

■ 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

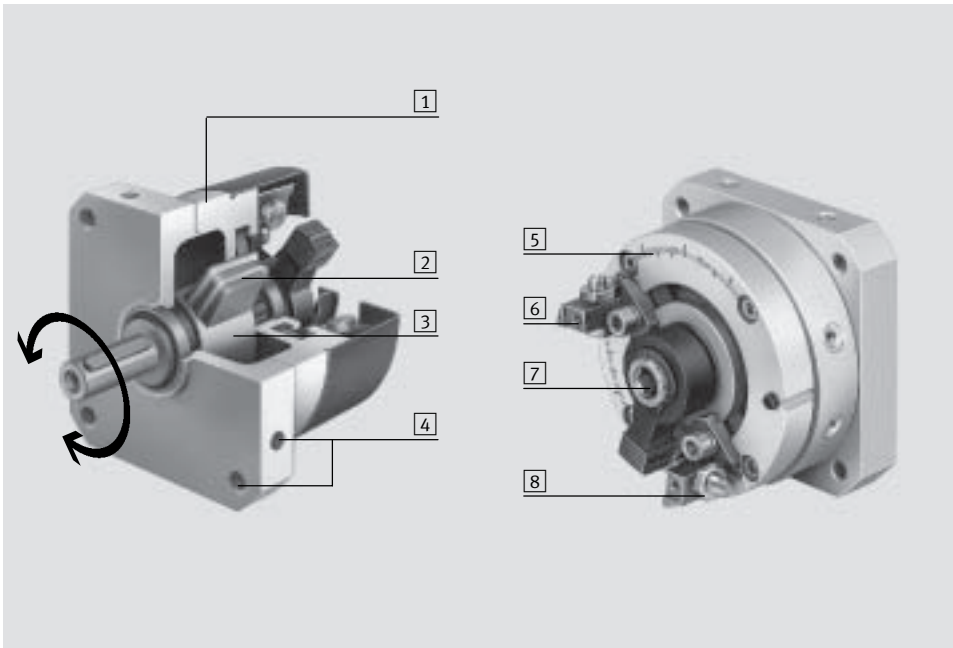
Swivel modules DSM

Key features



Swivel drives
Semi-rotary-vane drives

4.1



- 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

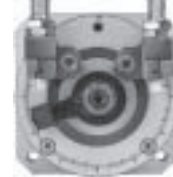


DSM with fixed stop

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

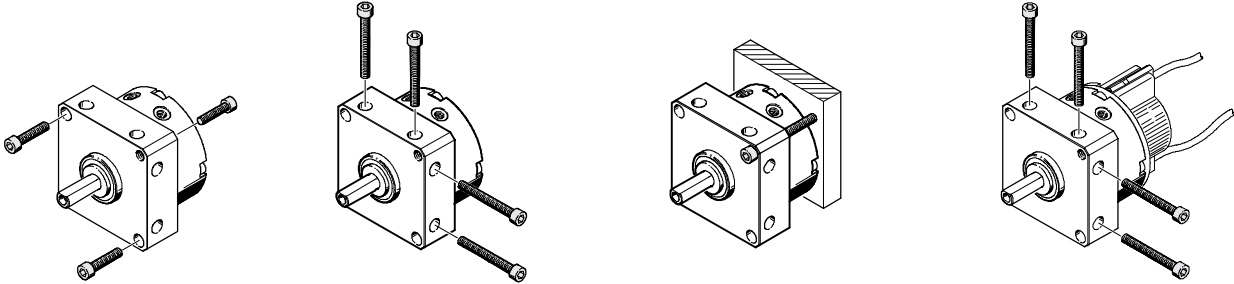


Swivel modules DSM

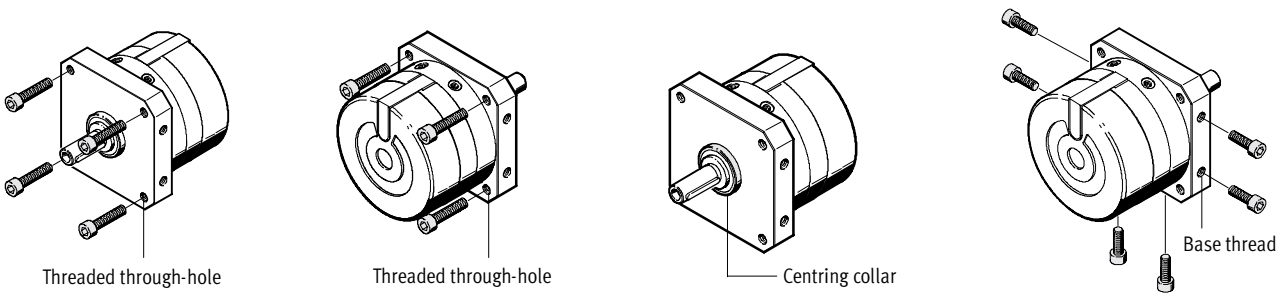
Key features

Mounting options

DSM-6 ... 10



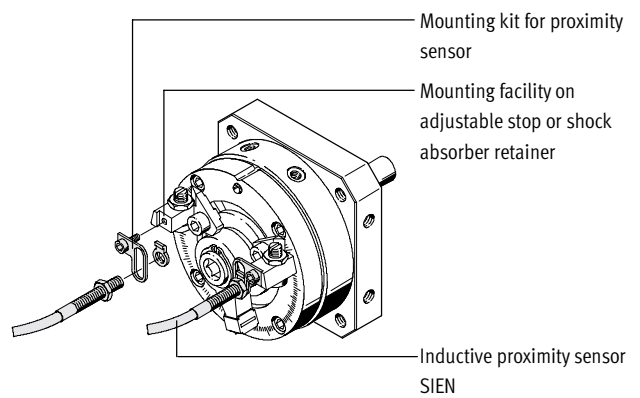
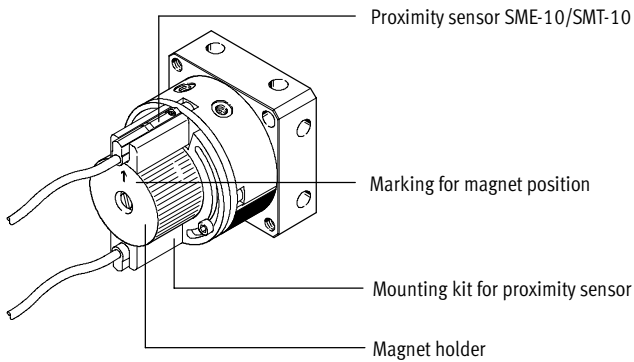
DSM-12 ... 40



Position sensing

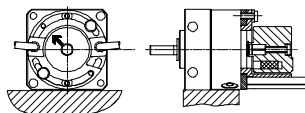
with DSM-6 ... 10

with DSM-12 ... 40

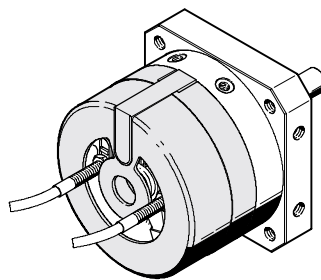
