CKD

SM－482428－A

# INSTRUCTION MANUAL

## WIDE ANGLE HIGH GRIP HAND

## HJD Series

- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

The 2nd edition

# For Safety Use

To use this product safety, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (to the level pursuant to JIS B 8370 Pneumatic System Rules).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your applications, requirements, and how to use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, **read this operation manual carefully for proper operation.**

Observe the cautions on handling described in this manual, as well as the following instructions:

## ⚠ Precautions:

- Before performing an overhaul inspection on the actuator, deactivate residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- To prevent an electric shock, do not touch the electric wiring connections (exposed live parts) of the actuator equipped with a solenoid valve or switch. Perform an overhaul inspection with the power off. Also, do not touch these live parts with wet hands.

# INDEX

HJD Series
Wide Angle High Gripe Hand
Manual No. SM-482428-A



2012. 07. 03

# 1. PRODUCT

## 1.1 Specifications

| Model code / Item | | HJD-32CS | HJD-40CS | HJD-50CS | HJD-63CS |
|---|---|---|---|---|---|
| Working fluid | | Compressed air | | | |
| Max. working pressure | MPa | 0.7 | | | |
| Min. working pressure | MPa | 0.3 | | | |
| Ambient temperature | ℃ | 5 to 60 | | | |
| Port size | | M5 | Rc1/8 | | |
| Open and close angle | ° | -4～184 | | | |
| Rod diameter | mm | ϕ14 | ϕ16 | ϕ20 | ϕ20 |
| Volumetric capacity (reciprocating) | $cm^3$ | 46 | 88.7 | 180.8 | 331.5 |
| Repeatability (Initial valve) | mm | ±0.1 | | | |
| Product weight | kg | 1.03 | 1.58 | 2.67 | 3.97 |
| Lubrication | | Not required (Use Turbine oil, Class 1, ISO VG32 when required) | | | |

## 1.2 Features

1) Realized powerful grasp-force because of the toggle mechanism.

2) Possible to use without any adjustment for various wide OD works because the open-close angle is 180° .

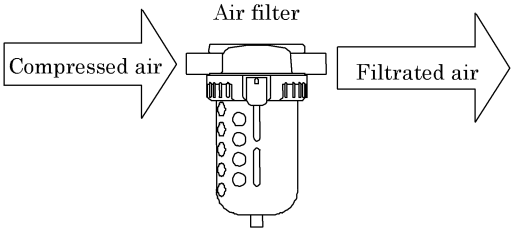
3) Realized improved repeatability and stabilized piston operation because of the use of piston guide.
Because the guide is used for the sliding area, it realize high rigidity against external load.

2
CAUTION

# 2. CAUTION

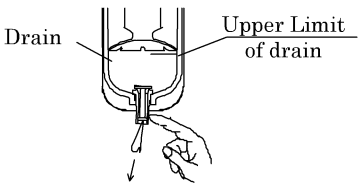
## 2.1 Fluid

1) It is necessary to use dehumidified air that has been filtered from compressed air. Carefully select an adequate filter that has an adequate filtration rate (preferably 5 $\mu$ m or less), flow rate and its mounting location (as nearest to the directional control valve as possible).




2) Be sure to drain out the accumulation in the filter periodically.

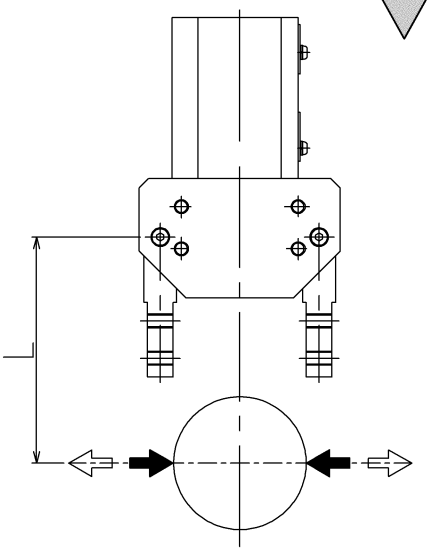
3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.




4) This hand does not require lubrication. It is recommended, however, to use Turbine oil Class 1, ISO VG32 as lubricant if lubrication is preferred.

