

## 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

### Stable high efficiency and long life

Stable high efficiency and long life have been realized by adopting a nut material excellent in compatibility with an aligning trapezoidal screw (centralizing screw) designed only for the power cylinder.

(L, M, H speed of 700N, L, M, H speed of 1.00kN, L, M speed of 1.50kN, L speed of 3.00kN)

### Quiet operation

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

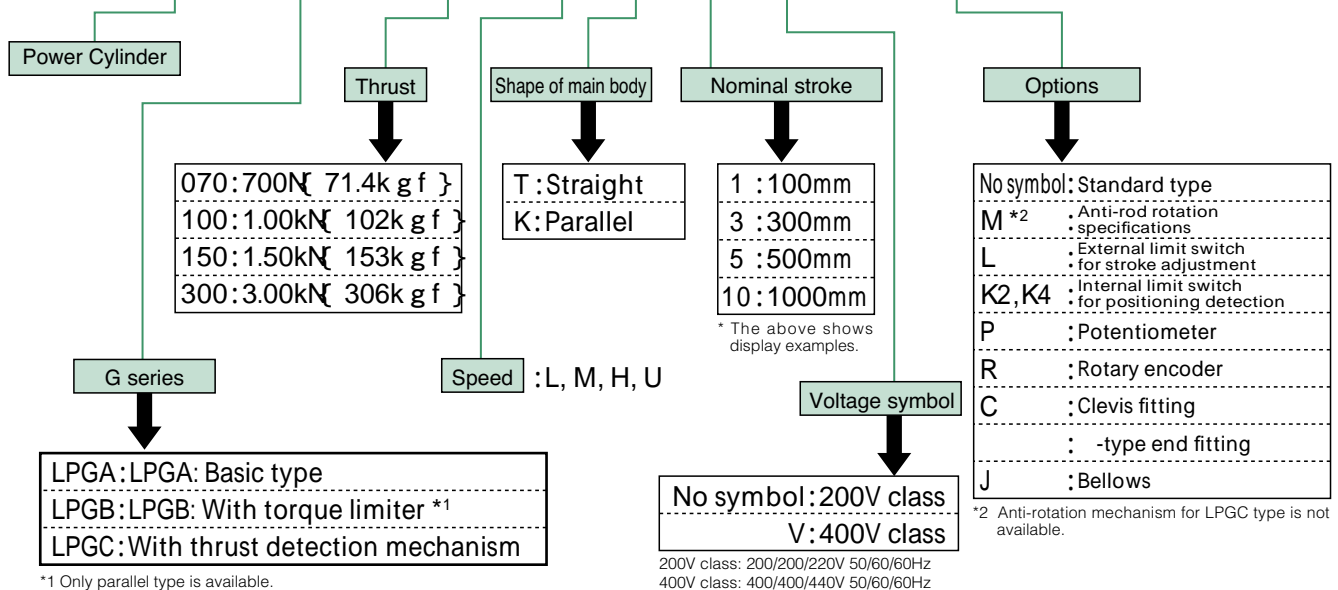
### Excellent speed stability

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 K2P J



## Standard model list

| Model                         | Speed<br>symbol | Rated<br>thrust<br>N<br>{ kgf } | Nominal<br>speed<br>mm/s<br>50/60Hz | Motor<br>capacity<br>kW | Rod moving<br>amount per<br>one turn of<br>manual shaft<br>mm | Rod rotation force |           | Nominal<br>stroke<br>mm | Shape of<br>main body |          | Type        |                     | Option                             |         |             |                            |                   |                |
|-------------------------------|-----------------|---------------------------------|-------------------------------------|-------------------------|---|--------------------|-----------|-------------------------|-----------------------|----------|-------------|---------------------|------------------------------------|---------|-------------|----------------------------|-------------------|----------------|
|                               |                 |                                 |                                     |                         |   | N·m                | { kgf·m } |                         | Straight              | Parallel | Basic model | With torque limiter | With thrust detection<br>mechanism | Bellows | External LS | Position detection<br>unit | -type end fitting | Clevis fitting |
| LPGA070<br>LPGB070<br>LPGC070 | L               | 700<br>{ 71.4 }                 | 25/30                               | 0.1                     | 1   | 1.54               | 0.16      | 100                     |                       |          |             | *1                  |                                    |         | *1          |                            | *1                | *2             |
|                               | M               |                                 | 75/90                               | 0.2                     | 3   | 2.31               | 0.24      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |
|                               | H               |                                 | 100/120                             | 0.4                     | 4   | 1.54               | 0.16      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |
|                               | U               |                                 | 200/240                             | 0.4                     | 8   | 0.99               | 0.10      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |
| LPGA100<br>LPGB100<br>LPGC100 | L               | 1.00k<br>{ 102 }                | 25/30                               | 0.1                     | 1   | 2.20               | 0.22      | 300                     |                       |          |             | *1                  |                                    |         | *1          |                            | *1                | *2             |
|                               | M               |                                 | 75/90                               | 0.2                     | 3   | 3.29               | 0.34      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |
|                               | H               |                                 | 100/120                             | 0.4                     | 4   | 2.20               | 0.22      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |
|                               | U               |                                 | 200/240                             | 0.4                     | 8   | 1.41               | 0.14      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |
| LPGA150<br>LPGB150<br>LPGC150 | L               | 1.50k<br>{ 153 }                | 25/30                               | 0.2                     | 1   | 3.29               | 0.34      | 600                     |                       |          |             | *1                  |                                    |         | *1          |                            | *1                | *2             |
|                               | M               |                                 | 75/90                               | 0.4                     | 3   | 4.94               | 0.50      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |
|                               | H               |                                 | 100/120                             | 0.4                     | 4   | 4.94               | 0.50      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |
| LPGA300<br>LPGB300<br>LPGC300 | L               | 3.00k<br>{ 306 }                | 25/30                               | 0.4                     | 1   | 6.59               | 0.67      | 1000                    |                       |          |             | *1                  |                                    |         | *1          |                            | *1                | *2             |
|                               | M               |                                 | 50/60                               | 0.2                     | 2   | 4.24               | 0.43      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |
|                               | H               |                                 | 67/80                               | 0.4                     | 2.67  | 4.24               | 0.43      |                         |                       |          |             |                     |                                    |         |             |                            |                   |                |

Note) 1. For LPGC070H, LPGC100H types in the above table, the motor capacity is 0.2kW.  
2. Rod rotating force of LPGC70H type in the above table is 2.31N·m(0.24[kgf·m]), and rotating force of LPGC100H type is 3.29N·m(0.34[kgf·m]).

\*1 Only parallel type is available.  
\*2 LPGC type is not available.  
\*3 At the U speed, press and stop cannot be used.

## Motor specifications

|                       |   |                      |
|-----------------------|---|----------------------|
| Model                 | Totally enclosed self cooling type with brake |                      |
| Output                | Standard model list                           |                      |
| Number of poles       | 4 poles                                       |                      |
| Power supply          | Voltage                                       | 3 200V / 200V / 220V |
|                       | Frequency                                     | 50Hz/ 60Hz/ 60Hz     |
| Heat resistance class | E   |                      |
| 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 51.

