Rotary Table: Basic Type
Vane Style
Series MSUB
Size: 1, 3, 7, 20

How to Order

Without auto switch MSUB 20 — 90 S □

With auto switch M D SUB 20 — 90 S — T79 L □

Connection port location

Nil	Side ported
E	Axial ported

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

Bearing type

B	Basic type

Free mount type

With auto switch unit

Nominal size (Torque)

1	MSUB1
3	MSUB3
7	MSUB7
20	MSUB20

Rotating angle

Application	Symbol	Rotating angle
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

Auto switch

Nil	Without auto switch

∗ For the applicable auto switch model, refer to the table below.
∗ Auto switches are shipped together (but not assembled).

Electrical entry/Lead wire length

Nil	Grommet/Lead wire: 0.5 m
L	Grommet/Lead wire: 3 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

Number of auto switches

S	1 pc. ∗
Nil	2 pcs.

∗ Right-hand auto switch will be used for actuators with 1 auto switch.

Applicable Auto Switch/Refer to page 11-11-1 for further information on auto switches.

Applicable model	Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire type	Lead wire length (m) ∗ 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wire connector	Applicable load	
MDSUB1 MDSUB3	Reed switch	—	Grommet	Yes	2-wire	24 V	—	—	—	97	Parallel cord	●	●	●	—	—	—	Relay, PLC
								100 V	—	93A	Heavy-duty cord	●	●	●	—			
	Solid state switch	—			3-wire (NPN)		5 V, 12 V	—	S99V	S99		●	●	—	—	○	IC circuit	
					3-wire (PNP)				S9PV	S9P		●	●	—	—	○		
					2-wire		12 V		T99V	T99		●	●	—	—	○	—	
MDSUB7 MDSUB20	Reed switch	—	Grommet	Yes	2-wire	24 V	—	100 V	—	R73	Heavy-duty cord	●	●	—	—	—	—	Relay, PLC
			Connector						—	R73C		●	●	●	●			
	Solid state switch	—	Grommet		3-wire (NPN)		5 V, 12 V	—	—	S79		●	●	—	—	○	IC circuit	
					3-wire (PNP)				—	S7P		●	●	—	—	○		
					2-wire		12 V		—	T79		●	●	—	—	○	—	
			Connector						—	T79C		●	●	●	●	—		

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

Refer to page 11-5-30 for details on other applicable switches.

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

Made to Order Refer to page 11-11-36 for detailed solid state switches with pre-wire connectors.

Order example: MSUA20 single vane type (connection port side location selected)
1. Standard type (Without auto switches), Rotation 90°, side port location MSUB20-90S
2. With switch unit (Without auto switches), Rotation 180°, Side port location MDSUB20-180S
3. With switch unit + Auto switch R73, Rotation 180°, Side port location 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
Rotating angle *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 (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 (sec/90°)		0.07 to 0.3											
Shaft load	Allowable radial load	20 N			40 N			50 N			60 N		
	Allowable thrust load *2	15 N			30 N			60 N			80 N		
		10 N			15 N			30 N			40 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. For details refer to the allowable load table below.

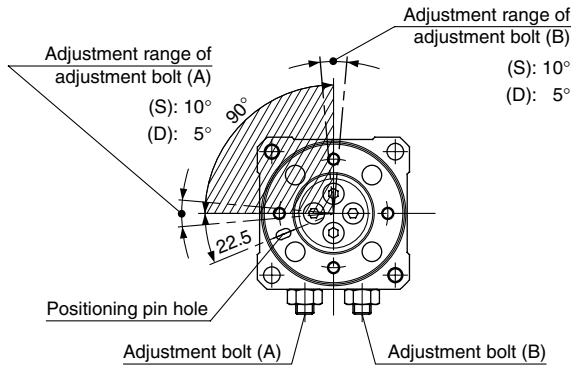
Note) Refer to page 11-1-34 for allowable kinetic energy.

*3 Correspondence to equivalent conventional free-mount types

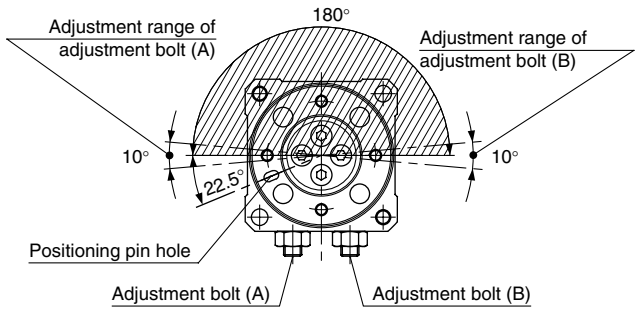
Rotary table		Free-mount rotary actuator
MSUB1	→	CRBU2W10
MSUB3	→	CRBU2W15
MSUB7	→	CRBU2W20
MSUB20	→	CRBU2W30

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.

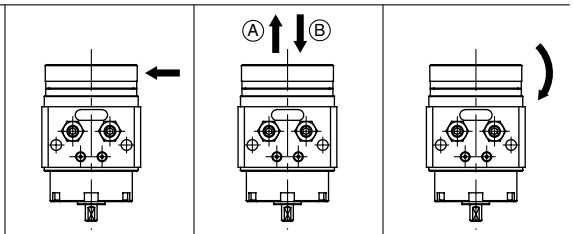
Weight

(g)

Size	Rotation angle	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	—	

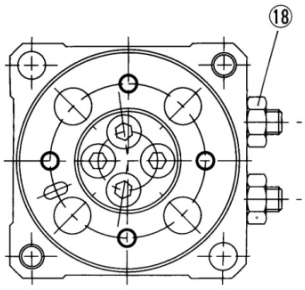
Allowable Load

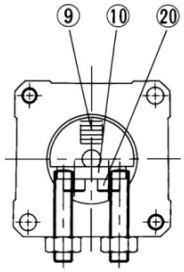
Do not permit the load and moment applied to the table to exceed the allowable values shown in the table below. (Operation above the allowable values can cause adverse effects on service life, such as play in the table and loss of accuracy.)



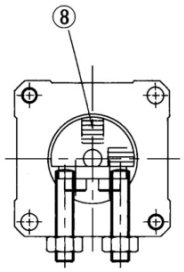
Size	Allowable radial load (N)	Allowable thrust load (N)		Allowable moment (N·m)
1	20	Ⓐ 15	Ⓑ 10	0.3
3	40	30	15	0.7
7	50	60	30	0.9
20	60	80	40	2.9

Construction/Component Parts

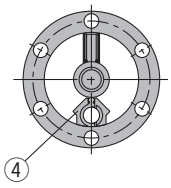




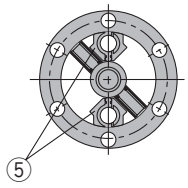
For 180°
(Figure in the middle position)



For 90°
(Figure with pressure to A port)

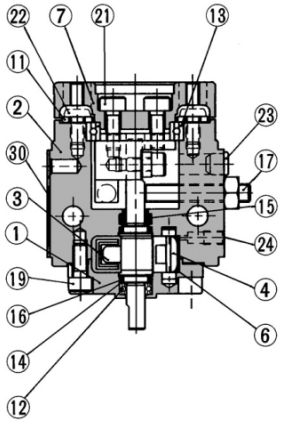


Single vane
(Figure in the middle position for 180°)

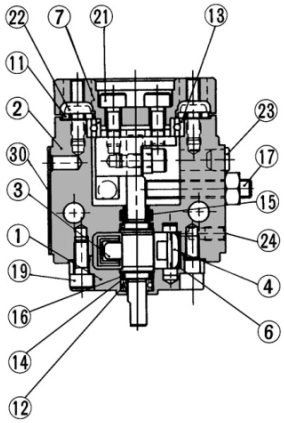


Double vane
(Figure with pressure to A port)

