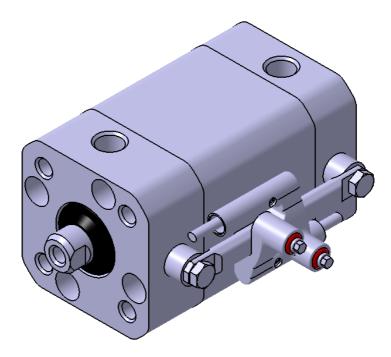




OPERATION MANUAL

HYGIENIC DESIGN CYLINDER 【HYQ Series】 Φ20, Φ25, Φ32, Φ40, Φ50, Φ63



☆Read this manual thoroughly before mounting and operating the actuator.

 $\bigstar \mathsf{Pay}$ particular attention to the section concerning safety.

 $\bigstar\ensuremath{\mathsf{Keep}}$ this manual in an accessible location.

SMC株式会社

承認·変更来歴表

<u>対応文書名:取扱説明書</u>

<u>対応文書NO:HYQ*-OM0003I</u>

<u>部 署: 開発第2部</u>

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承認	確認	確認	作成

Image: Sector		
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本書は、対応文書の原紙と一緒に保管する。

フォーマット No:FSM027-2B

Contents

1. Safety Instructions P1
2. Specifications P3 2—1. Specifications
3. Installation and Handling ••••••••••••••••••••••••••••••••••••
3-1. Air source
3–2. Operating Environment
3-3. Speed adjustment
3–4. Direction control
3–5. Caution on Design
3-6. Installation, setting-up and other
3—7. Auto switch
 4. Model selection 4-1. Allowable kinetic energy 4-2. Lateral load at rod end
5. Pneumatic circuit ······P16
6. Maintenance and Check ······P17
6—1. Daily check
6—2. Periodical check
6—3. How to replace packing
6-4. Consumable parts
7. Troubleshooting P22
8. Basic construction P24

1. Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "Danger", "Warning" or "Caution". To ensure safety, be sure to observe ISO 4414^{*1} , JIS B 8370^{*2} and other safety practices.

Indications

Indication	Indications
⚠ Danger :	In extreme conditions, there is a possible result of serious injury or loss of life.
Warning :	Operator error could result in serious injury or loss of life.
Caution :	Operator error could result in injury ^{*3)} or equipment damage ^{*4)} .

%1) ISO 4414: Pneumatic fluid power - General rules relating to systems

2) JIS B 8370: General Rules for Pneumatic Equipment

※3) An injury does not necessitate staying or going to a hospital for a long period of time to recover. This includes burns and electric shocks..

%4) Equipment damage is extensive damage related to equipment and machines.

Selection/Handling/Application

① The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalogue information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2 Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

(A trained and experienced operator is required to have understanding of JIS B 8370 "General Rules for Pneumatic Equipments" and other safety regulations.)

③ Do not service machinery/equipment or attempt to remove components until safety is confirmed.

- 1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
- 2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment, exhaust all residual compressed air in the system and relieve all energy (liquid pressure, spring force, capacitor, gravity).
- Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

④ Contact SMC if the product is to be used in any of the following conditions:

- 1. Conditions and environments beyond the given specifications, or if product is used outdoors or placed where direct sunshine strikes.
- 2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
- 3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.
- 4. Interlock circuit. In this case, provide double interlock circuit by providing a mechanical protective function for possible failure of either of them. Also, perform periodical checks to ensure it works properly.

Exemption

- (1)SMC doesn't take any responsibility for the damage resulting from an earthquake, fire due to other causes than our products, the third party behavior and the customer's intentional or unintentional fault, misuse and operation in other abnormal conditions.
- (2)SMC doesn't take any responsibility for the damage associated with use of our product or out-of-service product (including loss of company profits, suspension of company activity).
- (3)SMC doesn't take any responsibility for the damage resulting from the use in the manner other than specified in the catalogue or Operation Manual.
- (4)SMC doesn't take any responsibility for the damage resulting from malfunction due to use of our product in combination with equipments or software from another manufacturer.

2. Specifications

2-1. Specifications

Bore size(mm)	20 25		32	40	50	63		
Action	Double acting , Single rod							
Fluid	Air							
Proof pressure	1.5MPa							
Maximum operating pressure	1.0MPa							
Minimum operating pressure	0.2MPa 0.15MPa							
Ambient and fluid temperature	Without auto switch:0 to 70°C With auto switch:0 to 60°C							
Cushion	Rubber bumper							
Lubrication	Not required (Non-lube)							
Piston speed	50 to 500mm/s(pressurized at 1.0MPa)							
Thread tolerance	Conforming to ISO 965							
Stroke length tolerance	+1. ⁰ mm							
Piston rod material	SUS304, hard chrome plated							
Port size	M5 × 0.8 1/8(Rc, NPT, G) 1/4(Rc, NPT, G)							

A Warning

1) Features of the product.

