

Series 11-22-MHR3

3 Finger Rotary Actuated Air Gripper
Size: 10, 15

How to Order



Clean series
11 Vacuum suction type

11 - M D H R 3 - 10 R - M9B S

22 - M D H R 3 - 10 R - M9B S

Copper, fluorine and silicone-free + Low particle generation
22 Vacuum suction type

Number of fingers
3 | 3 fingers

Nominal size
10
15

Auto switch
Nil | Without auto switch (Built-in magnet)

Number of auto switches
Nil | 2 pcs.
S | 1 pc.

Built-in magnet

Nil	No
D	With magnet (For auto switch)

Connecting port

R: Body side	E: Axial side
Port	Port




* Only R type is available for "Without auto switch".

Model

Vacuum suction type	Model	Nominal size	Port size	Lubrication	Action	Gripping force N (Effective value at 0.5 MPa) (Note 1)		Open/Close stroke (Diameter)			Weight g (Note 2)
						External	Internal	Finger closing width (mm)	Finger opening width (mm)	Stroke (mm)	
11- 22-	MHR3-10	10	M3 x 0.5	Non-lube	Double acting	7	6.5	16	22	6	125 (130)
	MDHR3-10					13	12	19	27	8	230 (235)
11- 22-	MHR3-15	15	M3 x 0.5	Non-lube	Double acting	13	12	19	27	8	230 (235)
	MDHR3-15					13	12	19	27	8	230 (235)

Note 1) Refer to the **WEB catalog** for details of gripping force at each gripping point.
Value of effective gripping force is measured at the middle of open/close stroke.
Note 2) Values in () show MDHR weight, but it does not include auto switch weight.

Specifications

Item	Nominal size	
	10	15
Operating pressure	0.2 to 0.6 MPa	0.15 to 0.6 MPa
Ambient and fluid temperature	0 to 60°C	
Repeatability	±0.01 mm	
Maximum operating frequency	180 c.p.m.	
Grease	11-: Fluorine grease 22-: Lithium soap based grease	
Cleanliness class (ISO class)	11-/22-: Class 3	

Suction Flow Rate of Vacuum Suction Type (Reference values)

Size	Suction flow rate L/min (ANR)
10/15	1

Directional Control Valves

Air Cylinders

Rotary Actuators

Air Grippers

Air Preparation Equipment

Modular F. R.

Pressure Control Equipment

Fittings & Tubing

Flow Control Equipment

Pressure Switches/Pressure Sensors

Auto Switch Specifications (Refer to the WEB catalog for further information on auto switches.)

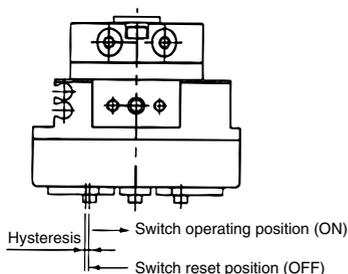
Type		Auto switch model	Load voltage	Load current range	Indicator light	Applicable load
Solid state auto switch	2-wire	D-M9B(V)	24 VDC (10 to 28 VDC)	5 to 30 mA	Yes	24 VDC relay, PLC
	3-wire	D-M9N(V)	28 VDC or less	50 mA or less	Yes	

Refer to page 946 for the applicable auto switch list.

PLC: Programmable Logic Controller

Auto Switch Hysteresis

¹¹⁻₂₂₋MDHR3



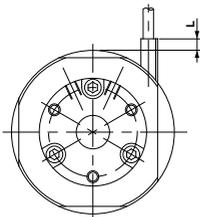
Please refer to the table as a guide when setting auto switch positions.

Model	Hysteresis (Max. value) (mm)
¹¹⁻ ₂₂₋ MDHR3-10	0.3
¹¹⁻ ₂₂₋ MDHR3-15	0.5

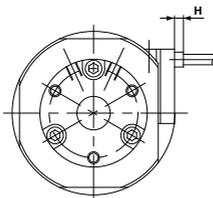
Protrusion of Auto Switch from Edge of Body

The maximum protrusion of auto switch (when fingers are fully open) from the edge of the body is shown in the table below. Use the table as a guideline for mounting.