# 3. HOLDING POWER

## 3.1 Holding Power and Weight of Load



1) The table of Holding Power on the next page represents the force with Claw length of ℓ at either Opening motion or Closing motion and does not represent max. weight of load capable to hold.

2) Required holding power varies remarkably depending on numerous elements.

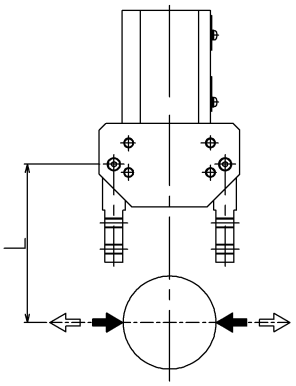
- Friction coefficient between Load and Claws
- Moment of inertia of Load during transference
- Relative position between center of gravity of Load and Clamp location, also width of Claws
- Structure and configuration of Claws

## 3.2 Guide line of selecting appropriate model (required gripping power) comparing with weight of Load

Safety coefficients for holding power against weight of Load are set as follows although it varies depending on Coefficient between Load and Claw, Shape of Load and Claws, transferring condition etc. Make that brief guideline for selecting models.

- Holding only — 5 times or Over
- Normal transference — 10 times or Over
- Transference with high acceleration — 20 times or Over

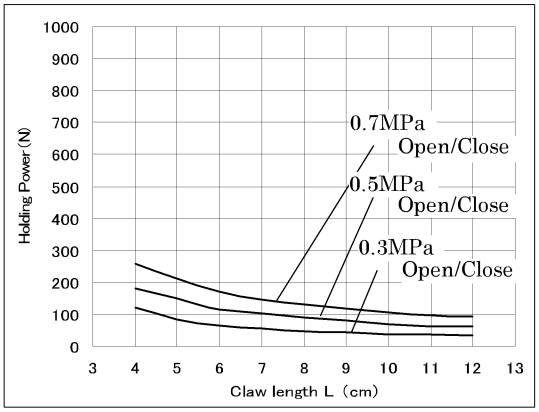
## 3.3 Data of Holding Power



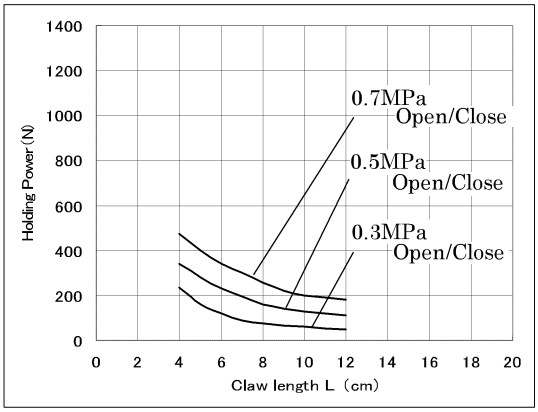
The following Tables represent the Holding power in either opening motion or closing motion with Claw length ℓ of hand at 0.3, 0.5 & 0.7MPa of Supplying pressure.

- Opening Motion ( ⇦ )
- Closing Motion ( ➡ )

