB300 LPGC300
L	1150	2085	1220	2060
M	170	280	310	1560
H	130	240	270	790
U	71	102	——	——

BRAKE HOLDING POWER

The load holding strength of the brake exceeds the rated thrust of the Power Cylinder so loads can be safely and securely held by the brake. This holding power is generated by the motor brake. While in operation the brake uses spring power and generates holding power that exceeds 150% of the rated torque of the motor.

SELECTION 2

Select the type of Power Cylinder to be used based on the following selection criteria.

1. **Setting Load of Overload protection device**
   - Slip Clutch (GB Type) : 150% ~ 200% against rated thrust
   - Thrust detection spring unit (GC Type) : 140% ~ 200% against rated thrust

2. **Brake Holding Power**
   The load holding strength of the brake exceeds the rated thrust of the Power Cylinder so loads can be safely and securely held by the brake. This holding power is generated by the motor brake. While in operation the brake uses spring power and generates holding power that exceeds 150% of the rated torque of the motor.

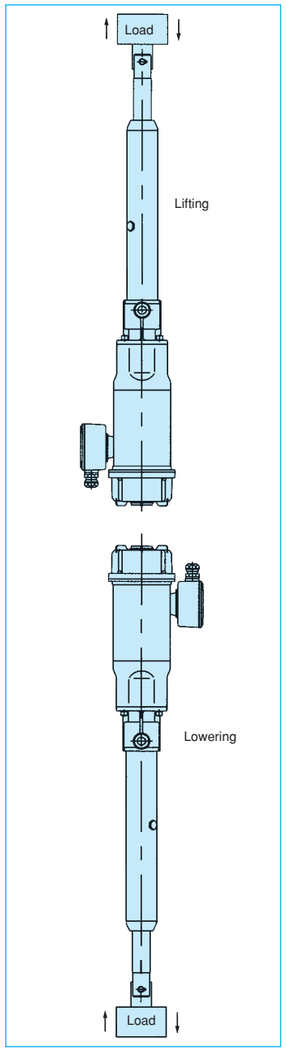
3. **Coasting and Stopping Accuracy**
   The position accuracy of the Power Cylinder varies depending upon speed and load inertia. Accuracy will improve as speed is lowered. Refer to the table shown below, and then set the limit switches taking into consideration expected coasting.

Coasting and Stopping Accuracy Table (Reference value when time lag of relay is 0.03S)

(Dimensions in mm)

Model	Operation	Lifting (In case of 1 and 3)				Lowering (In case of 2 and 4)			
		50Hz		60Hz		50Hz		60Hz	
		Coasting	Stopping accuracy	Coasting	Stopping accuracy	Coasting	Stopping accuracy	Coasting	Stopping accuracy
LPGA070 LPGB070 LPGC070	L	6.9	±0.4	10.0	±0.5	10.6	±0.4	14.9	±0.5
	M	15.0	±1.1	21.5	±1.3	21.8	±1.2	30.1	±1.4
	H	15.4	±1.4	21.7	±1.7	23.7	±1.5	32.7	±1.8
	U	34.2	±2.8	47.9	±3.4	60.6	±3.1	81.2	±3.8
LPGA100 LPGB100 LPGC100	L	6.1	±0.4	9.0	±0.5	10.6	±0.4	14.9	±0.5
	M	13.8	±1.1	19.8	±1.3	22.1	±1.2	30.5	±1.4
	H	14.1	±1.4	19.8	±1.7	23.8	±1.5	32.7	±1.8
	U	32.0	±2.8	45.0	±3.4	66.9	±3.1	88.2	±3.8
LPGA150	L	4.6	±0.4	6.6	±0.5	7.1	±0.4	9.8	±0.5
LPGB150	M	10.6	±1.1	14.7	±1.3	15.6	±1.2	21.3	±1.4
LPGC150	H	13.7	±1.4	19.0	±1.7	21.8	±1.6	30.0	±1.9
LPGA300	L	3.3	±0.4	4.6	±0.5	5.1	±0.4	6.9	±0.5
LPGB300	M	8.6	±0.8	12.4	±0.9	23.2	±0.8	29.4	±1.0
LPGC300	H	9.4	±1.0	13.1	±1.2	19.0	±1.1	25.0	±1.3

* Values of the above table show parallel type Power Cylinder and the Power Cylinder with slip clutch when their thrust is more than 100 N. Coasting of another type of Power Cylinder will be smaller than the above.
* Coasting Distance:
The amount of stroke traveled from power shut-off and until the unit completely stops.
* Stopping Accuracy:
The position deviation for repeated stops. The above values include ±25% time lag of relay and brake.



Note: In actual operation, rod anti-rotation provision is required.

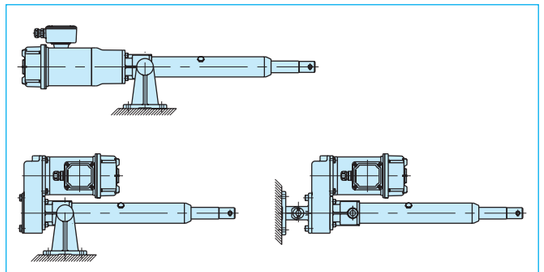
INSTALLATION & MAINTENANCE

INSTALLATION POSITION

Power Cylinders may be installed in any position.

INSTALLATION METHOD

Use a trunnion or clevis mount when installing. Install with either a male (I) or female (U) style end fitting.
Apply grease to the Trunnion Pin and Bracket hole.



MANUAL CONTROL

To manually adjust the stroke, remove the load from the actuator, release the brake of the brake motor then turn the manually operated shaft of the motor with a handle.
WARNING: Remove any load from the actuator rod before releasing the brake.

Regarding rod travel per manual operated shaft revolution, please refer to the table on page 17.

ANTI ROD ROTATION

- For the thrust of the actuator rod there is a reaction torque. Generally, connection to the driven load prevents rotation.
- If the actuator rod end piece is required to rotate freely or if the actuator rod is used to drive a rolling car or to pull a load with a wire rope or chain, please use option M.

SIDE LOADS ON THE ROD

Install the device so that bending moments are not applied to the actuator rod. Permanent damage to Power Cylinder may result.

SETTING THE EXTERNAL STROKE ADJUST LIMIT SWITCHES

1. Set the limit switches taking into consideration expected coasting. (refer to page 19)
2. Set the limit switches so that the rod stops within XA dimension.
3. When using the Power Cylinder for multiple driving, use the limit switches attached on min/max stroke end of each Power Cylinder.

MAINTENANCE

Lubrication

The Power Cylinder is delivered with grease applied to the screw and can be used without greasing. For maintenance, recommended grease and lubrication cycle is as below.

Table 2 Recommended Grease

MOBIL	MOBILUX EPNo.2
SHELL	ALVANIA EP GREASE

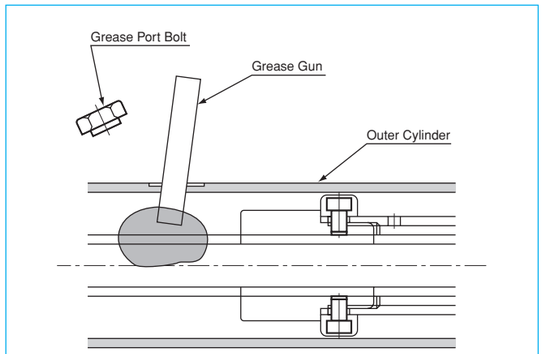
Table 3 Lubrication Cycle

Frequency of starts/day	Lubrication cycle
500~1000	3 to 6 months
100~500	6 to 12 months
10~200	12 to 18 months

Note: The above values are only for reference.

BALL SCREW LUBRICANT REPLACEMENT

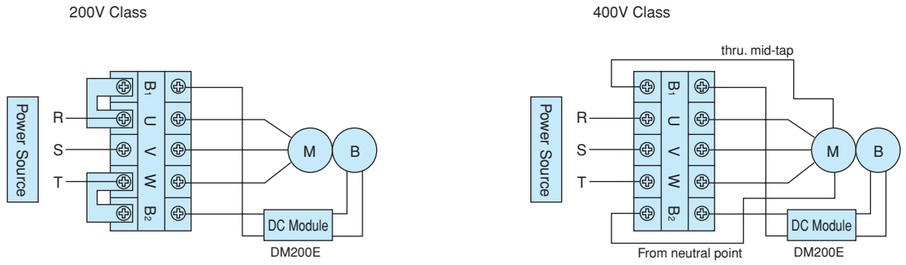
Grease must be applied to the ball screw. Grease can be injected through the grease port of the cylinder after extending the actuator rod to the forward stroke end.



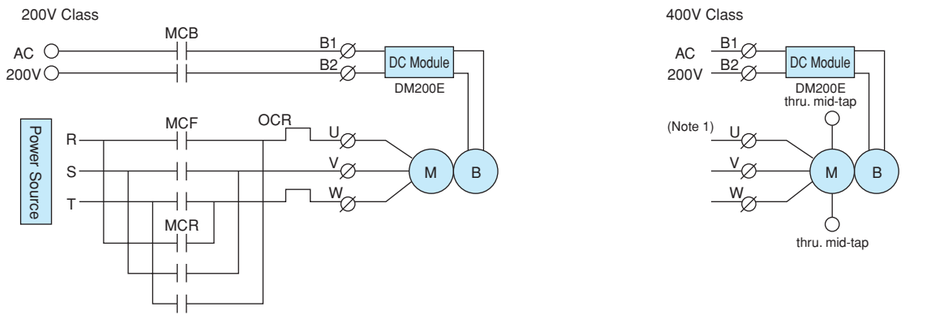
WIRING

BRAKE MOTOR WIRING (WITH DC BRAKE)

Pre-wiring



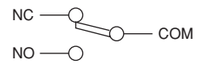
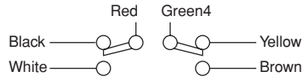
Separate brake power supply



Note: 1. When you use separate brake power supply operation using 400V class power source, please insulate wiring from the mid-tap. In this case, you have to input 200V power to the DC module. If you do not have a 200V power source, use a transformer to reduce voltage to 200V. Transformer capacity needs more than 90VA (from 0.1kW to 0.4kW) and please check it can be used without the voltage dropping.
MCB: AC 250V, 7A minimum
DC module contains a surge absorption device. Please add protection device for each contact point if necessary.
2. Do not insert a relay between the DC module and the brake coil. (Separate brake DC power supply is not available.)

* For more details, please refer to the instruction manual.

LIMIT SWITCHES SPECIFICATIONS

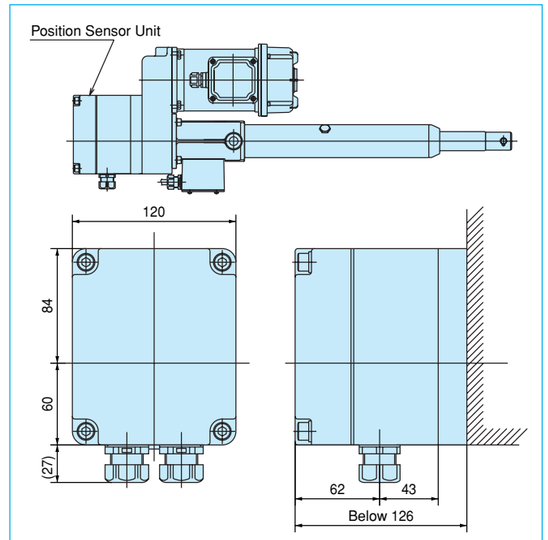
	Stroke adjustment Limit Switch (External)	Thrust detection Limit Switch	
Limit Switch	D4E-1B20N (OMRON)	SS-5GL2D (OMRON)	
Current	AC 250V 3A (cos ϕ = 0.4)	AC 250V 2A (cos ϕ = 0.4)	
Contact configuration		For Forward	For Backward
			
Connection	M3 Screw × 3 (ϕ5.8 ~ ϕ7.6)	0.5mm^2 × 6C Length: 1000mm Cabtire Cable	

POSITION SENSOR UNIT

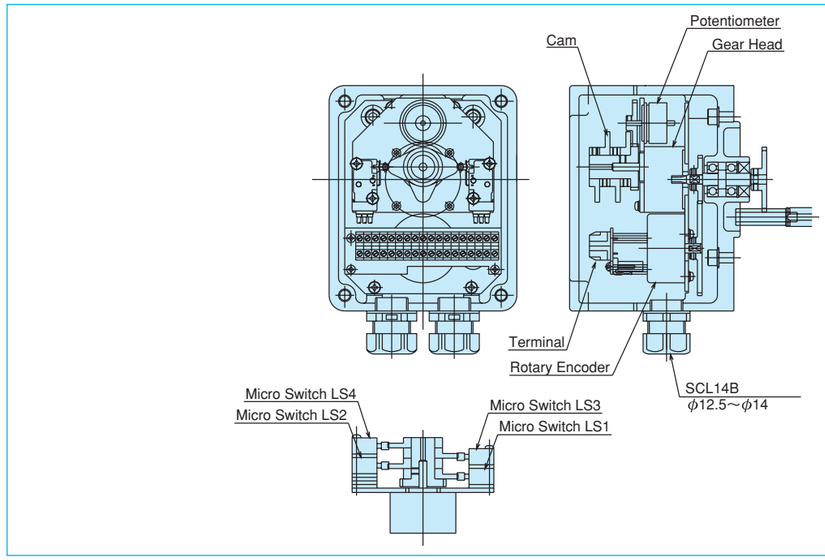
If position sensing is required, any or all of the following three built-in units may be used only with trunnion mount.

1. Internal position sensor limit switch (2 or 4 circuit)
2. Potentiometer
3. Rotary encoder

Note: Clevis adapter cannot be attached when a Position Sensor Unit is used.

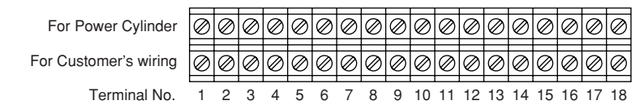


INTERNAL CONSTRUCTION OF POSITION SENSOR UNIT



INTERNAL WIRING OF THE POSITION LIMIT SWITCH UNIT

Use the internal terminal strip for the position sensor limit switch, potentiometer and rotary encoder wiring.
Use shielded wire for the rotary encoder signals.



Option	Position Limit Switch (Internal) (K2, K4)									Potentiometer			Rotary encoder					
Mark	LS1		LS2		LS3		LS4		COM	P			R					
Contact	a	b	a	b	a	b	a	b	c	1	2	3	1	2	Z	5V	0V	
Terminal number	18	17	5	6	16	15	7	8	4	1	2	3	9	10	11	12	13	14

POSITION DETECTION UNIT SPECIFICATIONS

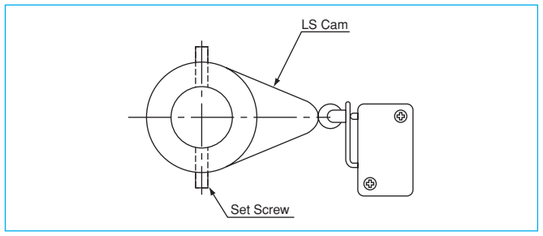
POSITION DETECTION INTERNAL LS

Use a Position detection internal LS when there is no space to install external stroke adjustment LS unit, or you want to use it combined with a Potentiometer and/or a Rotary encoder.

- When the two are attached (K2) ···The arrangement is as for micro switches LS1 and LS2 in the drawing on the previous page.
- When four are attached (K4) ·····The arrangement is as for micro switches LS1, LS2, LS3 and LS4 in the drawing on the previous page.

LS settings
To adjust the operating position, first operate the G series Power Cylinder, then adjust the LS cam and make the setting taking into account the amount of coasting. Use a hexagonal wrench (1.5) to loosen the LS cam's two hexagonal socket set screws and to make the adjustment. (See the illustration on the right.)
* The limit switches are not set before shipping. Upon delivery, please set them into suit your equipment.

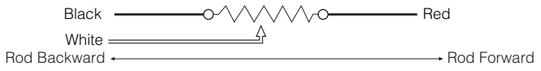
Micro switch specification	
Model No.	OMRON D2VW-5L2A-1M
Contact configuration	LS1, 3: Black, White, Red — LS2, 4: Green, Yellow, Brown
Capacity	AC 250V 2A (cosϕ=0.4)



POTENTIOMETER

Potentiometer is a changeable resistor that can output electrical signals following the stroke of the Power Cylinder.
Use it combined with a Printed circuit board and Stroke display meter.
If the actuator rod is rotated before installation, the stroke position will be out of phase with the potentiometer.

Potentiometer specification	
Model No.	CP-30
Maker	Sakae
Total resistance	1kΩ
Power rating	0.75W
Insulation rating	AC1000V 1min.
Effective electrical angle	355° ±5°
Effective angle of rotation	360° Endless



ROTARY ENCODER

The rotary encoder is ideal for controlling the stroke in conjunction with a programmable controller.

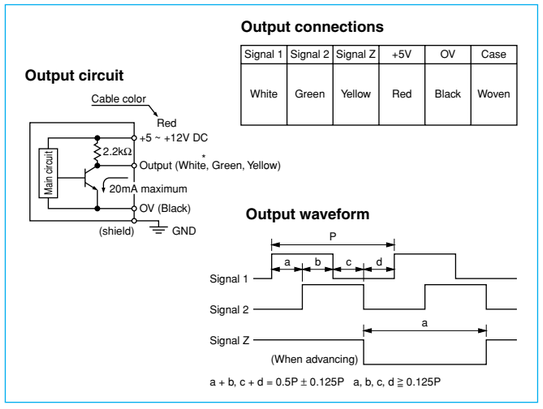
Type	MES-30-40
Manufacturer	Microtech Laboratory Inc. Japan Barufu Inc.
Output method	Incremental

ENCODER SPECIFICATIONS

Output pulse number	40P/R	
Output wave form	90-degree phase difference, two-phase waveform + origin output	
Output voltage	5V Power Source	"1" 4.5V min. "0" 0.5V max.
	12V Power Source	"1" 11.0V min. "0" 1.0V max.
Output resistance	Load resistance 2.2kΩ	
Signal accuracy	Cycle error: less than 0.1 cycles	
Power source	DC 5 to 12V 60mA	
Frequency response	50kHz	
Light source	Light emitting diode	
Light receiver	Phototransistor	

Operating temperature	0°C ~ 60°C
Storage temperature	–20°C ~ 80°C
Humidity	Less than 95% relative humidity (RH), (With no condensation)
Vibration	55Hz max. oscillation amplitude of 1.5mm for 2 hours in direction XYZ.
Shock	50G (X, Y, Z direction 3 times)

* Stated values are for the encoder only.