¹¹⁻₂₂₋MDHR3-10



When auto switch D-M9□ is used

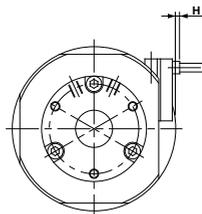


When auto switch D-M9□V is used

Max. protrusion of auto switch from edge of body: L, H (mm)

Auto switch model	D-M9□	D-M9□V
L	—	—
H	—	2.3

¹¹⁻₂₂₋MDHR3-15



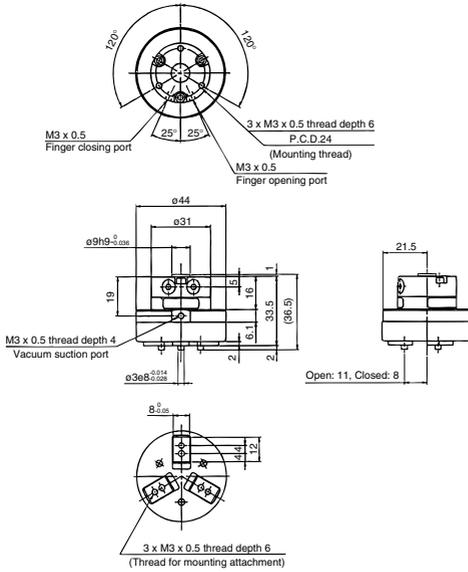
When auto switch D-M9□V is used

Max. protrusion of auto switch from edge of body: H (mm)

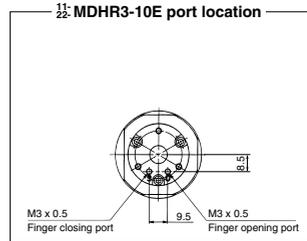
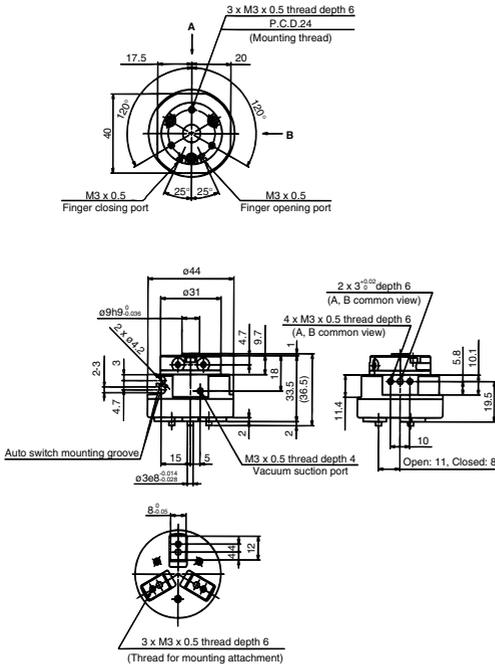
Auto switch model	D-M9□V
H	1.3

The auto switch will not protrude in the case of D-M9□.

Without Auto Switch: 11-22-MHR3-10R



With Auto Switch: 11-22-MDHR3-10R



Directional Control Valves

Air Cylinders

Rotary Actuators

Air Grippers

Air Preparation Equipment

Modular F. R.

