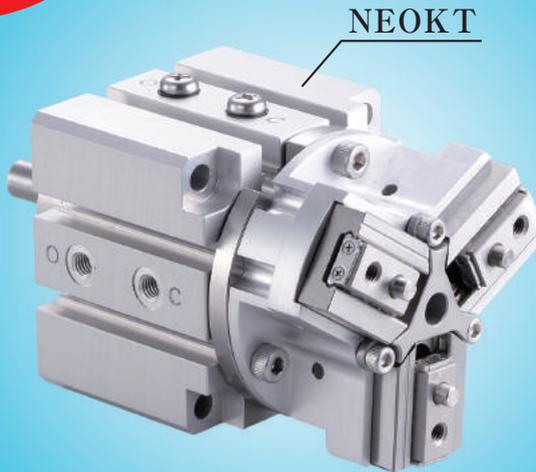




NEO Series

New-Era Original series

Bore Size
 $\phi 16$ 、 $\phi 20$



New-Era®

Three-jaw Swivel Gripper NEOKT Series

[Bore Size: $\phi 16$ 、 $\phi 20$]

Free movement of high-precision gripper by external drive!

Free piping and wiring direction

Air port and switch groove are provided on 2 faces.

High-precision and high-rigidity linear guide

Gripping Repeatability $\pm 0.01\text{mm}$

Rotational Runout Accuracy $\pm 0.05\text{mm}$

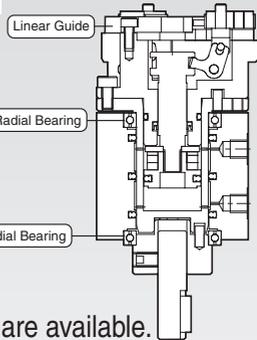
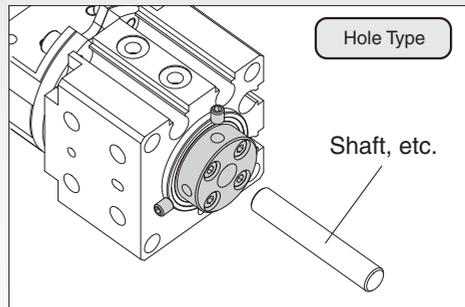
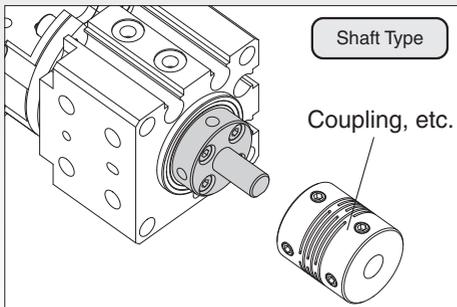
For details  P.14

Replaceable main body

Positioning Boss

The outer ring of the radial bearing can be used for positioning.

Connection Part Two types of connection parts are available.



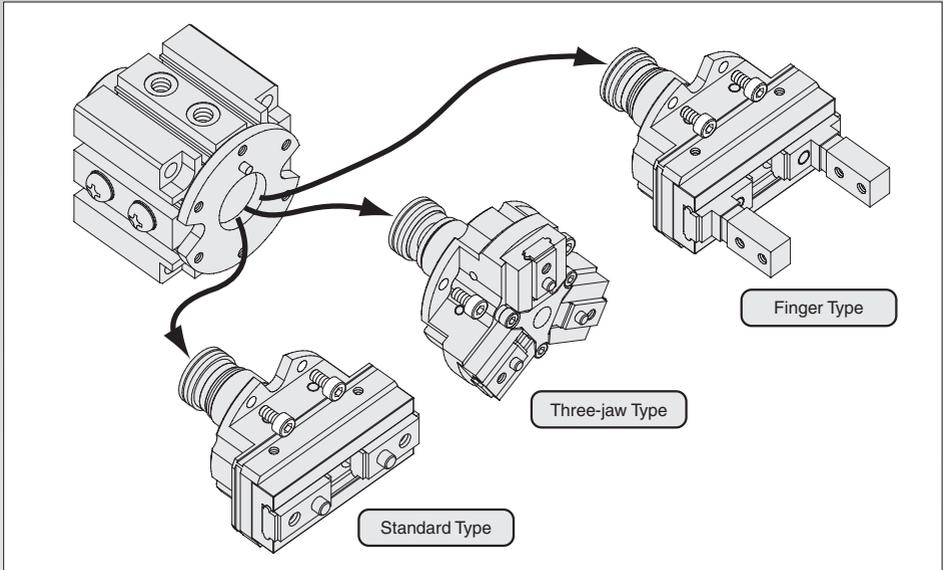
Product Features

With a swivel joint on the air gripper, NEOK series is compact-sized and achieves integration. The gripper is moved by external drive.

Since only the gripper part can be moved with the main body fixed, air pipe and switch wire are not twisted.

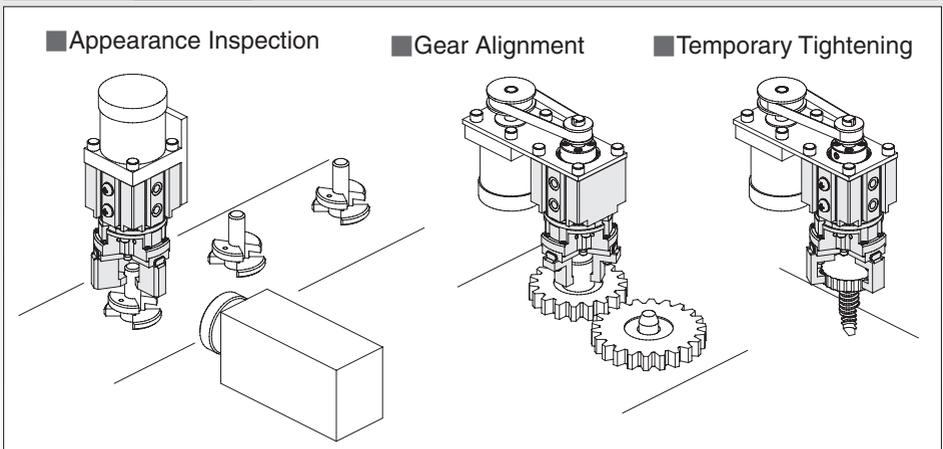
Gripper part or cylinder part can be purchased separately
Easy setup change and maintenance

Main Body



Application Example

For constant direction, angle control, inversion movement, etc.