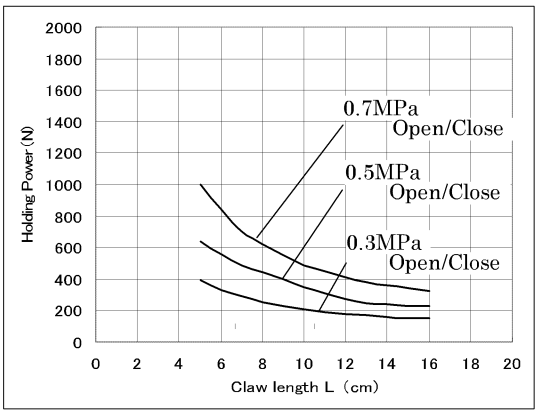
●HJD-32CS



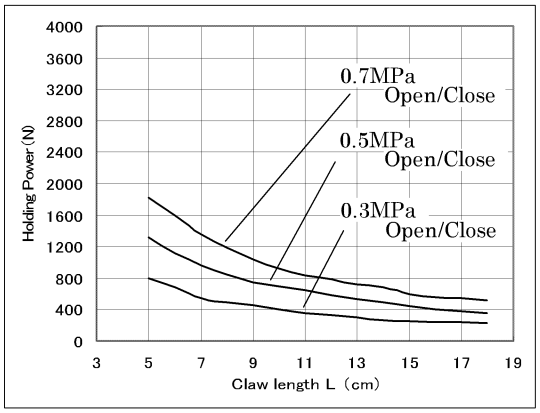

●HJD-40CS




●HJD-50CS

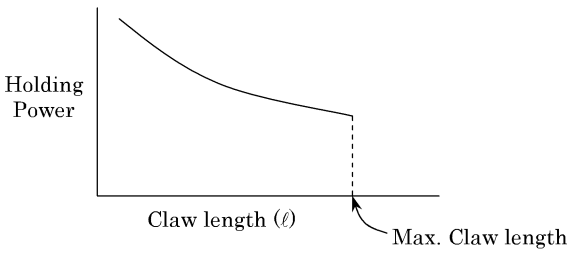



●HJD-63CS




## 3.4 Length of Claws

1) Make it short and light as much as possible because abrasion wear of moving parts of Master Jaw will be accelerated if claws are long and heavy.
2) Keep the claw length within the range to Tables above.



# 4. INSTALLATION

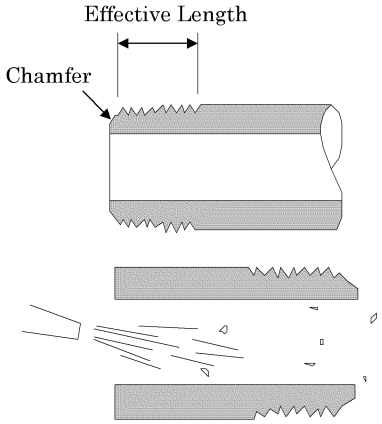
## 4.1 Piping

1) For piping beyond the filter, use pipes that hardly get corroded such as galvanized pipes, nylon tubes, rubber tubes, etc.

2) See to it that the pipe connecting cylinder and solenoid valve has effective cross-sectional area needed for the cylinder to drive at specified speed.

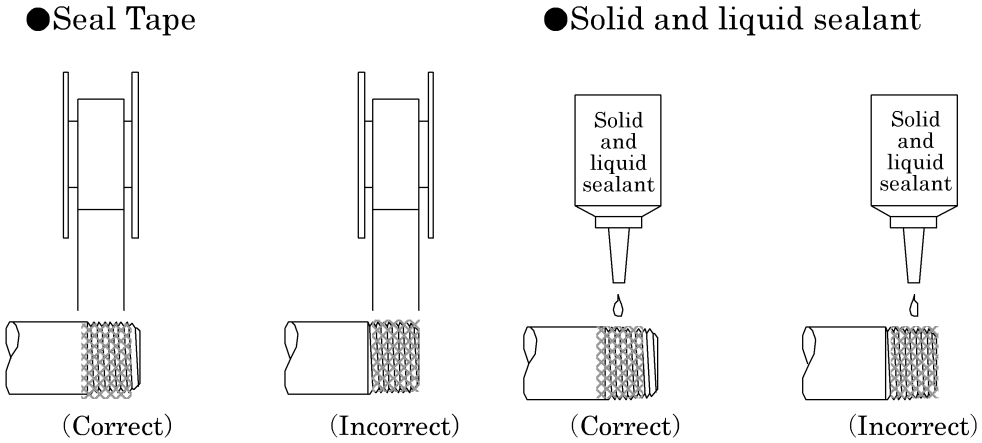
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.



