Power Cylinder

G series

Thrust：700N to 3.00kN {71.4kgf to 306kgf}

Power cylinder in intermediate thrust zone which can be used with AC power supply.
This can be used across a wide range of applications such as steel, food and multistory car parking for general industry.

● Wide variation
Basic 630 models and approximately 9000 models including option are standardized.
LPGA: Simple and basic economical type
LPGB: Built-in slip overload protection mechanism type
LPGC: Built-in thrust detection, press stop mechanism type

● Screw type selectable according to use
Trapezoidal screw excellent in cost performance
Best-suited for low-speed, low-frequency use
High-efficiency, long-life ball screw
Best-suited for high-speed, high-frequency use

● Variety of motor options
Heat resistance class F and class H are supported.
Different voltage specifications (Overseas voltages are supported.)
Inverter specifications
Global specifications (CE-compliant, UL-compliant and CCC-compliant)

● Quiet operation
Noise at the start and stop has been greatly reduced by drive of the motor with a quiet DC brake.

● Excellent speed stability
This power cylinder is basically structured so that the screw shaft is rotated by the induction motor and the nut (rod) is extend and retract, allowing for a stable speed run which is hardly affected by load variation.

Model No. designation

LP GC 300 L T 5 V T1 K2PIJ

- **LP** — Power Cylinder
- **GC** — G series
  - LPGA: Basic type
  - LPGB: With torque limiter *1
  - LPGC: With thrust detection mechanism

  *1 Only parallel type is available.
- **300** — Thrust
  - 070: 700N{71.4kgf}
  - 100: 1.00kN{102kgf}
  - 150: 1.50kN{153kgf}
  - 300: 3.00kN{306kgf}
- **L** — Speed: L, M, H, U
- **T** — Shape of main body
  - T: Straight
  - K: Parallel
- **5** — *2 Nominal stroke
  - 1: 100mm
  - 3: 300mm
  - 5: 500mm
  - 10: 1000mm

  *2 The above shows display examples.
- **V** — Voltage symbol
  - No symbol: 200V class 200/200/220V 50/60/60Hz
  - V: 400V class 400/400/440V 50/60/60Hz
  - V1: 380V/50Hz
  - V2: 380V/60Hz
  - V3: 415V/50Hz
  - V4: 460V/60Hz
- **T1** — Motor spec symbol See page 160 to 162.
- **K2PIJ** — Options
  - No symbol: Standard type
  - M *3: Anti-rod rotation specifications
  - L: With two external limit switches for stroke adjustment
  - K2,K4: Internal limit switch for positioning detection
  - P: Potentiometer
  - R: Rotary encoder
  - C: Clevis fitting *4
  - I: I-type end fitting
  - J: Bellows

  *3 Anti-rotation mechanism for LPGC type is not available.
  *4 The clevis fitting cannot be combined with K2, K4, P or R.

Trapezoidal screw type standard model list

Model	Speed symbol	Rated thrust N {kgf}	Nominal speed mm/s 50/60Hz	Motor capacity kW	Rod movement per turn of manual shaft mm	Rod rotating force N·m	Rod rotating force {kgf·m}	Nominal stroke mm	Main body shape: Straight	Main body shape: Parallel	Type: Basic	Type: With torque limiter	Type: With thrust detection mechanism	Option: Bellows	Option: External LS	Option: Position detection unit	Option: I-type end fitting	Option: Clevis fitting	Option: Anti-rotation mechanism
LPGA070	L	700 {71.4}	25/30	0.1	1	1.54	0.16	100	○	○	○	○ *1	○	○	○	○	○ *1	○	○ *2
LPGB070	M		75/90	0.2	3	2.31	0.24	200											
LPGC070	H		100/120	0.4	4	1.54	0.16	300											
LPGA100	L	1.00k {102}	25/30	0.1	1	2.20	0.22	400	○	○	○	○ *1	○	○	○	○	○ *1	○	○ *2
LPGB100	M		75/90	0.2	3	3.29	0.34	500											
LPGC100	H		100/120	0.4	4	2.20	0.22	600											
LPGA150	L	1.50k {153}	25/30	0.2	1	3.29	0.34	800	○	○	○	○ *1	○	○	○	○	○ *1	○	○ *2
LPGB150	M		75/90	0.4	3	4.94	0.50	1000											
LPGC150	H		100/120	0.4	4	4.94	0.50	1200											
LPGA300 LPGB300 LPGC300	L	3.00k {306}	25/30	0.4	1	6.59	0.67		○	○	○	○ *1	○	○	○	○	○ *1	○	○ *2

Note) 1. For LPGC070H and LPGC100H in the above table, the motor capacity is 0.2kW.
2. The rod rotating force of LPGC070H in the above table is 2.31N·m (0.24{kgf·m}), and the rod rotating force of LPGC100H is 3.29N·m (0.34{kgf·m}).

*1. Only parallel type is available.
*2. LPGC type is not available.

Ball screw type standard model list

Model	Speed symbol	Rated thrust N {kgf}	Nominal speed mm/s 50/60Hz	Motor capacity kW	Rod movement per turn of manual shaft mm	Rod rotating force N·m	Rod rotating force {kgf·m}	Nominal stroke mm	Main body shape: Straight	Main body shape: Parallel	Type: Basic	Type: With torque limiter	Type: With thrust detection mechanism	Option: Bellows	Option: External LS	Option: Position detection unit	Option: I-type end fitting	Option: Clevis fitting	Option: Anti-rotation mechanism
LPGA070 LPGB070 LPGC070	U	700 {71.4}	200/240	0.4	8	0.99	0.10	100 200 300	○	○	○	○ *1	○ *3	○	○	○ *1	○	○ *1	○ *2
LPGA100 LPGB100 LPGC100	U	1.00k {102}	200/240	0.4	8	1.41	0.14	400 500 600	○	○	○	○ *1	○ *3	○	○	○ *1	○	○ *1	○ *2
LPGA300 LPGB300 LPGC300	M	3.00k {306}	50/60	0.2	2	4.24	0.43	800 1000	○	○	○	○ *1	○	○	○	○ *1	○	○ *1	○ *2
	H		67/80	0.4	2.67	4.24	0.43	1200											

*1 Only parallel type is available.
*2 LPGC type is not available.
*3. Cannot be used for press contact stopping at the U speed.

Motor specifications

Type		Totally enclosed self cooling type with brake
Output		Standard model list
Number of poles		4 poles
Power supply	Voltage	3ϕ 200V/200V/220V
	Frequency	50Hz/60Hz/60Hz
Heat resistance class		B
Time rating		S2 30min.
Protection class		Totally enclosed outdoor type (IP55)

1) Different voltage specifications other than the above, 400/440V are also available.
2) For motor current value and brake current value, refer to page 89.

Painting color

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

Standards use environment

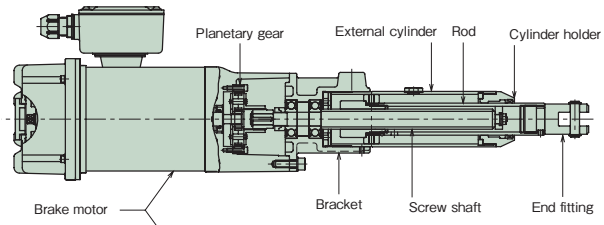
Model / Environment	Ambient temperature	Relative humidity (non-condensing)	Impact resistance value	Installation altitude	Atmosphere
Outdoor type	−15℃ to 40℃	85% or less	1G or less	1000m or lower above sea level	Normal outdoors

1) With use below freezing, the characteristics (current value and speed) of the cylinder may vary according to the effect of grease.
2) Cylinders with bellows are recommended in an excessively dusty location.
3) All models have a totally enclosed structure so that they can be used normally outdoors. Even so, however, an appropriate cover is required in such a hostile environment that is splashed with water or vapor or in such a location where snow accumulates. For use at 40°C or higher, always protect with a heat-insulating cover, etc. Never use in a flammable atmosphere. Doing so may cause an explosion or fire. In addition, avoid using in a location subjected to vibration or impact exceeding 1G.
4) For use in a misty atmosphere, contact us.

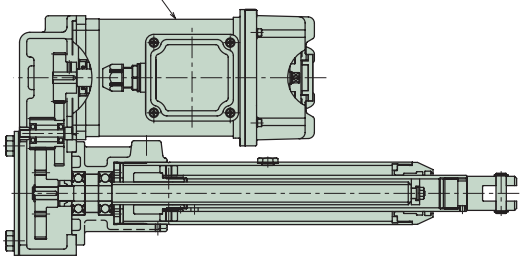
Structure

LPGA: Basic type

●Straight



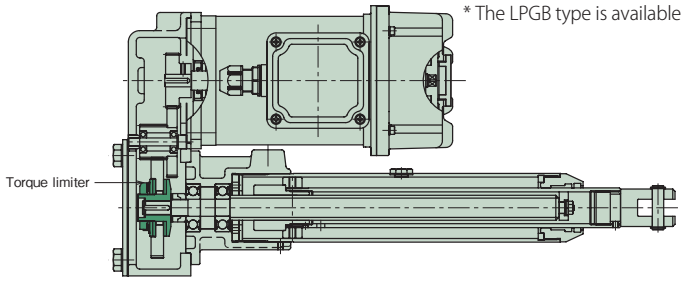
●Parallel



LPGB: With torque limiter

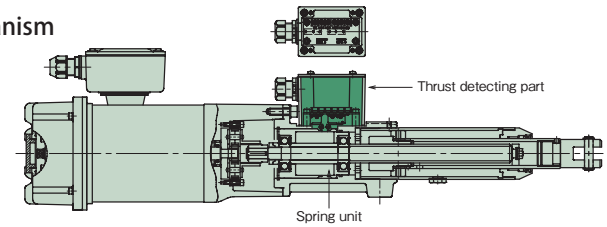
●Parallel

* The LPGB type is available only in parallel type due to the mechanism.

