

# Rotary Table: Basic Type Vane Type

# MSUB Series

Size: 1, 3, 7, 20

## How to Order

**Bearing type**  
**B** Basic type

**Connection port location**  
**NII** Side ported  
**E** Axial ported

**Free mount type**  
 Available with side ported only, when equipped with auto switch unit.

**Without auto switch**  
**MSUB 20 - 90 S**

**With auto switch (Built-in magnet)**  
**M D SUB 20 - 90 S - T79 L**

**Nominal size (Torque)**

1	MSUB 1
3	MSUB 3
7	MSUB 7
20	MSUB20

**Rotating angle**

Application	Symbol	Rotating angle
Single vane	90	90°
Single vane	180	180°
Double vane	90	90°

Rotation adjustment range  
 Single vane: Both ends ±5° each  
 Double vane: Both ends ±2.5° each

**Vane type**  
**S** Single vane  
**D** Double vane

**Number of auto switches**

S	1 pc. *
NII	2 pcs. **

\* S (1 auto switch) is shipped with a right-hand auto switch.  
 \*\* NII (2 auto switches) is shipped with a right-hand and a left-hand switch.

**Electrical entry/Lead wire length**

NII	Grommet/Lead wire: 0.5 m
L	Grommet/Lead wire: 3 m
Z	Grommet/Lead wire: 5 m
C	Connector/Lead wire: 0.5 m
CL	Connector/Lead wire: 3 m
CN	Connector/Without lead wire

\* Available only with R73, R80 and T79 type connectors.  
 \*\* Lead wire with connector part nos.  
 D-LC05: Lead wire 0.5 m  
 D-LC30: Lead wire 3 m  
 D-LC50: Lead wire 5 m

**Auto switch**  
**NII** Without auto switch (built-in magnet)

\* Refer to the table below for the applicable auto switch model.

## Applicable Auto Switches

Refer to pages 929 to 983 for further information on auto switches.

Applicable model	Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire type	Lead wire length (m) *				Pre-wired connector	Applicable load	
						DC	AC	Perpendicular	In-line		0.5 (NII)	3 (L)	5 (Z)	None (N)		IC circuit	Relay, PLC
MDSUB1	Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5V, 12V	—	S99V	S99	●	●	○	—	○	IC circuit	Relay, PLC
							12V	—	S99V	S9P	●	●	○	—	○	—	
MDSUB3	Reed auto switch	—	Grommet	No	2-wire	24 V	5 V, 12 V, 100 V	5V, 12V, 24V	—	90	●	●	○	—	—	IC circuit	Relay, PLC
							—	5 V, 12 V, 24 V, 100 V	—	90A	●	●	○	—	—	—	
MDSUB7	Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5V, 12V	—	—	S79	●	●	○	—	○	IC circuit	Relay, PLC
							12V	—	—	S7P	●	●	○	—	○	—	
MDSUB20	Reed auto switch	—	Connector	No	2-wire	24 V	—	100 V	—	T79	●	●	○	—	—	IC circuit	Relay, PLC
							—	100 V	—	T79C	●	●	○	—	—	—	
MDSUB20	Reed auto switch	—	Grommet	No	2-wire	24 V	48V, 100V	100 V	—	R80	●	●	○	—	—	IC circuit	Relay, PLC
							—	24 V or less	—	R80C	●	●	○	—	—	—	

\* Lead wire length symbols: 0.5 m ..... NII (Example) R73C  
 3 m ..... L (Example) R73CL  
 5 m ..... Z (Example) R73CZ  
 None ..... N (Example) R73CN

\* Auto switches marked with "○" are made-to-order specifications.

\* Refer to pages 970 to 971 for detailed solid state auto switches with pre-wired connectors.

Order example: MSUB20 single vane type (connection port side location selected)

1. Standard type (Without auto switches), Rotation 90°, side port location MSUB20-90S
2. With auto switch unit (Without auto switches), Rotation 180°, Side port location MDSUB20-180S
3. With auto switch unit + Auto switch R73, Rotation 180°, Side port location MDSUB20-180S-R73

### Specifications



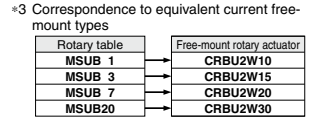
#### Moisture Control Tube IDK Series



When operating an actuator with a small diameter and a short stroke at a high frequency, the dew condensation (water droplet) may occur inside the piping depending on the conditions. Simply connecting the moisture control tube to the actuator will prevent dew condensation from occurring. For details, refer to the [Web Catalog](#).