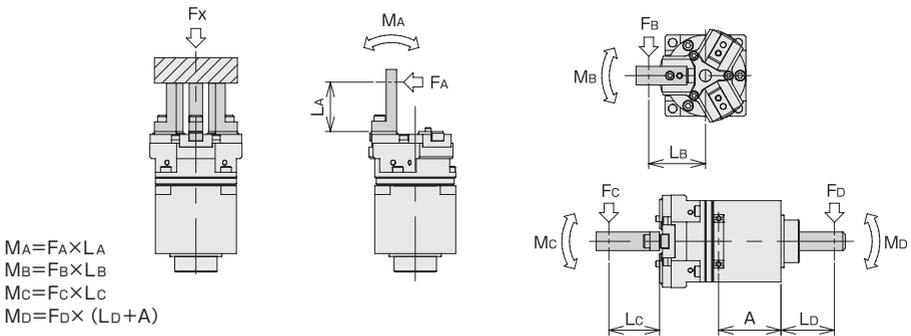


Specifications

Item	Model	NEOKT-16	NEOKT-20
Gripper Part			
Double Acting			
Type of Action		Double Acting	
Bore Size [mm]		$\phi 16$	$\phi 20$
Opening/Closing Stroke [mm]		6	10
Fluid		Air	
Operating Pressure Range [MPa]		0.1~0.7	
Proof Pressure [MPa]		1.05	
Maximum Operating Cycle [cpm]		120	
Operating Temperature Range [°C]		0~60	
Lubrication		Not Required	
Pipe Bore		M5x0.8	
Effective Gripping Force [N] 0.5[MPa], L=30[mm]		Opening Force : 27 Closing Force : 20	Opening Force : 47.5 Closing Force : 35.5
Gripping Repeatability [mm]		± 0.01	
Moment of Inertia [kg·m ²]		35×10^{-6}	12×10^{-5}
Swivel Part			
Minimum Starting Torque [N·m]		0.25	0.4
Allowable Rotational Speed [rpm]		120	
Lubrication		Not Required (Required for Regular Maintenance) ^{Note 1)}	
Common			
Rotational Runout Accuracy		± 0.05 ^{Note 1)}	
Mass [g]		340	750

Note 1) For details about lubrication method and rotational runout accuracy, see P.14

Allowable Load and Allowable Moment



Model	Load and Moment	FX [N]	MA [N·m]	MB [N·m]	Mc [N·m]	MD [N·m]	A [mm]
NEOKT-16		50	0.6	0.4	0.6	5	33
NEOKT-20		120	1.5	1	1.5	10	42.5

F_x: Pressing Force, etc.

M_A, M_B, M_c: Moments of inertial

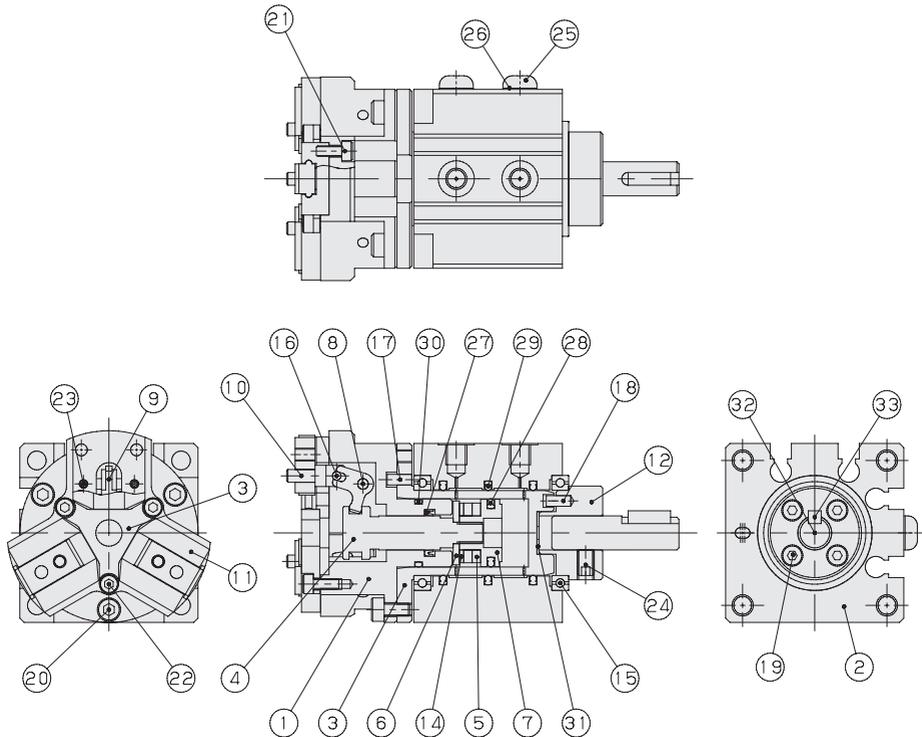
forces of jaw when opening, closing and swinging

M_D: Moment of radial force of gear or pulley, etc.

※For the example of attachment (jaw) design,

see P.9

Internal Structure Drawing



Parts List

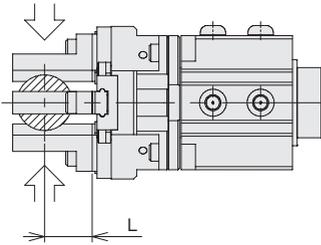
No.	Name	Material	No.	Name	Material	No.	Name	Material
1	Main Body	Aluminum Alloy	12	Stopper	Stainless Steel	23	Hexagon Socket Head Bolt	Steel
2	Case	Aluminum Alloy	13	Guide Presser	Stainless Steel	24	Hexagon Socket Head Bolt	Steel
3	Cylinder Tube	Stainless Steel	14	Spacer ^{Note 1)}	Aluminum Alloy	25	Plug	Stainless Steel
4	Piston Rod	Stainless Steel	15	Radial Bearing	Steel	26	Gasket	Steel, NBR
5	Magnet	Rare Earth Magnet	16	Driving Pin	Carbon Tool Steel	27	Rod Packing	NBR
6	Pressure Cover	Aluminum Alloy	17	Positioning Pin	Carbon Tool Steel	28	Piston Packing	NBR
7	Piston	Aluminum Alloy	18	Positioning Pin	Carbon Tool Steel	29	Rotary seal	NBR
8	Fulcrum Pin	Carbon Tool Steel	19	Hexagon Socket Head Bolt	Stainless Steel	30	O Ring	NBR
9	Action Lever	Carbon Steel	20	Hexagon Socket Head Bolt	Stainless Steel	31	Shim	Stainless Steel
10	Knuckle	Stainless Steel	21	Hexagon Socket Head Bolt	Stainless Steel	32	Shaft Adapter ^{Note 2)}	Stainless Steel
11	Linear Guide	Steel	22	Hexagon Socket Head Bolt	Stainless Steel	33	Key ^{Note 2)}	Carbon Steel

Note 1) ϕ 16 only Note 2) Shaft type only

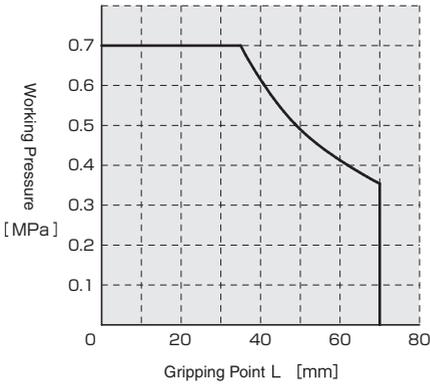
Gripping Point Limit Range

Ensure that the gripping point (the position where the workpiece is gripped) L is within the "Gripping Point Limit Range". If they exceed the limit range, an excessive moment will be applied to the guide part, causing backlash and a bad influence on the life and accuracy.