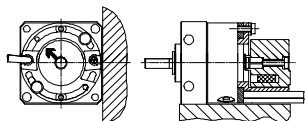


Note
If a swivel module with position sensing is to be attached to a ferritic component, the diagram opposite should be observed in order to assure reliable switching of the proximity sensor.

Recommended:



Not recommended:



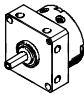
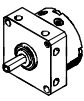
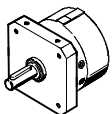
Swivel modules DSM

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

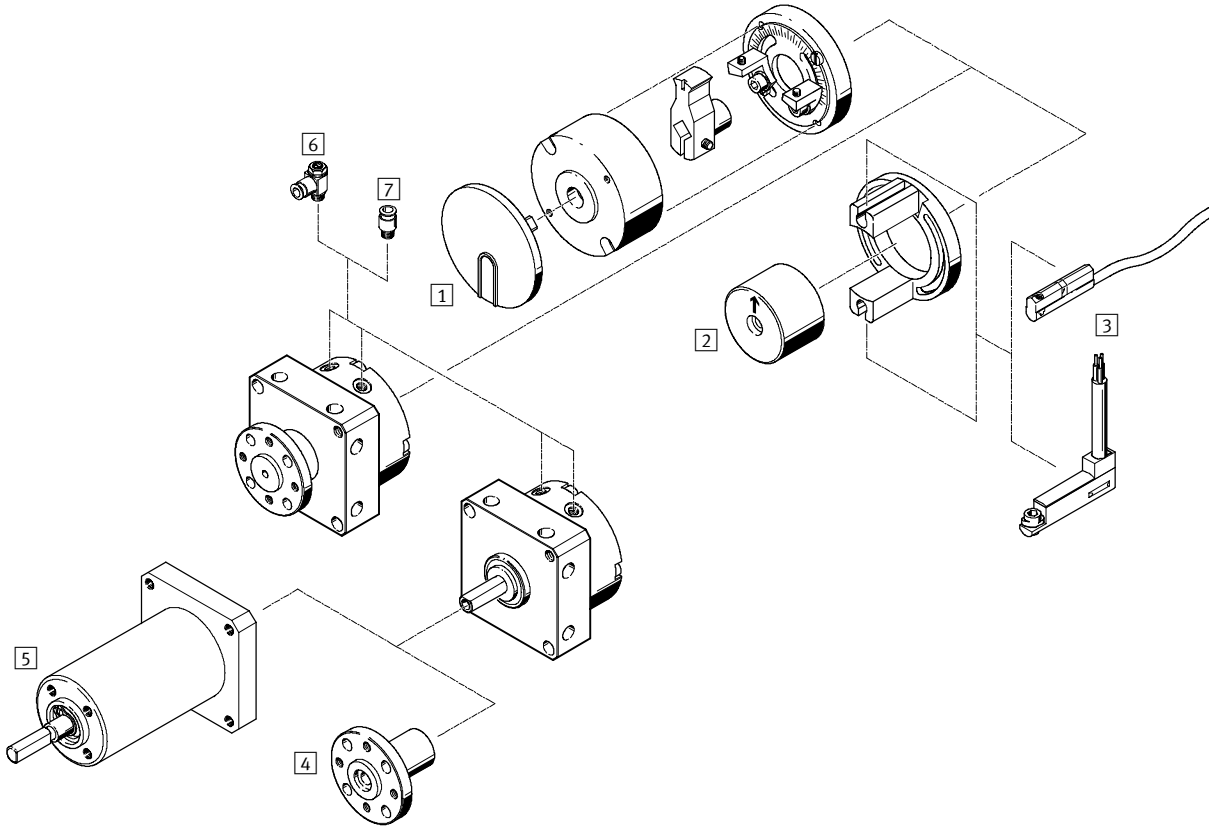
Type	Fixed stop	Shock absorber			→ Page
		Left CL	Right CR	At both ends CC	
with fixed swivel angle					
DSM-6 ... 10	■	-	-	-	1 / 4.1-9
with adjustable swivel angle					
DSM-6 ... 10	■	-	-	-	1 / 4.1-9
DSM-12 ... 40	■	■	■	■	1 / 4.1-19

