



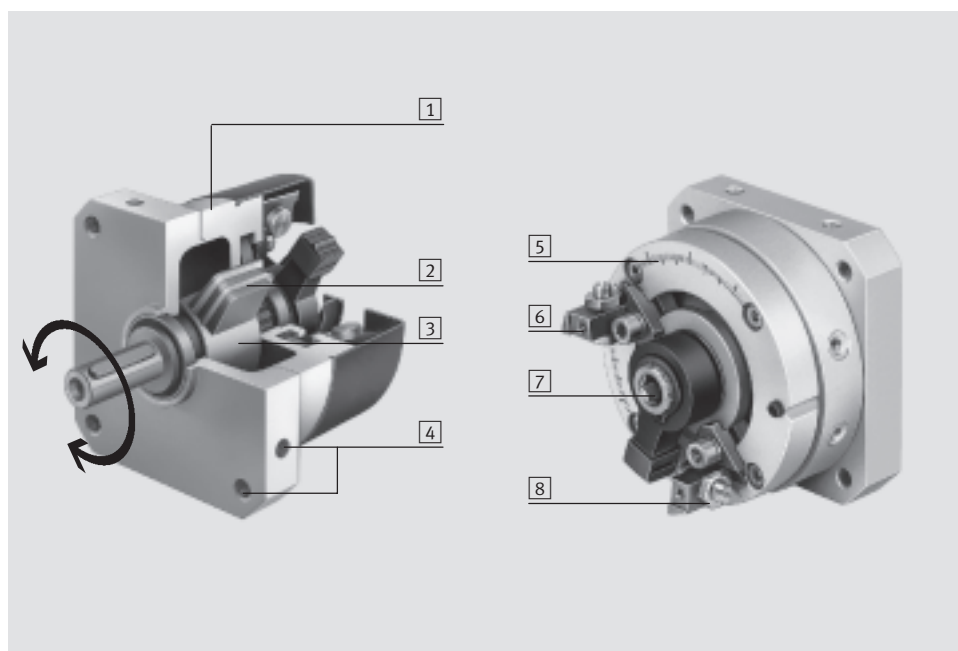
- Compact swivel actuators with minimum space requirement
- Adjustable swivel angle

Specified types in accordance with ATEX directive for potentially explosive atmospheres
→ www.festo.com/en/ex



Swivel modules DSM

Key features



- 1 Smooth operation thanks to machined surfaces
- 2 Polyurethane assures long service life for rotary vane and sealing system
- 3 Torques of up to 20 Nm with rotary vane in combination with spline shaft
- 4 Versatile, integrated mounting facilities
- 5 Swivel angle can be set anywhere within the swivel range
- 6 Mounting facility for inductive proximity sensors using sensor bracket, for contactless position sensing
- 7 Manual operation via internal hexagon socket in the drive shaft. A female thread is included for attachment of an additional drive shaft by the user.
- 8 Fixed stop with fine adjustment of the swivel angle

DSM-6 ... 10

Swivel modules DSM-6 through 10 are vane driven double-acting semi-rotary actuators. The swivel angle is infinitely adjustable. End-position cushioning is accomplished with flexible cushioning plates on the rotary vane.

The swivel modules are splash-water and dust proof.

DSM-12 ... 40

Swivel modules DSM-12 through to 40 are vane driven double-acting actuators with infinitely adjustable swivel angle over the entire range. End positions can be adjusted by means of stop screws and lock nuts. Impact energy from the stop lever is absorbed by flexible cushioning plates on the basic versions.

End position cushioning is accomplished by means of YSR shock absorbers with CL/CR/CC variants. The rotary vane itself is not suitable for use in defining end positions, i.e. the stop lever and the stops may not be removed.

The swivel modules are splash-water and dust proof.

Wide choice of variants

DSM with spigot shaft

DSM with spigot shaft and freewheel unit FLSM (accessories)

DSM with flanged shaft FW

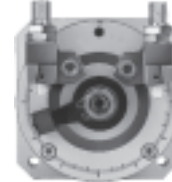
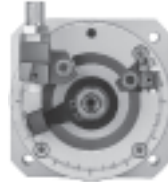


DSM with fixed stop

DSM-12 ... 40 with shock absorber on left CL

DSM-12 ... 40 with shock absorber on right CR

DSM-12 ... 40 with shock absorber on both sides CC



Swivel modules DSM

Key features

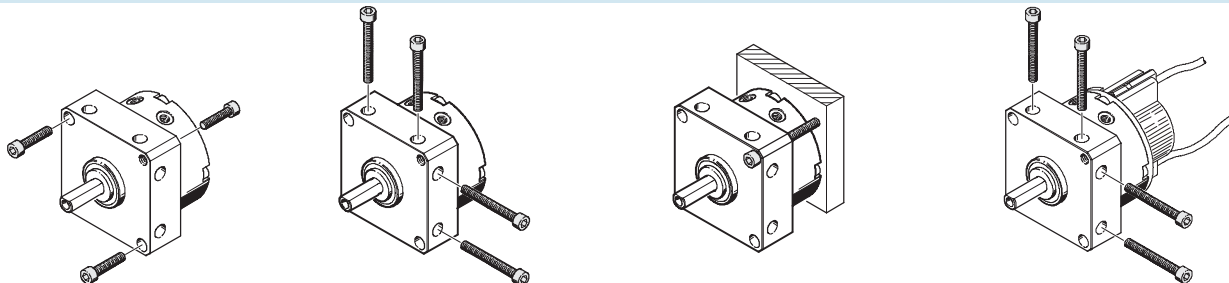
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Swivel drives
Semi-rotary vane drives

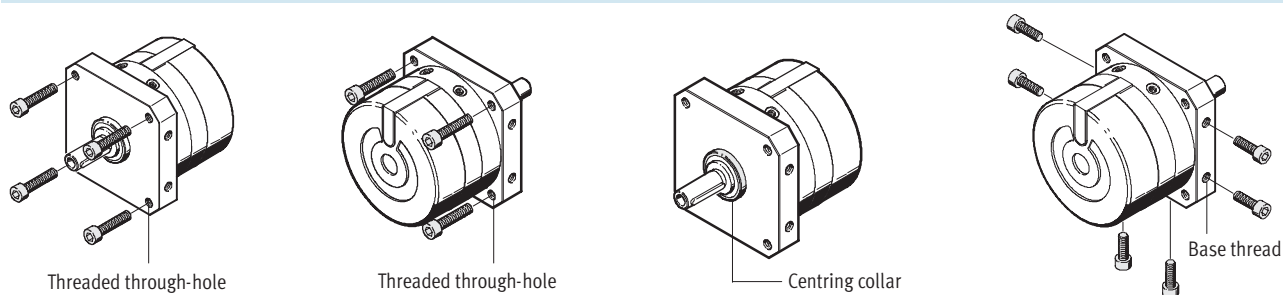
4.1

Mounting options

DSM-6 ... 10



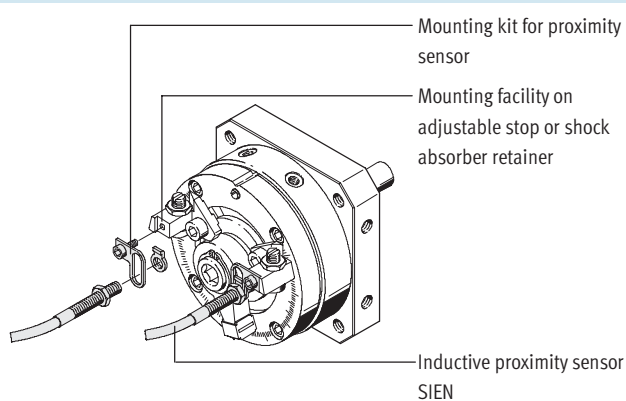
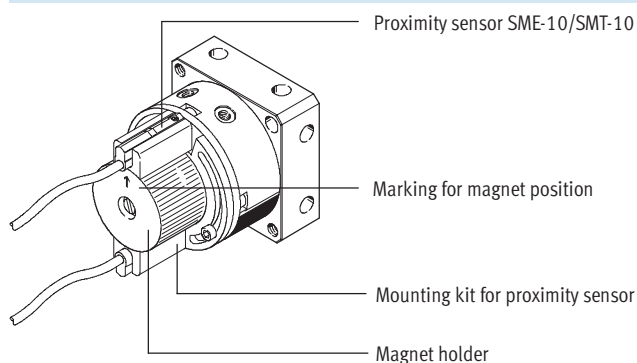
DSM-12 ... 40



Position sensing

with DSM-6 ... 10

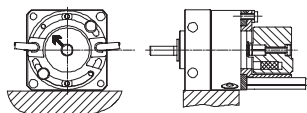
with DSM-12 ... 40



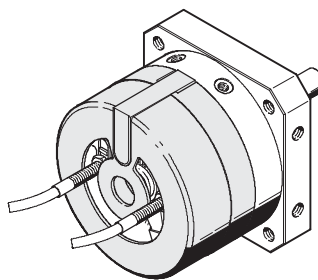
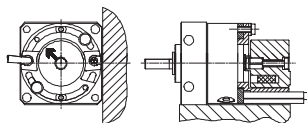
Note

If a swivel module with position sensing is to be attached to a ferritic component, the diagram opposite should be observed in order to assure reliable switching of the proximity sensor.

Recommended:



Not recommended:



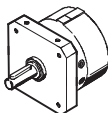
Swivel modules DSM

Product range overview



Swivel drives
Semi-rotary vane drives

4.1

Function	Version	Type	Piston $\varnothing$ [mm]	Max. swivel angle [°]	Position sensing	Spigot shaft	Flanged shaft FW
Double-acting	with fixed swivel angle						
		DSM-6 ... 10	6, 8	90, 180	■	■	■
			10	90, 180, 240			
	with adjustable swivel angle						
		DSM-6 ... 10	6, 8	180	■	■	■
			10	200			
	DSM-12 ... 40	12, 16, 25, 32, 40	270	■	■	■	

Swivel modules DSM

Product range overview



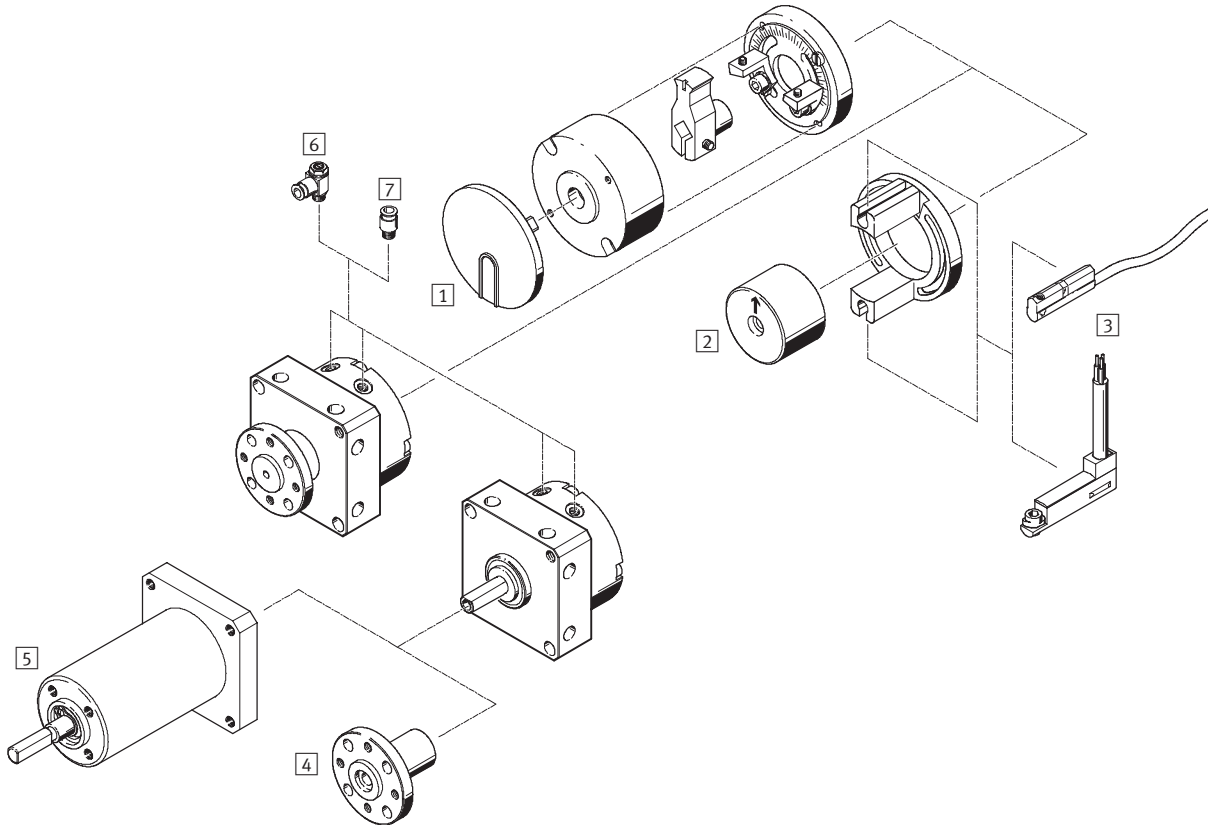
Type	Fixed stop	Shock absorber			→ Page
		Left CL	Right CR	At both ends CC	
with fixed swivel angle					
DSM-6 ... 10		–	–	–	1 / 4.1-9
with adjustable swivel angle					
DSM-6 ... 10		–	–	–	1 / 4.1-9
DSM-12 ... 40					1 / 4.1-19