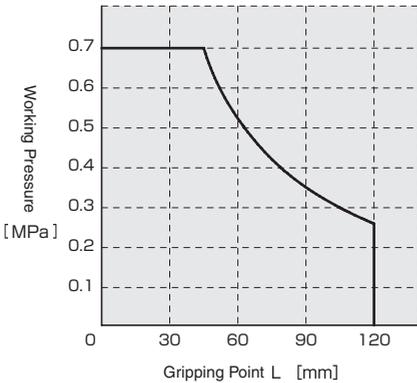
External Gripping State



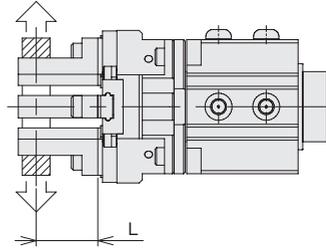
NEOKT-16C



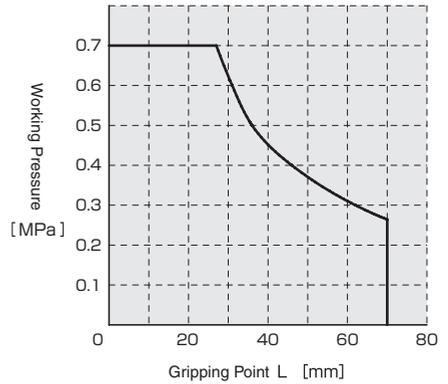
NEOKT-20C



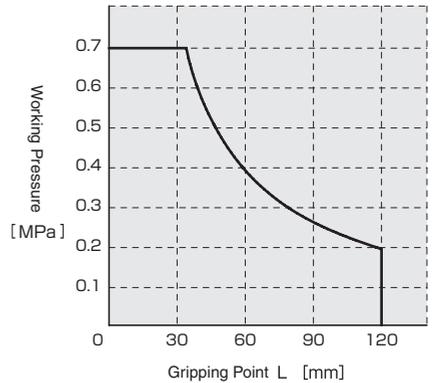
Internal Gripping State



NEOKT-16C



NEOKT-20C

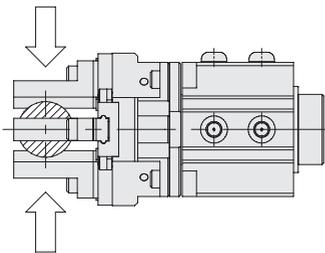


Effective Gripping Force

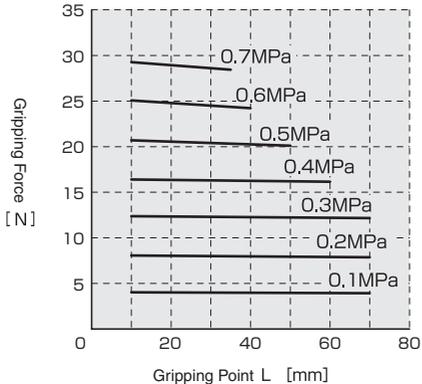
NEOKT Series

Effective Gripping Force

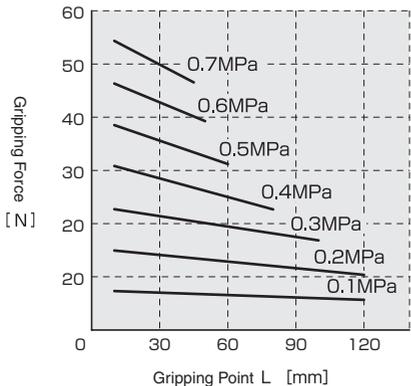
External Gripping State



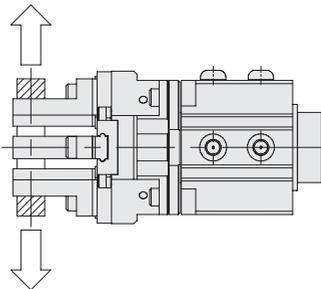
NEOKT-16C



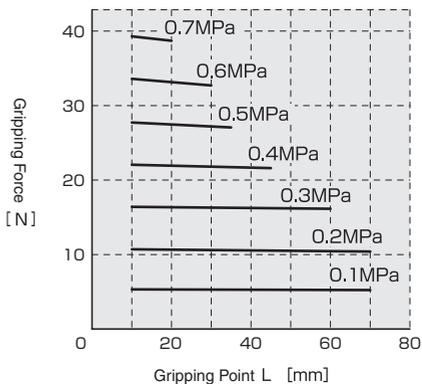
NEOKT-20C



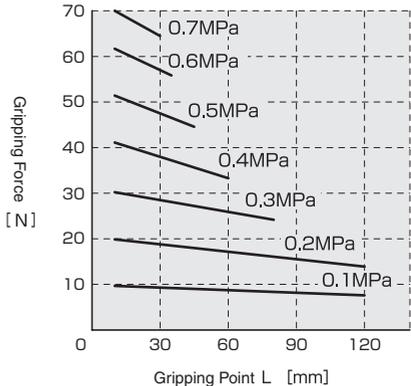
Internal Gripping State



NEOKT-16C



NEOKT-20C



※For details about attachment (jaw) mounting method, see P.11

Example of Attachment (Jaw) Design

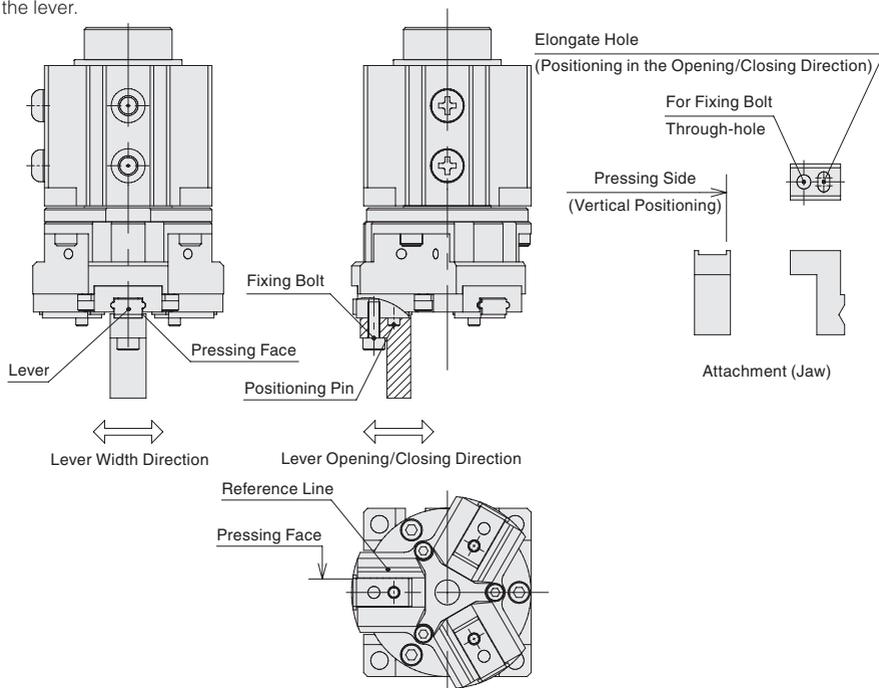
When you want to precisely position the attachment (jaw) or when you need mounting repeatability, the following mounting methods are effective.