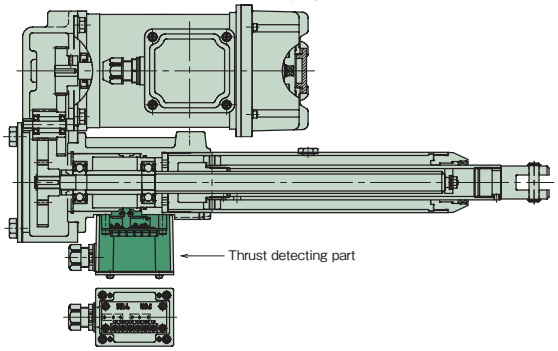


LPGC: With thrust detection mechanism

●Straight



●Parallel



Classification of usage according to type (protection device)

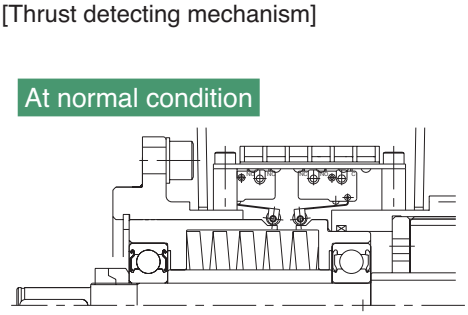
The power cylinder G series includes the following three types. Each of these can be selected so that optimum functions can be fully exerted depending on application. The three types of power cylinders have the same performances (thrust, speed, stroke).

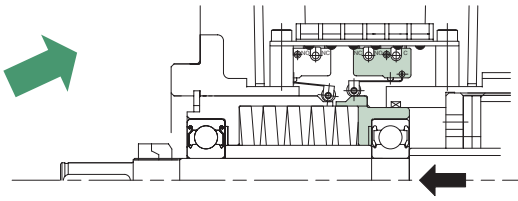
LPGA (basic model) ——— This type has a stop function with a brake only. Note that use exceeding the nominal stroke may result in breakage. When using this type, sensor for stroke regulation must be installed or optional external limit switch for stroke adjustment must be used. (The other two types similarly require a sensor for stroke adjustment.)
When detecting abnormalities, combination with an electric protection device is recommended. A shock relay and shock monitor are available as electric protection devices.

LPGB (with torque limiter) ——
* Only parallel type is available.
When any overload phenomena occurs and the set thrust is exceeded, the built-in torque limiter slips to exert the protecting function. However, long time slip generates heat on the motor, resulting in burnout, or reduces the transmissible torque, resulting in malfunction of the cylinder. Therefore, usage in combination with our shock relay is recommended.

LPGC (with thrust detecting mechanism) ———
A type with a thrust detecting mechanism in combination with a pre-loaded spring and a limit switch.
This mechanism exerts an effect in the following cases.
① When press (pull) and stop are performed.
② When an electric signal is required at overload.
③ When an overload is possibly applied from the load side during stoppage.
The built-in spring absorbs deflection impact load for impact within the rating.
* Cannot be used for press contact stopping at the mechanical stroke end.

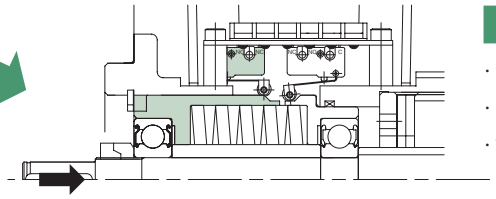
[Thrust detecting mechanism]





When extending

- When the cylinder is overloaded while extending
- When the cylinder stops within the XA dimension at the time of extending
- When a pressing force is attempted to be maintained even after stop



When retracting

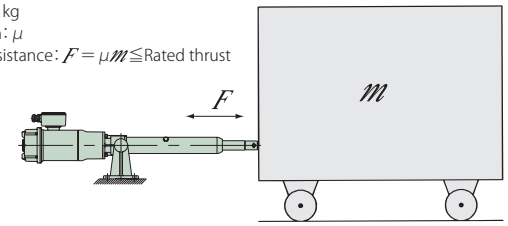
- When the cylinder is overloaded during retracting
- When the cylinder stops within the XA dimension at the time of retracting
- When a pressing force is attempted to be maintained even after stop

Preset load for protection device

Preset loads for protection devices of the GB type and GC type are as follows.
The protection device does not work at the start for opening/closing of the damper or the hopper gate, normal reverse, inclination and elevation, however, when load inertia is large due to horizontal movement of the carriage, the protection device works to impair smooth operation at the start. When load inertia exceeds values shown in the table below, take countermeasures such as slow start operation by the inverter, etc.

<Operation preset load for protection device>
GB (with a torque limiter): 150% to 200% of rated thrust
GC (with a thrust detecting mechanism): 140% to 200% of rated thrust
* Use the above values as a guide.

Mass of carriage: m kg
Coefficient of friction: μ
Carriage traveling resistance: $F = \mu m \leqq$ Rated thrust



<Allowable mass in consideration of inertia at the time of horizontal drive> Unit: 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	—	—

Cautions for use

① When installing rotary encoder or potentiometer
For the LPGC type, a spring mechanism is built in the operating part. The spring slightly deflects at press (pull) and stop, or when an overload occurs, the signal amount deviates by the deflection. For LPGB type, even if the safety device is tripped, the signal amount does not deviate. However, the LPGC type can be used at normal stroke operation.

② When there is a problem with movement of the rod even if overload is applied from the load side during stop
For the LPGC type, a spring mechanism is built in the operating part, therefore, when a large load is applied, the spring deflects and the rod moves by the deflection.
When the load is eliminated, the rod returns to the original position.

③ When using with press (pull) and stop, strength of the mating device shall be 250% of the rated thrust or more.

④ When the LPGC type is used, the time lag should be 0.03s or less.

Selection 1

Conditions of use required for selection

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

Selection procedures

1. Select the suitable model number from the standard model list (page 77) based on thrust, load N{ kgf}, speed (mm/s), and stroke (mm).
2. Determine the shape (straight or parallel) of the main body suitable for the installing condition, necessity of protection device and option from the machine used and use conditions.
3. Check that the frequency of operation and the working time rate are within the allowable values of the cylinder.

Frequency of operation and the working time rate

Allowable start cycle	10 cycles/min. or less
Allowable duty factor (%ED)	25

$$\text{Working time rate (\%ED)} = \frac{\text{operating time of 1 cycle}}{\text{Operating time of 1 cycle + dwell time}} \times 100\%$$

The working time rate is a ratio of the operating time per 10 minutes on a 10-minute basis.

Guide for life

<Expected traveling distance of trapezoidal screw type>
25km in cylinder (nut) traveling distance

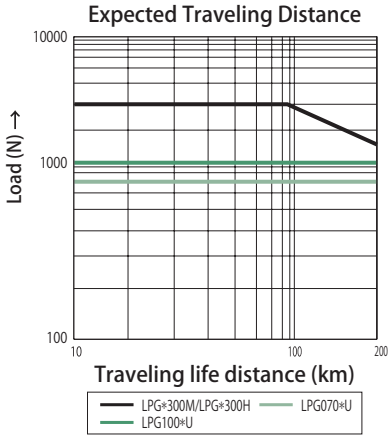
<Expected traveling distance of ball screw type>
The life of a ball screw is determined by flaking of the rolling surface caused by its fatigue. Check the rough life with this chart of expected traveling distance. However, in the case of great impact or in the case where lubrication or maintenance is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

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

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

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

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



Brake holding force

A load holding force while the power cylinder stops is exerted more than the rated thrust, therefore, it can be used for holding a load of the rated thrust. This holding force is generated by braking operation of the brake motor. The brake is of a spring braking type that always performs braking operation by a spring force during stop, and the brake torque has a holding force of 150% or more of the motor rated torque. The expected life of the brake is 2,000,000 times. However, gap adjustment is required.

* When selecting the H, U speed, refer to the cautions for selecting on page 94.
* Select a power cylinder of a sufficient thrust, allowing for a safety rate so that the loads used (static and dynamic) do not exceed the rated thrust.

Selection 2

Refer to the following cylinder characteristics data to check that the cylinder is suitable for the application.

<Coasting distance and stop accuracy>

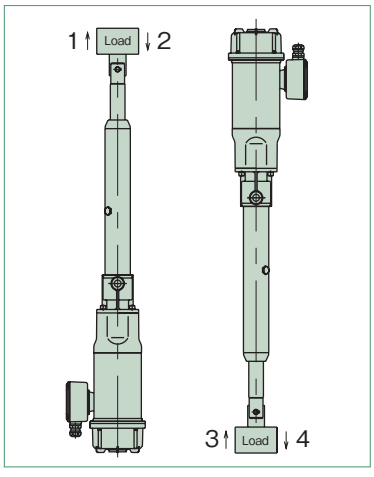
Coasting amount and stop accuracy vary depending on the operation speed and load. When you attempt to correctly position, cylinders with low operation speed are recommended. Set the limit switch in consideration of the coasting distance. Refer to the cautions for selecting on page 94.

Reference values of the coasting distance and stop accuracy are shown in the following table.