The hygienic design cylinder HYQ conforms to ISO standard in its outline and mounting dimensions. The actuator, has been designed specifically for use in machines in the food and packaging industries. The concept of hygienic design is a cylinder which is sterilized, is a cylinder having a shape which can be easily cleaned and kept hygienic.

	Detail	Allowed/Not allowed to mount in
		zone
Food zone	The food product has direct contact with the cylinder.	Not allowed
Splash zone (directly)	The food product can contact the cylinder, but the food product is not consumed.	Allowed
Non-food zone	The food does not contact the cylinder.	Allowed

-Allowable mounting zone-

XThe cylinder should never be mounted in the food zone.

2) Confirm the specifications.

The products are designed for use in industrial compressed air systems. If the products are used in conditions where pressure and/or temperature are outside the range of specifications, damage and/or malfunctions may occur. Do not use in these conditions. (Refer to the specifications.)

Please consult with SMC if you use a fluid other than compressed air.

- 4 -

3. Installation and Handling

3-1. Air source

The compressed air supplied to the cylinder must be filtered, and the pressure must be controlled by a suitable regulator. SMC's AF series filters and AR series regulators, are recommended.

A Warning

1) Use clean air.

Do not use compressed air which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as this can cause damage or malfunction.

A Caution

2) Installation of air filters.

Install air filters close to valves at their upstream side. A filtration degree of $5\,\mu$ m or less should be selected.

3) Install an aftercooler, air dryer, or water separator (Drain Catch).

Air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer, aftercooler or water separator, etc.

4) Use the product within the specified range of fluid and ambient temperature.

Take measures to prevent freezing when below 5°C, since moisture in circuits can freeze and cause damage to seals and lead to malfunctions.

The allowable operating range for this product is between

Without auto switch 0 to 70°C

With auto switch 0 to 60°C

If the cylinder is used at temp out of this range, the packing is hardened, the grease is lost and the packing is worn, resulting in air leakage.

For compressed air quality, refer to "Air Preparation Equipment" catalog.

5) Lubrication of cylinder

[Grease for standard(for non-food)]

The cylinder has been lubricated for life at the factory and can be used without any further lubrication. However, in the event that it is lubricated additionally, be sure to use Class 1 turbine oil (with no additive) ISO VG32.

Stopping lubrication later may lead to malfunctions because the new lubricant will cancel out the original lubricant. Therefore, lubrication must be continued once it has been started.

【Grease for food】

The cylinder has been lubricated for life at the factory and can be used without any further lubrication. If the cylinder is supplied with lubrication, it must be continually lubricated, otherwise it may fail in operatation..

6) Do not wipe off the grease attached on the sliding face of the cylinder.

If the grease is removed from the sliding part of the cylinder forcibly, a malfunction could occur. When the cylinder has been in operation for a long distance, the sliding parts become discolored black.. In such cases, to prolong cylinder life, wipe off the grease from the sliding parts, and add new grease. (When the grease is wiped off, use water. If it is wiped off with alcohol or special solvent, the packing could be damaged.)

7) Before piping

Before piping, the pipe should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

8) Wrapping of pipe tape

When screwing piping or fitting into ports, ensure that chips from the pipe threads or sealing material do not get inside the piping.

When the pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.

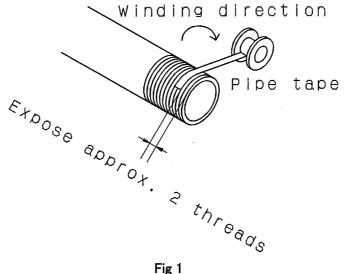


Fig 1

3-2. Operating Environment

Warning

1) Do not use in atmospheres or locations where corrosion hazards exist.

Refer to the construction drawings regarding cylinder materials.

- 2) In dusty locations or where water or oil, etc., splash on the equipment, take suitable measures to protect the rod.
- 3) Avoid highly humid places for storage of the cylinder. When the cylinder is stored, avoid humidity to prevent occurrence of rust and make sure the piston rod is retracted.
- 4) When using auto switches, do not operate in an environment with strong magnetic fields.

3-3. Speed adjustment

The cylinder can be adjusted to run at a desired speed by using the SMC AS series speed controller. There are two ways to achieve this, depending on the port of the cylinder which restricts the supplied air, supply or exhaust port. It should be noted that normally the air is restricted at the exhaust port.

A Caution

- 1) Use a speed controller to adjust the cylinder drive speed, gradually increasing from a low speed to the desired speed setting.
- Perform speed adjustment in the place having the actual operating conditions.
 If it is performed under different conditions, it might deviate.

3-4. Direction control

The direction of movement of the cylinder can be switched using SMC's solenoid valve, which is selected from various styles suitable for the cylinder and the application.

A Warning

1) Design circuitry to prevent sudden lurching of driven objects.