Positioning in the Lever Opening/Closing Direction

The position in the opening/closing direction is determined by processing an elongate hole for the positioning pin on the attachment (jaw) in the vertical direction, and fitting it to the positioning pin of the lever.

Positioning in the Lever Width Direction

By making a projection on one side of the attachment (jaw) and pressing it against the side of the lever on the reference line side, the position in the width direction can be determined. If there is concern about position misalignment during operation, make projections on both sides of the attachment and fit them to the lever.



Attachment (Jaw) Mass

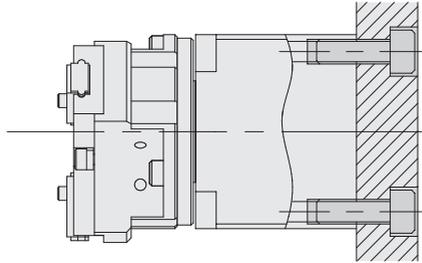
Please make the attachment (jaw) mounted to the lever as small as possible. Also, make sure that the mass of one jaw does not exceed that shown below. It shall be lighter when great acceleration or impact is applied during workpiece conveyance. Noted that applying large inertial load to the lever may cause breakage of internal parts.

Model	Mass [g]
NEOKT-16	50
NEOKT-20	100

Main Body Mounting Method

Main Body Mounting Method 1

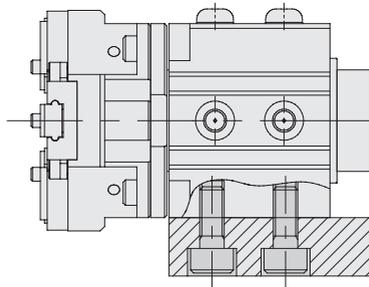
When the screw on the bottom face of the main body is used



Model	Bolt to be Used	Maximum Tightening Torque [N·m]
NEOKT-16	M5×0.8	2.84
NEOKT-20	M6×1.0	4.92

Main Body Mounting Method 2

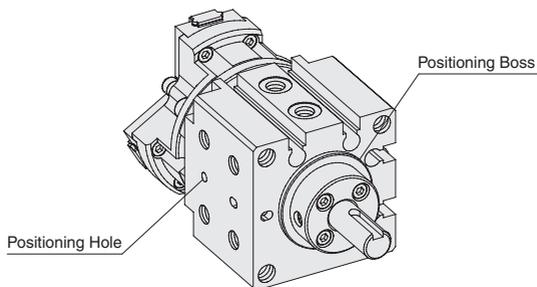
When the screw on the side of the main body is used



Model	Bolt to be Used	Maximum Tightening Torque [N·m]
NEOKT-16	M5×0.8	2.84
NEOKT-20	M6×1.0	4.92

■ Positioning When Mounting the Main Body

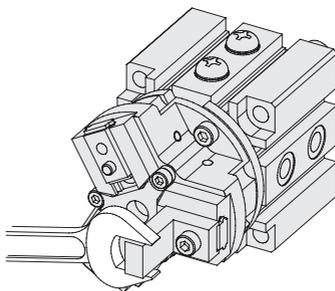
If positioning and reproducibility is required when mounting the main body, use positioning hole or boss according to mounting method.



Model	Positioning Hole	Positioning Boss
NEOKT-16	$\phi 2.5^{+0.03}_0$ depth 2.5	$\phi 27_{-0.01}$ height 1.5
NEOKT-20	$\phi 4^{+0.03}_0$ depth 4	$\phi 37_{-0.01}$ height 3

■ Attachment (Jaw) Mounting Method

When you mount the attachment (jaw), hold the attachment (jaw) with a spanner or the like to remove load to the lever.



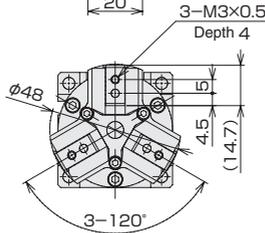
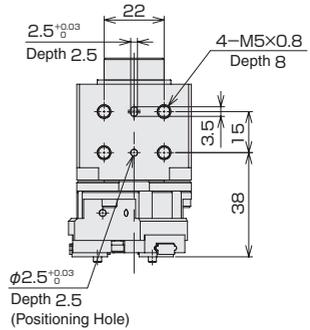
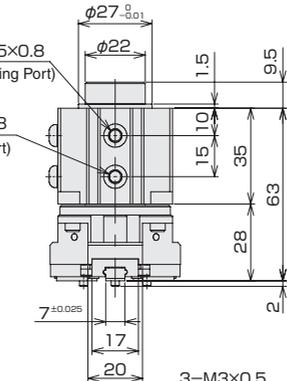
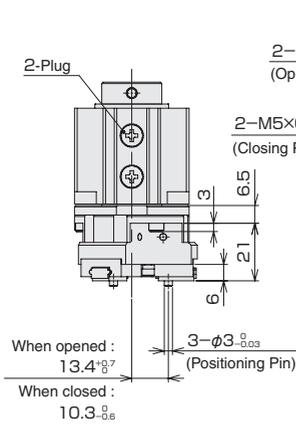
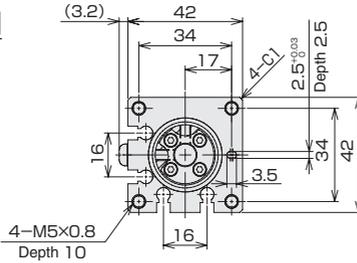
Model	Bolt to be Used	Maximum Tightening Torque [N·m]
NEOKT-16	M3×0.5	1.14
NEOKT-20	M4×0.7	2.7

Dimensions

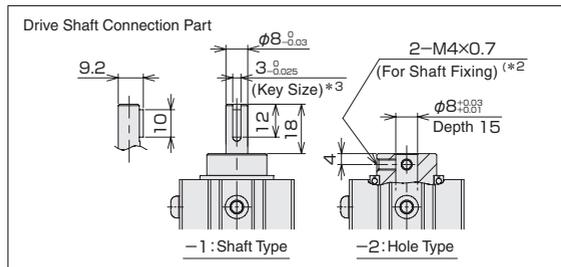
NEOKT-16C

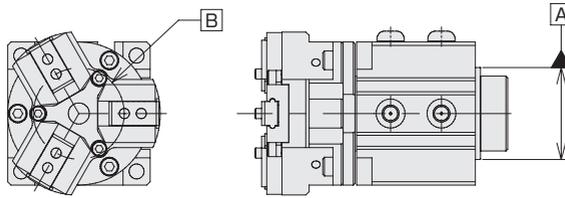
Drive Shaft Connection Part

- 1: Shaft Type
- 2: Hole Type



- *1) Two faces have an air port. Select the one you use according to the mounting condition.
- *2) For the hole type, 2 shaft fixing screws (M4x 6L) are attached.
- *3) The key is delivered as attachment.



