Rotary Table/Vane Style

Series ***MSU***

Size: 1, 3, 7, 20

Series

Vane Style/

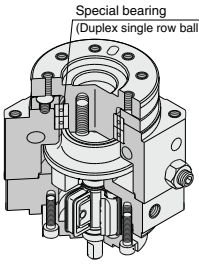
Rotary actuator with lightweight,

High precision type
Size: 1, 3, 7, 20

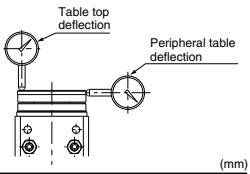
Series MSUA

Improved table deflection accuracy:
0.03 mm or less

High precision/High rigidity



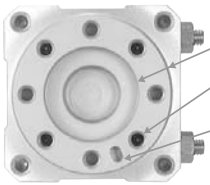
Deflection accuracy: Displacement for 180° rotation



(mm)

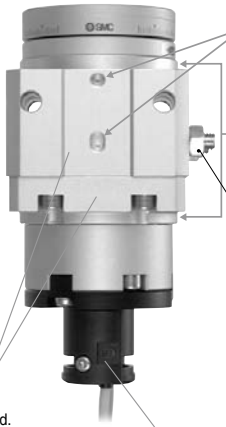
Model	MSUA
Table top deflection	0.03 (0.1 to 0.2)
Peripheral table deflection	0.03 (0.1 to 0.2)

Values inside ( ) are for Series MSUB



Easy alignment when mounting the load

- **Table inside/outside diameter tolerance H9/h9**
- **Female threads for load mounting provided in eight places.** (Increases freedom in mounting the load)
- **Mounting reference pin holes**

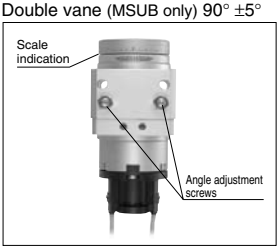


Easy alignment when mounting the body

- **Mounting reference pin holes** (Alignment with center of body) Provided on three sides, excluding port side
- **Reference diameter h9** (Alignment with center of table rotation)

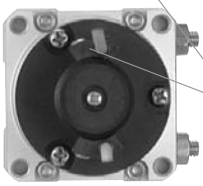
Angle adjustable

90° ±10°, 180° ±10°
Double vane (MSUB only) 90° ±5°



Disengageable

Maintenance work is simplified.
The drive unit can be replaced with the load mounted.



Auto switch capable

Since switches can be moved anywhere on the circumference, they can be mounted at positions which accommodate the specifications.

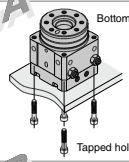
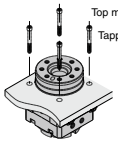
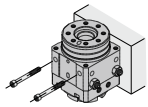
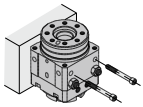
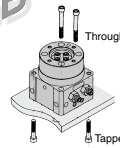
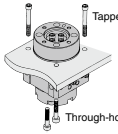
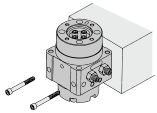
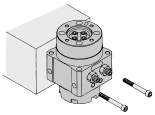
MSU

Size: 1, 3, 7, 20

compact table for robotic hands

Free mount type

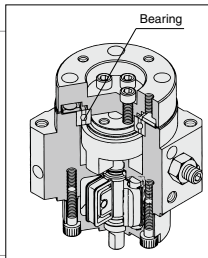
Can be mounted from three directions: axial, lateral, vertical

	Axial mounting		Lateral mounting	Vertical mounting
MSUA				
MSUB				

Basic type Series MSUB

Size: 1, 3, 7, 20

- **Single vane and double vane standardized**
- **Double vane has the same dimensions as single vane**
  (Except size 1)



Single vane

Series Variations

Series	Size	Rotating angle	Vane type	Applicable auto switch
High precision type **MSUA**	1, 3	90°	Single vane	D-9, D-T99 D-9□A, D-S99, S9P
	7, 20	180°		D-R73, D-T79 D-R80, D-S79, S7P
Basic type **MSUB**	1, 3	90°	Single vane	D-9, D-T99 D-9□A, D-S99, S9P
	7, 20	180°	Double vane *	D-R73, D-T79 D-R80, D-S79, S7P

* Double vane is available with 90° rotation setting only.

Rotary Table: High Precision Type
Vane Style
Series MSUA
Size: 1, 3, 7, 20

How to Order

Connection port location

Nil	Side ported
E	Axial ported

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

Bearing type

A	High precision type

Free mount type

Without auto switch MSUA 20 – 90 S □

With auto switch M D SUA 20 – 90 S – T79 L □

With auto switch
(Built-in magnet)

Nominal size (Torque)

1	MSUA 1
3	MSUA 3
7	MSUA 7
20	MSUA20

Rotating angle

Applicable	Symbol	Rotating angle
Single vane	90	90°
	180	180°

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

Vane type

S	Single vane

Number of auto switches

S	1 pc. *
Nil	2 pcs. **

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

Electrical entry/Lead wire length

Nil	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

Nil	Without auto switch (built-in magnet)

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

Applicable Auto Switches/Refer to pages 807 to 856 for further information on auto swiches.

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-wired connector	Applicable load	
MDSUA1 MDSUA3	Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	S99V	S99	Heavy-duty cord	●	●	○	—	○	IC circuit	Relay, PLC
					3-wire (PNP)			S9PV	S9P		●	●	○	—	○		
					2-wire	12 V		T99V	T99		●	●	○	—	○	—	
	Reed auto switch	—		No	2-wire	24 V 5 V, 12 V	5 V, 12 V, 24 V	—	90	Parallel cord	●	●	●	—	—	IC circuit	
						5 V, 12 V, 100 V	.5 V, 12 V, 24 V, 100 V	—	90A	Heavy-duty cord	●	●	●	—			
				Yes		—	—	—	97	Parallel cord	●	●	●	—	—	—	
						—	100 V	—	93A	Heavy-duty cord	●	●	●	—			
MDSUA7 MDSUA20	Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	—	S79	Heavy-duty cord	●	●	○	—	○	IC circuit	Relay, PLC
					3-wire (PNP)			—	S7P		●	●	○	—	○		
					2-wire	12 V		—	T79		●	●	○	—	○	—	
			Connector					—	T79C		●	●	●	●	—		
	Reed auto switch	—	Grommet			—	100 V	—	R73		●	●	○	—	—	—	
			Connector				—	—	R73C		●	●	●	●			
			Grommet	No		48 V, 100 V	100 V	—	R80		●	●	○	—		IC circuit	
			Connector			—	24 V or less	—	R80C		●	●	●	●		—	

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

* Auto switches are shipped together (but not assembled).

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

Order example: MSUA20 single vane type (connection port side location selected)
1. Standard type (Without auto switches), Rotation 90°, side port location
MSUA20-90S
2. With auto switch unit (Without auto switches), Rotation 180°, side port location
MDSUA20-180S
3. With auto switch unit + Auto switch R73, Rotation 180°, Side port location
MDSUA20-180S-R73

Made to Order Refer to pages 843 and 844 for detailed solid state auto switches with pre-wired connectors.

Specifications

Model *2		MSUA1		MSUA3		MSUA7		MSUA20	
Vane type		Single vane							
Rotating angle *1		90° ± 10°	180° ± 10°	90° ± 10°	180° ± 10°	90° ± 10°	180° ± 10°	90° ± 10°	180° ± 10°
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	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		Special 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			
Deflection accuracy		0.03 mm or less							

* 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)

Note) Refer to page 35 for allowable kinetic energy.

* 2 Correspondence to equivalent conventional free-mount types

Rotary table	Free-mount rotary actuator
MSUA 1	CRBU2W10
MSUA 3	CRBU2W15
MSUA 7	CRBU2W20
MSUA20	CRBU2W30

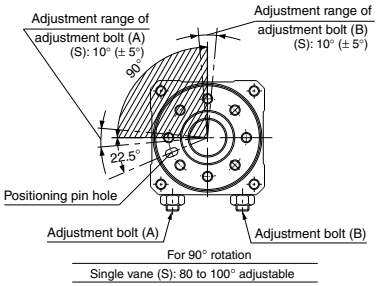
Symbol

Moisture Control Tube Series IDK

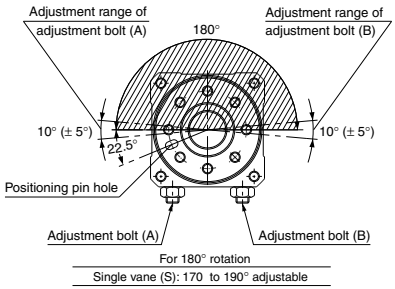
When operating an actuator with a small diameter and a short stroke at a high frequency, the dew condensation (water droplet) may occur inside the piping depending on the conditions.
Simply connecting the moisture control tube to the actuator will prevent dew condensation from occurring. For details, refer to **Series IDK in the WEB catalog**.

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



For 180° rotation
Single vane (S): 170 to 190° adjustable

Weight

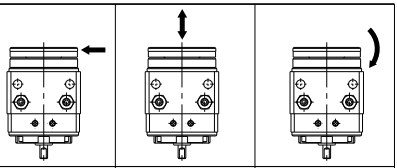
(g)

Size	Rotating angle	Basic weight Single vane	Auto switch unit Note)
1	90°	162	15
	180°	161	
3	90°	262	20
	180°	260	
7	90°	440	28
	180°	436	
20	90°	675	38
	180°	671	

Note) Values above do not include auto switch weight.

Allowable Load

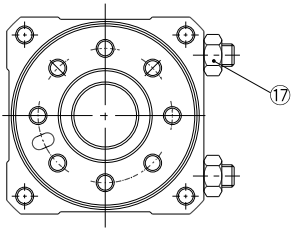
Do not permit the load and moment applied to the table to exceed the allowable values shown in the table below. (Operation above the allowable values can cause adverse effects on service life, such as play in the table and loss of accuracy.)