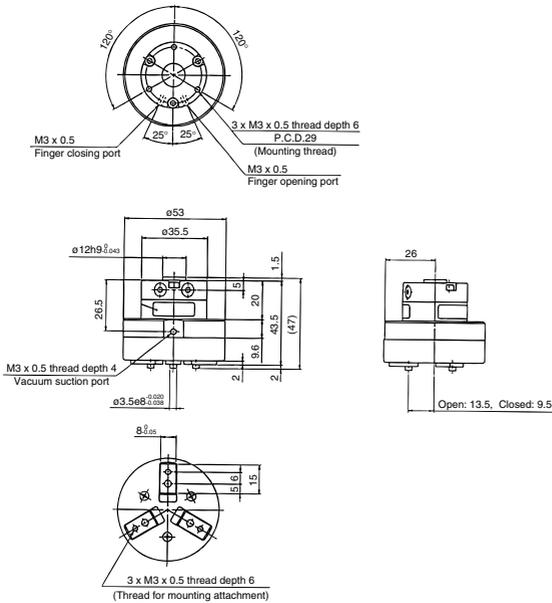
Pressure Control Equipment

Fittings & Tubing

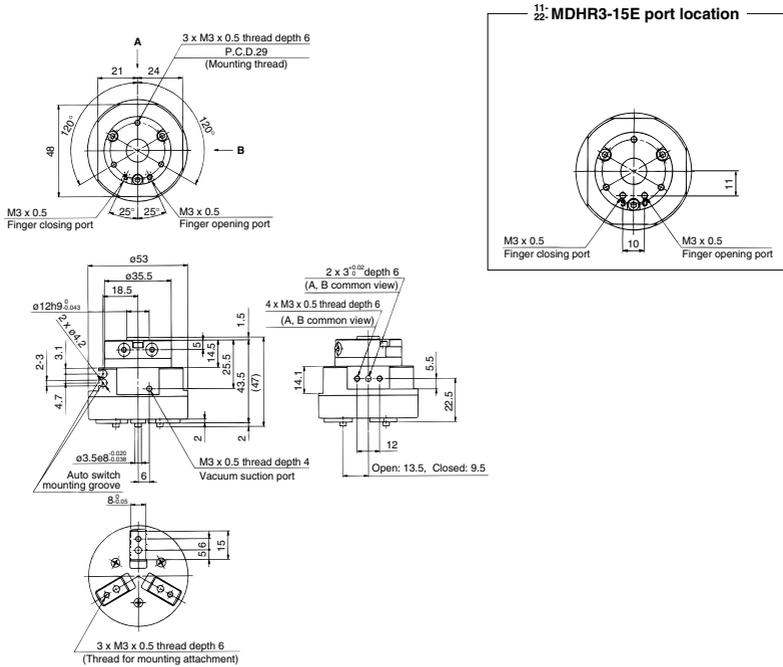
Flow Control Equipment

Pressure Switches/ Pressure Sensors

Without Auto Switch: 11-22-MHR3-15R



With Auto Switch: 11-22-MDHR3-15R





Air Grippers Precautions 1

Be sure to read this before handling.

Design/Selection

⚠ Warning

1. Confirm the specifications.

Products represented in this catalog are designed only for use in compressed air systems (including vacuum). Do not operate at pressures or temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)

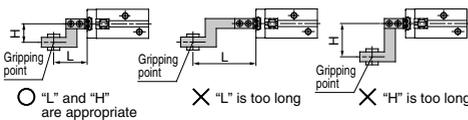
Please contact SMC when using a fluid other than compressed air (including vacuum). We do not guarantee against any damages if the product is used outside of the specification range.

2. Take safety measures (e.g. mounting protective covers) when workpieces pose a danger of fingers being caught in a gripper, etc.

3. If circuit pressure drops due to a power failure or trouble with the air supply, etc., there is a danger of workpieces dropping because of reduced gripping force. Implement drop prevention measures to avoid human injury and equipment damage.

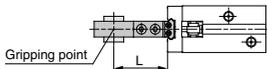
4. Keep the gripping point within the specified range of the gripping distance.

When the gripping point distance becomes large, the gripper attachment applies an excessively large load to the gripper sliding section, and causes adverse effects on the service life. Refer to the graph of the specified range of the gripping distance for each series.