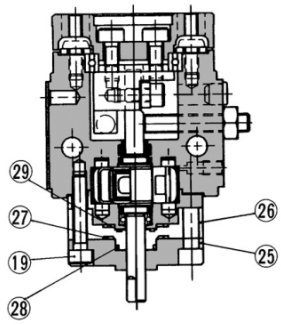
Single vane: Size 1



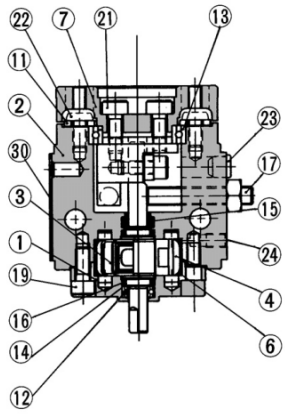
Single vane: Size 3, 7, 20



Double vane: Size 1



Double vane: Size 3, 7, 20



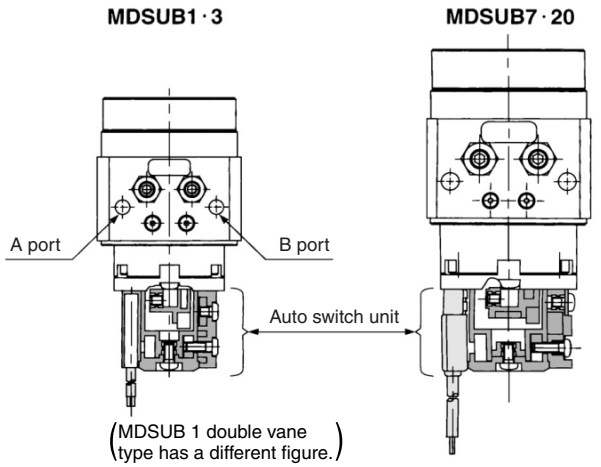
Component Parts

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 ㉔ is used only when the connection port is type SE.

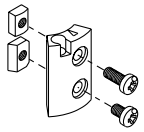
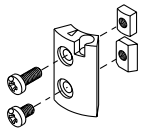
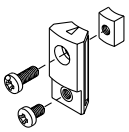
Internal construction with auto switch

Units are common for both single and double vane.



Model	Auto switch unit part no.
MDSUB1	P211070-1
MDSUB3	P211090-1
MDSUB7	P211060-1
MDSUB20	P211080-1

∗ Auto switches are not included with switch units.

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

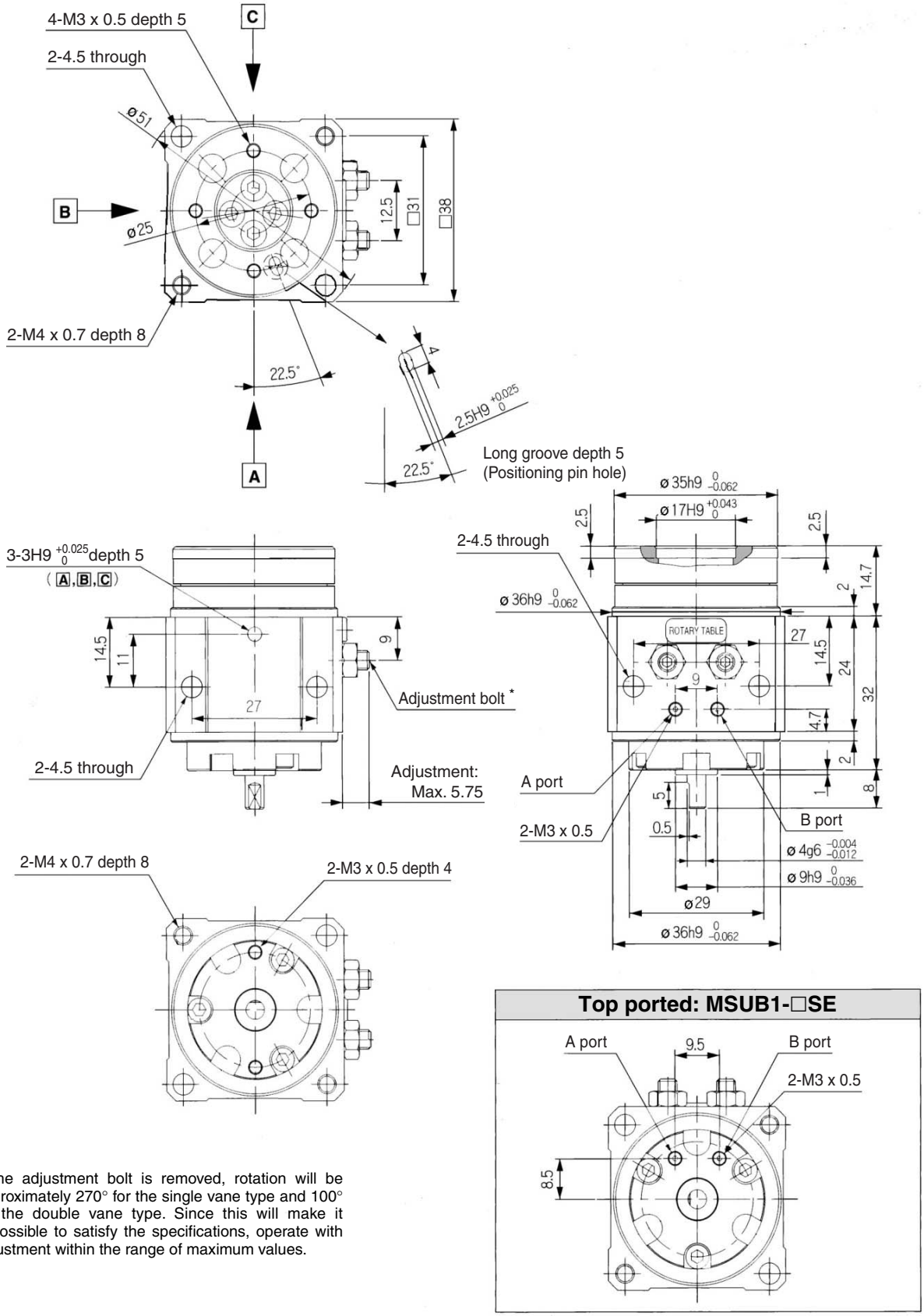
∗ Auto switch block unit shows the necessary assembly for mounting 1 piece of auto switch to the auto switch unit.