## Painting color

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

## Standard use environment

| Environment  | Ambient temperature | Relative humidity<br>(no dew condensation) | Impact resistance value | Installation altitude          | Atmosphere        |
|--------------|---------------------|--|-------------------------|--------------------------------|-------------------|
| Model        |                     |  |                         |                                |                   |
| Outdoor type | - 15 to 40          | 85% or less                                | 1G or less              | 1000m or lower above sea level | Normally outdoors |

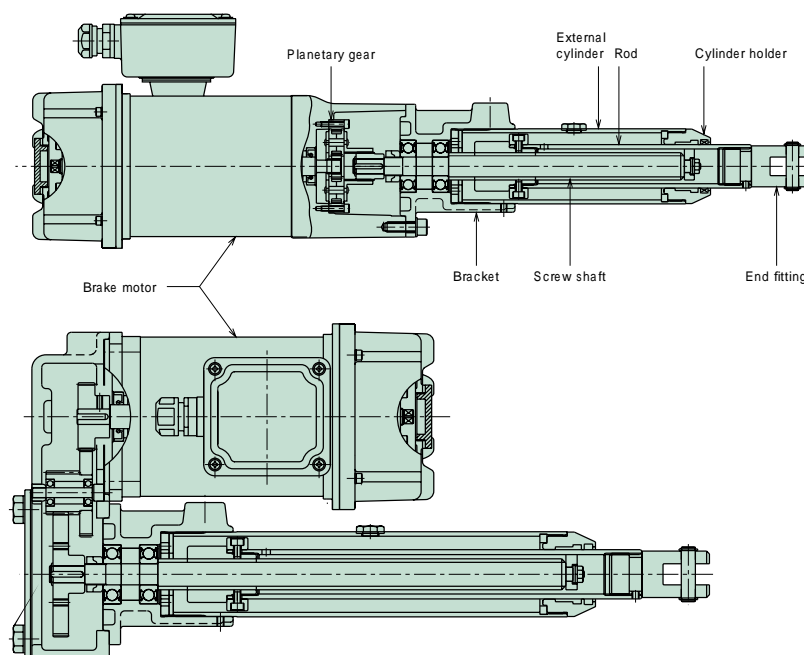
- 1) If used below the freezing point, the characteristics of the cylinder (current value, speed) may change from the influence of grease.
- 2) Cylinders with bellows are recommended in an excessively dusty location.
- 3) All models are totally enclosed structures so that they can be used normally outdoors, however, when exposed to constant adverse conditions such as water, steam and snow accumulation, an appropriate cover is required. When using at 40 or higher, always protect with a heat insulating cover, etc. Never use in a flammable atmosphere. Otherwise it may cause an explosion and fire. In addition, avoid using in a location where vibration or shock exceeding 1G is applied.

## Structure

### LPGA : Basic type

Straight

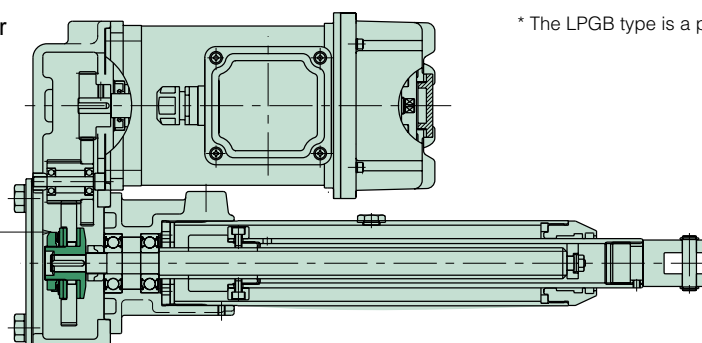
Parallel



### LPGB : With torque limiter

Parallel

Torque limiter

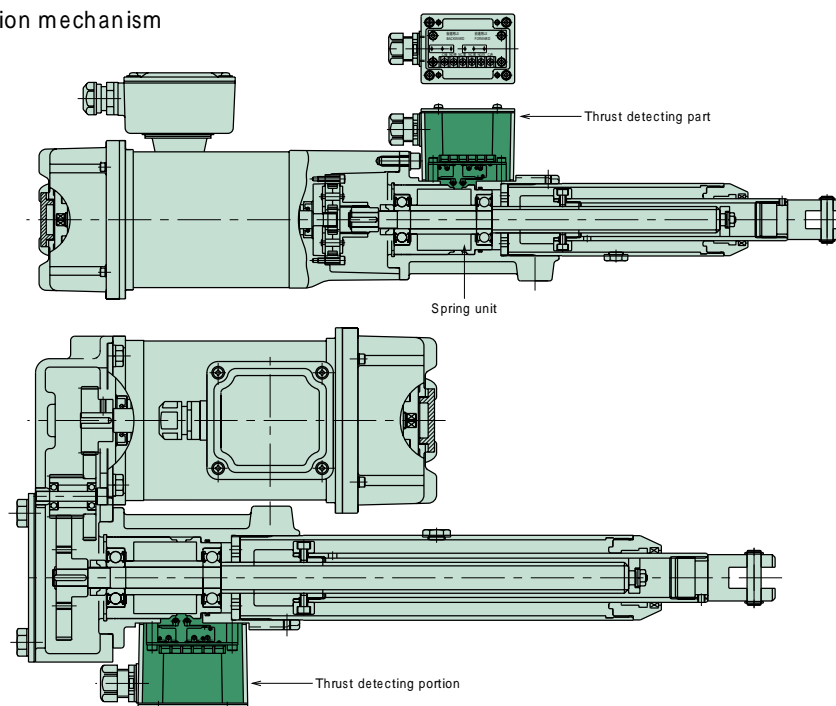


\* The LPGB type is a parallel type only due to the mechanism.

### 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).

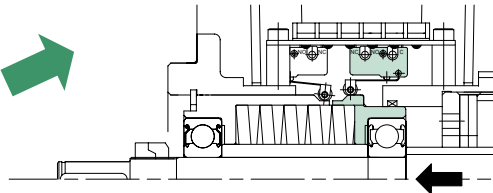
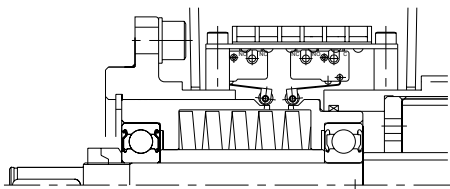
**LPGA (basic model)** — This type has a stop function with a brake only. Note that use exceeding the nominal stroke may result in breakage. When using this type, sensor for stroke regulation must be installed or optional external limit switch for stroke adjustment must be used. (The other two types 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)** — 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.  
\* Only parallel type is available.

**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.  
When press (pull) and stop are performed.  
When an electric signal is required at overload.  
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.

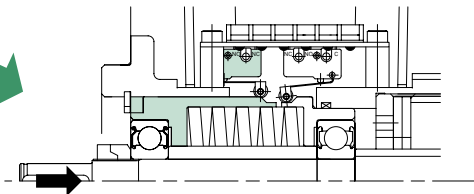
### [Thrust detecting mechanism]

#### At normal condition



#### 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.

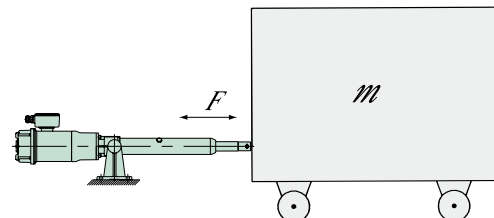
### <Operation preset load for protection device>

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 :  $\mu$   
Carriage traveling resistance :  $F = \mu M$  Rated thrust



## Cautions for use

### 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.

### 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.

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

## Selection 1

### Conditions of use required for selection

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

### Selection procedures

1. Select the suitable model number from the standard model list (page 39) 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                     |

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

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

The working time rate is calculated with the formula at the right.

### Duration of life as a guide

The duration of life of the main body is 25 km of a traveling distance of the cylinder (nut). (With rated thrust of the power cylinder) However, the wear lives of screws and nuts vary depending on the use conditions and the lubricating state.

Select a brake with an operating life of 2 million times as a guide. However, gap adjustment is required until the expiration of life. Either one of the standards first reached is a guide for the life.

### 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.

## 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.

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)

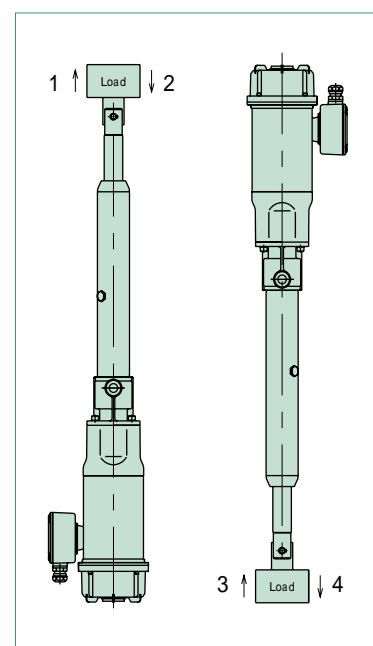
Unit: mm

| Usage<br>Model                |   | 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<br>LPGB070<br>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<br>LPGB100<br>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<br>LPGB150<br>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<br>LPGB300<br>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         |

\* 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.