■**Coasting distance and stop accuracy (Reference values) (When relay time lag is assumed to be 0.03 seconds)**

Unit: mm

Model \ Usage		Lifting load (In the case of 1 or 3)				Suspended load (In the case of 2 or 4)			
		50Hz		60Hz		50Hz		60Hz	
		Coasting distance	Stop accuracy	Coasting distance	Stop accuracy	Coasting distance	Stop accuracy	Coasting distance	Stop 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 LPGB150 LPGC150	L	4.6	±0.4	6.6	±0.5	7.1	±0.4	9.8	±0.5
	M	10.6	±1.1	14.7	±1.3	15.6	±1.2	21.3	±1.4
	H	13.7	±1.4	19.0	±1.7	21.8	±1.6	30.0	±1.9
LPGA300 LPGB300 LPGC300	L	3.3	±0.4	4.6	±0.5	5.1	±0.4	6.9	±0.5
	M	8.6	±0.8	12.4	±0.9	23.2	±0.8	29.4	±1.0
	H	9.4	±1.0	13.1	±1.2	19.0	±1.1	25.0	±1.3

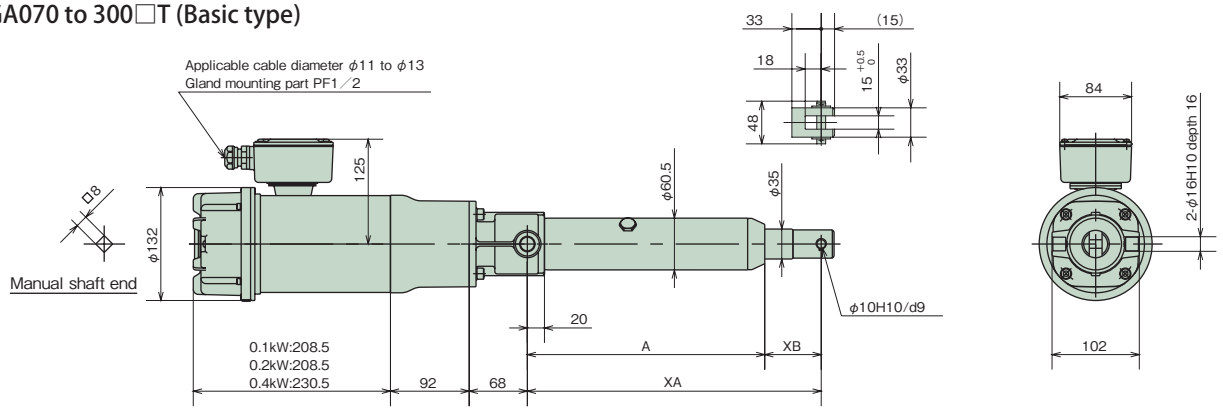


* An anti-rod rotation mechanism is required.

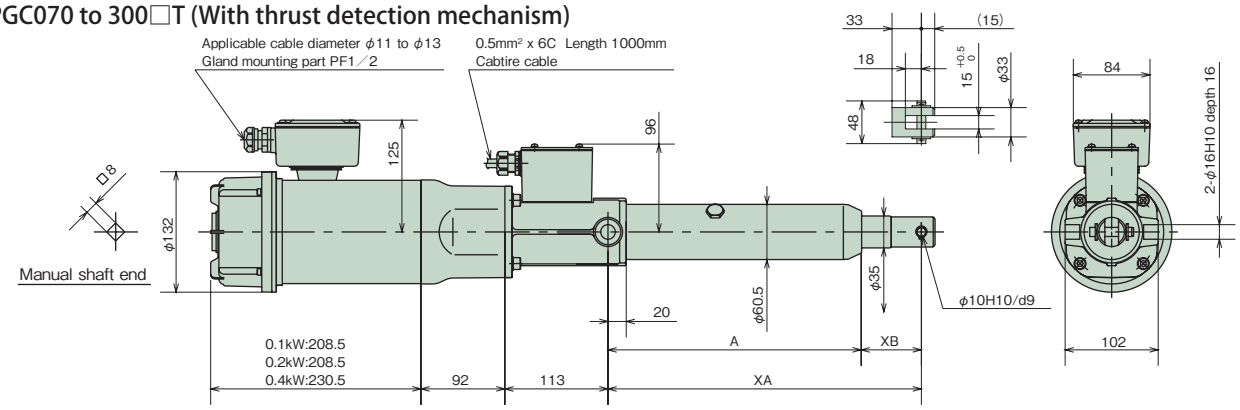
* The values in the above table slightly vary depending on the models.
* Coasting distance: This indicates a distance from a time when the limit switch or the stop button is operated until the cylinder stops. This coasting distance varies depending on how a load is applied and the operation circuit.
* Stop accuracy: This indicates a variation in the stop position when stop is repeated. The above table takes ±25% of time lag of the relay and the brake into consideration.

Dimensions Table Straight type

LPGA070 to 300□T (Basic type)



LPGC070 to 300□T (With thrust detection mechanism)



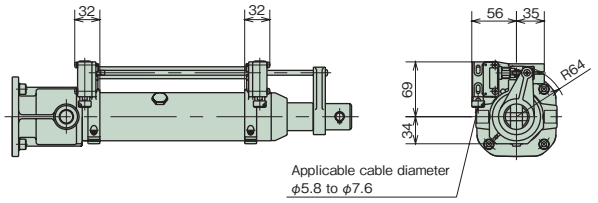
Unit: mm

Model		Speed symbol	Shape of main body	Nominal stroke	A	XA		XB		Approx. mass (kg)	
						MIN	MAX	MIN	MAX	LPGA	LPGC
LPGA LPGC	070 100 150 300	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
				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

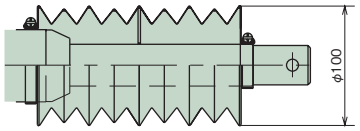
Note) 1. The mechanical stroke includes a margin of 3 to 8 mm of the nominal stroke on both sides.
2. For U speed, only 070 and 100 are applied.

Options

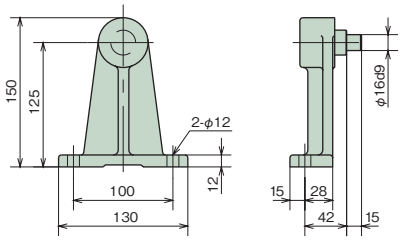
■ External LS（ -L）



■ Bellows（ -J）



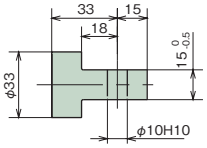
■ Trunnion fitting（LPGA300-T）



Mass: 3.5kg/set

Note) Apply grease to the trunnion pin and into the trunnion hole for installation.

■ I-type end fitting（ -I）

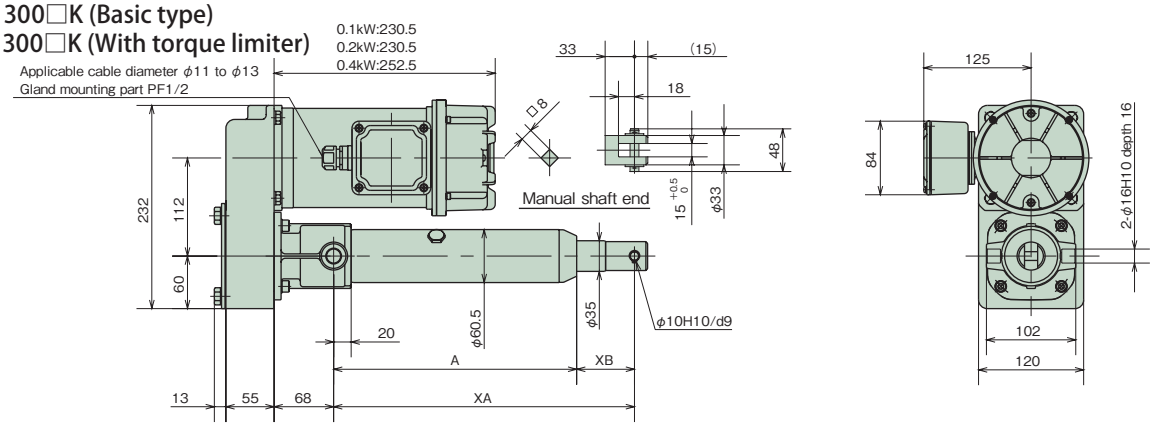


Note) Shipped as attached to the main body.
The XA dimensions are the same as the standard U-type end fitting.

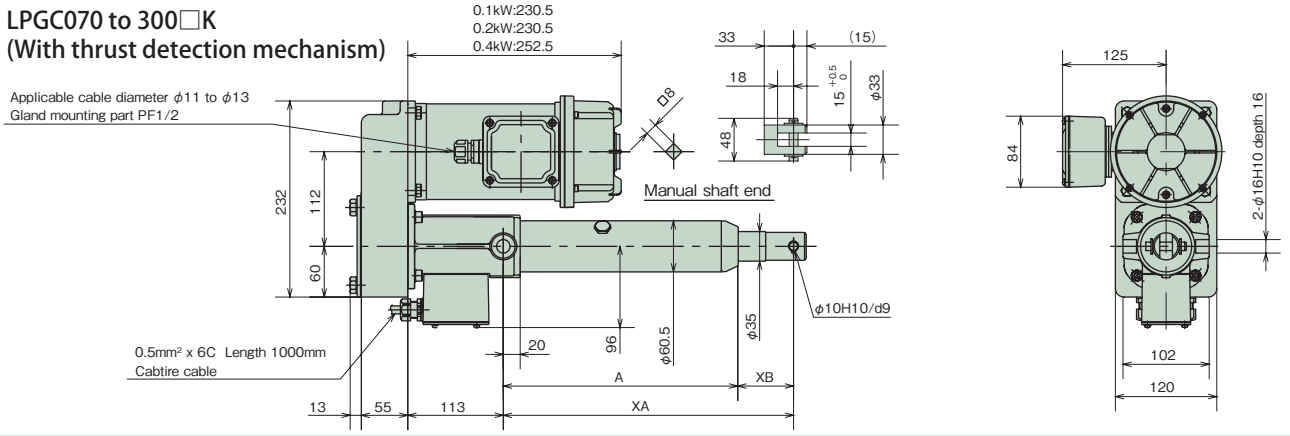
* Dimensions with no tolerance described have general tolerance, and their sizes become larger by approximately 2 to 5mm from the described dimensions. When designing the machine, take margins into consideration.

