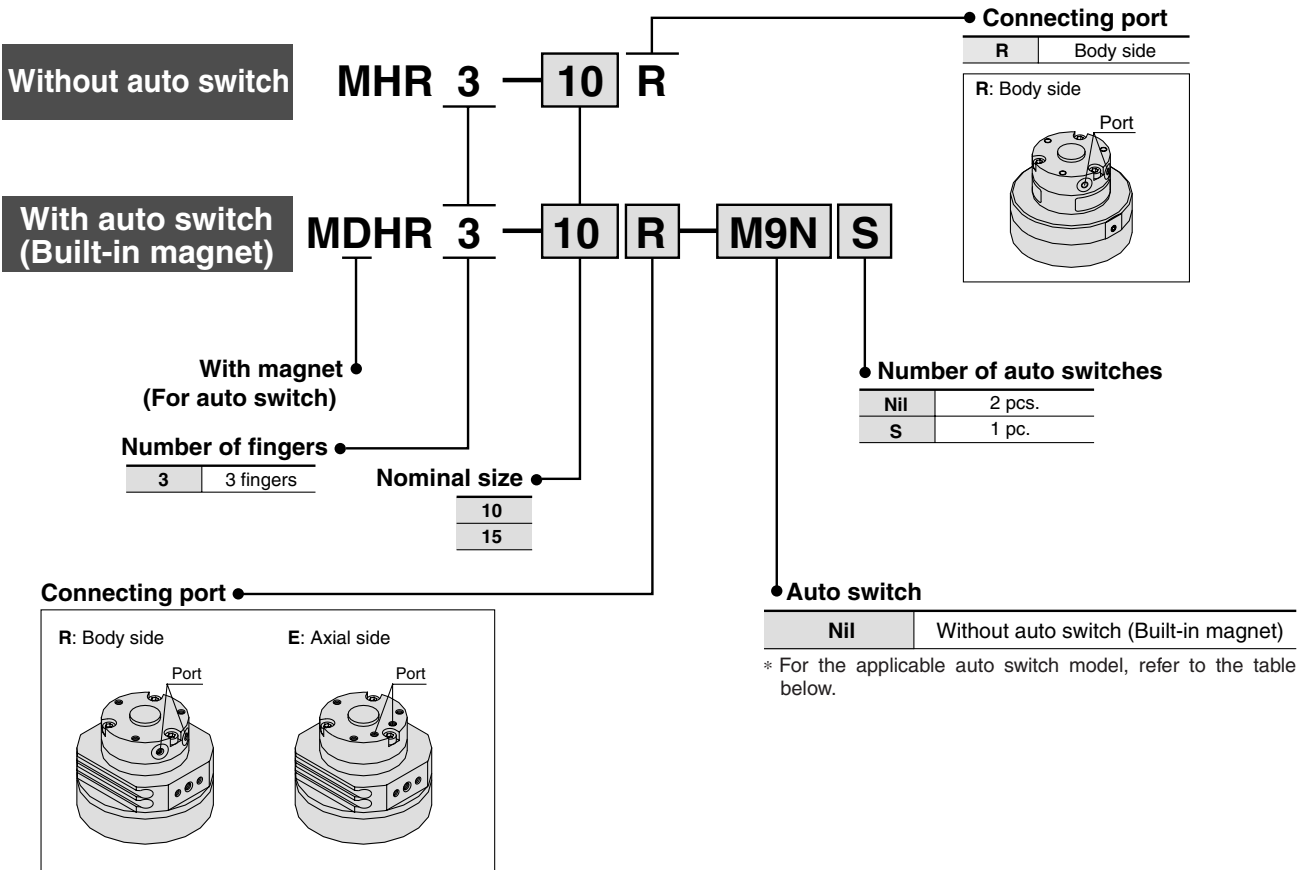


# 3 Finger Rotary Actuated Air Gripper

## Series *MHR3/MDHR3*

Size: 10, 15

### How to Order



### Applicable Auto Switch/Refer to page 12-13-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m) *			Flexible lead wire (-61)	Pre-wire connector	Applicable load		
					DC	AC	Electrical entry	In-line	0.5 (Nil)	3 (L)	5 (Z)			IC circuit	Relay, PLC	
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V	—	M9NV	M9N	●	●	○	Standard	○	IC circuit	Relay, PLC
				3-wire (PNP)		12 V		M9PV	M9P	●	●	○		○		
				2-wire		12 V		M9BV	M9B	●	●	○		○		

\* Lead wire length symbols: 0.5 m..... Nil (Example) M9N  
 3 m..... L (Example) M9NL  
 5 m..... Z (Example) M9NZ

\* Auto switches marked with a "○" symbol are produced upon receipt of order.

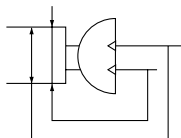


Refer to page 12-13-25 for solid state switch with pre-wire connector.

# 3 Finger Rotary Actuated Air Gripper Series **MHR3/MDHR3**



JIS Symbol



## Model/Specifications

Nominal size		10	15
Action		Double acting	
Holding force (N) (Effective value) <sup>(1)</sup> at 0.5 MPa	External grip	7	13
	Internal grip	6.5	12
Opening/Closing stroke (Diameter)	Finger closing width (mm)	16	19
	Finger opening width (mm)	22	27
	Stroke (mm)	6	8
Weight (g) <sup>(2)</sup>		120 (125)	225 (230)
Connection port		M3 x 0.5	
Repeatability		±0.01 mm	
Fluid		Air	
Operating pressure		0.2 to 0.6 MPa	0.15 to 0.6 MPa
Ambient and fluid temperature		0 to 60°C	
Max. operating frequency		180 c.p.m.	
Lubrication		Non-lube	



Note 1) Refer to page 12-5-20 "Effective Gripping Force" for details of gripping force at each gripping point.

Valve of effective gripping force is measured at the middle of opening/closing stroke.

Note 2) ( ) Value shows MDHR weight, but it does not include auto switch weight.

## ⚠ Caution

- Be sure to read before handling.
- Refer to pages 12-15-3 to 12-15-4 for Safety Instructions and Common Precautions on the products mentioned in this catalog, and refer to pages 12-1-4 to 12-1-6 for Precautions on every series.

