Rotary Table/Vane Type: Basic

Series MSUB

Sizes 1, 3, 7, 20

How to Order

Without Auto Switch Unit

With Auto Switch Unit

MSUB 20 — 90 S

M D SUB 20 — 90 S — R73

Bearing type

B	Basic type

Free-mount

Connection port position

Nil	Side ports
E	Top ports

Available with side ports only, when equipped with switch unit.

With auto switch unit

Nominal size (torque)

1	MSUB 1
3	MSUB 3
7	MSUB 7
20	MSUB 20

Rotation

Application	Symbol	Rotation
Single vane	90	90°
	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

Type of auto switch

Nil	Without auto switch

∗ Select applicable auto switches from the table below.

Number of auto switches

S	1 pc.∗
Nil	2 pcs.

∗ For 1 piece, a right hand auto switch is installed.

Applicable auto switches

Applicable model	Type	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch part no.	Lead wire type	Lead wire length (m)∗ 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Applicable loads	
MDSUB1 MDSUB3	Reed	Grommet	No	2 wire	5V, 12V	5V, 12V, 24V	90	Parallel cord	●	●	●	—	IC circuit	Relay, PLC
					5V, 12V, 100V	5V, 12V, 24V, 100V	90A	Heavy duty	●	●	●	—		
			Yes		—	—	97	Parallel cord	●	●	●	—	—	
						100V	93A	Heavy duty	●	●	●	—		
	Solid state				12V	—	T99		●	●	—	—		
							T99V		●	●	—	—		
				3 wire (NPN)	5V, 12V		S99		●	●	—	—	IC circuit	
				3 wire (PNP)			S99V		●	●	—	—		
							S9P		●	●	—	—		
							S9PV		●	●	—	—		
MDSUB7 MDSUB20	Reed	Grommet	Yes	2 wire	—	100V	R73	Heavy duty	●	●	—	—	—	Relay, PLC
		Connector					R73C		●	●	●	●		
		Grommet	No		48V, 100V	24V, 48V, 100V	R80		●	●	—	—	IC circuit	
		Connector					R80C		●	●	●	●		
	Solid state	Grommet	Yes		12V	—	T79		●	●	—	—	—	
		Connector					T79C		●	●	●	●		
		Grommet		3 wire (NPN)	5V, 12V		S79		●	●	—	—	IC circuit	
				3 wire (PNP)			S7P		●	●	—	—		

∗ Lead wire length symbols 0.5m .... Nil (Example) R73C
3m ..... L (Example) R73CL
5m ..... Z (Example) R73CZ
None ..... N (Example) R73CN

● Operating time —— 1.2ms ● Operating temperature range —— 5 to 60°C
● Impact resistance —— 300m/s² (reed), 1000m/s² (solid state)

Order example: MSUA20 single vane type (connection port side position selected)

1. Standard type (without auto switches), rotation 90°, side port position MSUB20-90S
2. With switch unit (without auto switches), rotation 180°, side port position MDSUB20-180S
3. With switch unit + auto switch R73, rotation 180°, side port position MDSUB20-180S-R73

Specifications

Model [3*]		MSUB1			MSUB3			MSUB7			MSUB20		
Vane type		Single vane		Double vane	Single vane		Double vane	Single vane		Double vane	Single vane		Double vane
Rotation [1*]		90°±10°	180°±10°	90°±5°	90°±10°	180°±10°	90°±5°	90°±10°	180°±10°	90°±5°	90°±10°	180°±10°	90°±5°
Fluid		Air (unlubricated)											
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 sec/90°		0.07 to 0.3											
Shaft load	**Allowable radial load**	20N			40N			50N			60N		
	Allowable thrust load [2*]	15N			30N			60N			80N		
		10N			15N			30N			40N		
	Allowable moment	0.3N·m			0.7N·m			0.9N·m			2.9N·m		
Bearing		Bearings											
Port position		Side ports or Top ports											
Port size	**Side ports**	M3			M5								
	Top ports	M3						M5					

∗1. Single vane 90° type can be adjusted to 90°±10° (both ends of rotation ±5° each)
Single vane 180° type 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.

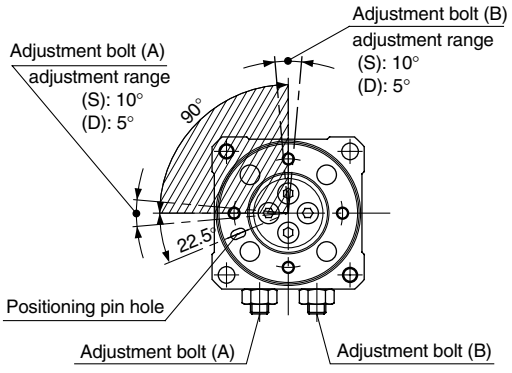
∗2. The allowable thrust load is directional. For details refer to the allowable load table below.

∗3. Correspondence to equivalent conventional free-mount types

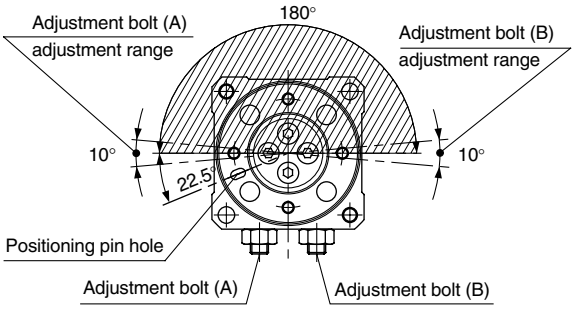
Rotary table		Free-mount rotary actuator
MSUB 1	→	**CRBUW10**
MSUB 3	→	**CRBUW15**
MSUB 7	→	**CRBUW20**
MSUB20	→	**CRBUW30**

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.

Applicable Auto Switches

Auto switch type	MDSUB1, 3	MDSUB7, 20
Reed switch	D-90/97, D-90A/93A	D-R7, R8
Solid state switch	D-S99, D-T99, D-S9P	D-S7, D-S7P, T7

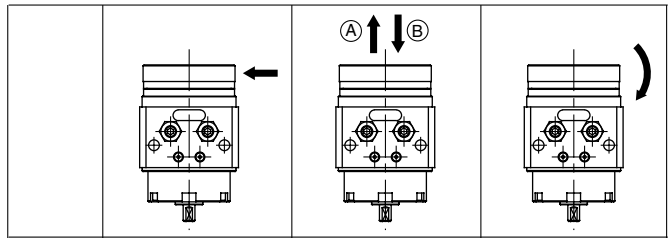
Weights

Unit: g

Size	Rotation	Basic weight		Auto switch unit + Auto switch 2 pcs.
		Single vane	Double vane	
1	90	145	150	25
	180	140	—	
3	90	230	240	30
	180	225	—	
7	90	360	375	50
	180	355	—	
20	90	510	580	60
	180	505	—	

Allowable Loads

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.)