When a cylinder is driven by an exhaust centre type directional control valve or when starting up after residual pressure is exhausted from the circuit, etc., the piston and its driven object will lurch at high speed if pressure is applied to one side of the cylinder because of the absence of air pressure inside the cylinder. Therefore, equipment should be selected and circuits designed to prevent sudden lurching, because there is a danger of human injury and/or damage to equipment when this occurs.

3-5. Caution on Design

A Warning

1) There is a possibility of dangerous sudden action by air cylinders if sliding parts of machinery are twisted due to external forces, etc.

In such cases, human injury may occur; e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be adjusted to operate smoothly and designed to avoid such dangers.

2) A protective cover is recommended to minimize the risk of personal injury.

If a stationary object and moving parts of a cylinder are in close proximity, personal injury may occur. Design the structure to avoid contact with the human body.

3) Securely tighten all stationary parts and connected parts so that they will not become loose.

Especially when a cylinder operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.

4) A deceleration circuit or shock absorber may be required.

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve the impact.

In this case, the rigidity of the machinery should also be examined.

5) Consider a possible drop in circuit pressure due to a power outage, etc.

When a cylinder is used in a clamping mechanism, there is a danger of workpieces dropping if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage, etc. Therefore, safety equipment should be installed to prevent damage to machinery and human injury. Suspension mechanisms and lifting devices also require consideration for drop prevention.

6) Consider a possible loss of power source.

Measures should be taken to protect against bodily injury and equipment damage in the event that there is a loss of power to equipment conrtolled by pneumatics, electricity, or hydraulics.

7) Consider emergency stops.

Design so that human injury and/or damage to machinery and euqipment will not be caused when machinery is stopped by a safety device under abnormal conditions, a power outage or a manual emergency stop.

- 8) Consider the action when operation is restarted after an emergency stop or abnormal stop. Design the machinery so that human injury or equipment damage will not occur upon restart of operation. When the cylinder has to be reset at the starting position, install manual safety equipment.
- 9) Design the system not to allow external force over max. output of the cylinder to act. Excessive external force may break the cylinder and lead to human injury and equipment damage.

10) Consider the force output of the cylinder to check the adequacy of the mounting base in rigidity.

If the mounting base is not rigid enough, human injury and equipment damage may be caused.

11) Do not operate multiple cylinders simultaneously.

Air is compressive fluid and difficult to control in its speed. The change in supply pressure, load, temperature, lubrication and deviation and change over the time of performance of the cylinder could affect the speed. Therefore, the simultaneous operation of the cylinders is possible for short periods by adjusting with a speed controller, but these factors may easily break the simultaneous operation. If it breaks, an excessive force is applied to the piston rod due to the difference in the positions. The force becomes a lateral load and causes eccentric wear of the packing, wear of the bushing and contact between the cylinder tube and piston occurs. For these reasons, designs which depend on the simultaneous operation of the cylinders should be avoided. If it is compelled, use a rigid and high accurate guide to compensate for the force outputted by each cylinder.

12) Intermediate stop

When using a 3 position closed centre valve, it is difficult to make a piston stop at the required position as accurately and precisely as with hydraulic pressure due to compressibility of air.

Furthermore, since valves and cylinders, etc. are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended period of time. Please contact SMC if it is necessary to hold a stopped position for an extended period.

A Caution

13) Operate the piston within a range such that collision damage will not occur at the stroke end.

The operation range should prevent damage from occurring when a piston, having inertial force, stops by striking the cover at the stroke end. Refer to the cylinder model selection procedure for the maximum usable stroke.

3-6. Installation, Setting-up and Other

A Caution

1) Be certain to match the rod shaft center with the load and direction of movement when connecting.

When not properly matched, problems may arise with the rod and tube, and damage may be caused due to friction on areas such as the inner tube surface, bushings, rod surface, and seals.

- 2) When an external guide is used, connect the rod end and the load in such a way that there is no interference at any point within the stroke.
- 3) Do not scratch or gouge the sliding portion of the cylinder tube or the piston rod by striking it with an object, or squeezing it.

The tube bore is manufactured under precise tolerances. Thus, even a slight deformation could lead to a malfunction.

Moreover, scratches or gouges, etc. in the piston rod may lead to damaged seals and cause air leakage.

4) Do not use until you verify that the equipment can operate properly.

After mounting, repairs, or modification, etc., connect the air supply and electric power, and then confirm proper mounting by means of appropriate function and leak tests.

5) Prevent the rotating parts from seizing. After mounting, repair or modification, etc., connect the air supply and electric power, and then confirm proper mounting by means of appropriate function and leak inspections.

6) Be sure to hold spanner flat of the piston rod when mounting and removing the load. If the piston rod at load side is not held, the connected (threaded) part of the piston rod could be loosened.

7) Shorten the piping length.