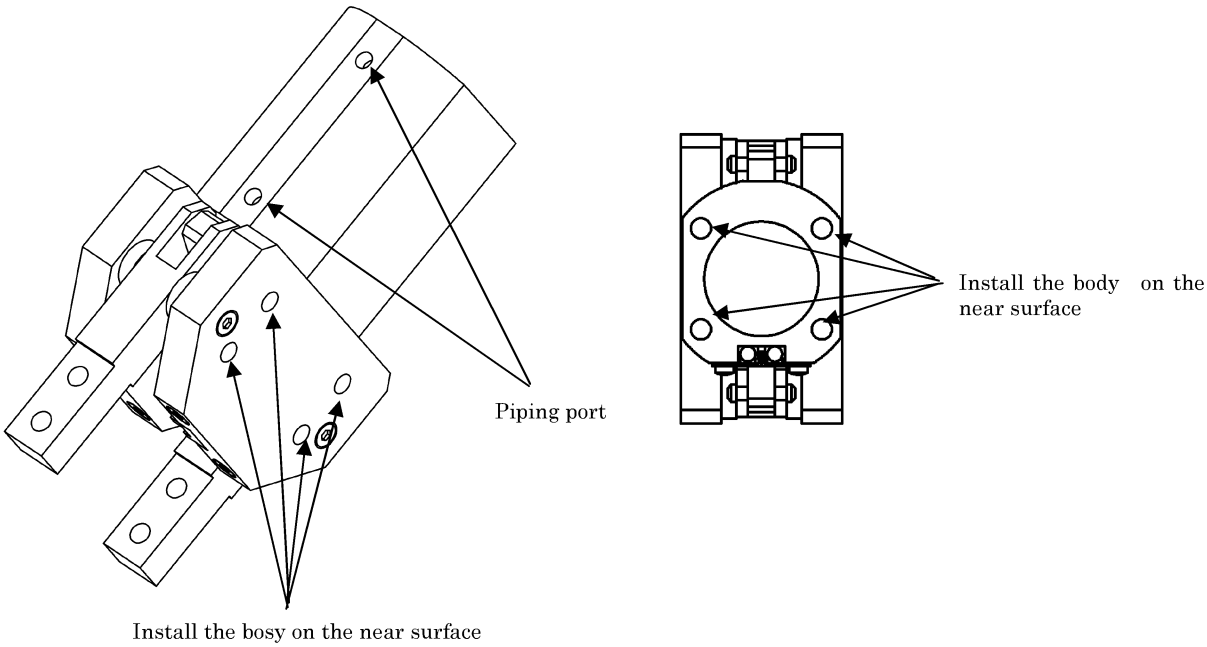

5) Flush air into the pipe to blow out foreign substances and chips before piping.

6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.



## 4.2 Installation

1) Ambient Temperature
   - The range of temperature is 5 to 60℃ where the hand of this type is serviceable.
2) Environmental Condition
   - Provide some protection to the system with such as cover etc in the environment where much dusts exist and splash of water or oil is foreseen.
3) Installation of Body
   - Three sides of hand are available to have body mounted. Select appropriate side to mount it depending upon the application of system.




- Thread diameter and depth of Body mounting bolt

| Model | Diameter of thread and depth |
|---|---|
| HJD-32CS | M6 depth 12 |
| HJD-40CS | M8 depth 15 |
| HJD-50CS | M10 depth 15 |
| HJD-63CS | M10 depth 18 |

# 5. MAINTENANCE

## 5.1 Periodic Inspection

In order to upkeep the Hand chuck in optimum condition, carry out periodic inspection every half a year or at every 500,000 times of actuation.

1) Inspection items
   (1) Apply grease to sliding portion.
   (2) Check whether its operation is smooth.
   (3) Check for any air leakage.
   (4) Check for any slackened bolts
   (5) Check for any play to master jaws.
   (6) Check if there are any abnormal strokes.

See "5.2 Trouble shooting", should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

## 5.2 Trouble Shooting

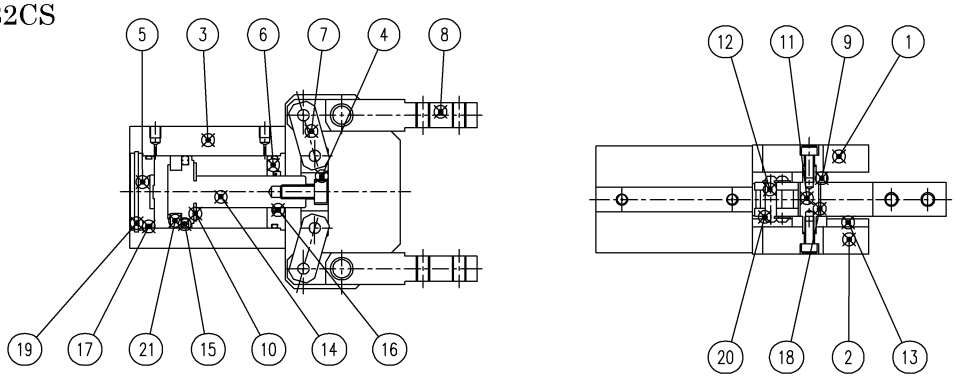
| Trouble | Possible Cause | Countermeasure |
|---|---|---|
| Does not operate | No pressure or inadequate pressure | Provide an adequate pressure source. |
| | Signal is not transmitted to direction control valve | Correct the control circuit |
| | Broken parts | Refer to Table of Damage or Deformation |
| | Broken packing | Replace the cylinder. |
| Does not function smoothly | Insufficient pressure | Increase the pressure. |
| | Chip or foreign particles caught | Clean and remove chips or particles. |
| | Broken packing | Replace the cylinder. |
| Breakage and/or deformation | Too heavy Claws | Make claws light. |
| | Too long Claws | Make claws short. |
| | Exertion working pressure | Reduce the pressure. |
| | External load is charged | 1) Take some remedy to remove charging external load.<br>2) Review the model and the way using it. Correct the misusage. |