Model <sup>*3</sup>		MSUB1		MSUB3		MSUB7		MSUB20	
Vane type	Single vane	Double vane	Single vane	Double vane	Single vane	Double vane	Single vane	Double vane	
	90° ± 10°   180° ± 10°   90° ± 5°		90° ± 10°   180° ± 10°   90° ± 5°		90° ± 10°   180° ± 10°   90° ± 5°		90° ± 10°   180° ± 10°   90° ± 5°		
Rotating angle <sup>*1</sup>									
Fluid		Air (Non-lube)							
Proof pressure (MPa)		1.05				1.5			
Ambient and fluid temperature		5 to 60°C							
Operating pressure range (MPa)		0.2 to 0.7		0.15 to 0.7		0.15 to 1.0			
Rotation time adjustment range (s/90°)		0.07 to 0.3 (0.5 MPa)							
Shaft load	Allowable radial load	20 N		40 N		50 N		60 N	
	Allowable thrust load <sup>*2</sup>	15 N		30 N		60 N		80 N	
	Allowable moment	0.3 N·m		0.7 N·m		0.9 N·m		2.9 N·m	
Bearing		Bearing							
Port location		Side ported or Top ported							
Port size	Side ported	M3 x 0.5				M5 x 0.8			
	Top ported	M3 x 0.5				M5 x 0.8			

\*1 Single vane 90° can be adjusted to 90° ± 10° (both ends of rotation ± 5° each)  
 Single vane 180° can be adjusted to 180° ± 10° (both ends of rotation ± 5° each)  
 Double vane 90° type can be adjusted to 90° ± 5° (both ends of rotation ± 2.5° each)  
 • Rotation angles other than 90° and 180° (single vane) are available by special order.  
 \*2 The allowable thrust load is directional. Refer to the allowable load table below for details.  
 (Note) Refer to page 45 for allowable kinetic energy.

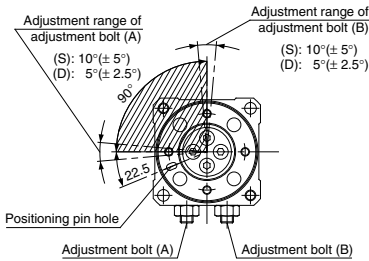


Symbol

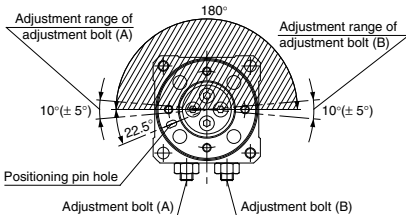


### Table Rotation Range

Angle adjustment is possible as shown in the drawings below using adjustment bolts (A) and (B).



For 90° rotation  
 Single vane (S): 80° to 100° adjustable  
 Double vane (D): 85° to 95° adjustable



For 180° rotation  
 Single vane (S): 170° to 190° adjustable  
 \* The double vane type is not available with 180° rotation.

### Weight

Size	Rotation angle	Basic weight		Auto switch unit (Note)
		Single vane	Double vane	
1	90°	145	150	15
	180°	140	—	
3	90°	230	240	20
	180°	225	—	
7	90°	360	375	28
	180°	355	—	
20	90°	510	580	38
	180°	505	—	

(Note) Values above do not include auto switch weight.

### Allowable Load

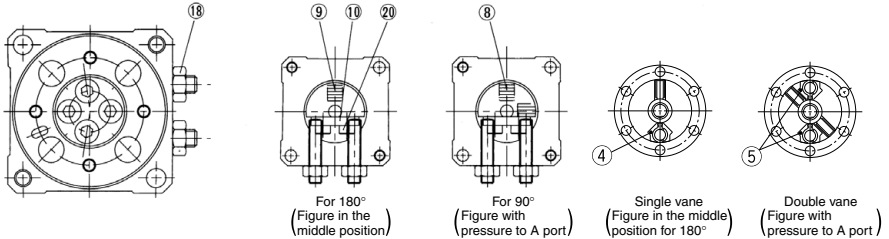
Do not permit the load and moment applied to the table to exceed the allowable values shown in the table below. (Operation above the allowable values can cause adverse effects on service life, such as play in the table and loss of accuracy.)

Size	Allowable radial load (N)	Allowable thrust load (N)		Allowable moment (N·m)
		(A)	(B)	
1	20	15	10	0.3
3	40	30	15	0.7
7	50	60	30	0.9
20	60	80	40	2.9

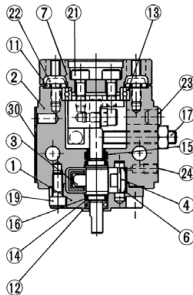
# MSUB Series

## Construction

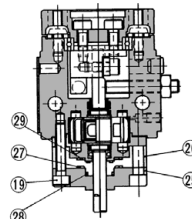
### Internal Construction of Rotary Table