Dimensions Table Parallel type

LPGA070 to 300□K (Basic type)
LPGB070 to 300□K (With torque limiter)



LPGC070 to 300□K
(With thrust detection mechanism)



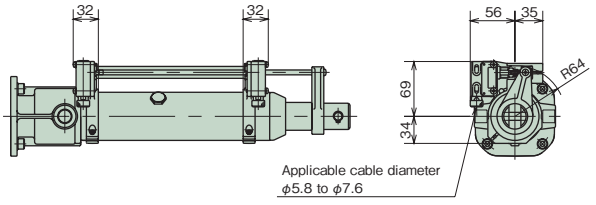
Unit: mm

Model		Speed symbol	Shape of main body	Nominal stroke	A	XA		XB		Approx. mass (kg)		
						MIN	MAX	MIN	MAX	LPGA	LPGB	LPGC
LPGA LPGB LPGC	070 100 150 300	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
				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

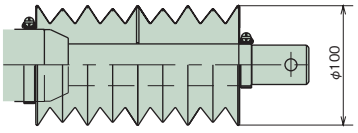
Note) 1. The mechanical stroke includes a margin of 3 to 8 mm of the nominal stroke on both sides.
2. For U speed, only 070 and 100 are applied.

Options

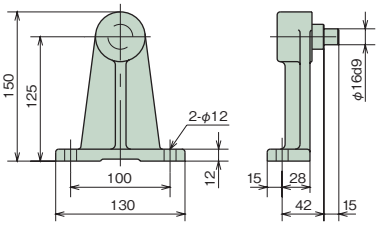
■ External LS (-L)



■ Bellows (-J)



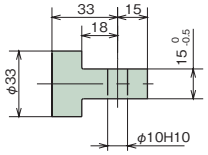
■ Trunnion fitting (LPGA300-T)



Mass: 3.5kg/set

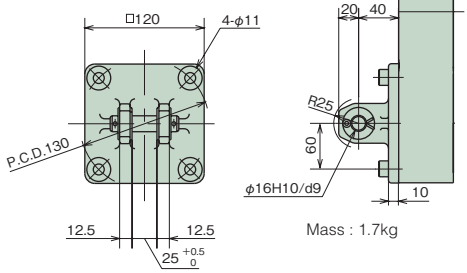
Note) Apply grease to the trunnion pin and into the trunnion hole for installation.

■ I-type end fitting (-I)



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

■ Clevis fitting (-C)



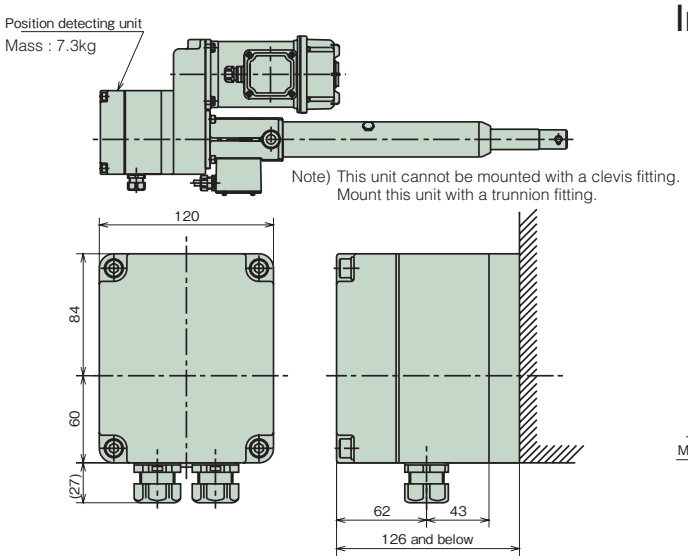
Mass : 1.7kg

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

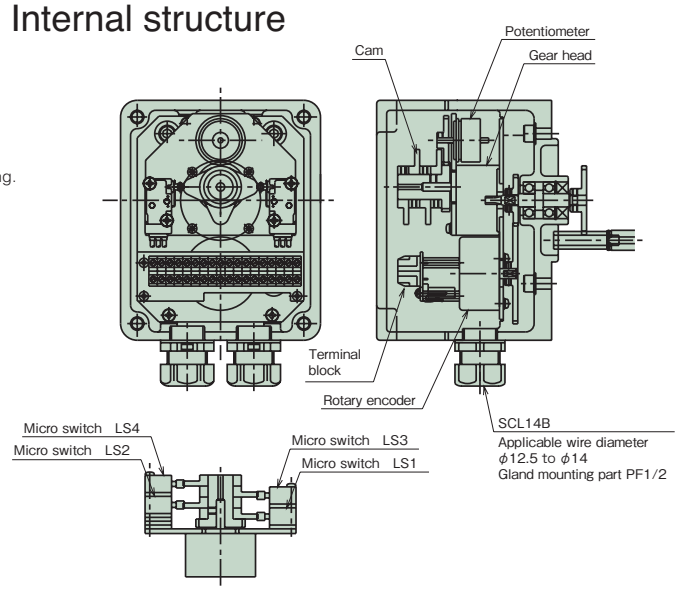
Position detecting unit

The following three types of the position detecting device can be built in the position detecting unit at your request.

1. Position detecting internal LS (with two or four pieces)
2. Potentiometer
3. Rotary encoder

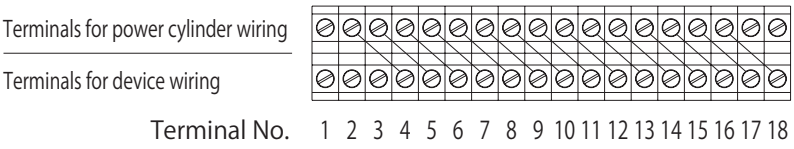


Internal structure



Wire connection into position detecting unit

Use terminals provided in the unit to connect to the internal limit switch, potentiometer and rotary encoder. COM for the internal limit switch is common. (internally wire-connected)
Use shield wire for wire-connection to the rotary encoder.



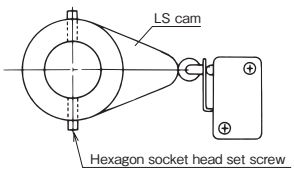
Option	Internal limit switch (K2, K4)									Potentiometer			Rotary encoder					
Symbol	LS1		LS2		LS3		LS4		Common	P			R					
Contact	a	b	a	b	a	b	a	b	c	1	2	3	1	2	Z	5V to 24V	0V	Case
Terminal No.	18	17	5	6	16	15	7	8	4	1	2	3	9	10	11	12	13	14

1. Position detecting internal LS (with two or four pieces)

Use this LS when the external LS cannot be installed due to the installation space or when performing operation in combination with the potentiometer or the rotary encoder.
With two pieces: Optional symbol K2 Arrangement of LS1 and LS2 in the above figure.
With four pieces: Optional symbol K4 Arrangement of all of LS1 through 4 in the above figure.

Micro switch specification	
Model	OMRON D2VW-5L2A-1M or equivalent
Circuit configuration	NC (Red) NO (Blue) COM (Black)
Electric rating	250V AC 4A (cosϕ0.7)
Connection	Terminal block connection in position detecting unit

<Setting of LS>
First, before installing a power cylinder to the equipment, operate the cylinder in a single unit to check the rotating direction of the LS cam.
Intall the equipment to the power cylinder, stop the power cylinder, or, move it to a position where you would like to have it be detected.
Then, rotate the LS cam, and tighten the hexagon socket head set screw to fix at a position where the micro switch operates.
At this time, estimate a coasting amount of the power cylinder depending on the pre-checked rotating direction.

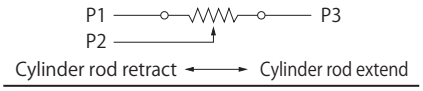


Position detecting unit

2. Potentiometer

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

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



3. Rotary encoder

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

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

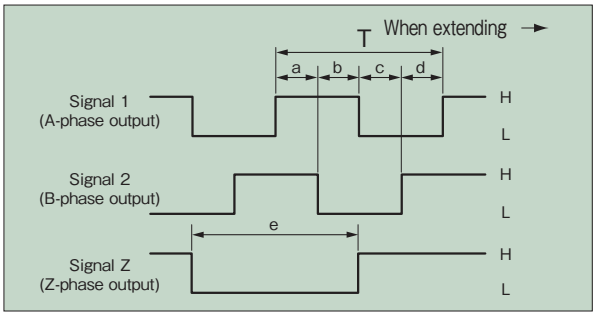
Note 1) Due to the open collector output, output signals are obtained when the pull-up resistor is connected.
Signal 1 and signal 2 are output voltages of H "(power supply voltage – 1)V or more" and L "1V or less."
For the Z-phase, negative logic applies.
<Reference resistance values> 5V: 220Ω, 12V: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

Output connection

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

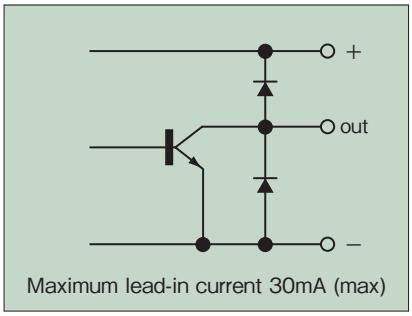
Figures in parentheses indicate terminal No.