MHZ

MHF

MHL

**MHR**

MHK

MHS

MHC

MHT

MHY

MHW

MRHQ

Misc.

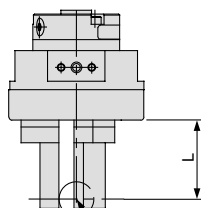
D-

20-

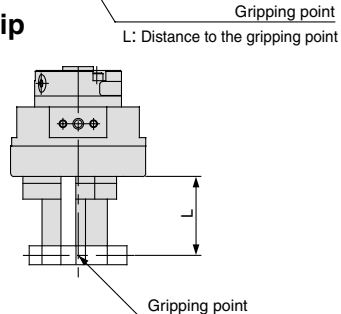
# Series MHR3/MDHR3

## Gripping Point

### External grip



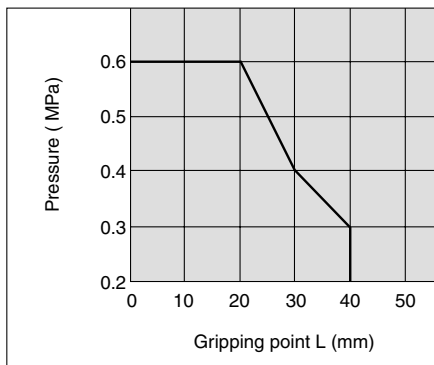
### Internal grip



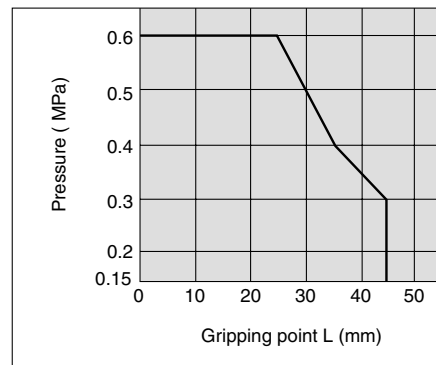
### Limitation of Gripping: External Grip/Internal Grip

- Workpiece gripping point should be within the gripping point range: L shown below, by operating pressure.
- When the gripping point distance becomes large, the finger attachment applies an excessively large load to the finger sliding section, causing excessive play of the fingers and possibly leading to premature failure.

MHR3-10R/MDHR3-10□



MHR3-15R/MDHR3-15□

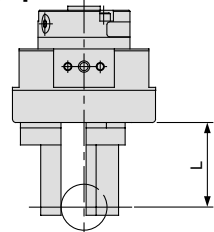


## Effective Gripping Force

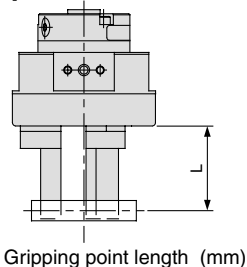
### Guidelines for the selection of the gripper with respect to component weight

- Selection of the correct model depends upon the component weight, the coefficient of friction between the finger attachment and the component, and their respective configurations. A model should be selected with a gripping force of 7 to 14 times that of the component weight.
- If high acceleration, deceleration or impact forces are encountered during motion, a further margin of safety should be considered.

### External grip

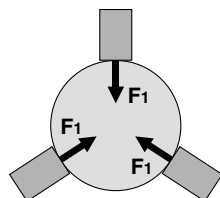


### Internal grip



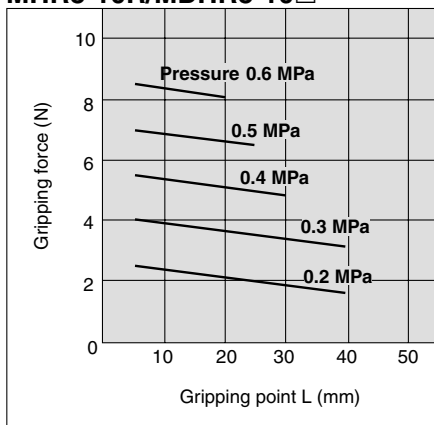
### Indication of effective gripping force

The effective gripping force shown in the graphs to the right is expressed as  $F_1$ , which is the thrust of one finger, when three fingers and attachments are in full contact with the workpiece as shown in the figure to the right.