Dimensions

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

MSUB1 (Single vane)

MSUB1-□S/SE

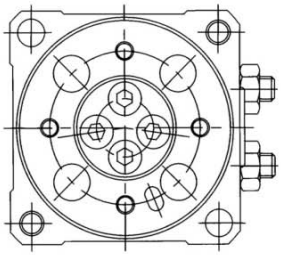


Top ported: MSUB1-□SE

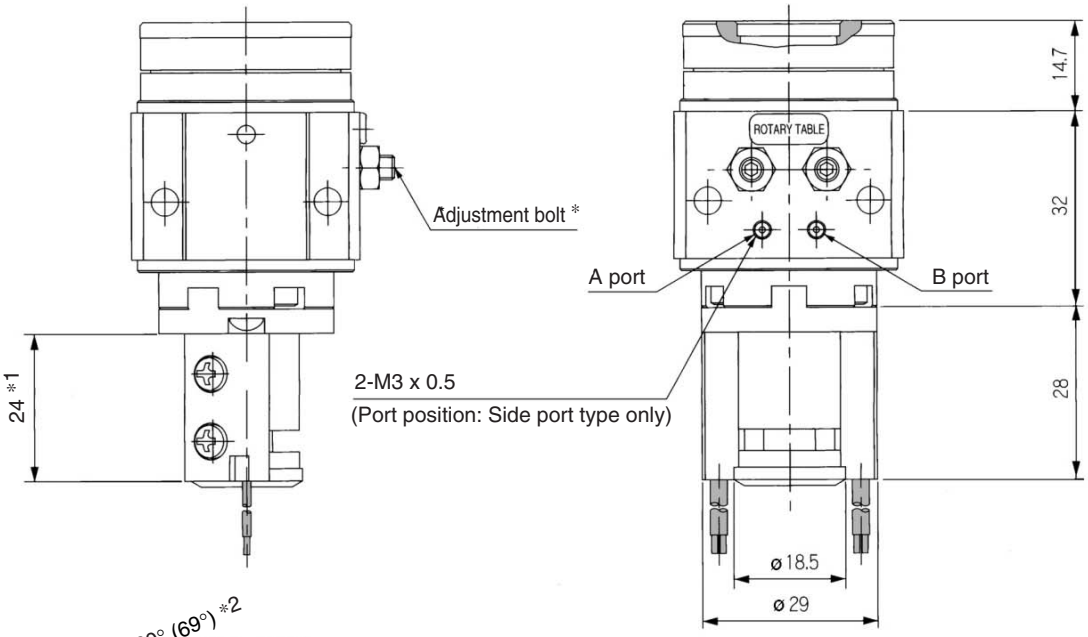
* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

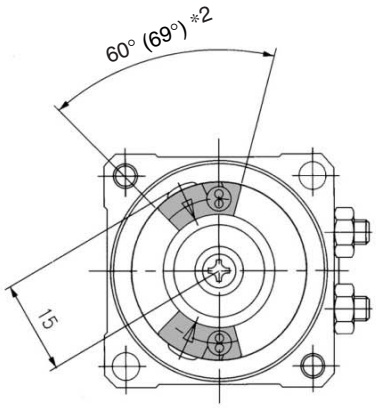
These drawings indicate the condition when the B port is pressurized.

With auto switch: MDSUB1-□S

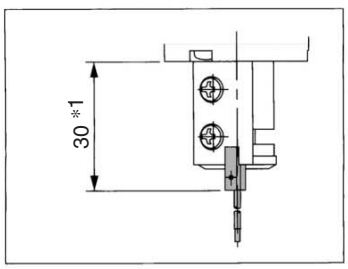


∗1) 24: When using FD-90/90A/S99(V)/T99(V)/S9P(V)
30: When using D-97/93A
∗2) 60°: When using D-90/90A/97/93A
69°: When using D-S99(V)/T99(V)/S9P(V)





D-97/93A



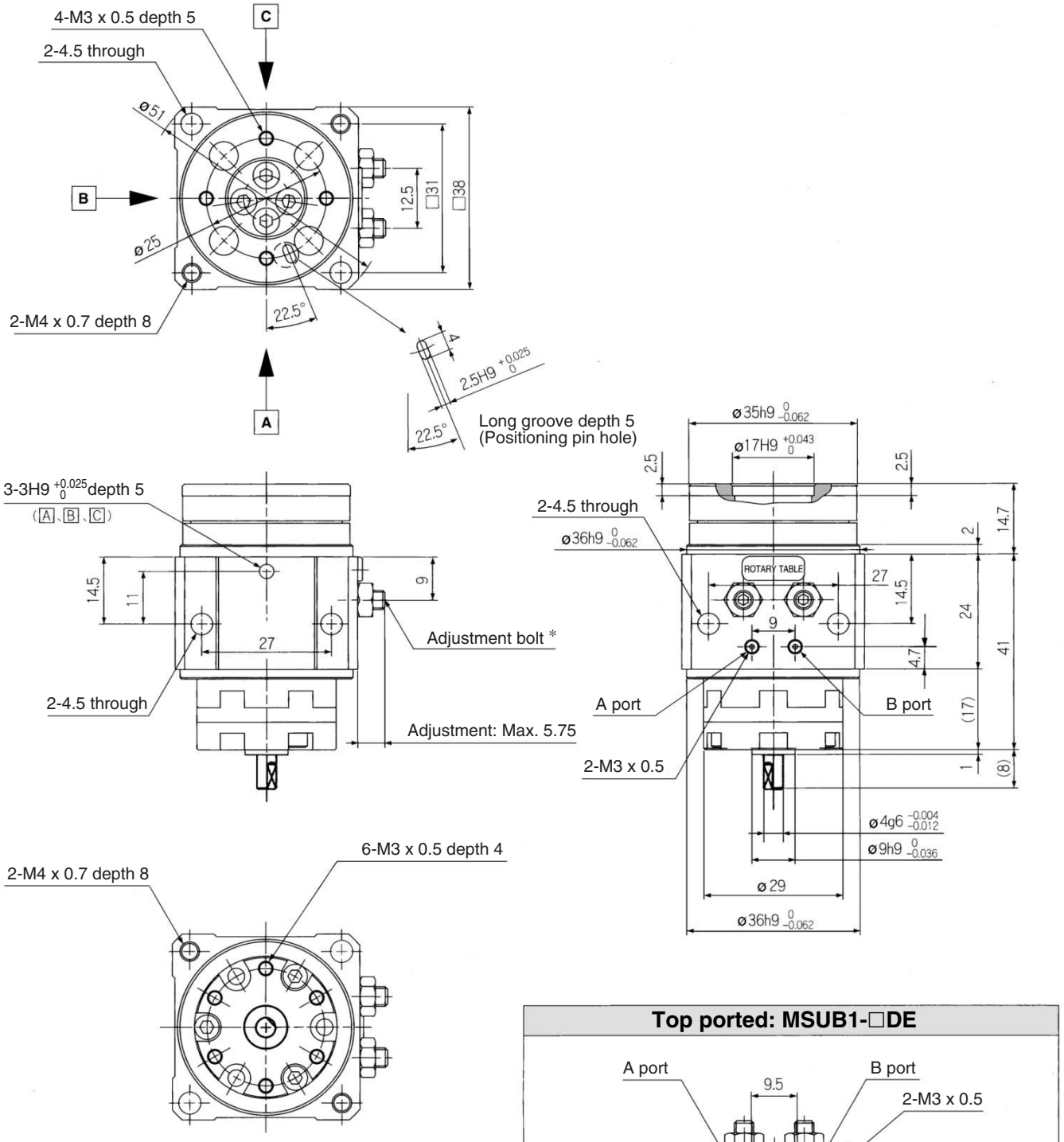
∗ If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

Dimensions

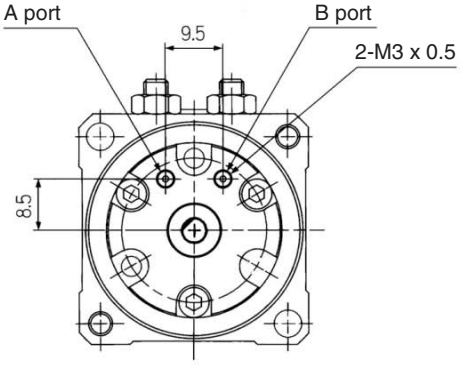
These drawings indicate the condition when the B port is pressurized.