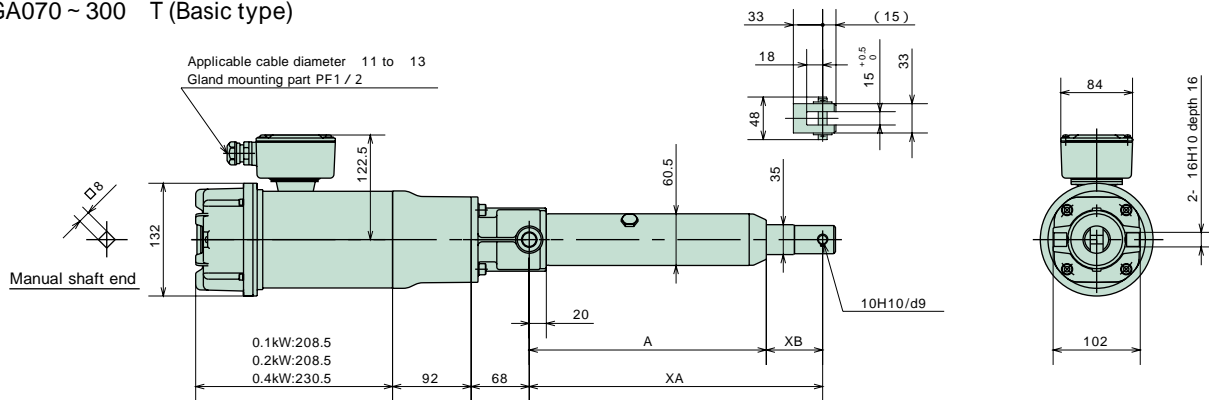
\* Stop accuracy: This indicates a variation in the stop position when stop is repeated. The above table takes ±25% of time lag of the relay and the brake into consideration.



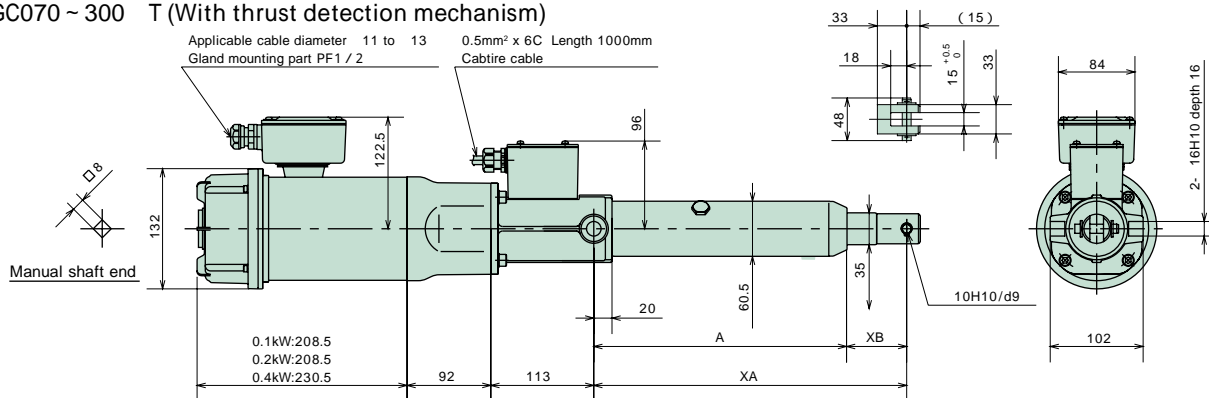
\* An anti-rod rotation mechanism is required.

## Dimensions Table Straight type

### LPGA070 ~ 300 T (Basic type)



### LPGC070 ~ 300 T (With thrust detection mechanism)



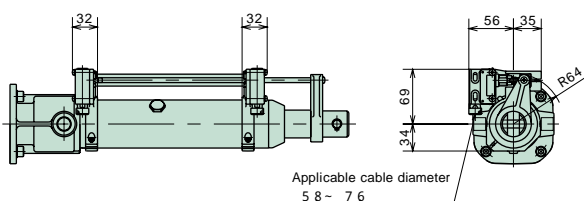
Unit: mm

| Model        |                          | Speed<br>symbol  | Shape of<br>main body | Nominal<br>stroke | A    | XA   |      | XB  |      | Approx. mass( kg ) |      |
|--------------|--------------------------|------------------|-----------------------|-------------------|------|------|------|-----|------|--------------------|------|
|              |                          |                  |                       |                   |      | MIN  | MAX  | MIN | MAX  | LPGA               | LPGC |
| LPGA<br>LPGC | 070<br>100<br>150<br>300 | L<br>M<br>H<br>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   |
|              |                          |                  |                       |                   |      |      |      |     |      |                    |      |
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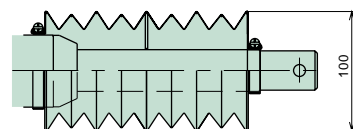
Note) 1. The mechanical stroke includes a margin of 3 to 8 mm of the nominal stroke on both sides.  
2. For U speed, only 070 and 100 are applied.

## Options

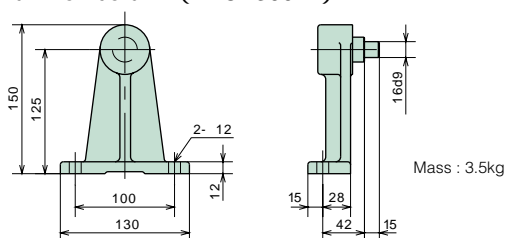
### External LS



### Bellow ( - J )

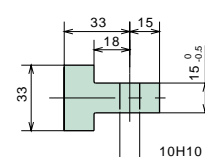


### Trunnion column ( LPGA300-T )



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

### -type end fitting ( LPGA300- )



\* 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.

Handwriting practice area with horizontal dashed lines.

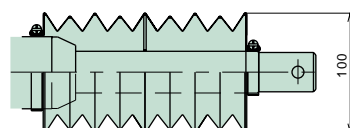
LPGA070 ~ 300 K (Basic type)  
LPGB070 ~ 300 K (With torque limiter)



| Model                |                          | Speed<br>symbol  | Shape of<br>main body | Nominal<br>stroke | A    | XA   |      | XB  |      | Approx. mass( kg ) |      |      |
|----------------------|--------------------------|------------------|-----------------------|-------------------|------|------|------|-----|------|--------------------|------|------|
|                      |                          |                  |                       |                   |      | MIN  | MAX  | MIN | MAX  | LPGA               | LPGB | LPGC |
| LPGA<br>LPGB<br>LPGC | 070<br>100<br>150<br>300 | L<br>M<br>H<br>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   |

## Options

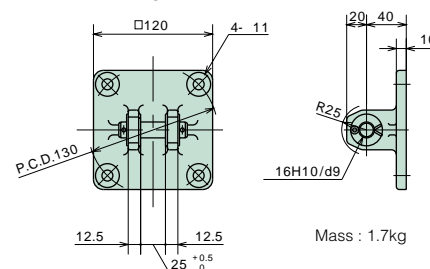
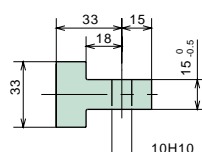
Bellows( - J )



## Trunnion column( LPGA300-T )

-type end fitting( LPGA300- )

## Clevis fitting( LPTB500-C )



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

45



Handwriting practice area with horizontal dashed lines.