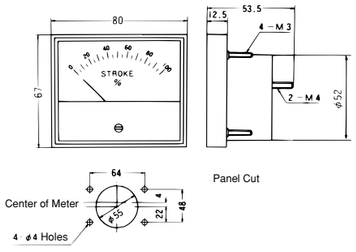


1. Please use the limit switches to make the origin setting.
2. External loads should not exceed allowable loss P.

POTENTIO-CONTROL OPTION

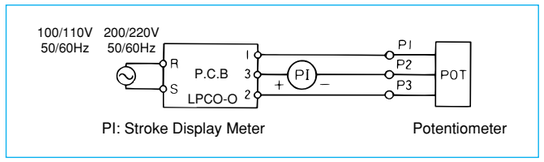
■ STROKE DISPLAY METER

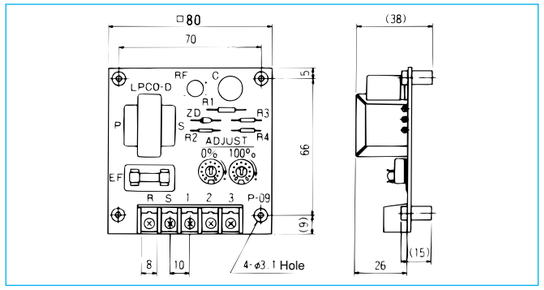
Type	RM-80B (DC100μA)
Class	JIS C 1102 2.5 class
Appearance	Frame/black
Scale specifications	Full stroke 100% display



■ PRINTED CIRCUIT BOARD

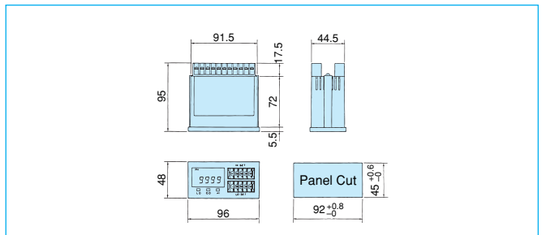
Please adjust the meter using the ADJUST controls located on the PCB. Do not get + and – confused on the stroke meter. To have the meter display 100% when at it's minimum value, switch terminals 1 and 2 on the PCB.





■ R CONTROLLER

The signal from the potentiometer located inside the G series Power Cylinder position detection mechanism is digitized for display and stroke control. An internally mounted scaling mechanism can display the actual stroke and the degree of extension (%). Direct connection of the R controller to the potentiometer is possible.

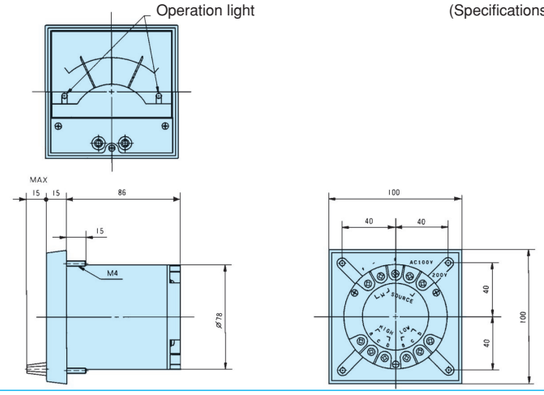


■ METER RELAY

Stroke adjustment can be easily performed from the control panel. (The steel panel attachment is standard. Please indicate if an aluminum panel is desired.)

Note: When using a TC unit, etc. (4 to 20 mA output), please indicate, 'For 4 to 20 mA output.'

Meter Relay Specifications	
Model No.	NRP-100 (TSURUGA)
Level	TISC1102 2.5
External appearance	Black Plastic
Scale specification	100% at full stroke
Power source	AC100/100, 200/220V 50/60Hz
Input	DC100μA max.
Output contact configuration	1C for both high and low (refer to page 25)
Contact rating	AC250V3A (cosϕ=1)



(Specifications and dimensions are subject to change.)

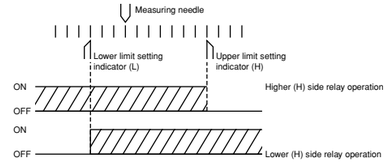
The G series Power Cylinder comes equipped with a potentiometer. Use caution when installing, if the screw is turned, stroke and phase settings will be thrown off. Using the limit switches, adjust the minimum and maximum application stroke setting before using the meter relay.

PRINTED CIRCUIT BOARD

Same as the stroke meter PCB.

RELAY OPERATION (NORMALLY CLOSED CONTACT)

The meter relay's wiring is the same as that of the stroke meter except that a separate power supply is necessary. Please use one of the other power sources. Direct connection of the output contact (normally closed) with the LS stroke adjustment normally closed, contact is simple.



SHOCK RELAY

We recommend a Shock Relay as the electric safety device for GB type Power Cylinder.

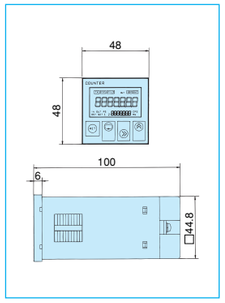
ROTARY ENCODER OPTIONS

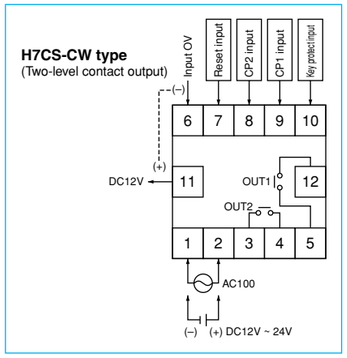
■ PULSE COUNTER

This counter is capable of displaying the pulse count from the rotary encoder in addition to sending relay output. With its prescale function, the actual amount of movement can also be displayed. For stroke control and other uses, please use it in conjunction with a self-protecting circuit. The display, and internal counter data, is backed up with internal batteries so that even when power is cut data is not lost.*

* If there is a power failure, counting is not possible, so do not attempt to move the jack. We recommend that external stroke adjusting limit switches also be used.

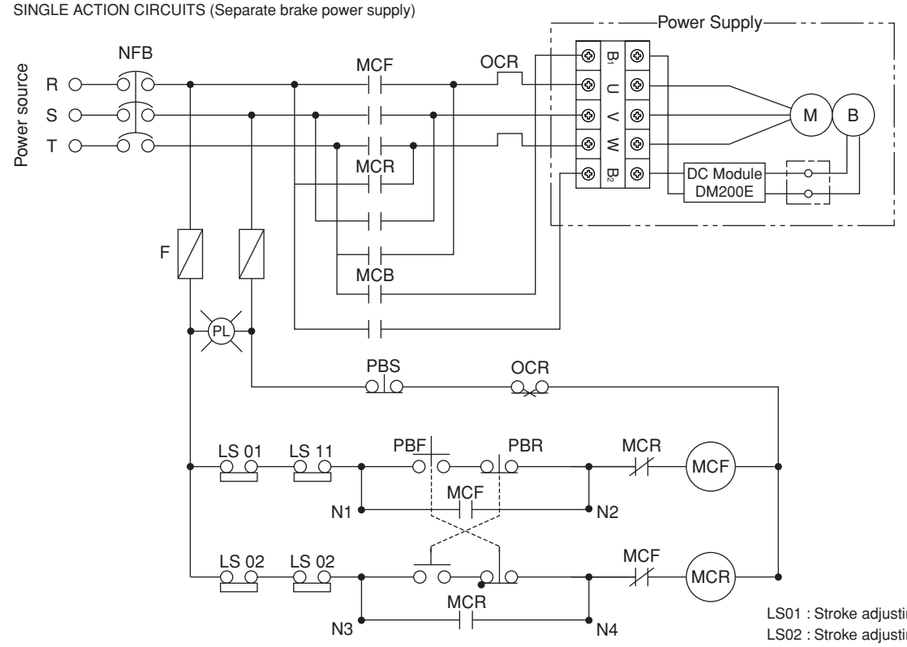
Model No.	OMRON H7CS-CW (±1 area type)
Type	Preset counter
Protective construction	IP54F (panel display section)
Prescale function	Yes (0.001 to 99.999)
Display type	Back-lit, 7-segment LCD
Rated voltage	AC100 to 240V (50/60Hz)
Power consumption	Approx. 6.6VA (at AC 250V, 50Hz)
Control output	Contact: AC 250V 3A (cosϕ=0.8 to 1)
External power supply	DC12V ±10% 100mA (less than 5% ripple)
Operating temperature	–10 to + 55°C (Not to be frozen)
Storage temperature	–25 to + 65°C (Not to be frozen)
Humidity	35 to 80% RH





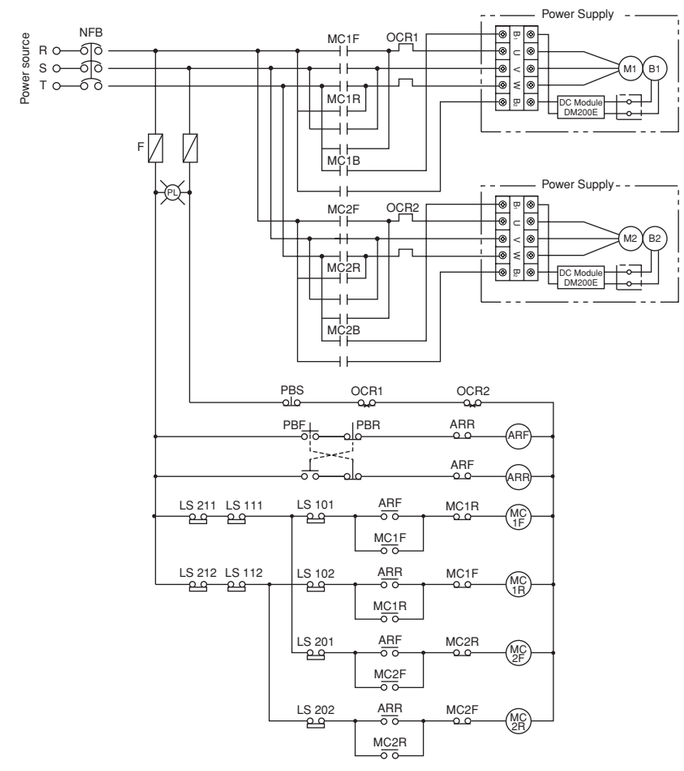
REFERENCE CIRCUITS

SINGLE ACTION CIRCUITS (Separate brake power supply)



LS01 : Stroke adjusting LS for forward
LS02 : Stroke adjusting LS for reverse
LS11 : Thrust detection LS for forward
LS12 : Thrust detection LS for reverse

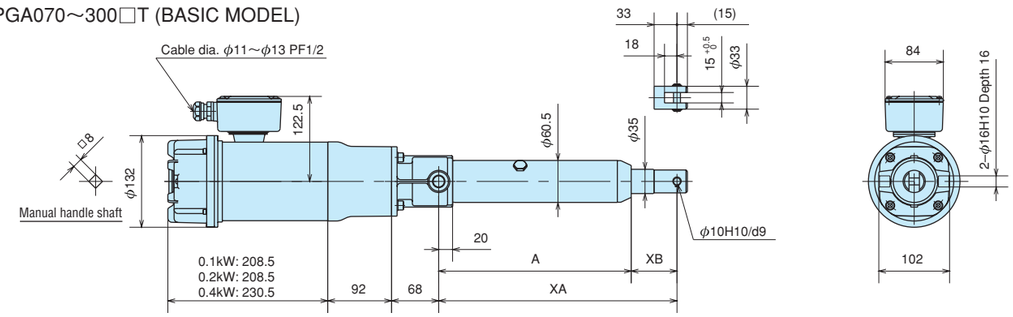
TWO MACHINES MULTIPLE DRIVE CIRCUIT (Separate brake power supply)



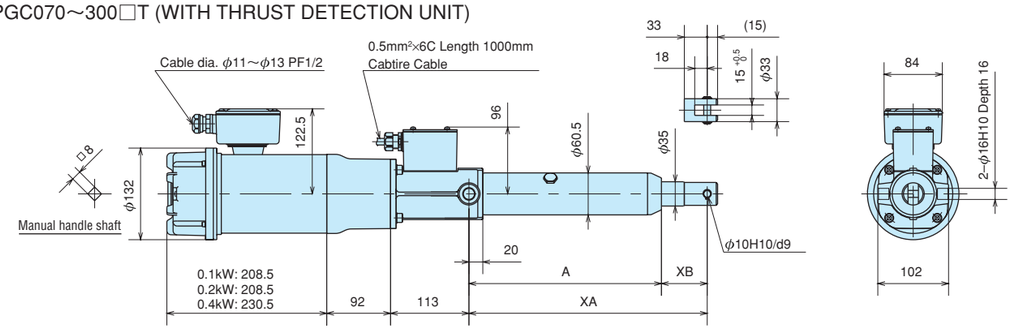
LS101 : Stroke adjusting LS for forward for LP1
LS102 : Stroke adjusting LS for reverse for LP1
LS201 : Stroke adjusting LS for forward for LP2
LS201 : Stroke adjusting LS for reverse for LP2
LS111 : Thrust detection LS for forward for LP1
LS112 : Thrust detection LS for reverse for LP1
LS211 : Thrust detection LS for forward for LP2
LS212 : Thrust detection LS for reverse for LP2

DIMENSIONS STRAIGHT TYPE

LPGA070～300□T (BASIC MODEL)



LPGC070～300□T (WITH THRUST DETECTION UNIT)



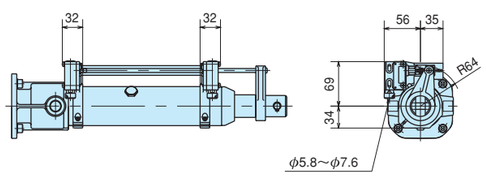
(Dimensions in mm)

Model		Speed	Type	Stroke	A	XA		XB		Approx. Weight (kg)	
						MIN	MAX	MIN	MAX	LPGA	LPGC
LPGA LPGC	070 100	L M H U	T	100	178	243	343	65	165	14	18
				200	278	343	543	65	265	15	19
				300	378	443	743	65	365	16	21
				400	478	543	943	65	465	18	22
				500	578	643	1143	65	565	19	23
	150 300	L M H		600	678	743	1343	65	665	20	24
				800	878	963	1763	85	885	22	26
				1000	1078	1183	2183	105	1105	24	28
				1200	1278	1403	2603	125	1325	27	31

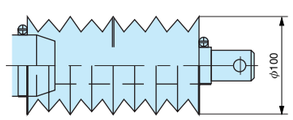
Note: Mechanical Stroke has a room for 3 ~ 8mm at each stroke end against XA dimensions.

OPTION

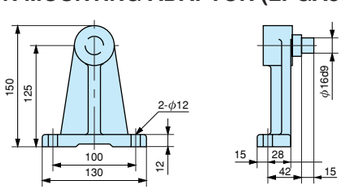
STROKE ADJUSTING LS



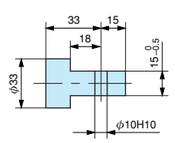
BELLOWS (-J)



TRUNNION MOUNTING ADAPTOR (LPGA300-T)

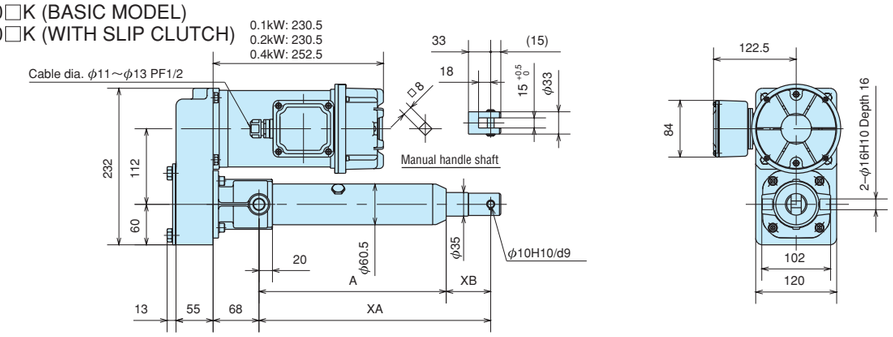


I TYPE END FITTING (LPGA300-I)

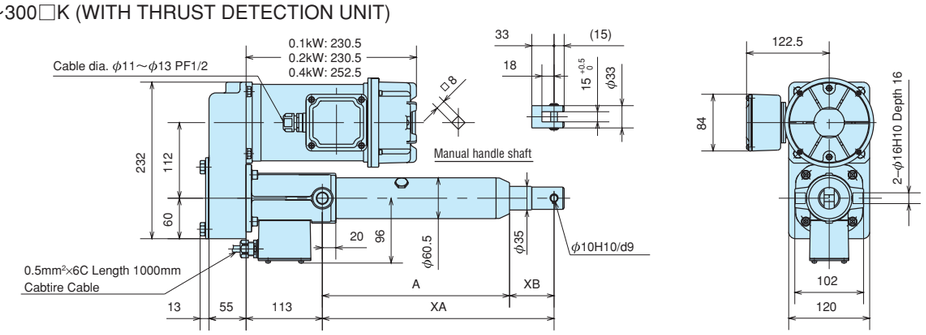


DIMENSIONS PARALLEL TYPE

LPGA070～300□K (BASIC MODEL)
LPGB070～300□K (WITH SLIP CLUTCH)



LPGC070～300□K (WITH THRUST DETECTION UNIT)



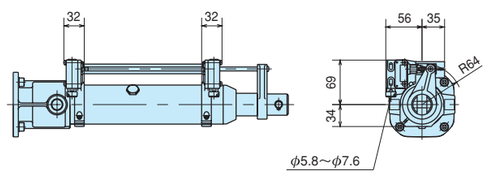
(Dimensions in mm)

Model		Speed	Type	Stroke	A	XA		XB		Approx. Weight (kg)		
						MIN	MAX	MIN	MAX	LPGA	LPGB	LPGC
LPGA LPGB LPGC	070 100	L M H U	K	100	178	243	343	65	165	18	18	23
				200	278	343	543	65	265	19	19	24
				300	378	443	743	65	365	21	21	25
				400	478	543	943	65	465	22	22	26
	150 300	L M H		500	578	643	1143	65	565	23	23	27
				600	678	743	1343	65	665	24	24	28
				800	878	963	1763	85	885	26	26	31
				1000	1078	1183	2183	105	1105	28	28	33
				1200	1278	1403	2603	125	1325	31	31	35

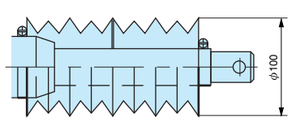
Note: Mechanical Stroke has a room for 3 ~ 8mm at each stroke end against XA dimensions.