Swivel modules DSM

Peripherals overview

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Piston $\varnothing$ 6 ... 10 mm



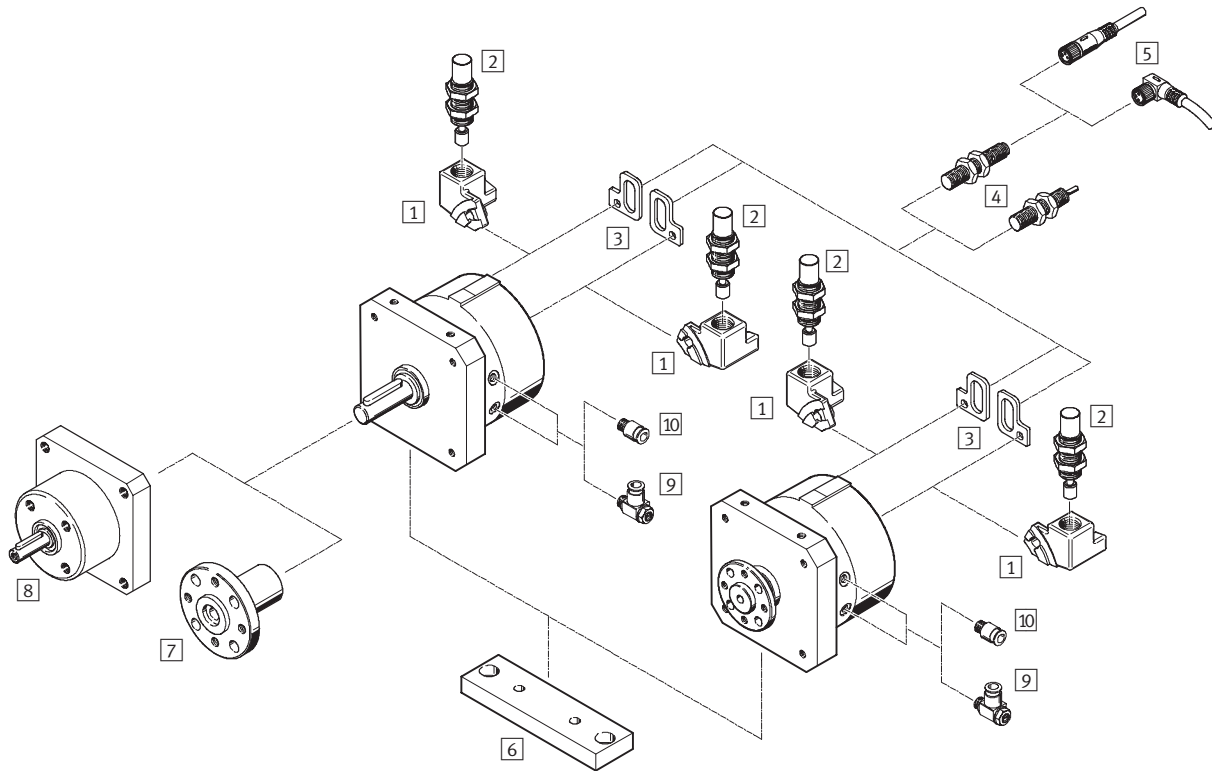
Accessories		
	Brief description	→ Page
1 End stop kit KSM	For swivel angle adjustment; expandable for swivel module DSM-...-P(-A)/DSM-...-P(-A)-FW an adapter and socket head screws must also be ordered for installation of the stop kit → 1 / 4.1-31	1 / 4.1-31
2 Mounting kit WSM-...-SME-10	For sensing the swivel angle; for mounting proximity sensors SME-/SMT-10; expandable for swivel module DSM-...-P(-FF)/DSM-...-P(-FF)-FW an adapter and socket head screws must also be ordered for installation of the mounting kit → 1 / 4.1-31	1 / 4.1-31
3 Proximity sensor SME/SMT-10	Proximity sensor for end position sensing	1 / 4.1-31
4 Push-on flange FWSR	Accessory for swivel module DSM with spigot shaft	1 / 4.1-30
5 Freewheel unit FLSM	Only in conjunction with swivel module DSM with spigot shaft	1 / 4.1-26
6 One-way flow control valve GRLA	To regulate speed	1 / 4.1-32
7 Push-in fitting QS	For connecting compressed air tubing with standard external diameters	Volume 3

Swivel modules DSM

Peripherals overview

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Piston $\varnothing$ 12 ... 40 mm



Swivel drives
Semi-rotary vane drives

4.1

Accessories		
	Brief description	→ Page
1	Shock absorber retainer DSM-...-CL/CR	1 / 4.1-28
2	Shock absorber YSR	1 / 4.1-32
3	Mounting kit WSM-...-J-M...	1 / 4.1-32
4	Proximity sensor, inductive SIEN	1 / 4.1-32
5	Plug socket with cable SIM	1 / 4.1-32
6	Mounting plate HSM	1 / 4.1-29
7	Push-on flange FWSR	1 / 4.1-30
8	Freewheel unit FLSM	1 / 4.1-26
9	One-way flow control valve GRLA	1 / 4.1-32
10	Push-in fitting QS	Volume 3

Swivel modules DSM

Type codes

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Piston Ø 6 ... 10 mm

		DSM	–	8	–	180	–	P	–	A	–	FF	–	FW
Type														
Double-acting														
DSM	Swivel module													
Piston Ø [mm]														
Max. swivel angle [°]														
Cushioning														
P	Non-adjustable at either end													
Position sensing														
	No position sensing													
A	For proximity sensing													
Adjustable swivel angle														
	Fixed swivel angle													
FF	Adjustable swivel angle													
Shaft														
	Spigot shaft													
FW	Flanged shaft													

Piston Ø 12 ... 40 mm

		DSM	–	25	–	270	–	P	–	FW	–	CL
Type												
Double-acting												
DSM	Swivel module											
Piston ∅ [mm]												
Max. swivel angle [°], adjustable												
Cushioning												
P	Non-adjustable at either end											
Shaft												
	Spigot shaft											
FW	Flanged shaft											
Fixed stop/shock absorber												
	Fixed stop											
CL	Shock absorber on left											
CR	Shock absorber on right											
CC	Shock absorbers at both ends											

Swivel modules DSM

Technical data DSM-6 ... 10

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Function



Ø - Diameter
6 ... 10 mm



Swivel drives
Semi-rotary vane drives

4.1

General technical data				
Piston Ø		6	8	10
Pneumatic connection		M3		
Design		Semi-rotary actuator with vane drive		
Operating medium		Filtered compressed air, lubricated or unlubricated		
Cushioning		Non-adjustable at either end		
Max. swivel angle	Fixed	90° or 180°	90° or 180°	90°, 180° or 240°
	Adjustable	180°		200°
Max. permissible frequency		3 Hz		3 Hz (with 240°: 2 Hz)
Conditions for externally fitted stops to limit angle of rotation	Min. permissible stop radius	10 mm	10 mm	13 mm
	Max. permissible stop force	15 N	30 N	60 N
Max. cushioning angle		0.5°		
Air consumption at max. swivel angle and 6 bar ¹⁾	90°	0.6 [cm ³]	0.7 [cm ³]	5.5 [cm ³]
	180°	1.2 [cm ³]	1.4 [cm ³]	11 [cm ³]
	240°	–		15 [cm ³]

1) Theoretical values

Operating and environmental conditions				
Piston Ø		6	8	10
Operating pressure		3.5 ... 8 bar		2.5 ... 8 bar
Temperature range ¹⁾		0 ... +60 °C		

1) Note operating range of proximity sensors

Forces and torques				
Piston Ø		6	8	10
Torque at 6 bar		0.15 Nm	0.35 Nm	0.85 Nm
Max. perm. radial load on drive shaft		15 N	20 N	30 N
Max. perm. axial load on drive shaft		10 N		
Max. perm. mass moment of inertia on the drive shaft ¹⁾		0.05 x 10 ⁻⁴ kgm ²	0.1 x 10 ⁻⁴ kgm ²	0.2 x 10 ⁻⁴ kgm ²

1) Unthrottled, please see diagrams starting on ➔ 1 / 4.1-11

Weights [g]				
Piston Ø		6	8	10
Basic variant		45	78	140

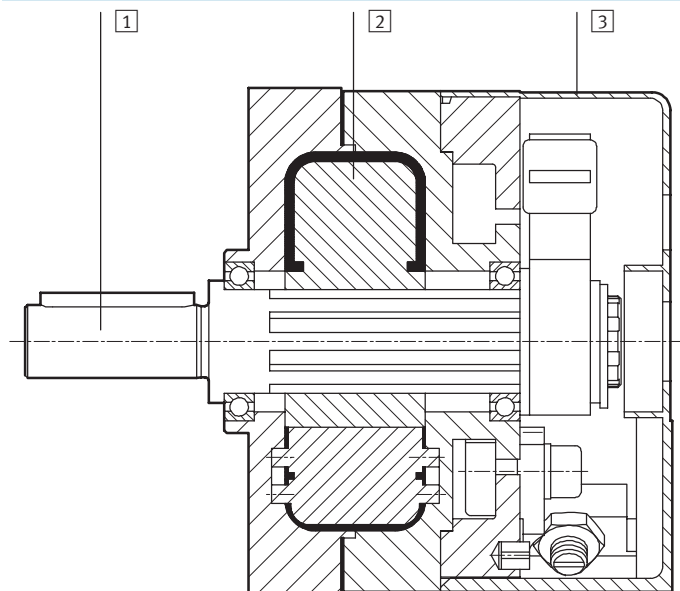
Swivel modules DSM

Technical data DSM-6 ... 10

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Materials

Sectional view



Swivel module		
1	Shaft	Stainless steel
2	Rotary vane	Plastic, glass fibre reinforced
3	Housing	Anodised aluminium
–	Screws	Galvanised steel
–	Seals	Polyurethane

Swivel modules DSM

Technical data DSM-6 ... 10

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Max. permissible mass moment of inertia

Example illustrating the use of the diagrams

A DSM-25-270-P swivel module is to be used to rotate a gripper with load through 180° in 0.4 s. The mass moment of inertia of the gripper and mass is $4.5 \times 10^{-4} \text{ kgm}^2$.

Question:

Is the value for the mass moment of inertia still permissible?

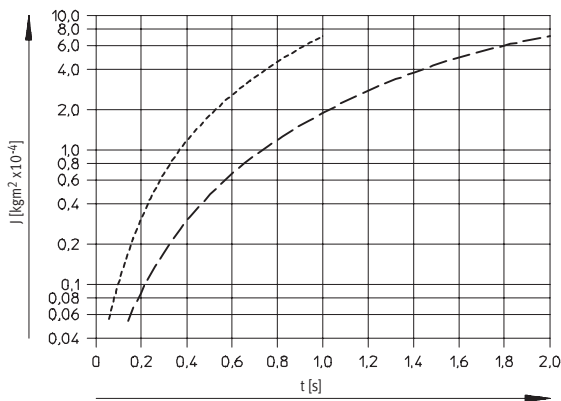
Answer:

The graph on page 1 / 4.1-21 indicates that the permissible mass moment of inertia is $6.5 \times 10^{-4} \text{ kgm}^2$ for a 180° angle of rotation. This means that the swivel actuator can be used without flow control valves!

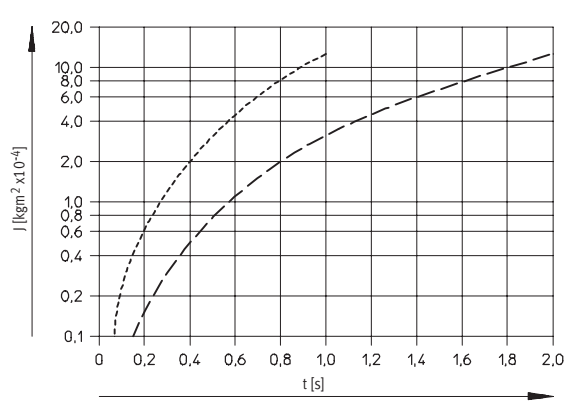
If the permissible mass moment of inertia had been exceeded in this example, it would be necessary to reduce the angular velocity by means of flow control valves, or to equip the DSM-25 with shock absorbers.