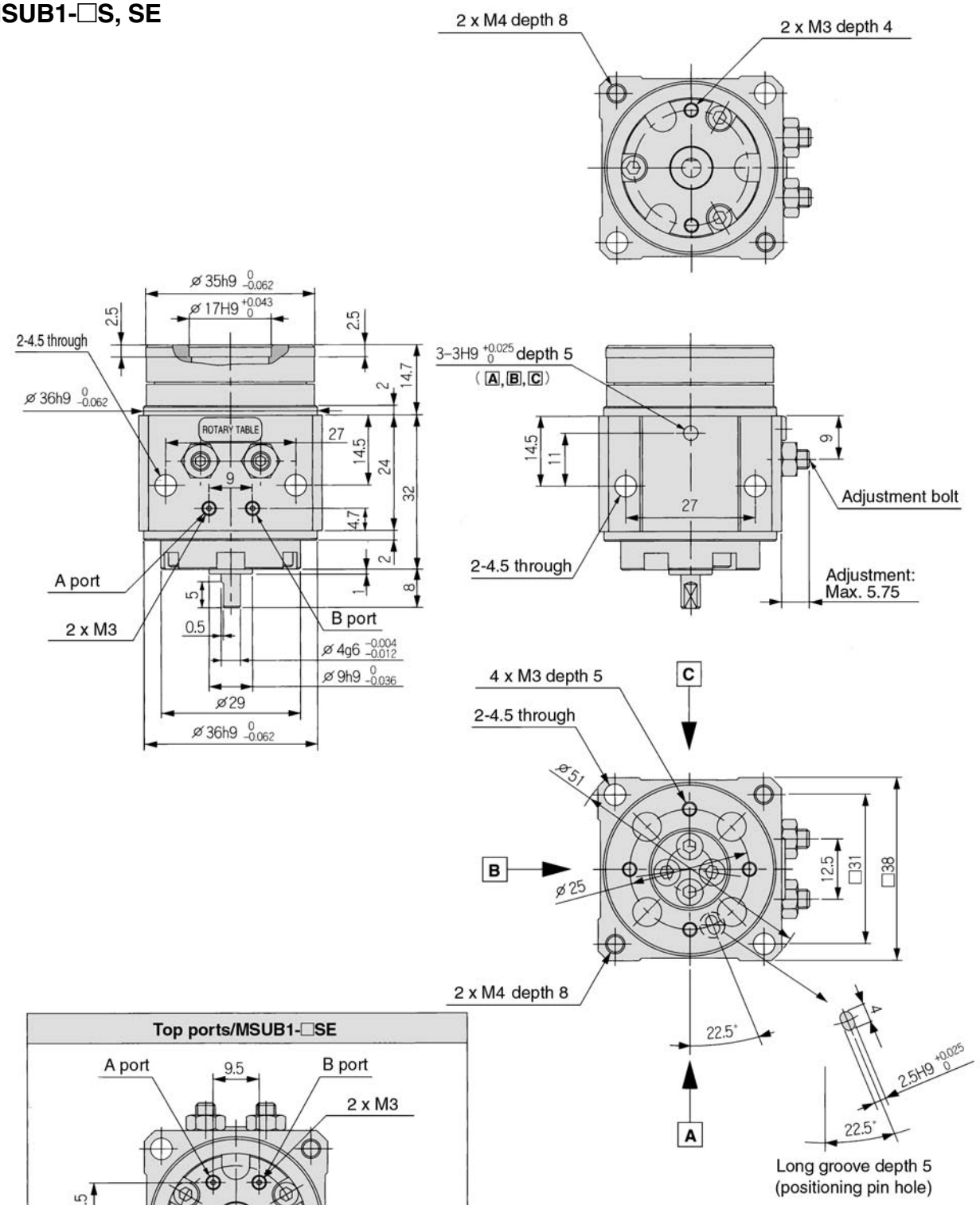
Size	Allowable radial load (N)	Allowable thrust load (N)		Allowable moment (N·m)
1	20	Ⓐ 15	Ⓑ 10	0.3
3	40	30	15	0.7
7	50	60	30	0.9
20	60	80	40	2.9

Dimensions

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

MSUB1 (Single vane)

MSUB1-□S, SE

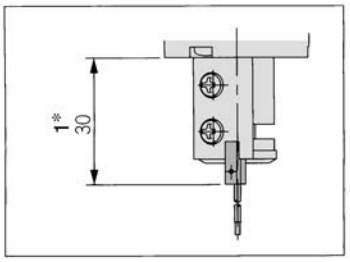


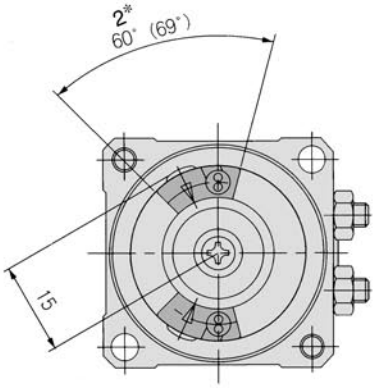
∗ If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

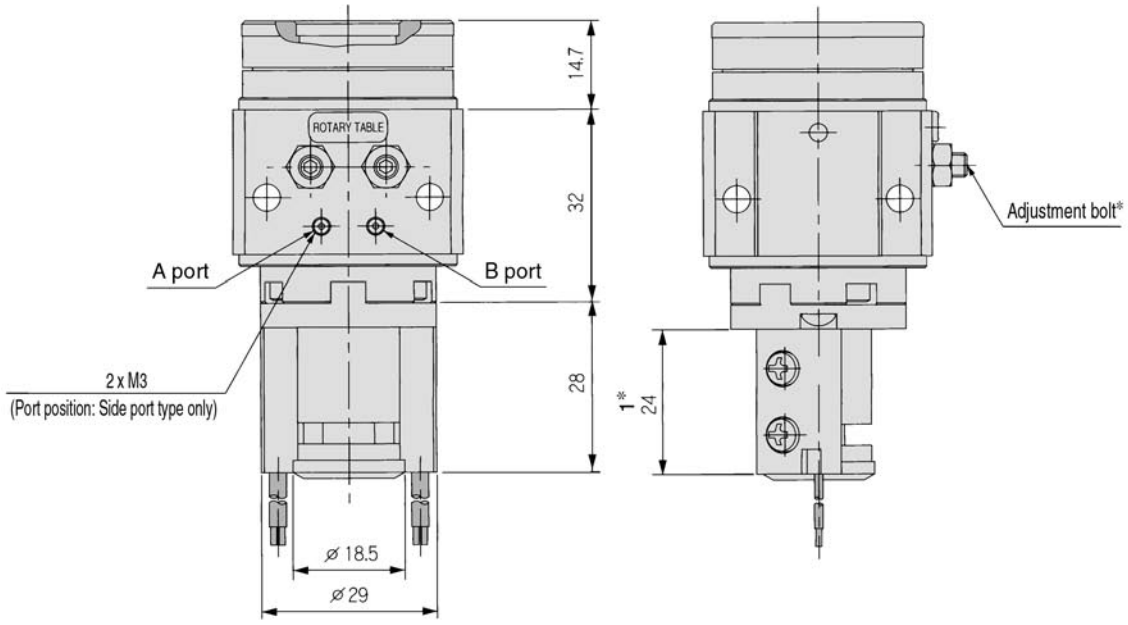
With auto switch: MDSUB1-□S

∗1) When using 24 : D-90, 90A, S99(V), T99(V), S9P(V)
When using 30 : D-97, 93A

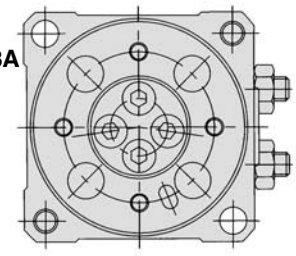
∗2) When using 60°: D-90, 90A, 97, 93A
When using 69°: D-S99(V), T99(V), S9P(V)







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.