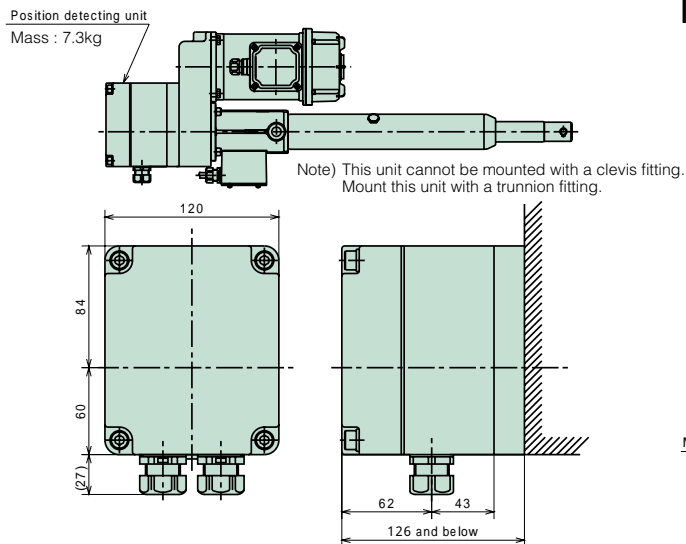
## Position detecting unit

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

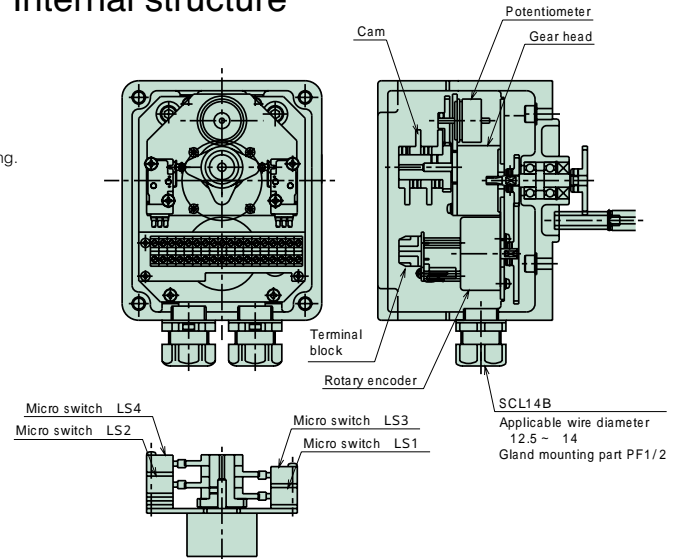
### 1. Position detecting internal LS (with two or four pieces)

## 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.

|                                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |   |   |    |
|-------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|---|---|----|
| Terminals for power cylinder wiring |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
| Terminals for device wiring         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
| Terminal No.                        | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15   | 16  | 17  | 18 |

| 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~12V | 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.

## <Setting of LS>

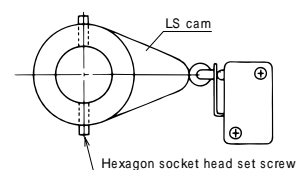
First, before installing a power cylinder to the equipment, operate the cylinder in a single unit to check the rotating direction of the LS cam.

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.

| Micro switch specification |  |
|----------------------------|--|
| Model                      | OMRON<br>D2VW-5LA2-1M or equivalent                  |
| Circuit configuration      | <p>NC (Red) —●— COM (Black)<br/>NO (Blue) —○—</p>    |
| Electric rating            | AC250V 4A (cos 0.7)                                  |
| Connection                 | Terminal block connection in position detecting unit |



## 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             | 1k   |
| Rated power                  | 0.75W  |
| Dielectric strength          | AC1000V 1min.  |
| Effective electric angle     | $355 \pm 5^\circ$                                      |
| Effective mechanical angle   | 360° endless   |
| Connection                   | Connected to terminal block in position detecting unit |
|                              |  |

### 3. Rotary encoder

| Rotary encoder specifications |   |
|-------------------------------|---|
| Model                         | OWW2-003-2M or equivalent   |
| Manufacturer                  | Nemicon Co, Ltd   |
| Output pulse number           | 30P/R   |
| Output waveform               | 90° phase difference two-phase square wave + home position output |
| Output voltage                | H Power voltage 1V or more (No load)                              |
|                               | L 0.5V or more (at maximum lead-in current)                       |
| Power supply                  | DC4.5 ~ 13.2V 80mA  |

\* Output pulse number from the power cylinder has been set to one pulse/stroke 1mm.

The output signal of the standard specification is of an incremental type, however, an absolute type is also available.

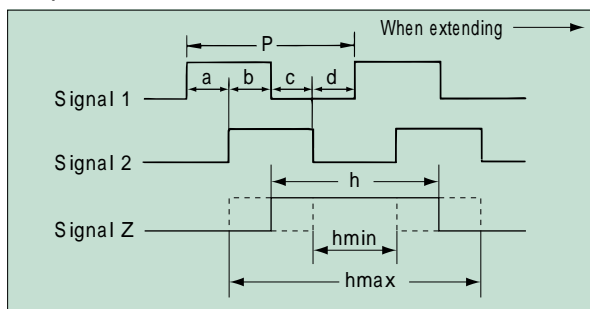
The output type of the standard specification is voltage output, however, open collector output and line driver output specifications are also available.

#### Output connection

| Signal 1     | Signal 2      | Signal Z       | +5V to 12V  | 0V            | Case           |
|--------------|---------------|----------------|-------------|---------------|----------------|
| Green<br>(9) | White<br>(10) | Yellow<br>(11) | Red<br>(12) | Black<br>(13) | Shield<br>(14) |

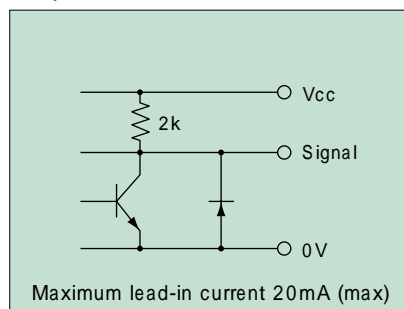
Figures in parentheses indicate terminal No.

#### Output waveform



a. b. c. d =  $P/4 \pm P/8$  P/2 h 3P/2

#### Output circuit



\* Use together with equipment such as the sequencer and a programmable controller to control a stroke as a digital signal.

The standard products incorporate an incremental type encoder.

The rotary encoder has been set to output one pulse per stroke of 1mm.

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 30 pulses.

Do not apply vibration or impact to the rotary encoder because it is precision equipment.

Use shield wire for wiring to the rotary encoder.

Distance between rotary encoder and controller should be within 5m.

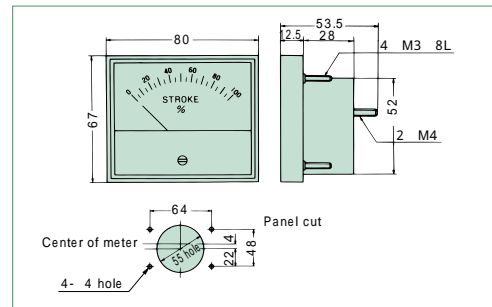
## Control option

### For potentiometer

#### Stroke indication meter

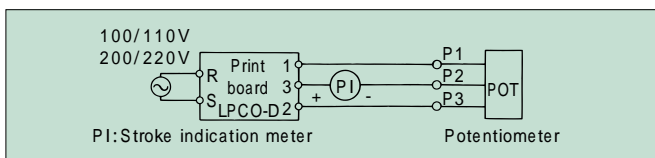
This meter indicates a stroke in % by a signal from the print board.

|                     |                                     |
|---------------------|-------------------------------------|
| Model               | RM-80B(DC100 $\mu$ A) or equivalent |
| Grade               | JIS C 1102 2.5 class                |
| Appearance          | Frame• black                        |
| Scale specification | Entire stroke is indicated in 100%  |



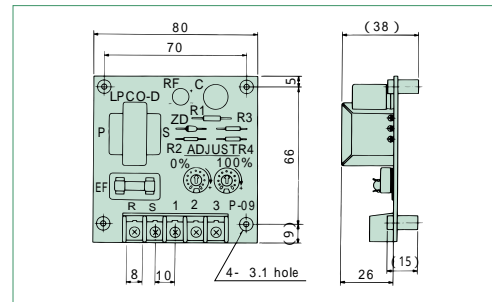
#### Printed board

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)

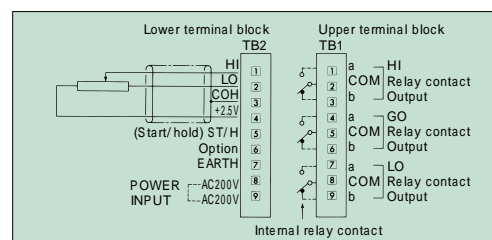
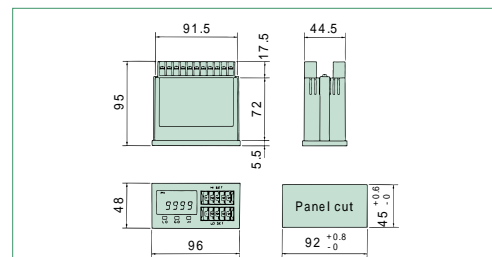


#### R controller

This controller converts voltage signals from the potentiometer in the position detecting unit of the power cylinder G series into digital signals, and performs indication and stroke control. This controller incorporates a scaling function, and can indicate real strokes or extension (%).