MSUB1 (Double vane)

MSUB1-□D



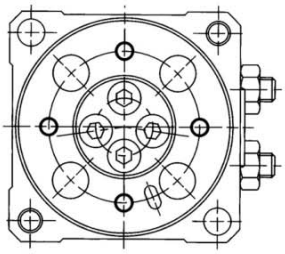
Top ported: MSUB1-□DE



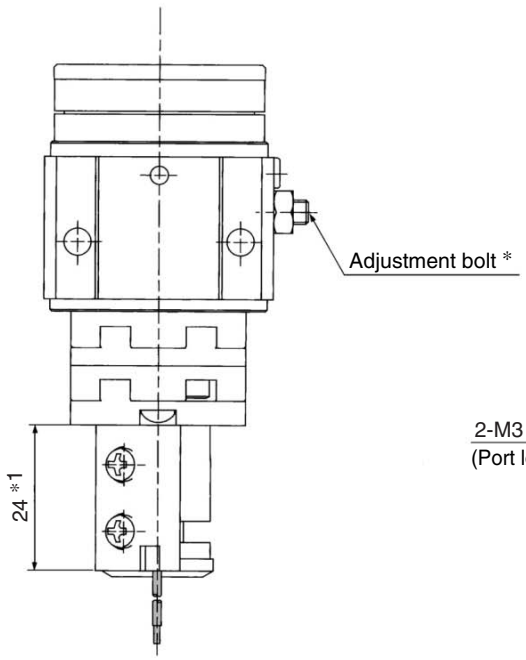
* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

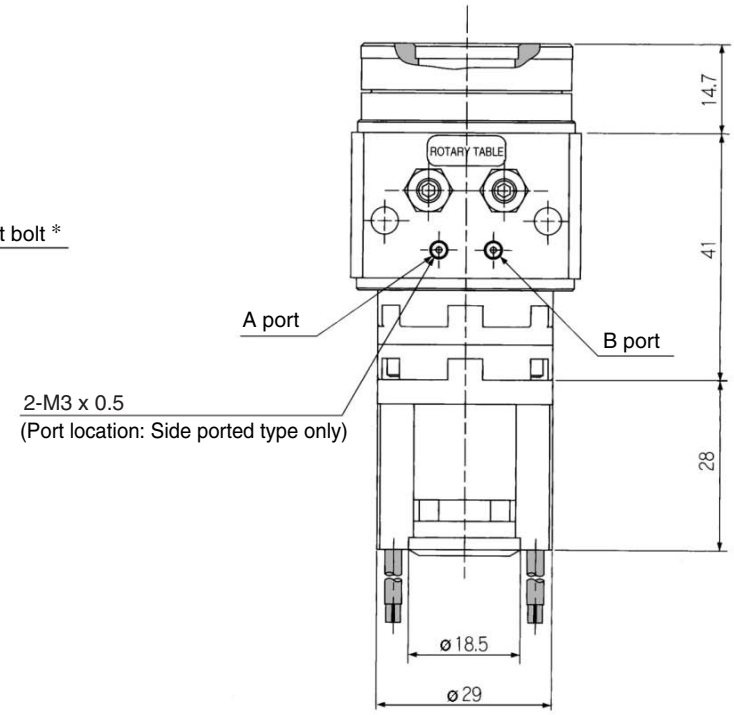
These drawings indicate the condition when the B port is pressurized.

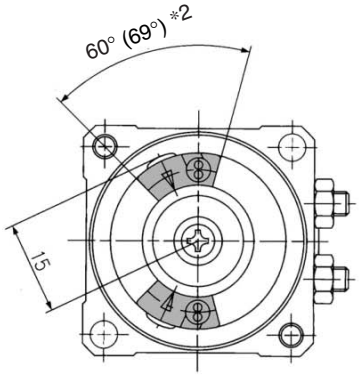
With auto switch: MDSUB1-□D



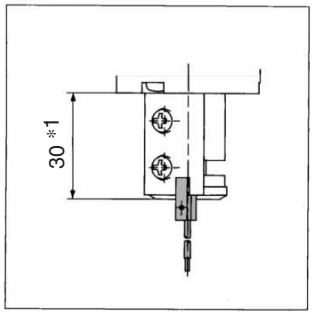
∗1) 24: When using D-90/90A/S99(V)/T99(V)/S9P(V)
30: When using D-97/93A
∗2) 60°: When using D-90/90A/97/93A
69°: When using D-S99(V)/T99(V)/S9P(V)







D-97/93A



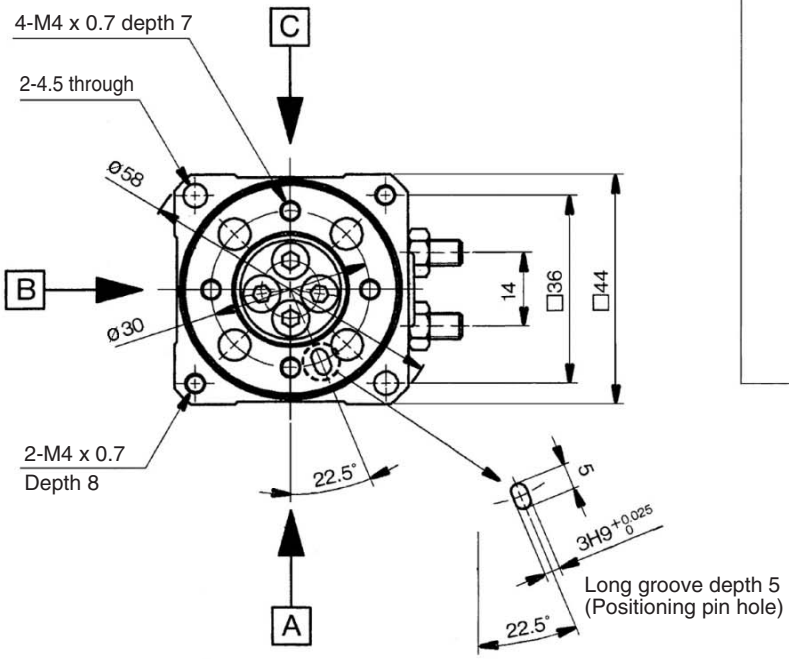
∗ If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

Dimensions

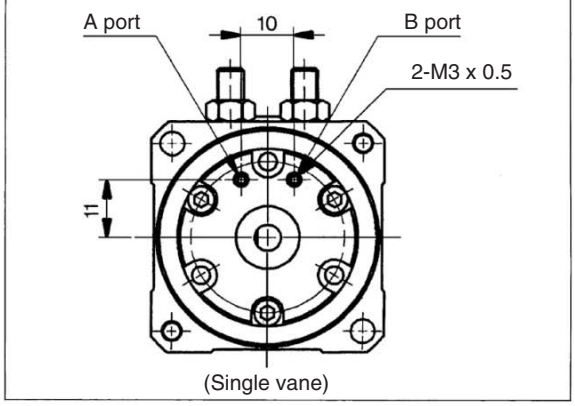
These drawings indicate the condition when the B port is pressurized.