If the piping connection is too long, the content volume of the piping becomes larger than the cylinder and the fog created by adiabatic swelling is prevented from escaping to the air and obliged to stay inside the tube. As the operation is repeated, the amount of the fog is increased and expected to turn into the water. The grease is then washed away by the water eliminating lubrication, increasing the friction resistance and subsequently causing operation failure. To prevent this, the following measure should be taken.

- (1)Shorten the piping tube between solenoid valve and cylinder as much as possible to ensure the created fog is exhausted to the air. For reference, the following relation should be achieved.
 - Cylinder content volume at atmospheric pressure $\times 0.7 \ge$ Piping tube content volume
- (2)Connect speed exhaust controller ASV and quick exhaust valve in the circuit of the cylinder to exhaust the pressure to atmosphere directly.
- (3)Locate the piping port downward to prevent the moisture created in the piping from returning to the cylinder easily.
- 8) Give consideration not to splash chemical, which could wash away oil, on the sliding part of the cylinder.

Some chemicals could wash away the grease from the sliding part of the piston rod. The chemical other than general cleaning fluid for water and food could shorten the life significantly. Consult SMC if it is used.

9) Mount the cylinder, support bracket and external cover with the following specific tightening torque.

Table 1

Applicable bore size	Thread size	Tightening torque(N•m)
Φ20	M5 × 0.8	2.48~4.47
Φ25•32•40	M6 × 1	4.22~7.60
Ф 50•63	M8 × 1.25	10.20~18.40

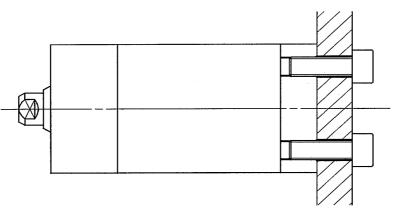


Fig 2

10) The mounting screw and bracket for the cylinder might let the dust collected in some operating conditions.

Take a measure depending on the operating conditions when mounting.

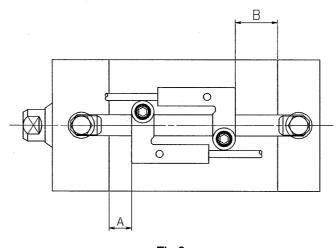
- 10 -

3-7. Auto switch

The type and specifications of applicable auto switch and the cautions for handling them can be found in the catalogue and operation manual respectively.

Table 2	Unit : mm		
Applicable bore size	А	В	Operating Range
Φ20	6.5	10.5	7
Φ25	6.5	11	6
Φ32	8.5	16	
Φ40	10.5	16	7.5
Φ50	10.5	17	7.5
Φ63	9	18	

3-7-1. Mounting position for detection at stroke end and Operating Range



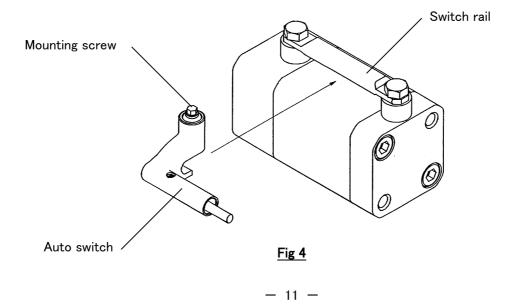


3-7-2. How to mount auto switch

①Insert a rail into a mounting groove. At this time, loosen the mounting screw in advance.

②Decide the position and tighten the screw.

Tightening torque: $0.8 \sim 1.4 \text{N} \cdot \text{m}$



3-7-3. Minimum Strokes for Auto Switch Mounting

Table 3

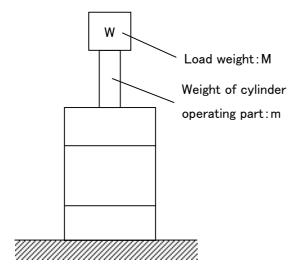
No. of auto swithes	D-F6
1	5
2	10

4. Model selection

4-1. Allowable Kinetic Energy

Table 4

Bore size(mm)	20	25	32	40	50	63	
Piston speed(m/s)	0.05~0.5						
Allowable kinetic energy(J)	0.11	0.18	0.29	0.52	0.91	1.54	



[Formula]

Kinetic energy $E(J) = \frac{(m+M)V^2}{2}$

m:Weight of cylinder operating part(kg)

M:Load weight(kg)

V:Piston speed(m/s)

Weight of cylinder movable parts / Without built-in magnet

Unit:g Bore Cylinder stroke(mm) size (mm) ____

Weight o	f cylinder	cylinder movable parts / With built-in magnet									Unit:g	
Bore	Cylinder stroke(mm)											
size (mm)	5	10	15	20	25	30	35	40	45	50	75	100
20	28	30	32	34	36	38	40	42	44	46	—	_
25	45	48	52	55	58	61	64	67	70	73	_	_
32	84	88	93	97	102	106	111	115	120	124	146	169
40	157	165	173	181	189	197	205	213	221	229	269	309
50		288	301	313	326	338	351	363	376	388	450	513
63	_	362	374	387	399	412	424	437	449	462	524	586