5. Attachment should be designed as light and short as possible.

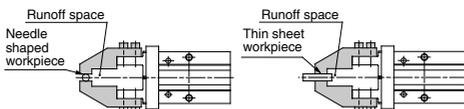
- 1) A long or heavy attachment increases the inertia force to open or close the fingers. Therefore, it may cause unsteady movement of fingers and have an adverse effect on life.
- 2) Even if the gripping point remains within the range limit, make the attachment as light and short as possible.



- 3) Select a larger size gripper or use two or more grippers for handling a long and/or large workpiece at one time.

6. Provide a runoff space in the attachment when using with a small or thin workpiece.

If a runoff space is not provided within the finger part, gripping becomes unsteady, and it may lead to gripping failure or slippage.



7. Select a model whose gripping force is compatible with the workpiece mass.

Incorrect selection may lead to the dropping of a workpiece, etc. Refer to the model selection criteria of each series of the effective gripping force and the workpiece mass.

8. Do not use in applications where excessive external force or impact force may be applied to the gripper.

Excessive external force or impact force may cause a malfunction. Please consult with SMC regarding any other applications.

9. Select a model having a sufficient working finger open/close width.

<In case of insufficient width>

- 1) Gripping becomes unsteady due to variations in open/close width or workpiece diameter.
- 2) When using an auto switch, the detection may not be reliable. Refer to the Auto Switch Hysteresis section and set the stroke including the hysteresis length for a reliable switch function.

When using the water resistant 2-color indicator auto switch, the gripper stroke may be limited by the setting of the indicator color during detection.

10. Please consult with SMC regarding a single acting, spring force only grip type.

This can cause unstable gripping in some cases or return malfunction, due to faulty operation, etc.

11. Do not disassemble the product or make any modifications, including additional machining. It may cause human injury and/or an accident.

12. Refer to the Auto Switches Precautions (pages 879 to 883) if using with an auto switch.

Mounting

⚠ Warning

1. Operation manual

Install the product and operate it only after reading the operation manual carefully and understanding its contents. Also, keep the manual in a location where it can be referred to as necessary.

2. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance.

3. Tighten threads with the proper tightening torque.

When installing the products, follow the listed torque specifications.

4. Do not scratch or dent the air gripper by dropping or bumping it when mounting.

Slight deformation can cause inaccuracy or malfunction.

5. Tighten the screw within the specified torque range when mounting the attachment.

Tightening with higher torque than the specified range may cause malfunction, while the tightening with lower torque may allow movement of gripping position and dropping of workpiece.



Air Grippers Precautions 2

Be sure to read this before handling.

Mounting

⚠ Caution

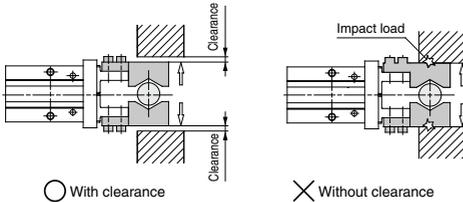
1. Avoid twisting the gripper when mounting an attachment.

Any damage to the gripper may cause malfunction and reduce the accuracy.

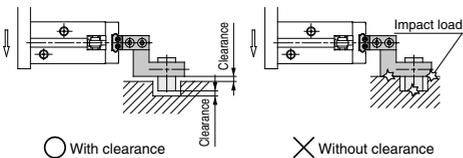
2. Avoid external force to fingers.

Fingers may be damaged by a continual lateral or impact load. Provide clearance to prevent the workpiece or the attachment from striking against any object at the stroke end.

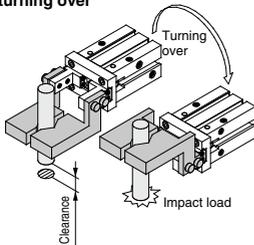
1) Stroke end when fingers are opened



2) Stroke end when gripper is moving

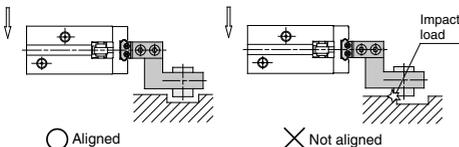


3) When turning over



3. Adjust the gripping point so that an excessive force will not be applied to the fingers when inserting a workpiece.

Confirm that the gripper can operate without receiving any shock by testing it in manual operation mode or by low speed operation.