Mass moment of inertia J as a function of swivel time t

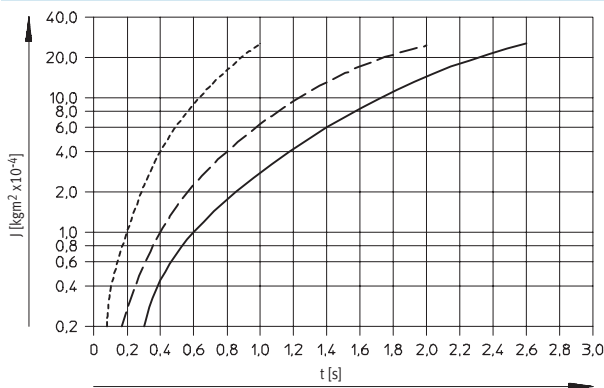
DSM-6



DSM-8



DSM-10



--- 90°
- - - 180°
— 240°

Swivel modules DSM

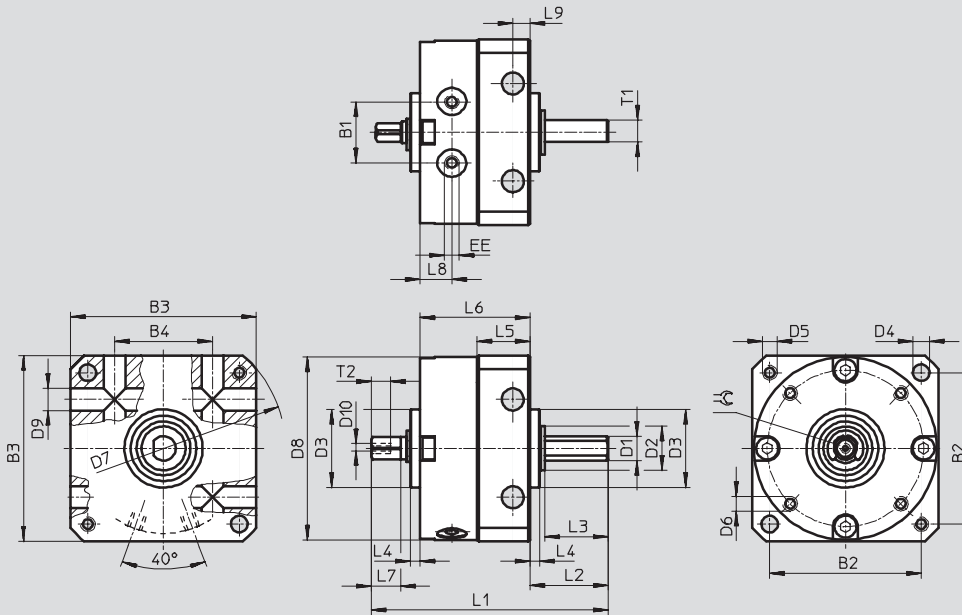
Technical data DSM-6 ... 10

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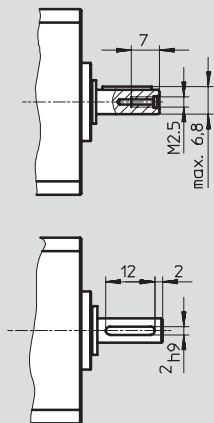
Dimensions

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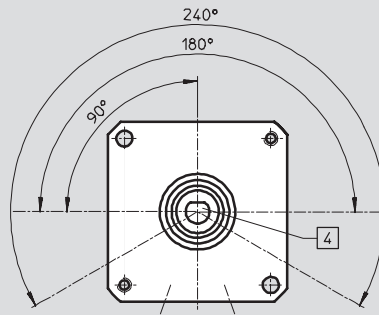
with spigot shaft and fixed stop



Spigot design for swivel module DSM-10



Shaft position



- - Note

For swivel angle tolerance, → table below. Compressed air connections are shown at the bottom in the drawing.

Ø	B1	B2	B3	B4	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	EE
[mm]					Ø g7	Ø	Ø	Ø H12			Ø H12	Ø	Ø H12		
6	10	25	30	17	4	8	14	3.2	M3	M2	40	29.4	3.5	M2	M3
8	12.8	31	38	20	5	9	16	3.2	M3	M2.5	50	37.4	3.5	M2	M3
10	15.9	38	47	26	6	12	19	4.3	M4	M3	62	46.4	4.5	M2.5	M3

Ø	L1	L2	L3	L4	L5	L6	L7	L8	L9	T1	T2	≈	Swivel angle tolerance
[mm]											h12		
6	43	13	10	2	9.8	21	5	6	3	3.5	4	3	0/+5°
8	50	16	13	2	11.3	23	6	6.5	3	4.5	4.3	3.5	0/+5°
10	61	19.6	16	2	14.3	28.4	8	7.5	4	–	5	4.5	0/+5°

Swivel modules DSM

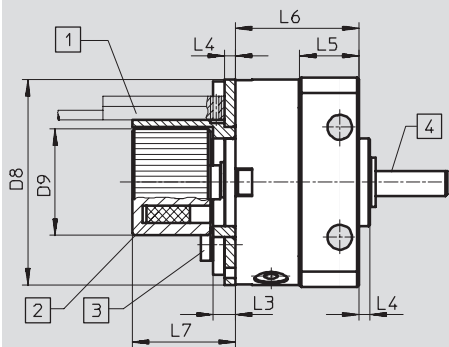
Technical data DSM-6 ... 10

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Dimensions

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With spigot shaft, fixed stop and position sensing



1 Proximity sensors not included in scope of delivery. Observe fitting space for proximity sensors and cable.

2 Magnet position

3 Max. tightening torque for sensor bracket screws
→ Table below

4 The flat or the woodruff key on the shaft indicates the position of the rotary vane

Ø [mm]	D8 Ø	D9 Ø	L3	L4	L5	L6	L7	Tightening torque [Nm]
6	29.4	17.3	4	2	9.8	21	19.5	0.19
8	37.4	19.3	4	2	11.3	23	19.5	0.32
10	46.4	22.3	4	2	14.3	28	19.5	0.44

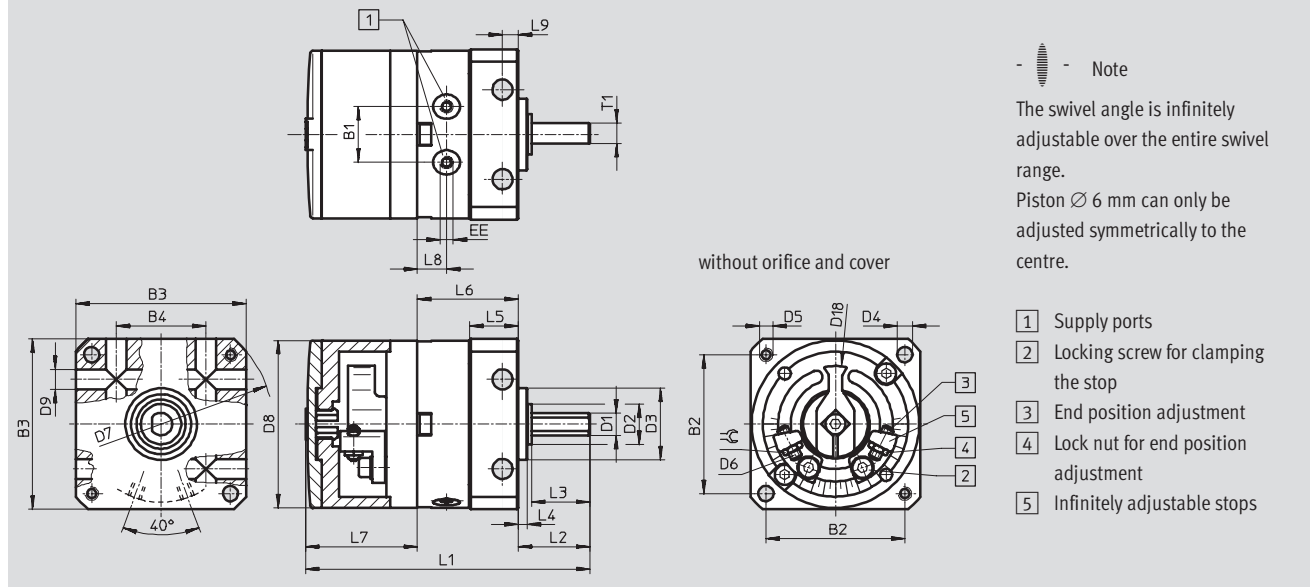
Swivel modules DSM

Technical data DSM-6 ... 10

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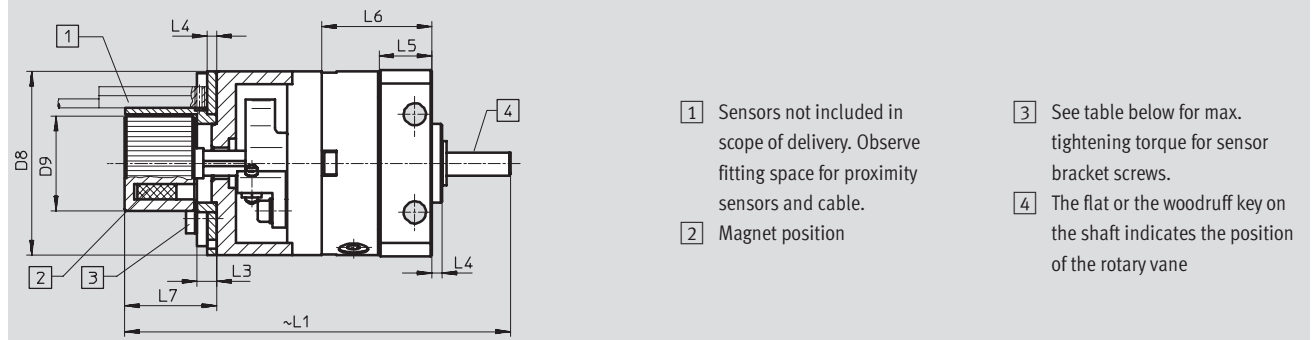
With spigot shaft, fixed stop and adjustable swivel angle



$\varnothing$ [mm]	B1	B2	B3	B4	D1 $\varnothing$ g7	D2 $\varnothing$	D3 $\varnothing$	D4 $\varnothing$ H12	D5	D6	D7 $\varnothing$ H12	D8 $\varnothing$	D9 $\varnothing$ H12	D18 $\varnothing$	EE
6	10	25	30	17	4	8	14	3.2	M3	M2	40	29.4	3.5	22	M3
8	12.8	31	38	20	5	9	16	3.2	M3	M2.5	50	37.4	3.5	26	M3
10	15.9	38	47	26	6	12	19	4.3	M4	M3	62	46.4	4.5	35.8	M3

$\varnothing$ [mm]	L1	L2	L3	L4	L5	L6	L7	L8	L9	T1	$\approx$	Max. swivel angle	Precision adjustment both ends
6	52	13	10	2	9.8	21	17.8	6	3	3.5	4	180°+5°	+1°/-5°
8	64	16	13	2	11.3	23	24.9	6.5	3	4.5	5	180°+5°	+1°/-5°
10	76	19.6	16	2	14.3	28.4	28.2	7.5	4	—	5.5	200°+5°	+1°/-5°

With spigot shaft, fixed stop, adjustable swivel angle and position sensing



$\varnothing$ [mm]	D8 $\varnothing$	D9	L1	L3	L4	L5	L6	L7	Tightening torque [Nm]
6	29.4	17.3	68.5	4	2	9.8	21	19.5	0.19
8	37.4	19.3	80	4	2	11.3	23	19.5	0.32
10	46.4	22.3	91.5	4	2	14.3	28.4	19.5	0.44