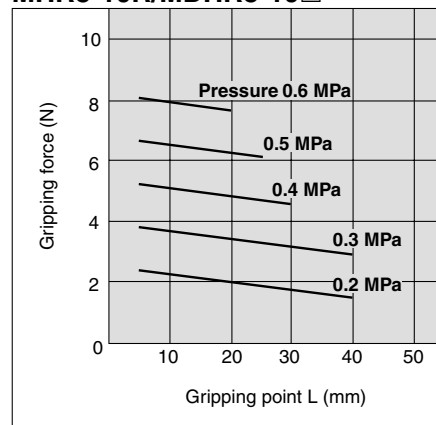
### External Grip

MHR3-10R/MDHR3-10□

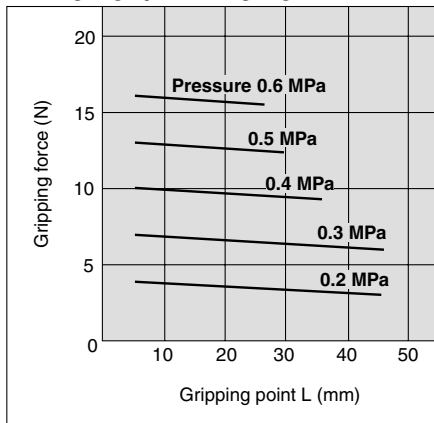


### Internal Grip

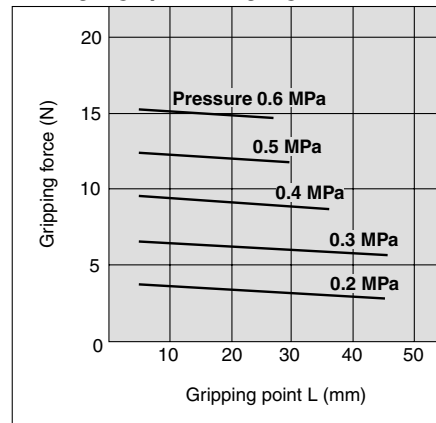
MHR3-10R/MDHR3-10□



MHR3-15R/MDHR3-15□

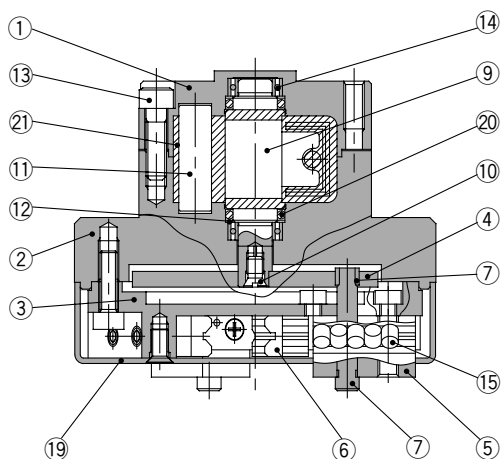


MHR3-15R/MDHR3-15□

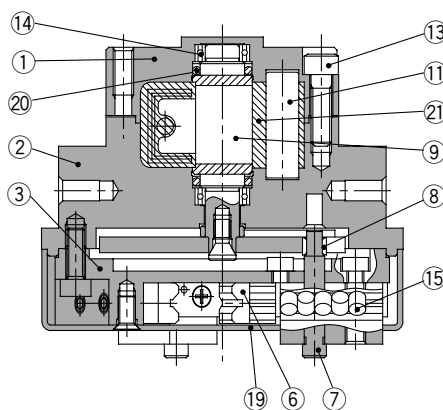
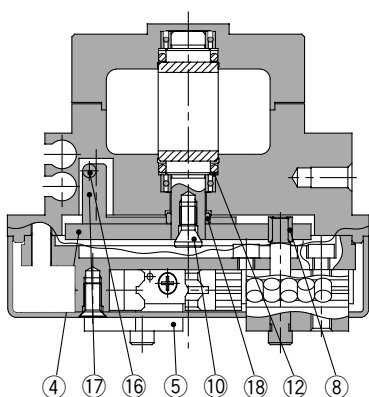


# 3 Finger Rotary Actuated Air Gripper Series MHR3/MDHR3

## Construction



### MDHR3



### Component Parts

No.	Description	Material	Note
①	Body	Aluminum alloy	Hard anodized
②	Adaptor body	Aluminum alloy	Hard anodized
③	Guide holder	Stainless steel	
④	Cam	Cold rolled steel	Nitrided
⑤	Finger assembly	Stainless steel	Heat treated
⑥	Guide	Stainless steel	Heat treated
⑦	Pin	Carbon steel	Heat treated Electroless nickel plated
⑧	Pin roller	Stainless steel	Nitrided
⑨	Vane shaft	Stainless steel, NBR	
⑩	Joint bolt	Chrome molybdenum steel	Zinc chromated
⑪	Stopper	Resin	

No.	Description	Material	Note
⑫	Back-up ring	Stainless steel plate	
⑬	Hexagon socket head bolt	Stainless steel	
⑭	Bearing	High carbon chrome bearing steel	
⑮	Cylindrical roller	Stainless steel	
⑯	Magnet	Magnetic material	
⑰	Magnet holder	Aluminum alloy	Hard anodized
⑱	Roller	Stainless steel	Nitrided
⑲	Cover	Aluminum alloy	Hard anodized
⑳	O-ring	NBR	
㉑	Stopper packing	NBR	

### Replacement Parts

Description	M□HR3-10□	M□HR3-15□	Main parts
Cover	P3313128	P3313228	⑲

MHZ

MHF

MHL

**MHR**

MHK

MHS

MHC

MHT

MHY

MHW

MRHQ

Misc.

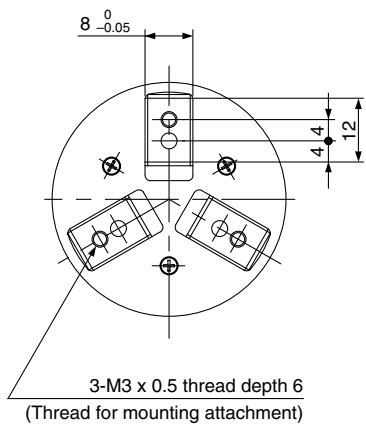
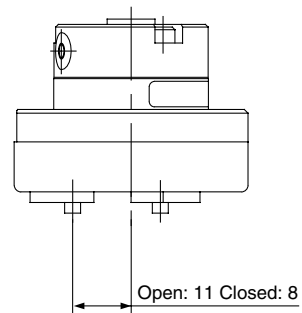
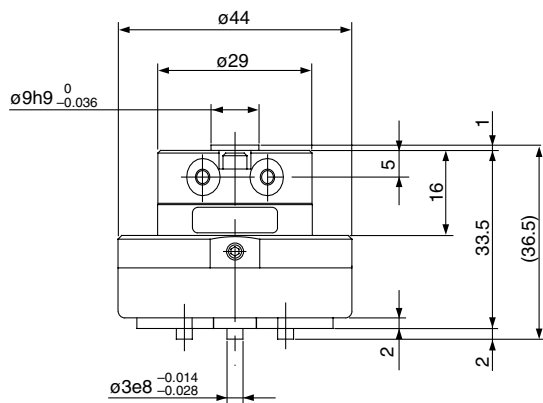
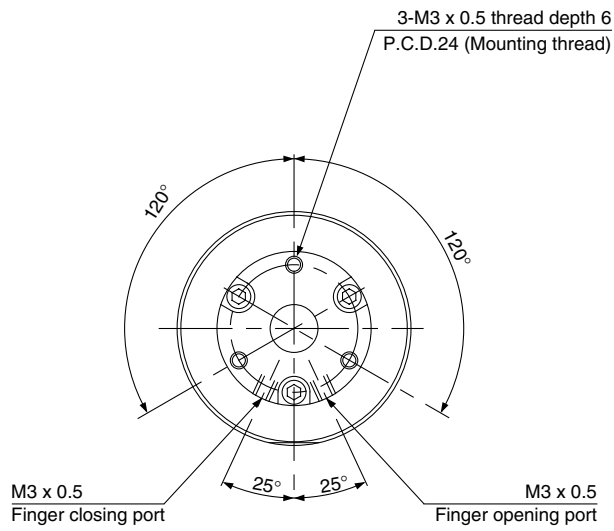
D-