Note : The cylinder of this type is unable to be disassembled because of being the special structure. Replace cylinder in its entirety when some trouble is discovered.

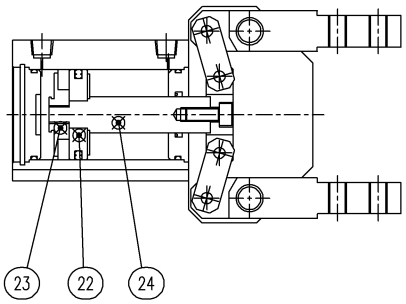
## 5.3 Internal Structure and Lists of Parts

### 1) Internal Structure

32CS




40CS～63CS




### 2) Parts List

| No. | Parts | Materials | Qty | No. | Parts | Materials | Qty |
|---|---|---|---|---|---|---|---|
| ① | Body A | Aluminum alloy | | ⑬ | Guide rail | steel | |
| ② | Body B | Aluminum alloy | | ⑭ | Piston | Aluminum alloy ・Stainless steel | |
| ③ | Cylinder | Aluminum alloy | | ⑮ | Piston packing seal | Nitril rubber | |
| ④ | Operation plate | steel | | ⑯ | Rod packing seal | Nitril rubber | |
| ⑤ | Cylinder cover | Aluminum alloy | | ⑰ | Cylinder gasket | Nitril rubber | |
| ⑥ | Rod cover | Aluminum alloy | | ⑱ | Bush | Oil impregnated bearing alloy | |
| ⑦ | link | steel | | ⑲ | C type snap ring | Stainless steel | |
| ⑧ | Master key | steel | | ⑳ | E type snap ring | Stainless steel | |
| ⑨ | Collar | steel | | ㉑ | Magnet | | |
| ⑩ | Cushion | Urethane rubber | | ㉒ | Piston A | Aluminum alloy | |
| ⑪ | Fulcrum axis | steel | | ㉓ | Piston B | Stainless steel | |
| ⑫ | Operation axis | steel | | ㉔ | Piston rod | Stainless steel | |

# 6. OPEN-CLOSE CONFIRMATION SWITCH

## 6.1 Features

1) Solid state type switch
   Service life is almost infinite, also Open-close load capacity is large.
2) Indicator light
   It makes confirmation of actuation or maintenance inspection easy.
3) No restriction regarding its mounting location
   Its relocation is also carried out easily by just loosening fixing screw.

## 6.2 Specifications

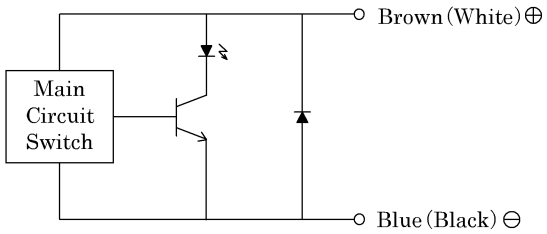
| Type · Model / Item | Contactless Switch | |
|---|---|---|
| | T2H/V | T3H/V |
| Applications | For use exclusively with programmable controller | For use with programmable controller, relay |
| Power supply voltage | — | DC10V to 28V |
| Load voltage | DC10V to 30V | DC30V or less |
| Load current | 5 to 25mA (Note 1) | 100mA or less |
| Current consumption | — | 10mA or less at DC24V |
| Internal voltage drop | 4V or less | 0.5V or less |
| Indicator light | LED(ON lighting) | |
| Leakage current | 1mA or less | 10 $\mu$A or less |
| Lead wire length (Standard) | 1m ( Oil-resistant PVC insulated and cabtyre cord 2 conductor 0.2mm$^2$ ) | 1m ( Oil-resistant PVC insulated and cabtyre cord 3 conductor 0.2mm$^2$ ) |
| Shock resistance | 980m/s$^2$ | |
| Insulation resistance | 20MΩ or more measuring with DC500V megger tester | |
| Withstand voltage | No abnormality permissible after applying 1000V AC for 1 minute. | |
| Ambient temperature | −10 to +60℃ | |
| Degree of protection | IEC Standard IP67, JIS C 0920 (Watertight Type), oil-resistant | |