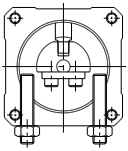


Size	Allowable radial load (N)	Allowable thrust load (N)	Allowable moment (N·m)
1	20	15	0.3
3	40	30	0.7
7	50	60	0.9
20	60	80	2.9

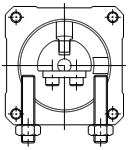
Construction

Internal Construction of Rotary Table

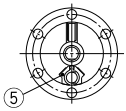




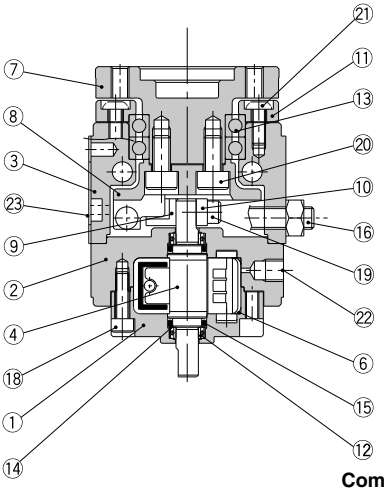
For 180°
(Figure in the middle position)



For 90°
(Figure with pressure to A port)



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



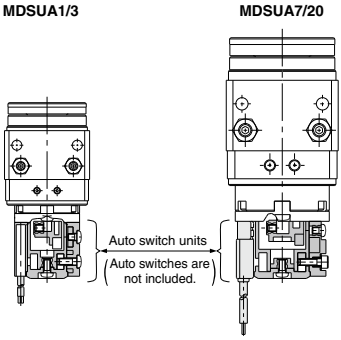
Component Parts

No.	Description	Material	Note
1	**Body A**	Aluminum alloy	Anodized
2	**Body B**	Aluminum alloy	Anodized
3	**Body C**	Aluminum alloy	Anodized
4	**Vane shaft**	Stainless steel (MSUA20 is carbon steel)	Single vane
5	**Stopper**	Resin	Single vane
6	**Stopper seal**	NBR	
7	**Table**	Aluminum alloy	Anodized, Serigraph
8	**Stopper lever**	Carbon steel	Heat treated, Electroless nickel plated
9	**Stopper guide**	Stainless steel	Nitriding
10	**Lever retainer**	Carbon steel	Zync Chromated
11	**Bearing retainer**	Aluminum alloy	Anodized
12	**Bearing**	High carbon chrome bearing steel	
13	**Special bearing**	High carbon chrome bearing steel	
14	**Back-up ring**	Stainless steel	
15	**O-ring**	NBR	
16	**With adjustment bolt**	Carbon steel	Heat treated
17	**Hexagon nut**	Carbon steel	
18	**Hexagon socket head cap screw**		
19	**Hexagon socket head cap screw**		
20	**Hexagon socket head cap screw**		
21	**Button bolt**		
22	**Hexagon socket head cap screw**		SE type only
23	**Label**		

* The plug ㉒ is used only when the connection port is type SE.
* Individual part cannot be shipped. Please purchase the whole unit. (Refer to page 178.)

Construction

Internal construction with auto switch



∗ Refer to page 57 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.
M(D)SUA 1	P211070-1
M(D)SUA 3	P211090-1
M(D)SUA 7	P211060-1
M(D)SUA20	P211080-1

Auto switch block unit			
MDSUA1/3			**MDSUA7/20**
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

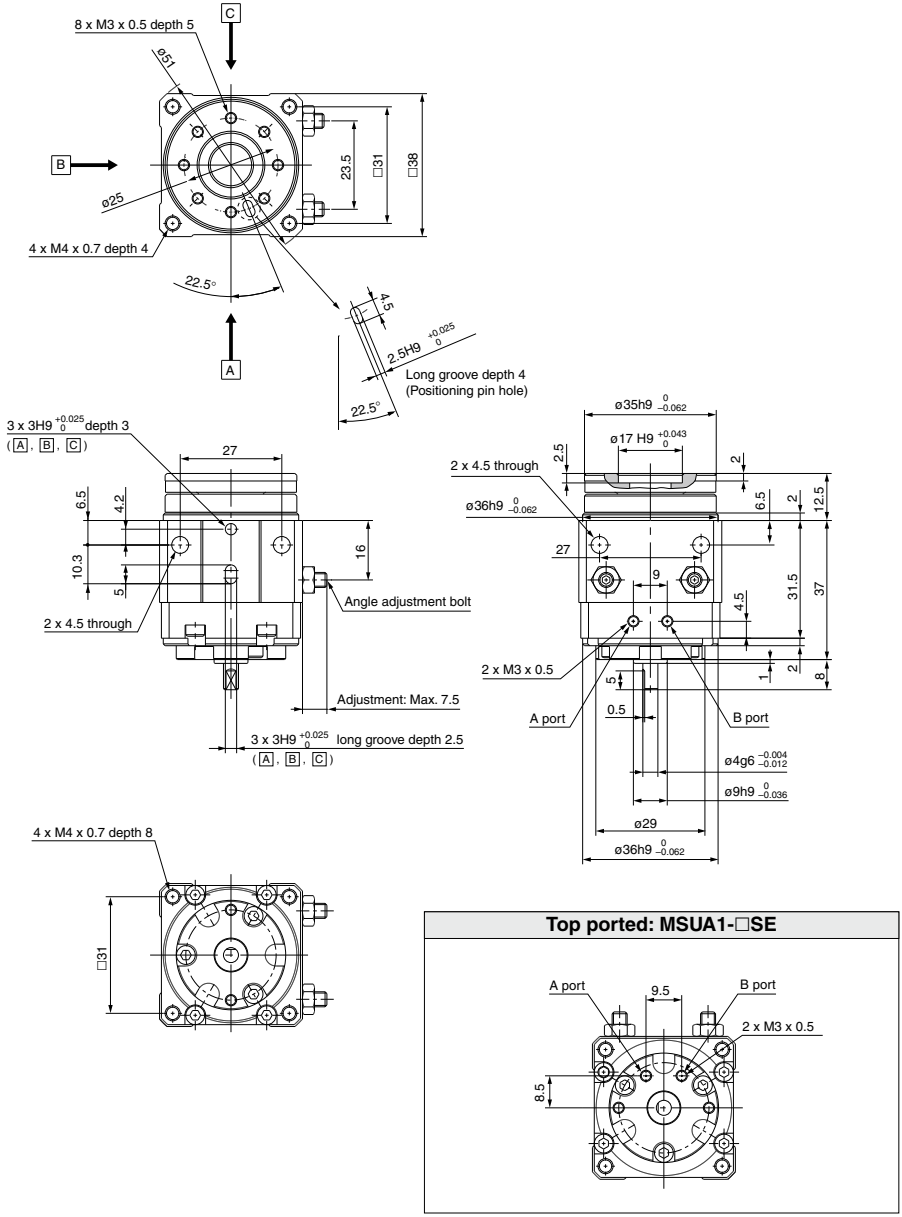
∗ The auto switch block unit is included in the auto switch unit.
∗ Auto switch block unit shows the necessary assembly for mounting 1 piece of auto switch to the auto switch unit.
∗ Individual part cannot be shipped.

Dimensions

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

MSUA1

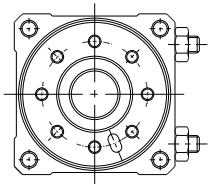
MSUA1-□S,SE



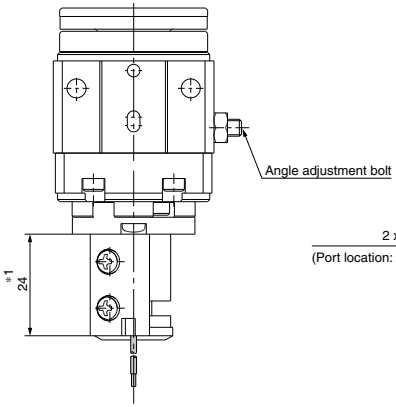
Top ported: MSUA1-□SE

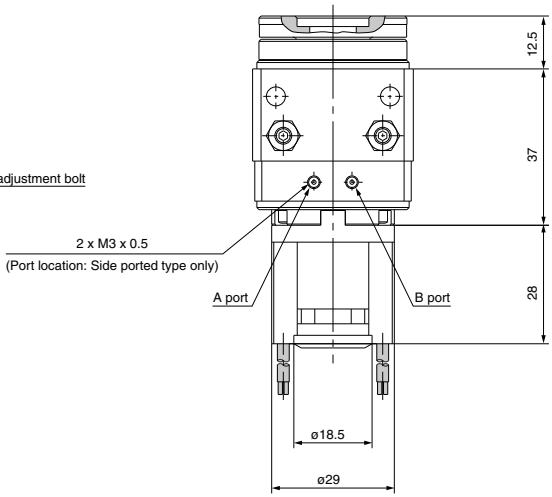
These drawings indicate the condition when the B port is pressurized.

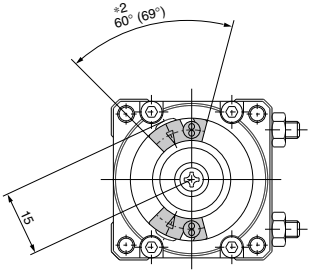
With auto switch: MDSUA1-□S



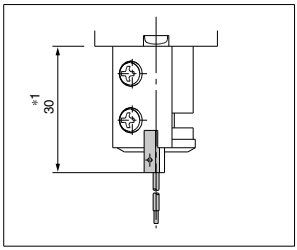
∗1) 24: When using D-90/90A/S99/S99V/S9P/S9PV/T99/T99V
30: When using D-97/93A
∗2) 60°: When using D-90/90A/97/93A
69°: When using D-S99/S99V/S9P/S9PV/T99/T99V