Swivel modules DSM

Technical data DSM-6 ... 10

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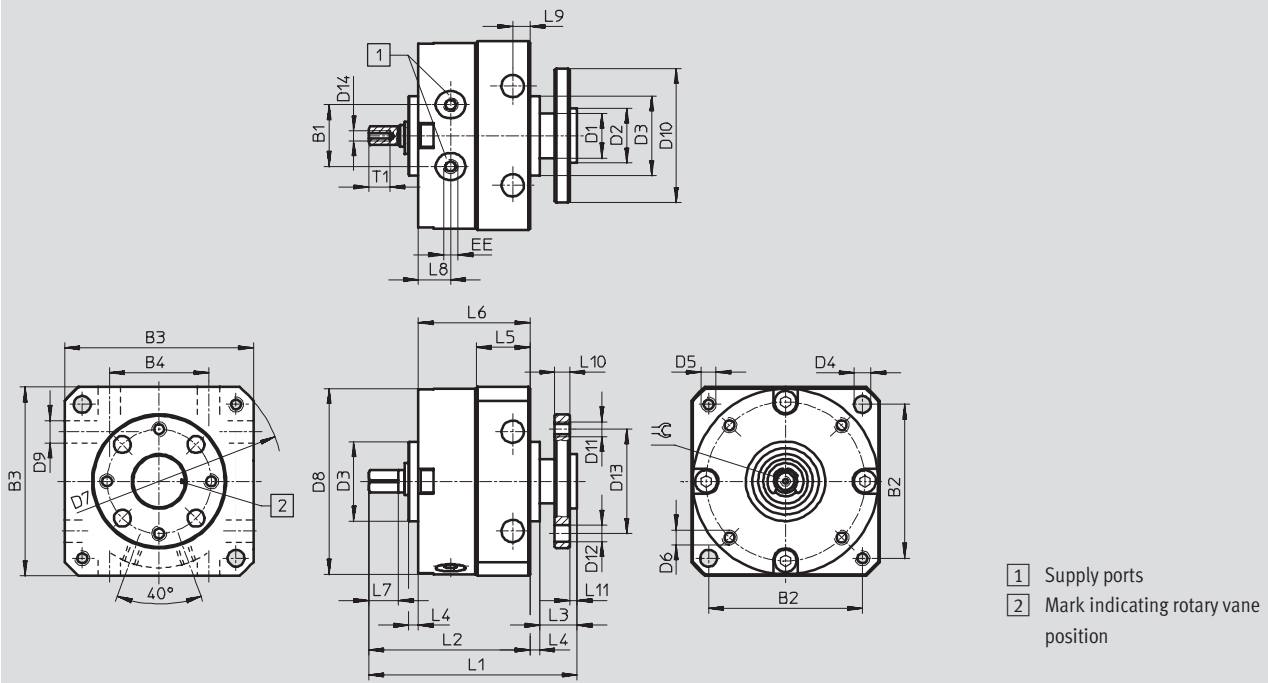
Swivel drives
Semi-rotary vane drives

4.1

Dimensions

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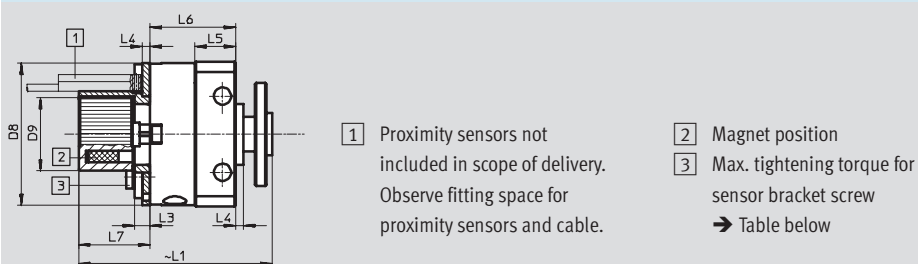
With fixed stop and flanged shaft



Ø	B1	B2	B3	B4	D1 Ø	D2 Ø	D3 Ø	D4 Ø	D5	D6	D7 Ø	D8 Ø	D9 Ø	D10 Ø	D11	D12 Ø	D13 Ø
[mm]					g7	f8					H12		H12			H13	
6	10	25	30	17	8	8	14	3.2	M3	M2	40	29.4	3.5	23	M3	3.4	16
8	12.8	31	38	20	9	11	16	3.2	M3	M2.5	50	37.4	3.5	27	M3	3.4	21
10	15.9	38	47	26	10	11	19	4.3	M4	M3	62	46.4	4.5	30	M3	3.4	21

Ø	D14	EE	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	T1	⌒	Swivel angle tolerance
[mm]																
6	M2	M3	39.5	30	7.5	2	9.8	21	5	6	3	3	1.5	4	3	0/+5°
8	M2	M3	43.5	34	7.5	2	11.3	23	6	6.5	3	3	1.5	4.3	3.5	0/+5°
10	M2.5	M3	53	41.4	9.6	2	14.3	28.4	8	7.5	4	3	1.6	5	4.5	0/+5°

With flanged shaft, fixed stop and position sensing



Ø	D8	D9	L1	L3	L4	L5	L6	L7	Tightening torque [Nm]
[mm]	Ø	Ø							
6	29.4	17.3	50	4	2	9.8	21	19.5	0.19
8	37.4	19.3	52	4	2	11.3	23	19.5	0.32
10	46.4	22.3	59.5	4	2	14.3	28.4	19.5	0.44

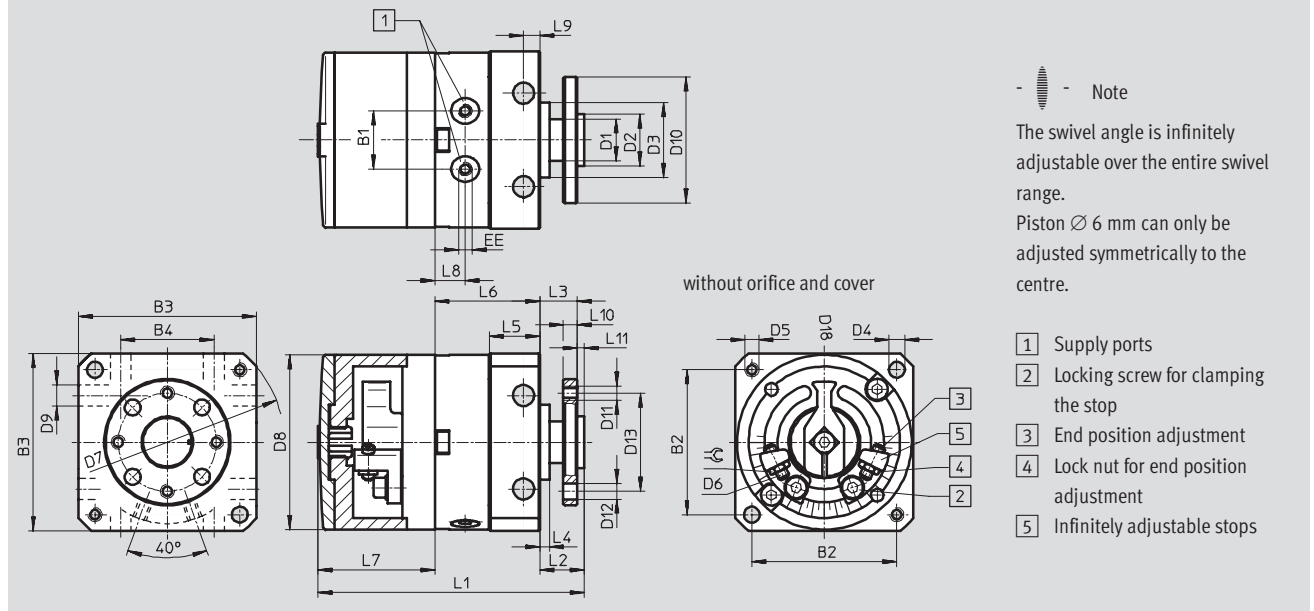
Swivel modules DSM

Technical data DSM-6 ... 10

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With flanged shaft, fixed stop and adjustable swivel angle



$\varnothing$	B1	B2	B3	B4	D1 $\varnothing$	D2 $\varnothing$	D3 $\varnothing$	D4 $\varnothing$	D5	D6	D7 $\varnothing$	D8 $\varnothing$
[mm]						g7	f8	H12			H12	
6	10	25	30	17	8	8	14	3.2	M3	M2	40	29.4
8	12.8	31	38	20	9	11	16	3.2	M3	M2.5	50	37.4
10	15.9	38	47	26	10	11	19	4.3	M4	M3	62	46.4

$\varnothing$	D9 $\varnothing$	D10 $\varnothing$	D11	D12 $\varnothing$	D13 $\varnothing$	D18 $\varnothing$	EE	L1	L2	L3	L4
[mm]	H12			H13							
6	3.5	23	M3	3.4	16	22	M3	48	9.5	8	2
8	3.5	27	M3	3.4	21	26	M3	58	9.5	8	2
10	4.5	30	M3	3.4	21	35.8	M3	68	11.6	10	2

$\varnothing$	L5	L6	L7	L8	L9	L10	L11	$\approx$	Max. swivel angle	Precision adjustment both ends
[mm]										
6	9.8	21	17.8	6	3	3	1.5	4	180° +5°	+1°/-5°
8	11.3	23	24.9	6.5	3	3	1.5	5	180° +5°	+1°/-5°
10	14.3	28.4	28.2	7.5	4	3	1.6	5.5	200° +5°	+1°/-5°

Swivel modules DSM

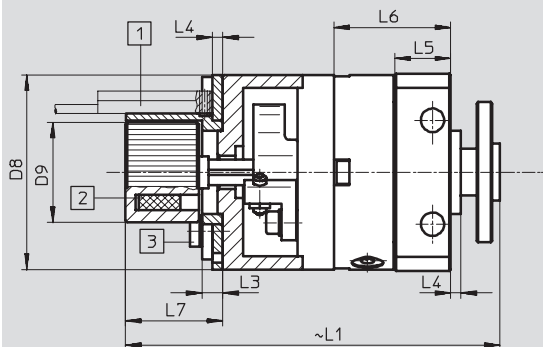
Technical data DSM-6 ... 10

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Dimensions

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With flanged shaft, fixed stop, adjustable swivel angle and position sensing



- 1 Proximity sensors not included in scope of delivery. Observe fitting space for proximity sensors and cable.
- 2 Magnet position

- 3 Max. tightening torque for sensor bracket screws
→ Table below



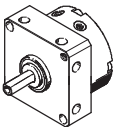
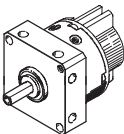
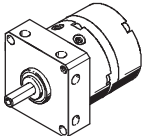
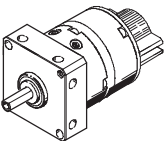
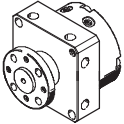
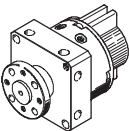
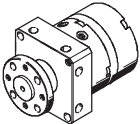
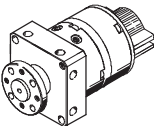
The swivel angle is infinitely adjustable over the entire swivel range.
Piston Ø 6 mm can only be adjusted symmetrically to the centre.

Ø [mm]	D8 Ø	D9 Ø	L1	L3	L4	L5	L6	L7	Tightening torque [Nm]
6	29.4	17.3	65	4	2	9.8	21	19.5	0.19
8	37.4	19.3	73.5	4	2	11.3	23	19.5	0.32
10	46.4	22.3	83	4	2	14.3	28.4	19.5	0.44

Swivel modules DSM

Technical data DSM-6 ... 10

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Ordering data								
Swivel module	Key features	Max. swivel angle	Ø [mm]	Part No.	Type			
Spigot shaft								
	• Fixed stop	90°	6	173 188	DSM-6-90-P			
			8	173 190	DSM-8-90-P			
			10	173 192	DSM-10-90-P			
		180°	6	173 189	DSM-6-180-P			
			8	173 191	DSM-8-180-P			
			10	173 193	DSM-10-180-P			
	240°	10	173 194	DSM-10-240-P				
		• Fixed stop • Position sensing	90°	6	173 195	DSM-6-90-P-A		
				8	173 197	DSM-8-90-P-A		
10				173 199	DSM-10-90-P-A			
180°			6	173 196	DSM-6-180-P-A			
			8	173 198	DSM-8-180-P-A			
			10	173 200	DSM-10-180-P-A			
	240°	10	173 201	DSM-10-240-P-A				
		• Fixed stop • Adjustable swivel angle	180°	6	175 827	DSM-6-180-P-FF		
				8	175 828	DSM-8-180-P-FF		
200°			10	175 829	DSM-10-240-P-FF			
				• Fixed stop • Position sensing • Adjustable swivel angle	180°	6	175 830	DSM-6-180-P-A-FF
						8	175 831	DSM-8-180-P-A-FF
	200°	10			175 832	DSM-10-240-P-A-FF		
	Flanged shaft							
			• Fixed stop		90°	6	185 928	DSM-6-90-P-FW
8				185 934		DSM-8-90-P-FW		
10		185 940		DSM-10-90-P-FW				
180°		6		185 929	DSM-6-180-P-FW			
		8		185 935	DSM-8-180-P-FW			
		10		185 941	DSM-10-180-P-FW			
	240°	10	185 942	DSM-10-240-P-FW				
		• Fixed stop • Position sensing	90°	6	185 930	DSM-6-90-P-A-FW		
				8	185 936	DSM-8-90-P-A-FW		
10				185 943	DSM-10-90-P-A-FW			
180°			6	185 931	DSM-6-180-P-A-FW			
			8	185 937	DSM-8-180-P-A-FW			
			10	185 944	DSM-10-180-P-A-FW			
	240°	10	185 945	DSM-10-240-P-A-FW				
		• Fixed stop • Adjustable swivel angle	180°	6	185 932	DSM-6-180-P-FF-FW		
				8	185 938	DSM-8-180-P-FF-FW		
200°			10	185 946	DSM-10-240-P-FF-FW			
				• Fixed stop • Position sensing • Adjustable swivel angle	180°	6	185 933	DSM-6-180-P-A-FF-FW
						8	185 939	DSM-8-180-P-A-FF-FW
	200°	10			185 947	DSM-10-240-P-A-FF-FW		