OPTION

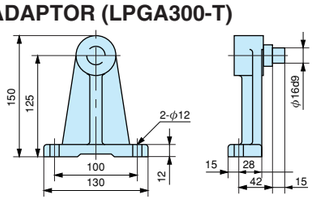
STROKE ADJUSTING LS



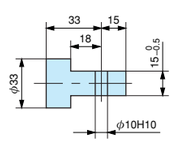
BELLOWS (-J)



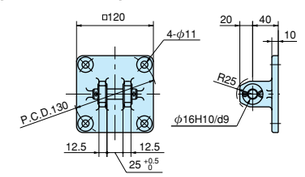
TRUNNION MOUNTING ADAPTOR (LPGA300-T)



I TYPE END FITTING (LPGA300-I)



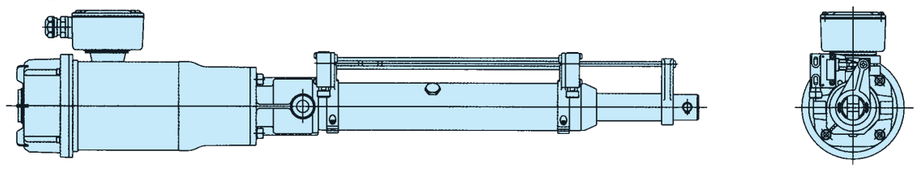
CLEVIS MOUNTING ADAPTOR (LPTB500-C)



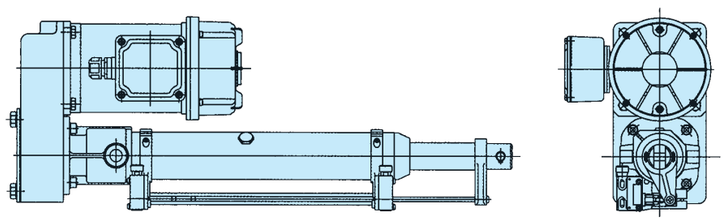
ADJUSTMENT FOR EXTERNAL LS AND VARIATIONS OF INSTALLATION

1. STANDARD INSTALLATION

Straight



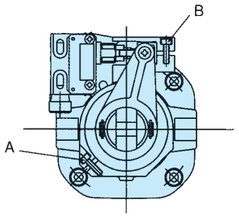
Parallel



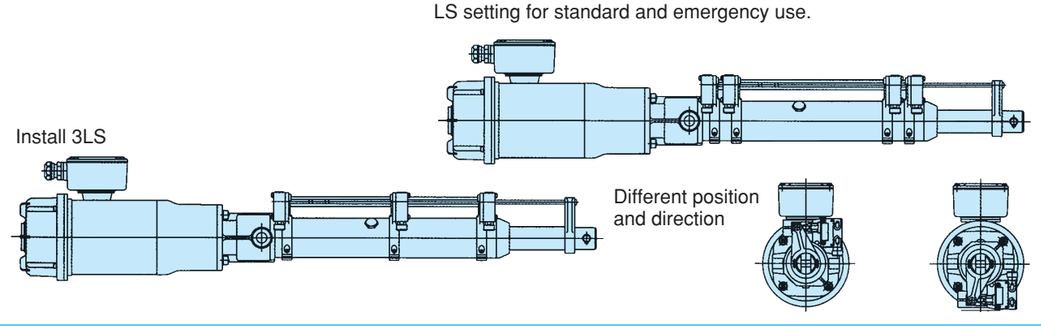
2. ADJUSTMENT METHOD

G series Power Cylinder has a room from 3 to 8 mm at both stroke end as mechanical stroke. However it should be used within XA dimensions. Please adjust the limit switches to operate within XA dimensions. If you operate over XA dimensions, The LS striker will come off from LS guide rail. When you adjust limit switches, please adjust and fix each limit switch to avoid lag of relative position between Power Cylinder body and LS guide rail.

1. Loosen set screw for LS flange (A) and LS guide rail (B).
2. Slide a flange to its required position.
3. Tighten the set screw for LS guide rail (B) first.
4. Tighten the set screw for LS flange (A) without twist between LS guide rail and LS rod.



3. VARIATION OF INSTALLATION



4. INSTALLATION OF EXTERNAL LS

- Tsubaki has an installation manual for changing direction and quantity of LS. Please consult Tsubaki.
- The direction of LS installation is free. Do not allow dust or mud on the LS guide rail for smooth operation of LS striker.

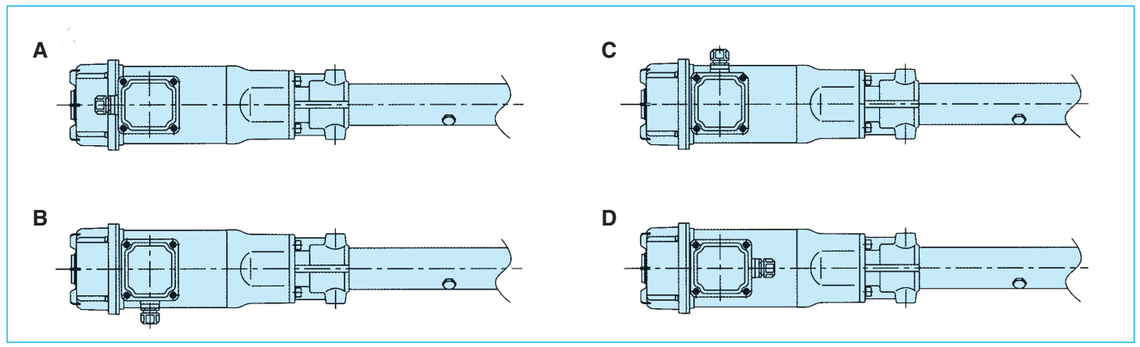
VARIATION OF DIRECTION AND POSITION OF MOTOR TERMINAL BOX

DIRECTION OF MOTOR TERMINAL BOX

Direction of the motor terminal box can installed as one of the four (4) directions shown below.
It can be easily changed by the user.

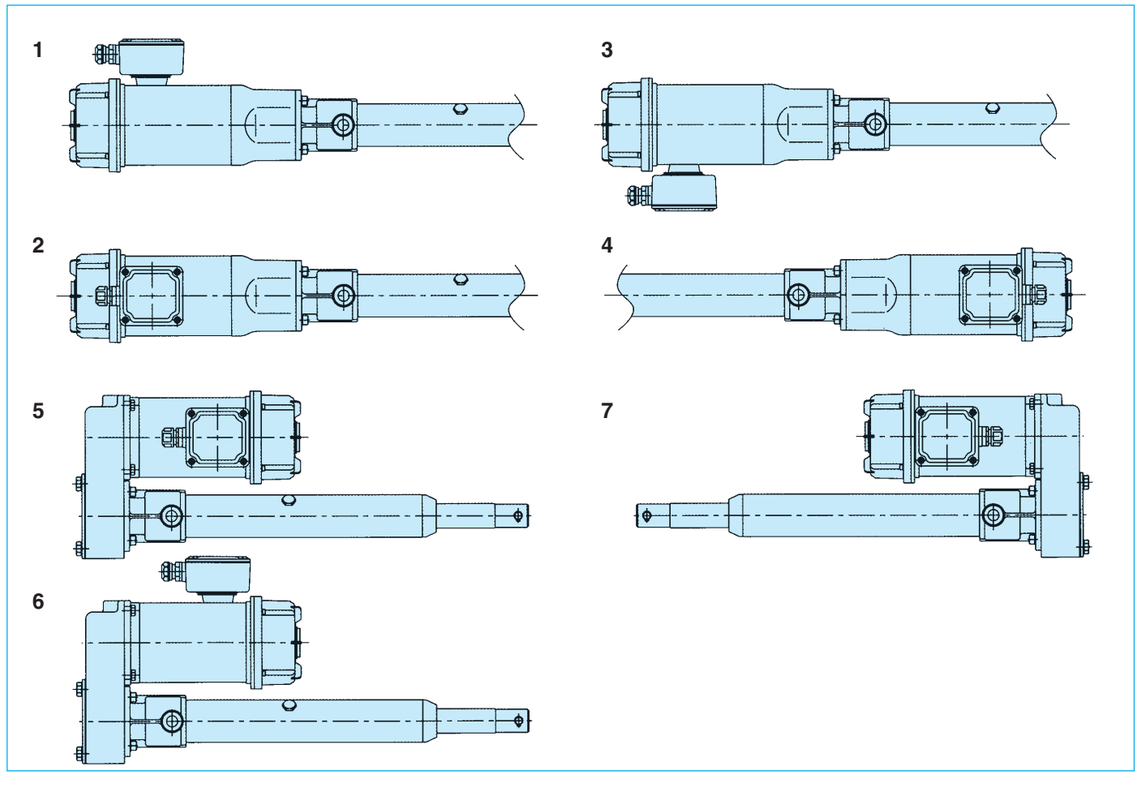
1. Remove the lid of the terminal box.
2. Remove the 2 screws tightening the terminal.
3. Lift the terminal without detaching the wiring to the motor and brake. Then take off the 4 screws fixing the terminal box.
4. Rotate the terminal box for the required direction and fix.
5. Install terminal.
6. Wire the cable from the power source and replace the lid on the terminal box.

When you fix the terminal box, please check that the rubber packing is inserted correctly and firmly tighten the screw.



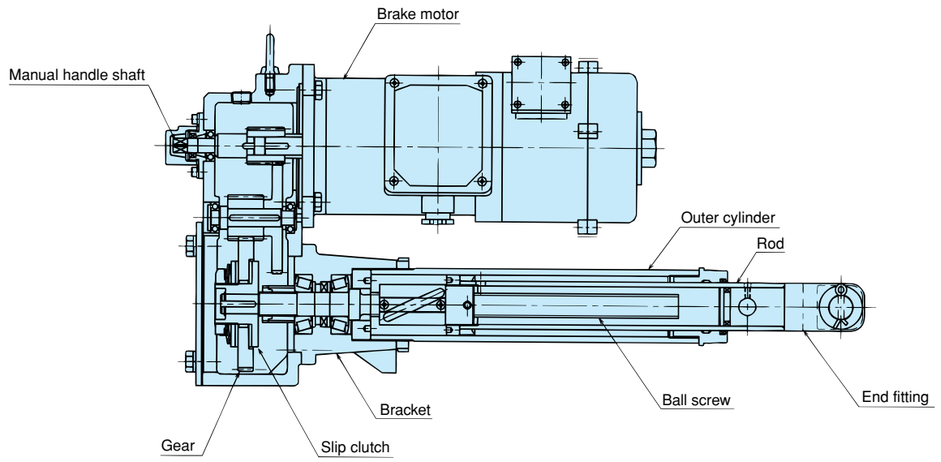
POSITION OF MOTOR TERMINAL BOX

Position of the motor terminal box can be rotated at 90 degrees intervals as shown below.
However, please do not perform this yourself. Please inform Tsubaki of the desired position when ordering.

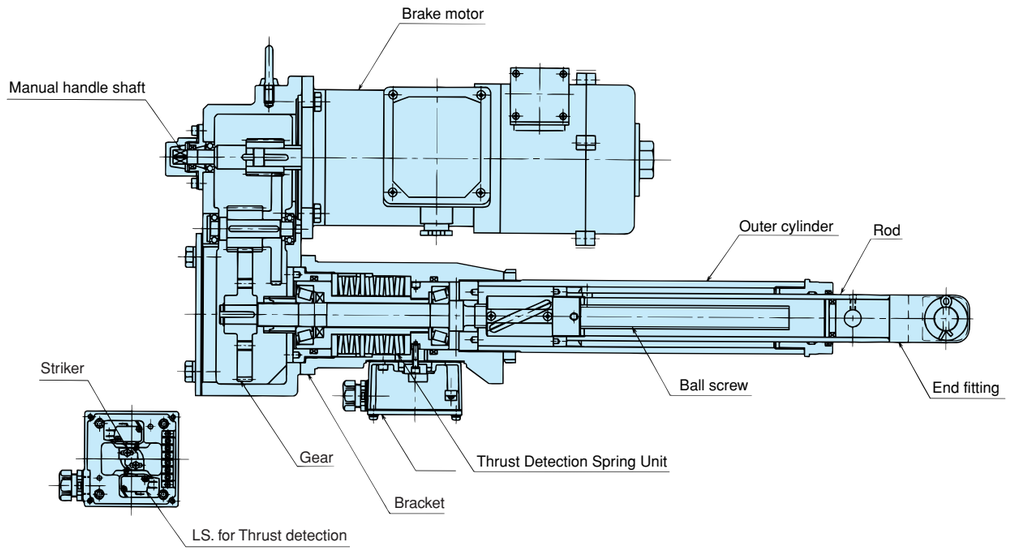


T Series TB type, TC type

TB type (Built-in Slip Clutch)



TC type (Built-in Thrust Detection System)



MOTOR ———— Brake motor, spring close type for outdoor use.
GEAR BOX ——— Optional remote control devices can be fitted. The manual handle shaft is at the end of the gear box.
CYLINDER ——— Ball screw and nut
LS. rod can be fitted for stroke adjustment. For outdoor use.
TB type ———— A slip type clutch is built in as safety device against overload. Suitable for remote control.
TC type ———— A thrust detection spring unit is built in as a safety device for overloading and press contact stopping.

SPECIFICATIONS

TB and TC type have the same basic function (Thrust, Speed and Stroke) and have the following features for thrust limiting mechanism.

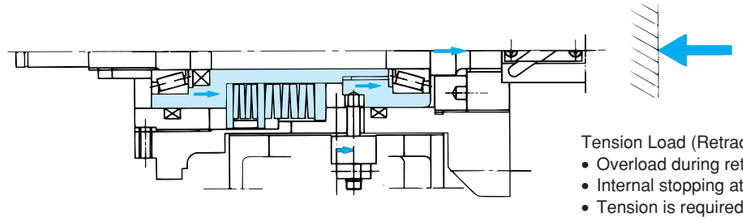
- **TB type:** Slip clutch type (economical)

  An internal slip clutch is built-in as an overload protection device.
  The slip clutch is activated when the thrust load exceeds the preset level.
  The special friction facing provides smooth operation when overloading or overrunning at the stroke end.
  *Tsubaki Shock Relay is recommended when the electrical signal for overloading is required for TB type.

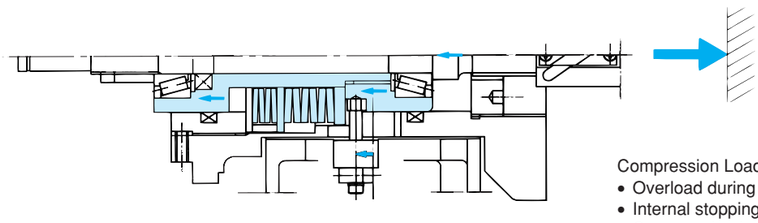
- **TC type:** Thrust detection unit type

  An internal thrust detection system consisting of two types of disk spring with different spring rate and cam operated limit switches provides the electrical signal to stop the motor when thrust load exceeds the preset level.
  (For thrust rating 6 tons and over, only one type of spring is used)
  This unique system is suitable for the following even for high-speed operation.
  1) Press (or pull) stopping
  2) Internal stopping at the mechanical stroke end
  3) Electrical signal is required when overloading
  4) In case overload acts to the POWER CYLINDER when stopping (Internal springs absorb the shock load)

TC TYPE THRUST DETECTION SYSTEM



Tension Load (Retraction)
- Overload during retracting
- Internal stopping at the backward stroke end
- Tension is required after stopping



Compression Load (Extension)
- Overload during extension
- Internal stopping at the forward stroke end
- Compression is required after stopping

INSTRUCTIONS

1. When using a rotary encoder or potentiometer.
   LPTC type Power Cylinder uses a spring unit. Therefore, electrical signal of rotary encoder or potentiometer will have some lag due to bending of spring unit when the spring unit is operating. LPTB type Power Cylinder can use rotary encoder or potentiometer without any lag when the slip clutch is operating. LPTC type Power Cylinder can use them when the spring unit does not operate.
2. Overload working during Power Cylinder stopping.
   LPTC type Power Cylinder cannot be used if the rod has to keep the same position when stopping.
3. When you use LPTC type Power Cylinder for press/pull stopping, the equipment strength required must be more than 250% against the rated thrust of the Power Cylinder.

SPECIFICATIONS

STANDARD SPECIFICATIONS

Model			Thrust N	Thrust {kgf}	Speed 50/60Hz (mm/sec.)	Motor (kW)	Stroke (mm)
LPTB LPTC	250	S L M H	2.45k	{250}	12.5/15 25/30 50/60 100/120	0.1 0.1 0.2 0.4	200～600
LPTB LPTC	500	S L M H	4.90k	{500}	12.5/15 25/30 50/60 100/120	0.1 0.2 0.4 0.75	200～800
LPTB LPTC	1000	S L M H	9.80k	{1000}	12.5/15 25/30 50/60 100/120	0.2 0.4 0.75 1.5	200～800 *1000
LPTB LPTC	2000	S L M H	19.6k	{2000}	12.5/15 25/30 50/60 75/90	0.4 0.75 1.5 2.2	200～800 *1000 *1200
LPTB LPTC	4000	S L M H	39.2k	{4000}	9/11 25/30 35/42 60/72	0.75 1.5 2.2 3.7	200～1200 *1500
LPTB LPTC	6000	S L M H	58.8k	{6000}	6.3/7.6 17.5/21 25/30 42/50	0.75 1.5 2.2 3.7	500 1000 *1500
LPTB LPTC	8000	S L M H	78.4k	{8000}	10/12 20/24 30/36 43/52	1.5 2.2 3.7 5.5	500 1000 1500
LPTB LPTC	12000	S L M H	118k	{12000}	10/12 18.5/22 30/36	2.2 3.7 5.5	500 1000 1500
LPTB LPTC	16000	S L M H	157k	{16000}	14.5/17.5 20/24 31/37	3.7 5.5 7.5	500 1000 1500 2000
LPTB LPTC	32000	S L M H	314k	{32000}	10/12 15/18 20/24	5.5 7.5 11	500 1000 1500 2000

Note: 1. Separate power supply for brake is recommended for press (pull) stopping. When using the LPTC-M and LPTC-H, the brake wiring must be separated.
2. Thrust is limited for the stroke of *marked size. Refer to the dimensions table.

Brake

• 0.1 ~ 0.4 kW Motor

- DC Brake
- Separate power supply is available.
- AC 200V is needed for DC Module input

• 0.75 ~ 11 kW motor

- 3 phase AC Brake
- Separate power supply is available
- Same voltage as motor for AC Brake input

MOTOR SPECIFICATIONS

Brake Motor, Enclosed type, Self-cooling type
4P 200V/200V/220V 50/60/60Hz
Insulation class E, 30 min. rating for use (IP54)

Paint: Munsell 5GY6/0.5

Ambient Conditions

Ambient temp.	–15°C ~ 40°C
Humidity	Below 85%
Shock	Below 1G
Altitude	Less than 1000 m
Outdoor use	

MODEL No.