20-

# Series MHR3/MDHR3

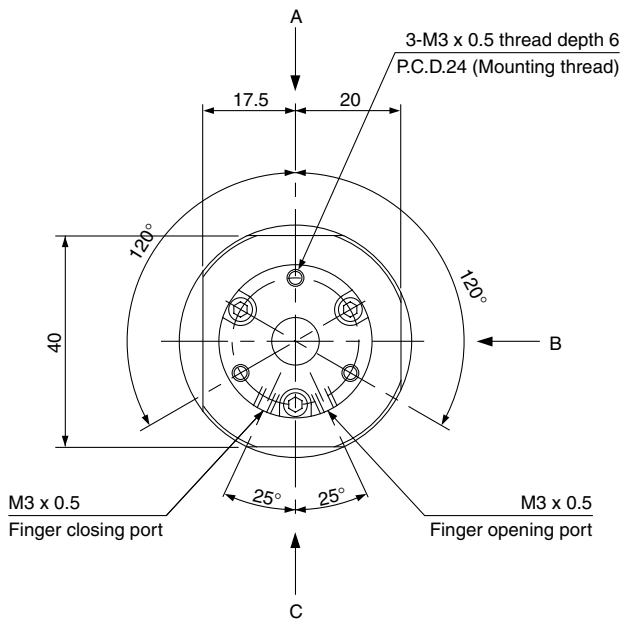
## Nominal Size 10

### Without auto switch: MHR3-10R

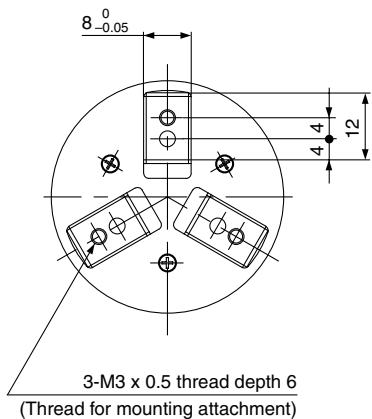
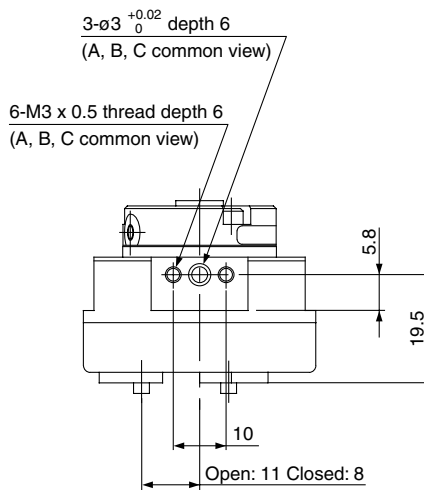
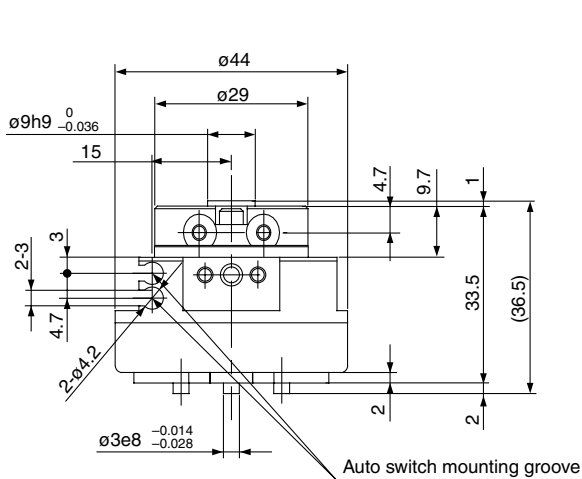
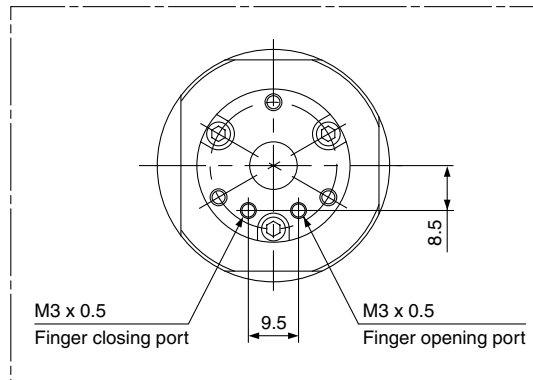


# 3 Finger Rotary Actuated Air Gripper Series **MHR3/MDHR3**

## With auto switch (Built-in magnet): MDHR3-10R

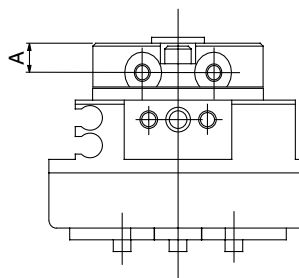


### MDHR3-10E Port Location



### Dimensional Differences between MHR and MDHR

Regardless of auto switch installation, some body dimensions are different.



Model	A
MHR3-10R	5
MDHR3-10R	4.7

MHZ

MHF

MHL

**MHR**

MHK

MHS

MHC

MHT

MHY

MHW

MRHQ

Misc.