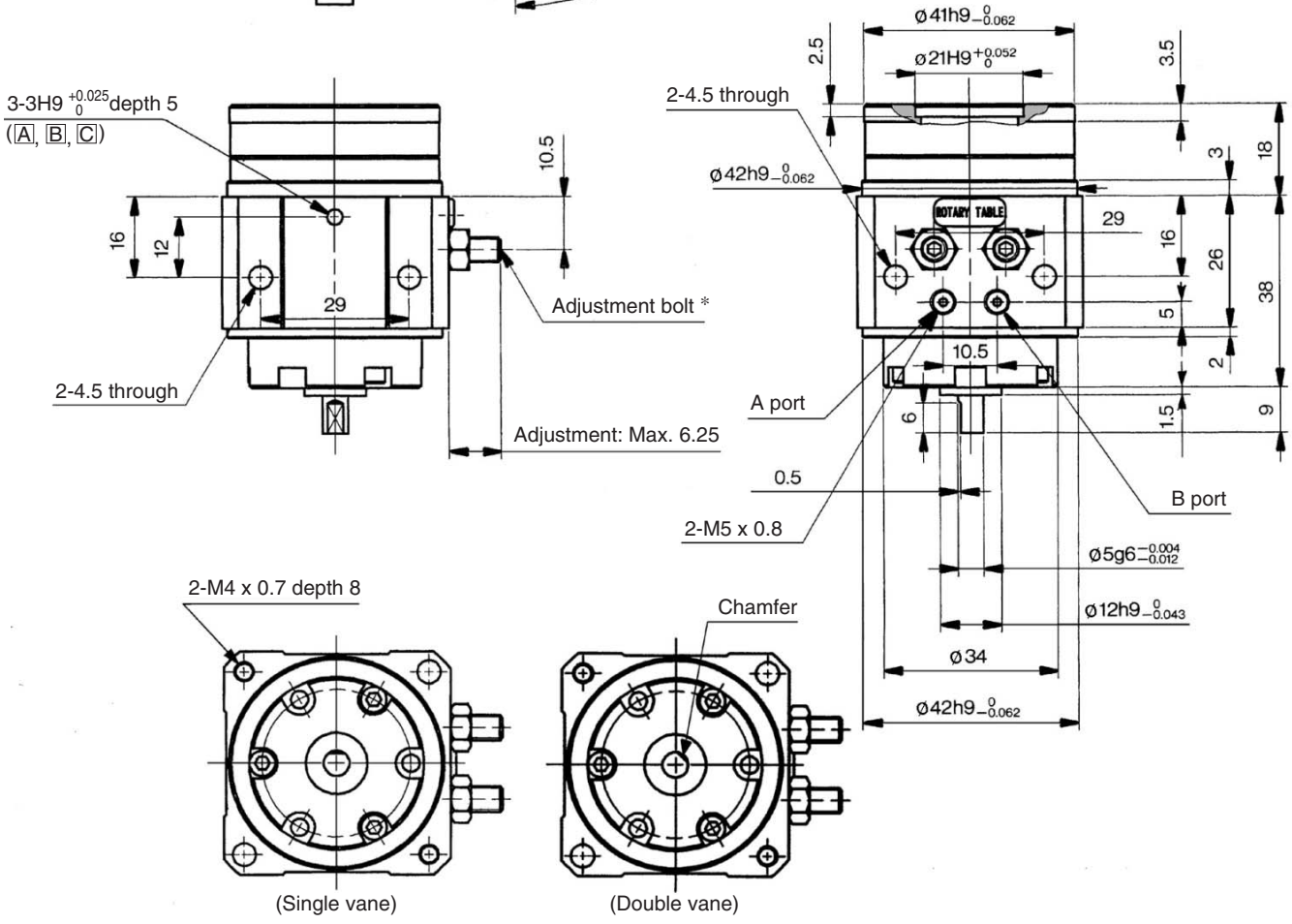
MSUB3 (Single vane/Double vane)

MSUB3-□S/D



Top ported: MSUB3-□SE/DE



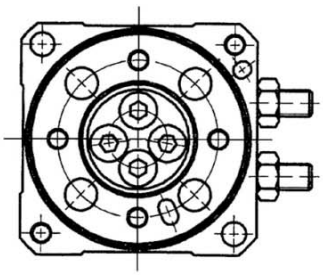


The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs from single and double vane.

* 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.

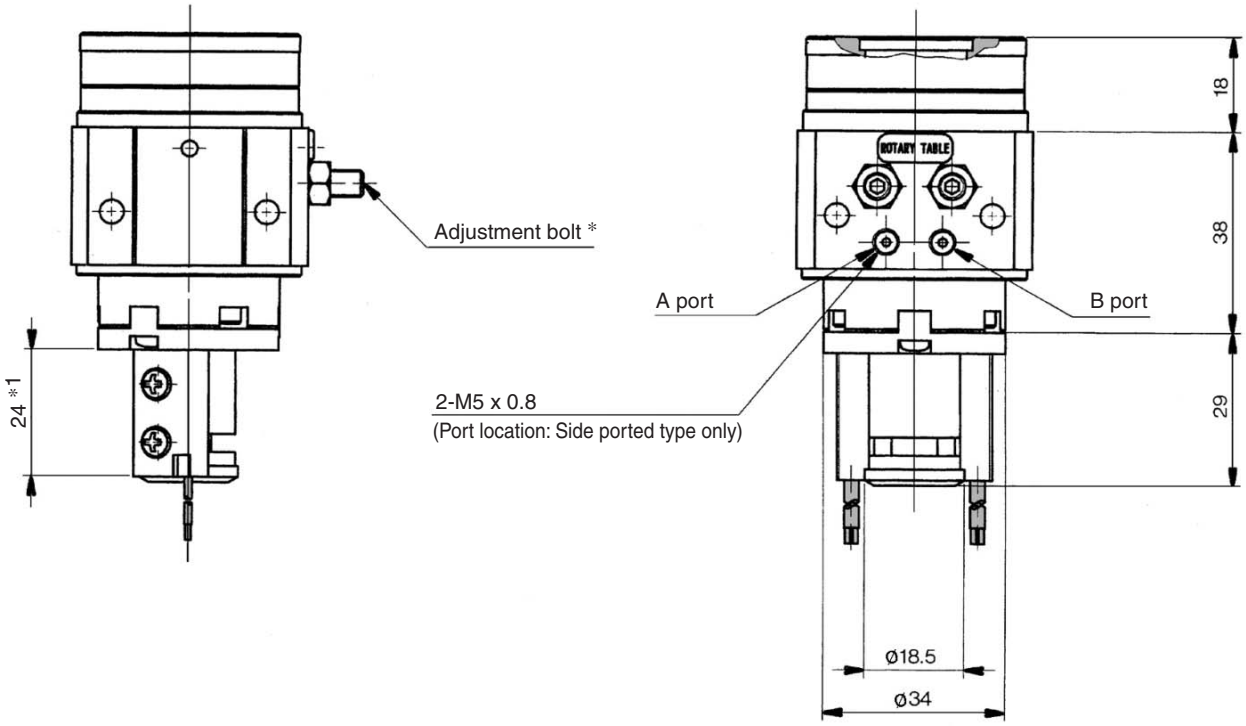
These drawings indicate the condition when the B port is pressurized.