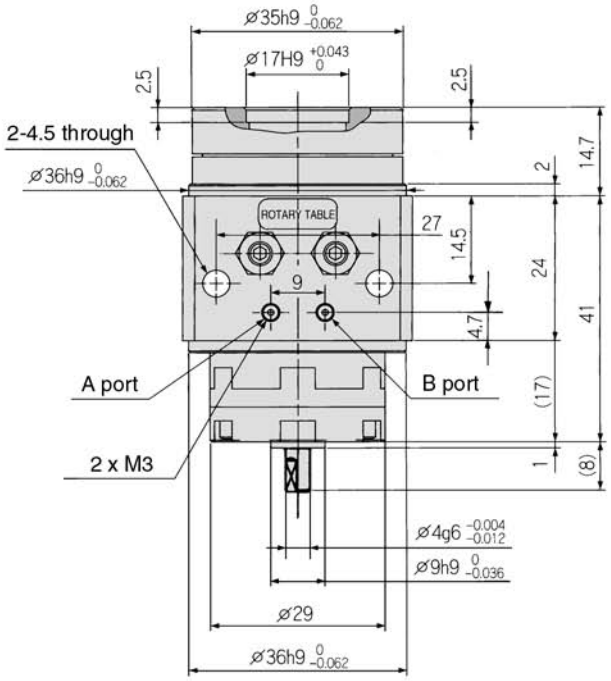
Dimensions

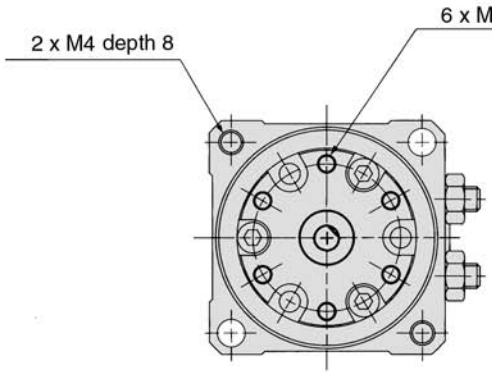
These drawings indicate the condition when the B port is pressurized.

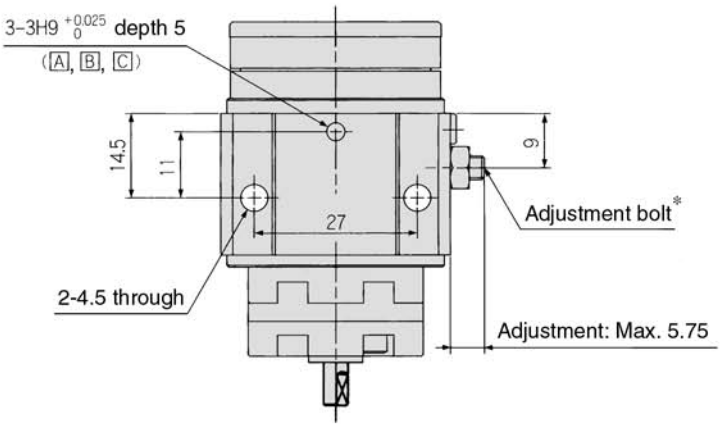
MSUB1 (Double vane)

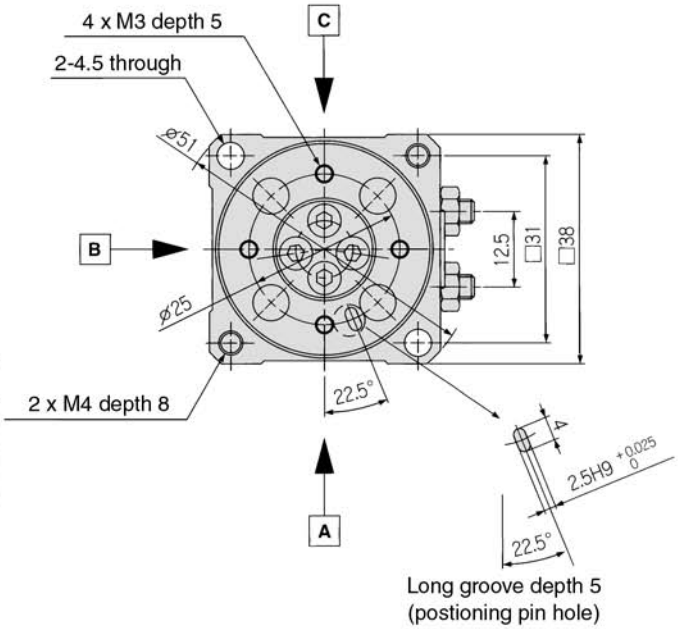
MSUB1-□D

∗ 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.