This R controller can be directly connected to the potentiometer.

|   |                                     |
|---|-------------------------------------|
| Model   | RX-5455-NBAS (BURRUF) or equivalent |
| Total resistance value of input potentiometer | 0.8k ~ 12k                          |
| Indication                                    | 4 digits 7 segment LED              |
| Appearance                                    | Black                               |
| Comparison output                             | HI, LO, GO (Relay output)           |
| Comparison preset value                       | 0 - $\pm$ 9999                      |
| Comparison output contact capacity            | DC30V/1A AC250V/0.2A                |
| Output contact configuration                  | 1C (for all of HI, GO, LO sides)    |
| Power supply                                  | 200V AC $\pm$ 10% 50/60Hz           |



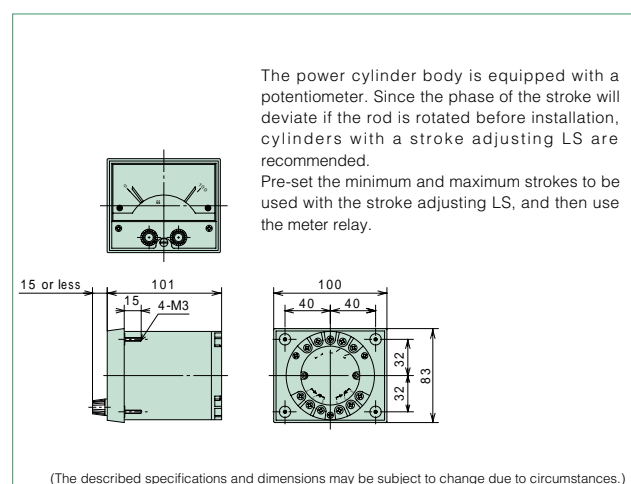
#### Meter relay

Used for simple adjustment of stroke on the operation panel.

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

Note) Specify for output of 4 to 20mA if the IC unit (4 to 20mA output), etc., is used.

| 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                 | AC100/100, 200/220V 50/60Hz                            |
| Input                        | Max. DC100 $\mu$ A                                     |
| Output contact configuration | For both of HIGH, LOW sides<br>1C (See the right Fig.) |
| Contact capacity             | AC250V3A (cos $\phi$ = 1)                              |

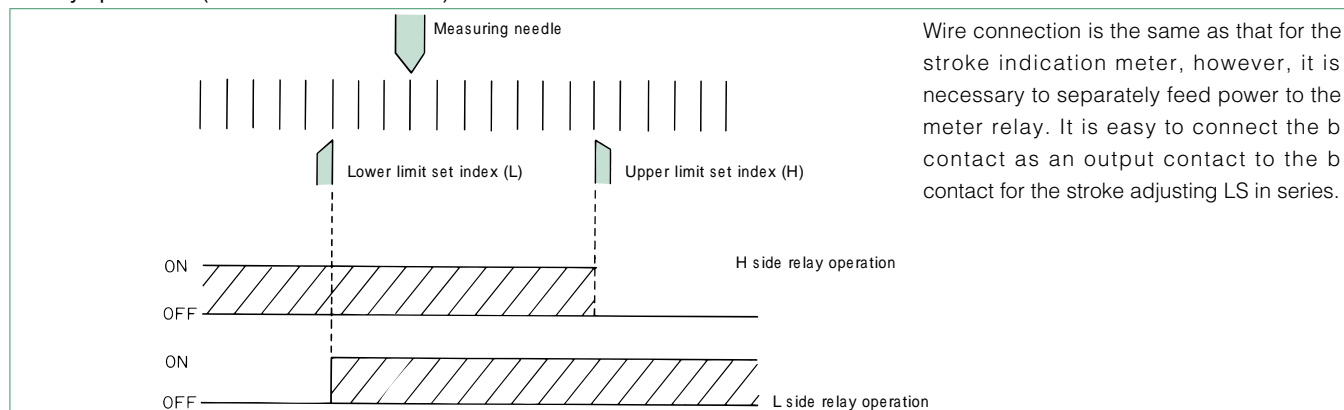


## Control option

### <Printed board>

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

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



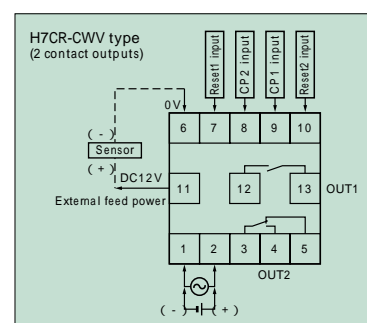
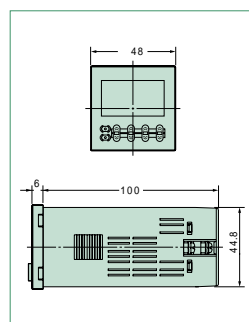
## For rotary encoder

### Pulse counter

This counter indicates the number of pulses from the rotary encoder and produces relay output. This has a pre-scale function and can indicate the real moving amount. When using this counter for stroke control, combine with a self hold circuit. Indicated values and internal counter value do not change even at power failure because they are backed up by a built-in battery.

Note) Do not move the power cylinder in the event of a power failure because this counter cannot count at that time.

|                               |   |
|-------------------------------|---|
| Model                         | OMRON H7CX-AW or equivalent                         |
| Type                          | Preset counter                                      |
| Protecting structure          | IP54F (Panel surface)                               |
| Pre-scale function            | With (0.001 to 99.999)                              |
| Indication method             | Values calculated by 7 segment LCD, with back light |
| Rated voltage                 | AC100 ~ 240V (50/60Hz)                              |
| Power consumption             | Approx. 6.6V (at 240V AC 50Hz)                      |
| Control output                | With contact: AC250V 3A $\cos \phi = 0.8 \sim 1$    |
| External feed power           | DC12V $\pm 10\%$ 100mA (Ripple 5% or less)          |
| Operating ambient temperature | -10 to 55 °C (however, shall not be frozen)         |
| Storage temperature           | -25 to 65 °C (however, shall not be frozen)         |
| Operating ambient humidity    | 35 ~ 80%RH  |



## Shock relay

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

For details, refer to the "TSUBAKI Emerson SAFCON overload protection devices and control devices catalogue."