1) Hysteresis
   There is hysteresis to cylinder switch as well as it is to micro switch.
   It is a distance between where switch turns ON while piston moves a certain direction and where the said switch turns OFF as piston reverses its stroke.

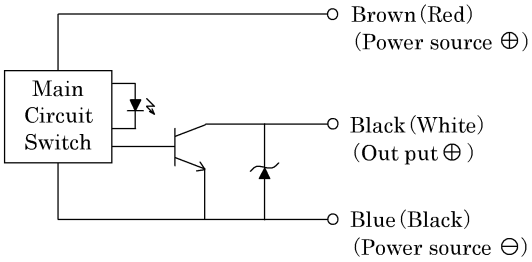
## 6.3 Internal Structure of Switch and Wire Connection

### 1) Internal Circuit Switch

●T2H・T2V



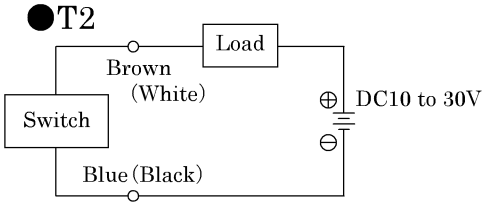

●T3H・T3V



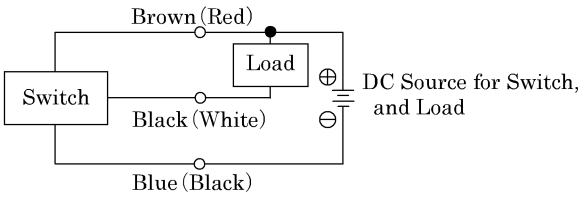

### 2) Wire Connection

(1) Basic Circuit

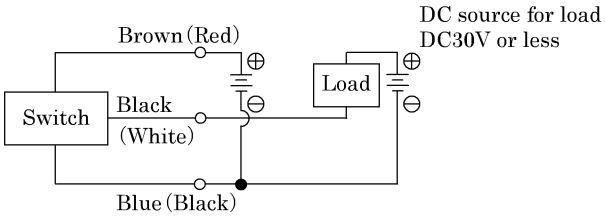
●T2




●T3



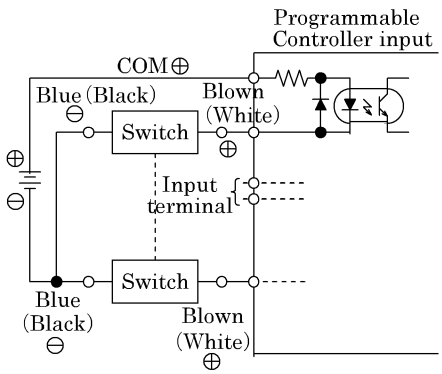

●T3




DC source for switch

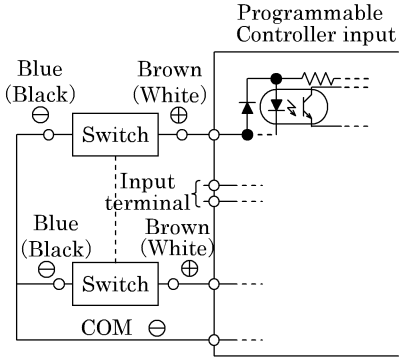
(2) Example of connection to Programmable controller

●T2



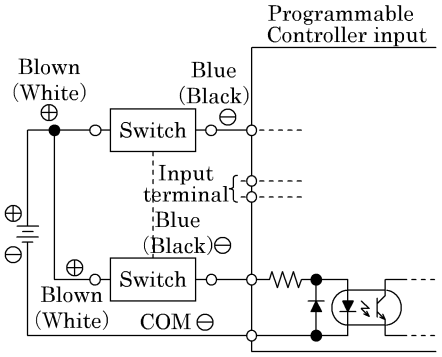

Connection to source input type
(Source outside)