Unit:g

Bore size(n	ım)	20	25	32	40	50	63
Rod end male	Thread	4	8	16	27	140	68
thread	Nut	2	5	9	13	27	27

Calculation Example)HYDQB32-20M

•Cylinder weight: HYDQB32-20 ••• 97g

•Option wight<u>: Rod end male thread •••• 25g</u>

122g

4-2. Lateral Load at Rod End

🕂 Caution

In principle, the load applied to the piston rod should always be kept in the axial direction. If this situation cannot be avoided, keep the lateral load applied on the bushing of the cylinder, to 1/20 or less of the maximum output of the cylinder.

- Calculation of allowable lateral load -

$$fB = \frac{F}{20}, F = \frac{\pi}{4}D^2 \cdot P$$

Table 5

$$fR < \frac{L_1}{L_1 + (L_2 + stroke)} \cdot fB$$

F:Maximum output(MPa)

fB: Allowable maximum load to bushing(N)

D:Bore size(mm)

P:Maximum operating pressure(MPa)

fR:Allowable mounted load(N)

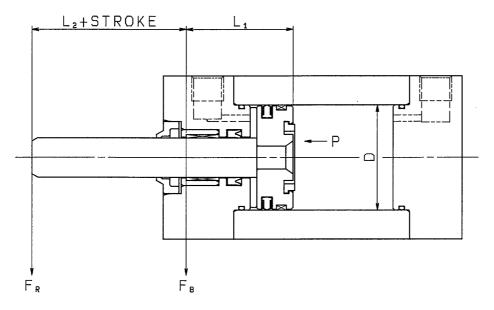
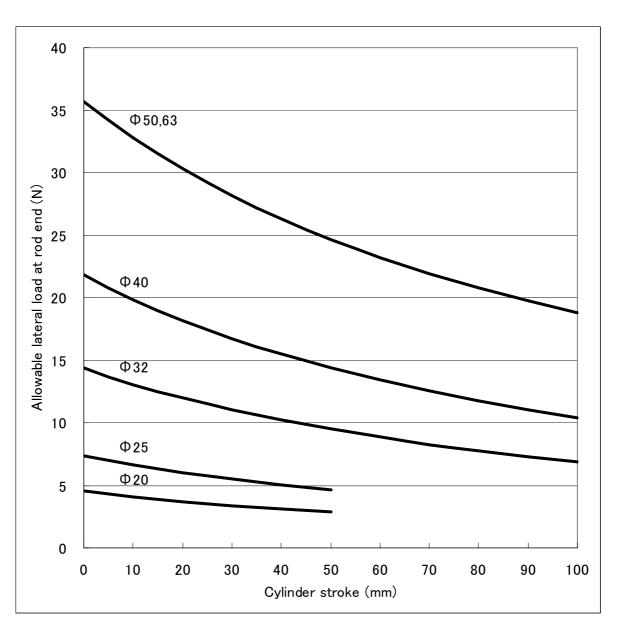


Fig 5

D	L ₁	L ₂	fB	Stroke range
(mm)	(mm)	(mm)	(N)	(mm)
Ф 20	27	16	15.7	5 10 15 20 25 20 25 40 45 50
Φ25	28.7	16.8	24.5	5,10,15,20,25,30,35,40,45,50
Ф 32	37.2	16.3	40.2	5 10 15 20 25 20 25 40 45 50 75 100
Φ40	36.7	18.3	62.8	5,10,15,20,25,30,35,40,45,50,75,100
Φ50	41.2	21.3	98.2	10 15 20 25 20 25 40 45 50 75 100
Ф 63	41.4	22.1	155.9	10,15,20,25,30,35,40,45,50,75,100

When the load is mounted on the rod end, add the distance to the center of gravity to the dimension L2.



<u>Graph 1</u>

The thick solid line of graph 2 shows the allowable lateral load to the cylinder.

(The distance between the rod end and load is 50mm.)

5. Pneumatic circuit

The typical circuit for HYQ series where air filter, regulator, solenoid valve and speed controller (meter-out) are used for operation is as follows.

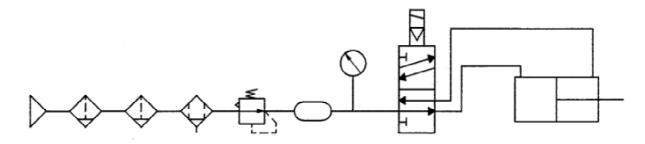


Fig 6

6. Maintenance and Check

6-1. Daily check

1) Is the operation smooth?

- 2) Is there any abnormal change in the piston speed and cycle time?
- 3) Is there any abnormality in the stroke?