Shock relay TSBSA series  
(Economy, automatic reset type)



Shock relay TSBSS series  
(Economy, self-holding type)



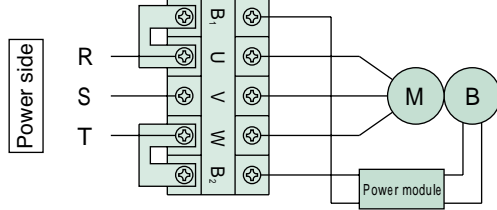
Shock relay TSBED series  
(Digital indication, self-holding/automatic reset type)

## Wire connection

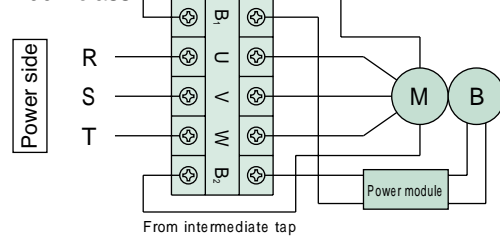
### Wire connection for brake motor (motor with DC brake)

#### AC internal wiring

##### 200V class

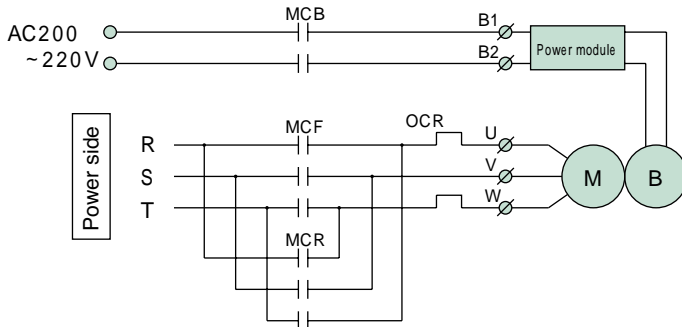


##### 400V class

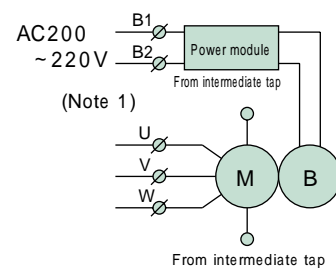


#### AC external wiring

##### 200V class



##### 400V class



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.)

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

## Limit switch specification

|                       | Stroke adjusting external LS                        | Thrust detecting LS                          |
|-----------------------|---|--|
| Model                 | OMRON<br>D4E-1B20N or equivalent                    | OMRON<br>SS-5GL2D or equivalent              |
| Circuit configuration |   |  |
| Electric rating       | AC250V 3A (cos 0.4)                                 | AC250V 2A (cos = 0.4)                        |
| Connection            | M3 screw x3<br>Applicable cable diameter 5.8 to 7.6 | 0.5Ex6C Length 1000A<br>Cable cable draw-out |

## Motor current value, Brake current value

| Output,<br>frame No. | Motor current value (A) |               |               |               |               |               | Brake<br>model | Brake current value (A) |              |              |              |              |              |
|----------------------|-------------------------|---------------|---------------|---------------|---------------|---------------|----------------|-------------------------|--------------|--------------|--------------|--------------|--------------|
|                      | 200V<br>50Hz            | 200V<br>60Hz  | 220V<br>60Hz  | 400V<br>50Hz  | 400V<br>60Hz  | 440V<br>60Hz  |                | 200V<br>50Hz            | 200V<br>60Hz | 220V<br>60Hz | 400V<br>50Hz | 400V<br>60Hz | 440V<br>60Hz |
| 4P 0.1kW             | 0.73<br>(2.7)           | 0.63<br>(2.4) | 0.65<br>(2.6) | 0.38<br>(1.5) | 0.33<br>(1.3) | 0.34<br>(1.4) | SBH01LP        | 0.17<br>0.26            | 0.17<br>0.26 | 0.17<br>0.28 | 0.17<br>0.26 | 0.17<br>0.26 | 0.17<br>0.28 |
| 4P 0.2 kW            | 1.26<br>(5.6)           | 1.1<br>(5.2)  | 1.1<br>(5.7)  | 0.63<br>(2.5) | 0.55<br>(2.2) | 0.55<br>(2.4) | SBH02LP        | 0.17<br>0.26            | 0.17<br>0.26 | 0.17<br>0.28 | 0.17<br>0.26 | 0.17<br>0.26 | 0.17<br>0.28 |
| 4P 0.4 kW            | 2.2<br>(9.0)            | 2.0<br>(7.7)  | 2.0<br>(8.5)  | 1.1<br>(4.4)  | 1.0<br>(3.8)  | 1.00<br>(4.2) | SBH04LP        | 0.17<br>0.26            | 0.17<br>0.26 | 0.17<br>0.28 | 0.17<br>0.26 | 0.17<br>0.26 | 0.17<br>0.28 |

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.

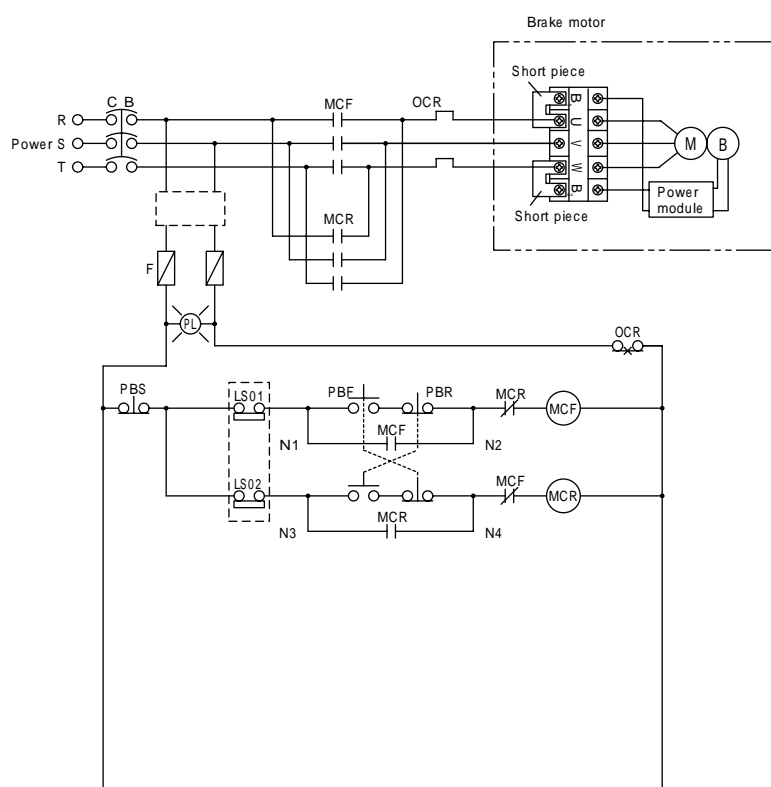
3. A DC brake is used as a brake. The upper stage of the brake current value indicates a value on the primary side of the power module, and the lower stage indicates a value on the secondary side.

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 brake AC internal wiring reference circuit



LS01: Extend stroke adjusting external limit switch

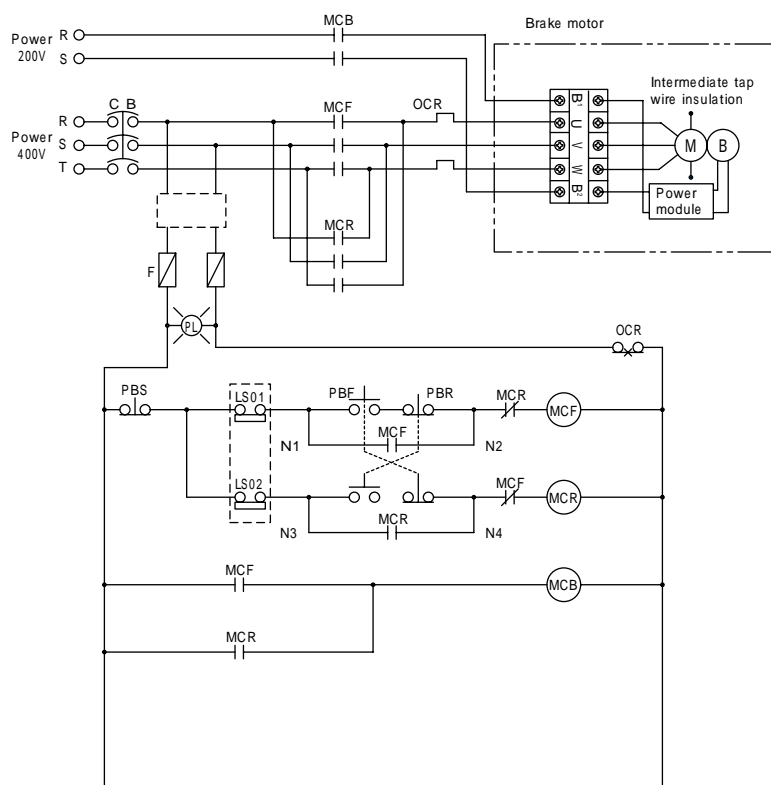
LS02: Retract stroke adjusting external limit switch

#### 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 86.

### 400V class Brake AC external 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 AC250V, 7A or more.

\* For wire connection when an inverter is used, refer to page 86.

