

# Safety



The safety issues enumerated here are to prevent damages by directing customers to use the products appropriately. The issues have been classified into "caution," "warning," and "danger" in order to indicate the degree and urgency of damages.

[Caution] Events in which it is expected that people will become injured or that only materials will be damaged when products are mishandled.

[Warning] Events in which people could die or become severely wounded when products are mishandled.

[Danger] Urgent events in which people could die or incur severe wounds.

※ Please remember the following before use.

## ▶ Warning

- Because the products registered on the catalogue were designed to be used with pressurized air systems, do not use the products off the specified pressure or temperature levels. It could be the reason of destruction or malfunctioning.
- Remove debris within the pipe by air blowing (flushing) or washing before piping. Pressurized air that contains abundance of moisture could cause damages to air pressurized machines.
- Use after removing moisture with an air dryer or drain catch.
- When compressed air contains synthetic oil, salt, and corrosive gas, use clean air to prevent destruction or malfunctioning.
- Do not use the product in places where the product could be subject to vibration or impact.
- Do not disassemble or modify the main body. However, if it becomes necessary to disassemble the product to fix it, turn off the power, intercept the pressure and exhaust the pressurized air.

# Safety

## - General precautions when using pneumatic products

### \* Appropriate pressure

Pneumatic products' pressure should be between 3 to 7 for them to operate normally.

When the product is used under a low pressure (under 3bar), the operation (especially of the slide cylinder) could be defective. In the case of a rotary cylinder or a rotary unit, there is a possibility that the parts related to the attached absorber could not function well.

When the pressure is high (more than 7bar), the product could be damaged or its life could be shortened. For large products, high pressure could cause unexpected accidents. Especially, when the pressure is greater than 10bar, it would be a violation of the regulations on high pressure.

### \* Appropriate temperatures

The appropriate temperature range is from 5°C to 60°C. Make sure that the outside temperature doesn't exceed 60°C because under the temperature of 5°C the moisture contained in the air and over the temperature of 60°C, the problem with the NBR packing (although the packing can withstand up to 100°C, partial temperature rise could take place) could occur. Also, because the coefficients of heat expansion of various materials used in products are different, jams could occur during operations. Furthermore, air leakages and cracks in parts could occur. Therefore, consult us before using pneumatic products under continuous high temperature or low temperature or under the condition in which high temperature and low temperature states are repeated.

Even for a single product, diverse packings are used for producers. Also, due to the fact that not every heat-resistant packing has been developed, when supply problems occur (delivery date, price, and inventory), beware that product specifications could change because products are designed based on the available packings.

### \* Appropriate speed

Because the speed of pneumatic cylinders is affected by the built-in packings, you can use them under the speed of from 50mm/sec to 500mm/sec. Under low speed, uneven operations such as the stick slip could occur and under high speed, life of the packing could be compromised substantially, resulting in the leakage of air. Therefore, consult us before using the equipment under high speed.

### \* Product life

There is a regulation in a foreign country that stipulates that a cylinder should be able to withstand damages to its pistons after working distance 300km. When the movement of the cylinder with the stroke of 150mm is calculated, movement of about 1 million is guaranteed. Air finger products are subject to load caused by the gripping of the product.

Also, the product is located at the hem of general cylinders, thereby being exposed to oil, chips, and polishing stone powders. As a result, the life is reduced to 1/4 that of a general cylinder.

Our warranty period for our products is 1 million operations or 1 year, whichever comes first. For products that exceed the above criteria, we provide product services by charging for only parts and services. However, the service cost could increase for those products that have been around for more than 5 years or for those products that are no longer being produced. In such cases, we recommend that you replace your product with a product of identical specifications.