D-97/93A

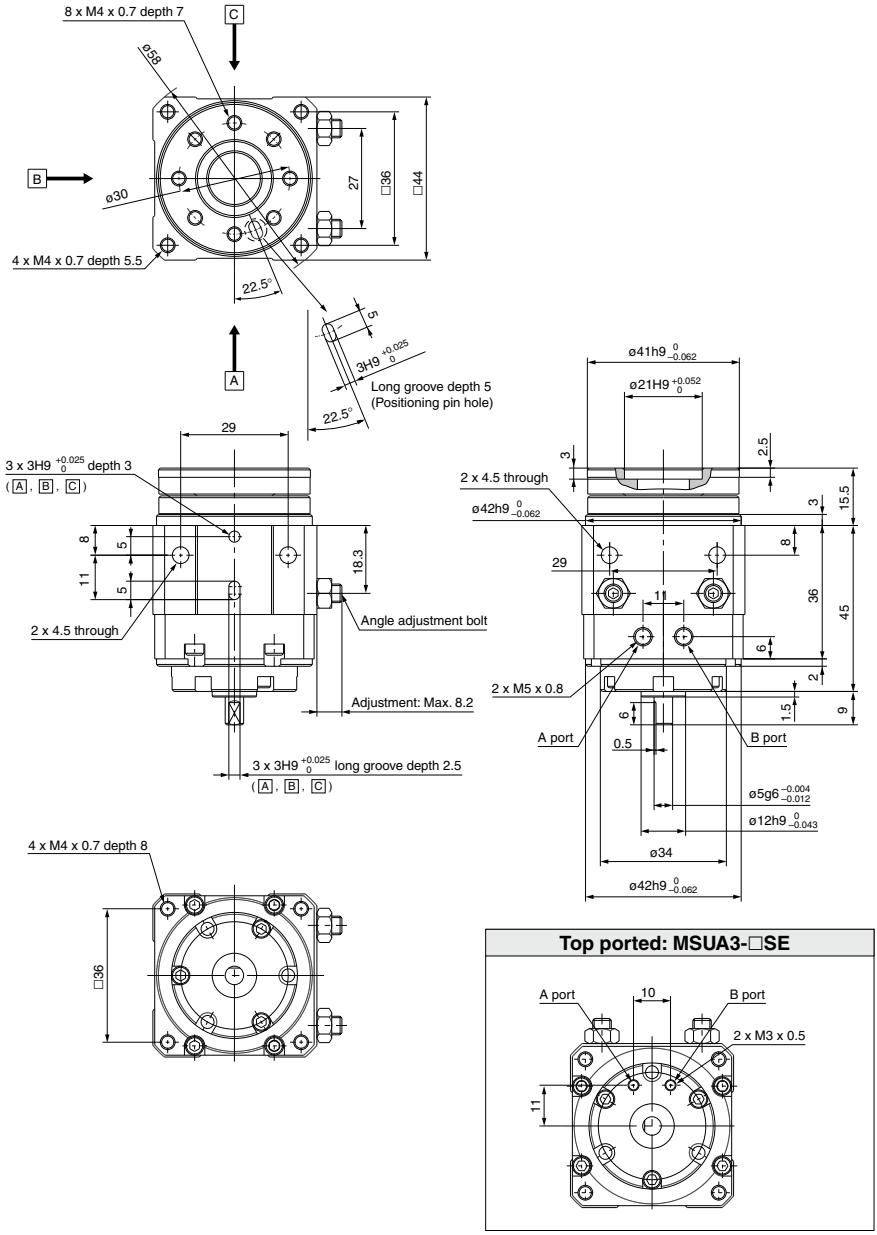


Dimensions

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

MSUA3

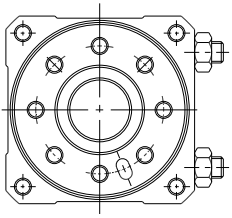
MSUA3-□S/SE



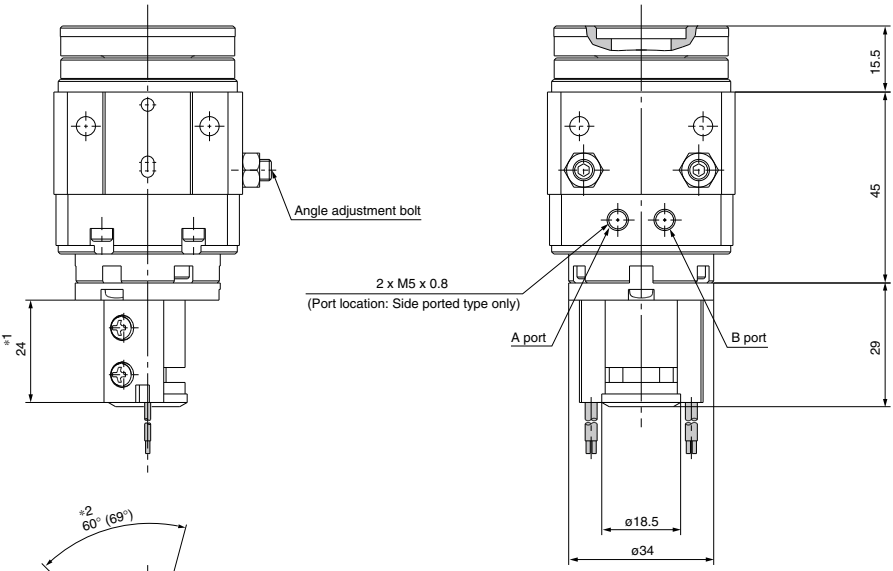
Top ported: MSUA3-□SE

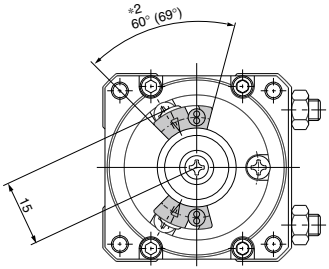
These drawings indicate the condition when the B port is pressurized.

With auto switch: MDSUA3-□S

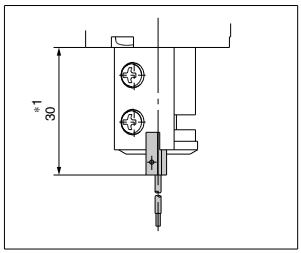


∗ 1) 24: When using D-90/90A/S99/S99V/S9P/S9PV/T99/T99V
30: When using D-97/93A
∗ 2) 60°: When using D-90/90A/97/93A
69°: When using D-S99/S99V/S9P/S9PV/T99/T99V