## Installation

### Installation direction

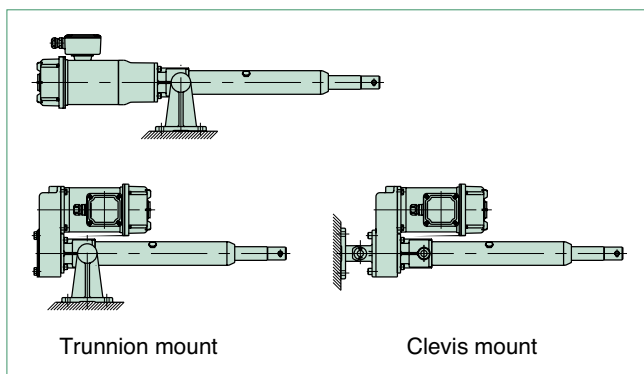
Either horizontal, vertical and inclined directions are allowed.

### 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 -type end fitting.



### Manual 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 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 39).

### 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).

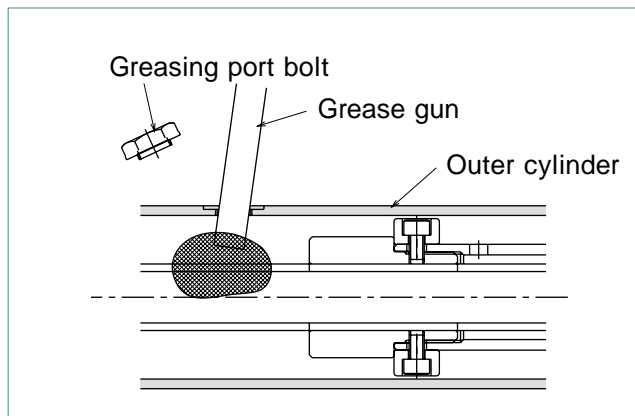
### Setting of stroke adjusting external LS

1. Take the coasting amount (page 42) 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.

## Maintenance

### Greasing on ball screw

Use the ball 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 ball screw, remove the greasing port bolt on the outer cylinder and advance the rod in the full stroke and apply grease to the outer circumference of the screw with a grease gun, and then reciprocate the rod within the stroke to be used. Repeat this operation a few times.



#### ⚠ WARNING

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

Table 1 Recommended grease

| Use classification | Company name         | Grease name                |
|--------------------|----------------------|----------------------------|
| Screw shaft        | TSUBAKI EMERSON      | 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 100.

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.)

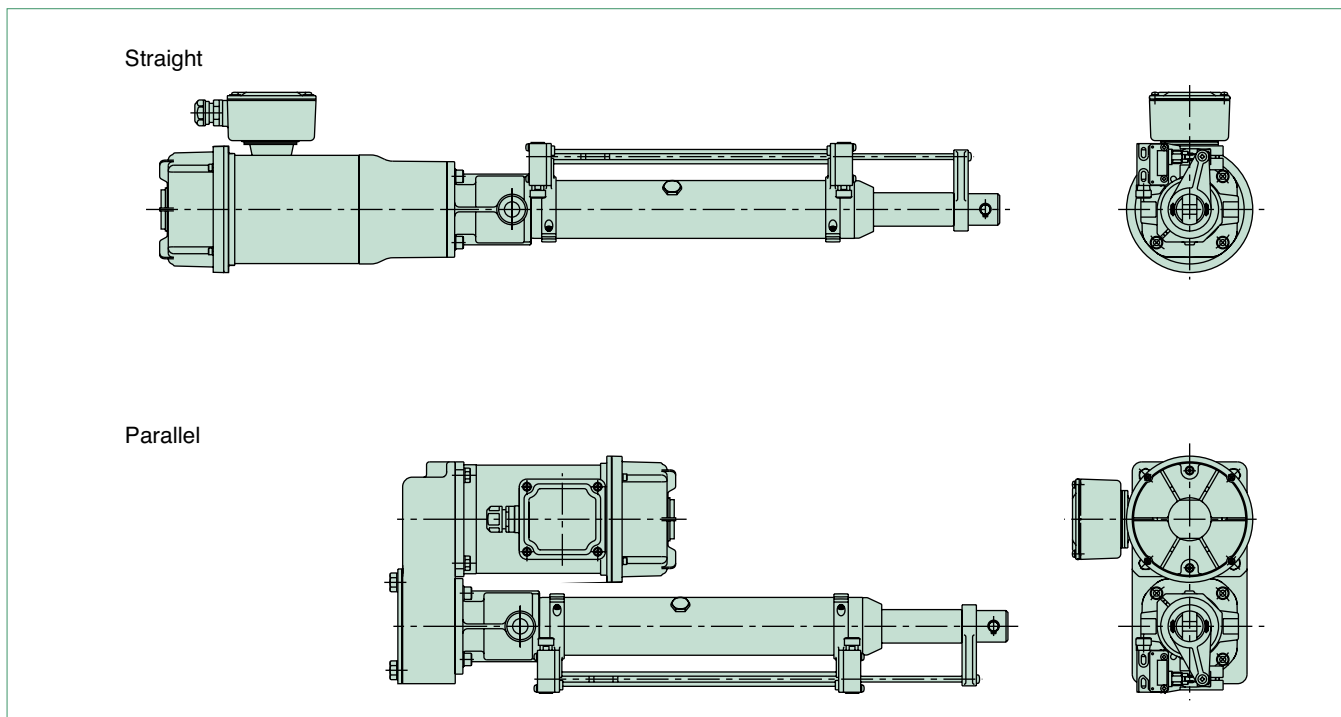
Helical gear (parallel type): Moly gear grease No. 1 (SUMICO LUBRICANT CO., LTD.)

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



## Adjustment of external limit switch and variation of mounting

### 1. Standard Mounting Form

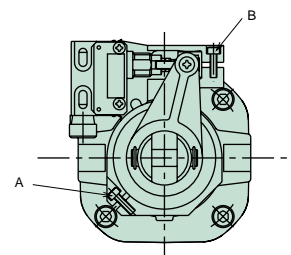


### 2. Adjustment method

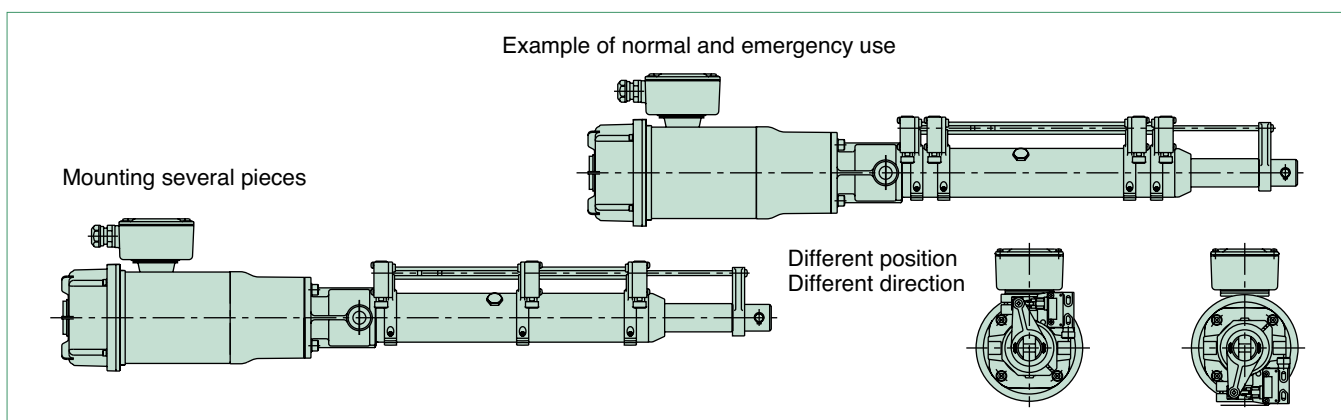
The power cylinder G series has a margin of approximately 3 to 8mm of the nominal stroke on both sides which allows for mechanical stroke. The stroke to be used is within the nominal stroke, therefore, adjust the limit switch so that operation is made in this range. If the nominal stroke is exceeded, 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, a separate Instruction Manual is available. Contact us.
- 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