Rotational Runout Accuracy

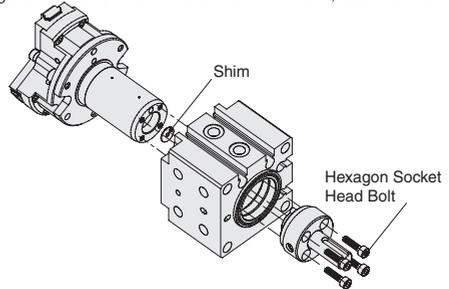
Rotation misalignment of lever pin center **B** relative to positioning boss center **A** : $\pm 0.05\text{mm}$

Lubrication

Although the swivel joint is coated with lubricant, operation may become less smooth depending on the rotational speed, usage conditions and ambient environment, so it is recommended to fill lubricant regularly. If it is used in that condition, the wear of the sliding part will increase, which may result in a shorter life.

The grease supplying period varies depending on usage conditions and ambient environment, but the total number of rotations 2 million is generally used as a guide. The swivel joint can be disassembled after removing the hexagon socket head bolt shown in the figure. After disassembly, apply lithium soap base grease after wiping off old grease of the rotary seal inside the case. During disassembly, be careful to avoid loss of internal part (shim).

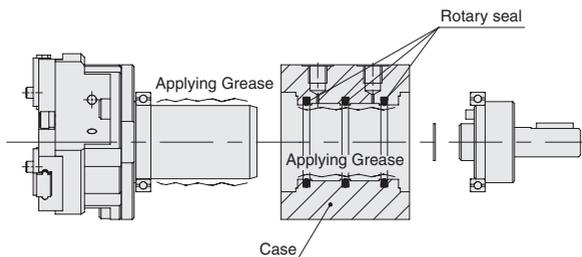
In case of difficult disassembly, it is also possible to fill from the air port. Turbine oil (ISO, VG32) can also be used.

**Rotary Seal Replacement**

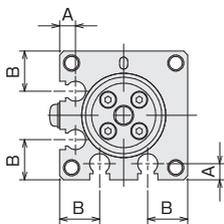
After disassembly, the rotary seal installed inside the case can be replaced.

The rotary seals are installed at the 3 locations shown in the figure below. After removing the rotary seals with a flat-blade screwdriver with no sharp tip, install new rotary seals with grease evenly applied to the housing. When installing, make sure that the rotary seals are free from dust and that they are not twisted or cut. When reassembling, apply grease to the outer peripheral surface of the main body assy and the inner surface of the case.

(After installing the main body assy in the case, wipe off any excess grease.)



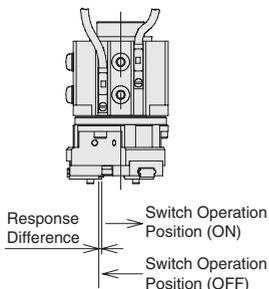
Switch Mounting Groove Dimensions



Bore Size	[mm]	
A	φ16	φ20
B	6.6	9
	13	18.5

Switch Response Difference

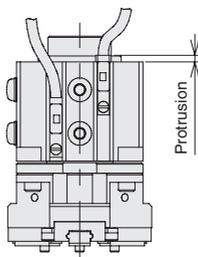
Refers to the distance from the position where the levers move and the switch turns on to the position where the levers move in the reverse direction and the switch turns off.



Bore Size	[mm]	
Maximum Response Difference	φ16	φ20
Maximum Protusion	0	0

Switch Protusion Distance

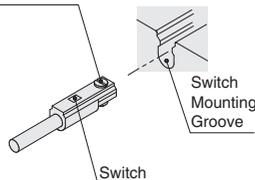
The maximum protusion (when the lever is fully closed) of switch from the end face of the main body is as follows. Please use it as a guide for mounting.



Switch Mounting

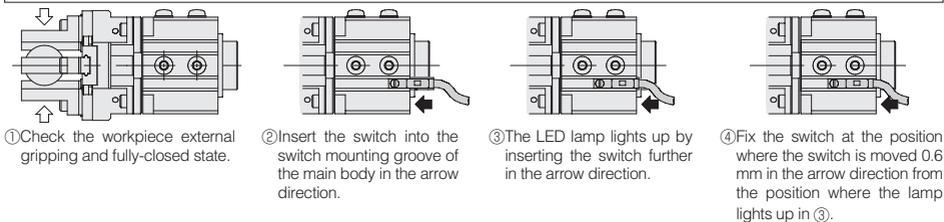
Insert the switch into the switch mounting groove. After setting the mounting position, tighten the switch fixing screw with a precision screwdriver. The tightening torque shall be 0.1 N·m or less.

Switch Fixing Screw (M2.5X0.45)

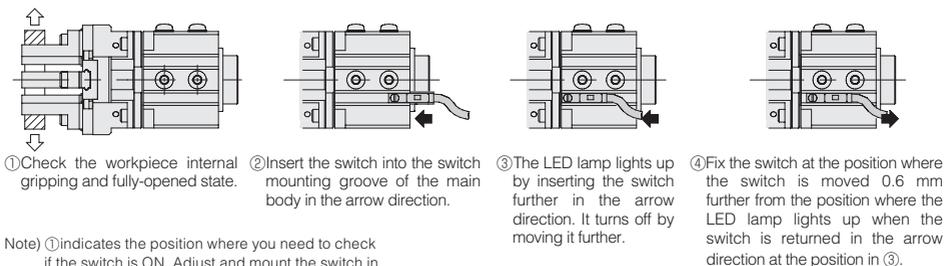


Switch Mounting Position Adjustment

For external gripping



For internal gripping



Note) ① indicates the position where you need to check if the switch is ON. Adjust and mount the switch in the order from ① to ④.