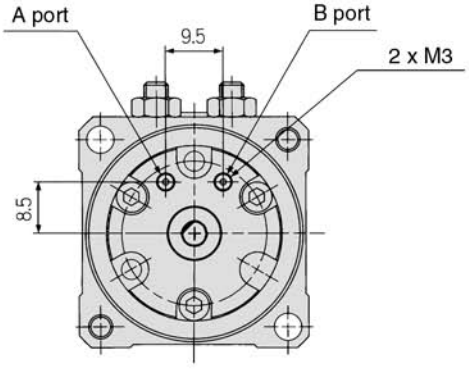








Top ports/MSUB1-□DE

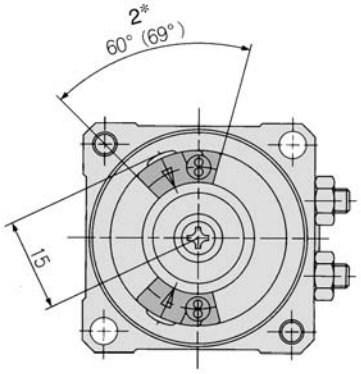


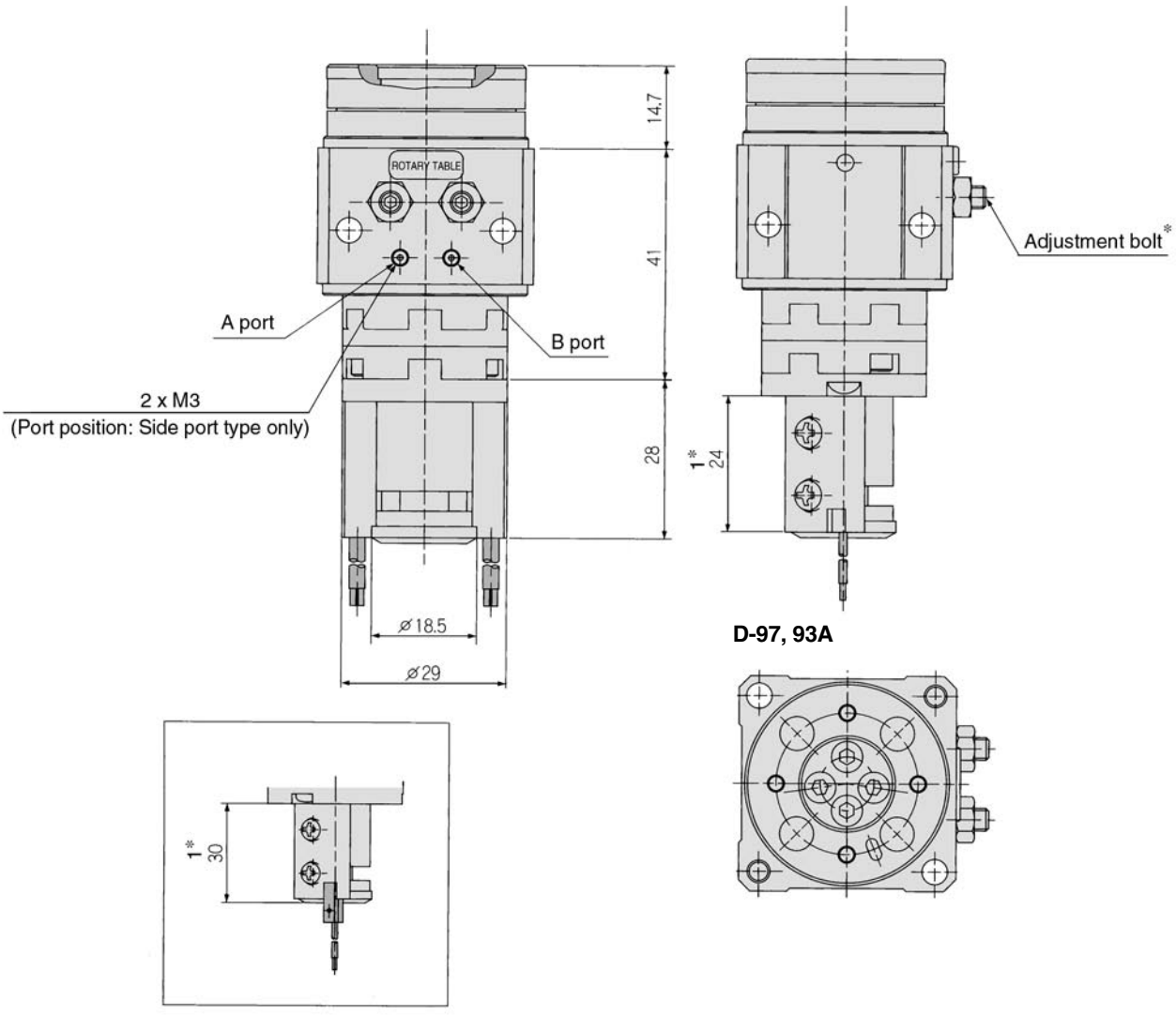
These drawings indicate the condition when the B port is pressurized.

With auto switch: MDSUB1-□D

∗1) When using 24 : D-90, 90A, S99(V), T99(V), S9P(V)
When using 30 : D-97, 93A

∗2) When using 60° : D-90, 90A, 97, 93A
When using 69° : D-S99(V), T99(V), S9P(V)





D-97, 93A

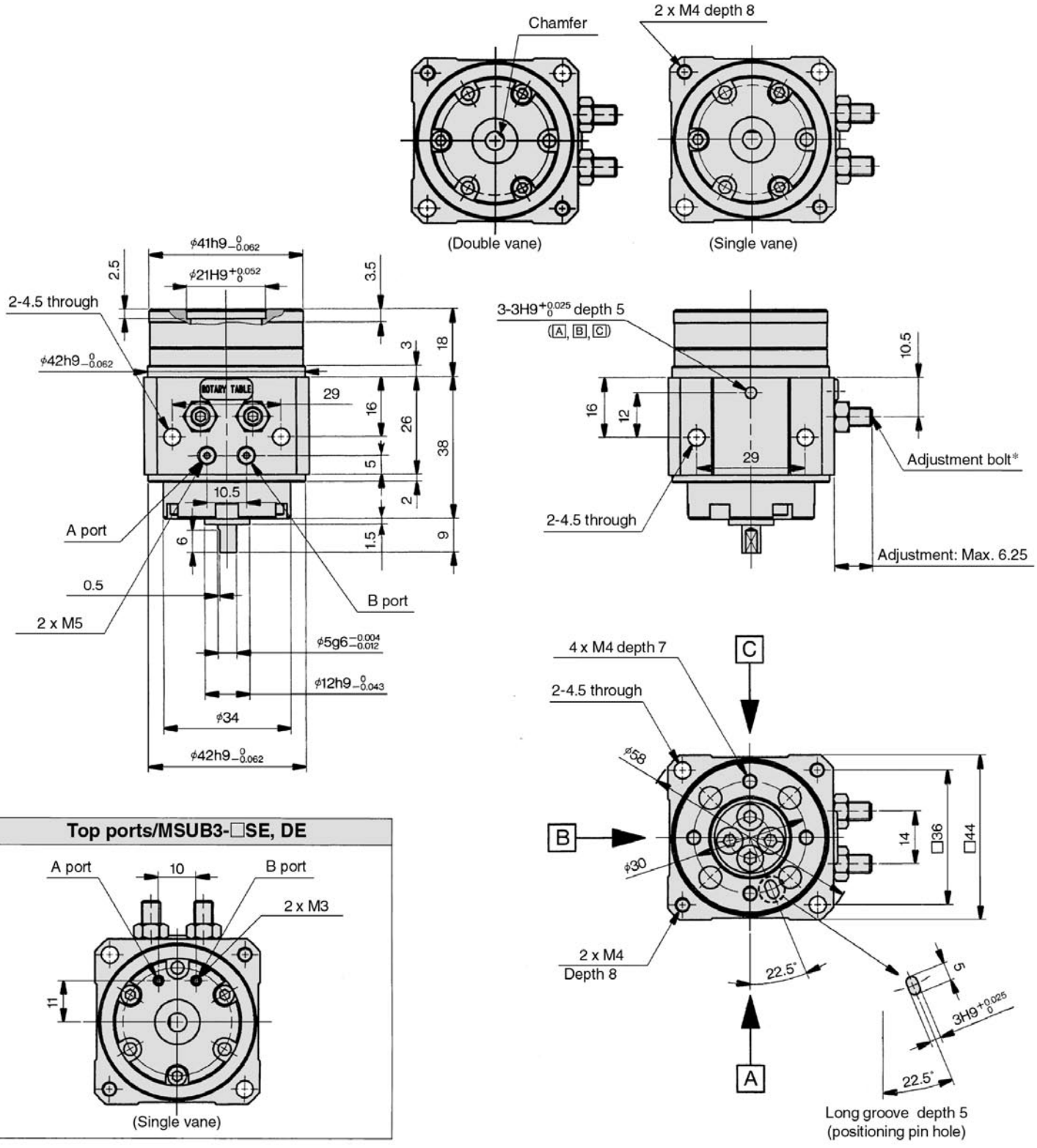
∗ If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

Dimensions

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

MSUB3 (Single vane, Double vane)

MSUB3-□S, D



The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs for single and double vane.

∗ 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.

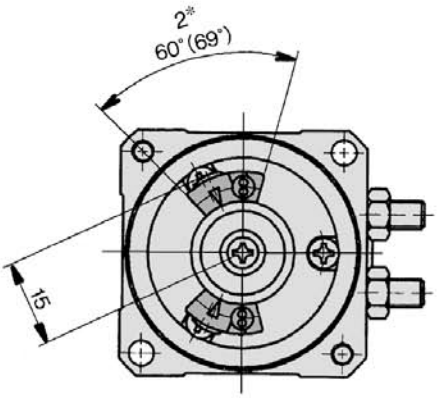
These drawings indicate the condition when the B port is pressurized.