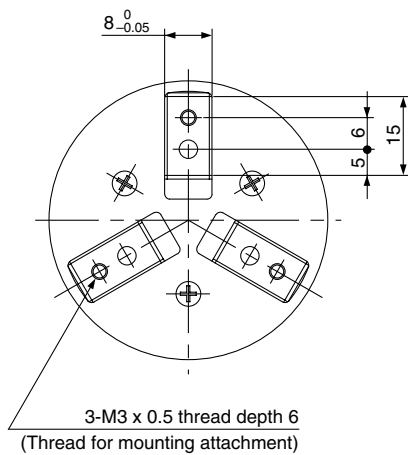
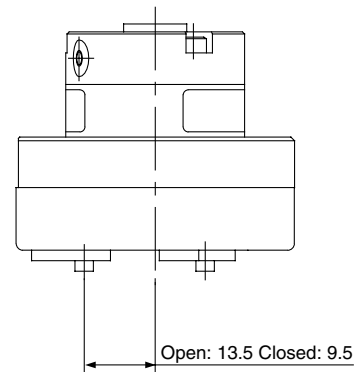
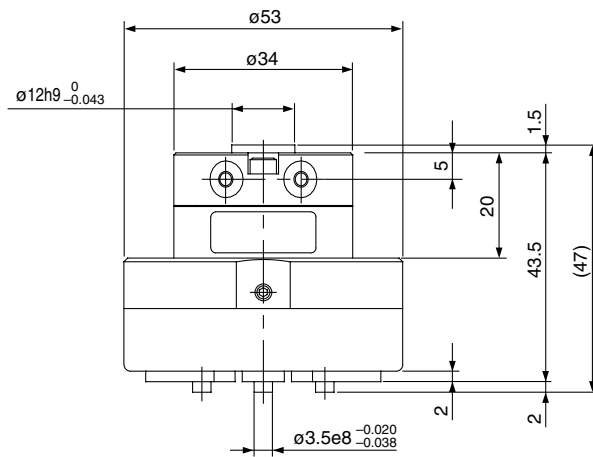
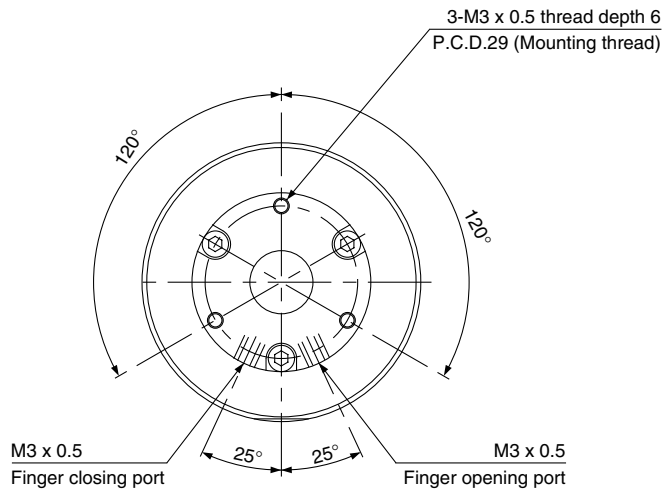
D-

20-

# Series MHR3/MDHR3

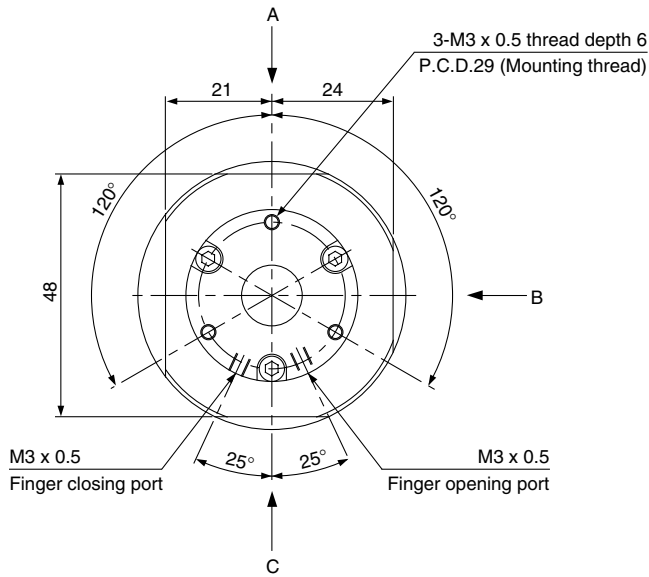
## Nominal Size 15

Without auto switch: MHR3-15R

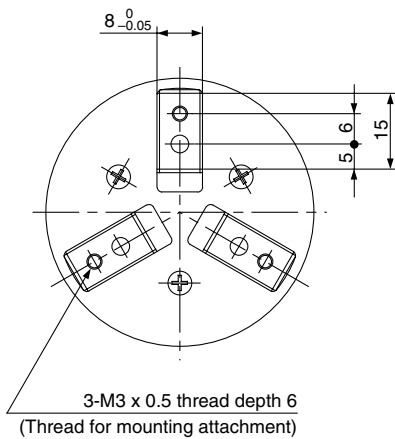
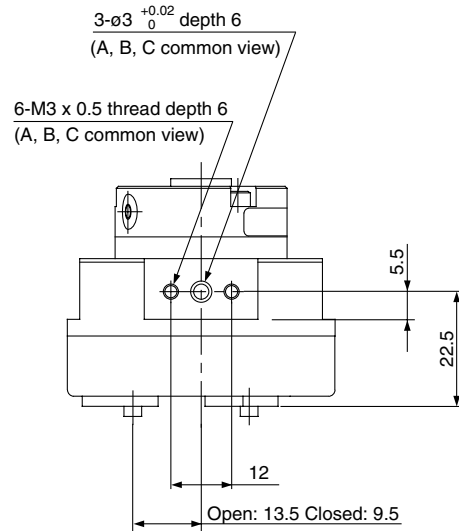
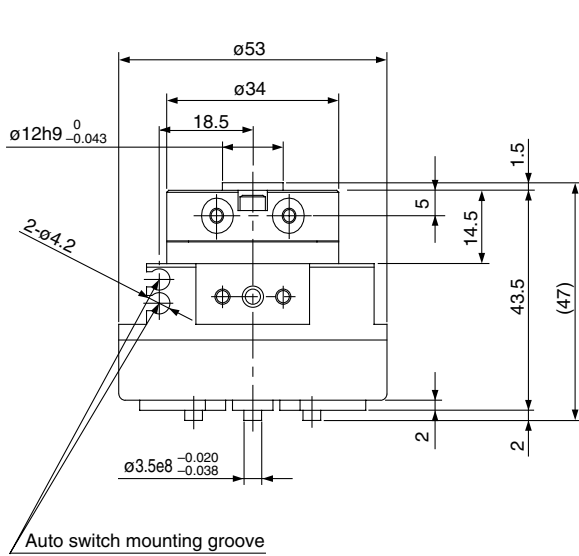
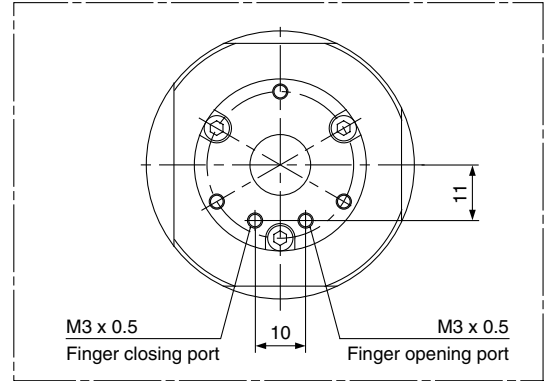