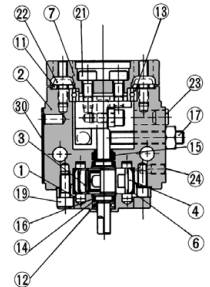
#### Single vane: Size 1, 3, 7, 20



#### Double vane: Size 1



#### Double vane: Size 3, 7, 20



### Component Parts

No.	Description	Material	Note
1	Body (A)	Aluminum alloy	Anodized
2	Body (B)	Aluminum alloy	Anodized
3	Vane shaft	Stainless steel (MSUB20: Carbon steel)	Single vane
		Carbon steel	Double vane
4	Stopper	Resin	Single vane
5	Stopper	Stainless steel	Double vane
6	Stopper seal	NBR	
7	Table	Aluminum alloy	Anodized, Serigraph
8	Stopper lever (D)	Carbon steel	Heat treated, Electroless nickel plated
9	Stopper lever (S)	Carbon steel	Heat treated, Electroless nickel plated
10	Lever retainer	Carbon steel	Zync Chromated
11	Ring collar	Carbon steel	Zync Chromated
12	Bearing	High carbon chrome bearing steel	
13	Bearing	High carbon chrome bearing steel	
14	Back-up ring	Stainless steel	
15	Scraper	NBR	
16	O-ring	NBR	
17	Adjustment bolt	Carbon steel	Heat treated
18	Hexagon nut	Carbon steel	
19	Hexagon socket head cap screw		
20	Hexagon socket head cap screw		
21	Hexagon socket head cap screw		
22	Button bolt		
23	Rubber cap	NBR	
24	Hexagon socket head set screw		SE type only
25	Cover	Aluminum alloy	
26	Plate	Resin	
27	Gasket	NBR	
28	O-ring	NBR	
29	O-ring	NBR	
30	Label		

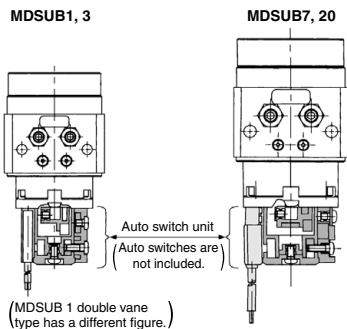
\* The plug 28 is used only when the connection port is type SE.

\* Individual part cannot be shipped.

## Construction

### Internal construction with auto switch

Units are common for both single and double vane.



\* Refer to page 116 for the component parts.

\* The auto switch unit can be retrofitted on a rotary actuator.  
Auto switches should be ordered separately since they are not included.

Model	Auto switch unit part no.
<b>M(D)SUB 1</b>	P211070-1
<b>M(D)SUB 3</b>	P211090-1
<b>M(D)SUB 7</b>	P211060-1
<b>M(D)SUB20</b>	P211080-1

Auto switch block unit			
MDSUB1/3		MDSUB7/20	
For reed auto switch		For solid state auto switch	Combination of reed and solid state auto switches
Right-handed	Left-handed	Combination left & right-handed	Combination left & right-handed
Part no.: P211070-8	Part no.: P211070-9	Part no.: P211070-13	Part no.: P211060-8

\* The auto switch block unit is included in the auto switch unit.

\* Auto switch block unit shows the necessary assembly for mounting 1 piece of auto switch to the auto switch unit.

\* Individual part cannot be shipped.