Output waveform



a. b. c. d = T/4 ± T/8 T/2 ≦ e ≦ 3T/2

Output circuit



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

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

Control option

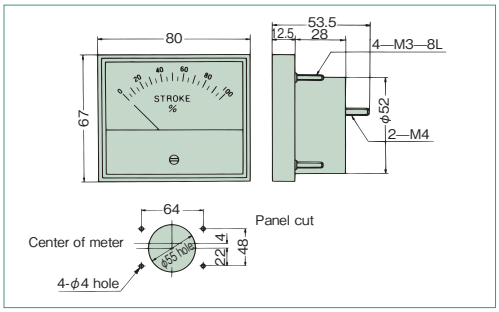
For potentiometer

■ Stroke indication meter

This meter indicates a stroke in % by a signal from the print board.

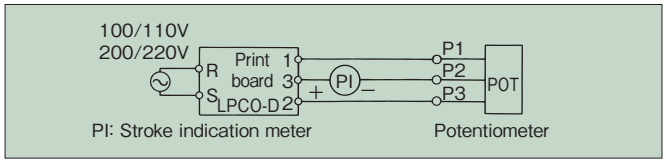
Model	RM-80B(100 μ A DC) or equivalent
Grade	JIS C 1102 2.5 class
Appearance	Frame・black
Scale specification	Entire stroke is indicated in 100%

* A separate printed board is also required.

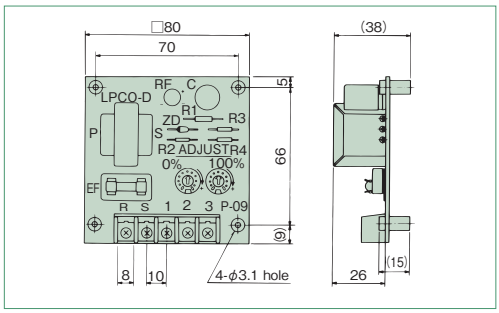


■ Printed board

This printed board converts voltage signals from the potentiometer in the position detecting unit of the power cylinder G series into current signals.



Adjust the meter with an ADJUST volume on the print board. Do not make a mistake with the stroke indication meter + and -. Replace the terminals 1 and 2 on the print board to set the indication meter to 100% when the stroke is MIN.
Model LPCO-D1 (Operation power 100/110V 50/60Hz)
LPCO-D2 (Operation power 200/220V 50/60Hz)



■ Meter relay

Used for simple adjustment of stroke on the operation panel.

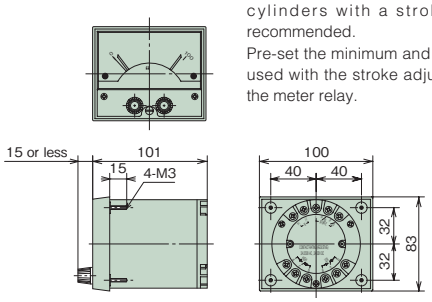
(Iron panel attachment is standard.
Contact us separately when installing an aluminum panel.)

Note) For using 4 – 20mA output, designate as “for 4 – 20mA output.”

Meter relay specification	
Model	NRC-100HL (TSURUGA) or equivalent
Grade	JIS C 1102 2.5 class
Appearance	Frame・black
Scale	Entire stroke is indicated in 100%
Power supply	100/100V AC, 200/220V AC 50/60Hz
Input	Max. 100μA DC
Output contact configuration	For both of HIGH, LOW sides 1C (See the right Fig.)
Contact capacity	250V AC 3A (cosϕ=1)

* A separate printed board is also required.

The power cylinder body is equipped with a potentiometer. Since the phase of the stroke will deviate if the rod is rotated before installation, cylinders with a stroke adjusting LS are recommended.
Pre-set the minimum and maximum strokes to be used with the stroke adjusting LS, and then use the meter relay.



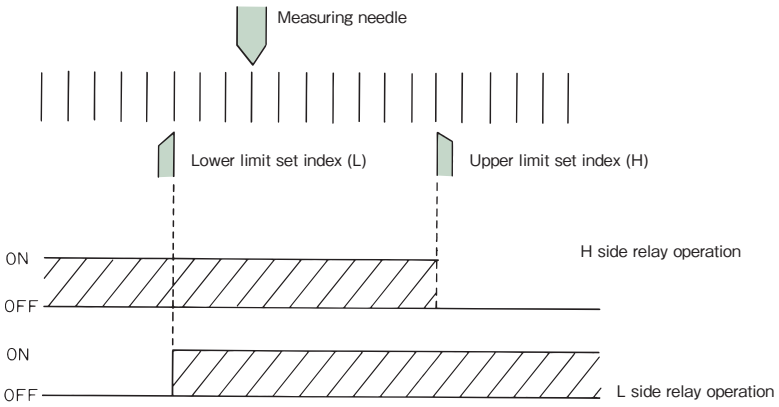
(The described specifications and dimensions may be subject to change due to circumstances.)

Control option

<Printed board>

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

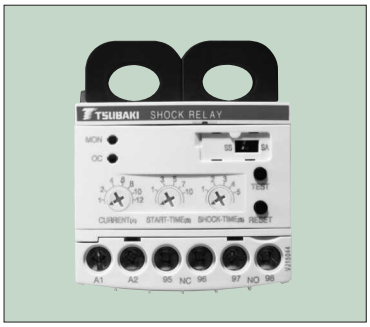
<Relay operation> (In the case of b contact)



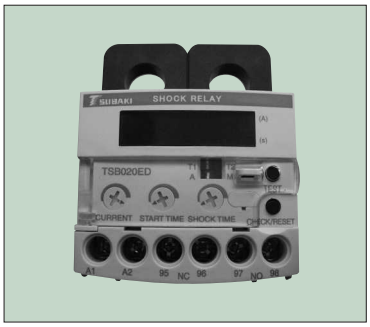
Wire connection is the same as that for the stroke indication meter, however, it is necessary to separately feed power to the meter relay. It is easy to connect the b contact as an output contact to the b contact for the stroke adjusting LS in series.

SHOCK RELAY®

Our highly reliable shock relay is recommended as an electric safety device for the GB type power cylinder.
Contact Tsubaki for more information.



SHOCK RELAY TSB-SB series
(Self-holding output relay Automatic rest output relay)

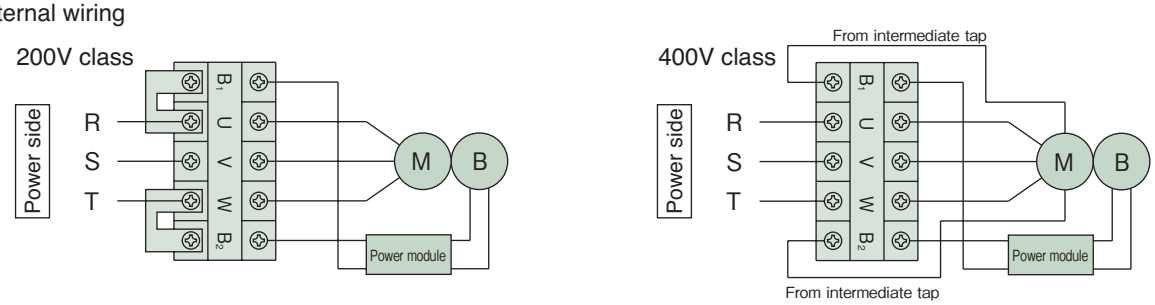


SHOCK RELAY TSBED series
(Digital indication, self-holding/automatic reset type)

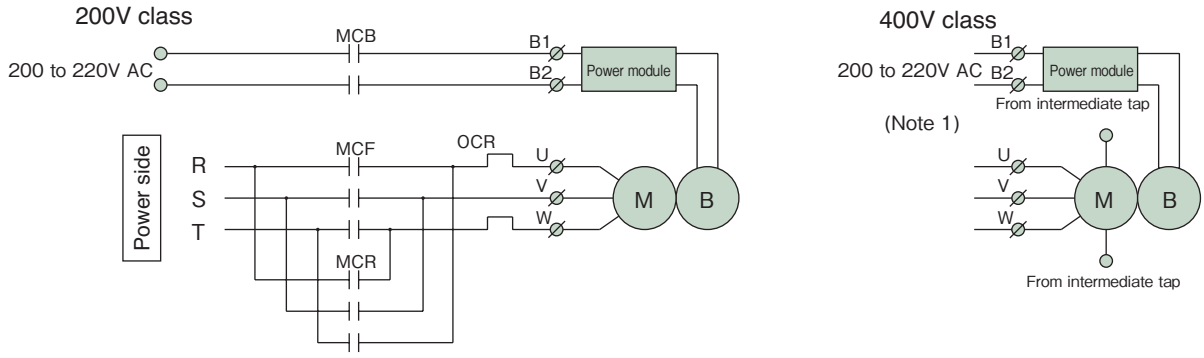
Wire connection

Wire connection for brake motor (motor with DC brake)

Brake internal wiring



Brake external wiring



Note) 1. When AC external wiring in the three-phase 400V class motor, make sure to insulate the wire from the intermediate tap. In this case, input power supply to the power module requires 200 to 220V. If no power of 200 to 220V is supplied, decrease the voltage to 200 to 220V by a transformer.
If a voltage of 230V or more is directly input to the power module, the brake and the power module may burn out.
The capacity of the transformer shall be 90VA or more (0.1 to 0.4kW), and check that there is no voltage drop.
Use an MCB with a contact capacity of 250V AC, 7A or more.
The power module includes a surge absorbing protection element. Add a protection element for the contact in each part if necessary.
2. Do not put a relay contact on the output side of the standard power module (between the power module and brake coil). (Do not perform DC external wiring.)
3. By the above connection, the rod retracts in a straight type, and the rod extends in a parallel type.