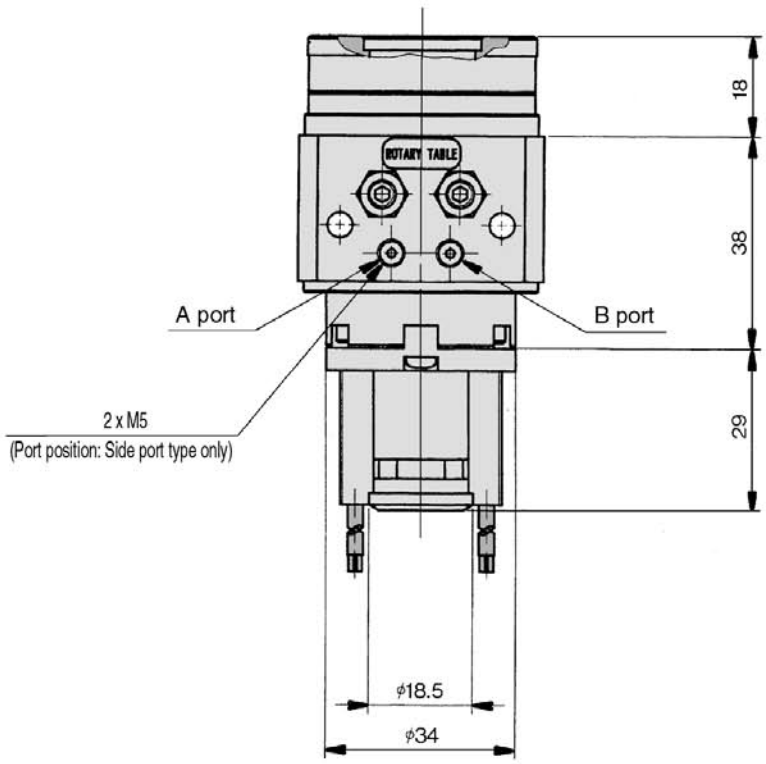
With auto switch: MDSUB3

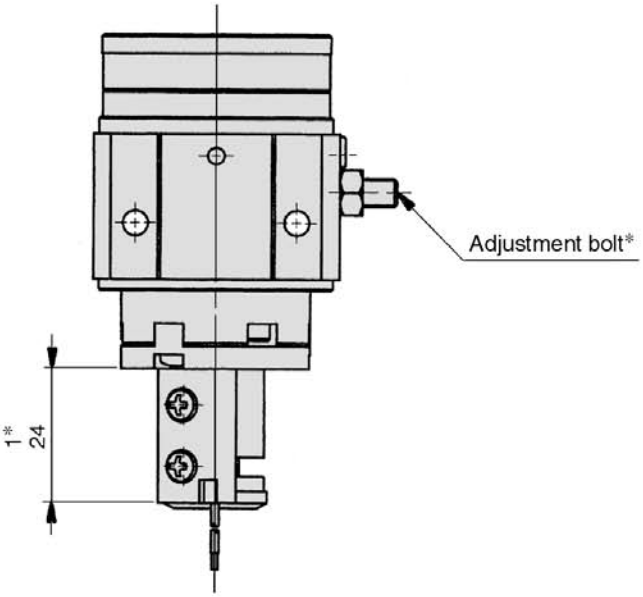
∗1) When using 24 : D-90, 90A, S99(V), T99(V), S9P(V)
When using 30 : D-97, 93A

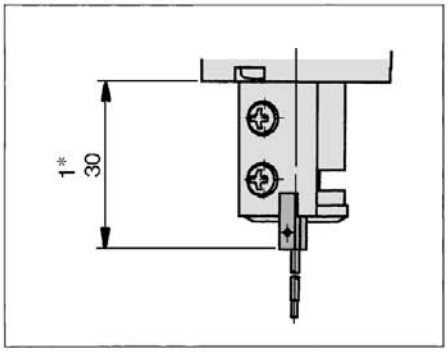
∗2) When using 60°: D-90, 90A, 97, 93A
When using 69°: D-S99(V), T99(V), S9P(V)

∗ 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.

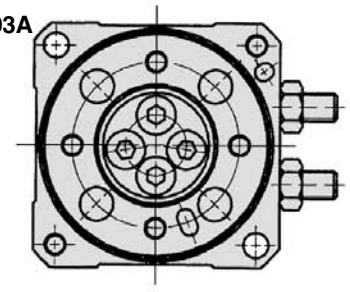








D-97, 93A

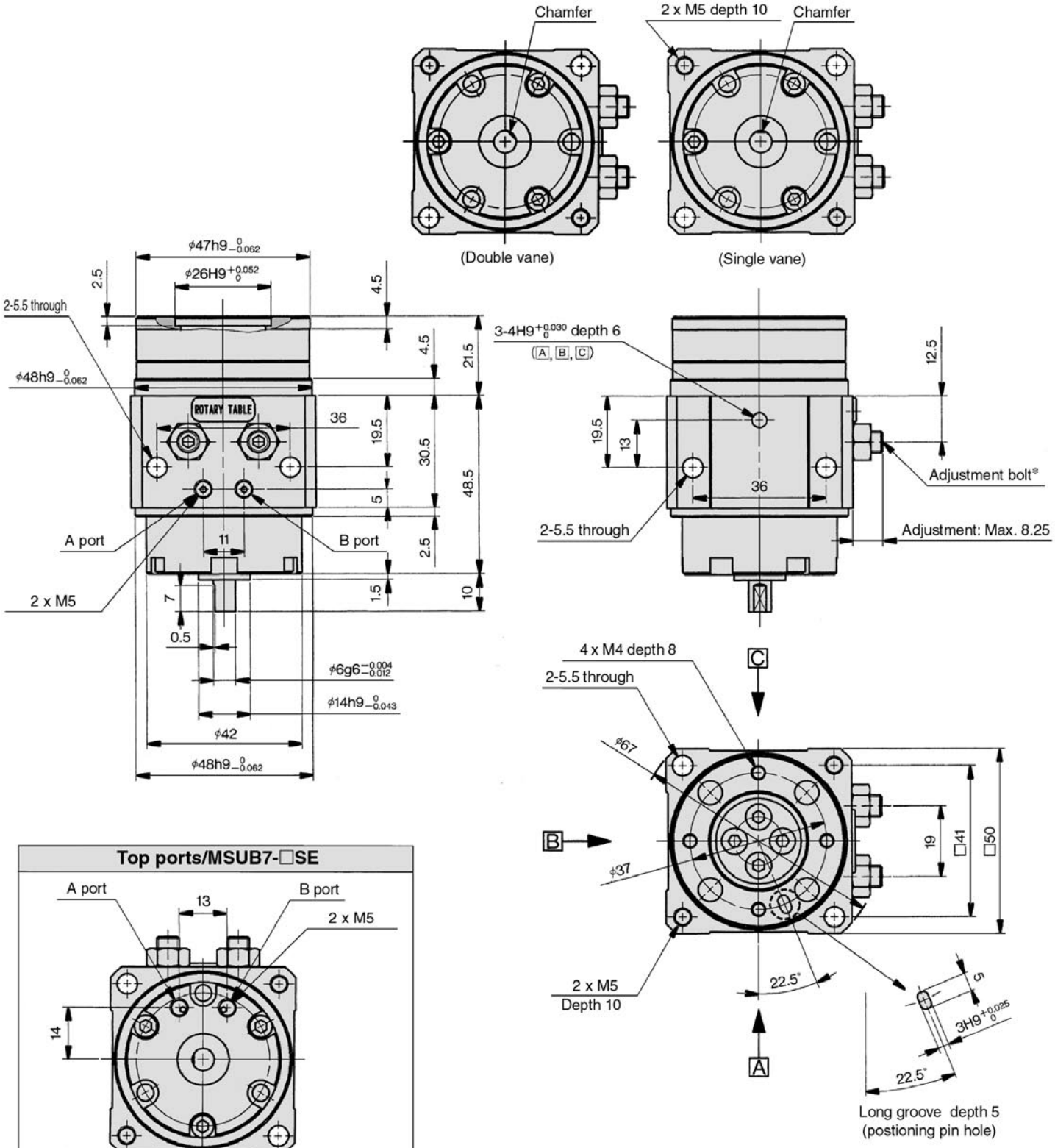


Dimensions

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

MSUB7 (Single vane, Double vane)

MSUB7-□S, D



Top ports/MSUB7-□SE

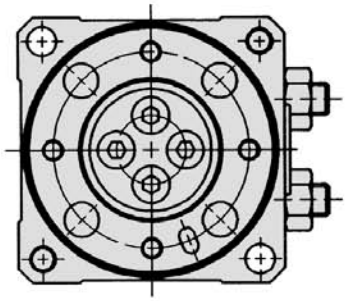
The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs for single and double vane.