LPT B 1000 L 4 V L P C I J F

- LPT: T Series Power Cylinder
- B: B type or C type
- 1000: Thrust
- L: Speed: S·L·M·H
- 4: Stroke 4: 400mm
- V: Power Source No mark 200/200/220V, 50/60/60Hz; V: 400/400/440V, 50/60/60Hz; X: Other voltage (e.g. 380-415V 50Hz)
- L: L: LS. for stroke adjusting (2pcs.); L3: LS. for stroke adjusting (3pcs.); K_2, K_4: Ls. for positioning
- P: P: Potentiometer; R: Rotary Encoder
- C: C: Clevis Adaptor
- I: No mark: STD. End Fitting; I: I type End Fitting
- J: Bellows
- F: Different position of Motor terminal box/L. S.

Trunnion Mounting Adaptor: Order separately from Power Cylinder

SELECTION PROCEDURE

Application data:

1. Power Cylinder type being considered and method of operation
2. Thrust and inertia load
3. Stroke
4. Speed
5. Frequency of use (times/minute)
6. Period of use (hours/day) and (days/year)
7. Design life (years)
8. Load characteristics
9. Operating conditions – environmental
10. Voltage and frequency of the power source

TYPE SELECTION

- Select the type of cylinder to be used based on the operating environment, load condition and the following selection criteria.

SELECTION CRITERIA: TB and TC Power Cylinders have the same basic features; thrust, speed, stroke, load, and integral motor.

The **TB** type is an economical, light weight, positive displacement linear actuator with slip clutch safety protection. This actuator should be considered when coupled with optional position feedback if position accuracy is critical.

The **TC** type provides thrust detection in tension and compression of the Power Cylinder at 150 ~ 200% of rated load without damage to the Power Cylinder (providing that power source is coupled to thrust detection circuit). The unique thrust detection mechanism employed also provides for moderate shock loading of the unit without damage. This actuator should be considered for applications that may see shock loads, require electronic overload signal, or when press/pull stopping is required. (See Table 1).

Table 1 (For high frequency use of thrust detection unit)

TYPE	LPTC250-LPTC4000			LPTC6000-LPTC32000		
SPEED	S, L	M	H	S, L	M	H
TOTAL STOP CYCLES ($\times 10^4$)	30	10	5	10	3	1

Note: 1. When press (or pull) stopping is being used. It is recommended that you use external wiring for the brake. (If high or medium speeds are being used, the wiring must be made separately).
2. If the values in Table 1 will be exceeded, we recommend that stopping be initiated using external limit switches.
3. When press (or pull) stopping are required, please ensure that the strength of the equipment being used with the power cylinder exceeds 250% of the maximum thrust produced.

MODEL SELECTION

1. Calculate annual running distance.
   Annual Running Distance (km) =
   Actual Load Stroke (m) × *Cycles/Day* ×
   Operating Days/Year
2. Choose a service factor based on the Power Cylinder, load characteristics and the annual running distance of the Power Cylinder.
3. Multiply the thrust and the load service factors.
4. Using the compensated thrust, stroke, speed and number of cycles, select the appropriate model for your application from the standard models.

Table 2 Service Factor

Characteristics of the load	Application	Thrust (kgf) ~LP16000 / LP32000	Annual running distance (km) ~50 km / ~25 km	~100 km / ~50 km	~150 km / ~75 km
Uniform load Low inertia load	Opening/closing for damper, valve, etc.		1.0	1.3	1.5
Medium shock Medium inertia load	Opening/closing for hopper gate Loading/unloading application, lifter, etc.		1.3	1.7	2.0
Heavy shock/with vibration High inertia load	Buffer for belt conveyors Heavily loaded cars, etc.		1.5	2.0	2.3

Note: If the running distance exceeds that listed above. Please consult Tsubaki.

CONFIRMATION OF THE SPECIAL FEATURES

1. Ensure that the frequency of use is kept below the allowable value listed in Table 3. The allowed operating frequency depends on the starting frequency and the work rate and must be within the range specified in the table below. The duty cycle is calculated with the following formula.
2. The accuracy of positioning depends upon the stopping method employed.
3. If multiple driving is required, refer to page 30.
4. If TC Type is specified be sure total press stops do not exceed values shown in Table 1 page 26.

$$\textit{Working time rate ED (\%)} = \frac{\textit{Working Time per cycle}}{\textit{Working Time per cycle + stopping time per cycle}} \times 100\ (\%)$$

Table 3 Allowable Frequency of Operation

Model	LPTB · LPTC									
	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 12000M 16000M 32000L	16000H 32000M	32000H
Number of motor starts (times/min.)	5	5	5	4	4	4	4	3	3	2
Working time rate ED (%)	less than 25%									

Note: The operating frequency is set by the motor temperature limit not the Power Cylinder. Consult factory if number of starts is greater than listed above.

INERTIA LOAD FOR HORIZONTAL APPLICATIONS

Setting load of the overload protection device is from 150% to 200% against rated thrust of cylinder.
When starting with large inertia loads, there is possibility of not smooth operation because over protection device is activated. Refer to Table 4 for the limits. Slow Speed Range Power Cylinders are not limited by inertia.

* The internal thrust detection mechanisms are not user adjustable and may vary ±15%.

Car weight : m
Coefficient of friction : μ
Car running resistance : $F = \mu m \leq$ *Rated Thrust*

Table 4 Allowable car weight, considering inertia

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 load/kg	4300	1500	850	5500	2650	950	10000	3200	2200	12300	8400	7100	31800	26000	16800

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 load/kg × 10^3	73	60	39	106	69	86	271	158	200	274	344	189	368	761	860

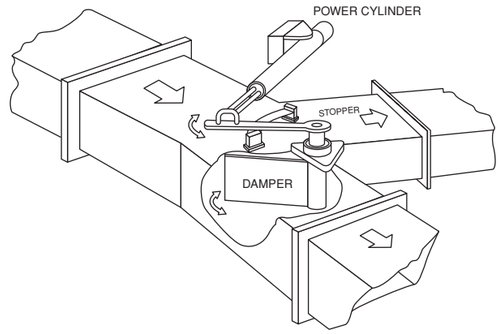
Note: In case of speed "S", it is no problem practically because of slow speed.

SELECTION EXAMPLE

The following is an example of the procedure to be followed when selecting a Power Cylinder.
Application Data is required before selecting an individual Power Cylinder.
Begin the Selection Process by obtaining the information required on page 32.
When data is available – follow the selection procedure shown on pages 34 and 35.

APPLICATION DATA

1. **Type of application:** Damper opening/closing (2 mid-point stops, tension and compression press stopping).
2. **Required Thrust:** 1,300 kgf.
3. **Stroke:** 600 mm (0.6m)
4. **Speed:** 600 mm in about 20 secs (30 mm/sec).
5. **Frequency of use:** 1 cycle/10 mins. (6 cycles/hr.)
6. **Operating time:** 10 hrs/day, 250 days/year, 5 years
7. **Design life:** 5 years
8. **Load characteristics:** Forward and reverse loading, uniform load
9. **Operating conditions:** Outdoors, dusty, temp. range 0°C - 35°C
10. **Power:** 220V, 60Hz-3PH



SELECTION OF POWER CYLINDER

1. **Type Selection:** Press stopping with internal Limit switch.
   The TC type Power Cylinder meets these requirements.
2. **Select the Size of Power Cylinder:**

a) Determine Service Factor: Calculate annual running distance.

$$\frac{2\ \textit{Strokes}}{\textit{Cycle}} \times \frac{0.6\ \textit{Meters}}{\textit{Stroke}} \times \frac{6\ \textit{Cycles}}{\textit{Hour}} \times \frac{10\ \textit{Hours}}{\textit{Day}} \times \frac{250\ \textit{Days}}{\textit{Yr}} = 18\ \textit{km}$$

b) Minimum thrust rating = service factor × required thrust of Power Cylinder
Min. Thrust Rating = 1.3 × 1300 kgf = 1690 kgf

Model Selection : LPTC 2000 L6 K2 J

Two position Limit Switch (mid-point stops) — K2
bellows — J

3. **Confirmation of Choice:** Based on allowed operating frequency and total press stops.
   Operating Frequency
   Starting frequency: $\frac{2\ \text{Times}}{10\ \text{Min.}} < \frac{4\ \text{times}}{\text{Min.}}$

$$\textit{Working time rate} = \left[\left(\frac{600mm \times 2}{30mm/sec} \right) \div (10\ \textit{Min} \times 60\ \textit{Sec/Min}) \right] \times 100\% = \textbf{6.7\% < 25\%}$$

$$\textit{Total Press Stops} = \frac{2\ \textit{Stops}}{\textit{Cycle}} \times \frac{6\ \textit{Cycles}}{\textit{Hour}} \times \frac{10\ \textit{Hours}}{\textit{Day}} \times \frac{250\ \textit{Days}}{\textit{Year}} \times 5\ \textit{Years}$$

$$= \textbf{15} \times \textbf{10}^{\textbf{4}} < \textbf{30} \times \textbf{10}^{\textbf{4}}$$

BRAKE HOLDING POWER

The load holding strength of the brake exceeds the rated thrust of the Power Cylinder so loads can be safely and securely held by the brake. This holding power is generated by the motor brake. While in operation the brake uses spring power and generates holding power that exceeds 150% of the rated torque of the motor.
Caution: Overload of TB Power Cylinder will result in loss of brake – unit may free-fall.

BRAKE STOPPING

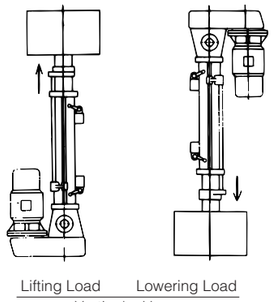
Using either limit switches or push button control, multiple positioning including mid-point, upper and lower point stopping are possible. Stopping accuracy and coasting distance depend upon the load size and drive speed. When accurate positioning is required, it is recommended that either low operating speed be used or that the brake be wired separately from the motor. When setting the limit switches, please consider the over travel of the rod.
(see Table 5)

COASTING AND STOPPING ACCURACY

The following chart provides coasting and stopping data for the T-Series at full load.
A: **Coasting Distance in mm:**
The amount of stroke traveled between the power shut-off and until the unit completely stops.
B: **Stopping Accuracy in mm:**
The position deviation for repeated stops.

Table 5 Coasting and Stopping Accuracy Table

Model			Standard Braking (Pre-wiring)				Brake wired separately			
			Lifting		Lowering		Lifting		Lowering	
			A	B	A	B	A	B	A	B
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	15.5	±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	8.5	±1.8	12.0	±2.8	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	5.7	±1.2	8.2	±1.9	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	4.1	±0.9	5.6	±1.3	2.6	±0.5	4.0	±0.9
		H	6.1	±1.3	11.0	±3.0	3.9	±0.7	8.6	±2.4
LPTB LPTC	32000	L	2.1	±0.5	2.8	±0.7	1.3	±0.3	2.0	±0.4
		M	3.1	±0.7	5.4	±1.4	2.0	±0.4	4.2	±1.1
		H	4.3	±0.9	6.1	±1.4	2.7	±0.5	4.4	±1.0



Lifting Load — Vertical Use
Lowering Load

Note: In actual operation, rod anti-rotation provision is required.

INSTALLATION

MULTIPLE DRIVING

As illustrated in Diagram 1, multiple driving is possible to distribute load in lifting and lowering operations.
This arrangement results in low speed variation. When making your selection, please use the formula to the below.

$$\textit{Thrust per cylinder} = \frac{\textit{Required thrust (kgf)}}{\textit{Number of Power Cylinders} \times \textit{Multi-Factor}}$$

Table 6 Multi-Factor

Power Cylinders being used (units)	2	3	4	5	6
Load Sharing Factor	0.8	0.7	0.6	0.55	0.5

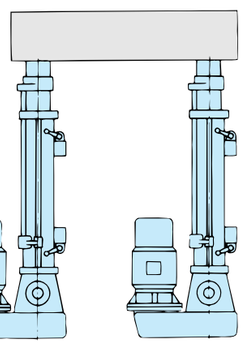
ACCURACY IN MULTIPLE DRIVING

Speed change due to load variation is up to 5% for each Power Cylinder. The possible stopping inaccuracies are listed in Table 5, page 29.

CONTROL

When starting, connect power to all motors at the same time.
When stopping, use the limit switches attached to each device.
Avoid using one limit switch to control all of the devices as error will accumulate. (see Dia. 1)

Diagram 1

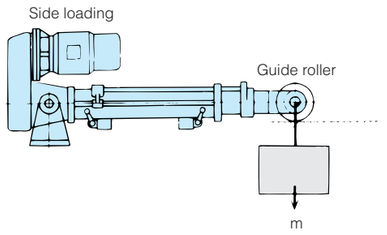


SIDE AND ECCENTRIC LOADING

Do not apply eccentric or side loading to the cylinder.

When eccentric or side loading is present, install the device to insure that no direct moment is applied to the cylinder rod.

Diagram 2

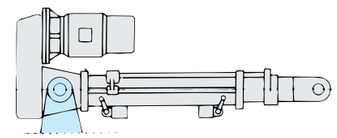


INSTALLATION POSITION

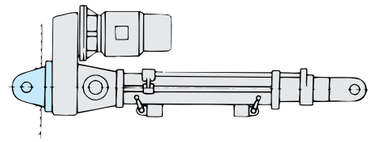
Power Cylinders may be installed in any position

INSTALLATION METHOD: Use a trunnion or clevis mount when installing. Install with either a male (I) or female (U) style end fitting.

Trunnion mount



Clevis mount



Refer to the available options listed on pages 51.

MANUAL CONTROL

To manually adjust the stroke, **remove the load from the actuator**, release the brake of the brake motor then turn the shaft of the motor pinion on the gear box with a wrench or a socket wrench.
WARNING: Remove any load from the actuator rod before releasing the brake.

ROD ANTI ROTATION

- Accompanying the thrust of the actuator rod there is a reaction torque. Generally, connection to the driven load prevents rotation.
- If the actuator rod end piece is required to rotate freely or if the actuator rod is used to drive a rolling car or to pull a load with a wire rope or chain please contact Tsubaki.

SIDE LOADS ON THE ROD

- Install the device so that bending moments are not applied to the actuator rod. Permanent damage to the Power Cylinder may result.

SETTING THE EXTERNAL STROKE ADJUSTMENT LIMIT SWITCHES

- Refer to Table 5 page 37, then set the limit switches based on the expected coasting.
- When the full nominal stroke is to be used, set the limit switches so that stopping occurs within the XA dimension limit taking in to consideration coasting (XA dimension see pages 47-50).
- When multiple cylinders are to be used for driving, use limit switches on each cylinder to control the upper and lower stroke limits.

MAINTENANCE

BALL SCREW LUBRICANT REPLACEMENT

Grease must be applied to ball screw. Grease can be injected through the grease port of the cylinder after extending the actuator rod to the forward stroke end.

Recommended Grease

Ball Screw	SHELL	SHELL ALVANIA EP No. 2
	MOBIL	MOBILUX EP No. 2

Lubrication Cycle for Ball Screw

Frequency of starts/day	Lubrication cycle
500~1000	3 to 6 months
100~500	6 to 12 months
10~100	12 to 18 months

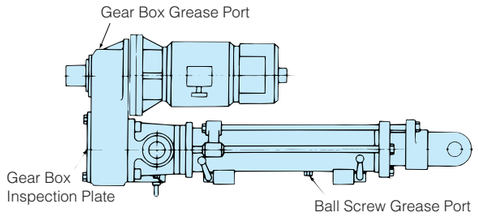
GEAR BOX LUBRICATION

The gears and bearing of the speed reducer are lubricated with grease inside the casing.
It is unnecessary to apply lubricant more than once a year. If the power cylinder is operated constantly or left unused for long periods of time, the grease condition should be checked.

Recommended Grease

Gear Box	SHELL	SHELL ALVANIA EP No. 1
	MOBIL	MOBILUX EP No. 1

Inspection points - Diagram 3

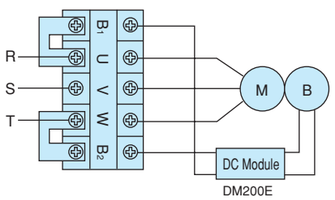


WIRING

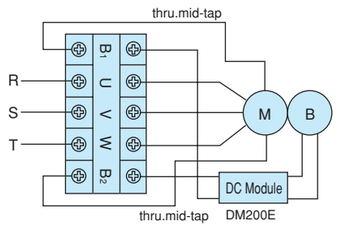
BRAKE MOTOR WIRING (Pre-wiring)

SBH type Brake motor 0.1 kW, 0.2 kW, 0.4 kW

For 200V Class

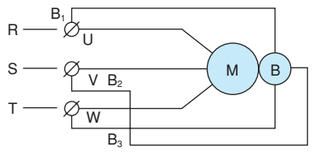


For 400V Class



NB type Brake motor 0.75 kW~3.7 kW

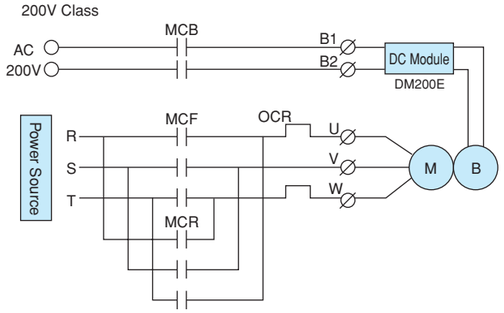
5.5 kW and above motor with 9 lead wires.
For Brake: B_1, B_2 and B_3
For Motor: U, V, W, Z, X and Y
Brake lead wires are connected with U, V, W respectively.



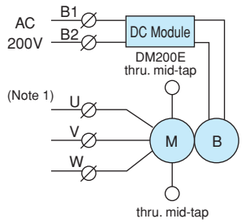
Separate the lead wires of Brake from terminal for quick braking circuit.