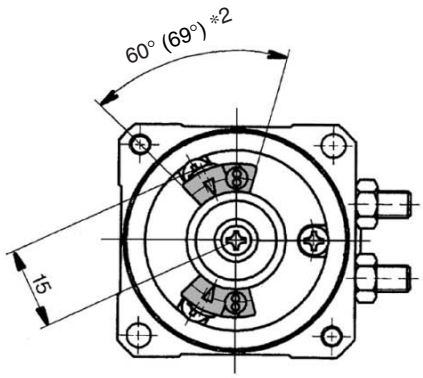
With auto switch: MDSUB3



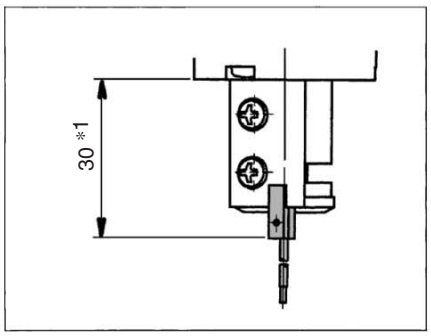
∗1) 24: When using D-90/90A/S99(V)/T99(V)/S9P(V)
30: When using D-97/93A
∗2) 60°: When using D-90/90A/97/93A
69°: When using D-S99(V)/T99(V)/S9P(V)

∗ 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

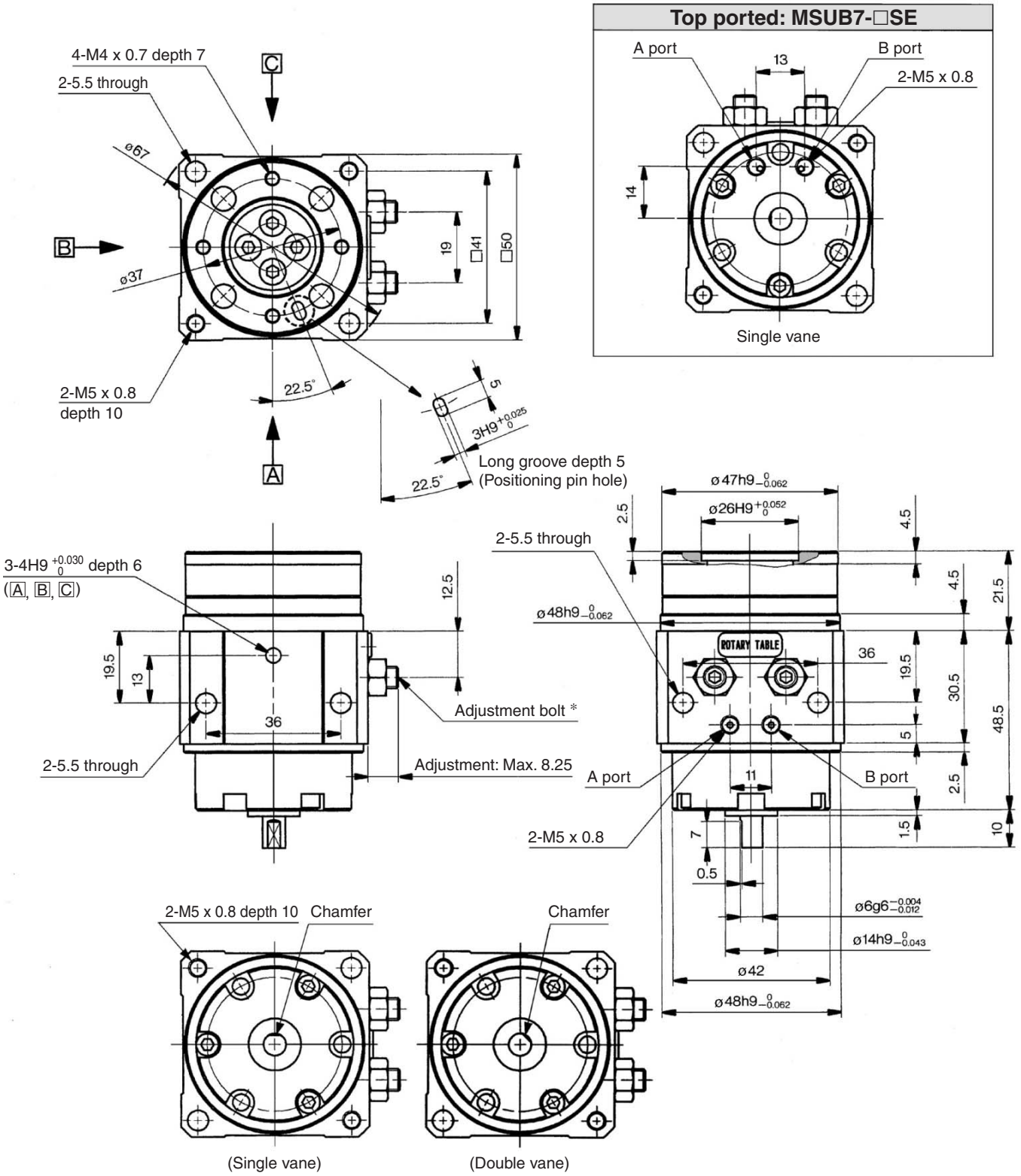


Dimensions

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

MSUB7 (Single vane/Double vane)

MSUB7-□S/D



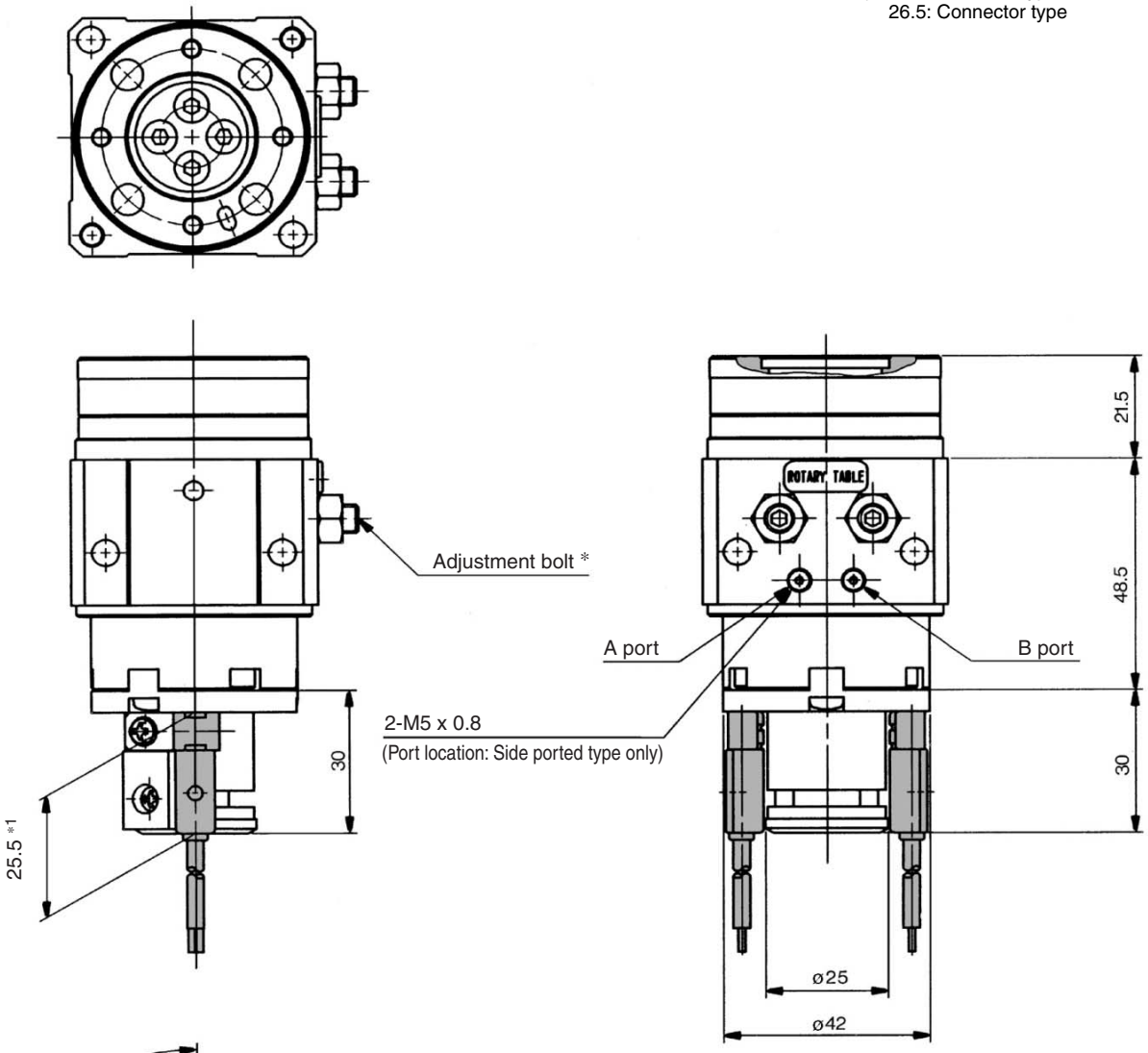
The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs from single and double vane.