Swivel modules DSM

Technical data DSM-12 ... 40

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Function



Ø Diameter
12 ... 40 mm

[www.festo.com/en/
Spare_parts_service](http://www.festo.com/en/Spare_parts_service)



Swivel drives
Semi-rotary vane drives

4.1

General technical data						
Piston Ø		12	16	25	32	40
Pneumatic connection		M5			G1/8	
Design		Semi-rotary actuator with vane drive				
Operating medium		Filtered compressed air, lubricated or unlubricated				
Cushioning		Non-adjustable at either end; self-adjustable at one end; self-adjustable at both ends				
Max. swivel angle	without shock absorber	270°	270°	270°	270°	270°
	with shock absorber (CR/CL)	254°	254°	258°	258°	255°
	with two shock absorbers (CC)	238°	238°	246°	246°	240°
Max. permissible frequency (with max. swivel angle)	without shock absorber	2 Hz				
	with shock absorber	1.5 Hz	1 Hz		0.7 Hz	
Conditions for externally fitted stops to limit angle of rotation	Min. permissible stop radius	15 mm	17 mm	21 mm	28 mm	40 mm
	Max. permissible impact force	90 N	160 N	320 N	480 N	650 N
Cushioning angle	without shock absorber	1.8 ... 2.1°	1.3 ... 2.1°	1.1 ... 1.9°	0.9 ... 1.7°	1.4 ... 2.1°
	with shock absorber	13°	12°	10°	12.5°	15°
Swivel angle adjustment		Without shock absorber –5 ... +1°; with shock absorber ➔ 1 / 4.1-28				
Air consumption at max. swivel angle and 6 bar1)		82 cm ³	163 cm ³	288 cm ³	632 cm ³	1,168 cm ³

1) Theoretical values

Operating and environmental conditions					
Piston Ø	12	16	25	32	40
Operating pressure	2 ... 10 bar		1.5 ... 10 bar		
Temperature range ¹⁾	- 10 ... +60 °C				

1) Note operating range of proximity sensors

Forces and torques						
Piston Ø		12	16	25	32	40
Torque at 6 bar		1.25 Nm	2.5 Nm	5 Nm	10 Nm	20 Nm
Max. perm. radial load on drive shaft		45 N	75 N	120 N	200 N	350 N
Max. perm. axial load on drive shaft		18 N	30 N	50 N	75 N	120 N
Max. perm. mass moment of inertia on the drive shaft ¹⁾	without shock absorber	0.35 x 10 ⁻⁴ kgm ²	0.7 x 10 ⁻⁴ kgm ²	1.1 x 10 ⁻⁴ kgm ²	1.1 x 10 ⁻⁴ kgm ²	2.4 x 10 ⁻⁴ kgm ²
	with shock absorber	7 x 10 ⁻⁴ kgm ²	12 x 10 ⁻⁴ kgm ²	16 x 10 ⁻⁴ kgm ²	21 x 10 ⁻⁴ kgm ²	40 x 10 ⁻⁴ kgm ²

1) Unthrottled, please see diagrams starting on → 1 / 4.1-21

Swivel modules DSM

Technical data DSM-12 ... 40

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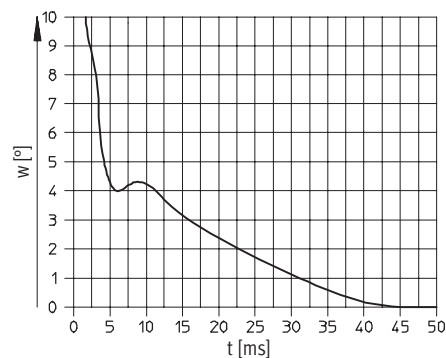
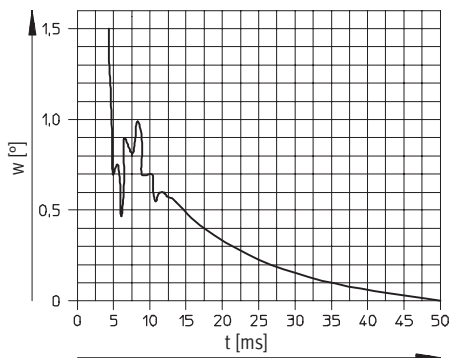
Weights [g]					
Piston Ø	12	16	25	32	40
Without shock absorber	250	450	690	1 380	2 600
Shock absorber at one end	260	440	670	1 390	2 670
Shock absorbers on both sides	300	510	730	1 480	2 830

Materials	
Swivel module	
Housing, stop lever	Anodised aluminium
Shaft	Nickel-plated steel
Rotary vane	Plastic, glass fibre reinforced
Fixed stops / screws	Galvanised steel
Stop screws	Stainless steel
Cap	Plastic, glass fibre reinforced
Seals	Polyurethane

Swivel drives
Semi-rotary vane drives

4.1

Cushioning (cushioning angle w as a function of swivel time t)
Fixed stop
Integrated shock absorber



Max. permissible mass moment of inertia
Example illustrating the use of the diagrams

A DSM-25-270-P swivel module is to be used to rotate a gripper with load through 180° in 0.4 s. The mass moment of inertia of the gripper and mass is $4.5 \times 10^{-4} \text{ kgm}^2$.

Question:

Is the value for the mass moment of inertia still permissible?

Answer:

The graph on page 1 / 4.1-21 indicates that the permissible mass moment of inertia is $6.5 \times 10^{-4} \text{ kgm}^2$ for a 180° angle of rotation. This means that the swivel actuator can be used without flow control valves!

If the permissible mass moment of inertia had been exceeded in this example, it would be necessary to reduce the angular velocity by means of flow control valves, or to equip the DSM-25 with shock absorbers.



Note

In the diagrams, swivelling time is specified for CL/CR/CC variants up to the point when the stop lever meets the shock absorber. The specified cushioning time of the shock absorber must be added in order to obtain total swivelling time.

Swivel modules DSM

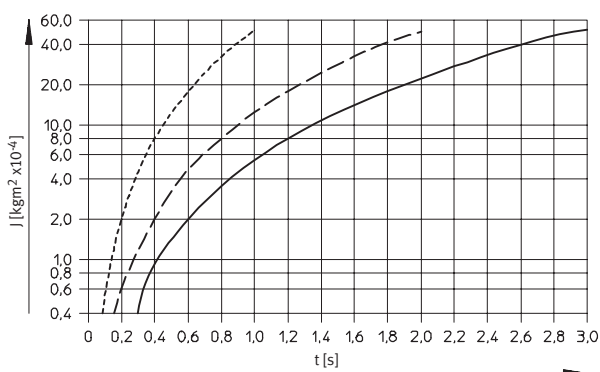
Technical data DSM-12 ... 40

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Mass moment of inertia J as a function of swivel time t