* Crimp contact bolt: M4

* For the other details, refer to the Operation Manual.

Limit switch specification

	Stroke adjusting external LS	Thrust detecting LS
Model	OMRON D4E-1B20N or equivalent	OMRON DS25W-3L2D or equivalent
Circuit configuration	NC NO COM	For extend: Black, Red, White For retract: Green, Yellow, Brown
Electric rating	250V AC 3A (cosϕ0.4)	250V AC 2A (cosϕ=0.4)
Connection	M3 screw x3 Applicable cable diameter ϕ5.8 to ϕ7.6	0.5E x 6C Length 1000A Cabtire cable draw-out

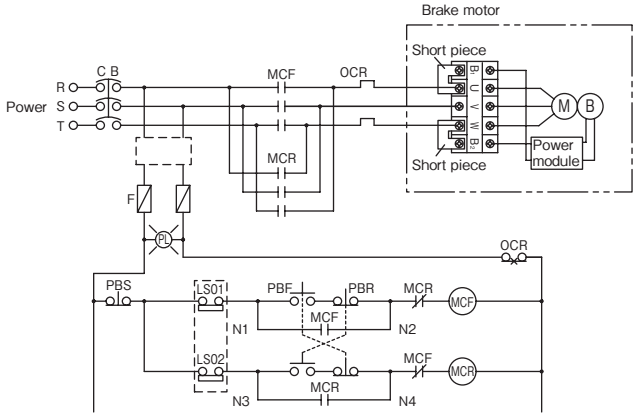
Motor current value, Brake current value

Output, frame No.	Motor current value (A)						Brake model	Brake current value (A)					
	200V 50Hz	200V 60Hz	220V 60Hz	400V 50Hz	400V 60Hz	440V 60Hz		200V 50Hz	200V 60Hz	220V 60Hz	400V 50Hz	400V 60Hz	440V 60Hz
4P - 0.1kW	0.72 (2.76)	0.62 (2.60)	0.65 (2.84)	0.36 (1.38)	0.31 (1.27)	0.32 (1.41)	SBH01LP	0.18 0.27	0.18 0.27	0.19 0.29	0.18 0.27	0.18 0.27	0.19 0.29
4P - 0.2 kW	1.3 (4.91)	1.1 (4.68)	1.1 (5.14)	0.63 (2.40)	0.55 (2.22)	0.56 (2.41)	SBH02LP	0.18 0.27	0.18 0.27	0.19 0.29	0.18 0.27	0.18 0.27	0.19 0.29
4P - 0.4 kW	2.4 (11.6)	2.1 (10.2)	2.1 (11.0)	1.2 (5.14)	1.1 (4.88)	1.1 (5.39)	SBH04LP	0.18 0.27	0.18 0.27	0.19 0.29	0.18 0.27	0.18 0.27	0.19 0.29

Note) 1. The above values are rated current values of the motor and brake. The numerical value in parentheses is a start current value of the motor.
2. The rated current values and start current values do not include brake current values.
3. A DC brake is used as a brake. The upper stage of the brake current value indicates a value on the primary side of the power module, and the lower stage indicates a value on the secondary side.
4. The above values are references because the rated current values for the power cylinder vary depending on the operating conditions.
5. For AC internal wiring of the 400V class, the voltage is converted to 200V through the motor intermediate tap to be input. For AC external wiring, decrease the voltage to 200 to 220V by a transformer. The capacity of the transformer shall be 90VA or more.

Reference circuit

200V Class GA type brake internal wiring reference circuit



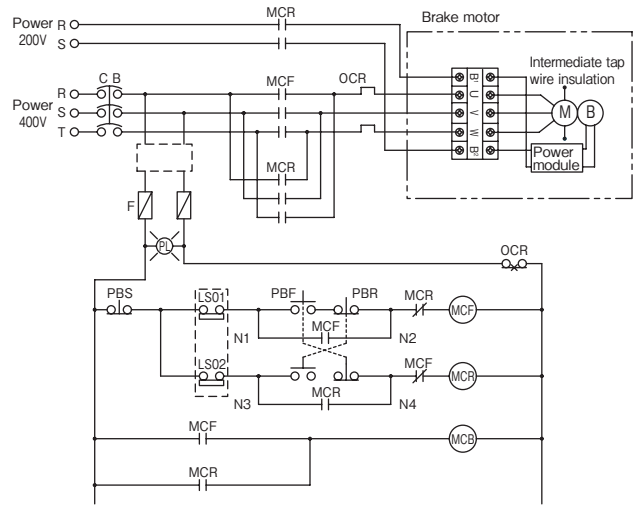
LS01: Extend stroke adjusting external limit switch
LS02: Retract stroke adjusting external limit switch

NOTE :

(1) This diagram shows a single-acting circuit. When using in an inching circuit, remove the wire connection between N1 and N2, N3 and N4, and short-circuit the PBS.
(2) If the power voltage for the motor is different from the control voltage, put a transformer into a [ ] portion in the diagram.
(3) When AC external wiring the brake, remove the short piece on the terminal block and apply a normal power voltage (200 to 220V) to B1 and B2 from the outside.

* For wire connection when an inverter is used, refer to page 89.

400V Class GA type brake internal wiring reference circuit



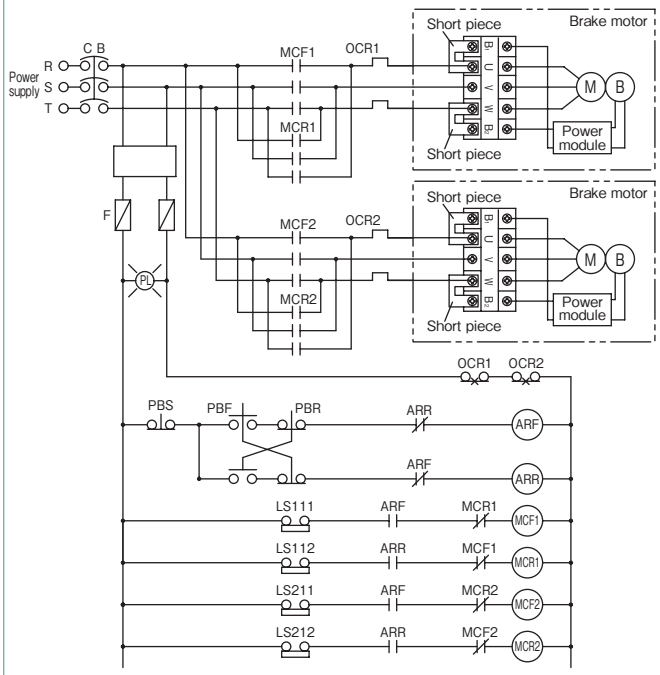
LS01: Extend stroke adjusting external limit switch
LS02: Retract stroke adjusting external limit switch

NOTE :

(1) This diagram shows a single-acting circuit. When using in an inching circuit, remove the wire connection between N1 and N2, N3 and N4, and short-circuit the PBS.
(2) If the power voltage for the motor is different from the control voltage, put a transformer into a [ ] portion in the diagram.
(3) When AC external wiring the brake, remove the wire connected to the terminal block from the motor intermediate tap and insulate it. Apply a normal power voltage (200 to 220V) to B1 and B2 (primary side of the module). If there is no power of 200V, decrease the voltage to 200V by a transformer.
The capacity of the transformer shall be 90VA or more (0.1 to 0.4KW), and check that there is no voltage drop.
Use a contact capacity of 250V AC, 7A or more.

* For wire connection when an inverter is used, refer to page 89.

0.1 – 0.4kW GA type brake internal wiring reference circuit for linkage of two



LS111: LP No. 1 extend stroke adjusting external limit switch LS1
LS112: LP No. 1 retract stroke adjusting external limit switch LS1
LS211: LP No. 2 extend stroke adjusting external limit switch LS2
LS212: LP No. 2 retract stroke adjusting external limit switch LS2

NOTE :

(1) This diagram shows an example of 0.1 – 0.4kW brake internal wiring circuit for linkage of two in inching motion.
(2) If the power supply voltage for the motor is different from the control voltage, put a transformer in the [ ] section in the diagram.
(3) Lead wires B1 and B2 for the brakes are connected to U and W on the motor terminal block by using short pieces.
(4) For using the brakes by external wiring, remove the short pieces, and externally apply not inverter output but normal power supply voltage to B1 and B2.