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## \* About the specifications of optional products

In the event that producers are out of business, or foreign products are out of stock, it becomes impossible to check the specifications, or when there aren't any appropriate products, the company tries to resolve the problems with products that meet the users' specifications. As of 2004, the company had produced and supplied more than 2,000 optional products, retaining blueprints and data. However, due to the unique characteristics of optional products, exorbitant costs and time could be consumed compared to standard products because of extraordinary amount of preparations (including designing), production of tools and tool setting, and program modifications. Also, standard products are stable because they are backed by tests as a result of 17 years of experience in production and because of the use of standard parts. However, optional products could be of lower quality due to the fact that products are produced according to limited specifications. When ordering optional products, remember that price increases, late deliveries, and quality deteriorations could result. Also, when producing optional products, the RS specifications are designed and produced based on the sensor types used by us. When you wish to use your own sensor, please provide us with the sensor and mounting parts beforehand. If you need to custom design a product, we will produce the product according to your specifications.

## \* Caution when using replacement parts

Some users purchase parts without ordering from us separately.

- When you make an order without indicating the RS, parts related to the sensor (magnet and parts attached to the sensor) are not provided. When you order separately later on, a higher price will be charged. Also, we are not liable for problems that occur due to the use of a sensor attached arbitrarily. During the warranty period, product services will be provided.

- When you order without indicating the PS, the parts related to the adjacent sensor (sensor dock and sensor bracket) are not provided.

When you order the parts separately later on, higher prices will be charged. Also, the problems could occur due to the sensitivity, length, and thickness

- When ordering without indicating the DA, the parts related to the shock absorber (buckling protector, spacer ring, and others) are not provided.

Do not change or attach the oil pressure shock absorber that are attached to the rotary cylinder or rotary unit arbitrarily. The parts related to the shock absorber have been designed and produced by considering comprehensively the rod, stroke, length, shape of screws, and impact absorption energy. As a result, when specifications change, many problems could occur. Before attaching or changing the shock absorber, make an inquiry to us and attach the product with identical specifications.

- The air pipe speed controller or one-touch fitting parts were designed based on the products that could be purchased in the marketplace. Because damages and mutual interruptions could occur, inquire us before using products with special specifications (PF types, check valves, and inch types)

## \* Problems associated with additional processing

Additional processing to the existing parts including the standard pin part of the finger adapter rotary units (RHU + finger assembly), addition of the bottom side of the AF 56N and air port, the BF option of the AF 30 & AF 46 type (addition of the air port at the bottom) and additional processing to the existing parts (especially on the standard pin), addition of the standard part and air port on the bottom of the AF 56N, and the BP option on the AF 30 & AF 46 type (addition of the air port on the bottom) are delivered without additional post-processing. When hard anodizing is performed, changes to the common difference occur. Therefore, take note that products are delivered in the processed state.

## \* About unannounced specification changes

Because products and their functions improve continuously, changes to the interior and exterior could take place. We do our best to keep the specifications listed on the catalogue in order to keep our promise with our customers. However, changes could occur inevitably in order to enhance the quality. When an existing product is eliminated and replaced by an improved product, the changes could take place without prior notice in the case that 100% compatibility is assured. In such a case, no prior notification takes place. Material changes, color changes, and specification changes of some sensors could change without prior notification. However, when problems with product usage are foreseen due to the changes in the location of the mounting tap and in the shape as well as administrative changes, changes of products' names take place or notifications are made when ordered.

# Safety

## - Caution when using Gripper types

### \* Caution when using the sensor

1) Under the environment in which the sequence control is required due to the use of the magnetic sensor, we produce and sell RS type products except for small products. Also, most products have built-in magnets.

2) When fully assembled products are shipped, it is checked whether the sensor operates properly. However, when products are used onsite, defective sensors could be discovered.

There could be many different factors,

but one of the causes could be the transmission of magnetic force through the mounting bolt that goes through the body and through the plate attached to the product. When a problem occurs, use bolts made of stainless materials and change the material of the mounting plate with aluminum.

3) For some small products, iron magnets of the Nd-Fe type have been built-in. Due to the material's characteristics, the magnetic power decreases drastically under high temperatures (greater than 50 degrees).

Therefore, caution is required when using a product under high temperature.

4) For small products, there is a possibility that the sensor could protrude under the body. Generally, the extrusion is indicated on every product, but changes in the extrusion length could change due to the state of the induction of the sensor. Therefore, when selecting a small product, be sure to obtain sufficient

### \* Caution about the center of the axis

When gripping an object while the object has been fixed, be careful about the center of the axis.