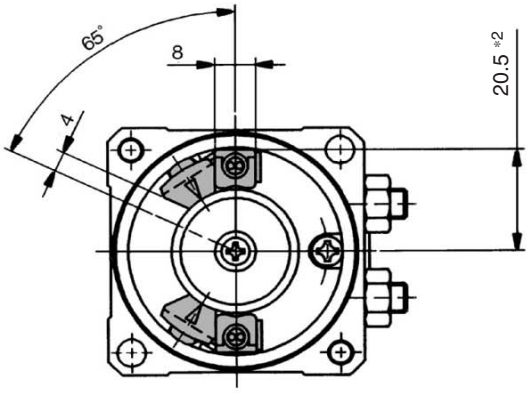
* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

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

With auto switch: MDSUB7

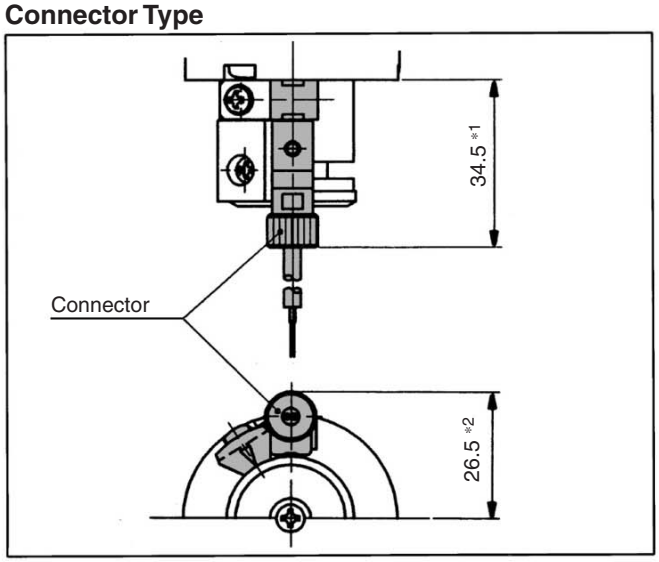
∗1) 25.5: Grommet type
34.5: Connector type
∗2) 20.5: Grommet type
26.5: Connector type





∗ 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.

Connector Type

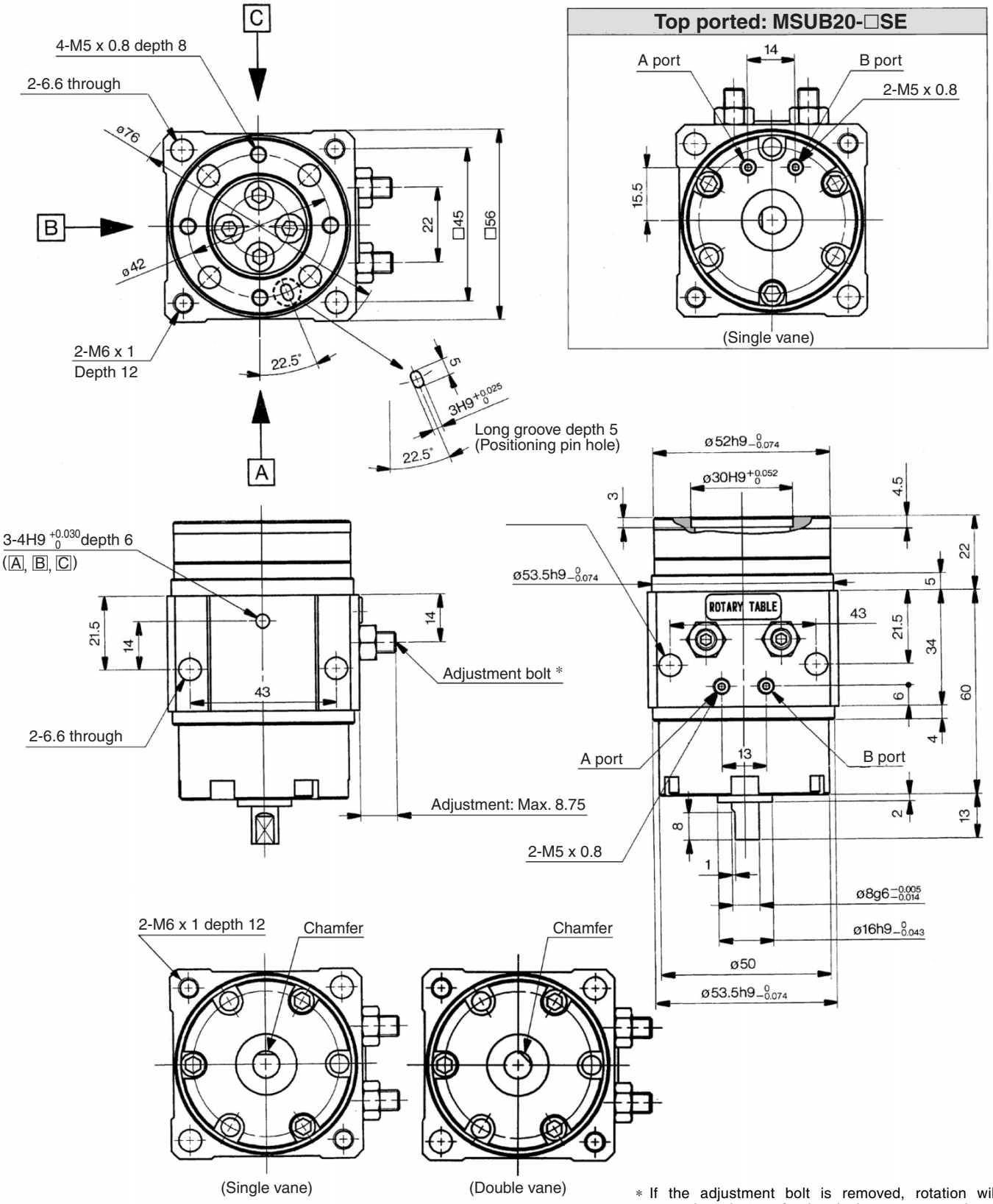


Dimensions

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

MSUB20 (Single vane/Double vane)