# 3 Finger Rotary Actuated Air Gripper Series **MHR3/MDHR3**

With auto switch (Built-in magnet): MDHR3-15R



**MDHR3-15E Port Location**



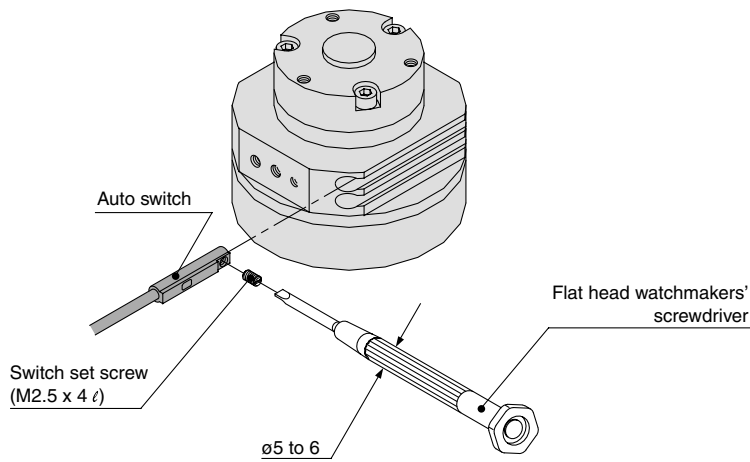
- MHZ
- MHF
- MHL
- MHR**
- MHK
- MHS
- MHC
- MHT
- MHY
- MHW
- MRHQ
- Misc.
- D-
- 20-



# Series MHR3/MDHR3

## Mounting of Auto Switch

To set the auto switch, insert the auto switch into the installation groove of the gripper from the direction indicated in the following drawing. After setting the position, tighten the attached switch mounting set screw with a flat head watchmakers' screwdriver.



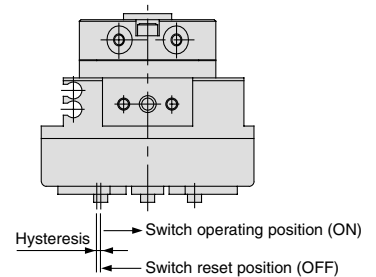
Note) Use a watchmakers' screwdriver with a grip diameter of 5 to 6 mm to tighten the auto switch mounting screw. The tightening torque should be about 0.05 to 0.1 N·m. As a rule, it should be turned about 90° beyond the point at which tightening can be felt.

## Auto Switch Hysteresis

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

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

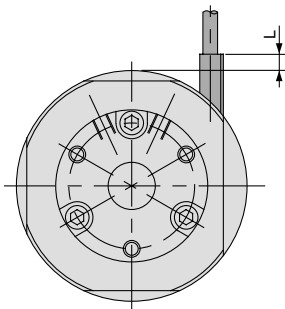
### MDHR3



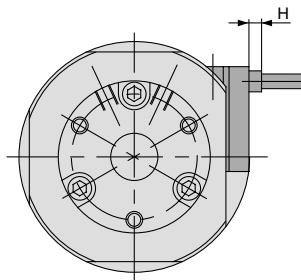
## Protrusion of Auto Switch from Edge of Body

The maximum protrusion of an 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.

### MDHR3-10

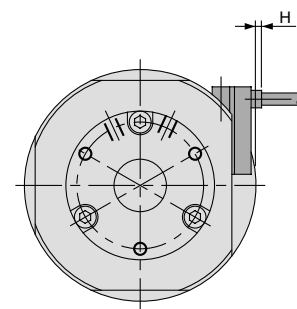


When auto switch D-M9□ is used



When auto switch D-M9□V is used

### MDHR3-15



When auto switch D-M9□V is used

### Max. Protrusion of Auto Switch from Edge of Body: L, H (mm)

Auto switch model	D-M9N	D-M9□V
L	—	—
H	—	2.3

### Max. Protrusion of Auto Switch from Edge of Body: H (mm)

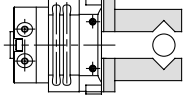
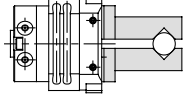
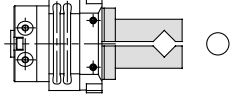
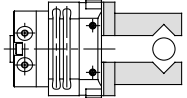
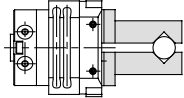
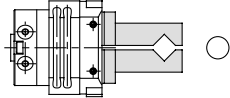
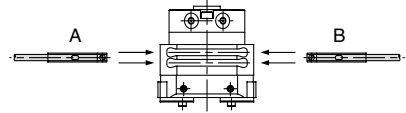
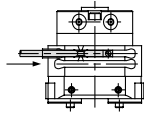
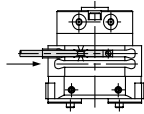
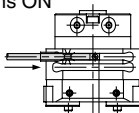
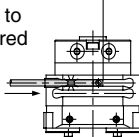
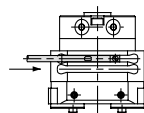
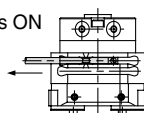
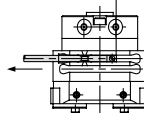
Auto switch model	D-M9□V
H	1.3

The auto switch will not protrude in the case of D-F9□.