Installation

Installation direction

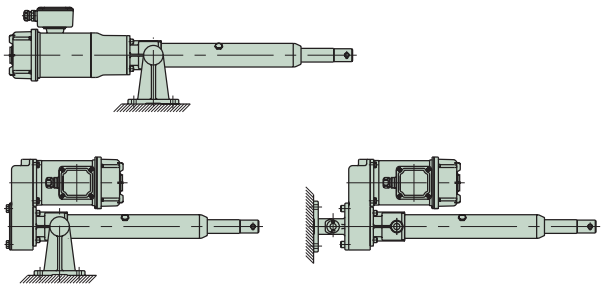
Either horizontal, vertical and inclined directions are allowed.

Installation method

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

Apply grease to the trunnion pins and bracket holes for mounting.

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



Trunnion mount　　Clevis mount

Mannual operation

When manually adjusting the stroke, rotate the manual shaft on the motor opposite load side with the manual handle after releasing the brake. For how to release the brake, refer to the Operation Manual. The manual handle is attached to the standard product.

⚠ WARNING

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

For the amount of movement of the rod per one turn of the manual shaft, refer to the standard model list (page 77).

Anti-rod rotation

1. Anti-rod rotation is required because a rotating force is generated on the rod with thrust. Generally, rotation can be mainly prevented by installing the rod end to a driven machine.
2. When operating with the end set free or installing pulleys to pull a rope, use a rod anti-rotation specification (option symbol M).

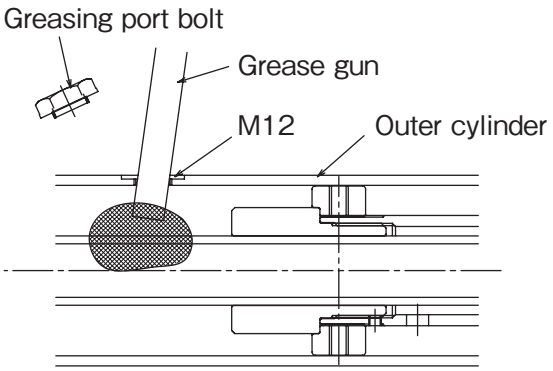
Setting of stroke adjusting external LS

1. Take the coasting amount (page 80) into consideration to set adjustment of the limit switch.
2. When using the cylinder at the nominal stroke, set the limit switch so that the cylinder stops within the XA dimension in the Dimensions Table.
3. When synchronized operating two or more power cylinders, install a limit switch at the extend limit and retract limit on each cylinder to stop each cylinder. Avoid controlling all power cylinders with one limit switch because accumulated errors in stroke will occur. For the control circuit, see the example of circuit for linkage on page 90.

Maintenance

Greasing on screw

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



⚠ WARNING

Never insert your finger into the greasing port.

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

Table 1　Recommended grease

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

* The above greases are filled before shipment.
Note)　JWGS100G is separately sold in a container of 100g. (See page 280.)

Table 2　Lubrication cycle

Lubrication cycle		
Traveling distance	Every 5km	
Operating frequency	100 times or more/day	One to three months
	10 to 100 times/day	Three to six months
	Up to 10 times/day	Six months to one year

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

Greasing on Reduction part

Grease has been applied on the tooth surfaces in advance, therefore, use the decelerating part as it is.

Initial tooth surface application grease

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

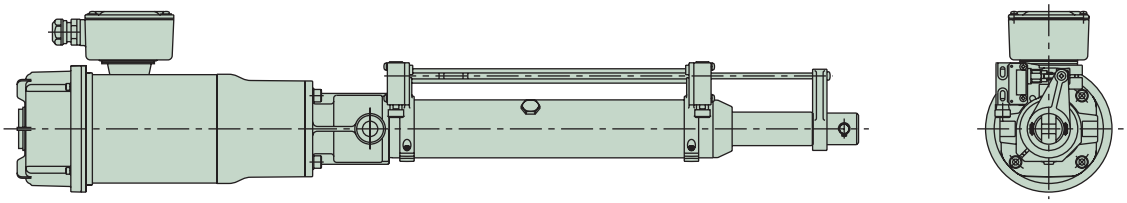
Helical gear (parallel type): Moly gear grease No. 1 (SUMICO LUBRICANT CO., LTD.)

* Apply grease to the helical gear part (parallel type) approximately once a year.

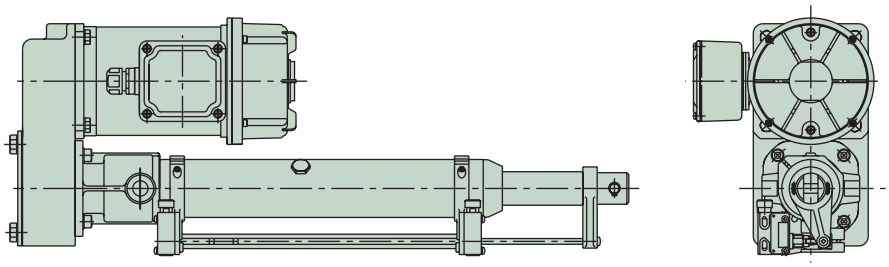
Adjustment of external limit switch and variation of mounting

1. Standard Mounting Form

● Straight



● Parallel

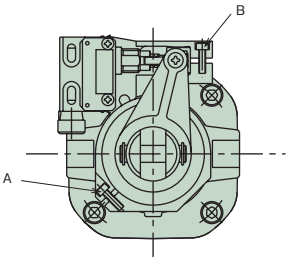


2. Adjustment method

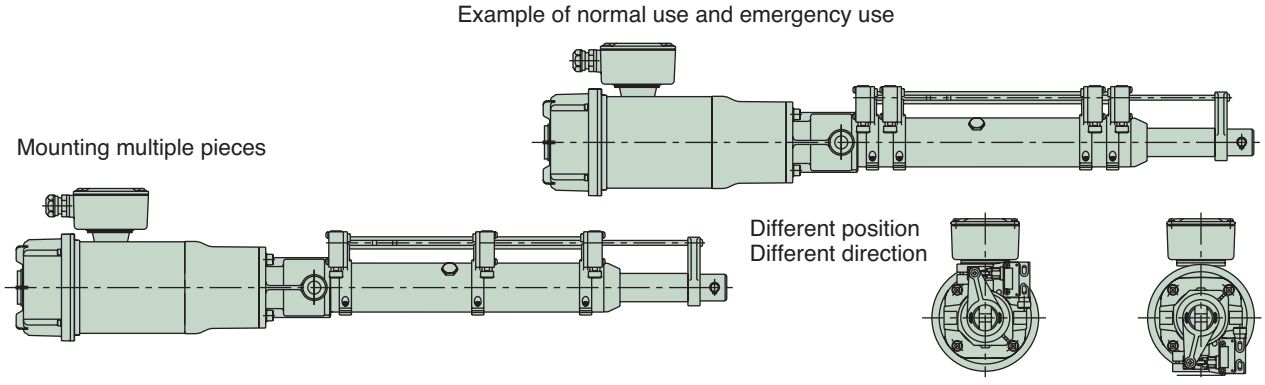
The power cylinder G series has a margin of approximately 3 to 8mm of the nominal stroke on both sides which allows for mechanical stroke. The stroke to be used is within the nominal stroke, therefore, adjust the limit switch so that operation is made in this range. If the nominal stroke is exceeded, the striker protrudes from the LS guide rail. When adjusting the limit switches, adjust and fix the limit switches one by one so that the relative position between the LS guide rail and the cylinder body is not deviated.

<Adjustment method>

1. Loosen the LS flange tightening bolt (A) and the guide rail tightening bolt (B).
2. Slide the flange to a position where you want it set.
3. Tighten the guide rail tightening bolt (B) beforehand.
4. Check that the guide rail and the LS rod are not twisted, and tighten the LS flange tightening bolt (A).



3. Mounting variations



4. Change in mounting work

- For change in orientation and quantity, please contact to Tsubaki.
- Either mounting direction is allowed, however, take the direction into consideration so that accumulation of dust or dirt the guide rail does not impair operation of the striker.

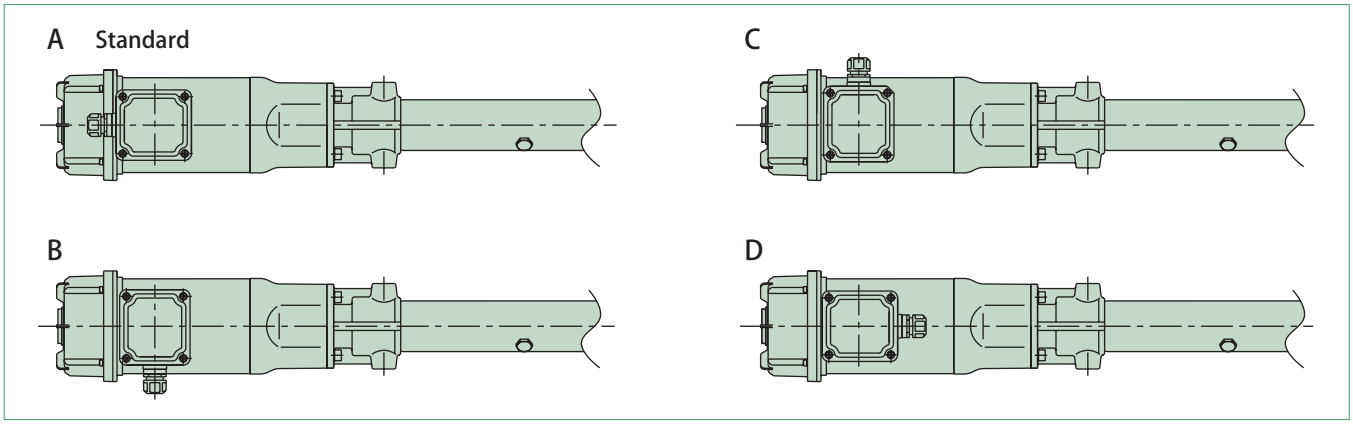
Variation in direction and position of terminal box

1. “Direction” of motor terminal box

The motor terminal box can be fixed in four directions shown in the following diagram.
This direction can be easily changed by the customer.
Be aware that if the lead wires are pulled or bent forcefully, the wires will be broken.
Procedures to change are as follows.