4. Control the open/close speed with the speed controller to avoid excessive high-speed operation.

If the finger open/close speed is greater than necessary, impact forces on the fingers and other parts will increase. This can cause a loss of repeatability when gripping a workpiece and have an adverse effect on the life of the unit.

Finger Open/Close Speed Adjustment

Example of Using SMC's Speed Controller

Double acting	<ul style="list-style-type: none"> The speed can be adjusted with the built-in speed controller in the following series: MHC2-10D to 25D, MHK2-12D to 25D and MHKL2-12D to 25D. Use the table below as a guide for adjusting the speed. Series other than those previously mentioned For a cylinder with an inner diameter of $\phi 6$ and $\phi 10$, connect 2 speed controllers in a meter-in state or 1 dual speed controller. If the cylinder has a bore size of $\phi 16$ or larger, connect 2 speed controllers in a meter-out state.
Single acting	<p>Connect one speed controller, then adjust the speed with the meter-in control.</p> <p>External gripping ——— Connect to closing port. Internal gripping ——— Connect to opening port.</p>

Applicable speed controllers

Air gripper mounted type ——— AS1200-M3/M5
AS2200-01, etc.

Piping type ——— AS1000 series
AS1001F, AS2051F, etc.

Guide to Built-in Needle Adjustment

Model	Number of needle rotations from fully closed state (*)
MHC2-10	1/4 to 1/2
MHC2-16	1/2 to 1
MHC2-20	1 to 1 1/2
MHC2-25	1 1/2 to 2
MHK2-12D	3/4 to 1
MHK2-16D	1 to 1 1/4
MHK2-20D	1 1/2 to 1 3/4
MHK2-25D	1 3/4 to 2
MHKL2-12D	1 to 1 1/4
MHKL2-16D	1 1/4 to 1 1/2
MHKL2-20D	1 3/4 to 2
MHKL2-25D	2 to 2 1/4

(*) Needle is tightened until it strikes the end lightly.

When an angular gripper is used, depending on the length of the attachment, it might be necessary to adjust the open/close movement to a slower speed. This will prevent the base of the fingers from being exposed to shocks that are created by inertial force.



Air Grippers Precautions 3

Be sure to read this before handling.

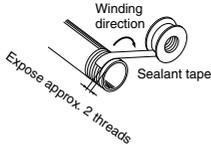
Piping

⚠ Caution

1. Refer to the **Fittings and Tubing Precautions (pages 1237 to 1240)** for handling **One-touch fittings**.
2. **Preparation before piping**
3. **Winding of sealant tape**

Before piping is connected, it should be thoroughly flushed out with air or washed to remove chips, cutting oil and other debris from inside the pipe.

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping. Also, if sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



Lubrication

⚠ Caution

1. The **non-lube type air gripper is lubricated at the factory, and can be used without any further lubrication.**
- In the event that lubrication will be applied, use class 1 turbine oil (without additives) ISO VG32. Furthermore, once lubrication is applied, it must be continued. If lubrication is later stopped, malfunction can occur due to loss of the original lubricant. Refer to the Material Safety Data Sheet (MSDS) of the hydraulic fluid when supplying the fluid.