6-2. Periodical check

- 1) Are the cylinder mounting bolts and work, firmly fixed?
- 2) Is the operation smooth?
- 3) Are there any abnormal changes in the piston speed and cycle time?
- 4) Is there any external leakage?
- 5) Is there any abnormality in the stroke?
- 6) Are there any flaws on the piston rod
- 7) Is the drain of the air filter removed periodically?

Check the above-mentioned items, and if any defect is found, take an appropriate measure. If there is an unclear point, consult SMC's sales.

A Warning

1) Perform maintenance in above procedure.

If the cylinder is handled incorrectly, breakage and operating failure of the equipment around the cylinder may be caused.

2) Removal of equipment and supply and exhaust of compressed air

Before removing the equipment, make sure the load or work cannot drop or run away out of control. Cut off the air and power supply for the system and exhaust the compressed air from the system. Before the system is restarted, make sure the actuator cannot extend out of control.

6-3. How to replace packing

- 1. Disassembly of the cylinder
 - 1)Cleaning

Prior to disassembly, wipe off any dirt from the outside of the actuator. This will prevent intrusion of dust and foreign materials during disassembly.

Take particular care on the surface of the piston rod.

②Removal of switch rail (if the switch is mounted)

Loosen the hexagon bolt and remove the switch rail and switch rail pedestal .

③Removal of rod cover

Loosen the hexagon socket head cap screw and remove the rod cover.

(4) Disassembly

Pull out the piston rod by holding a bolt or nut mounted on the piston rod end. Take care not to scratch or mark the internal face of the cylinder tube.

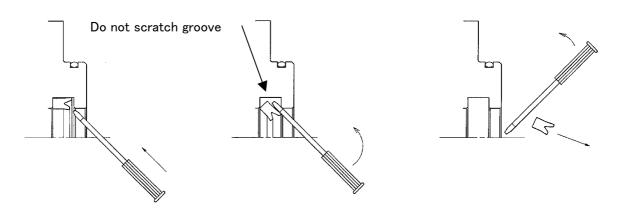
⑤Removal of the head cover

Loosen the hexagon socket head cap screw and remove the head cover.

2. Removal of the packing

①Rod packing[Fig 7]

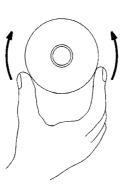
Insert a precision driver etc. from behind the rod cover and prise the packing out. Take care not to scratch or score the packing groove in the rod cover.





②Piston packing[Fig 8]

Since the piston packing is inserted deeply, push it partially to make it come off and pull it out manually. Do not use precision driver.



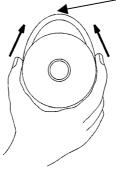


Fig 8

③Tube gasket[Fig 8]

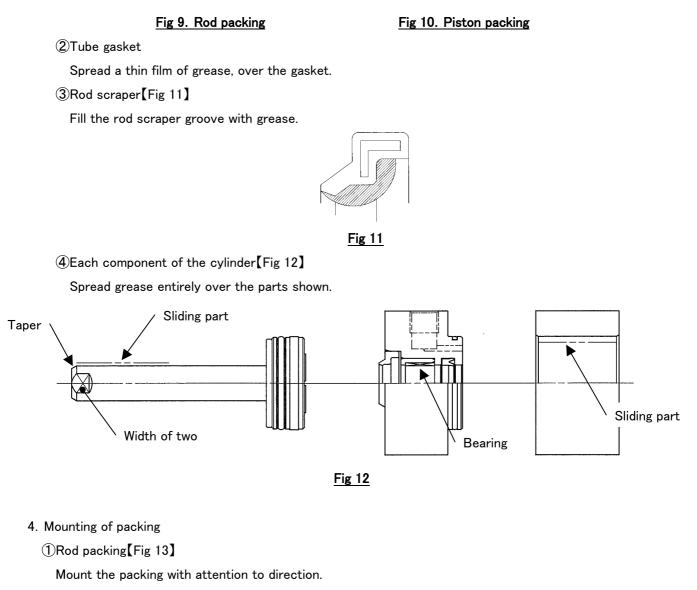
Push the tube gasket partially to make it come off and pull it out manually.

3. Application of grease

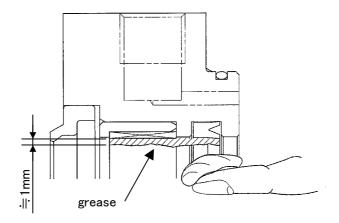
①Rod packing and Piston packing[Fig 9, Fig 10]

Apply the grease all around new packing evenly. Also add the grease inside the groove.





Then, apply the grease on the packing and bearing evenly.





2 Piston packing

When mounting the packing, ensure there are no twists in the packing.

③Tube gasket

Pay attention not to make the gasket come off.

5. Reassembly of the cylinder

①Tighten the head cover.