Separate brake power supply

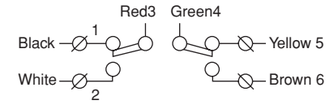
200V Class



400V Class

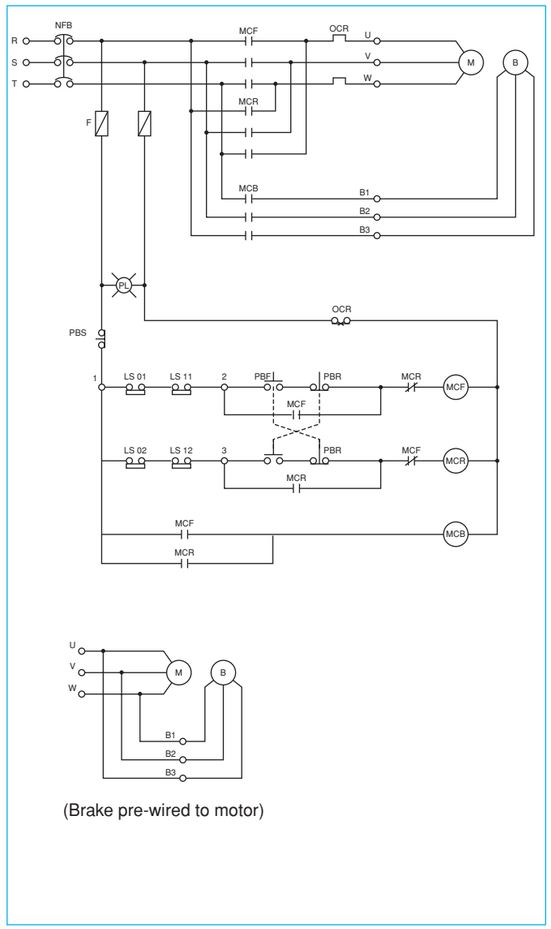


LIMIT SWITCHES SPECIFICATIONS

	Stroke adjustment Limit Switch (External)	Thrust detection Limit Switch	
Power Cylinder	All Sizes	LPTC 250 ~ LPTC 32000	
Limit Switch	WLCA 2 (OMRON)	V-165-1AR5 (OMRON)	
Current	AC 250V 10A (cos ϕ = 0.4)	AC 250V 10A (cos ϕ = 0.4)	
Contact configuration		Compression-Forward	Tension-Reverse
			
Connection	SCS-10B (ϕ8.5 ~ ϕ10.5) PF1/2	SCL-14A (ϕ10.5 ~ ϕ12.5) PF1/2	

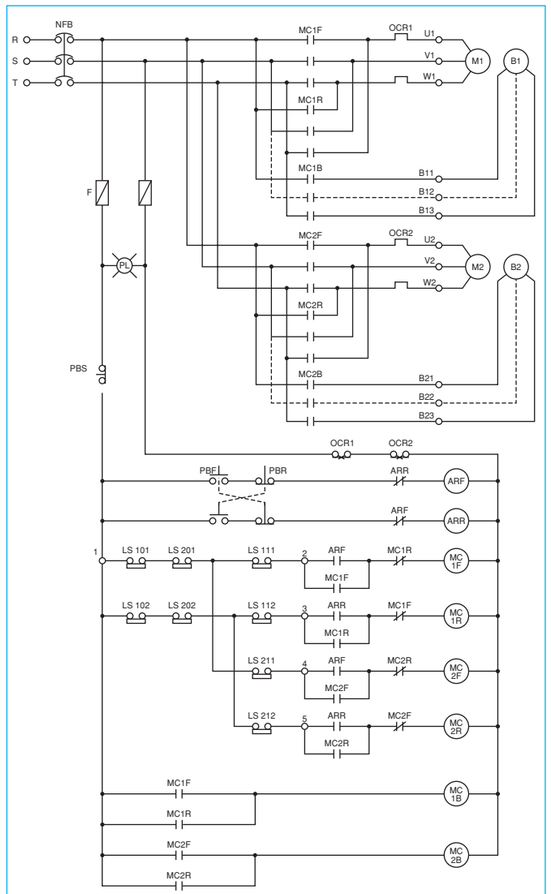
REFERENCE CIRCUITS (For the motor 0.75kw and bigger)

• SINGLE ACTION CIRCUITS (Separate brake power supply)



(Brake pre-wired to motor)

• TWO MACHINE MULTIPLE DRIVE CIRCUIT (Separate brake power supply)



Note: Please refer to the page 26 for the motor 0.4kw and smaller.

POSITION CONTROL

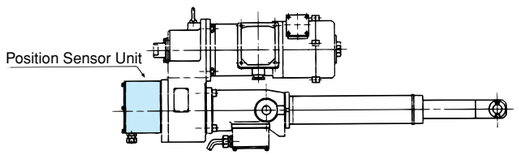
POSITION SENSOR UNIT

If position sensing is required, any or all of the following three built-in units may be used only with trunnion mount.

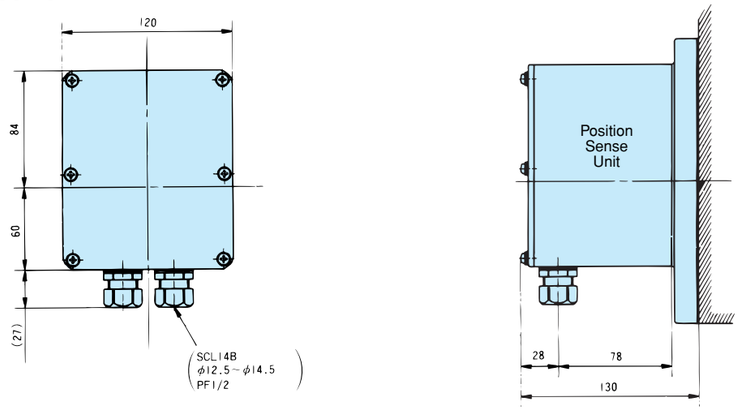
1. Internal position sensor limit switch (2 or 4 circuit)
2. Potentiometer
3. Rotary encoder

NOTE: Clevis adapter can not be attached when a Position Sensor Unit is used

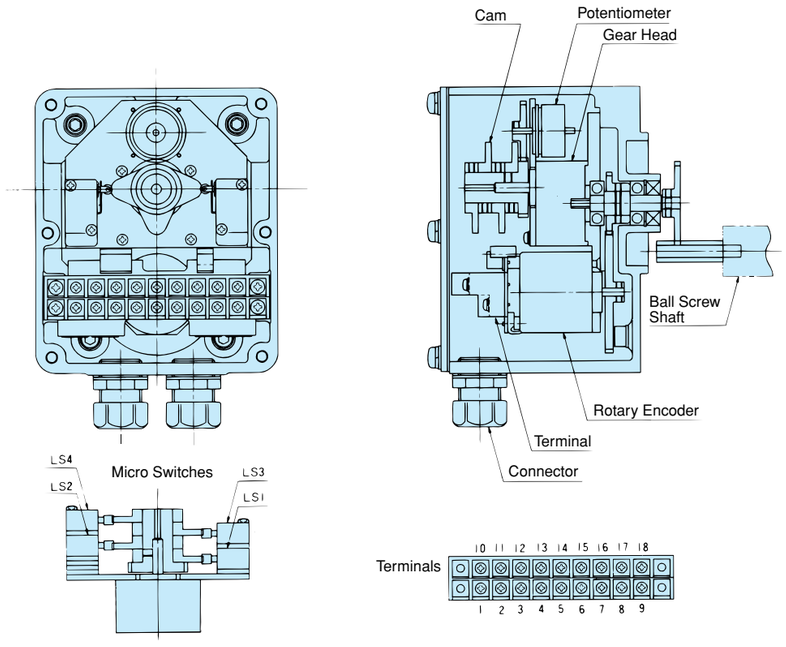
POSITION SENSOR UNIT



POSITION SENSOR UNIT



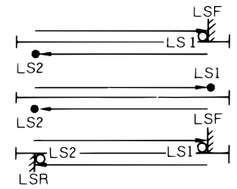
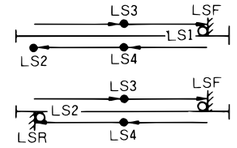
INTERNAL CONSTRUCTION OF POSITION SENSOR UNIT



LIMIT SWITCHES

- Two limit switches - K2
- Four limit switches - K4

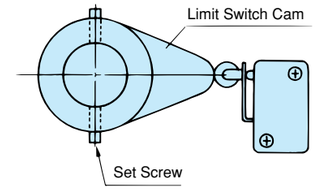
Operating examples of Limit Switch application

K2		External press stop, position sensing (extension) Fixed position stopping (retraction) Fixed position stopping at both ends Press stopping at both ends, position sensing
K4		Fixed mid-position stopping, external stopping, position sensing (extension) Fixed position stopping (retraction) Fixed mid-position stopping, external stopping, position sensing both directions

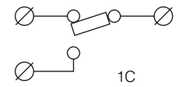
Press stop
Fixed Position Stopping
Position Sensing

LIMIT SWITCH SET-UP

To adjust the working position of the power cylinder, adjust the cam that controls the limit switch. Adjust it by loosening the two set screws shown in the diagram, and rotate to desired limit setting.
Tighten set screws.



INTERNAL POSITION SENSOR LIMIT SWITCH

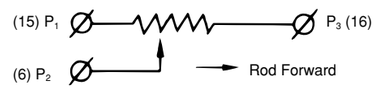
Type	P2VW-5L2A-1M (OMRON) or equivalent
Capacity	AC 250V 4A (cos ϕ =0.4)
Contact configuration	 1C

POTENTIOMETER

If the actuator rod is rotated before installation, the stroke position will be out of phase with the potentiometer.
After installation, adjust the phase correctly. The stroke may be adjusted with the external limit switches.
CAUTION: Overtravel limit switches required.

POTENTIOMETER SPECIFICATIONS

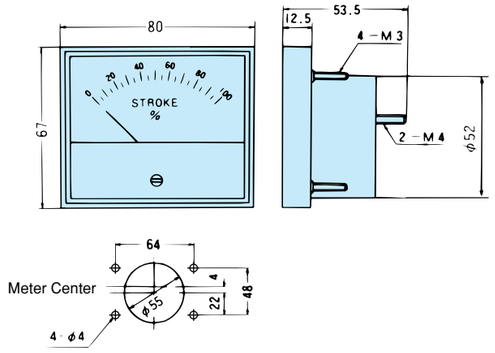
Type	CP-30 or equivalent
Maker	Sakae
Total resistance	1 K OHM
Power rating	0.75 W
Insulation rating	AC 1000V (1 min.)
Effective electrical angle	355°
Effective angle of rotation	360° (Infinite)



The numbers in brackets indicate the terminals.

CONTROL OPTIONS

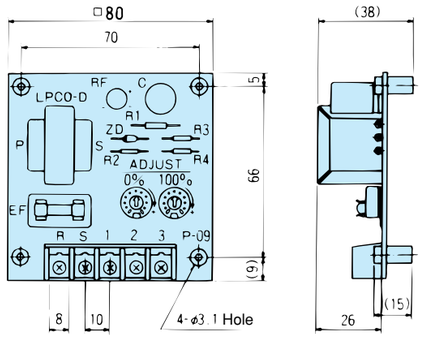
• Stroke indication meter



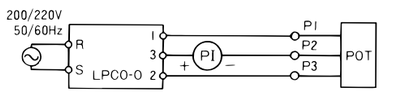
Model number	RM-80B (DC 100μA)
External Apparance	Black plastic
Scale Specification	Full stroke indicated by 100%

To adjust the meter, use the potentiometers on the printed circuit board. If you require the meter to read 100% at minimum stroke, reverse wires 1 and 2.

CIRCUIT BOARD



CIRCUIT BOARD



P1: Stroke Indication Meter Potentiometer

ROTARY ENCODER

The rotary encoder provides an interface to programmable controllers. It may be used in combination with an AC motor speed controller such as an inverter or servo controller to provide accurate positioning. All Power Cylinders move 1mm/pulse.

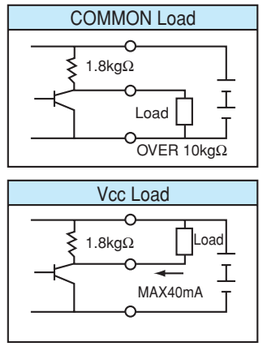
ENCODER SPECIFICATIONS

Output method	Incremental
Output pulse number	60 Pulse/Rev
Output wave form	90° phase difference
Output voltage	12V Power Source: Above 10V 5V Power Source: Above 4V
Output resistance	Above 10KΩ
Signal accuracy	± 1/15P ±1/4P
Power source	DC 4.75V ~ 13.2V 70mA
Frequency response	20 kHz
Light source	L.E.D.
Light receiver	Phototransister
Type	SP-405Z or equivalent
Maker	Ono

ENVIRONMENTAL CONDITIONS

Operating temperature	0°C ~ 50°C
Storage temperature	–20°C ~ +80°C
Humidity	85% (40°C 8hrs.)
Vibration	5G (X, Y, Z direction 2 hrs.)
Shock	50G (X, Y, Z direction 3 times,10G on the shaft)

Output Circuit



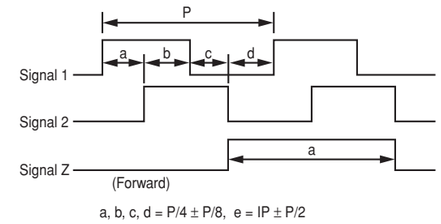
Allowable Loss P MAX = 250mW

Low Level Output Current lot. MAX = 40mA

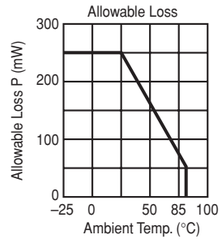
Output Connection

Signal 1	Signal 2	Signal Z	+5V	OV	Case
Blue (3)	White (4)	Orange (5)	Red (13)	Black (12)	Mesh (14)

Output Wave

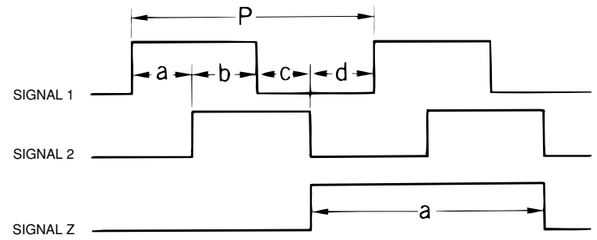


a, b, c, d = P/4 ± P/8, e = IP ± P/2



1. ( ) shows Terminal No.
2. Set the origin point by limit switch.
3. Use load below allowable loss P.

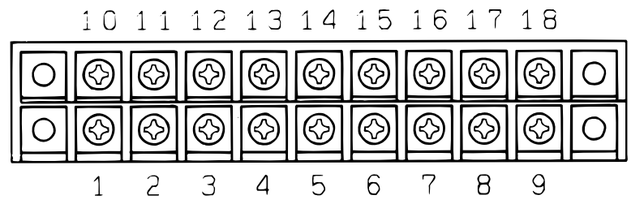
OUTPUT WAVE FORMS



INTERNAL WIRING OF THE POSITION LIMIT SWITCH UNIT

Use the internal terminal strip for the position sense limit switch, potentiometer and rotary encoder wiring.
Use shielded wire for the rotary encoder signals.

Diagram 4



Position Limit Switch (Internal)

LS1		LS2		LS3		LS4		COM
a1	b1	a2	b2	a3	b3	a4	b4	C
8	9	1	2	17	18	10	11	7

Potentiometer

P1	P2	P3
15	6	16

Rotary Encoder

ϕV	+5V	Case	Sig 1	Sig 2	Sig Z
12	13	14	3	4	5

POWER CYLINDER STROKE CONTROL

There are a variety of methods by which stroke control may be achieved. The position accuracy of the Power Cylinder varies depending upon stroke, speed, load size, load inertia, direction (vertical, inclined, etc.) and brake wiring. Further, some limitations may result due to the operating conditions. The following is a general guide to the types of control available.

LIMIT SWITCHES

Two types of limit switches are available:
External - stroke adjustment for upper and lower position setting.
Internal - Built-in switches control mid-point position setting.
Combination of both external and internal may be selected by using K4 switch shown on page 42.
Accuracy will improve as speed is lowered.

PRESS STOPPING

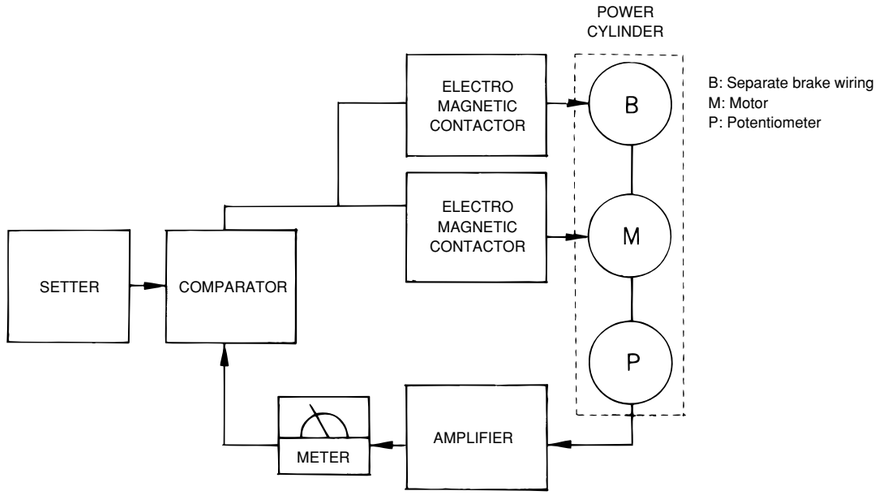
(TC type using thrust sensing limit switches)
When using press or pull stopping, mechanical stopping is employed at both ends with a thrust sensing limit switch to control the drive. This mechanical stopping allows good positioning accuracy.

POTENTIOMETER CONTROL

Potentiometer control is used when free adjustment of the stroke is required. In general, as the speed is reduced, accuracy of operation will improve. To protect against stroke overrun, it is recommended that stroke adjustment limit switches be used.

CAUTION: Overtravel limit switches required.

Potentiometer Control

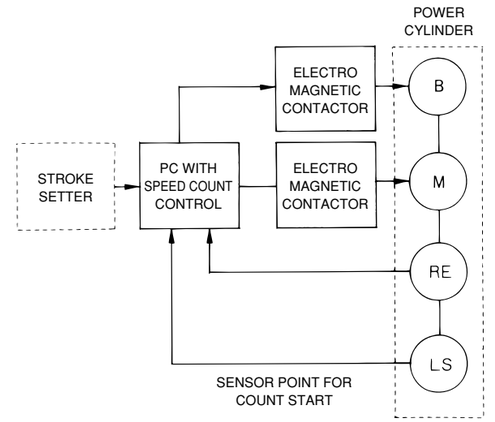


ROTARY ENCODER CONTROL (ABSOLUTE CONTROL) ONE DIRECTION

Use the rotary encoder with a programmable controller, with an attached counter. A limit switch is used to initiate counting. An externally installed adjustable limit switch is recommended.

Direct control method
To provide absolute position control, external limit switches may be used to trigger the counter/control circuitry in the programmable controller.

B: Separately wired brake
M: Motor
RE: Rotary Encoder
LS: External Stroke Adjustment Limit Switch

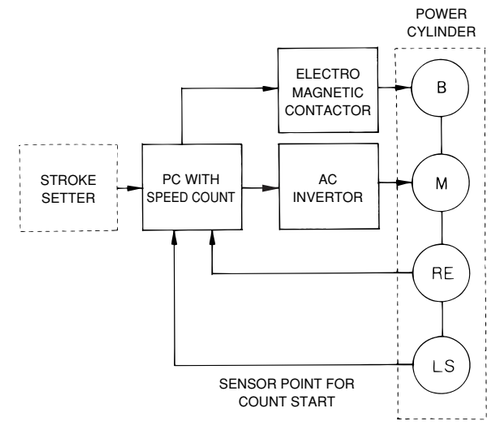


This system switches the motor off when the signal is received from the limit switch. The rod speed then decreases as it coasts towards the final stop position. When the stop position is reached the brake is applied as the rod speed decreases providing accurate positioning.
CAUTION: Overtravel limit switches required.