Without shock absorber

DSM-12-270-P

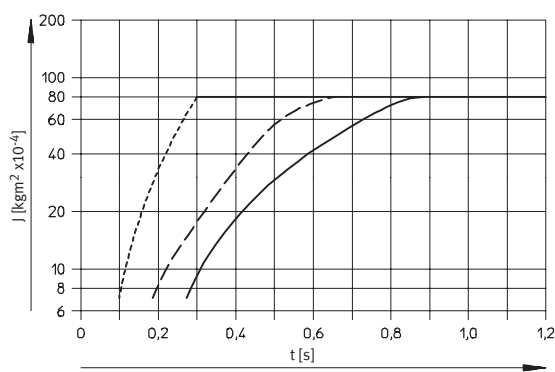


With shock absorber

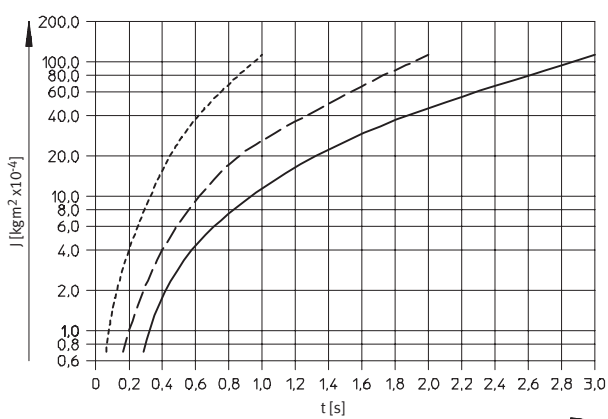
DSM-12-270-P-CL/CR/CC

Max. permissible mass moment of inertia: $80 \times 10^{-4} \text{ kgm}^2$

Cushioning time, shock absorbers YSR-5-5-C: approx. 0.1 s



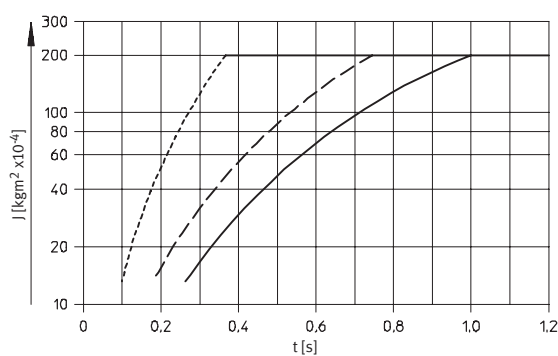
DSM-16-270-P



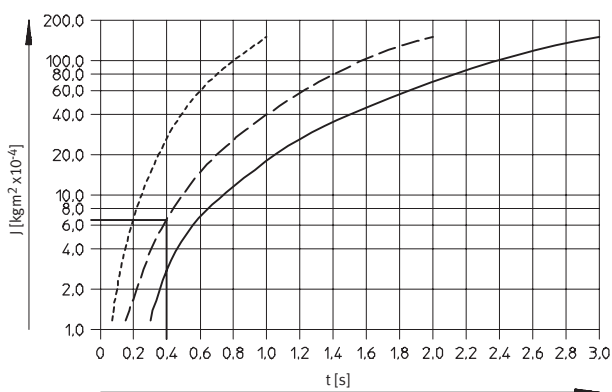
DSM-16-270-P-CL/CR/CC

Max. permissible mass moment of inertia: $200 \times 10^{-4} \text{ kgm}^2$

Cushioning time, shock absorbers YSR-7-5-C: approx. 0.1 s



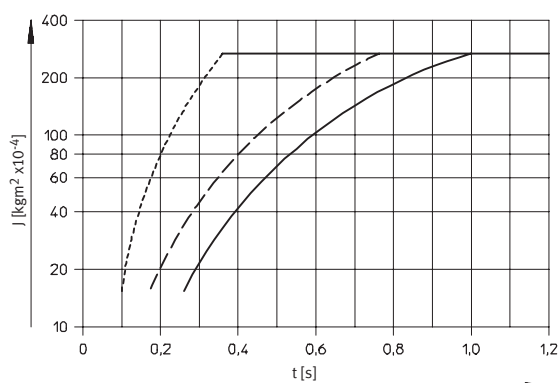
DSM-25-270-P



DSM-25-270-P-CL/CR/CC

Max. permissible mass moment of inertia: $280 \times 10^{-4} \text{ kgm}^2$

Cushioning time, shock absorbers YSR-7-5-C: approx. 0.1 s



--- 90°
--- 180°
— 270°

Swivel modules DSM

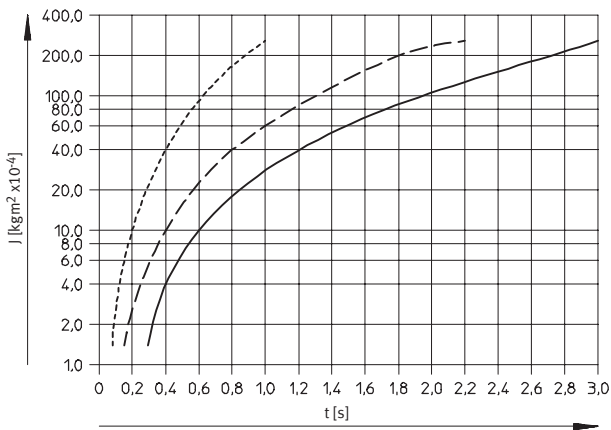
Technical data DSM-12 ... 40

FESTO

Mass moment of inertia J as a function of swivel time t

Without shock absorber

DSM-32-270-P

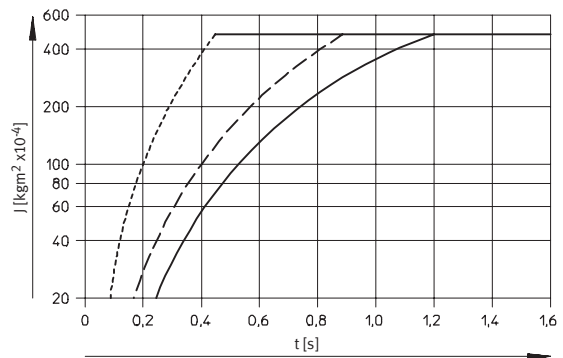


With shock absorber

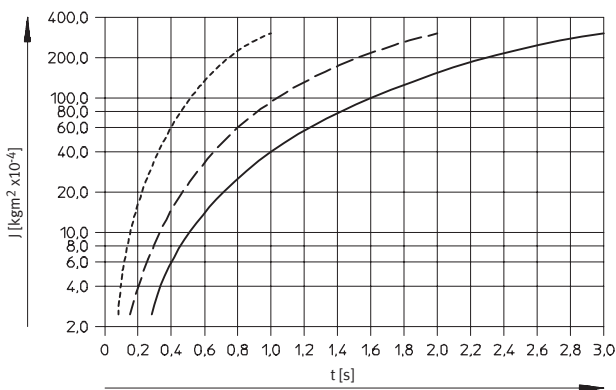
DSM-32-270-P-CL/CR/CC

Max. permissible mass moment of inertia: $500 \times 10^{-4} \text{ kgm}^2$

Cushioning time, shock absorbers YSR-8-8-C: approx. 0.25 s



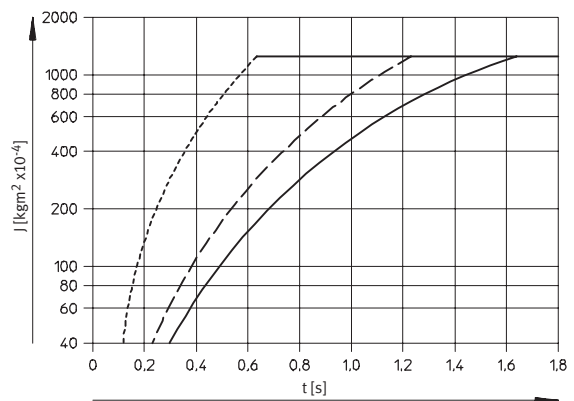
DSM-40-270-P



DSM-40-270-P-CL/CR/CC

Max. permissible mass moment of inertia: $1200 \times 10^{-4} \text{ kgm}^2$

Cushioning time, shock absorbers YSR-12-12-C: approx. 0.3 s



--- 90°
- - - 180°
— 270°

Swivel modules DSM

Technical data DSM-12 ... 40

FESTO

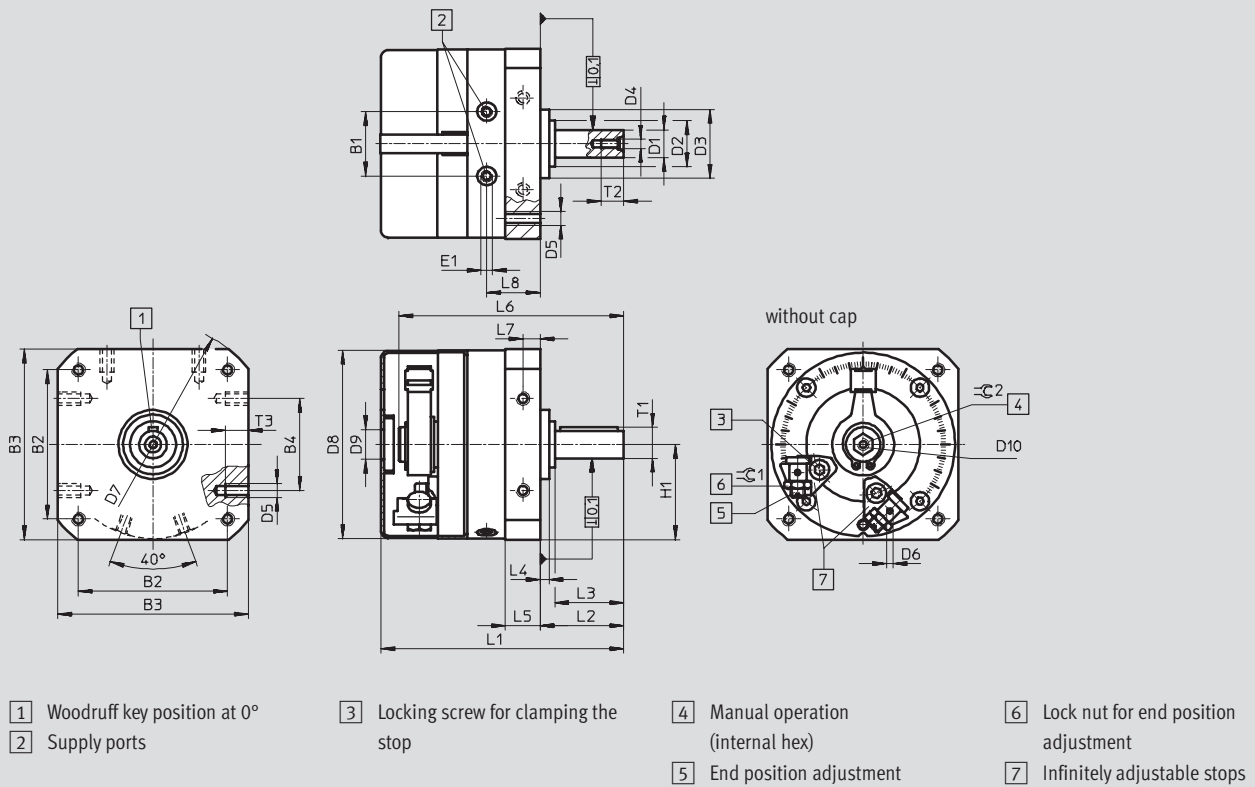
Swivel drives
Semi-rotary vane drives

4.1

Dimensions

Download CAD data → www.festo.com/en/engineering

With spigot shaft and fixed stop



Ø	B1	B2	B3	B4	D1 Ø g7	D2 Ø	D3 Ø f8	D4	D5	D6	D7 Ø	D8 Ø	D9 Ø	D10	E1	H1
[mm]																
12	19.8	48	59	30	8	15	24	M3	M4	M3	78	58	9	M4	M5	29.5
16	23.5	57	70	40	10	18	28	M3	M5	M3	91	69	12.5	M5	M5	35
25	28	65	83	40	12	20	30	M4	M6	M3	106	82	13	M5	M5	41.5
32	35.5	85	105	60	16	27	42	M5	M8	M3	135	104	16.5	M5	G $\frac{1}{8}$	52.5
40	43.8	105	130	80	20	36	52	M6	M10	M3	168	128	23.5	M6	G $\frac{1}{8}$	65

Ø	L1	L2	L3	L4	L5	L6	L7	L8	T1 max.	T2	T3	≈C1	≈C2	Woodruff key to DIN 6885 ¹⁾
[mm]														
12	77.5	24.5	20	3	10.3	68.3	5	16.5	8.8	9	8	7	6	A2x2x16
16	90.8	28	23	2.6	13	81.2	6.5	20.2	11.2	9	8	8	8	A3x3x18
25	105.5	36.5	30	4	15.2	97.5	7.5	23.5	13.5	10	10	10	8	A4x4x25
32	139.5	51	40	8	19.2	127.1	9.5	30.5	18	12.5	12	13	10	A5x5x36
40	171.5	62	50	8	23.7	155.5	12	36	22.5	16	15	17	10	A6x6x45

1) included in scope of delivery

Swivel modules DSM

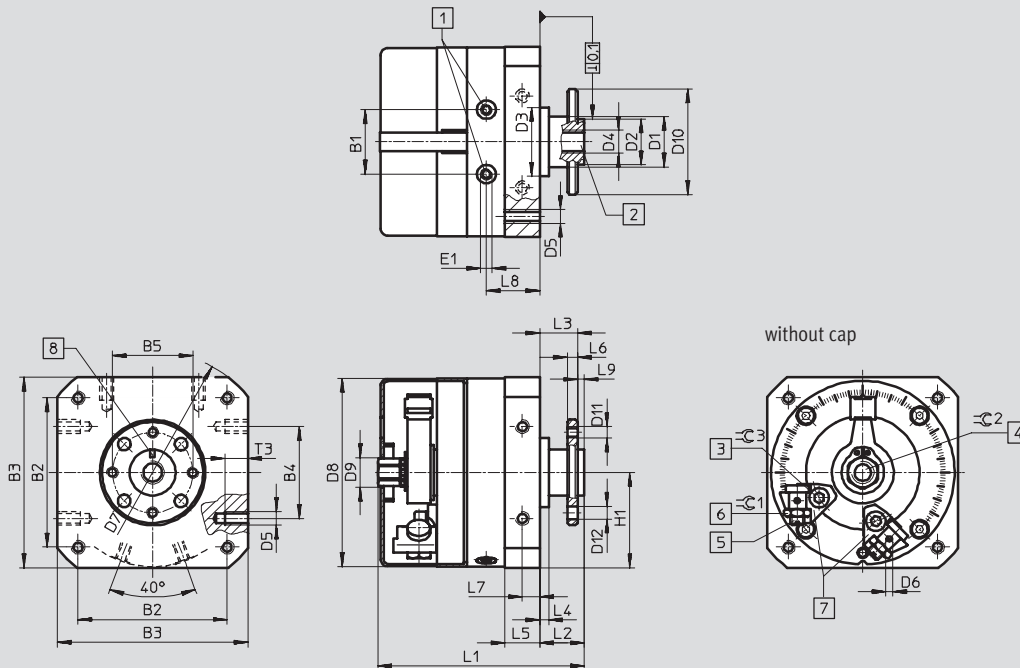
Technical data DSM-12 ... 40

FESTO

Dimensions

Download CAD data → www.festo.com/en/engineering

With fixed stop and flanged shaft



- | | | | |
|-----------------------------------|---------------------------------------|--|--|
| 1 Supply ports | 3 Locking screw for clamping the stop | 5 End position adjustment | 7 Infinitely adjustable stops |
| 2 Flanged shaft with through-hole | 4 Manual operation (external hex) | 6 Lock nut for end position adjustment | 8 The position of the marking corresponds to the position of the stop. |

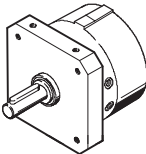
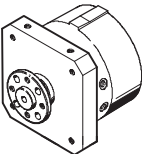
Ø	B1	B2	B3	B4	B5	D1 Ø	D2 Ø f8	D3 Ø f8	D4	D5	D6	Ø	D8 Ø	D9 Ø	Ø	D11
[mm]																
12	19.8	48	59	30	25	15	14	24	M5	M4	M3	78	58	9	33	M3
16	23.5	57	70	40	28	18	16	28	M5	M5	M3	91	69	12.5	38	M4
25	28	65	83	40	35	20	20	30	G1/8	M6	M3	106	82	13	46	M5
32	35.5	85	105	60	45	27	28	42	G1/8	M8	M3	135	104	16.5	60	M6
40	43.8	105	130	80	54	36	36	52	G1/4	M10	M3	168	128	23.5	70	M8

Ø	D12 Ø	E1	H1	L1	L2	L3	L4	L5	L6	L7	L8	L9	T3	≈C 1	≈C 2	≈C 3
[mm]																
12	3.4	M5	29.5	67.3	13	11	3	10.3	3	5	16.5	2	8	7	8	2.5
16	4.5	M5	35	79	15	13	2.6	13	4	6.5	20.2	2	8	8	11	3
25	5.5	M5	41.5	90	19.5	16.5	4	15.2	4.5	7.5	23.5	3	10	10	13	4
32	6.6	G1/8	52.5	115.8	27	23	8	19.2	6	9.5	30.5	4	12	13	13	5
40	9	G1/8	65	143.8	33	28	8	23.7	7.5	12	36	5	15	17	19	8