# Series MDHR2/MDHR3 Auto Switch Installation Example and Mounting Position

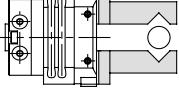
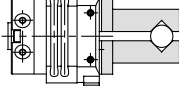
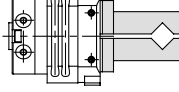
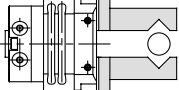
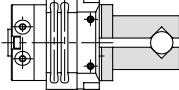
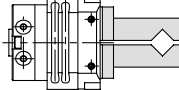
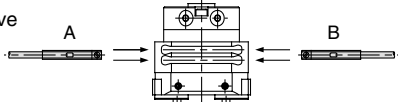
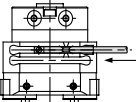
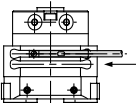
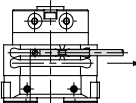
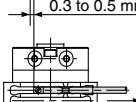
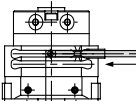
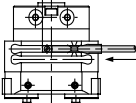
Various auto switch applications are possible through different combinations of auto switch quantities and detecting positions.

## 1) Detection when Gripping Exterior of Workpiece/Auto Switch Mounted from Direction A

Detection example		1. Confirmation of fingers in reset position	2. Confirmation of workpiece held	3. Confirmation of workpiece released
<b>Position to be detected</b>		Position of fingers fully opened 	Position when gripping a workpiece 	Position of fingers fully closed 
<b>Operation of auto switch</b>		Switch turned ON when fingers return. (Light ON)	Switch turned ON when gripping a workpiece. (Light ON)	When a workpiece is held (Normal operation): Switch to turn OFF (Light not illuminating) When a workpiece is not held (Abnormal operation): Switch to turn ON (Light illuminating)
<b>Detection combinations</b>	<b>One auto switch</b>	●		
			●	
	<b>Two auto switches</b>	● ————— ●	● ————— ●	● ————— ●
		● ————— ●	● ————— ●	● ————— ●
<b>How to determine auto switch installation position</b>		<b>Step 1)</b> Fully open the fingers. 	<b>Step 1)</b> Position fingers for gripping a workpiece. 	<b>Step 1)</b> Fully close the fingers. 
<p>At no pressure or low pressure, connect the switch to a power supply, and follow the directions.</p>		<p><b>In the case of mounting switch from A direction</b> <b>Step 2)</b> Insert the auto switch into the switch installation groove from direction A.</p> 		
		<p><b>Step 3)</b> Slide the auto switch in the direction of the arrow until the light illuminates and fasten it at a position 0.3 to 0.5 mm in the direction of the arrow beyond the position where the indicator light illuminates.</p> 	<p><b>Step 3)</b> Slide the auto switch in the direction of the arrow until the indicator light illuminates.</p> 	
		<p>Position where light turns ON</p>  <p>0.3 to 0.5 mm</p> <p>Position to be secured</p> 	<p><b>Step 4)</b> Slide the auto switch in the direction of the arrow until the indicator light goes out.</p> 	
			<p><b>Step 5)</b> Move the auto switch in the opposite direction, and fasten it at a position 0.3 to 0.5 mm in the direction of the arrow beyond the position where the indicator light illuminates.</p> <p>Position where light turns ON</p>  <p>0.3 to 0.5 mm</p> <p>Position to be secured</p> 	

- Note 1) It is recommended that gripping of a workpiece be performed close to the center of the finger stroke.  
 Note 2) When holding a workpiece close at the end of open/close stroke of fingers, detecting performance of the combinations listed in the above table may be limited, depending on the hysteresis of an auto switch, etc.

## 2) Detection when Gripping Exterior of Workpiece/Auto Switch Mounted from Direction B

Detection example		1. Confirmation of fingers in reset position	2. Confirmation of workpiece held	3. Confirmation of workpiece released
<b>Position to be detected</b>		Position of fingers fully opened 	Position when gripping a workpiece 	Position of fingers fully closed 
<b>Operation of auto switch</b>		Switch turned ON when fingers return. (Light ON)	Switch turned ON when gripping a workpiece. (Light ON)	When a workpiece is held (Normal operation): Switch to turn OFF (Light not illuminating) When a workpiece is not held (Abnormal operation): Switch to turn ON (Light illuminating)
<b>Detection combinations</b>	One auto switch	●	●	●
	Two auto switches	● ————— ●	●	●
		● ————— ●	●	●
<b>How to determine auto switch installation position</b>		<b>Step 1) Fully open the fingers.</b> 	<b>Step 1) Position fingers for gripping a workpiece.</b> 	<b>Step 1) Fully close the fingers.</b> 
<p>At no pressure or low pressure, connect the switch to a power supply, and follow the directions.</p>		<p><b>In the case of mounting switch from B direction</b></p> <p><b>Step 2) Insert the auto switch into the switch installation groove from direction B.</b></p> 		
<p><b>Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates.</b></p>  <p><b>Step 4) Slide the auto switch in the direction of the arrow until the indicator light goes out</b></p>  <p><b>Step 5) Move the auto switch in the opposite direction and fasten it at a position 0.3 to 0.5 mm beyond the position where the indicator light illuminates.</b></p> <p style="text-align: center;">Position where light turns ON</p>  <p style="text-align: center;">Position to be secured</p> 		<p><b>Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates. Move the switch an additional 0.3 to 0.5 mm in the direction of the arrow and fasten it.</b></p> <p style="text-align: center;">Position where light turns ON</p>  <p style="text-align: center;">0.3 to 0.5 mm</p> <p style="text-align: center;">Position to be secured</p> 		

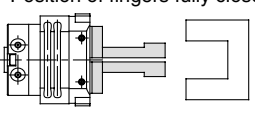
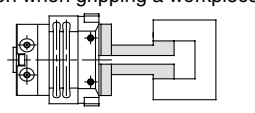
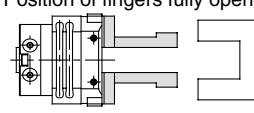
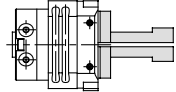
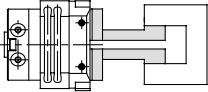
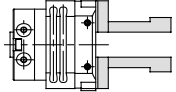
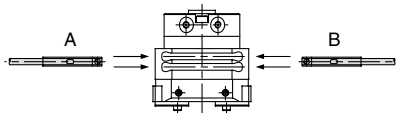
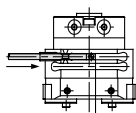
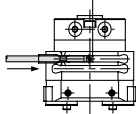
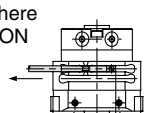
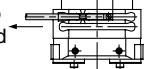
- MHZ
- MHF
- MHL
- MHR
- MHK
- MHS
- MHC
- MHT
- MHY
- MHW
- MRHQ
- Misc.
- D-
- 20-

Note 1) It is recommended that gripping of a workpiece be performed close to the center of the finger stroke.  
 Note 2) When holding a workpiece close at the end of open/close stroke of fingers, detecting performance of the combinations listed in the above table may be limited, depending on the hysteresis of an auto switch, etc.