Wipe off the old adhesive from the threaded part of the hexagon socket head cap screw and apply a new layer of adhesive (Loctite 242 (blue)).

Tighten the cylinder tube and head cover with hexagon socket head cap screw.

Table 6	Unit:N•m	
Applicable bore size	Tightening torque	
Ф 20	2.1~3.9	
Φ25	3.6~6.8	
Ф 32	0.10.0	
Φ40	2.1~3.9	
Φ50	3.6~6.8	
Ф 63	8.8~16.2	

②Inset the rod assembly into the cylinder tube.

Apply the grease to the part receiving the cylinder tube and insert the rod assembly carefully and slowly make sure the piston packing and gasket are not damaged.

③Tighten the rod cover.

Wipe off the old adhesive from the threaded part of the hexagon socket head cap screw, and apply a new layer of adhesive (Loctite 242 (blue).

Tighten the cylinder tube and rod cover with hexagon socket head cap screw.

(Tightening torque:refer to table 7)

(4) Mount the switch rail (if the switch is mounted).

Т	ab	٩	7
. 1	au	ie	1

Unit:N•m

Applicable bore size	Tightening torque
Φ20 to Φ63	2.2~2.7

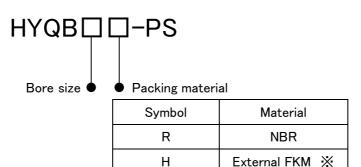
(5) Check the assembly condition.

Confirm there is no air leakage from the packing and the cylinder can operate smoothly at minimum operating pressure.

6-4. Consumable parts

6-4-1. Replaced parts

The service parts are as follows.



%External seal including the rod packing and tube gasket are made of

FKM.

Table 8. Seal Kit(Material:NBR)

		Content and qty.			
Bore size (mm)	Kit no.	Rod packing	Piston packing	Tube gasket	
		Material:NBR			
20	HYQB20R-PS	1	2	1	
25	HYQB25R-PS	1	2	1	
32	HYQB32R-PS	1	2	1	
40	HYQB40R-PS	1	2	1	
50	HYQB50R-PS	1	2	1	
63	HYQB63R-PS	1	2	1	

Table 9. Seal Kit(Material:External FKM)

		Content and qty.			
Bore size (mm)	Bore size (mm)	Rod packing	Piston packing	Tube gasket	
		Materia	Material: NBR		
20	HYQB20H-PS	1	2	1	
25	HYQB25H-PS	1	2	1	
32	HYQB32H-PS	1	2	1	
40	HYQB40H-PS	1	2	1	
50	HYQB50H-PS	1	2	1	
63	HYQB63H-PS	1	2	1	

6-4-2. Storage of packing (for extended period)

- 1) Put the packing into an enclosed package for storage
- 2) Avoid exposure to direct sunlight, high temp. and humidity.
- 3) Do not deform or damage the packing by crushing..
- 4) The packing may have white powder on the surface during storage. This will not effect the performance of the packing.

6-4-3. Grease package

When the grease is added during replacement of the packing and maintenance of the cylinder, use the grease package, shown in table 10 and 11.

Table 10. Grease package [Grease for standard(for	non-food】
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Part no.	Net
GR-S-010	10g

Table 11. Grease package [Grease for food]

Part no.	Net
GR-H -010	10g

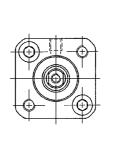
7. Troubleshooting

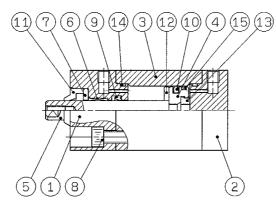
Trouble	Phenomenon	Possible cause	Remedy	Related section
 The operation is not smooth. The force output is reduced. The cylinder doesn't operate. 	Air leakage (external)	 The rod packing is damaged by flaws on the piston rod. The rod packing is damaged by a lack of grease on the piston rod. The rod packing is damaged by use at temp. out of the specified range. Shortage of grease Foreign materials are allowed to enter. 	 Replace piston rod and rod packing. Apply the grease on piston rod and replace packing. Keep operating temp. range and replace rod packing. Add grease. Remove foreign materials from rod packing. 	6–3
	Air leakage (internal)	1. The piston packing is worn due to grease washed away by water.	1 , Install air cleaning equipment, in the line, and replace the piston packing.	3-1
	A lack of pneumatic pressure	 The pressure from the factory source is reduced. The regulator setting has been displaced. The piping is clogged. 	 Supply adequate pressure. Set regulator properly. Flush the piping. 	3-1
	Overload	1. The lateral load has been exceeded.	1 Use within the allowable value.	4-2
	Low operating speed	1. The speed is lower than specified piston speed.	1、Use within specifications.	3-3
	Improper pneumatic circuit design.	1、The system construction is not suitable.	 Select adequate size of tube, fitting, directional control valve, speed controller etc. 	3-1 3-5

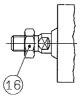
A part is	Breakage of	1、The speed is too high due	1、Adjust the speed with the	
damaged.	damper,	to insufficient adjustment	speed controller again so	
	piston rod,	of the speed controller.	that the speed will	
	rod cover	2、The kinetic energy exceeds	decrease within the	
	and cylinder	the allowable value.	specifications.	
	tube	3、The lateral load exceeds	2、Use within the allowable	3–3
		the allowable value.	value.	3-3 4-1
		4、An abnormal external force	3、Use within the allowable	
		is applied.	value.	4–2
			4、Mechanism interference,	
			eccentric load and overload	
			could cause deformation	
			and damage of the cylinder.	
			Remove these factors.	