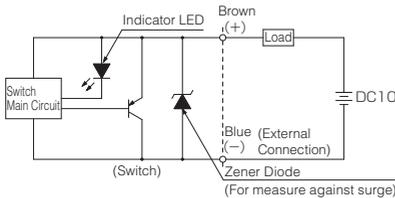
Specifications

Item	Model	ZE135	ZE155	ZE235	ZE255
Wiring Method		2-Wire System	3-Wire System	2-Wire System	3-Wire System
Lead Wire Leading Direction		Straight Type		L-shaped	
Power Supply Voltage		—	DC4.5~28V	—	DC4.5~28V
Load Voltage		DC10~28V	DC4.5~28V	DC10~28V	DC4.5~28V
Load Current		4~20mA (At 25°C, 10mA at 60°C)	50mA MAX.	4~20mA (At 25°C, 10mA at 60°C)	50mA MAX.
Consumption Current at ON		—	10mA MAX. (DC24V)	—	10mA MAX. (DC24V)
Internal Drop Voltage <small>Note 1)</small>		4.5V MAX.	0.5V MAX. <small>(However, 20 mV at the voltage of 10V or less)</small>	4.5V MAX.	0.5V MAX. <small>(However, 20 mV at the voltage of 10V or less)</small>
Leakage Current		1mA MAX. (DC24V, 25°C)	50μA MAX. (DC24V)	1mA MAX. (DC24V, 25°C)	50μA MAX. (DC24V)
Delay Time		1ms MAX.			
Insulation Resistance <small>Note 2)</small>		100MΩ MIN. (Between case and lead wire terminal at DC 500V Mega)			
Withstand Voltage <small>Note 2)</small>		AC500V (50/60Hz) 1 minute (Between case and lead wire terminal)			
Shock Resistance		294m/s ² {30.0G} (Non-repetitive)			
Vibration Resistance		Double amplitude 1.5mm·10~55Hz {88.3m/s ² (9.0G)}			
Protective Structure		IEC IP67, JIS C0920 (Watertight type) Red			
Operation Indicator		LED indicator illuminates at ON			
Lead Wire <small>Note 3)</small>		PCCV0.15SQx2 cores (brown, blue)x ϕ ^{Note 3)}	PCCV0.15SQx3 cores (brown, blue, black)x ϕ ^{Note 3)}	PCCV0.15SQx2 cores (brown, blue)x ϕ ^{Note 3)}	PCCV0.15SQx3 cores (brown, blue, black)x ϕ ^{Note 3)}
Operating Temperature Range		0~60°C			
Storage Temperature Range		-10~70°C			
Mass		15g (When the lead wire length A is 1 m), 35g (When the lead wire length B is 3 m)			

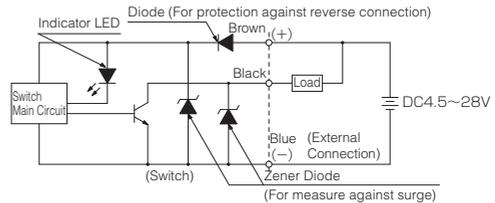
Note 1): The internal drop voltage changes depending on the load current. Note 2): As per our test standards. Note 3): Lead wire length L: A: 1 m, B: 3 m

Internal Circuit

ZE135 · ZE235

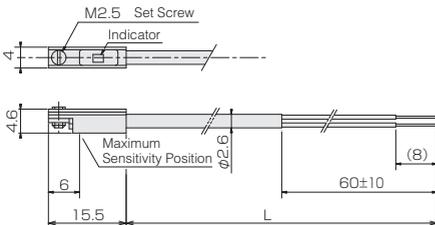


ZE155 · ZE255

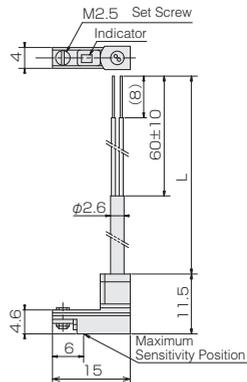


Outside Dimensions [mm]

ZE135 · ZE155



ZE235 · ZE255



Position Detection Switch

ZE Type (Solid State)

Precautions in Switch Handling

1. Pay attention to the lead wire color when connecting them. Wrong connection may result in malfunction or breakage.
2. Do not connect 2-wire system solid state sensor switches to TTL and C-MOS.
3. Use of a protection diode for surge is recommended for inductive load such as an electromagnetic relay.
4. Do not connect the sensor switches in series (no AND connection) because the circuit voltage is dropped in direct proportion to the number of sensor switches.
5. When the sensor switches are connected in parallel (OR connection), sensor outputs (e.g. black wires) can be directly connected. In this case, however, be careful not to cause a load restoration failure because leakage current increases in direct proportion to the number of sensors.
6. The sensor switches are magnetic induction type switches. Therefore, do not use them in places with a strong external magnetic field and do not get them closer to the great current such as a power line. Do not use a magnetic body for the mounting member. Doing so may result in malfunction.
7. Do not put a force to the lead wires such as by pulling the lead wire or bending it extremely.
8. Do not use the switches in an environment that is exposed to chemicals or gases.
9. The switch tightening torque shall be $0.1 \text{ N} \cdot \text{m}$ or less when the switch is fixed.

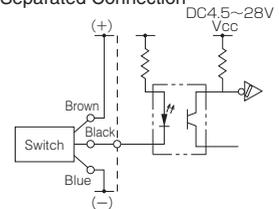
Solid State

Switch Connection	2-Wire System Solid State	3-Wire System Solid State
Basic Connection		
Connection with Relay		
Serial (AND) Connection Parallel (OR) Connection		
Connection with Solenoid Valve		
Connection with Sequencer		

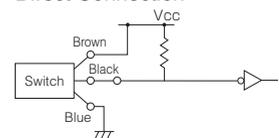
The next connection examples show only for the 3-wire system solid state.

★ Connection with TTL

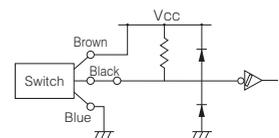
Separated Connection



Direct Connection



★ Connection with C-MOS



Gripper Selection Guide

Precautions for Selection

(1) Safety Measures

If the movable parts of the workpiece and gripper may cause damage to the human body or mechanical equipment during operation, take safety measures such as installing a protective cover.

In addition, if using a pneumatic gripper, see also the common precautions of pneumatic equipment.

(2) Gripping Force and Workpiece Mass

The gripping force varies depending on the type of action (single acting type or double acting type) and working pressure. It also relates to the material, shape, surface roughness and movement speed, etc. of the workpiece to be gripped. As a general guide, select a gripper that has a gripping force of 10 to 20 times or more the workpiece weight.

In addition, it shall be greater than that when great acceleration or impact is applied during workpiece conveyance.

Selection of an unsuitable model may cause workpiece falling, etc.