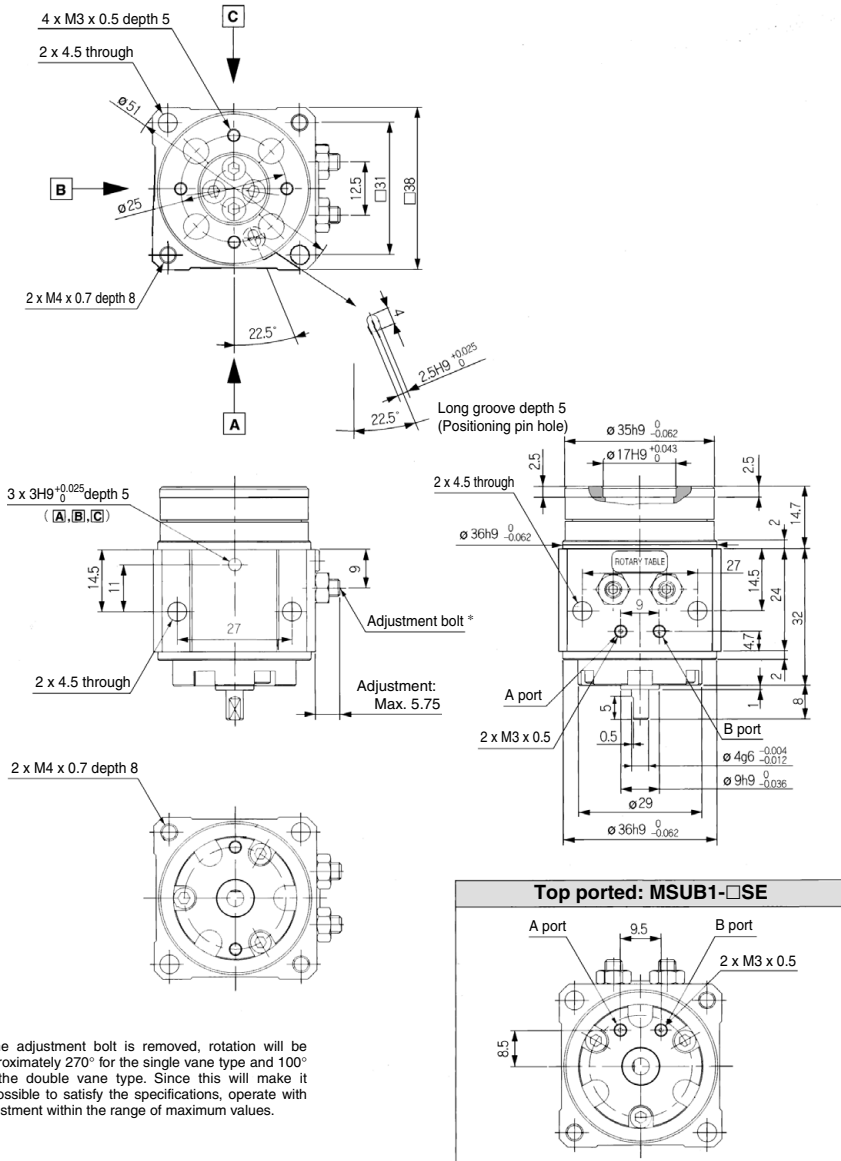
# MSUB Series

## Dimensions

These drawings indicate the condition when the B port is pressurized.

### MSUB1 (Single vane)

#### MSUB1-□S/SE



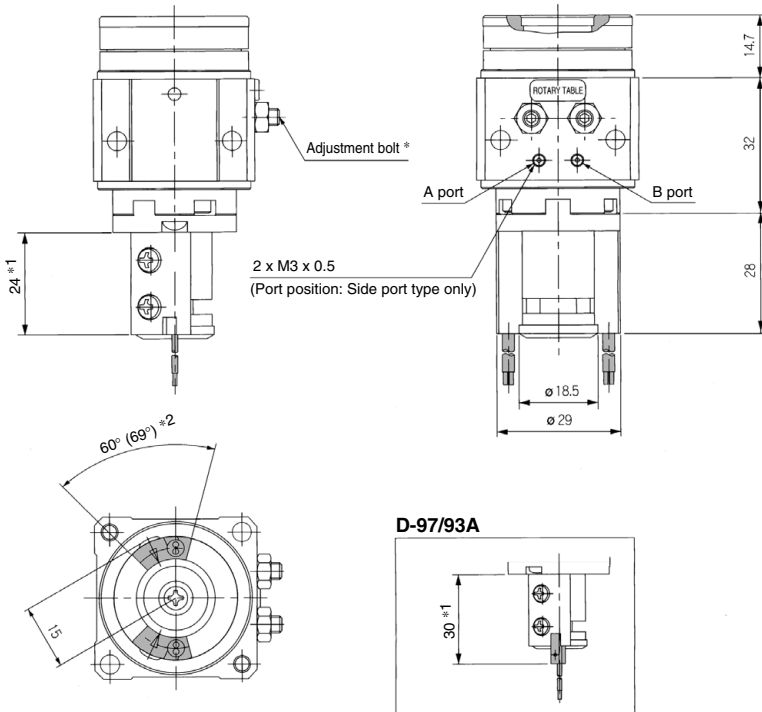
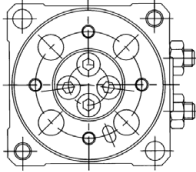
\* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

# Rotary Table: Basic Type Vane Type **MSUB Series**

These drawings indicate the condition when the B port is pressurized.

## With auto switch: MDSUB1-□S

- \*1) 24: When using D-90/90A/S99(V)/T99(V)/S9P(V)
- 30: When using D-97/93A
- \*2) 60°: When using D-90/90A/97/93A
- 69°: When using D-S99(V)/T99(V)/S9P(V)



\* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

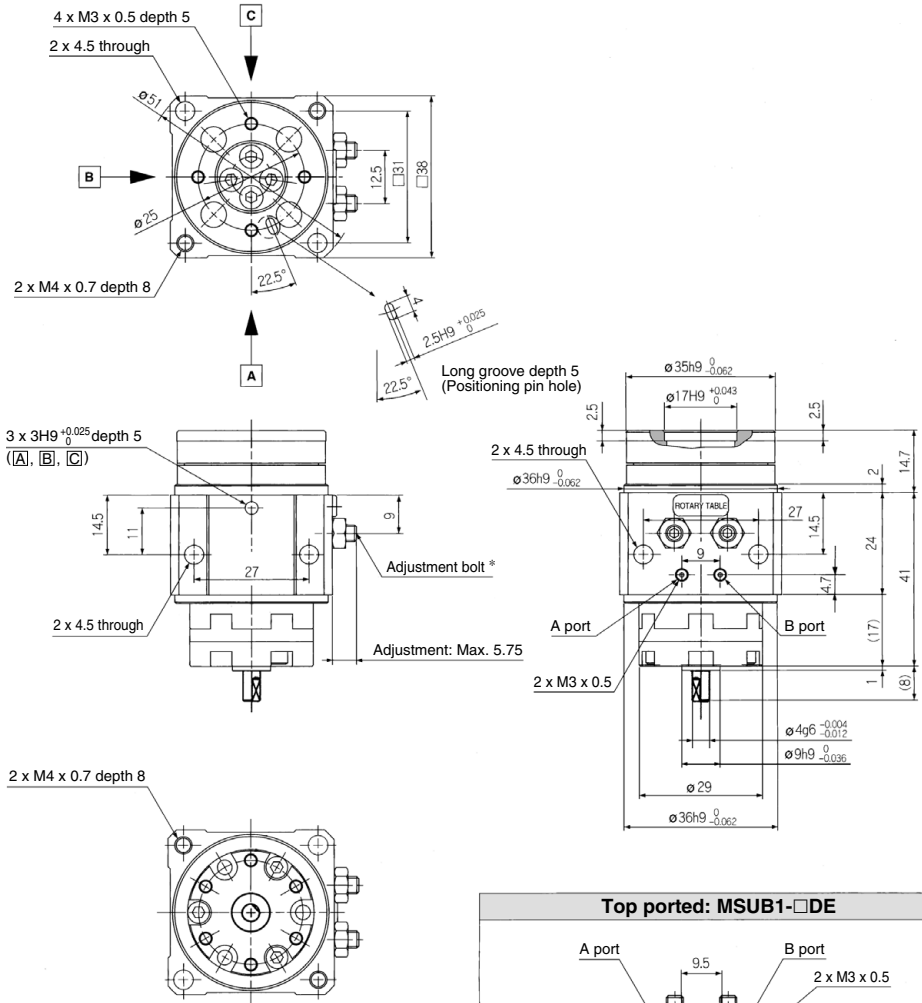
# MSUB Series

## Dimensions

These drawings indicate the condition when the B port is pressurized.

### MSUB1 (Double vane)

#### MSUB1-□D

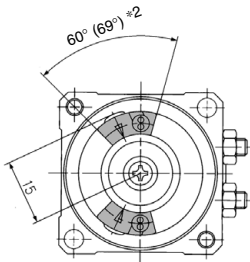
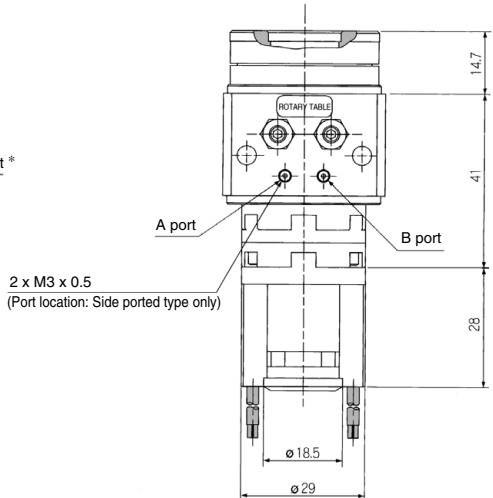
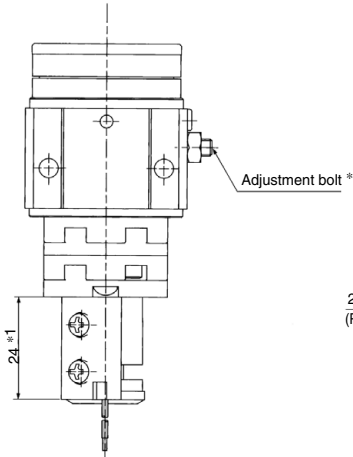
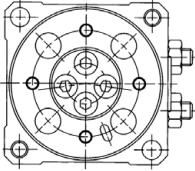


\* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

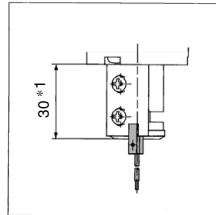
These drawings indicate the condition when the B port is pressurized.

## With auto switch: MDSUB1-□D

- \*1) 24: When using D-90/90A/S99(V)/T99(V)/S9P(V)  
30: When using D-97/93A
- \*2) 60°: When using D-90/90A/97/93A  
69°: When using D-S99(V)/T99(V)/S9P(V)



### D-97/93A



\* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.