D-97/93A

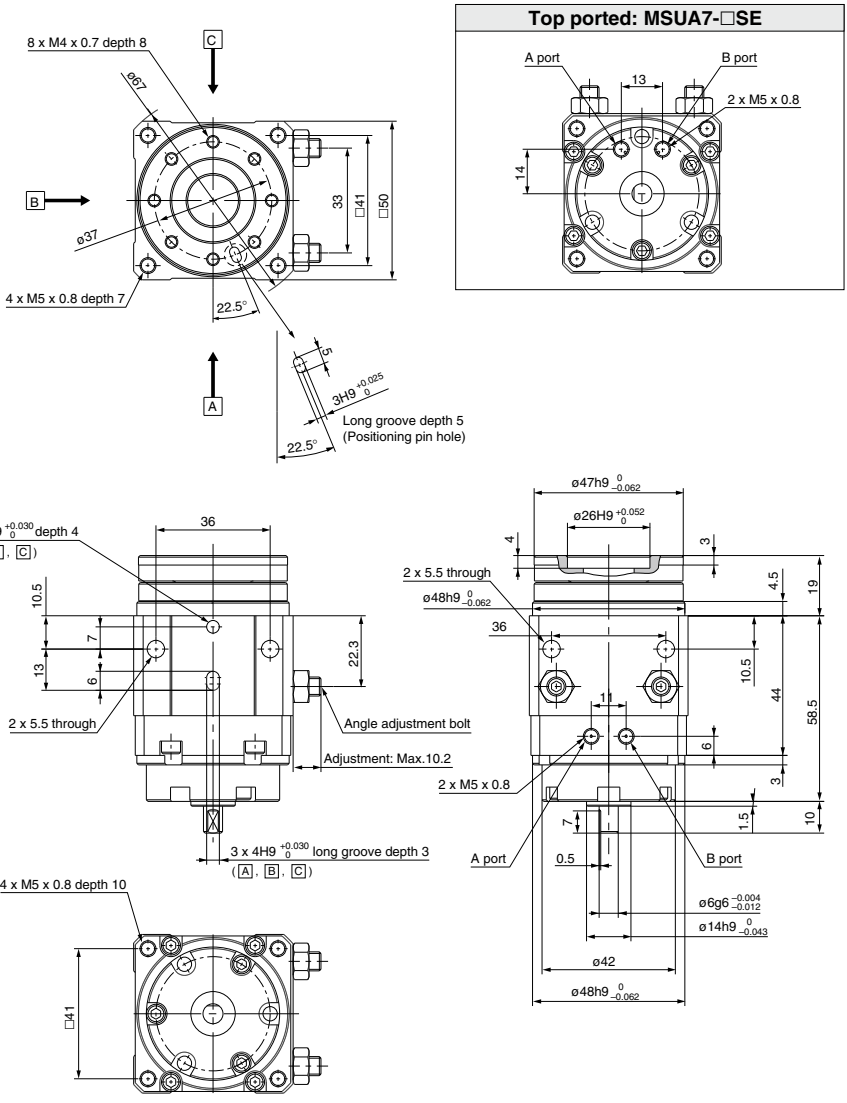


Dimensions

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

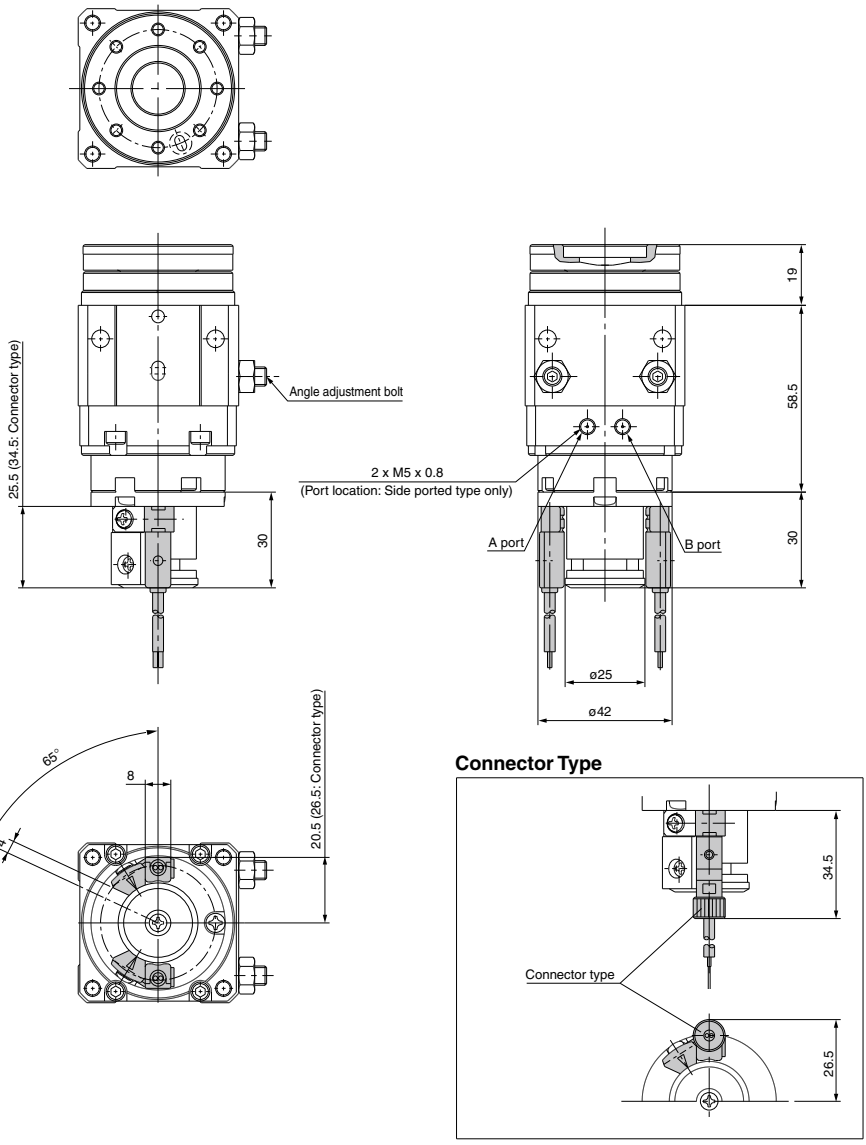
MSUA7

MSUA7-□S/SE



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

With auto switch: MDSUA7-□S



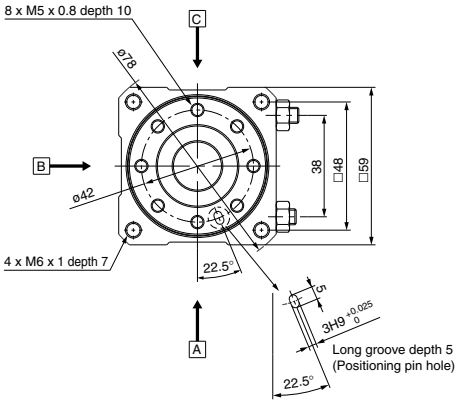
Connector Type

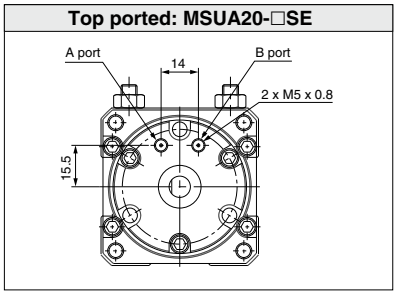
Dimensions

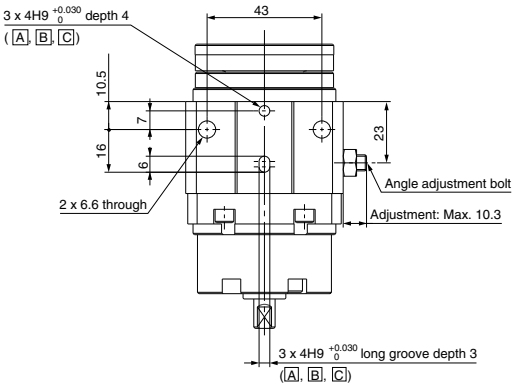
These drawings indicate the condition when the B port is pressurized.

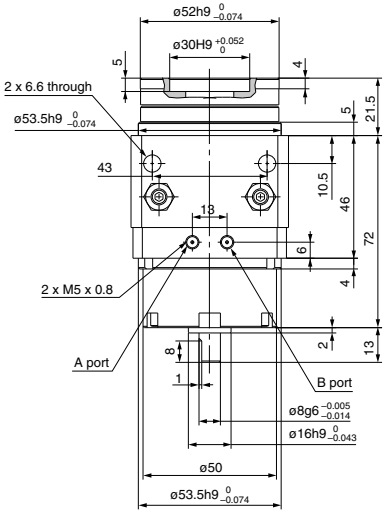
MSUA20

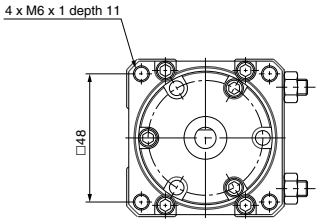
MSUA20-□S/SE





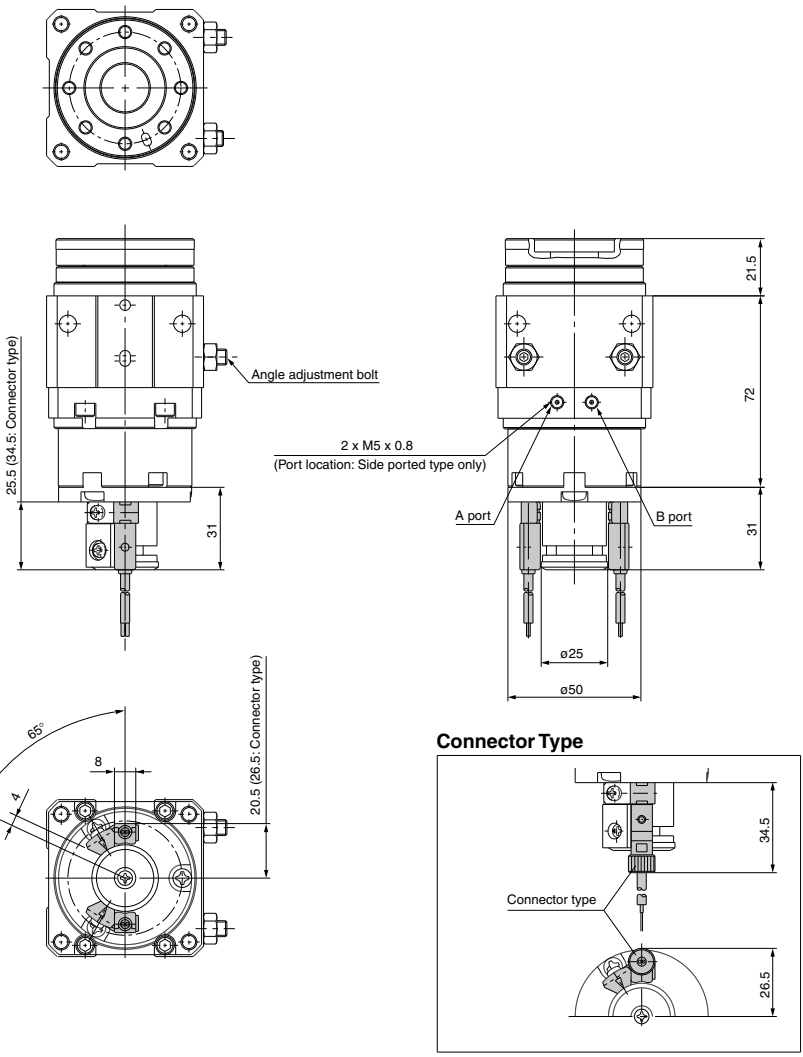






These drawings indicate the condition when the B port is pressurized.

With auto switch: MDSUA20-□S



Connector Type

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

How to Order

Bearing type

B	Basic type

Free mount type

Connection port location

Nil	Side ported
E	Axial ported

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

Without auto switch MSUB **20** – **90** **S** ☐

With auto switch M **D** SUB **20** – **90** **S** – **T79** **L** ☐

With auto switch (Built-in magnet): D

Nominal size (Torque)

1	MSUB 1
3	MSUB 3
7	MSUB 7
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 (built-in magnet)

∗Refer to the table below for the applicable auto switch model.

Number of auto switches

S	1 pc. ∗
Nil	2 pcs. ∗∗

∗ S (1 auto switch) is shipped with a right-hand auto switch.
∗∗ Nil (2 auto switches) is shipped with a right-hand and a left-hand switch.

Electrical entry/Lead wire length

Nil	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

Applicable Auto Switches/Refer to pages 807 to 856 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-wired connector	Applicable load	
MDSUB1 MDSUB3	Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5V,12V	—	S99V	S99	Heavy-duty cord	●	●	○	—	○	IC circuit	Relay, PLC
					3-wire (PNP)			S9PV	S9P		●	●	○	—	○		
					2-wire	12V		T99V	T99		●	●	○	—	○	—	
	Reed auto switch	—		No		24 V 5 V, 12 V	5 V, 12 V, 24 V	—	90	Parallel cord	●	●	●	—	—	IC circuit	
						5 V, 12 V, 100 V	5 V, 12 V, 24 V, 100 V	—	90A	Heavy-duty cord	●	●	●	—			
				Yes		—	—	—	97	Parallel cord	●	●	●	—		—	
						—	100 V	—	93A	Heavy-duty cord	●	●	●	—			
MDSUB7 MDSUB20	Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5V,12V	—	—	S79	Heavy-duty cord	●	●	○	—	○	IC circuit	Relay, PLC
					3-wire (PNP)			—	S7P		●	●	○	—	○		
			Connector		2-wire	12V		—	T79		●	●	○	—	○	—	
						24 V		—	T79C		●	●	●	●	—		
	Reed auto switch	—	Grommet			—	100 V	—	R73		●	●	○	—	—	—	
			Connector				—	—	R73C		●	●	●	●			
			Grommet	No		48V,100V	100 V	—	R80		●	●	○	—		IC circuit	
			Connector			—	24 V or less	—	R80C		●	●	●	●		—	

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) R73C
3 m ····· L (Example) R73CL
5 m ····· Z (Example) R73CZ
None ····· N (Example) R73CN
∗ Auto switches are shipped together (but not assembled).

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

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

Made to Order — Refer to pages 843 to 844 for detailed solid state auto switches with pre-wired connectors.

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 (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 *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. Refer to the allowable load table below for details.

Note) Refer to page 35 for allowable kinetic energy.