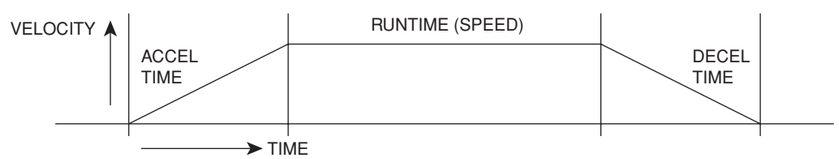
MOTOR SPEED CONTROL

Absolute position control with acceleration and deceleration can be provided by using an A.C. inverter coupled to the programmable controller to control motor speed.

B: Separately wired brake
M: Motor
RE: Rotary Encoder
LS: External Stroke Adjustment Limit Switch



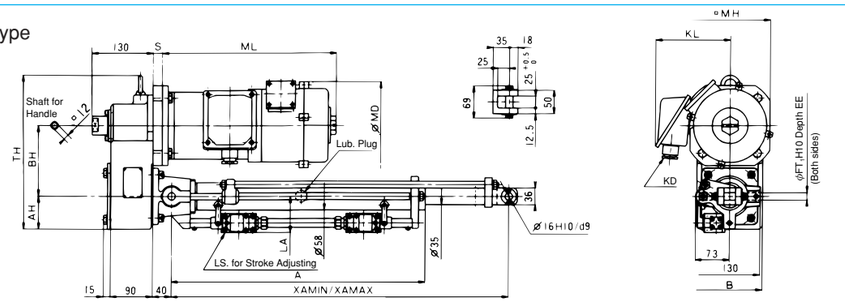
CAUTION: Overtravel limit switches required.
No matter what control method is used, where high inertia loads are to be driven horizontally or lifted or lowered vertically it is required that provision be made for control of the acceleration and deceleration rates.
Failure to provide system control may result in damage to equipment or personal safety.



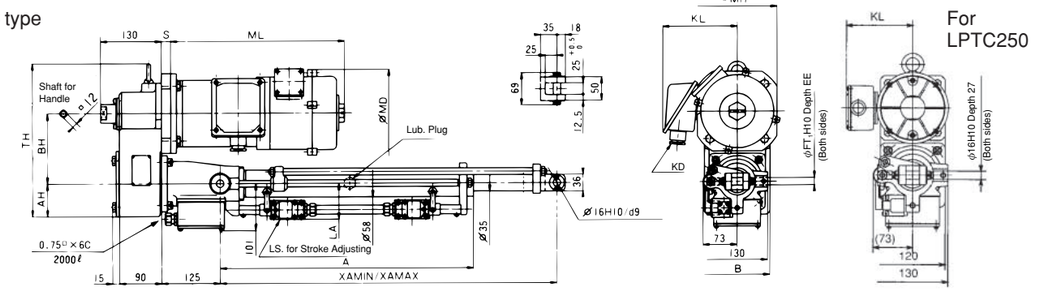
SPECIFICATIONS/DIMENSIONS

LPT $^{B}_{C}$ 250 to 4000

LPTB type



LPTC type



For LPTC250

DIMENSIONS

Size	Speed mm/sec. 50/60Hz	Motor kw	Length B_1	Length B_2	Length C	Length F	Length S	Height AH	Height BH	Height TH	Height LB	Width AB	Width BB	Width TB	Cylinder Q	Cylinder R
LPT250S	12.5/15	0.1	90	40 (125)	15	130	—	60	125	287	— (101)	120	73	130	35	58
L	25/30															
M	50/60	0.2					—									
H	100/120	0.4														
LPT500S	12.5/15	0.1	90	40 (125)	15	130	65	60	125	287	— (101)	130	73	120	35	58
L	25/30	0.2														
M	50/60	0.4					—									
H	100/120	0.75					20	70	150	327				140		
LPT1000S	12.5/15	0.2	90	50 (145)	15	130	65	70	150	327	— (107)	140	—	150	40	70
L	25/30	0.4					—									
M	50/60	0.75					20									
H	100/120	1.5														
LPT2000S	12.5/15	0.4	105	50 (165)	16	145	70	85	165	367	— (110)	170	—	180	50	76
L	25/30	0.75					—									
M	50/60	1.5					20									
H	75/90	2.2														
LPT4000S	9/11	0.75	130	50 (195)	18	170	90	100	195	446	— (127)	200	—	220	70	95
L	25/30	1.5					—									
M	35/42	2.2					20									
H	60/72	3.7														

Size	Trunnion FT_1	Trunnion EE	End fitting E	End fitting FT_2	End fitting GT	End fitting HT	End fitting JT	End fitting KT	End fitting L	End fitting LT	Motor KD	Motor KL	Motor MD	Motor ML	Motor MH	Handle SH
LPT250S	16	27	36	16	25	12.5	18	25	35	69	OA-W1613 (ϕ11~13)	123	132	296	120	12
L														231		
M																
H														253		
LPT500S	16	27	36	16	25	12.5	18	25	35	69	A20C	123	132	231	120	12
L																
M														253		
H														374	170	
LPT1000S	20	32	40	20	30	15	20	30	45	82	A20C	123	132	231 253	120	12
L																
M												159	186	374	170	
H												172		439		
LPT2000S	25	37	50	25	35	17.5	25	40	60	99	A20C	123	132	253	120	12
L												159	186	374	170	
M												172		439		
H											A25C	190	230	481	200	
LPT4000S	32	45	70	32	40	20	35	50	75	115	A20C	159 172	186	374 439	170	12
L																
M											A25C	190	230	481	200	
H												201	255	524		

LPT250

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	

LPT500

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	

LPT1000

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	

LPT2000

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	15.7	{1600}	1200	1395	2395	
1200	12.3	{1250}	1400	1615	2815	

LPT4000

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	

Approx. Weight (kg)

Size \ Nominal stroke	200	300	400	500	600
LPTB250S	35	36	37	38	39
LPTC250S	39	40	41	42	43
LPTB250L	31	33	34	35	36
LPTC250L	35	37	38	39	40
LPTB250M	31	33	34	35	36
LPTC250M	35	37	38	39	40
LPTB250H	34	35	36	37	38
LPTC250H	38	39	40	41	42

Size \ Nominal stroke	200	300	400	500	600	800
LPTB500S	35	36	37	38	39	42
LPTC500S	39	40	41	42	43	46
LPTB500L	31	33	34	35	36	39
LPTC500L	35	37	38	39	40	43
LPTB500M	34	35	36	37	38	40
LPTC500M	38	39	40	41	42	44
LPTB500H	52	53	55	56	57	59
LPTC500H	56	57	59	60	61	63

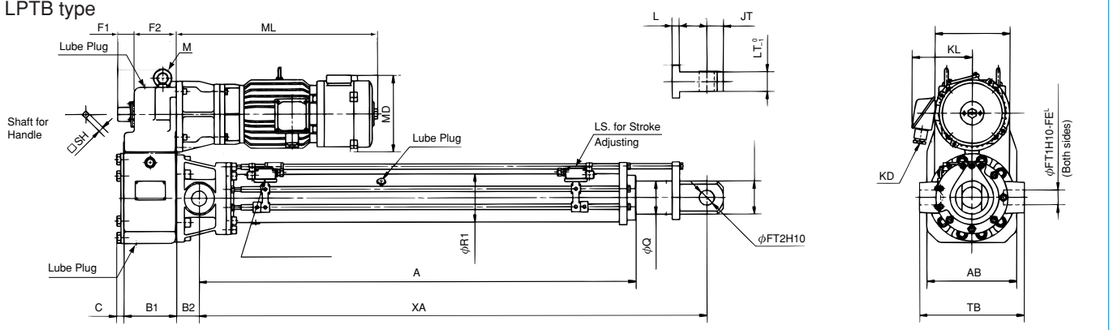
Size \ Nominal stroke	200	300	400	500	600	800	1000
LPTB1000S	42	44	45	47	49	52	56
LPTC1000S	48	50	51	53	55	58	62
LPTB1000L	40	42	44	45	47	51	54
LPTC1000L	46	48	50	51	53	57	60
LPTB1000M	56	58	60	62	63	67	70
LPTC1000M	62	64	66	68	69	73	76
LPTB1000H	62	64	66	67	69	73	76
LPTC1000H	68	70	72	73	75	79	82

Size \ Nominal stroke	200	300	400	500	600	800	1000	1200
LPTB2000S	56	58	60	63	65	69	73	77
LPTC2000S	64	66	68	71	73	77	81	85
LPTB2000L	65	67	69	71	73	77	81	85
LPTC2000L	73	75	77	79	81	85	89	93
LPTB2000M	71	73	75	77	79	83	87	91
LPTC2000M	79	81	83	85	87	91	95	99
LPTB2000H	91	93	95	97	99	103	107	111
LPTC2000H	99	101	103	105	107	111	115	119

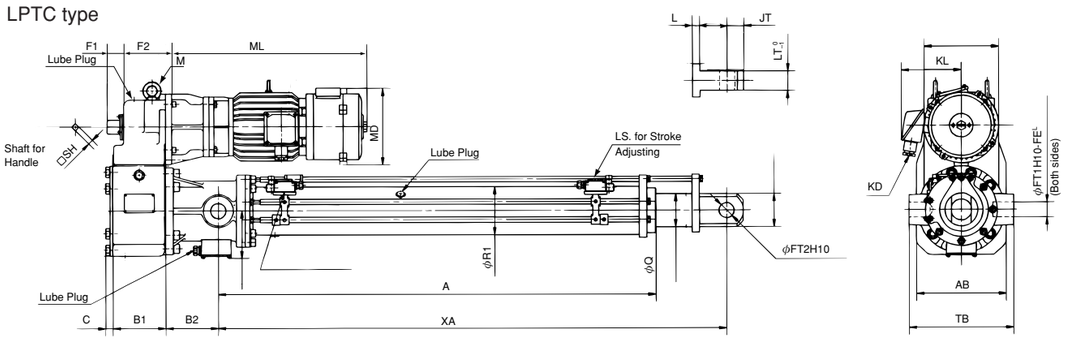
Size \ Nominal stroke	200	300	400	500	600	800	1000	1200	1500
LPTB4000S	100	104	107	111	114	121	128	135	146
LPTC4000S	115	119	122	126	129	136	143	130	161
LPTB4000L	99	102	106	109	112	116	126	133	144
LPTC4000L	114	117	121	124	127	131	141	148	159
LPTB4000M	118	122	126	129	133	140	146	153	164
LPTC4000M	133	137	141	144	148	155	161	168	179
LPTB4000H	137	140	144	147	151	158	165	172	182
LPTC4000H	152	155	159	162	166	173	180	187	197

LPT6000 ~ LPT32000

LPTB type



LPTC type



DIMENSIONS for LPT6000 ~ LPT32000

	Speed 50/60Hz	Motor kw	Length					Height					Width	
			B_1	B_2	C	F_1	F_2	AH	BH	IH	TH	LB	AB	TB
LPT6000S	6.3/7.6	0.75	145	60	20	50	125	120	230	160	450	—	240	260
L	17.5/21	1.5		(155)										
M	25/30	2.2												
H	42/50	3.7												
LPT8000S	10/12	1.5	175	65	25	50	145	150	280	175	540	—	300	310
L	20/24	2.2		(165)										
M	30/36	3.7												
H	43/52	5.5												
LPT12000L	10/12	2.2	175	75	25	50	145	150	280	175	540	—	300	350
M	18.5/22	3.7		(175)										
H	30/36	5.5												
LPT16000L	14.5/17.5	3.7	220	90	32	50	175	180	329	162	609	—	360	400
M	20/24	5.5		(180)										
H	31/37	7.5												
LPT32000L	10/12	5.5	280	130	42	85	190	260	590	275	1025	—	520	540
M	15/18	7.5		(285)										
H	20/24	11												

	Cylinder		Trunnion		End fitting				Motor				Other	
	Q	R	FT_1	EE	FT_2	JT	L	LT	KD	KL	MD	ML	SH	Z
LPT6000S	80	115	40	55	40	40	65	45	A20C	159	186	461	17	16
L									A20C	162	186	436		
M									A25C	190	230	501		
H									A25C	201	255	544		
LPT8000S	95	130	45	60	45	45	70	50	A20C	162	186	573	17	16
L										190	230	481		
M									A25C	201	255	524		
H										229	304	616		
LPT12000L	110	160	50	70	50	55	90	65	A25C	190	230	626	17	16
M										201	255	669		
H										229	304	761		
LPT16000L	130	180	63	75	63	65	100	80	A25C	201	255	669	24	20
M										229	304	761		
H										229		799		
LPT32000L	180	240	90	110	90	90	140	125	A25C	229	304	591	27	30
L												629		
H									A30B	263	324	731		

LPT6000

Nominal stroke	A	XA Min	XA Max
500	855	1010	1510
1000	1355	1560	2560
1500	1955	2210	3710

LPT8000

Nominal stroke	A	XA Min	XA Max
500	900	1065	1565
1000	1400	1615	2615
1500	1900	2165	3665

LPT12000

Nominal stroke	A	XA Min	XA Max
500	950	1135	1635
1000	1450	1685	2685
1500	1950	2235	3735
2000	2450	2785	4785

LPT16000

Nominal stroke	A	XA Min	XA Max
500	1060	1260	1760
1000	1560	1810	2810
1500	2060	2360	3860
2000	2560	2910	4910

LPT32000

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

Approx. Weight (kg)

Size \ Nominal stroke	500	1000	1500
LPTB6000S	153	178	203
LPTC6000S	175	198	225
LPTB6000L	163	188	213
LPTC6000L	185	210	225
LPTB6000M	178	203	228
LPTC6000M	200	223	250
LPTB6000H	193	218	243
LPTC6000H	220	238	265

Size \ Nominal stroke	500	1000	1500
LPTB8000S	236	267	298
LPTC8000S	266	297	328
LPTB8000L	233	263	293
LPTC8000L	263	293	323
LPTB8000M	251	281	312
LPTC8000M	281	311	342
LPTB8000H	286	316	346
LPTC8000H	316	346	376

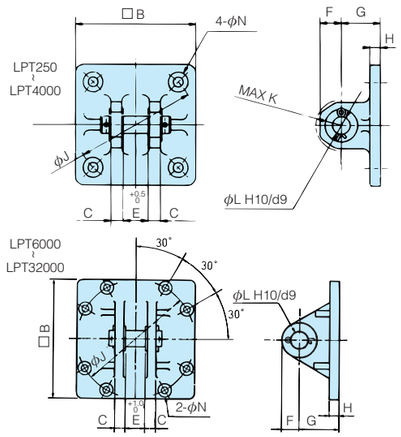
Size \ Nominal stroke	500	1000	1500	2000
LPTB12000L	291	333	375	417
LPTC12000L	330	372	414	456
LPTB12000M	306	348	389	432
LPTC12000M	345	387	428	471
LPTB12000H	340	382	422	455
LPTC12000H	379	421	461	504

Size \ Nominal stroke	500	1000	1500	2000
LPTB16000L	490	546	602	657
LPTC16000L	539	595	651	706
LPTB16000M	525	581	637	693
LPTC16000M	574	630	686	742
LPTB16000H	535	591	647	705
LPTC16000H	584	640	696	754

Size \ Nominal stroke	500	1000	1500	2000
LPTB32000L	1260	1358	1455	1556
LPTC32000L	1350	1448	1545	1646
LPTB32000M	1270	1368	1465	1566
LPTC32000M	1360	1458	1555	1646
LPTB32000H	1308	1406	1503	1604
LPTC32000H	1398	1496	1593	1694

OPTIONS

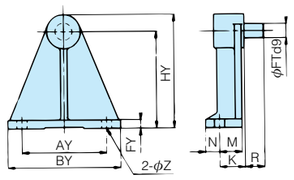
CLEVIS MOUNTING ADAPTOR

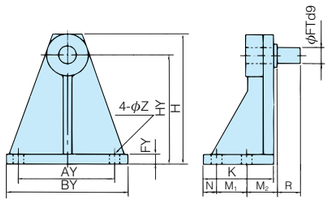


CLEVIS MOUNTING ADAPTOR (mm)

Power Cylinder Size	Size No. of Clevis	B	C	E	F	G	H	J	K max.	L	N
LPT250S L M H LPT500S L M	LPTB500-C	120	12.5	25	20	40	10	130	R25	16	11
LPT500H LPT1000S L M H	LPTB1000-C	140	15	30	25	40	12	140	R31	20	11
LPT2000	LPTB2000-C	170	17.5	35	30	55	15	170	R36	25	14
LPT4000	LPTB4000-C	200	20	40	40	70	20	210	R47	32	18
LPT6000	LPTB6000-C	240	22.5	45	50	85	22	240	—	40	18
8000	LPTB8000-C	300	25	50	55	100	25	300	—	45	18
12000	LPTB12000-C	300	32.5	65	60	120	27	300	—	50	22
16000	LPTB16000-C	360	40	80	70	145	30	360	—	63	22
32000	LPTB32000-C	520	65	125	100	240	40	520	—	90	26

TRUNNION MOUNTING ADAPTOR



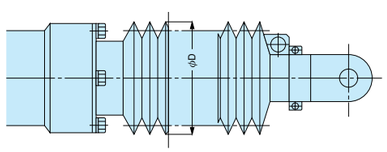


TRUNNION MOUNTING ADAPTOR (mm)

Power Cylinder Size	Size No. of Trunnion	AY	BY	FY	FT	HY	K	M	N	R	Z
LPT250S L M H LPT500S L M	LPTB500-T	130	180	15	16	150	52	40	25	25	18
LPT500H LPT1000S L M H	LPTB1000-T	130	180	15	20	150	45	40	25	30	18
LPT2000S L M H	LPTB2000-T	150	200	15	25	170	45	40	25	35	18
LPT4000S L M H	LPTB4000-T	180	240	20	32	170	55	50	30	45	22

	Trunnion Mounting Adaptor											
	Size No. of Trunnion	AY	BY	FY	H	HY	Z	FT	K	N	M_1 M_2	R
LPT6000	LPTB6000-T	220	280	22	290	240	22	40	160	30	70	55
8000	LPTB8000-T	250	320	25	335	280	27	45	185	35	80	60
12000	LPTB12000-T	280	360	27	360	300	33	50	195	40	85	70
16000	LPTB16000-T	320	400	30	450	380	33	63	210	40	90	75
32000	LPTB32000-T	400	500	35	420	320	45	90	275	50	120	110

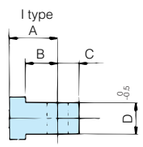
BELLOWS



BELLOWS (mm)

Model No.	D
LPT500 and below	90
LPT1000	90
LPT2000	90
LPT4000	120
LPT6000	135
LPT8000	150
LPT12000	180
LPT16000	210
LPT32000	250