MSUB20-□S/D



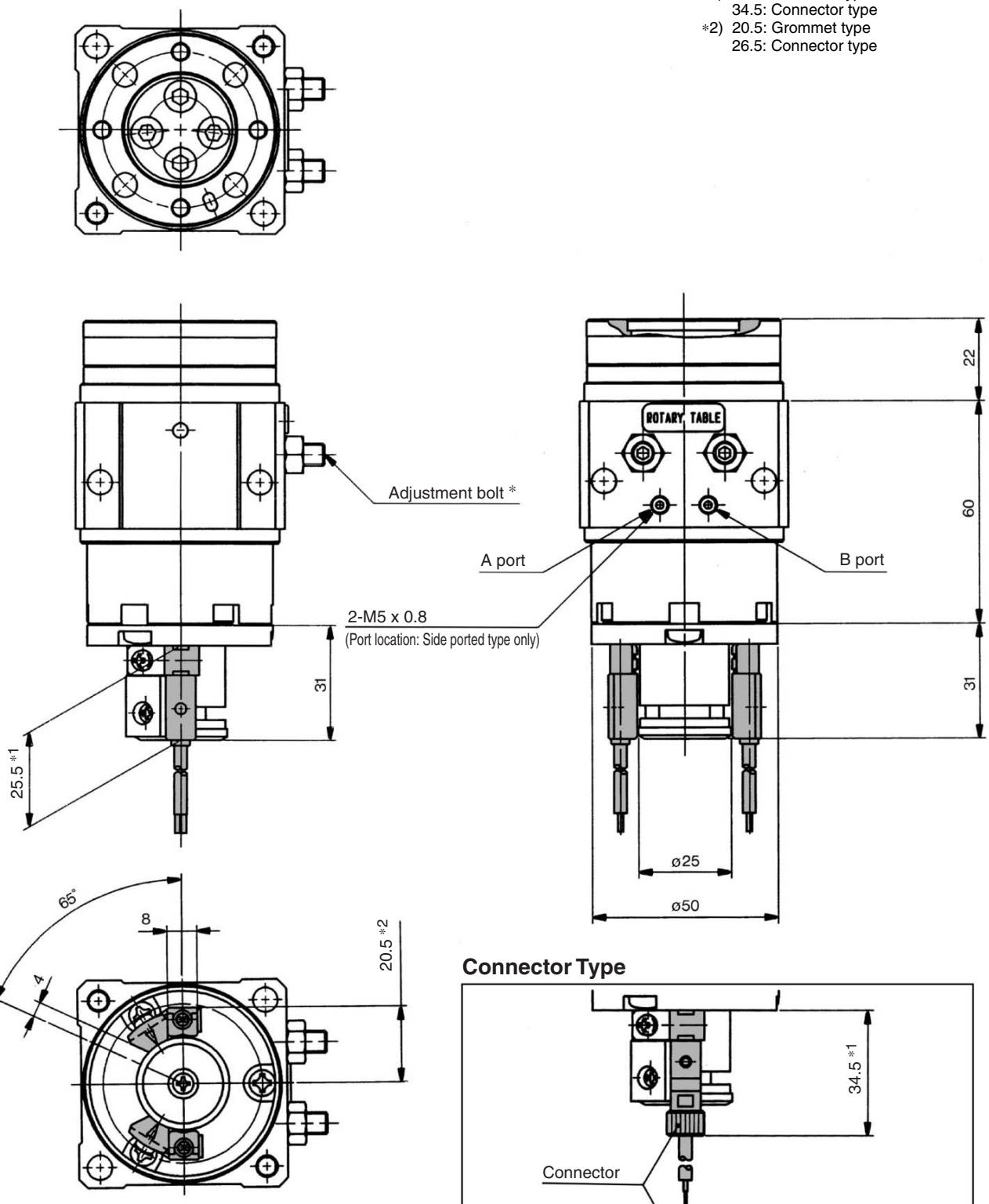
The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs from single and double vane.

* 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

∗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.

Connector Type

Series MDSU
Auto Switch Specifications

The auto switches below are also mountable in addition to the models in “How to Order”.
Refer to pages 11-11-10 to 11-11-15 for detailed auto switch specifications.

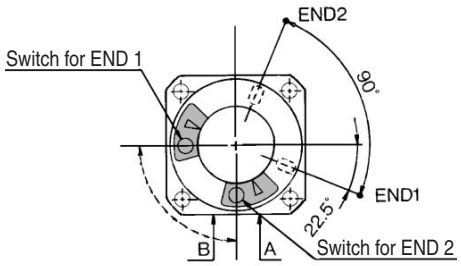
Applicable series	Type	Model	Electrical entry (Entry direction)	Features
MDSU□1 **MDSU□3**	Reed switch	D-90	Grommet (In-line)	With no indicator light, Parallel cord
		D-90A	Grommet (In-line)	With no indicator light, Heavy-duty cord
MDSU□7 **MDSU□20**		D-R80	Grommet (In-line)	No indicator light
		D-R80C	Connector (In-line)	

Table Positioning Pin Hole Rotation Range and Auto Switch Mounting Position

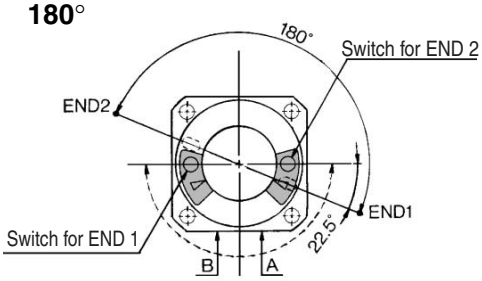
MSU□1/3

Single vane type

90°

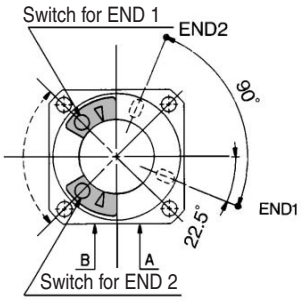


180°



Double vane type (MSUB only)

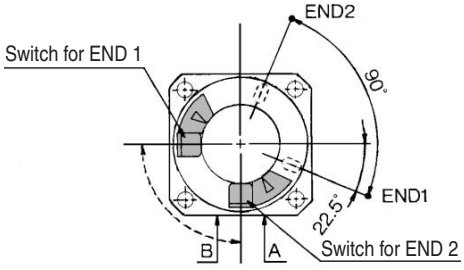
90°



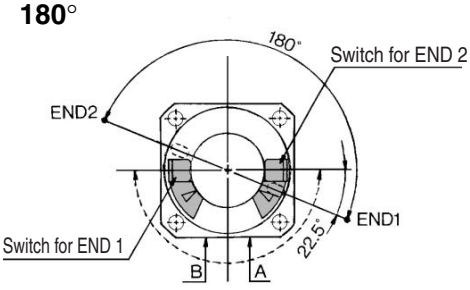
MSU□7/20

Single vane type

90°

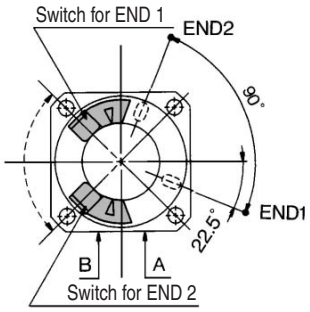


180°

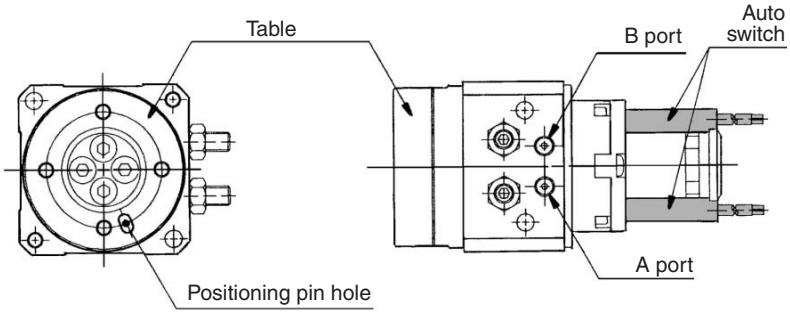


Double vane type (MSUB only)

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 switch operates, and when the pin hole is at END2, the END2 switch operates.
- The arrows on the broken line indicate the rotation range of the internal magnet. The rotation range of each switch can be reduced by moving the END1 switch clockwise and the END2 switch counterclockwise.



Auto Switch Operating Angle and Hysteresis Angle

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

Refer to page 11-4-24 for operating angle of auto switch and angle of hysteresis and the procedure for moving the auto switch detection position.