*3 Correspondence to equivalent conventional free-mount types

Rotary table	Free-mount rotary actuator
MSUB 1	CRBU2W10
MSUB 3	CRBU2W15
MSUB 7	CRBU2W20
MSUB20	CRBU2W30

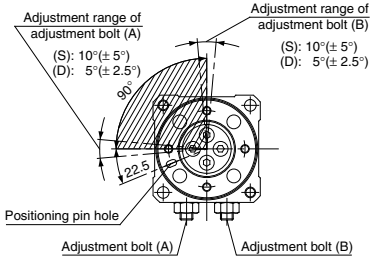
Symbol

Moisture Control Tube Series IDK

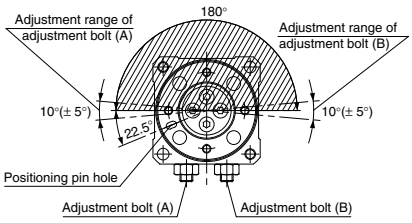
When operating an actuator with a small diameter and a short stroke at a high frequency, the dew condensation (water droplet) may occur inside the piping depending on the conditions.
Simply connecting the moisture control tube to the actuator will prevent dew condensation from occurring. For details, refer to **Series IDK in the WEB catalog**.

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

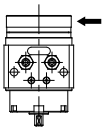
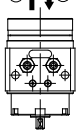
(g)

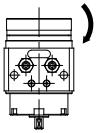
Size	Rotation angle	Basic weight		Auto switch unit Note)
		Single vane	Double vane	
1	90°	145	150	15
	180°	140	—	
3	90°	230	240	20
	180°	225	—	
7	90°	360	375	28
	180°	355	—	
20	90°	510	580	38
	180°	505	—	

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.)

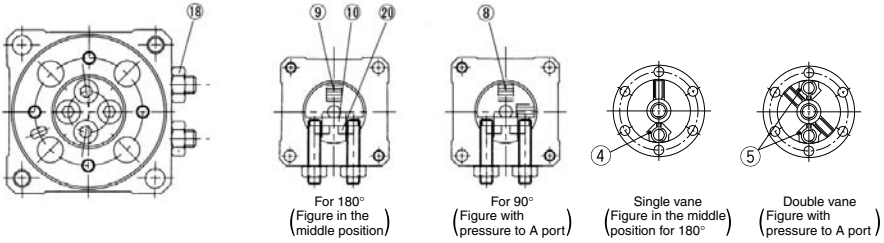





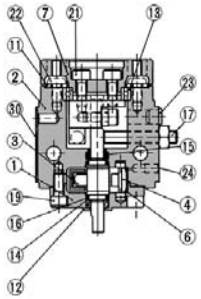
Size	Allowable radial load (N)	Allowable thrust load (N)		Allowable moment (N·m)
		Ⓐ	Ⓑ	
1	20	15	10	0.3
3	40	30	15	0.7
7	50	60	30	0.9
20	60	80	40	2.9

Construction

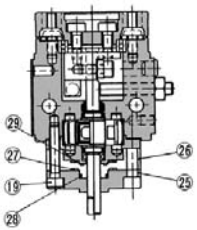
Internal Construction of Rotary Table



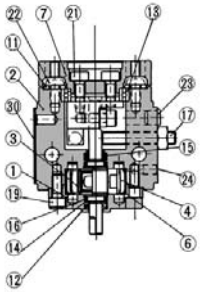
Single vane: Size 1, 3, 7, 20



Double vane: Size 1



Double vane: Size 3, 7, 20



Component Parts

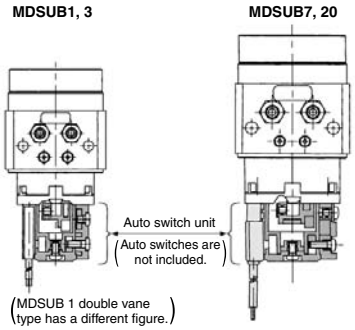
No.	Description	Material	Note
1	**Body (A)**	Aluminum alloy	Anodized
2	**Body (B)**	Aluminum alloy	Anodized
3	**Vane shaft**	Stainless steel (MSUB20: Carbon steel)	Single vane
		Carbon steel	Double vane
4	**Stopper**	Resin	Single vane
5	**Stopper**	Stainless steel	Double vane
6	**Stopper seal**	NBR	
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 ㉔ 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 57 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.
M(D)SUB 1	P211070-1
M(D)SUB 3	P211090-1
M(D)SUB 7	P211060-1
M(D)SUB20	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

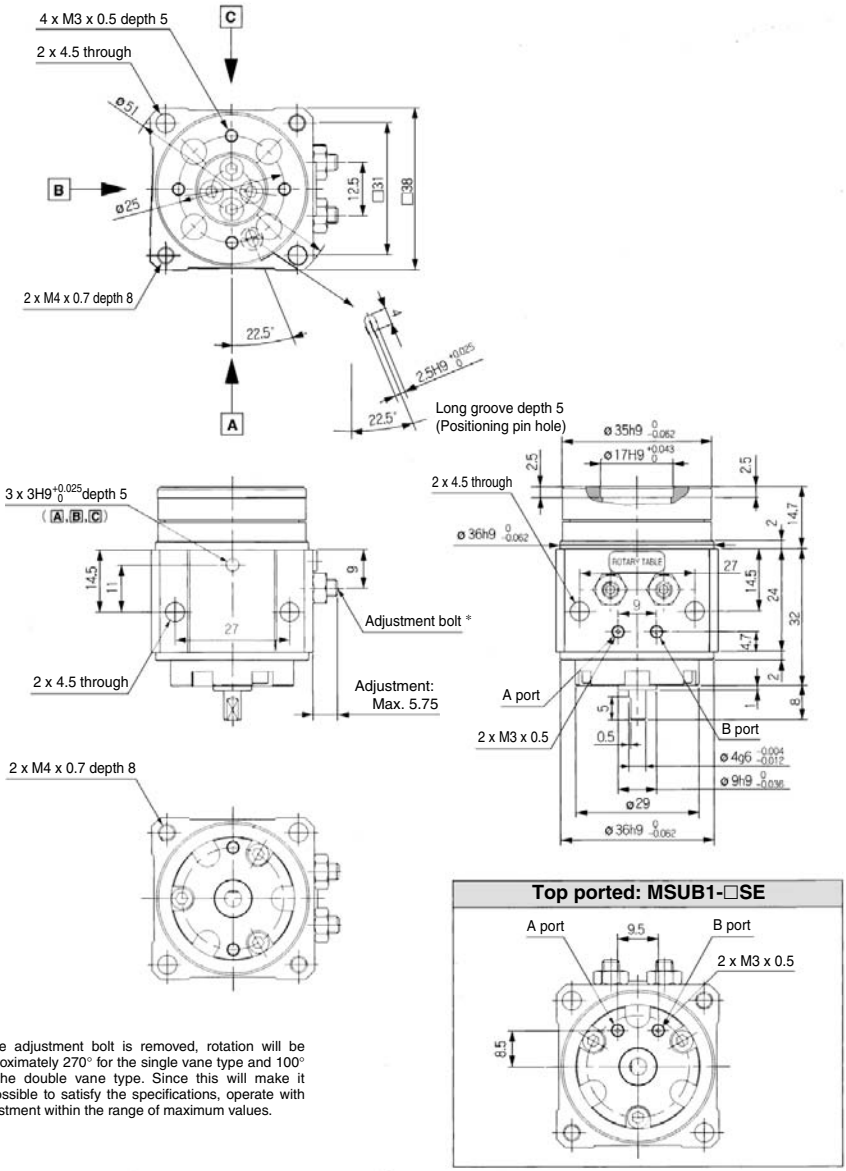
∗ The auto switch block unit is included in the auto switch unit.
∗ Auto switch block unit shows the necessary assembly for mounting 1 piece of auto switch to the auto switch unit.
∗ Individual part cannot be shipped.

Dimensions

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

MSUB1 (Single vane)

MSUB1-□S/SE



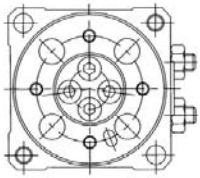
Top ported: MSUB1-□SE

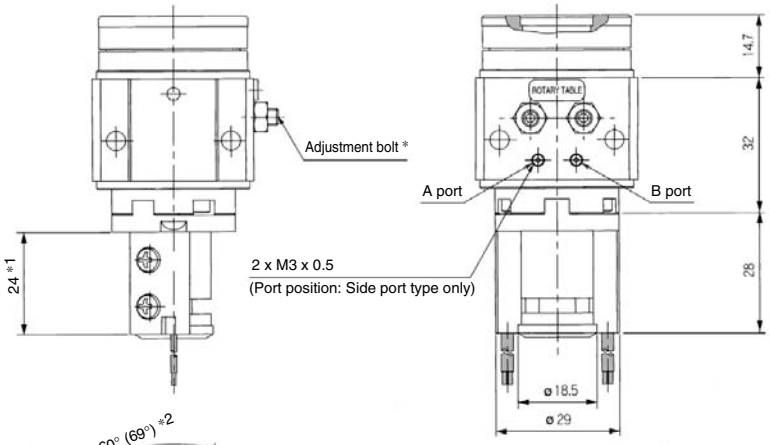
* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

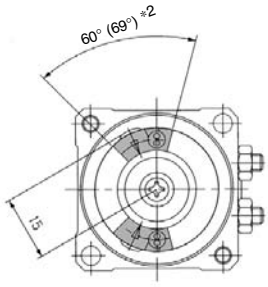
These drawings indicate the condition when the B port is pressurized.