* 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.

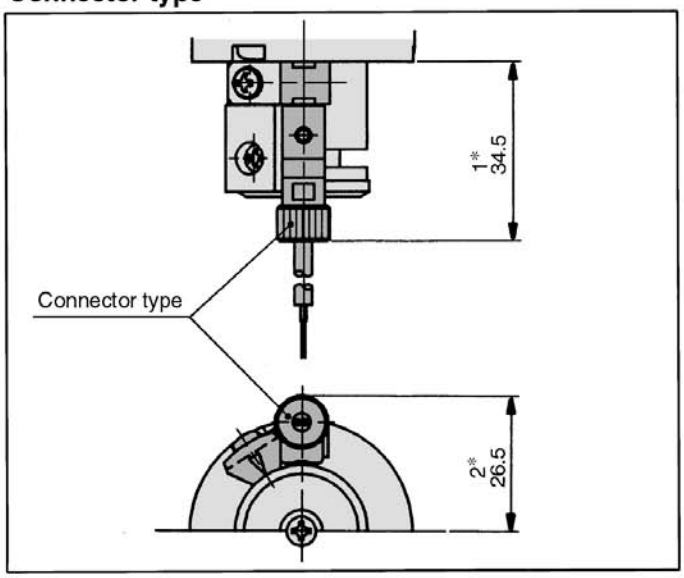
These drawings indicate the condition when the B port is pressurized.

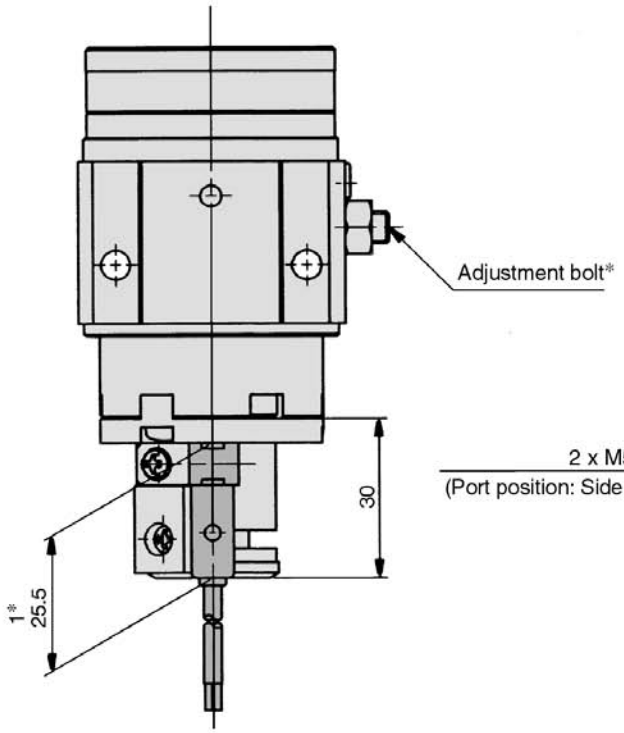
With auto switch: MDSUB7

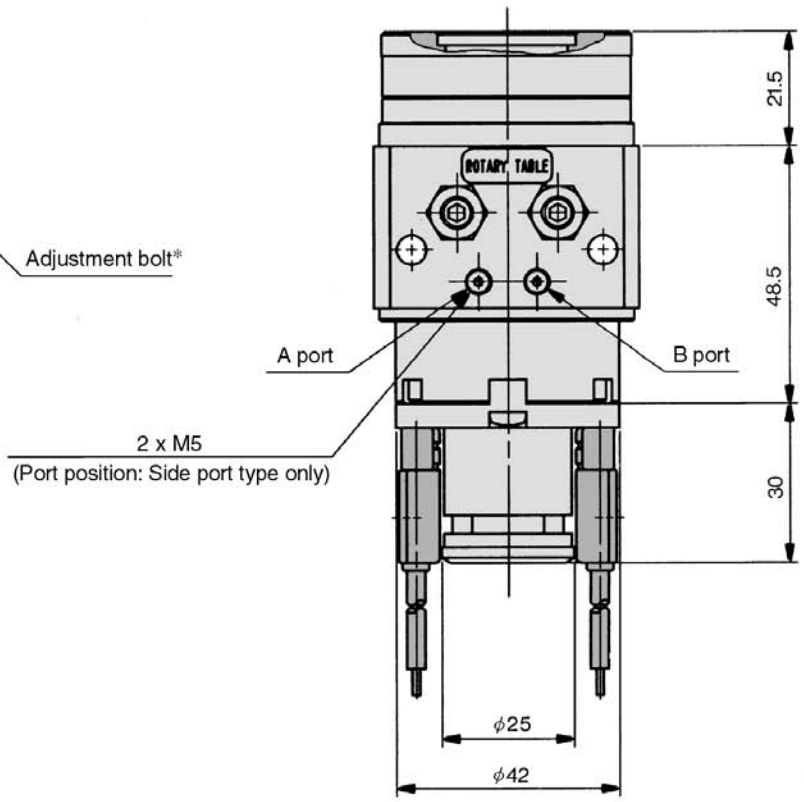
* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