(3) Gripping Point Limit Range

Ensure that the gripping point (the position where the workpiece is gripped) L is within the "Gripping Point Limit Range". If they exceed the limit range, an excessive moment will be applied to the guide part, causing backlash and a bad influence on the life and accuracy.

(4) Attachment (Jaw) Design

The attachment shall be designed to be as light and short as possible.

If the attachment is long and heavy, the bending moment applied to the finger part and the inertial force at the time of gripping will become too large, causing increased backlash or damage.

(5) Opening/Closing Stroke

Select a model that has a margin in gripper opening/closing and stroke relative to workpiece. If there is no margin, gripping may become unstable due to the variation of gripper opening/closing width and workpiece diameter.

When a detection switch is used, it may cause detection failures.

(6) Mounting

When mounting the attachment to the finger part, do not twist the finger part. Twisting may cause backlash or reduced accuracy.

Also, adjust and check so that no external force is applied when opening/closing the finger part. When moving the gripper or opening/closing the finger part, collision of the workpiece or attachment with other objects may cause backlash or damage. When mounting the gripper body, prevent scratches or dents due to the gripper falling or collision.

(7) Opening/Closing Speed

If the opening/closing speed of the finger part is too high, the inertia of the finger part and attachment may cause backlash or damage.

Install a speed control valve to prevent impact.



Actuator Precaution ①

Please read the following instructions before use.

Design



WARNING

◆ Abnormal action

Actuators may cause a kind of impact when force change occurs due to rattle in the sliding part of a machine. In this case, actuators may result in bodily damage (e.g. hands or legs being caught) or machine damage. Therefore, adjust actuators for smooth mechanical movement and design them to prevent bodily damage.

◆ Protective cover

When there is a risk that a system or a product is harmful to human body during operation, install a protective cover.

◆ Impact relaxation

When the driven object moves at a high speed or its mass is large, it is difficult to absorb impact using the cushion of the cylinder only. Therefore, install a circuit to reduce the speed before going to the cushion to release impact. In this case, consider the rigidity of the mechanical system fully.

◆ Power source failures and supply pressure drop

If the power source (e.g. electric, pneumatic pressure, hydraulic source) has a failure or the air pressure drops due to troubles, cylinder power will drop, thus leading to load decrease. Take measures to prevent damage to human bodies and equipment.

◆ Jumping prevention circuit

When the cylinder is driven by the exhaust center type directional control valve or one side of the piston is pressed under the condition that air has been exhausted from the cylinder (such as when starting after the residual pressure has been exhausted from the circuit), driven objects will jump out at a high speed. Such situation may be harmful to the human body (e.g. hands or legs getting caught) or machine damage. Therefore, select equipment and design circuits to prevent driven objects from jumping.

◆ Emergency stop, abnormal stop

Design actuators so that their motions do not damage human bodies or equipment even in case of emergency/ abnormal stop of the system or when the system is re-started after stop.

Selection



WARNING

◆ Operating pressure range

If the system is used with the maximum working pressure or above, each part will be worn or damaged, thus resulting in breakage or operation failures. If the system is used with the minimum working pressure or less, the specified thrust force cannot be generated, thus causing malfunctions such as failure to move smoothly. Therefore, use products within the specified operating pressure range.
(See the specifications.)

◆ Intermediate stop

When the 3-position closed center type directional control valve is used to stop the cylinder piston in the intermediate position, it cannot stop it correctly and accurately because it uses not hydraulic pressure but compressed air. Also, it is not assured that valves and cylinders leak no air. Therefore, pistons may not be able to stop for a long time. Consult us if you need to realize long time stop position retention.

Mounting



WARNING

◆ Locking in mounting

Product fixing bolts and attachment/jig mounting bolts must have a locking. Mount bases must have a structure to prevent deformation and breakage due to thrust force or inertia force at stopping.



CAUTION

◆ Precautions in operating

Do not use the product until it is confirmed that equipment operate properly.
After mounting, repair or modification, connect compressed air and power and conduct appropriate functional tests and leak inspection to check if the mounting is appropriate.

◆ Equipment operation check

After mounting the product to the system, do not start the system immediately but check if the product has been properly mounted for safety.

◆ Product handling

Dropping or hitting the product or pinching the product with a tool will result in product deformation, thus causing accuracy deterioration and operational failure.

◆ Speed adjustment

Adjust the cylinder drive speed gradually to the specified speed with a speed controller from the low speed side.

◆ Precautions in magnetic products

Bringing magnetic products such as a magnetic disk, a magnetic guard and a magnetic tape close to the built-in switch sensing magnet type may result in data erase. Also, do not bring them close to any equipment that may cause malfunction due to magnetism.



Actuator Precaution ②

Please read the following instructions before use.

Piping



CAUTION

◆ Seal tape winding

When you screw in pipes and joints, be careful not to make piping screw chips and sealing materials enter into the inside of the pipes.

When you use a seal tape, wind a screw with the tape so that 1.5 to 2 turns of the screw head is not winded.

Lubrication



CAUTION

◆ Use in lubrication circuit

If the system needs lubricating, use additive-free turbine oil class 1 ISO VG32 or ISO VG46. Do not use machine oil and spindle oil because they will damage packings, thus causing operation failures. Do not stop lubricating in the middle of lubricating because doing so will cause flowout of lubrication grease, thus accelerating damage of packings and other parts, resulting in operation failures.

Air source



CAUTION

◆ Quality of compressed air

Compressed air containing drain (e.g. dust, water, salt, degraded compressor oil, oil carbon particles) and corrosive gas will damage packings and other parts, thus causing operation failures and damages. Therefore, use clean compressed air.

◆ Drain removal measure

Compressed air containing a large amount of drain not only causes operation failures of the air compressor but also causes environmental contamination. Install equipment such as an after-cooler, an air dryer and an air filter (nominal filtration rating: 50µm or less).

The air cleaning system to drive actuators is recommended in JPAS005 "Guidelines for Use and Selection of Pneumatic Cylinders".

◆ Temperature of compressed air

Hot compressed air will accelerate damage of packings and other parts.

Even when the environmental temperature is within the specified range, heat may transmit through jigs connected to the actuator and driven objects. When the environmental temperature is low, drain and moisture will become solidified or frozen, thus resulting in damaged packings and parts and operation failures. Therefore, measures to prevent freezing must be taken.

Usage environment



WARNING

◆ Outdoor use

Do not use the product in places where the product is directly or indirectly exposed to wind and rain, is exposed to direct sunlight, or any outdoor place where the product is influenced by temperature or any other factors because this product is not resistant to weather.

◆ Use in the corrosive environment

Do not use the product in water or places where the product is exposed to salt water, acid, alkaline fluid splash, iron powder or in their gases or moisture vapors.

◆ Cover installation

Attachment of dust, water, oil, chips, iron powder, or spatter to the rod and the sliding parts will result in damaged shafts and packings, thus causing air leak and operation failures. Install a cover to prevent them from attaching.