●T2



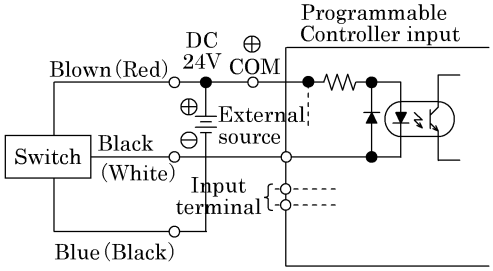

Connection to source input type
(Source inside)

●T2



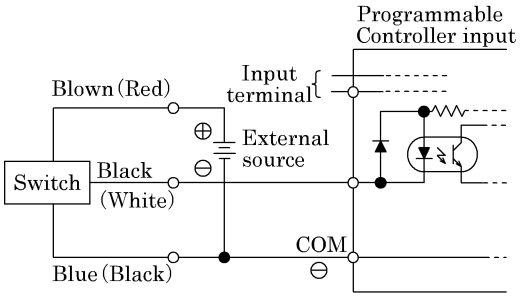

Connection to sink input type

●T3




Connection to source input type
(Source outside)

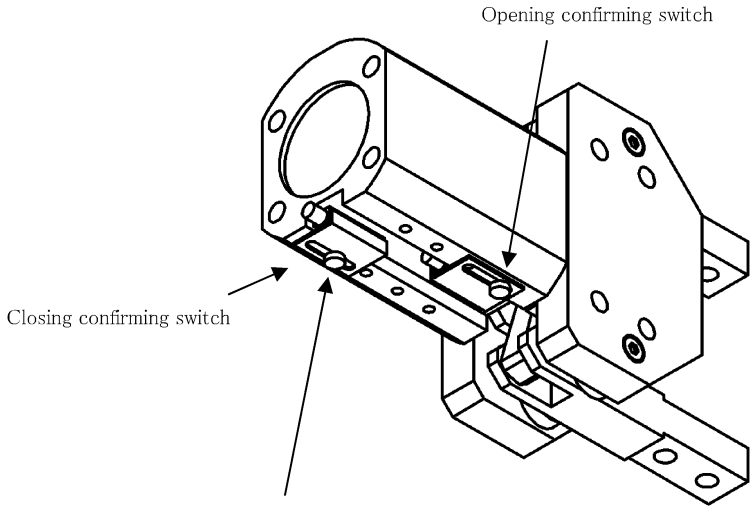
●T3




Connection to source input type
(Source inside)

## 6.4 Switch Adjustment

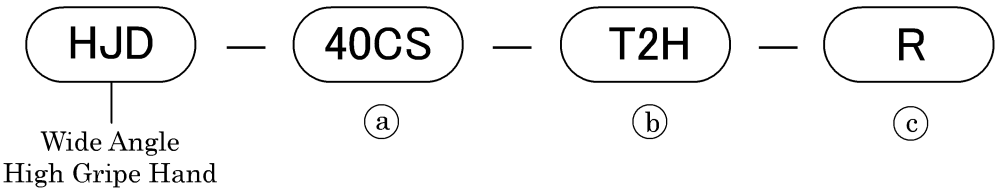
To adjust the Open-close confirmation Switch, side the switch first to find the location where Indicator light turns ON. Keep sliding the switch for further 0.3 to 0.5mm further away, and then fix the switch at that position.




Tightening torque, 0.1 to 0.2N･m

# 7. MODEL CODE

## 7.1 Model Code of Product itself




| (a) Size | (b) Switch model code | | (c) Switch quantity | |
|---|---|---|---|---|
| 32CS | T2H※ | Solid state, 2 wire | R | Open side, 1 ea. |
| 40CS | T2V※ | | H | Close side, 1 ea. |
| 50CS | T3H※ | Solid state, 3 wire | D | 2 ea. |
| 63CS | T3V※ | | | |

| ※ Length of Lead code | |
|---|---|
| No marking | 1m (Standard) |
| 3 | 3m (Optional) |
| 5 | 5m (Optional) |