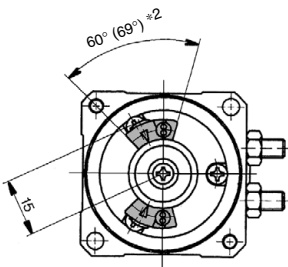
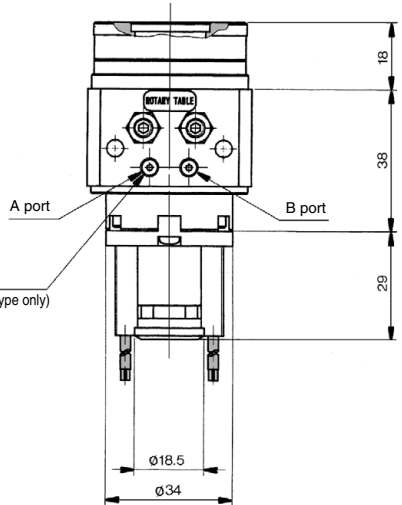
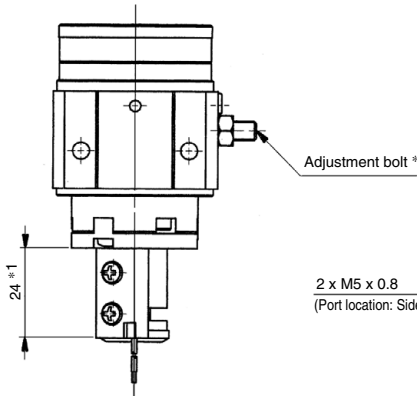
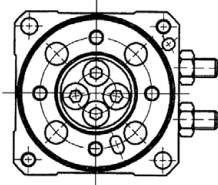
# Rotary Table: Basic Type Vane Type **MSUB Series**

These drawings indicate the condition when the B port is pressurized.

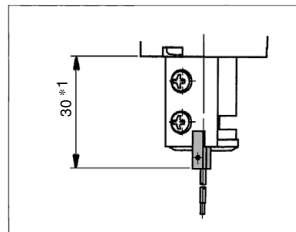
## With auto switch: MDSUB3

- \*1) 24°: When using D-90/90A/S99(V)/T99(V)/S9P(V)  
30°: When using D-97/93A
- \*2) 60°: When using D-90/90A/97/93A  
69°: When using D-S99(V)/T99(V)/S9P(V)

\* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.



## D-97/93A

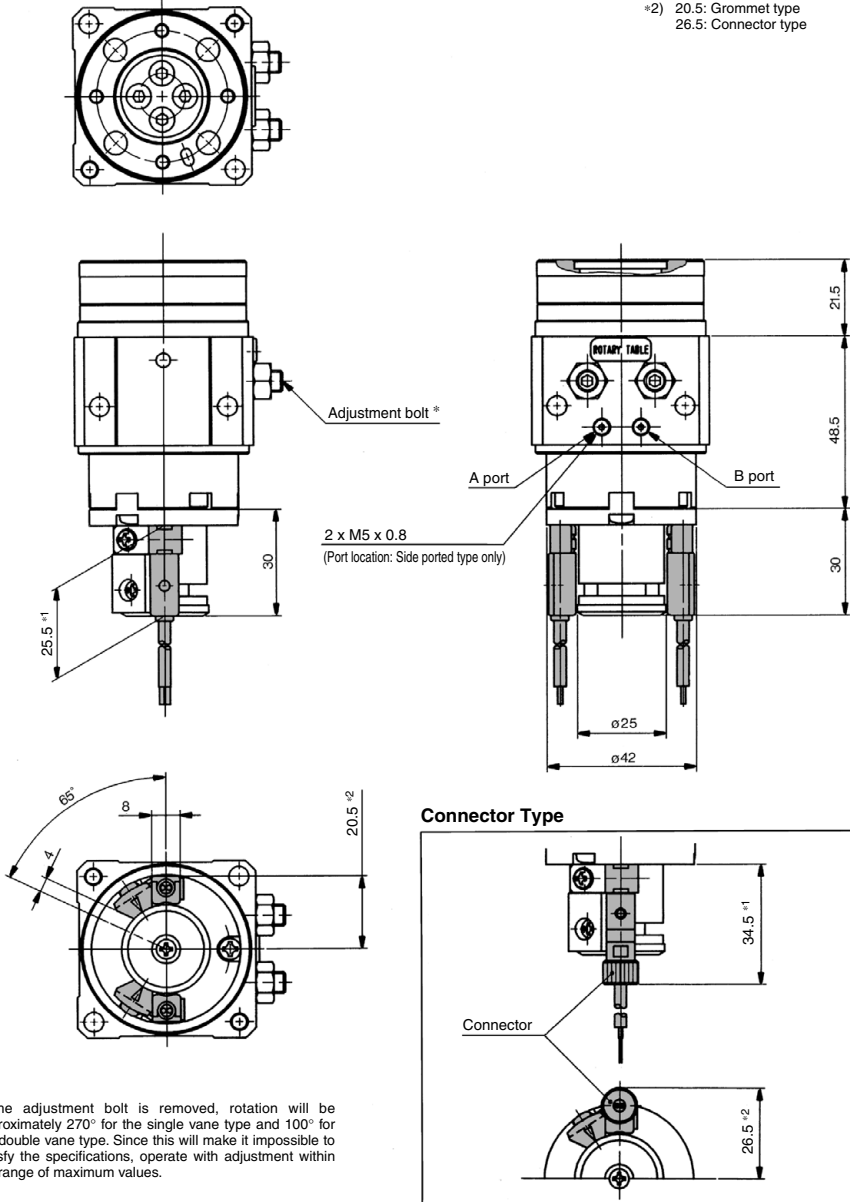




These drawings indicate the condition when the B port is pressurized.