With auto switch: MDSUB1-□S

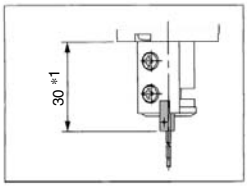
∗1) 24: When using D-90/90A/S99(V)/T99(V)/S9P(V)
30: When using D-97/93A
∗2) 60°: When using D-90/90A/97/93A
69°: When using D-S99(V)/T99(V)/S9P(V)







D-97/93A



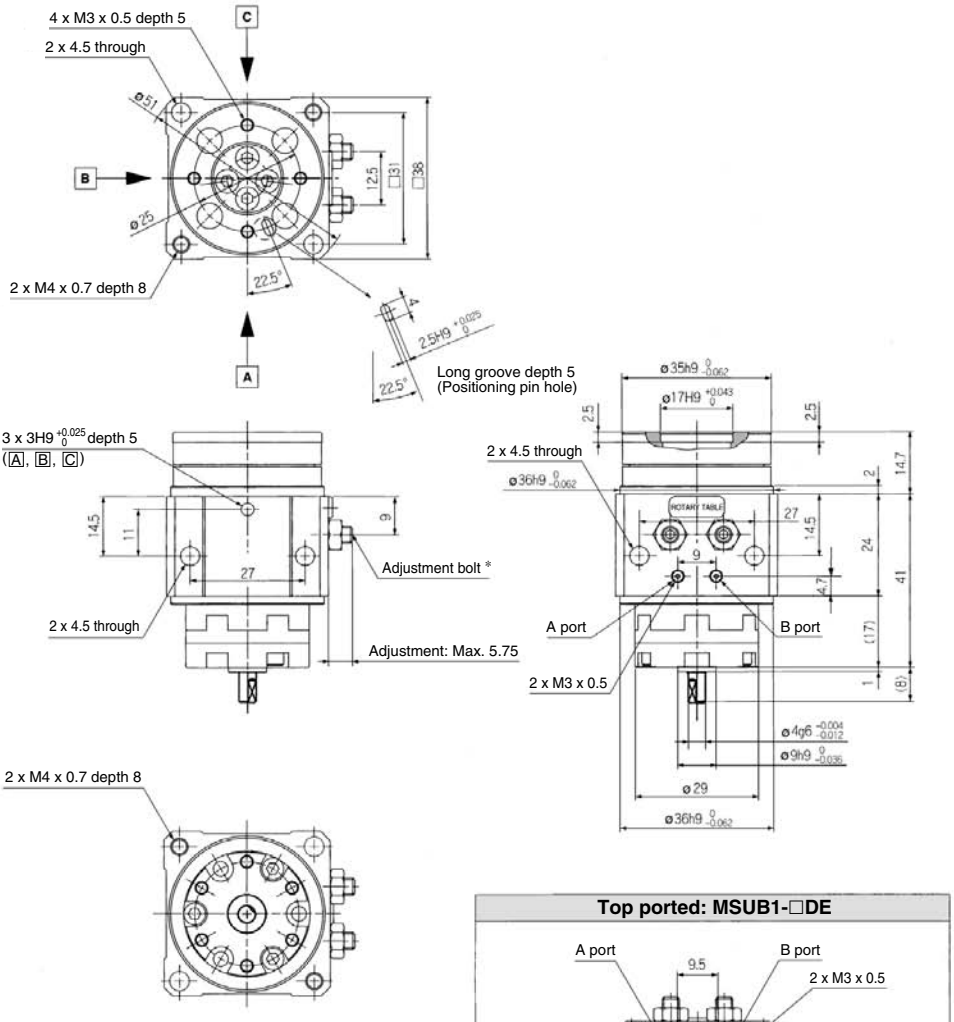
∗ If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

Dimensions

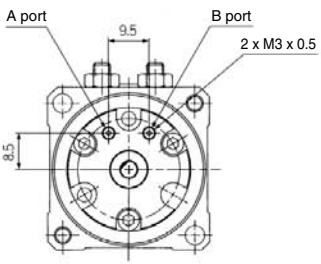
These drawings indicate the condition when the B port is pressurized.

MSUB1 (Double vane)

MSUB1-□D



Top ported: MSUB1-□DE

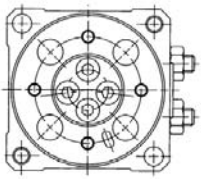


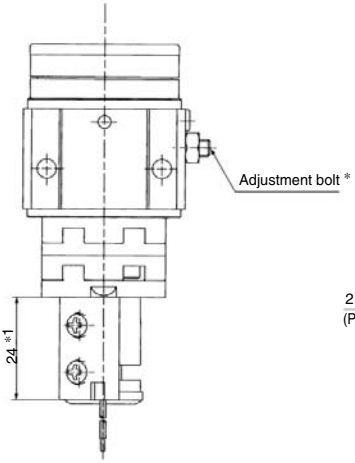
* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

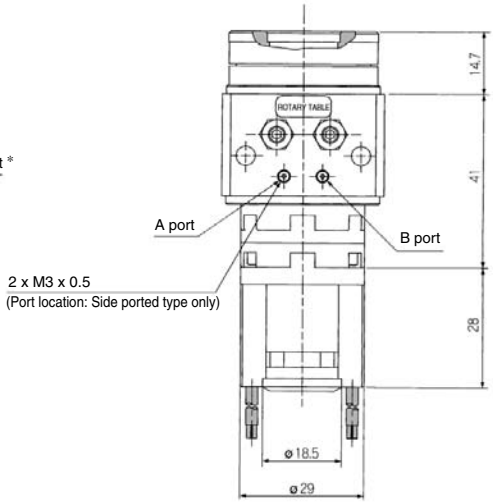
These drawings indicate the condition when the B port is pressurized.

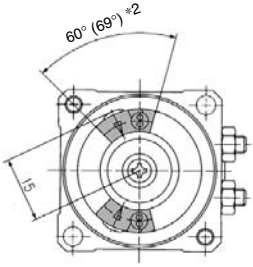
With auto switch: MDSUB1-□D

∗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)

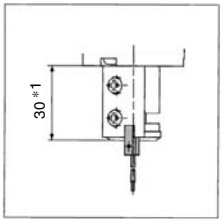








D-97/93A



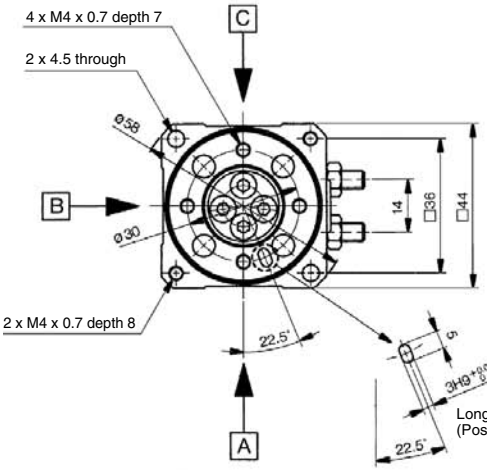
∗ If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

Dimensions

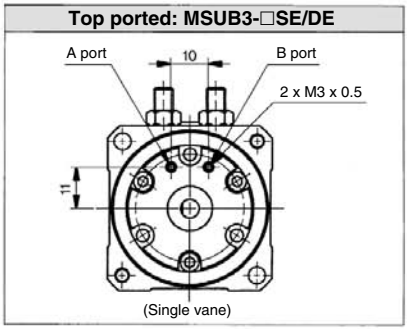
These drawings indicate the condition when the B port is pressurized.

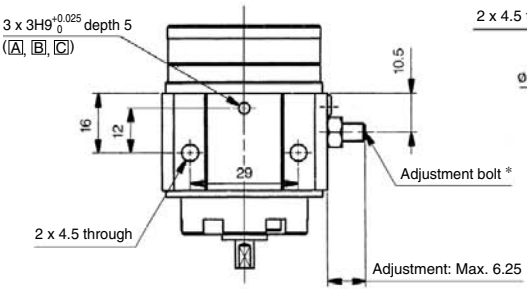
MSUB3 (Single vane/Double vane)

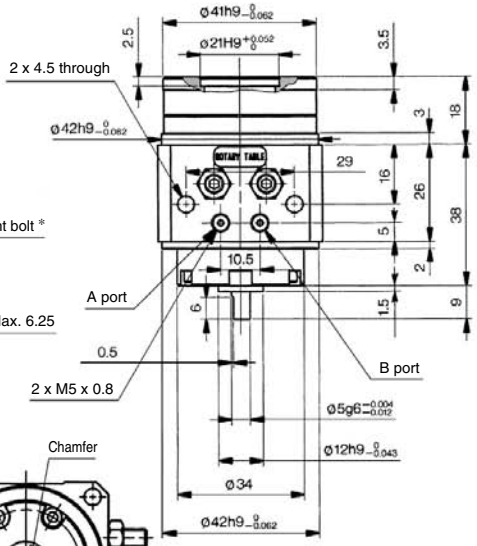
MSUB3-□S/D

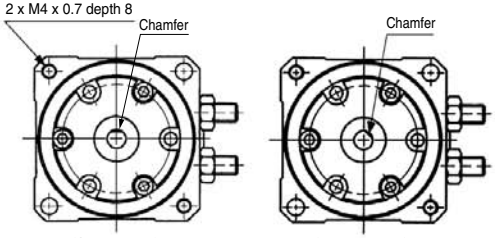


Top ported: MSUB3-□SE/DE









(Single vane) (Double vane)

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.

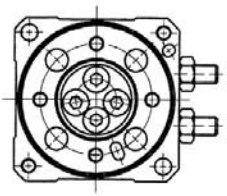
* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

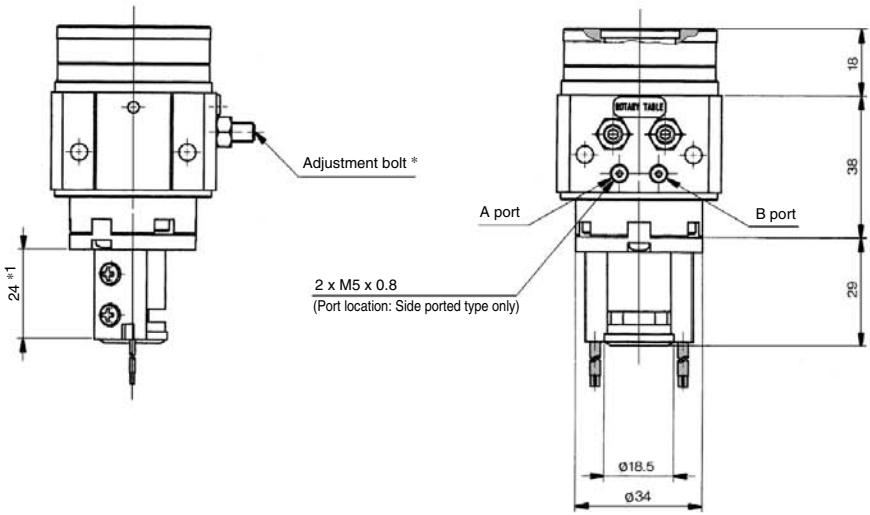
These drawings indicate the condition when the B port is pressurized.