END FITTING



END FITTING (mm)

	A	B	C	D
LPT250 LPT500	35	25	18	25
LPT1000	45	30	20	30
LPT2000	60	40	25	35
LPT4000	75	50	35	40

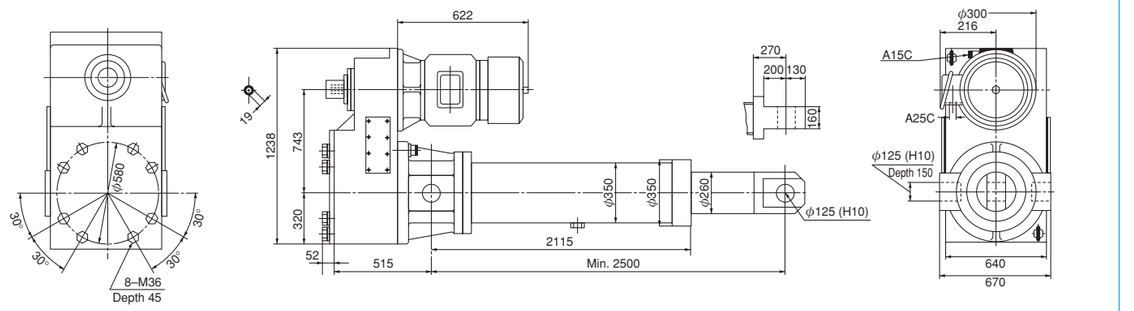
Ultra Heavy Duty Series

AVAILABLE DESIGN RANGE

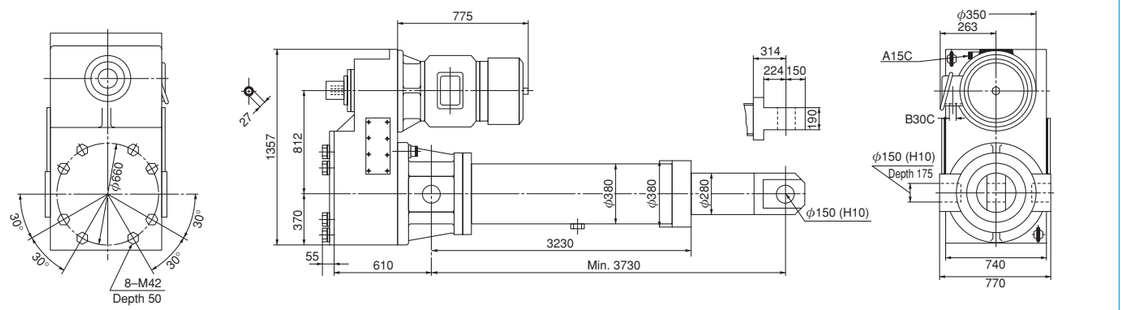
Model		Thrust (kgf)	Speed mm/sec 50/60Hz	Stroke (mm)
LP63000	L M H	63000	7.5/9 10/12 15/18	1000～3000
LP90000	L M	90000	7.5/9 10/12	1000～3000
LP125000	L	125000	7.5/9	1000～3000

Please supply us your requirement including application, duty cycle, actual thrust force, speed, stroke and atmosphere. We will design the best matched Power Cylinder for you.

Example of dimension:
Size: LPT63000L10

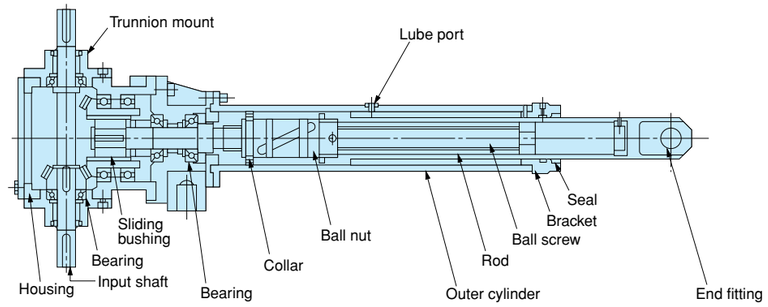


Example of dimension:
Size: LPT90000M20

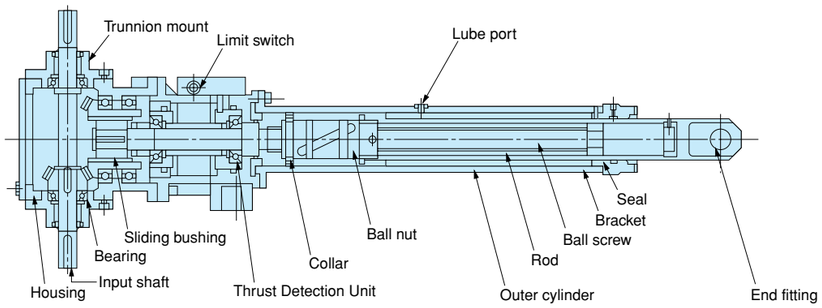


Multi Series

LPTB type



LPTC type



CYLINDER

- Ball screws convert rotary motion into linear motion. Cylinder stroke can be adjusted by an externally mounted limit switch.
- Limit switches for outdoor use are available.
- Bellows are available for additional protection for outdoor use.
- Integral dust seal for cylinder rod is rated for outdoor use.

GEAR BOX

- Heat treated spiral bevel gears for tough dependable performance.
- Cradle movement is also possible with multiple cylinder operation.
- Low Maintenance.
- Leak Proof

LPTB and LPTC FEATURES

TB Type Features

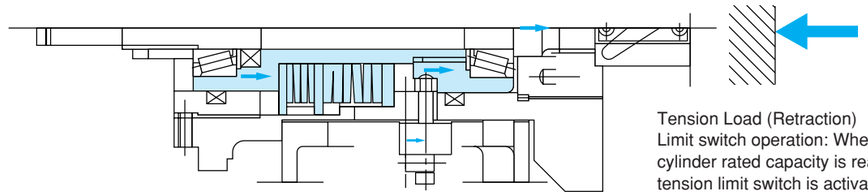
- Economical ball screw drive.
- Light weight and compact.
- During stopping, rod position is kept stationary by driver source brake.

TC Type Features

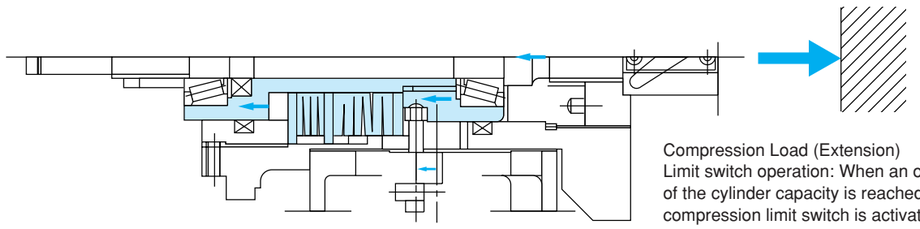
- Press-loaded stopping, stroke and self-stopping (Consult Tsubaki).
- Electrical overload indication (optional).
- When Power Cylinder is stopped, this mechanism allows absorption of shock or overload from driven side.

THRUST LIMITING MECHANISM AVAILABLE – TC TYPE

The TC Power Cylinder utilizes an internal thrust detection system. This unique system is employed to detect thrust loading-providing electrical feed back that allows press/pull stopping. Two types of disk springs with different spring rates are coupled with cam operated limit switches, which result in a system that will allow press stopping during high speed operation in both tension and compression of the Power Cylinder.
(For thrust ratings in excess of 6 tons only one type of spring is used.)



Tension Load (Retraction)
Limit switch operation: When a load of 150%* of the cylinder rated capacity is reached, the internal tension limit switch is activated.



Compression Load (Extension)
Limit switch operation: When an overload of 150%* of the cylinder capacity is reached, the internal compression limit switch is activated.

* The internal thrust detection mechanisms are not user adjustable and may vary ±15%

STANDARD SPECIFICATIONS

Model		LPT500B	LPT1000B	LPT2000B	LPT4000B	LPT6000B	LPT8000B	LPT12000B	LPT16000B	LPT32000B
Thrust	kN	4.90	9.80	19.6	39.2	58.8	78.4	118	157	314
	{kgf}	500	1000	2000	4000	6000	8000	12000	16000	32000
Screw lead	mm	6	8	10	12	12	16	16	24	24
Gear ratio		2	2	2	2	2	2	2	2	2
Overall efficiency	%	85.5	85.5	85.5	85.5	85.5	85.5	85.5	85.5	85.5
No-load idling torque	N·cm	0.74	2.06	5.19	14.7	23.5	108	160	331	624
	{kgf·cm}	0.075	0.21	0.53	1.5	2.4	11	16.3	33.8	63.7
Holding torque	N·m	1.78	4.74	11.9	28.4	42.7	75.9	114	228	455
	{kgf·m}	0.18	0.48	1.21	2.90	4.35	7.74	11.6	23.2	46.4
Allowable input shaft torque (Note 1.)	N·m	11.0	29.3	73.2	176	264	471	353	707	1413
	{kgf·m}	1.12	2.99	7.47	17.9	26.9	48.1	36.1	72.2	144.2
Necessary input torque per basic capacity (Note 2.)	N·m	2.74	7.32	18.3	43.9	65.9	118	177	354	707
	{kgf·m}	0.28	0.75	1.87	4.48	6.73	12.0	18.0	36.1	72.1
Screw movement per input shaft revolution	mm	3	4	5	6	6	8	8	12	12
Maximum input shaft rpm r/min	LPTB	2400	1800	1080	720	500	382.5	255	180	120
	LPTC	1200	900	720	420	300	270	165	120	90
Screw shaft rotational torque at the basic capacity	N·m	5.20	13.9	34.7	83.2	125	222	333	665	1331
	{kgf·m}	0.53	1.41	3.54	8.49	12.7	22.6	34.0	67.9	136
Stroke	mm	200, 300 400, 500 600, 800	200, 300 400, 500 600, 800	200, 300 400, 500 600, 800	200, 300 400, 500 600, 800 1000, 1200	500 1000 1500	500 1000 1500	500 1000 1500 2000	500 1000 1500 2000	500 1000 1500 2000

Note: 1. Allowable torque of input shaft only. (Please confirm when link operation.)
2. This torque are including no-load idling torque.

AMBIENT CONDITIONS

Outdoor Use	Temperature	Shock
	–20°C ~ 80°C	Less Than 3G

Note: 1. These ambient conditions apply only to the main body of the cylinder, the motor or other optional parts may have varying requirements.
2. Bellows are recommended for dirty or dusty surroundings.
3. For use near the sea, modified paint and limit switches are available and recommended for proper protection against corrosion.

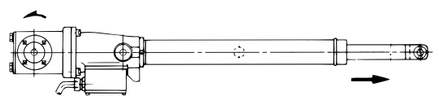
Paint: Munsell 5GY 6/0.5

MODEL NUMBER AND ORDERING EXPLANATION

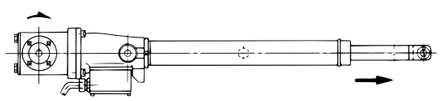
LPT B 1000 B R 6 L I J

- LPT: Power Cylinder Multi-Series
- B: B type (No thrust detector) / C type (Thrust detector)
- 1000: Thrust: 1000kg
- B: Bevel gear type
- R: Relation of input shaft rotation and rod movement (see below)
- 6: Stroke: 6 = 600mm
- L: L = Rod Limit switches
- I: No mark = STD. End fitting / I = Male Clevis End fitting
- J: Bellows

R type



L type



MULTI- SERIES POWER CYLINDER SELECTION

REQUIRED ORDER INFORMATION

1. Type
2. Thrust and inertia load (kgf)
3. Stroke (mm)
4. Speed (mm/sec.)
5. Frequency of starts (times/min.)
6. Operational hours per day and annual running days
7. Load characteristics
8. Ambient conditions

SELECTION PROCEDURE

1. Decide what type of cylinder is needed for the application, LPTB or LPTC.
2. Choose the service factor from the table.
3. Calculate annual running distance using stroke, frequency of use, working hours.
   Annual running distance (km)
   = Stroke under load (m) × Frequency of starts (time/day) × Working days (days/year) × 10^{-3}
4. When load varies during operation, calculate equivalent load as follows;

$$P_M = \frac{P_{Min} + (2 \times P_{Max})}{3}$$

P_M = Equivalent load (kgf)
P_{Min} = Minimum load (kgf)
P_{Max} = Maximum load (kgf)

5. For synchronous operation determine “Multi-Factor” from table.
6. Calculate Equivalent Load
   = Thrust × Service Factor × Multi-Factor
7. Select the type of cylinder from calculated equivalent load and stroke required.
8. Check life of cylinder by comparing annual running distance with load life chart.

Service Factor

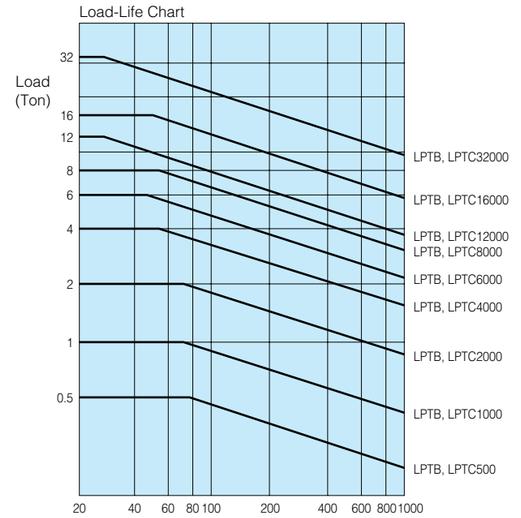
Characteristics	Typical application	SF
Uniform/no shock Low inertia	Opening/Closing damper, valve	1
Light shock Medium inertia	Opening/closing hopper gate Loading, unloading lifter	1.2
Heavy shock, Vibration	Buffer for belt conveyer, Heavily loaded car.	1.5 2

Multi Factor

Number of units	2	3	4	5	6
Multi factor	1.0	1.0	1.0	1.25	1.50

Please consult Tsubaki when more than six units are required.

Load-Life Chart



Life in running distance (km)

Life is based on B10 life of ball screw.

MOTOR SELECTION

Various types of motors may be used, **(a brake is necessary due to the high efficiency of the ball screw)** power-off type brakes are recommended, and the torque of the brake should exceed 150% of the required for the load.

Motor capacity is calculated as follows:

$$kw = \frac{P \times V}{102 \times \eta}$$

kw = Motor capacity (kw)
P = Driven load (kgf)
V = Velocity (m/s)
η = Cylinder efficiency (η = 0.85) (at rated thrust)

Efficiency of other elements, such as gear reducers, must also be taken into consideration.

Note:
1. If motor is larger than required, it will cause damage to the cylinder.
2. The brake must be connected to the power source separately from the motor.

MAINTENANCE

BALL SCREW LUBRICANT REPLACEMENT

Grease must be applied to ball screw. Grease can be injected through the grease port of the cylinder after extending the actuator rod to the forward stroke end.

Recommended Grease

Ball screw	SHELL	SHELL ALVANIA EP No. 2
	MOBIL	MOBILUX EP No. 2

Lubrication Cycle for Ball Screw

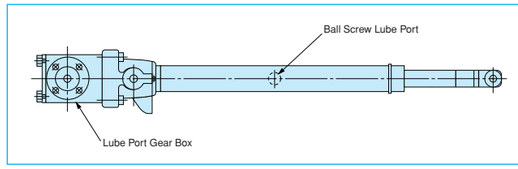
Frequency of starts/day	Lubrication Cycle
500~1000	3 to 6 months
100~500	6 to 12 months
10~100	12 to 18 months

GEAR BOX LUBRICATION

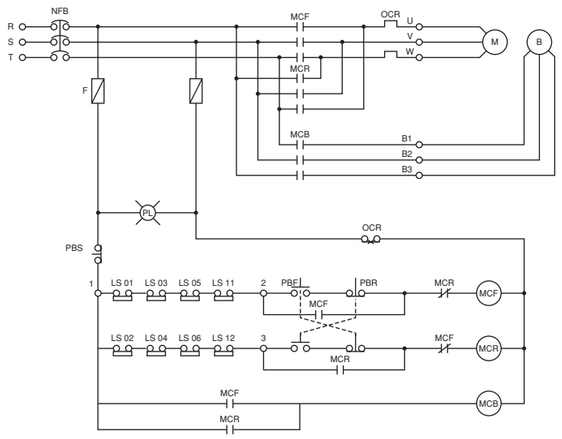
Gears and bearings are pre-lubricated with grease, and require no additional maintenance. After long term operation or storage, grease quality may deteriorate. Unit should be checked and additional grease added if necessary.

Recommended Grease

Gear box	SHELL	SHELL ALVANIA EP No. 1
	MOBIL	MOBILUX EP No. 1



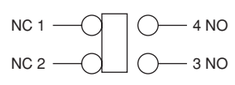
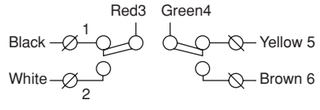
WIRING



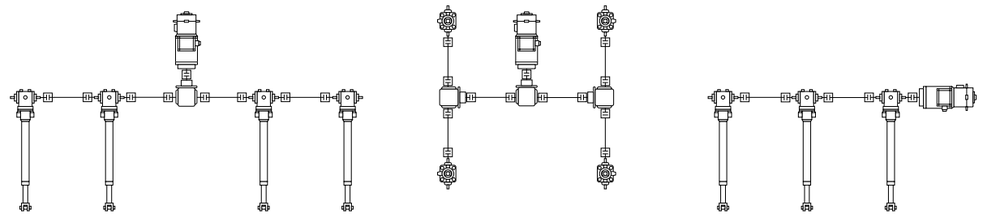
LS01, LS03, LS05; FORWARD STROKE LIMIT SWITCHES
LS02, LS04, LS06; REVERSE STROKE LIMIT SWITCHES
LS11, LS12; EXTERNAL STROKE ADJUSTMENT LIMIT SWITCHES

An example wiring diagram is shown here.
For reference only.
All Limit Switches in series.

LIMIT SWITCHES SPECIFICATIONS

	Stroke adjustment Limit Switch (External)	Thrust detection Limit Switch	
Power Cylinder	All Sizes	LPTC 250 ~ LPTC 32000	
Limit switch	WLCA 2 (OMRON)	V-165-1AR5 (OMRON)	
Current	AC 250V 10A (cos ϕ = 0.4)	AC 250V 10A (cos ϕ = 0.4)	
Contact configuration		Forward	Reverse
			
Connection	SCS-10B (ϕ8.5 ~ ϕ10.5) PF1/2	SCL-14A (ϕ10.5 ~ ϕ12.5) PF1/2	

APPLICATION INFORMATION



1. **SYNCHRONOUS OPERATION**
   The Multi-cylinder allows synchronous operation of several units. The above diagrams illustrate some possible installation options.