Air Supply

⚠ Warning

1. **Type of fluids**
Please consult with SMC when using the product in applications other than compressed air.
2. **When there is a large amount of drainage.**
Compressed air containing a large amount of drainage can cause malfunction of pneumatic equipment. An air dryer or water separator should be installed upstream from filters.
3. **Drain flushing**
If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. It causes malfunction of pneumatic equipment.
If the drain bowl is difficult to check and remove, installation of a drain bowl with an auto drain option is recommended.
For compressed air quality, refer to SMC Best Pneumatics No.5 catalog.
4. **Use clean air.**
Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

⚠ Caution

1. **When extremely dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment. Please consult with SMC.**
2. **Install an air filter.**
Install an air filter upstream near the valve. Select an air filter with a filtration size of 5 μm or smaller.
3. **Take measures to ensure air quality, such as by installing an aftercooler, air dryer, or water separator.**
Compressed air that contains a large amount of drainage can cause malfunction of pneumatic equipment such as air grippers. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.
4. **Ensure that the fluid and ambient temperature are within the specified range.**
If the fluid temperature is 5°C or less, the moisture in the circuit could freeze, causing damage to the seals and equipment malfunction. Therefore, take appropriate measures to prevent freezing.
For compressed air quality, refer to SMC Best Pneumatics No.5 catalog.

Directional Control Valves

Air Cylinders

Rotary Actuators

Air Grippers

Air Preparation Equipment

Modular F. R.

Pressure Control Equipment

Fittings & Tubing

Flow Control Equipment

Pressure Switches/ Pressure Sensors



Air Grippers Precautions 4

Be sure to read this before handling.

Operating Environment

Warning

- 1. Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.**
Refer to each construction drawing on the air grippers material.
- 2. Do not expose the product to direct sunlight for an extended period of time.**
- 3. Do not use in a place subject to heavy vibration and/or shock.**
- 4. Do not mount the product in locations where it is exposed to radiant heat.**
- 5. Do not use in dusty locations or where water or oil, etc., splash on the equipment.**

Maintenance

Warning

- 1. Perform maintenance inspection according to the procedures indicated in the operation manual.**
If handled improperly, malfunction and damage of machinery or equipment may occur.
- 2. Maintenance work**
If handled improperly, compressed air can be dangerous. Assembly, handling, repair and element replacement of pneumatic systems should be performed by a knowledgeable and experienced person.
- 3. Drain flushing**
Remove drainage from air filters regularly.
- 4. Removal of equipment, and supply/exhaust of compressed air**
When components are removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc. Then, cut off the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function.
When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent cylinders from sudden movement.
- 5. Do not allow people to enter or place objects in the carrying path of the air gripper.**
This can cause an injury or accident, etc.
- 6. Do not put hands, etc. in between the air gripper fingers or attachments.**
This can cause an injury or accident, etc.
- 7. When removing the air gripper, first confirm that no workpieces are being held and then release the compressed air before removing the air gripper.**
If a workpiece is still being held, there is a danger of it being dropped.

Caution

- 1. The dust cover is a consumable part. Replace it as necessary.**
Fine particles, cutting oil, etc., may cause the main body to malfunction.

Air Grippers

Applicable Auto Switch List

Type	Auto switch mounting	Electrical entry	Auto switch model	Applicable air grippers			
				Size			
				11-/22-MHZ2 10 to 25	11-/22-MDHR2 10 to 30	11-/22-MDHR3 10-15	11-/22-MHL2 10 to 40
Solid state auto switch	Direct	Grommet	D-F8N-F8P-F8B	●			
			D-M9N-M9P-M9B D-M9NV-M9PV-M9BV	●	●	●	●
			D-Y59A-Y7P-Y59B D-Y69A-Y7PV-Y69B				●
	Direct	Grommet	D-Y7NW-7PW-7BW D-Y7N WV-7PWV-7BWV				●
			D-F9NW-F9PW-F9BW D-F9N WV-F9PWV-F9BWV	●	●	●	●
	Direct	Grommet	D-Y7BAL				●
2-color indicator							

Note) Refer to the **WEB catalog** for further information on auto switches.

Note) When using the 2-color indicator type, please make the setting so that the indicator is lit in red to ensure the detection at the proper position of the air gripper.

Directional Control Valves

Air Cylinders

Rotary Actuators

Air Grippers

Air Preparation Equipment

Modular F. R.

Pressure Control Equipment

Fittings & Tubing

Flow Control Equipment

Pressure Switches/ Pressure Sensors