Swivel modules DSM

Technical data DSM-12 ... 40

FESTO

Ordering data					
Swivel module	Key features	Max. swivel angle	Ø [mm]	Part No.	Type
Spigot shaft					
	• Fixed stop • Adjustable swivel angle	270°	12	159 540	DSM-12-270-P
			16	159 541	DSM-16-270-P
			25	158 959	DSM-25-270-P
			32	152 593	DSM-32-270-P
			40	152 594	DSM-40-270-P
	• Shock absorber on left • Adjustable swivel angle	254° 254° 258° 258° 255°	12	164 321	DSM-12-270-P-CL
			16	163 000	DSM-16-270-P-CL
			25	163 002	DSM-25-270-P-CL
			32	163 004	DSM-32-270-P-CL
			40	163 006	DSM-40-270-P-CL
	• Shock absorber on right • Adjustable swivel angle	254° 254° 258° 258° 255°	12	164 322	DSM-12-270-P-CR
			16	163 001	DSM-16-270-P-CR
			25	163 003	DSM-25-270-P-CR
			32	163 005	DSM-32-270-P-CR
			40	163 007	DSM-40-270-P-CR
	• Shock absorbers on both sides • Adjustable swivel angle	238° 238° 246° 246° 240°	12	164 323	DSM-12-270-P-CC
			16	161 746	DSM-16-270-P-CC
			25	161 747	DSM-25-270-P-CC
			32	161 748	DSM-32-270-P-CC
			40	161 749	DSM-40-270-P-CC
Flanged shaft					
	• Fixed stop • Adjustable swivel angle	270°	12	157 657	DSM-12-270-P-FW
			16	157 658	DSM-16-270-P-FW
			25	157 659	DSM-25-270-P-FW
			32	157 660	DSM-32-270-P-FW
			40	157 661	DSM-40-270-P-FW
	• Shock absorber on left • Adjustable swivel angle	254° 254° 258° 258° 255°	12	170 080	DSM-12-270-P-FW-CL
			16	170 083	DSM-16-270-P-FW-CL
			25	170 086	DSM-25-270-P-FW-CL
			32	170 089	DSM-32-270-P-FW-CL
			40	170 092	DSM-40-270-P-FW-CL
	• Shock absorber on right • Adjustable swivel angle	254° 254° 258° 258° 255°	12	170 081	DSM-12-270-P-FW-CR
			16	170 084	DSM-16-270-P-FW-CR
			25	170 087	DSM-25-270-P-FW-CR
			32	170 090	DSM-32-270-P-FW-CR
			40	170 093	DSM-40-270-P-FW-CR
	• Shock absorbers at both ends • Adjustable swivel angle	238° 238° 246° 246° 240°	12	170 079	DSM-12-270-P-FW-CC
			16	170 082	DSM-16-270-P-FW-CC
			25	170 085	DSM-25-270-P-FW-CC
			32	170 088	DSM-32-270-P-FW-CC
			40	170 091	DSM-40-270-P-FW-CC

Swivel modules DSM

Accessories

Free wheel unit FLSM

Material:

Housing: Anodised aluminium

Shaft: $\varnothing 6, 8$ steel

$\varnothing 10 \dots 40$ hardened steel

Sleeve: $\varnothing 6, 8$ steel

$\varnothing 10 \dots 40$ hardened steel



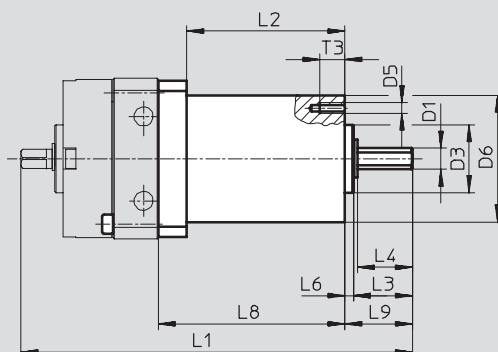
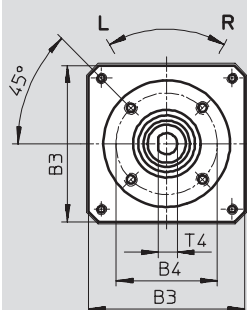
Note

The minimum possible rotation angle is 3° .

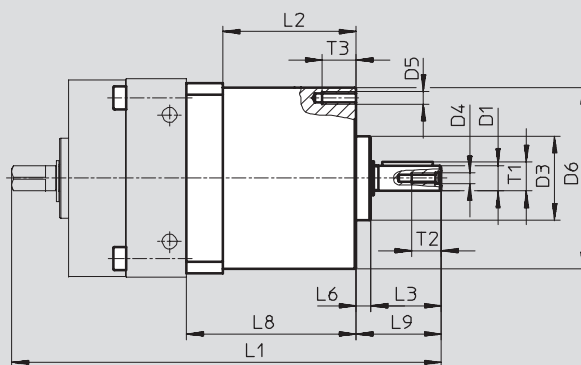
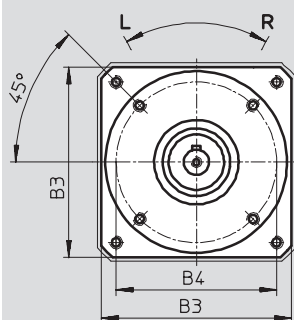
Switching accuracy is, however, dependent on speed and load.

Dimensions

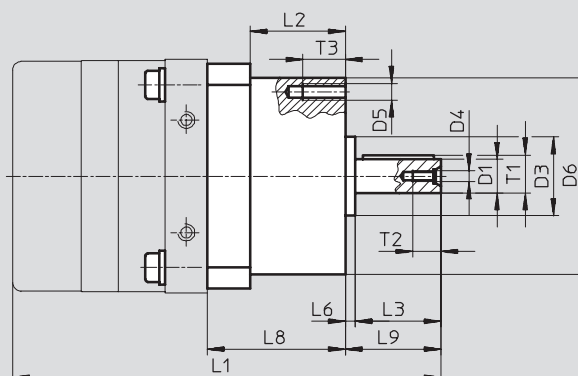
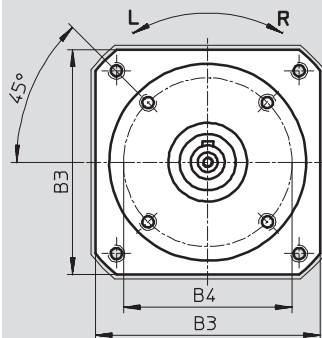
FLSM-6/8



FLSM-10



FLSM-12 ... 40



Swivel modules DSM

Accessories

FESTO

Dimensions and ordering data													
For Ø	B3	B4	D1	D3	D4	D5	D6	L1	L2	L3	L4	L6	L8
[mm]		±0.15	Ø g7	Ø h8			Ø ±0.3					+0.2	±0.1
6	29.5	23	4	14	–	M3	28	85.8	36 ±0.1	10.8	10	2	43
8	37	24	5	16	–	M3	30	94.5	37.5 ±0.1	14	13	2	44.5
10	45	38	6	20	M2.5	M3	43	101	30 ±0.1	16.7	–	3.5	40
12	55	42	8	25	M3	M3	48.5	125	37 ±0.4	20	–	3.5	47.3
16	65	50	10	24	M3	M4	60	137	34 ±0.4	23	–	3.5	47
25	80	60	12	28	M4	M6	70	152	34 ±0.4	30	–	3.5	49
32	100	83	16	42	M5	M6	95	197.8	42.8 ±0.4	40	–	7.2	60.8
40	120	96	20	52	M6	M8	110	244.5	54 ±0.4	50	–	6	77

For Ø	L9	T1	T2	T3	T4	Woodruff key to DIN 6885	CRC ¹⁾	Weight	Direction of rotation	Part No.	Type
[mm]								[g]			
6	12.8	–	–	5	3.5	–	2	100	left-hand	188 523	FLSM-6-L
									right-hand	188 522	FLSM-6-R
8	16	–	–	6	4.5	–	2	125	left-hand	188 525	FLSM-8-L
									right-hand	188 524	FLSM-8-R
10	20.2	6.8	7	8	–	A2x2x12	2	160	left-hand	188 527	FLSM-10-L
									right-hand	188 526	FLSM-10-R
12	24.5	8.8	9	8	–	A2x2x16	2	300	left-hand	164 229	FLSM-12-L
									right-hand	164 234	FLSM-12-R
16	27.4	11.2	9	10	–	A3x3x18	2	450	left-hand	164 230	FLSM-16-L
									right-hand	164 235	FLSM-16-R
25	34	13.5	10	15	–	A4x4x25	2	650	left-hand	164 231	FLSM-25-L
									right-hand	164 236	FLSM-25-R
32	48.5	18	12.5	15	–	A5x5x36	2	1 500	left-hand	164 232	FLSM-32-L
									right-hand	164 237	FLSM-32-R
40	58	22.5	16	15	–	A6x6x45	2	2 350	left-hand	164 233	FLSM-40-L
									right-hand	164 238	FLSM-40-R

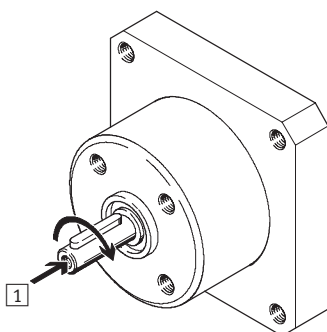
1) Corrosion resistance class 2 according to Festo standard 940 070

Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents

Direction of rotation

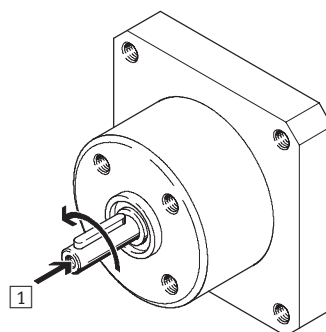
The freewheel unit blocks one of the two possible swivel directions of the DSM swivel module.

FLSM-...-R, right-hand (clockwise) rotation



1 Viewed towards drive shaft

FLSM-...-L, left-hand (counter-clockwise) rotation



Swivel modules DSM

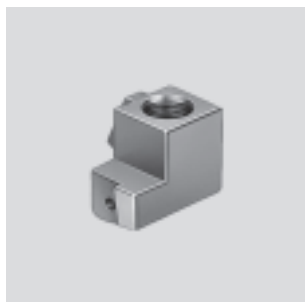
Accessories

Shock absorber retainer DSM-...-CL/CR

Material:

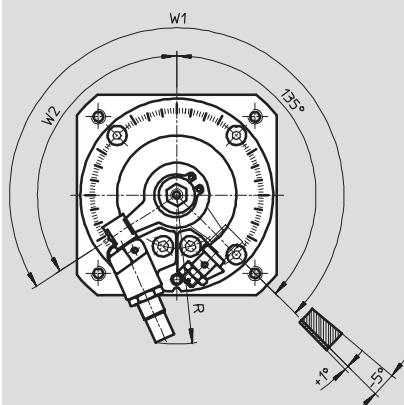
Galvanised steel

Free of copper, PTFE and silicone

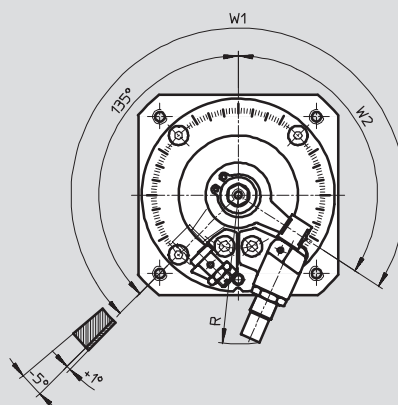


Dimensions

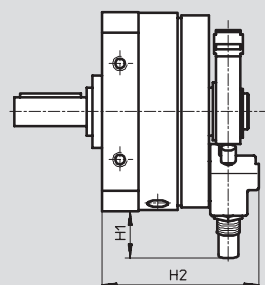
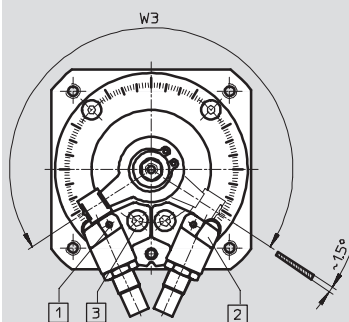
CL variants