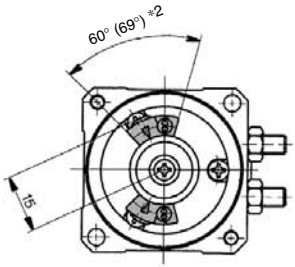
With auto switch: MDSUB3

∗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)

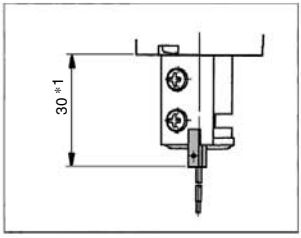
∗ If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.







D-97/93A

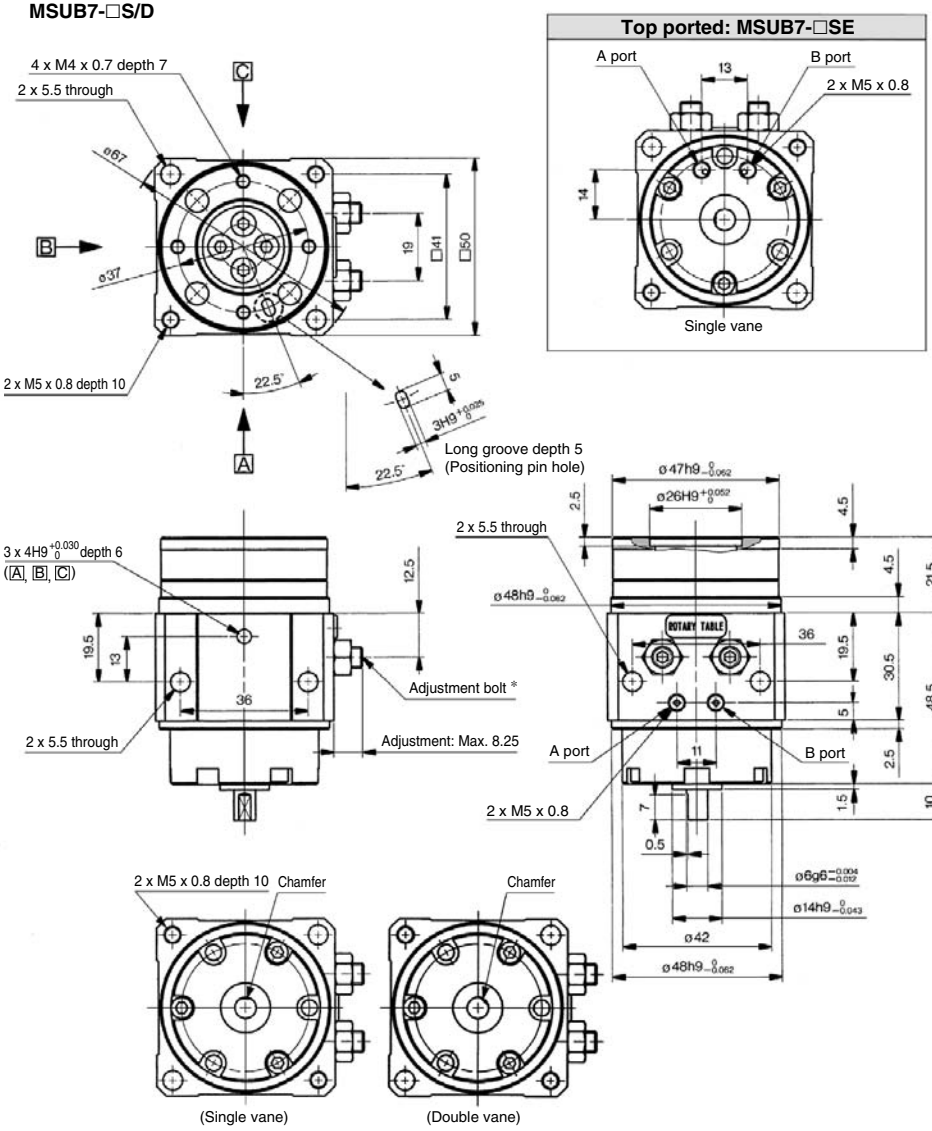


Dimensions

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

MSUB7 (Single vane/Double vane)

MSUB7-□S/D



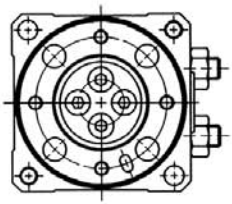
The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs from single and double vane.

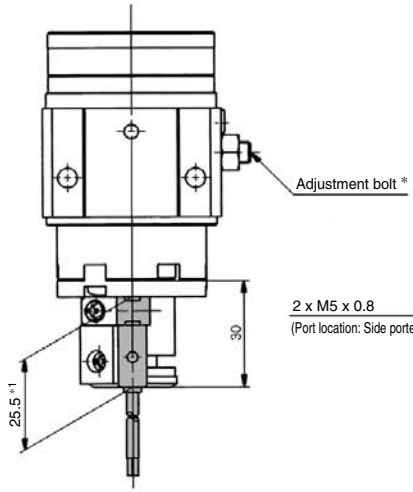
* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

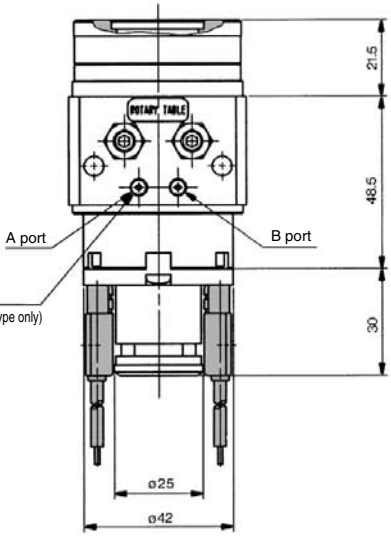
These drawings indicate the condition when the B port is pressurized.

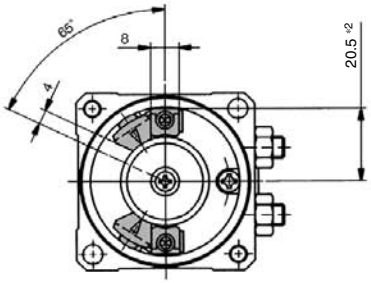
With auto switch: MDSUB7

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

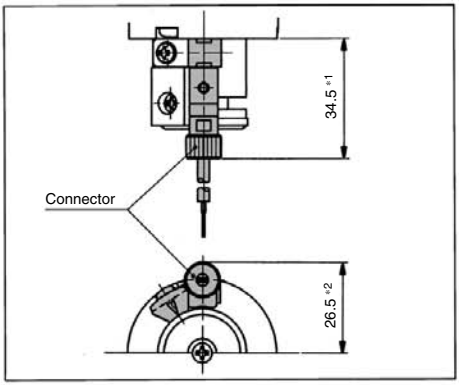








Connector Type



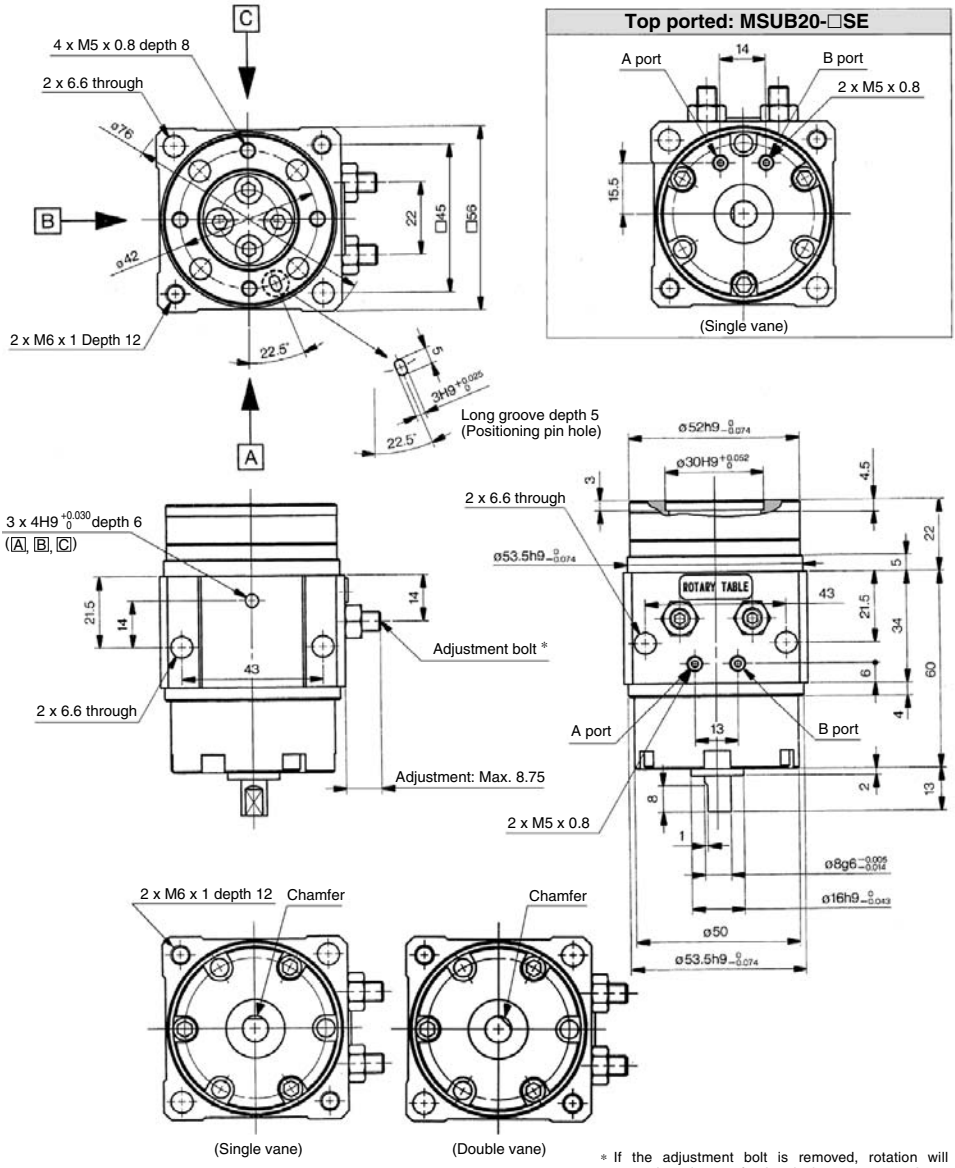
∗ If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

Dimensions

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

MSUB20 (Single vane/Double vane)