Wedge type products such as the AF 30, AF 46, and AF 56N are structurally weak against eccentricity.

When supporting equipments are not used, either the jaw could stop operating or damages to the plunger could occur.

### \* Caution about the gripping power of the finger

1) The gripping power of the finger could be broadly classified into general and disassembly types.

- The general type could be indicated as thrust x operational thrust x efficiency.

※ Thrust = value derived by multiplying the cross section of the piston by air pressure and operational coefficient = the transportational distance of the piston / operational distance of a jaw, and the efficiency = 0.8. For the constant including the operational coefficient and variables, inquire us. We plan to document our data and distribute them in the nearest future.

- The disassembly method is the method of analysis that incorporates the structural interpretation of various operational powers, frictional coefficient, lubrication coefficient, and gear efficiency. The method is too complicated for a general user to use and changes to the value could occur due to various coefficients and variable values. We are in the process of developing a program. Also, we have come up with methods of calculating the wedge type, rack & pinion type, angular open and close type air fingers, drooping of the slide cylinder, and the appropriate load of the rotary cylinder, and are currently distributing the calculation methods

2) In order to check the operational state of the air finger of the parallel open and close method, the machine is usually opened and the jaw is operated manually. However, according to 1) above, when the operational distance of the piston is great and the operational distance of the jaw is relatively small, the thrust generated by air pressure is great and the quality is relatively defective when operated manually. That's because the piston has to be moved a lot by operating the jaw just a little. Therefore, due to the structure of the air finger, it's not correct to change the operational direction of the piston by using a medium, especially for wedge type products.

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3) For angular open and close type air finger products, the distance between the center of the product and the hinge point (the rotational center of the jaw) is short, the gripping power is substantially lower compared to the diameter of the piston. Therefore, refer to the specifications of the catalogue.

4) The factor that decreases the product's gripping power and its durability the most is the distance between the finger body and the operational point. As the operational distance increases, a bending momentum occurs, increasing the friction on the sliding of the jaw drastically, resulting in the damages to the jaw, wear and tear of the sliding, and expansion of the body. Therefore, set the operational distance as short as possible.

5) Generally, the durability and thrust of the finger isn't proportional according to the differences in the weights of the objects.

For example, when light objects such as a ping pong ball or an iron ball of identical volume are gripped, the force that acts on the jaw is identical and the differences in the effects on the durability of the jaw are minuscule. Even when very light objects are gripped, please be careful about the distance of the operation point indicated in 4).

## \* Production of Normally Open and Normally Close

These days, orders for red brass products with built-in springs that maintain the normally open and normally close states under the atmospheric pressure are on the rise. The major uses for red brass products are as follows:

1) To prevent the drooping of objects and collision while moving by maintaining the standard state when air is intercepted

2) To supplement insufficient thrust when opening or closing

3) To save on air and electricity for operating the solenoid, and to realize fast response with the spring by using only the spring without using an air port

Restitution of the compressed spring = Spring coefficient x Displacement (Compression length)

Here, the spring coefficient is reduced inversely with the length under the identical condition.

When classifications are made by the ① Length of the repulsive force "0">② Required minimum repulsive force>③ Required maximum repulsive force>④ Allowed change in length>⑤ and Contact length, only ② to ③ or ② to ④ are applied to products. Here, the length of the product is stretched by the length of the [③ or ④ - existing spare space].

Therefore, when ordering normally open and normally close products, be careful of the fact that the product's length increases. Especially, when the maintenance of a constant repulsive force is required, take note that the product's length could increase further because specifications with low spring coefficients (relatively long length) are required in order to ensure that changes in the repulsive force according to displacement are reduced.

## \* When using the product in places where impure materials could infiltrate

1) Refrain from using cross roller type products such as the AF 216 or LMT. When dusts and other impure materials infiltrate the roller, the rotation of the roller is obstructed. When they stick to the roller, the guides on both sides are stretched to the lateral directions, causing defects and making it impossible to use the product.