8. Basic construction

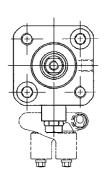
Φ20•Φ25

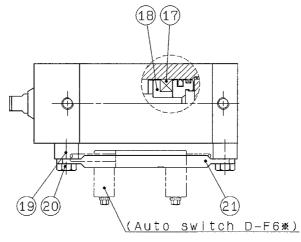






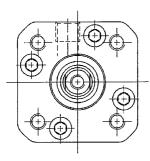
Built-in magnet type

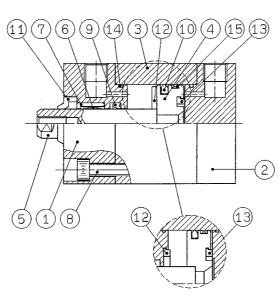


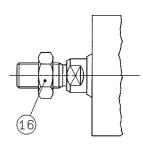


11	Rod scraper	NBR	1	(FKM is available.)					
10	Piston packing	NBR	1		21	Switch rail	Stainless steel	1	(only for built−in magnet type)
9	Rod packing	NBR	1	(FKM is available.)	20	Hexagon bolt	Stainless steel	2	(only for built−in magnet type)
8	Hexagon socket head cap screw	Stainless steel	4		19	Switch rail pedestal	Stainless steel	2	(only for built−in magnet type)
7	Bushing holder	Aluminum alloy	1	Chromated	18	Magnet holder	Aluminum alloy	1	(only for built−in magnet type)Chromated
6	Bushing	Resin	1		17	Magnet	Resin	2	(only for built−in magnet type)
5	Piston rod	Stainless steel	1	Hard chrome plated	16	Rod end nut	Stainless steel	1	(only for rod end nut)
4	Piston	Aluminum alloy	1	Chromated	15	Wear-ring	Resin	1	
3	Cylinder tube	Aluminum alloy	1	Anodic oxidization coating	14	Cylinder tube gasket	NBR	2	(FKM is available.)
2	Head cover	Aluminum alloy	1	Anodic oxidization coating	13	Damper B	Resin	1	
1	Rod cover	Aluminum alloy	1	Anodic oxidization coating	12	Damper A	Resin	1	
No	Description	Material	Qty	Note	No	Description	Material	Qty	Note

Φ 32 to Φ 63

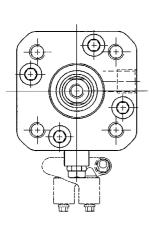


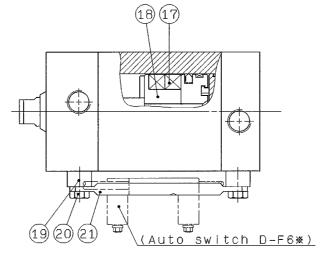




In case of $\Phi63$

Built-in magnet type





11	Rod scraper	NBR	1	(FKM is available.)					
10	Piston packing	NBR	1		21	Switch rail	Stainless steel	1	(only for built−in magnet type)
9	Rod packing	NBR	1	(FKM is available.)	20	Hexagon bolt	Stainless steel	2	(only for built−in magnet type)
8	Hexagon socket head cap screw	Stainless steel	4		19	Switch rail pedestal	Stainless steel	2	(only for built−in magnet type)
7	Bushing holder	Aluminum alloy	1	Chromated	18	Magnet holder	Aluminum alloy	1	(only for built-in magnet type)Chromated
6	Bushing	Resin	1		17	Magnet	Resin	2	(only for built−in magnet type)
5	Piston rod	Stainless steel	1	Hard chrome plated	16	Rod end nut	Stainless steel	1	(only for rod end nut)
4	Piston	Aluminum alloy	1	Chromated	15	Wear-ring	Resin	1	
3	Cylinder tube	Aluminum alloy	1	Anodic oxidization coating	14	Cylinder tube gasket	NBR	2	(FKM is available.)
2	Head cover	Aluminum alloy	1	Anodic oxidization coating	13	Damper B	Resin	1	
1	Rod cover	Aluminum alloy	1	Anodic oxidization coating	12	Damper A	Resin	1	
No	Description	Material	Qty	Note	No	Description	Material	Qty	Note