MSUB20-□S/D



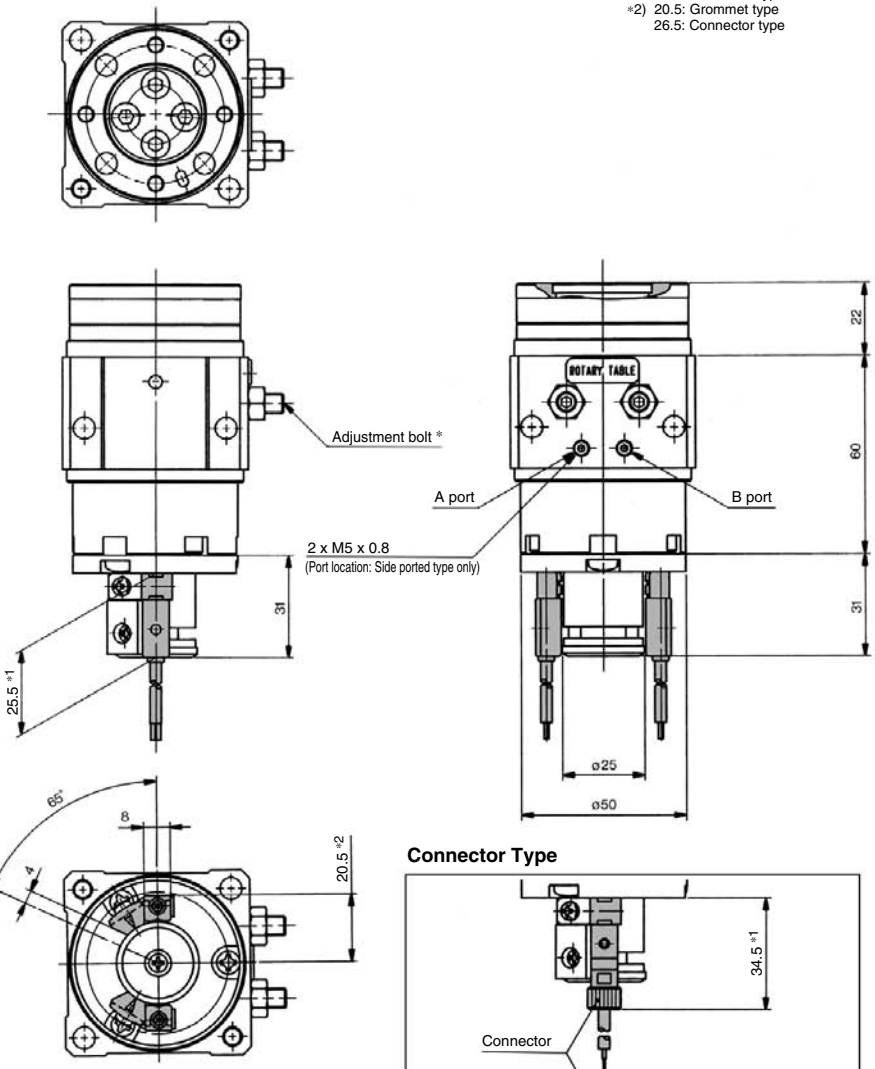
The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs from single and double vane.

* 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.

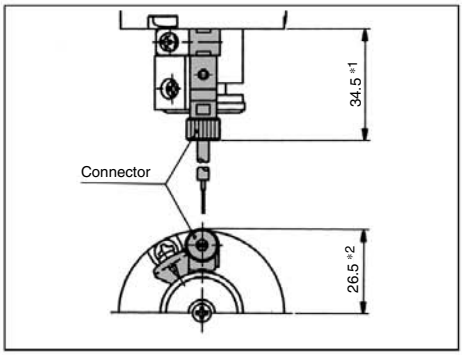
With auto switch: MDSUB20

∗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 Mounting

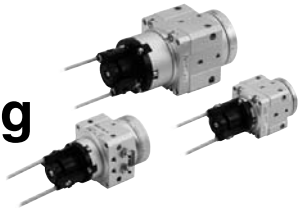
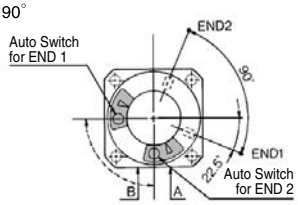


Table Positioning Pin Hole Rotation Range and Auto Switch Mounting Position

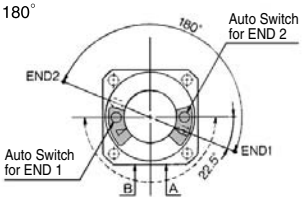
MSU□1/3

Single vane type

90°

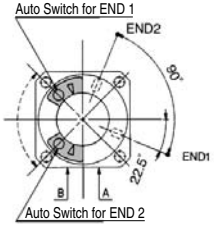


180°



Double vane type (MSUB only)

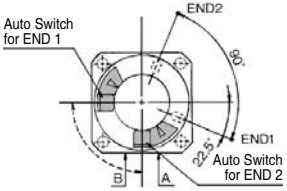
90°



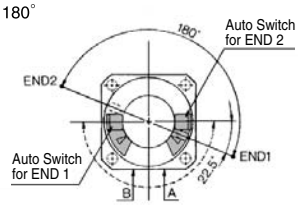
MSU□7/20

Single vane type

90°

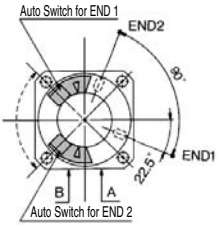


180°

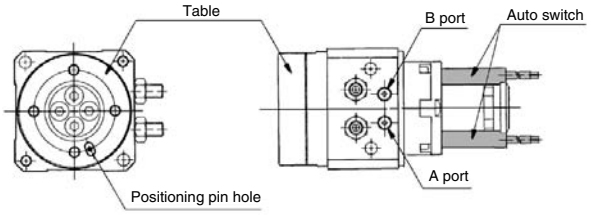


Double vane type (MSUB only)

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°	

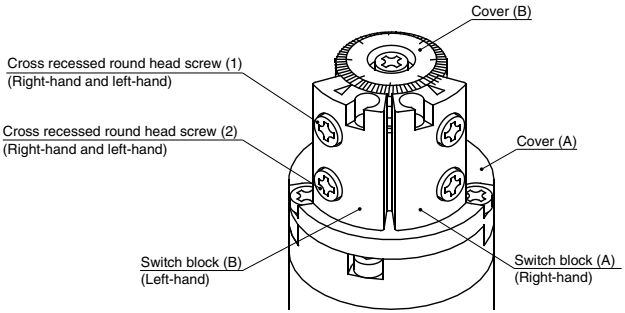
Note) Since the above values are only provided as a guideline, they are not guaranteed. In the actual setting, adjust them after confirming the auto switch performance.

Refer to page 142 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.



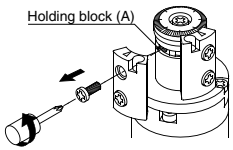
Solid state auto switch

<Applicable auto switch>

3-wire····· D-S99(V)□/S9P(V)□
2-wire····· D-T99(V)□

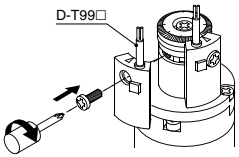
* For details about shape and specifications of the auto switch, refer to SMC's catalog.

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

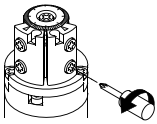
<Applicable auto switch>

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.

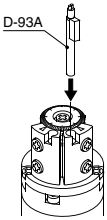
①**Preparations**
Loosen the cross recessed round head screw (2). (About 2 to 3 turns)

* This screw has been secured temporarily at shipment.



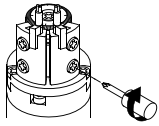
②**Reed auto switch mounting**
Insert the reed auto switch until it is in contact with the hole in the switch block.

* 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.



Series MSU
Specific Product Precautions

Be sure to read before handling. Refer to front matter 35 for Safety Instructions and pages 4 to 14 for Rotary Actuator and Auto Switch Precautions.

Selection

⚠Warning

1. Ensure the load energy within the product's allowable energy value.

Operation with a load kinetic energy exceeding the allowable value can cause human injury and/or damage to equipment or machinery. (Refer to model section procedures in this catalog.)

⚠Caution

1. When there are load fluctuations, allow a sufficient margin in the actuator torque.

In case of horizontal mounting (operation with product facing sideways), malfunction may occur due to load fluctuations.

Mounting

⚠Caution

1. Adjust the rotation angle within the prescribed ranges.

Single vane type: (90°±10°, 180°±10°) (±5° at end of rotation)
Double vane type: (90°±10°) (±2.5° at end of rotation)

∗ Series MSUB only.

Adjustment outside the prescribed ranges may cause malfunction of the product or failure of switches to operate.

2. Adjust the rotation time within the prescribed values using a speed controller, etc. (0.07 to 0.3 s/90°)

Adjustment to a speed slower than 0.3 s/90° can cause sticking and slipping or stopping of operation.

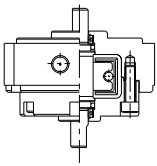
Maintenance

⚠Caution

<High precision type/MSUA>

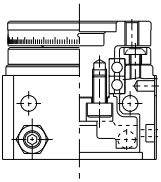
In case a rotary unit and table unit are required for maintenance, order with the unit part numbers shown below.

Rotary unit



Model	Unit part no.
MSUA 1-□S	P402070-2A
MSUA 1-□SE	P402070-2B
MSUA 3-□S	P402090-2A
MSUA 3-□SE	P402090-2B
MSUA 7-□S	P402060-2A
MSUA 7-□SE	P402060-2B
MSUA20-□S	P402080-2A
MSUA20-□SE	P402080-2B

Table unit



Model	Unit part no.
MSUA 1- 90□	P402070-3A
MSUA 1-180□	P402070-3B
MSUA 3- 90□	P402090-3A
MSUA 3-180□	P402090-3B
MSUA 7- 90□	P402060-3A
MSUA 7-180□	P402060-3B
MSUA20- 90□	P402080-3A
MSUA20-180□	P402080-3B

Note 1) Note that the rotation angle should not be changed even though the rotary unit has been changed. For maintenance, order units with a part number suitable for the model being used.

Note 2) Due to the integral construction of the MSUB series, the rotary and table units cannot be ordered separately.