# Series MDHR2/MDHR3 Auto Switch Installation Example and Mounting Position

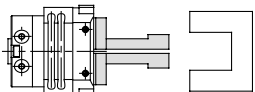
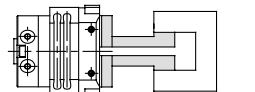
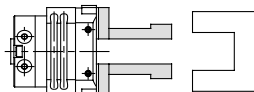
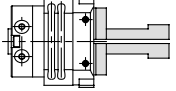
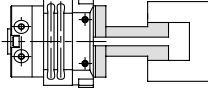
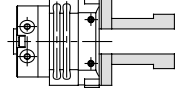
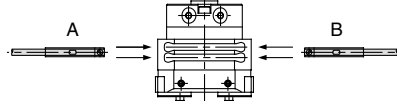
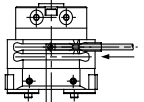
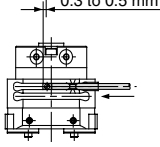
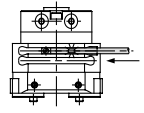
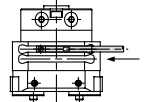
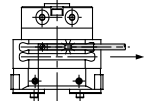
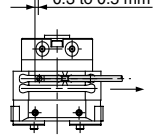
Various auto switch applications are possible through different combinations of auto switch quantities and detecting positions.

## 3) Detection when Gripping Interior of Workpiece/Auto Switch Mounted from Direction A

Detection example		1. Confirmation of fingers in reset position	2. Confirmation of workpiece held	3. Confirmation of workpiece released	
Position to be detected		Position of fingers fully closed 	Position when gripping a workpiece 	Position of fingers fully opened 	
Operation of auto switch		Switch turned ON when fingers return. (Light ON)	Switch turned ON when gripping a workpiece. (Light ON)	When a workpiece is held (Normal operation): Switch to turn OFF (Light not illuminating) When a workpiece is not held (Abnormal operation): Switch to turn ON (Light illuminating)	
Detection combinations	One auto switch	●		●	
	Two auto switches	●	●	●	
		●	●	●	
How to determine auto switch installation position		Step 1) Fully close the fingers. 	Step 1) Position fingers for gripping a workpiece. 	Step 1) Fully open the fingers. 	
At no pressure or low pressure, connect the switch to a power supply, and follow the directions.		In the case of mounting switch from A direction			
		Step 2) Insert the auto switch into the switch installation groove from direction A.			
		Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates.	Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates. Move the switch an additional 0.3 to 0.5 mm in the direction of the arrow and fasten it.		
		Step 4) Slide the auto switch in the direction of the arrow until the indicator light goes out.	Position where light turns ON  0.3 to 0.5 mm		
		Step 5) Move the auto switch in the opposite direction and fasten it at a position 0.3 to 0.5 mm beyond the position where the indicator light illuminates.	Position to be secured  0.3 to 0.5 mm		
		Position where light turns ON  0.3 to 0.5 mm	Position to be secured  0.3 to 0.5 mm		

- Note 1) It is recommended that gripping of a workpiece be performed close to the center of the finger stroke.  
 Note 2) When holding a workpiece close at the end of open/close stroke of fingers, detecting performance of the combinations listed in the above table may be limited, depending on the hysteresis of an auto switch, etc.

## 4) Detection when Gripping Interior of Workpiece

Detection example		1. Confirmation of fingers in reset position	2. Confirmation of workpiece held	3. Confirmation of workpiece released
<b>Position to be detected</b>		Position of fingers fully closed 	Position when gripping a workpiece 	Position of fingers fully opened 
<b>Operation of auto switch</b>		Switch turned ON when fingers return. (Light ON)	Switch turned ON when gripping a workpiece. (Light ON)	When a workpiece is held (Normal operation): Switch to turn OFF (Light not illuminating) When a workpiece is not held (Abnormal operation): Switch to turn ON (Light illuminating)
<b>Detection combinations</b>	One auto switch	●	●	●
	Two auto switches	● ————— ●	● ————— ●	● ————— ●
		● ————— ●	● ————— ●	● ————— ●
<b>How to determine auto switch installation position</b>		<b>Step 1) Fully close the fingers.</b> 	<b>Step 1) Position fingers for gripping a workpiece.</b> 	<b>Step 1) Fully open the fingers.</b> 
<p>At no pressure or low pressure, connect the switch to a power supply, and follow the directions.</p>		<p><b>In the case of mounting switch from B direction</b></p> <p><b>Step 2) Insert auto switch into the switch installation groove from direction B.</b></p> 		
<p><b>Step 3) Slide the auto switch in the direction of the arrow until the light illuminates and fasten it at a position 0.3 to 0.5 mm in the direction of the arrow beyond the position where the indicator light illuminates.</b></p> <p style="text-align: center;">Position where light turns ON</p>  <p style="text-align: center;">Position to be secured</p> 		<p><b>Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates.</b></p>  <p><b>Step 4) Slide the auto switch in the direction of the arrow until the indicator light goes out.</b></p>  <p><b>Step 5) Move the auto switch in the opposite direction, and fasten it at a position 0.3 to 0.5 mm in the direction of the arrow beyond the position where the indicator light illuminates.</b></p> <p style="text-align: center;">Position where light turns ON</p>  <p style="text-align: center;">Position to be secured</p> 		

- MHZ
- MHF
- MHL
- MHR
- MHK
- MHS
- MHC
- MHT
- MHY
- MHW
- MRHQ
- Misc.
- D-
- 20-



Note 1) It is recommended that gripping of a workpiece be performed close to the center of the finger stroke.

Note 2) When holding a workpiece close at the end of open/close stroke of fingers, detecting performance of the combinations listed in the above table may be limited, depending on the hysteresis of an auto switch, etc.