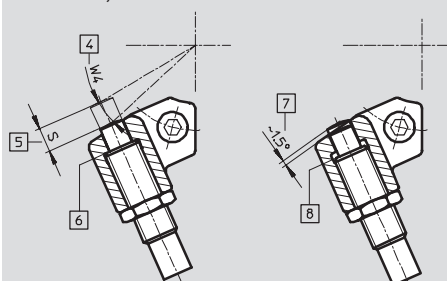
CR variants



CC variants



Precision adjustment



- 1 Mounting thread for end position sensing
- 2 Infinitely adjustable shock absorber retainer for adjustment of swivel angle

- 3 Locking screw for tightening the shock absorber retainer
- 4 Cushioning angle

- 5 Cushioning length
- 6 Shock absorber at internal stop in retainer

- 7 Precision adjustment (not with DSM-12)
- 8 Shock absorber unscrewed

Swivel modules DSM

Accessories

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Dimensions and ordering data							
For Ø	H1	H2	R	S	T1	W1	W2
[mm]	max.		max.		max.	max.	max.
12	18	48	48	4.5	8.8	254°	119°
16	22	60.8	58	5	11.2	254°	119°
25	19	68.3	61	5	13.5	258°	123°
32	27	82	81	8	18	258°	123°
40	41	101.5	108	12	22.5	255°	120°

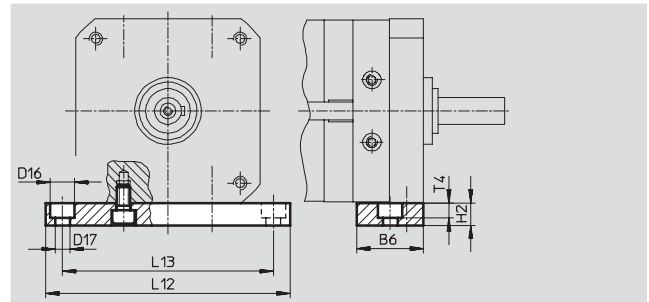
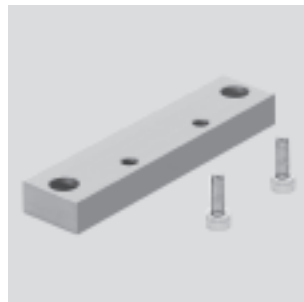
For Ø	W3	W4	Woodruff key to DIN 6885	CRC ¹⁾	Weight [g]	For shock absorbers	Part No.	Type
[mm]	max.							
12	238°	13°	A2x2x16	2	30	Left	164 324	DSM-12-CL
						Right	164 325	DSM-12-CR
16	238°	12°	A3x3x18	2	50	Left	161 184	DSM-16-CL
						Right	161 185	DSM-16-CR
25	246°	10°	A4x4x25	2	51	Left	161 186	DSM-25-CL
						Right	161 187	DSM-25-CR
32	246°	12.5°	A5x5x36	2	95	Left	161 188	DSM-32-CL
						Right	161 189	DSM-32-CR
40	240°	15°	A6x6x45	2	175	Left	161 190	DSM-40-CL
						Right	161 191	DSM-40-CR

1) Corrosion resistance class 2 according to Festo standard 940 070

Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents

Mounting plate HSM

Material:
Aluminium



Dimensions and ordering data										
For Ø	B6	D16	D17	H2	L12	L13	T4	CRC ¹⁾	Weight [g]	Part No. Type
[mm]		Ø	Ø							
12	20	8	4.5	10	84	72	4.6	2	48	165 571 HSM-12
16	28	10	5.5	10	98	84	5.7	2	80	165 572 HSM-16
25	30	11	6.6	10	110	95	6.8	2	94	165 573 HSM-25
32	40	15	9	15	145	125	9	2	246	165 574 HSM-32
40	45	18	11	20	180	155	11	2	459	165 575 HSM-40

1) Corrosion resistance class 2 according to Festo standard 940 070

Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents

Swivel modules DSM

Accessories

FESTO

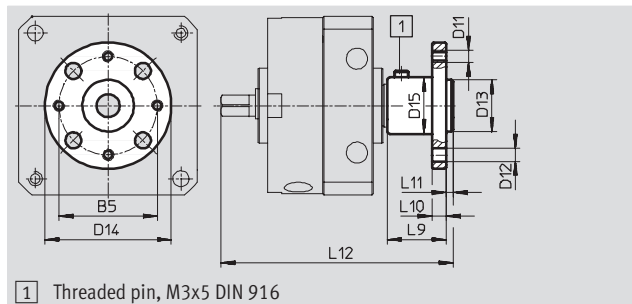
Push-on flange FWSR

for piston $\varnothing$ 6/8

Material:

Wrought aluminium alloy, anodised

Free of copper, PTFE and silicone



Dimensions and ordering data													
For $\varnothing$	B5	D11	D12 $\varnothing$	D13 $\varnothing$	D14 $\varnothing$	D15 $\varnothing$	L9	L10	L11	L12	CRC ¹⁾	Weight [g]	Part No. Type
[mm]			H13	g7									
6	16	M3	3.4	8	23	10	10.5	3	1.5	45	2	6	185 948 FWSR-6
8	21	M3	3.4	11	27	12	12.5	3	1.5	51	2	8	185 949 FWSR-8

1) Corrosion resistance class 2 according to Festo standard 940 070

Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents

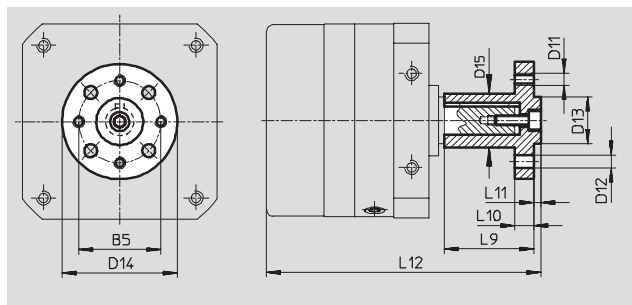
Push-on flange FWSR

for piston $\varnothing$ 10 ... 40

Material:

Wrought aluminium alloy, anodised

Free of copper, PTFE and silicone



- - Note

The swivel module shown in the dimensional drawing corresponds to variants with piston dia. 12 to 40 mm.

Dimensions and ordering data													
For $\varnothing$	B5	D11	D12 $\varnothing$	D13 $\varnothing$	D14 $\varnothing$	D15 $\varnothing$	L9	L10	L11	L12	CRC ¹⁾	Weight [g]	Part No. Type
[mm]			H13	g7									
10	21	M3	3.4	11	30	12	22	3	1.6	68.6	2	14	32 798 FWSR-10
12	25	M3	3.4	14	35	15	25	3	3	85.5	2	32	14 659 FWSR-12
16	28	M4	4.5	16	40	17	28	5	3	98.8	2	51	13 239 FWSR-16
25	35	M5	5.5	20	50	23	38	8	3	116.5	2	68	13 240 FWSR-25
32	45	M6	6.5	28	60	28	48	10	4	151.5	2	180	13 241 FWSR-32
40	54	M8	9	36	70	38	60	11	5	186.5	2	300	14 656 FWSR-40

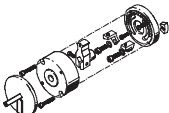
1) Corrosion resistance class 2 according to Festo standard 940 070

Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents

Swivel modules DSM

Accessories

FESTO

Ordering data – Kits				
	For Ø	Remarks	Part No.	Type
Mounting kit				
	6	For proximity sensor SME/SMT-10	173 205	WSM-6-SME-10
	8		173 206	WSM-8-SME-10
	10		173 207	WSM-10-SME-10
End stop kit				
	6	For swivel angle adjustment, max. 180°	175 833	KSM-6
	8		175 834	KSM-8
	10	For swivel angle adjustment, max. 200°	175 835	KSM-10

Ordering data – Kit accessories				
For Ø	Remarks	Part No.	Type	
6	Adapter for attachment of stop kit KSM or mounting kit WSM-...-SME-10	375 098	DSM-6-180-P-A-FF	
8		375 099	DSM-8-180-P-A-FF	
10		375 100	DSM-10-240-P-A-FF	
6	Socket head screw for attachment of stop kit KSM or mounting kit WSM-...-SME-10	258 568	DIN 84-M2x25-4.8	
8		385 259	DIN 84-M2x30-4.8	
10		365 902	M2.5x32 ¹⁾	

1) Screw similar to DIN 84

Ordering data – Proximity sensors for C-slot, magneto-resistive								Technical data➔ 1 / 10.2-64	
	Mounting	Switch output	Electrical connection		Cable length [m]	Connection direction	Part No.	Type	
			Cable	M8 plug					
NO contact									
	Insertable from above	PNP	3-core	–	2.5	Longitudinal	525 915	SMT-10F-PS-24V-K2,5L-OE	
			–	3-pin	0.3	Longitudinal	525 916	SMT-10F-PS-24V-K0,3L-M8D	
						Lateral	526 675	SMT-10F-PS-24V-K0,3Q-M8D	
	Insertable	NPN	3-core	–	2.5	Lateral	173 223	SMT-10-NS-KQ-LED-24	
			–	3-pin	0.3		173 225	SMT-10-NS-SQ-LED-24	
		PNP	3-core	–	2.5		173 219	SMT-10-PS-KQ-LED-24	
			–	3-pin	0.3		173 221	SMT-10-PS-SQ-LED-24	

Ordering data – Proximity sensors for C-slot, magnetic reed							Technical data➔ 1 / 10.2-66	
	Mounting	Electrical connection		Cable length [m]	Connection direction	Part No.	Type	
		Cable	M8 plug					
NO contact								
	Insertable from above	–	3-pin	0.3	Longitudinal	525 914	SME-10F-DS-24V-K0,3L-M8D	
		3-core	–	2.5	Longitudinal	525 913	SME-10F-DS-24V-K2,5L-OE	
		2-core				526 672	SME-10F-ZS-24V-K2,5L-OE	
	Insertable from above	3-core	–	2.5	Longitudinal	173 210	SME-10-KL-LED-24	
					Lateral	173 211	SME-10-KQ-LED-24	
		–	3-pin	0.3	Longitudinal	173 212	SME-10-SL-LED-24	
					Lateral	173 213	SME-10-SQ-LED-24	

1) The proximity sensor has 2 wires internally. One pin of the M8 plug is unused

Swivel modules DSM

Accessories

FESTO

Ordering data – Shock absorbers				Technical data → 1 / 9.0-2	
	For Ø	Remarks	Part No.	Type	
	12	For shock absorber retainer DSM-...-CL/CR	158 981	YSR-5-5-C	
	16, 25		160 272	YSR-7-5-C	
	32		34 571	YSR-8-8-C	
	40		34 572	YSR-12-12-C	

Ordering data – Mounting kits					
	For Ø	Remarks	Part No.	Type	
	12	For inductive proximity sensors SIEN-M5	161 041	WSM-12-J-M5	
	16		161 042	WSM-16-J-M5	
	25		161 043	WSM-25-J-M5	
	32	For inductive proximity sensors SIEN-M8	161 044	WSM-32-J-M8	
	40		161 045	WSM-40-J-M8	

Ordering data – Proximity sensors, inductive				Technical data → Volume 4	
	For Ø	Remarks	Connection	Part No.	Type
	12, 16, 25	For mounting kit WSM-...-J-M5	Cable	150 370	SIEN-M5B-PS-K-L
			Plug	150 371	SIEN-M5B-PS-S-L
	32, 40	For mounting kit WSM-...-J-M8	Cable	150 386	SIEN-M8B-PS-K-L
			Plug	150 387	SIEN-M8B-PS-S-L

Ordering data – Plug sockets with cable						Technical data➔ 1 / 10.2-114	
	Mounting	Switch output		Connection	Cable length [m]	Part No.	Type
		PNP	NPN				
Straight socket							
	M8 union nut	■	■	3-pin	2.5	159 420	SIM-M8-3GD-2,5-PU
					5	159 421	SIM-M8-3GD-5-PU
Angled socket							
	M8 union nut	■	■	3-pin	2.5	159 422	SIM-M8-3WD-2,5-PU
					5	159 423	SIM-M8-3WD-5-PU

Ordering data – One-way flow control valves				Technical data ➔ Volume 2	
	Connection		Material	Part No.	Type
	Thread	For tubing O.D.			
For exhaust air					
	M3	3	Metal design	175 041	GRLA-M3-QS-3
	M5	3		193 137	GRLA-M5-QS-3-D
		4		193 138	GRLA-M5-QS-4-D
		6		193 139	GRLA-M5-QS-6-D
		G1/8		3	193 142
	4			193 143	GRLA-1/8-QS-4-D
	6			193 144	GRLA-1/8-QS-6-D
	8			193 145	GRLA-1/8-QS-8-D