2. **OVERLOAD PROTECTION**
   When a LPTB type is used, a torque limiter coupling is recommended on the motor output shaft to protect against overload. A torque limiter coupling is not necessary for the LPTC type, however thrust detectors for each Power Cylinder must be individually wired to the power source, separate from the motor.

3. **STROKE ADJUSTMENT**
   Stroke is limited by external limit switches at both ends. Limit switches are available for mounting to Power Cylinder body. Rod "coasting" distance must be considered when determining proper positioning of limit switches. All upper and lower limit switches must be wired in series.

4. **ROD ROTATION REACTION TORQUE**
   The thrust of the actuator rod creates a reaction torque. Generally, connection to the driven load prevents rotation. If the actuator rod end piece is required to rotate freely or if the actuator rod is used to drive a rolling car or to pull a load with a wire rope or chain, please contact Tsubaki.

5. **THRUST DETECTOR**
   Preset thrust detector setting of LPTC Series Power Cylinder is 150% of rated thrust and the safety device does not operate during normal turning, inclining and lifting motion starts. However, in applications with a heavy load or vehicle, the safety device may be triggered during starting or cutting off operation. Please consult Tsubaki.

6. **ALIGNMENT**
   Proper alignment of trunnion and rod end centers is very important, and care must be taken to ensure it is done correctly. **A side load must not be applied to the cylinder during operation.**

7. **FLOATING SHAFT**
   Long floating shafts may induce vibration. Shaft rigidity and backlash of coupling must be carefully checked.

8. **COUPLING**
   Chain, gear, and flange type couplings are recommended for connecting input shaft.

9. **OVERHUNG LOAD (O.H.L)**
   Be sure that overhung load is below the limit (Table 1) before installing gears, sprockets and pulleys on a shaft.

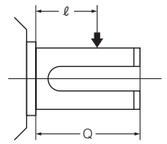
$$\text{Allowable O.H.L.} \geqq \frac{T \times f \times Lf}{R}$$

Drive Factor: f

Chain sprocket	1.00
Gear	1.25
V-belt pulley	1.50
Flat-belt pulley	2.50

O.H.L (kgf):

T = Torque (kgf·m)
f = Drive factor
Lf = Load position factor
R = Radius of sprockets, gears, V-pulleys etc.



ℓ = Distance of load position
Q = Shaft length

Table 1 Allowable overhung load

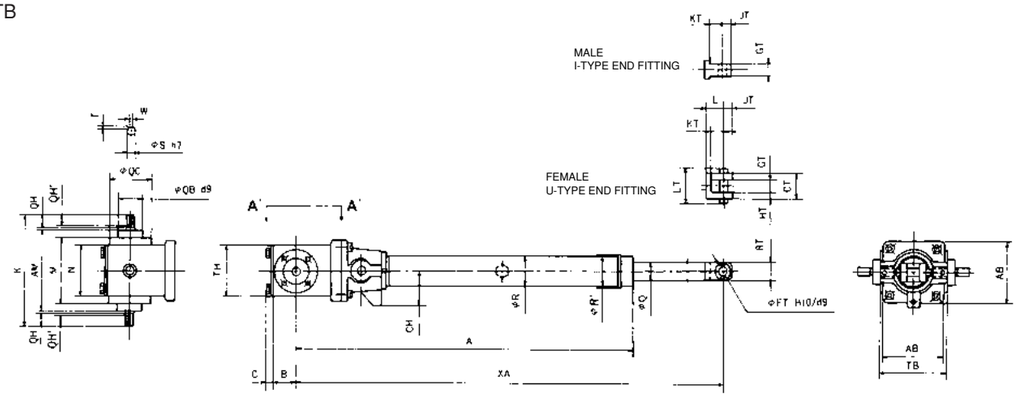
Size - LPTB, TC	500	1000	2000	4000	6000	8000	12000	16000	32000
Allowable O.H.L. (kgf)	56	108	199	356	469	689	903	1430	2280

Load position factor: Lf

ℓ /Q	0.25	0.38	0.5	0.75	1
Lf	0.8	0.90	1.0	1.50	2

DIMENSIONS

LPTB

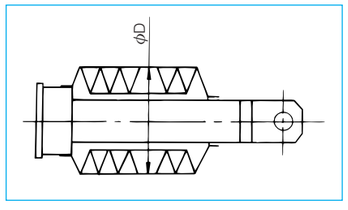


Size	Stroke	Length		Input shaft						Input bracket				Gear housing				Bracket						End fitting										
		A	XA Min.	S	W	T	QH	QH'	K	QB	QC	AM	M	AB	TH	B	C	N	CH	TB	Q	R	R'	RT	CT	GT	HT	LT	KT	L	JT	FT
LPTB 500	200	470	565	15	5	5	25	22	220	50	85	160	130	120	100	45	15	100	68.5	130	35	58	63	36	50	25	12.5	69	25	35	18	16
	300	570	675																													
	400	670	785																													
	500	770	895																													
	600	870	1000																													
	800	1070	1220																													
1000	200	500	605	15	5	5	25	22	220	50	85	160	130	120	100	45	15	100	48	150	40	70	75	40	60	30	15	82	30	45	20	20
	300	600	715																													
	400	700	825																													
	500	800	935																													
	600	900	1040																													
	800	1100	1260																													
2000	200	560	680	20	6	6	30	25	270	60	110	200	160	130	130	55	17	130	71	180	50	76	81	50	70	35	17.5	99	40	60	25	25
	300	660	790																													
	400	760	900																													
	500	860	1010																													
	600	960	1115																													
	800	1160	1335																													
4000	200	645	780	35	10	8	70	60	450	80	160	300	230	190	190	80	17	190	90	220	70	95	100	70	80	40	20	115	50	75	35	32
	300	745	890																													
	400	845	1000																													
	500	945	1105																													
	600	1045	1215																													
	800	1245	1430																													
	1000	1445	1645																													
	1200	1645	1865																													
6000	500	1075	1230	35	10	8	70	60	480	80	160	330	260	220	220	80	17	220	—	260	80	115	—	80	—	45	—	—	65	—	40	40
	1000	1575	1780																													
	1500	2175	2430																													
8000	500	1145	1310	40	12	8	80	70	550	90	180	380	300	260	210	90	22	240	—	310	95	130	—	95	—	50	—	—	70	—	45	45
	1000	1645	1860																													
	1500	2145	2410																													
12000	500	1205	1390	40	12	8	80	70	550	90	180	380	300	260	210	90	22	240	—	350	110	160	—	110	—	65	—	—	90	—	55	50
	1000	1705	1940																													
	1500	2205	2490																													
	2000	2705	3040																													
16000	500	1370	1570	50	14	9	85	75	630	120	220	440	340	320	280	110	25	280	—	400	130	180	—	130	—	80	—	—	100	—	65	63
	1000	1870	2120																													
	1500	2370	2670																													
	2000	2870	3220																													
32000	500	1795	2055	60	18	11	120	100	940	200	320	680	520	500	450	175	25	450	—	540	180	240	—	180	—	125	—	—	140	—	90	90
	1000	2295	2605																													
	1500	2795	3155																													
	2000	3295	3705																													

OPTION

Bellows: **LPTB 500 — 4 J**
- LPTB: Series
- 500: Thrust
- 4: Stroke
- J: Bellows

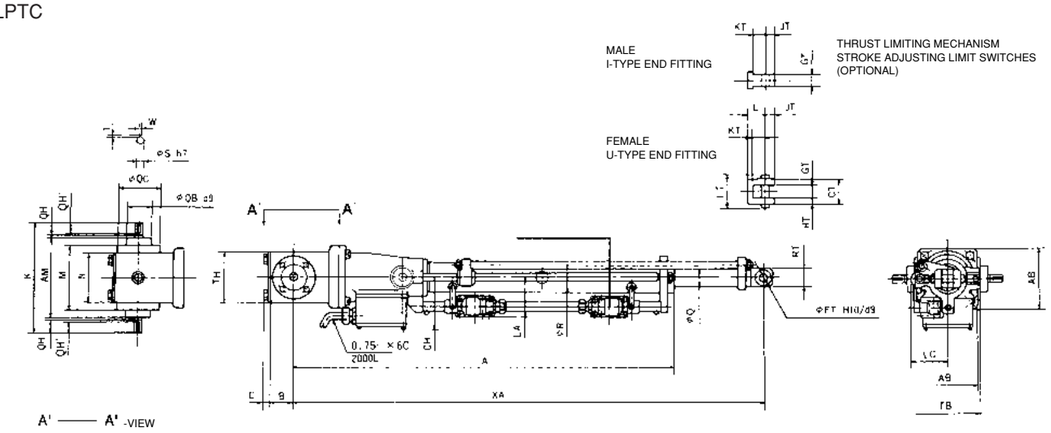
Trunnion: **LPTB 500 B — T**
- LPTB: Series
- 500: Thrust
- B: For Multi series
- T: Trunnion



Bellows

LPTB/LPTC	500	1000	2000	4000	6000	8000	12000	16000	32000
D	90	90	90	120	135	150	180	210	250

LPTC

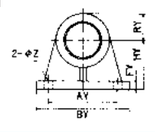


Size	Stroke	Length		Input shaft						Input bracket				Gear housing				Bracket					End fitting											
		A	XA Min.	S	W	T	QH	QH'	K	QB	QC	AM	M	AB	TH	B	C	N	CH	TB	Q	R	FT	RT	CT	GT	HT	LT	KT	L	JT	LA		LC
LPTC 500	200	555	650	15	5	5	25	22	220	50	85	160	130	120	100	45	15	100	101	130	35	58	16	36	50	25	12.5	69	25	35	18	161	76.5	73
	300	655	760																															
	400	755	870																															
	500	855	980																															
	600	955	1085																															
	800	1155	1305																															
1000	200	595	700	15	5	5	25	22	220	50	85	160	130	120	100	45	15	100	107	150	40	70	20	40	60	30	15	82	30	45	20	161	76.5	73
	300	695	810																															
	400	795	920																															
	500	895	1030																															
	600	995	1135																															
	800	1195	1355																															
2000	200	675	795	20	6	6	30	25	270	60	110	200	160	130	130	55	17	130	110	180	50	76	25	50	70	35	17.5	99	40	60	25	164	79	76
	300	775	905																															
	400	875	1015																															
	500	975	1125																															
	600	1075	1230																															
	800	1275	1450																															
4000	200	790	925	35	10	8	70	60	450	80	160	300	230	190	190	80	17	190	127	220	70	95	32	70	80	40	20	115	50	75	35	182	97.5	85
	300	890	1035																															
	400	990	1145																															
	500	1090	1250																															
	600	1190	1360																															
	800	1390	1575																															
	1000	1590	1790																															
	1200	1790	2010																															
6000	500	1170	1325	35	10	8	70	60	480	80	160	330	260	220	220	80	17	220	139	260	80	115	40	80	—	45	—	—	65	—	40	—	—	—
	1000	1670	1875																															
	1500	2270	2525																															
8000	500	1245	1410	40	12	8	80	70	550	90	180	380	300	260	210	90	22	240	145	310	95	130	45	95	—	50	—	—	70	—	45	—	—	—
	1000	1745	1960																															
	1500	2245	2510																															
12000	500	1305	1490	40	12	8	80	70	550	90	180	380	300	260	210	90	22	240	160	350	110	160	50	110	—	65	—	—	90	—	55	—	—	—
	1000	1805	2040																															
	1500	2305	2590																															
	2000	2805	3140																															
16000	500	1460	1660	50	14	9	85	75	630	120	220	440	340	320	280	110	25	280	170	400	130	180	63	130	—	80	—	—	100	—	65	—	—	—
	1000	1960	2210																															
	1500	2460	2760																															
	2000	2960	3310																															
32000	500	1950	2210	60	18	11	120	100	940	200	320	680	520	500	450	175	25	450	238	540	180	240	90	180	—	125	—	—	140	—	90	—	—	—
	1000	2450	2760																															
	1500	2950	3310																															
	2000	3450	3860																															

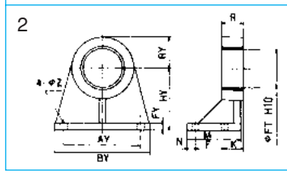
TRUNNION ADAPTER DIMENSIONS

Size		AY	BY	FY	HY	RY	FT	F	K	M	N	R	Z	
LPTB LPTC	500	130	180	15	150	40	50	—	45	65	25	15	18	1
LPTB LPTC	1000	130	180	15	150	40	50	—	45	65	25	15	18	
LPTB LPTC	2000	150	200	15	170	50	60	—	45	65	25	20	18	
LPTB LPTC	4000	180	240	20	170	70	80	—	55	80	30	35	22	
LPTB LPTC	6000	180	240	20	170	70	80	—	55	80	30	35	22	2
LPTB LPTC	8000	250	320	25	280	80	90	80	80	185	35	40	27	
LPTB LPTC	12000	250	320	25	280	80	90	80	80	185	35	40	27	
LPTB LPTC	16000	320	400	30	320	100	120	90	90	210	40	50	33	
LPTB LPTC	32000	400	500	35	380	160	200	120	120	275	50	80	45	

1



2



CONTROL BOXES

CONTROL BOXES FOR POWER CYLINDERS

1. **TYPE** A ····· The Rod goes forward/reverse when the forward/reverse switch is pushed.

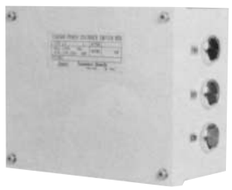
2. **TYPE** B ····· The rod goes forward/reverse by a fixed stroke after the forward/reverse switch is pushed.
   Rod will stop by the function of a limit switch on the Power Cylinder.
   The rod will stop at any position when the stop switch is pushed.

3. **TYPE** C ····· Has both A and B type functions.

4. **TYPE** D ····· Has not only A and B functions but also stroke indicator.
   A built-in potentiometer is actuated by the movement of the rod and shows the position of the rod on a meter.

Type C for Mini Series

Types A & B



Type D

Outdoor type

Model & Type	Power Cylinder			Basic Specifications				Indoor type				Outdoor type			
	G series	*T series	Ultra Heavy series	Power Source	Motor	Break capacity	Thermal relay setting current	Type A	Type B	Type C	Type D	Type A	Type B	Type C	Type D
LP40C-□	—	—	—	50/60Hz 100V	4P-20W	2A	0.5A	△	△	●	○	△	△	△	△
LP250C-□	—	250S.L. 500S		50/60Hz 200/220V	4P-0.1kW	3A	0.65A	●	●	○	○	○	○	△	△
LP500C-□	—	250M 500L 1000S			4P-0.2kW	4A	1.2A	●	●	○	○	○	○	△	△
LP1000C-□	LPG070 LPG100 LPG300	250H 500M 1000L 2000S			4P-0.4kW	5A	2.5A	●	●	○	○	○	○	△	△
LP2000C-□	—	500H 1000M 2000L 4000S 6000S			4P-0.75kW	10A	4.0A	●	●	○	○	○	○	△	△
LP4000C-□	—	1000H 2000M 4000L 6000L 8000S			4P-1.5kW	15A	8.0A	●	●	○	○	○	○	△	△
LP8000C-□	—	2000H 4000M 6000H 8000L 12000L			4P-2.2kW	15A	9.3A	●	●	○	○	○	○	△	△
LP16000C-□	—	4000H 6000H 8000M 12000M 16000L			4P-3.7kW	20A	14.6A	●	●	○	○	○	○	△	△
LP32000C-□	—	8000H 12000H 16000M 32000L			4P-5.5kW	40A	22.6A	○	○	○	○	○	○	△	△
LP63000C-□	—	16000H 32000M	LP63000L		4P-7.5kW	50A	28.9A	○	○	○	○	○	○	△	△
LP90000C-□	—	32000H	LP63000M LP90000L		4P-11kW	75A	44.5A	○	○	○	○	○	○	△	△
LP125000C-□	—		LP63000H LP90000M LP125000L		4P-15kW	100A	58.0A	○	○	○	○	○	○	△	△

* Without LPTC-M and LPTC-H. LPTC-M and LPTC-H are M.T.O. basis.

●: Available ○: Available upon request (M.T.O). △: To be designed as per request

ENQUIRY SHEET

Specify the following when ordering

Item	Description	Application sketch
Name of equipment and machinery		
Working load	Push kgf Pull kgf	
Stroke	mm	
Speed	mm/sec.	
Power	Phase V Frequency Hz	
Frequency of operation	Times/mm Times/day	
Fitting method	Trunnion, Clevis	
Atmosphere	Ambient temp. Moisture, gas, dust	
Place to be installed	Indoors or outdoors	
Control box	Necessary or unnecessary. If necessary specify control method	
Optional parts required		
Remarks		

⚠ SAFETY POINTS

Warning

To avoid danger please comply with the below points

- Do not release the brake when the Power Cylinder is supporting a load. If the brake is released when under loaded conditions, suspended objects may fall or movable parts may suddenly move.
- When manually operating the Power Cylinder by the manual shaft, make sure that the Power Cylinder is not supporting a load. Operate the Power Cylinder according to the handling manual.
- When using for suspended operations, provide safety shelving to prevent falling and never stand under the cylinder when in operation.
- Observe the Labor Safety & Hygiene Regulations, General Criteria, Paragraph 1, Chapter 1, Edition 2, or your local regulations of such.
- Installation, removal, maintenance and inspection:
  · Carry out operation according to the handling manual.
  · When performing electrical wiring, observe Laws and Regulations such as Electricity Equipment Criteria and Extension Rules, as well as following cautions (Ex. direction, space, operating conditions, etc) indicated in the handling manual.
  Especially, follow the instructions with regard to grounding so as to prevent electric shocks.
  · Shut down the power source and make sure that power will not be turned on accidentally (Ex. Power lock etc.).
  · Wear the proper work clothes and protective accessories (safety glasses, gloves, safety shoes, etc.).

Caution

To avoid accidents please comply with the below points

- Always operate within the allowable stroke range. Operating the Power Cylinder outside the allowable stroke range may result an accident.
- Before switching on the power, make sure that the limit switches have been wired correctly and the stroke has been adjusted correctly.
- Operate the Power Cylinder within correct electrical voltage range. Operating the Power Cylinder outside this range may result in motor burnout or fire.
- Efficiency and functioning of parts may lessen with wear and age. Carry out periodic inspection as set out in the handling manual. When functioning or efficiency is defective please contact a Tsubaki distributor for repairing.
- The Handling manual is supplied with the product. Please read it before use and refer to the instructions to ensure correct usage of the product. If the handling manual cannot be found, please request a replacement copy through Tsubaki or your Tsubaki distributor, indicating the product name, series, and number.
- The handling manual must be delivered to the final user.

Caution

- The product information contained in this catalog is mainly to assist in selection of machinery. Before using this product please thoroughly read the “handling manual” and correctly operate the product.