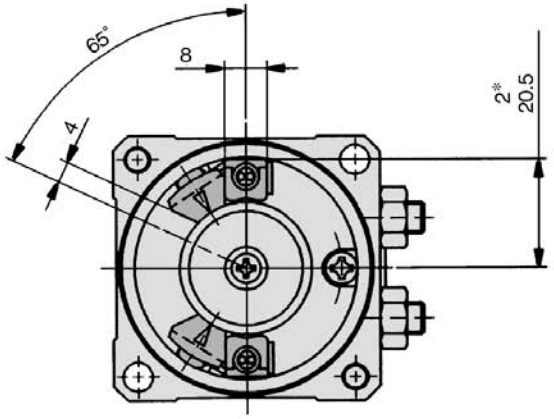


Connector type









*1) 25.5: Grommet type
34.5: Connector type

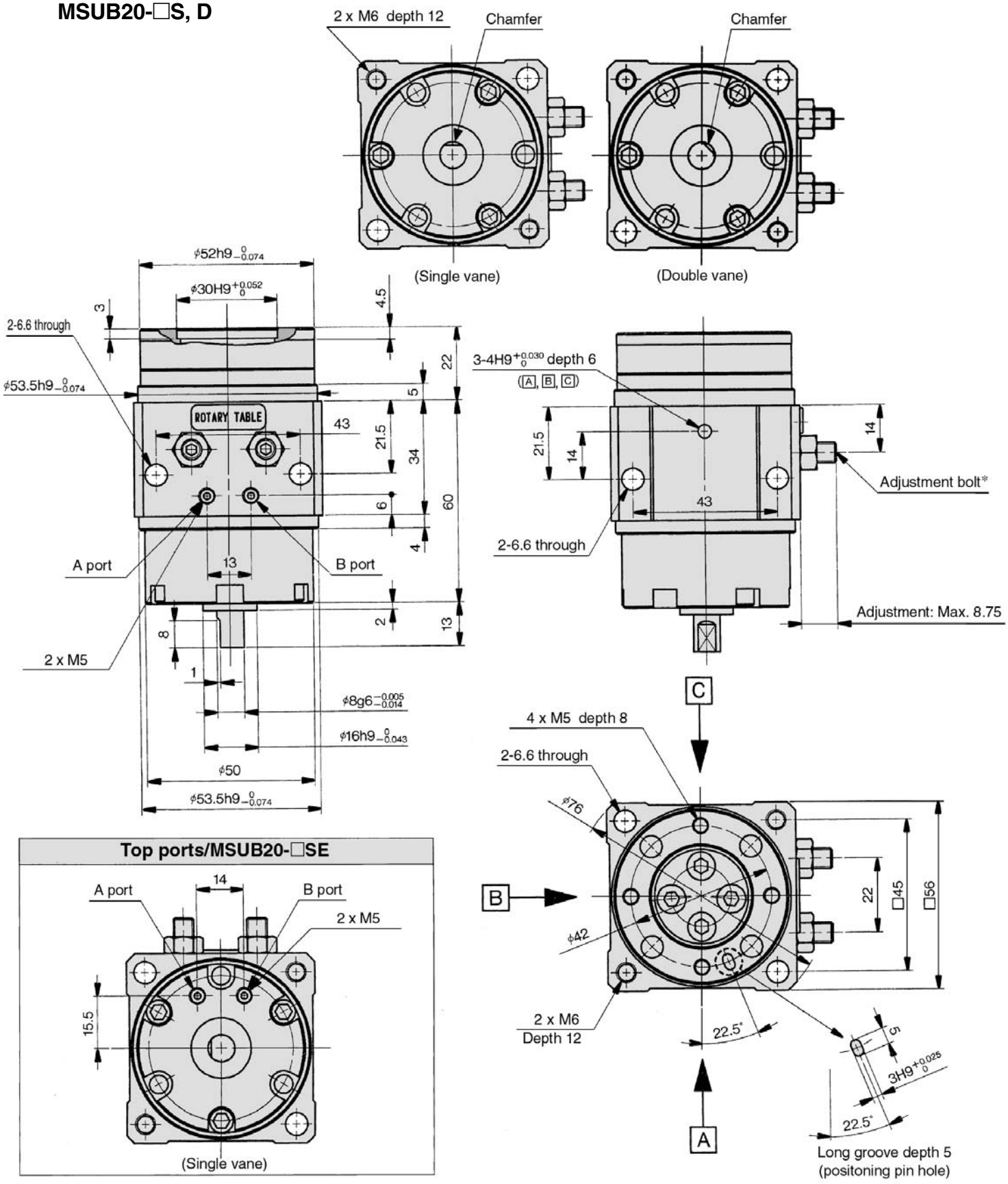
*2) 20.5: Grommet type
26.5: Connector type

Dimensions

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

MSUB20 (Single vane, Double vane)

MSUB20-□S, D



Top ports/MSUB20-□SE

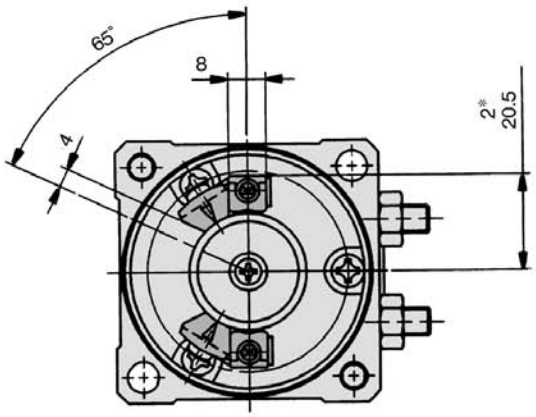
The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs for single and double vane.

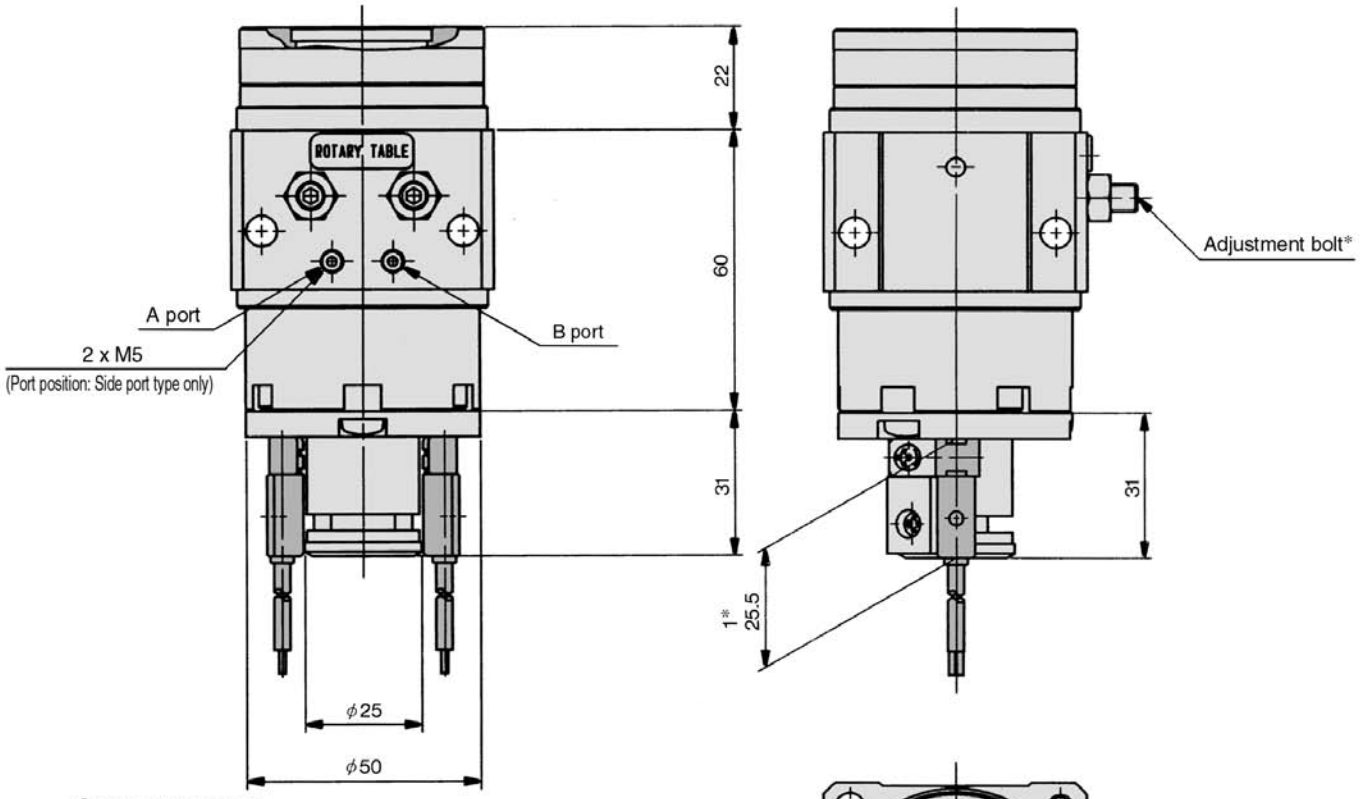
* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