### “Direction” of motor terminal box

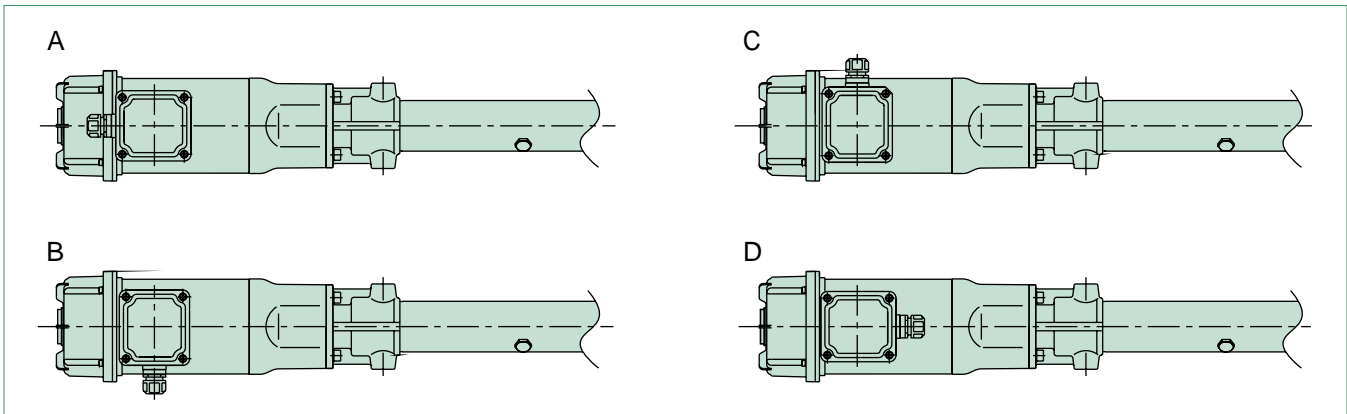
The motor terminal box can be fixed in four directions shown in the following diagram.

This direction can be easily changed by the customer.

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.
6. After connecting the power cable, install the lid, then the procedures are completed.

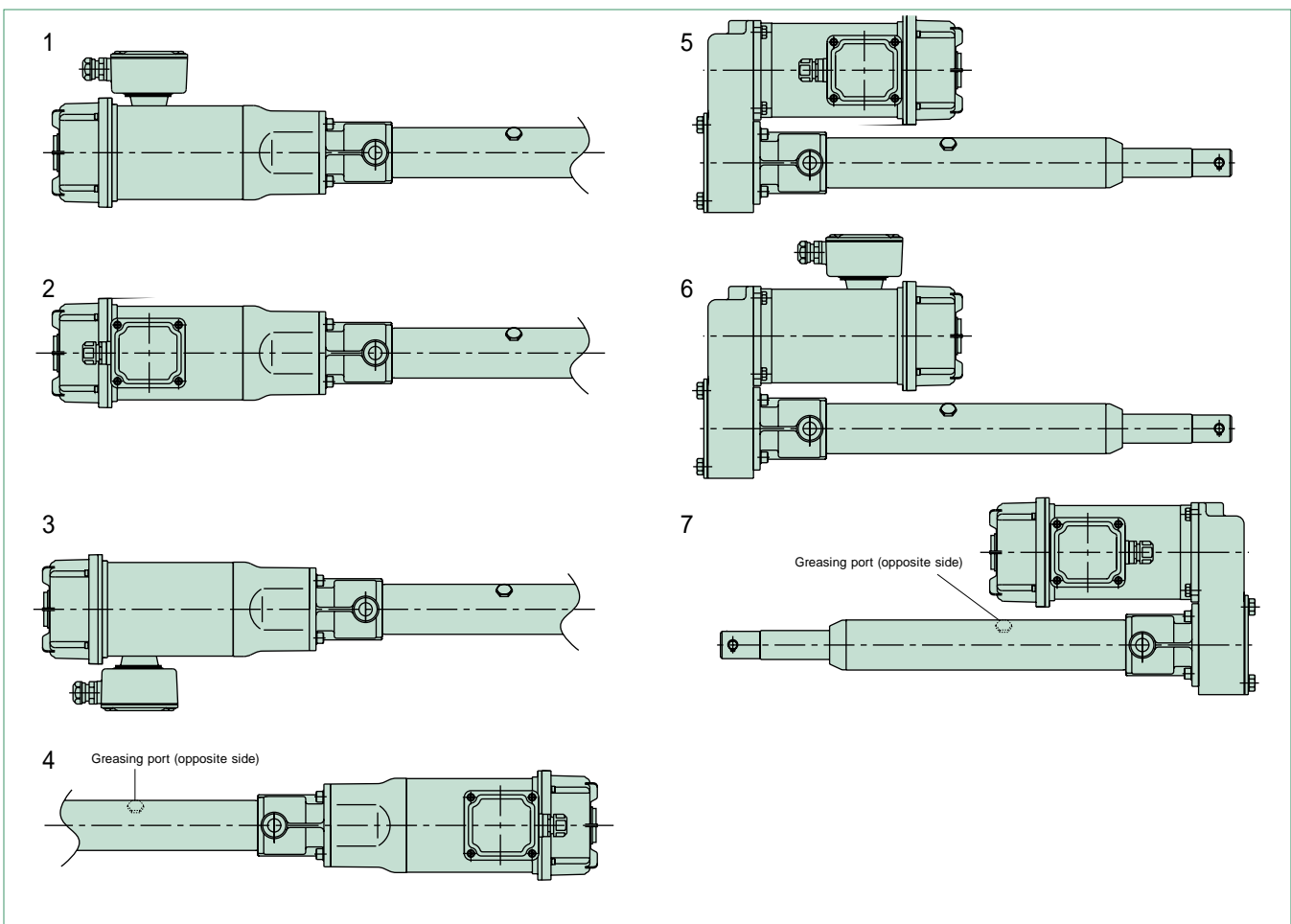
When fixing the terminal box to the main body, check that the rubber packing is correctly sandwiched, then firmly tighten the four screws.



### “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.

When using a cylinder of the cabtire cable lead wire specification outdoors, carry out waterproofing treatment

## **■ 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.

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.

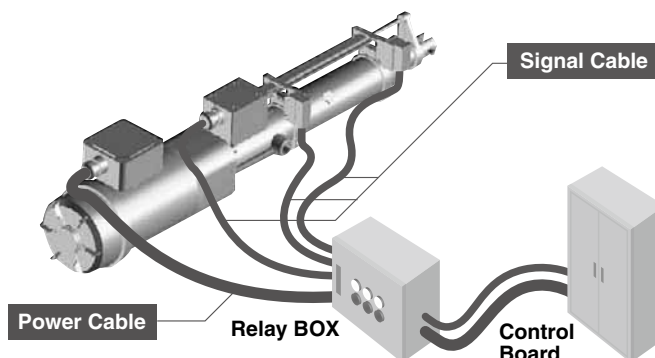


To respond to voices of the “power cylinder is troublesome when it comes to wiring!” from customers, [simple wiring specifications] have been added to LPG series. (Option)

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

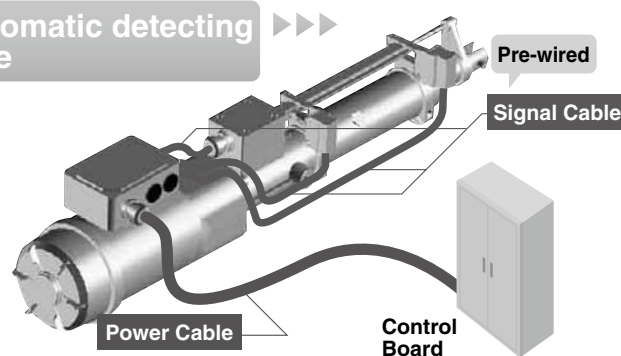
Slim and simple in appearance

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