2) When the product is applied to polishing processes, resulting in the infiltration of polishing dusts, refrain from using products whose aluminum bodies become subject to friction by the jaw such as the AF 30 and AF 46 types, if possible. If such products have to be used, consult us before use. Polishing stone dusts infiltrate into the side of the jaw that's subject to friction, acting as the body's abrasive material to decrease the life of the product drastically.

3) In most cases, foreign materials infiltrate inside products through existing niches (especially the spot on which the close sensor dock is placed). Request us to close up unnecessary space

4) Add the air blowing (flushing) mechanism that supplies compressed air into the product periodically and exhausts the air to prevent the infiltration of impure materials.

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5) Scraper seals and other equipment should be added in order to prevent the infiltration of foreign materials inside the cylinder. In order to save space in the air finger, the scraper seal is absent on our products and other companies' products.

6) Review products that are used for attaching cover such as the AF 13C and AF 22C beforehand.

7) Due to the requirements of lean production and order specifications, we have not been able to meet the demand of the javarar (anti-dust cover made from rubber). We will do our best to produce products that could augment it.

## \* Caution when using the key home

Most of slide cylinder bodies are produced with extruding and impression materials because the measurements (including the common difference) indicated on the blueprint cannot be satisfied in the manufacturing process. As a result, extruding and impression processes are undergone. Some parts excluding main parts could be completed in the impression state that's less than the measurement indicated on the blueprint. When you wish to use the key way indicated in the blueprint, notify us when ordering.

## \* Use of the maximum values of the stroke and the median administration

1) The minimum administration indicated on the specifications of the slide cylinder is the minimum value for the production of products, and the value below 1mm is possible. However, for the RH, SC, TL, and other products, the air cushion function is lost. Also, most products cannot use 2 sensors.

2) When the maximum administration is exceeded, the GS and SC that use the cylinders sold in the market depend on the possibility of the production of the cylinder. However, with the changes according to the elongation of the impression body, the operations become defective, with the occurrence of excessive drooping for the GC, SC, and others. For the RH (W) 20, NO, NF, and JO that manufacture the slide shaft, the difficulty of production is enormous, resulting in higher prices, late deliveries, and other problems. Therefore, care should be taken.

3) For the median administration, when the unit that's below the decimal point is demanded (eg: 31.2), select an upper administration (eg: 32) and adjust minuscule amounts by using the basic stopper.

## \* Allowable load of the rotary cylinder

In our catalogue, the allowed trust of the rotary cylinder and radial load are set low. Generally, the rotary cylinder's life and function are determined by the amount of impact caused by the inertial momentum. This inertial momentum is proportional to the  $\text{weight} \times \text{distance}^2$ , and is affected more by the distance from the center than by weight. Set the distance from the center at the minimum.

Many users select products with the weight in mind. Therefore, the allowable weight was recorded low by predicting the distance to the object for general use.

## \* Optimal use of the rotary cylinder

1) Locate the object to the place closest to the center of rotation of the rotary cylinder.

2) Lighten the weight of the load such as the adapter plate and bracket.

3) When subject to lopsided load (especially in the direction of perpendicular gravity), attach a balancing weight (FMF) to balance the weight on both sides. When there is a change in the load due to loading and unloading, attach a balancing weight that's close to the median value of the maximum and minimum load (layered structure for adding or subtracting weight) for test purposes so that you may use the product under the optimal condition.

# Safety

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## \* The Real Stopping System of the Rotary Cylinder

For rotary cylinders with a double power structure (in which thrusts occur simultaneously on both cylinders) such as the SDRJ and RHU, we encounter customers' opinions that the exteriors of our products are inferior to those of other companies that are simpler

That's due to the difference in structure. Our products are based on the stoppage structure in which the turn table is stopped. As a result, the stoppage power is equal to the rotational power (2x). In contrast, the products that stop pistons inside have stoppage power that is reduced by half relative to the rotational power (2x). We will provide answers to questions when you ask for structures and principles. Compare our products

with other products onsite while air has been supplied and the products are not operating (especially in the perpendicular direction). Sleekness of the exterior cannot take precedence over function.