## With auto switch: MDSUB7

- \*1) 25.5: Grommet type  
34.5: Connector type
- \*2) 20.5: Grommet type  
26.5: Connector type



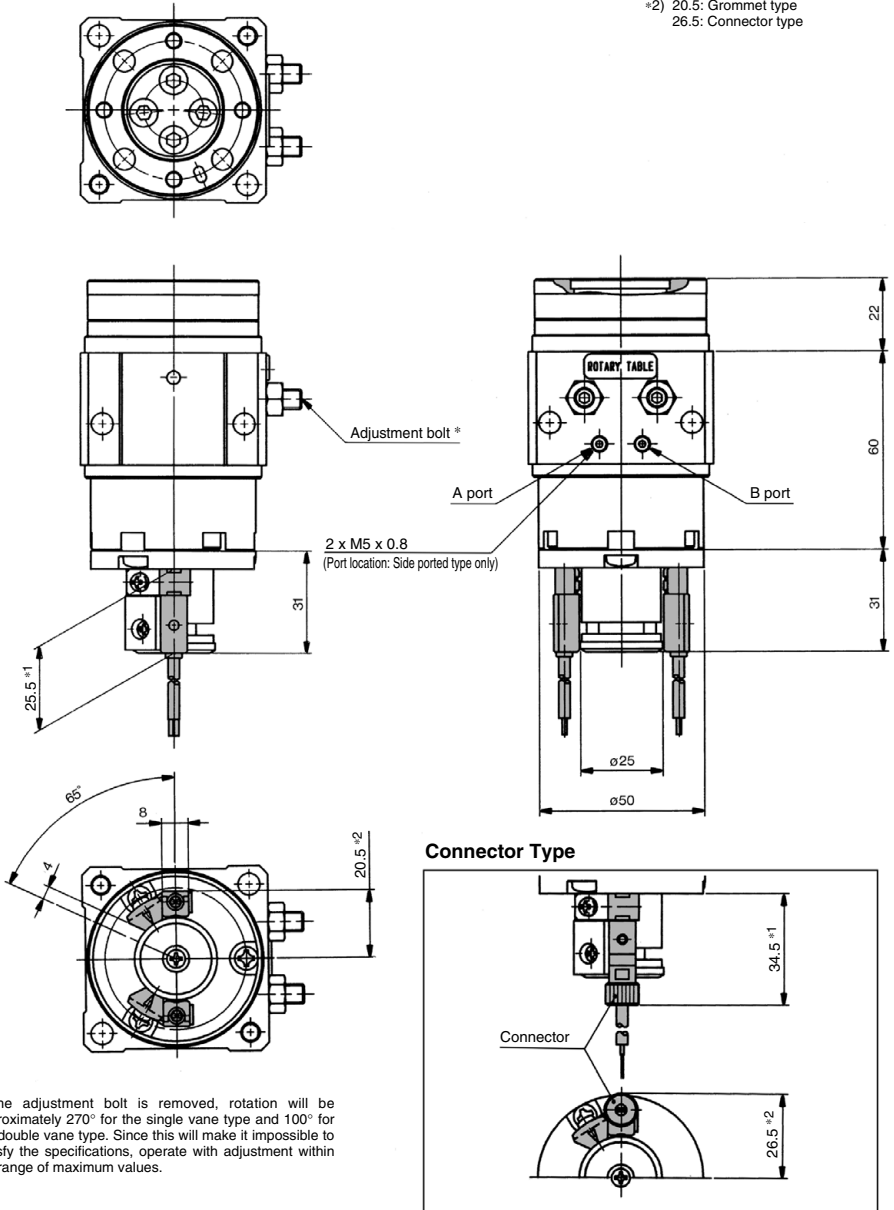
\* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.



These drawings indicate the condition when the B port is pressurized.

With auto switch: MDSUB20

- \*1) 25.5: Grommet type  
34.5: Connector type
- \*2) 20.5: Grommet type  
26.5: Connector type



\* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

# Auto Switch Mounting

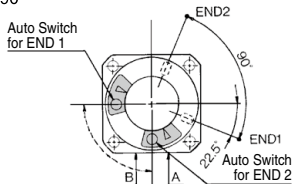


## Table Positioning Pin Hole Rotation Range and Auto Switch Mounting Position

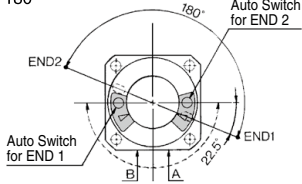
### MSU□1/3

#### Single vane type

90°

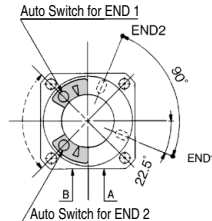


180°



#### Double vane type (MSUB only)

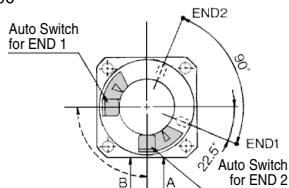
90°



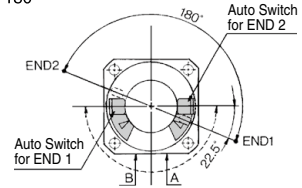
### MSU□7/20

#### Single vane type

90°

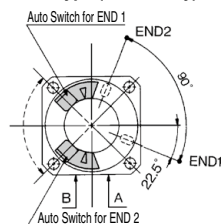


180°



#### Double vane type (MSUB only)

90°



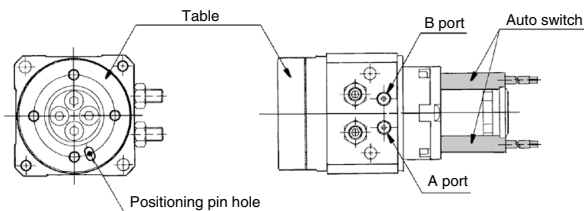
- In drawings that show the rotation range, the arrows on the solid line 90° (180°) indicate the rotation range of the positioning pin holes on the table surface. When the pin hole is at END1, the END1 auto switch operates, and when the pin hole is at END2, the END2 auto switch operates.
- The arrows on the broken line indicate the rotation range of the internal magnet. The rotation range of each auto switch can be reduced by moving the END1 auto switch clockwise and the END2 auto switch counterclockwise.

### Auto Switch Operating Angle and Hysteresis Angle

Model	Operating angle	Hysteresis angle
MDSU□1, 3	110°	10°
MDSU□7, 20	90°	

Note) Since the above values are only provided as a guideline, they are not guaranteed. In the actual setting, adjust them after confirming the auto switch performance.

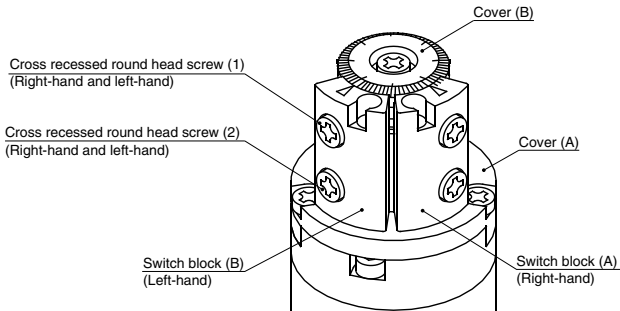
Refer to page 162 for operating angle of auto switch and angle of hysteresis and the procedure for moving the auto switch detection position.



## MSU□1·3Auto Switch Mounting

### External view and descriptions of auto switch unit

The following shows the external view and typical descriptions of the auto switch.



### Solid state auto switch

#### <Applicable auto switch>

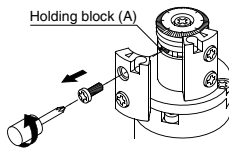
**3-wire..... D-S99(V)□/S9P(V)□**

**2-wire..... D-T99(V)□**

\* For details about shape and specifications of the auto switch, refer to SMC's catalog.

#### ① Switch block detaching

Remove the cross recessed round head screw (1) to detach the switch block.



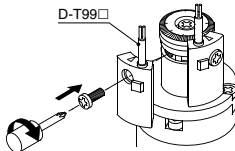
#### ② Solid state auto switch mounting

Secure the solid state auto switch with the cross recessed round head screw (1) and holding block (A).

Proper tightening torque:  
0.4 to 0.6(N·m)

\* Since the holding block (A) moves inside the groove, move it to the mounting position beforehand.

\* Use the auto switch after the operating position has been adjusted with the cross recessed round head screw (1). For details about how to adjust the operating position, refer to SMC's catalog.



### Reed auto switch

#### <Applicable auto switch>

**D-97/93A(With indicator light)**

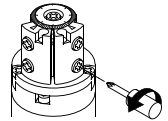
**D-90/90A(Without indicator light)**

\* For details about shape and specifications of the auto switch, refer to SMC's catalog.

#### ① Preparations

Loosen the cross recessed round head screw (2). (About 2 to 3 turns)

\* This screw has been secured temporarily at shipment.

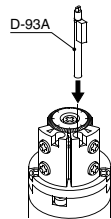


#### ② Reed auto switch mounting

Insert the reed auto switch until it is in contact with the hole in the switch block.

\* Insert the D-97/93A in the direction shown in the figure on the right.

\* Since the D-90/90A is a round type, it has no directionality.



#### ③ Reed auto switch securing

Tighten the cross recessed round head screw (2) to secure the reed auto switch.

Proper tightening torque:  
0.4 to 0.6(N·m)

\* Use the auto switch after the operating position has been adjusted with the cross recessed round head screw (1). For details about how to adjust the operating position, refer to SMC's catalog.