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

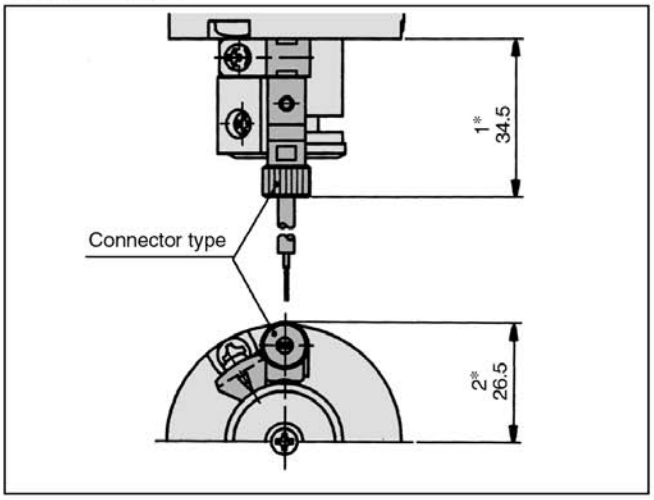
With auto switch: MDSUB20

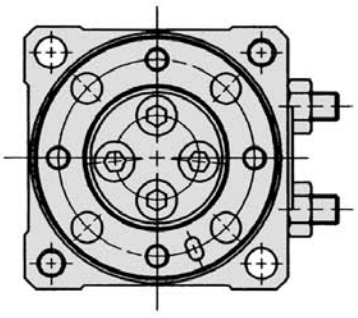
∗ If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.





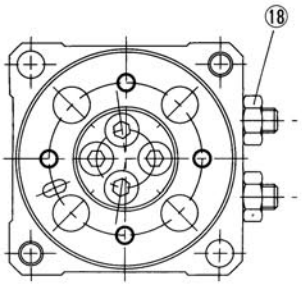
Connector type

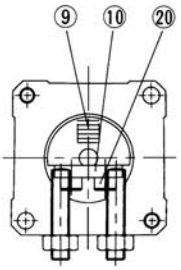




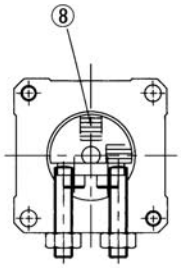
∗1) 25.5: Grommet type
34.5: Connector type
∗2) 20.5: Grommet type
26.5: Connector type

Construction/Parts List

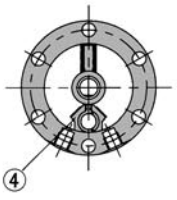




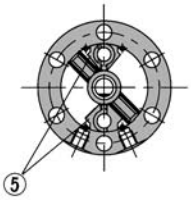
180°
(Indicates intermediate position)



90°
(Indicates A port pressurized)

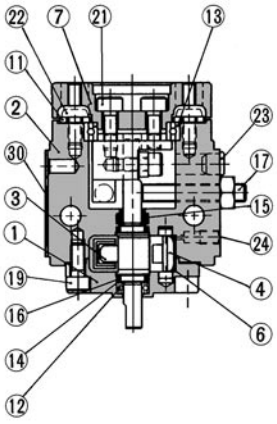


Single vane
(Indicates intermediate position for 180°)

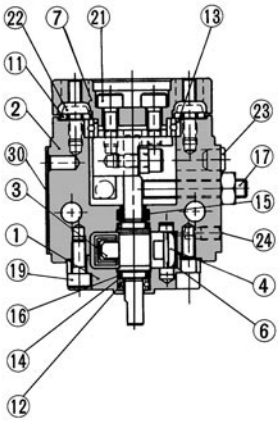


Double vane
(Indicates A port pressurized)

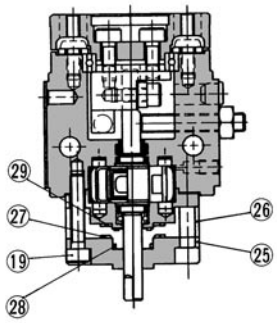
Single vane: Size 1



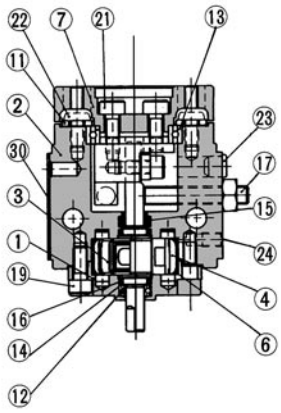
Single vane: Sizes 3, 7, 20



Double vane: Size 1



Double vane: Sizes 3, 7, 20



Parts list

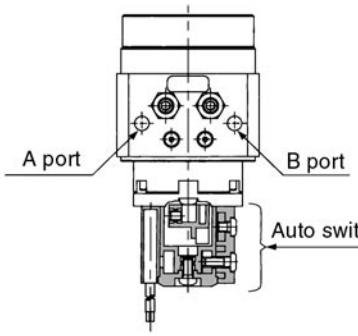
No.	Description	Material	Note
1	**Body (A)**	Aluminum alloy	Light gray color
2	**Body (B)**	Aluminum alloy	Light gray color
3	**Vane shaft**	Stainless steel (MSUB20: Carbon steel)	Single vane
		Carbon steel	Double vane
4	**Stopper**	Resin	Single vane
5	**Stopper**	Stainless steel	Double vane
6	**Stopper seal**	NBR	
7	**Table**	Aluminum alloy	Light gray color
8	**Stopper lever (D)**	Carbon steel	
9	**Stopper lever (S)**	Carbon steel	
10	**Lever retainer**	Carbon steel	
11	**Ring collar**	Carbon steel	
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	
18	**Hexagon nut**	Stainless steel	
19	**Hexagon socket head cap screw**	Stainless steel	
20	**Hexagon socket head cap screw**	Stainless steel	
21	**Hexagon socket head cap screw**	Stainless steel	
22	**Button bolt**	Carbon steel	
23	**Rubber cap**	NBR	
24	**Hexagon socket head set screw**	Stainless steel	
25	**Cover**	Aluminum alloy	SE type only
26	**Plate**	Resin	
27	**Gasket**	NBR	
28	**O-ring**	NBR	
29	**O-ring**	NBR	
30	**Label**		

∗ The plug number 24 is used only when the connection port is type SE.

Internal construction with auto switch

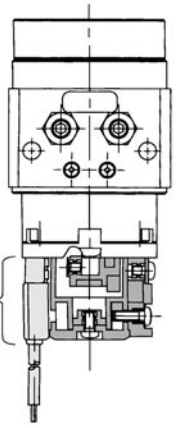
Units are common for both single and double vane.

MDSUB1, 3



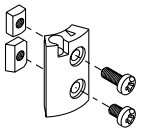
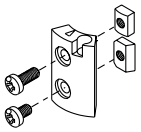
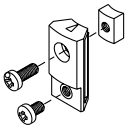
(The external configuration of the MDSUB1 double vane is different.)

MDSUB7, 20



Model	Auto switch unit part no.
MDSUB 1	P211070-1
MDSUB 3	P211090-1
MDSUB 7	P211060-1
MDSUB20	P211080-1

∗ Auto switches are not included with switch units.

Auto switch block unit		
For MDSUB1, 3		**For MDSUB7, 20**
Right-handed	Left-handed	Combination left & right-handed
		
Part no.: P211070-8	Part no.: P211070-9	Part no.: P211060-8

∗ A switch block unit is the assembly required to mount one auto switch on a switch unit.