◆ Operating temperature range

Use with a temperature exceeding the maximum operating temperature will result in deterioration acceleration such as hardening of packings, thus causing operation failures. Even when the environmental temperature is within the specified range, heat may transmit through jigs and driven objects. When the product is working at a high speed, its sliding surfaces will locally overheat, thus causing similar problems, freezing due to adiabatic expansion or surface dew condensation.

When the temperature is lower than the minimum operating temperature, drain and moisture will become solidified or frozen, thus resulting in damaged packings and operation failures. Therefore, measures to prevent freezing must be taken.

Maintenance and check



WARNING

◆ Removing equipment, and supplying and exhausting compressed air

Before removing equipment, make sure that driven object fall prevention measures and runaway prevention measures have been taken, cut off supply air, turn off the power of the equipment and exhaust compressed air from the system.

Before re-starting the equipment, make sure that the jumping prevention measures have been taken and do it carefully.



CAUTION

◆ Draining air filter

Operating the equipment without maintaining or draining the air dryer and the air filter will result in life shortening or equipment failures. Drain tends to increase in summer in particular, so drain them frequently in summer. Use of a type with an auto drain function is recommended.



Switch Precaution ①

Please read the following instructions before use.

Design and selection

WARNING

◆ Specification check

Please read the specifications carefully because use of a load current, voltage, temperature or impact outside of the specified range will result in equipment breakage or operation failures.

◆ Contact protection circuit (measure against surge voltage)

When an induction load such as a relay or a solenoid is connected, surge voltage is generated. In this case, therefore, install a contact protection circuit. See "Switch Connection Method" for details.

◆ Actuator installation interval

Switches are operated by a magnet built in the actuator. Therefore, if two products get close to each other, their magnets may interfere with each other, thus causing malfunction.

◆ Leakage current

<Solid State>

For the 2-wire system solid state auto switch, currents (leakage currents) flow to the load to activate the internal circuit even when they are OFF.

When the leakage current is lower than the load operation current (input off current of the controller), restoration failure occurs (ON state remains). If such switch cannot meet the specification, use a 3-wire system switch. When switches (n switches) are connected in parallel, the magnitude of the current flow to the load will be n times.

◆ Serial connection

When switches with an indicator are connected in series, voltage drop occurs due to the internal resistance of light-emitting diodes, etc. (When n switches are connected, the voltage drop is n times.)

In this case, the load may not operate even when the switches are normally operated.

◆ Switch wiring length

When the switch wiring is long, excessive current flows into the contact due to the incoming current when the switch is turned ON. Thus, the switch may remain ON. When the wire length is longer than 10 m, install a cable surge absorbing circuit. See "Switch Connection Method" for details.

◆ Detection in the middle of a stroke

Note that when a switch is provided in the middle of a stroke, the switch operates when the piston speed is too high but the load may not be operated. In this case, decrease the speed or install an electric hold circuit.

◆ Interlock

When a switch is used for systems such as an interlock, design it in consideration of failures and malfunctions.

◆ Securing the maintenance space

Secure the space for operations such as switch adjustment and indicator check.

Mounting and adjustment

WARNING

◆ Switch handling

Impact to a switch such as by falling may result in breakage of the inside of the switch.

◆ Lead wire handling

Excess tensile force on a lead wire may result in lead wire breakage in the cable or breakage of the inside of a switch.

◆ Switch fixing tightening torque

Tightening the switch fixing screw or mounting bracket with a torque larger than the specified torque may result in switch breakage. Insufficient torque may result in out of mounting position in use. Follow the specified tightening torque for each switch.

◆ Switch setting position

Adjust the switch mounting position so that the piston stops in the center of the operation range (ON range). (The mounting position specified in the catalogue shows the optimal position in the stroke end.) When it is set in the end of the operation range (around the ON/OFF border line), operation may be unstable.

Wiring

WARNING

◆ Lead wire wiring

To install a switch in the movable area, take some wiring measures such as allowing extra cable length and replaceable cables. When wire is bundled with air pipes by a spiral tube, unreasonable force may be applied to the wires. Therefore, allow extra length of wires in this case.

◆ Load connection

Operating a 2-wire system switch while connecting it directly to the power without connecting any load such as a relay and a sequence controller may result in instant overcurrent, thus resulting in switch breakage.

◆ Short-circuit of load

Operating a switch with a short-circuited load will cause the flow of overcurrent, thus resulting in switch breakage.

◆ Polarity

In case of DC, wires have polarity. Brown lead wires are (+) and blue lead wires are (-). When wires are connected reversely in the contact switch, the switch operates but the light-emitting diode does not illuminate.

When wires are connected reversely in the solid state switch, the switch does not operate and the internal circuit may be broken.

When the power wire (brown) and the output wire (black) are connected reversely in the 3-wire system switch, the switch will be broken.



Switch Precaution ②

Please read the following instructions before use.

Usage environment



DANGER

◆ Use in the hazardous atmosphere

Do not use switches in the explosive gas atmosphere. Switches do not have an explosion-proof structure. Do not use them in the explosive gas atmosphere because doing so may result in explosion.



WARNING

◆ Use in a powerful magnetic field

Use of a switch in a powerful magnetic field will result in switch operation failure and malfunctions because the internal magnetic force and the magnetic field distribution change.

◆ Adjacent of magnetic body

Note that when there is a large amount of iron power (e.g. chips, welding spatters) accumulated around the switch cylinder or magnetic bodies (attracted to the magnet) are adjacent to the switch cylinder, the magnetic force inside the cylinder is deprived so the switch may not operate.

◆ Usage environment

The water proof property of the switch is applicable to the IEC Standard IP66 (JIS C0920 Water Proof Type). However, if they are constantly exposed to water, insulation failure may occur. When they are exposed to oil (e.g. cutting oil) or chemical or in such atmosphere, lead wire hardening or insulation failure may occur.

◆ Impact

If excessive impact is applied to a contact switch in use, the contact may cause malfunction. Such failures will be reduced by using no-contact switches, but you must check the impact-resistant values in the specifications before doing so.

◆ Surge generating places <Solid State>

When there is a large surge generating system (e.g. electromagnetic lifter, high-frequency induction furnace, motor) in the periphery of the cylinder with a no-contact switch, circuit elements inside the switch may deteriorate or break. Therefore, take measures against the surge (source of generation) and pay attention to confusion with other lines.

◆ Temperature change

Even when switches are used within the specified use temperature, extreme environmental temperature changes may have a bad influence on the parts inside the switch.

Maintenance and check



WARNING

◆ Screw and hardware looseness check

Looseness of a switch mounting screw and hardware will result in switch displacement, thus causing unstable operation and malfunction. After setting the position again, tighten them with a specified torque.

◆ Lead wire breakage check

Damaged lead wire coating may result in insulation failure or breakage. Replace the switch or repair the lead wire immediately.

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