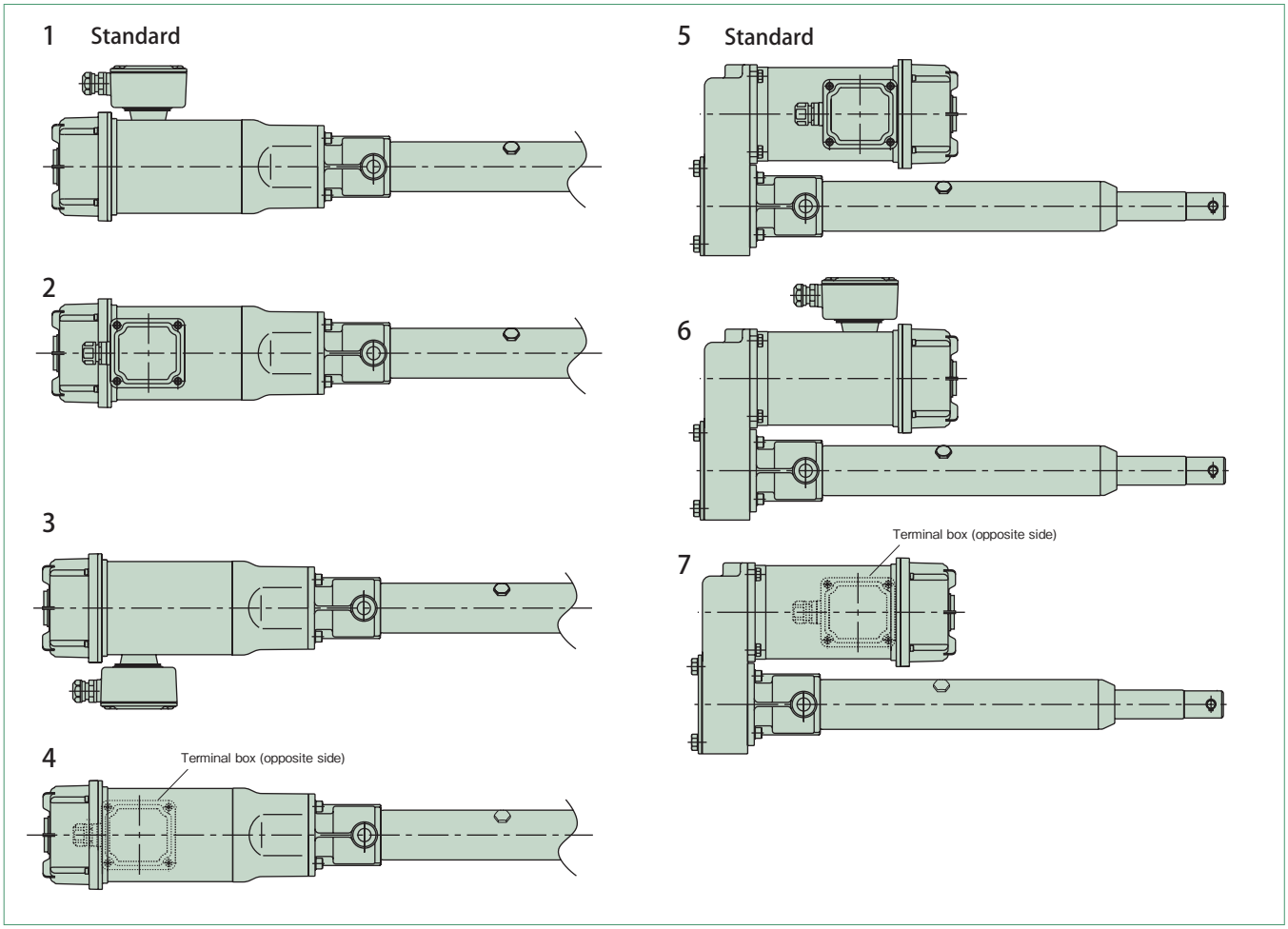
1. Remove the lid of the terminal box.
2. Remove the two screws fixed to the terminal block.
3. Bring up the terminal block without removing the wire connection for the motor and the brake, and remove the four screws fixed to the terminal box.
4. Rotate the terminal box in the desired direction and re-fix it to the main body.
5. Install the terminal block again.
   Be aware that if the lead wires are trapped under the terminal block, the wires will be broken or an insulation failure will occur.
6. After connecting the power cable, install the lid, then the procedures are completed.

When fixing the terminal box to the main body, check that the rubber packing is correctly sandwiched, then firmly tighten the four screws.



2. “Position” of motor terminal box

The position of the motor terminal box can be rotated by every 90 degrees around the motor shaft as shown in the following diagram.
However, this change must not be carried out by the customer. Specify the position when ordering the power cylinder.



⚠ WARNING

■ Cautions for selecting

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

Speed symbol	H	U
Nominal speed mm/s 50/60Hz	100/120	200/240
0.5s operation moving amount mm	50/60	100/120
Predicted maximum coasting amount mm (Reference)	24/33	67/89
Minimum necessary stroke mm	74/93 or more	167/209 or more

■ Cautions for installation

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

■ Cautions for use

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

Easy wiring specifications

This is a specification in which limit switches for thrust detection and external adjustment are wired by us before shipment. For details, request a leaflet.

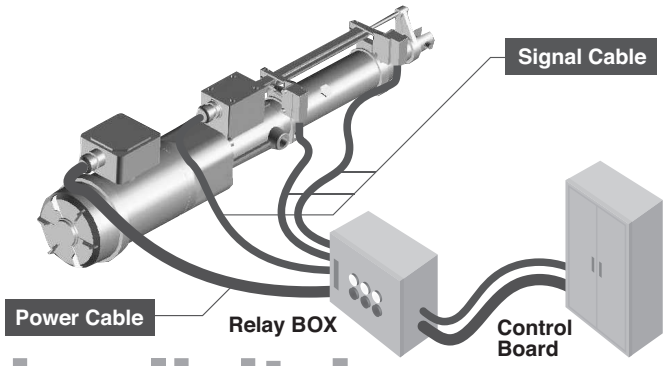
Power cylinder G series have become easier to use.

Slim & Simple　Cost-effective　Safe

To respond to voices of the **"power cylinder is troublesome when it comes to wiring!"** from customers, **[simple wiring specifications]** have been added to LPG series. (Option)
The power cylinder can be selected from two of "Automatic detecting type" and "Centralized terminal box type" with the keywords of simple, neat, reduction in wiring man-hours, and safety (automatic detecting type).

In standard specifications

- **Large number of wires and its complexity require wiring man-hours and cost at the relay box.**
- **Equipment may be damaged due to omission of wiring for the external limit switch for thrust detection and stroke adjustment.**



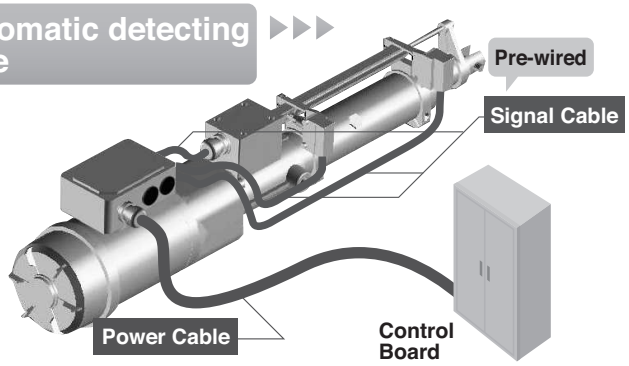
Needs simplicity!

By adoption of easy wiring specifications

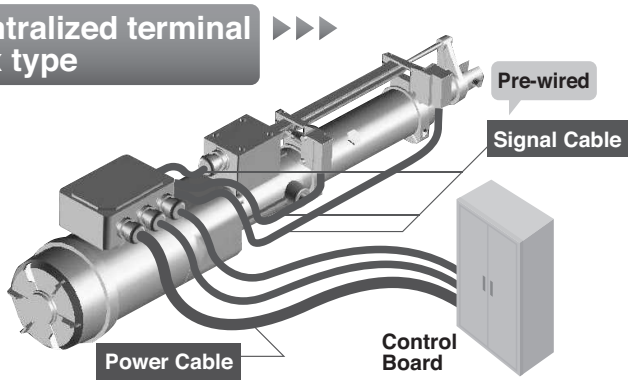
Advantages

- Slim and simple in appearance
- Cost reduction by pre-wired relay boxes
- Operates just by connecting the power cable to the terminal box
- Prevents damage from excessive torque and stroke caused by incomplete relay box wiring

Automatic detecting type



Centralized terminal box type



Innovation in Motion

TSUBAKI

MASA JAYA

PT. MASA JAYA PERKASA

info@masajayaperkasa.com

Jl. Hayam Wuruk No. 76,
Jakarta Barat,DKI Jakarta 11160

(+62)21-649-6496

(+62)852-1116-7713