Swivel modules DSM

Peripherals overview



Piston \varnothing 6 ... 10 mm



Swivel drives
Semi-rotary-vane drives

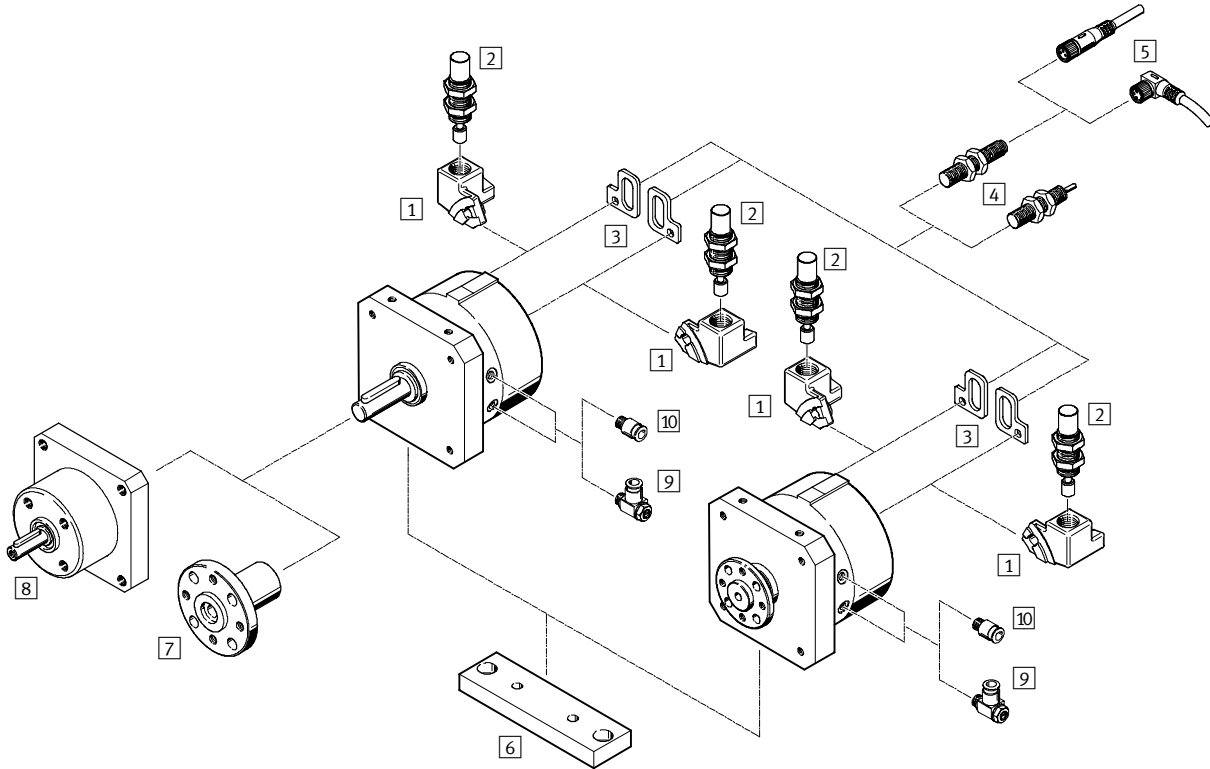
4.1

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 to CETOP RP 54 P	Volume 3

Swivel modules DSM

Peripherals overview

Piston \varnothing 12 ... 40 mm

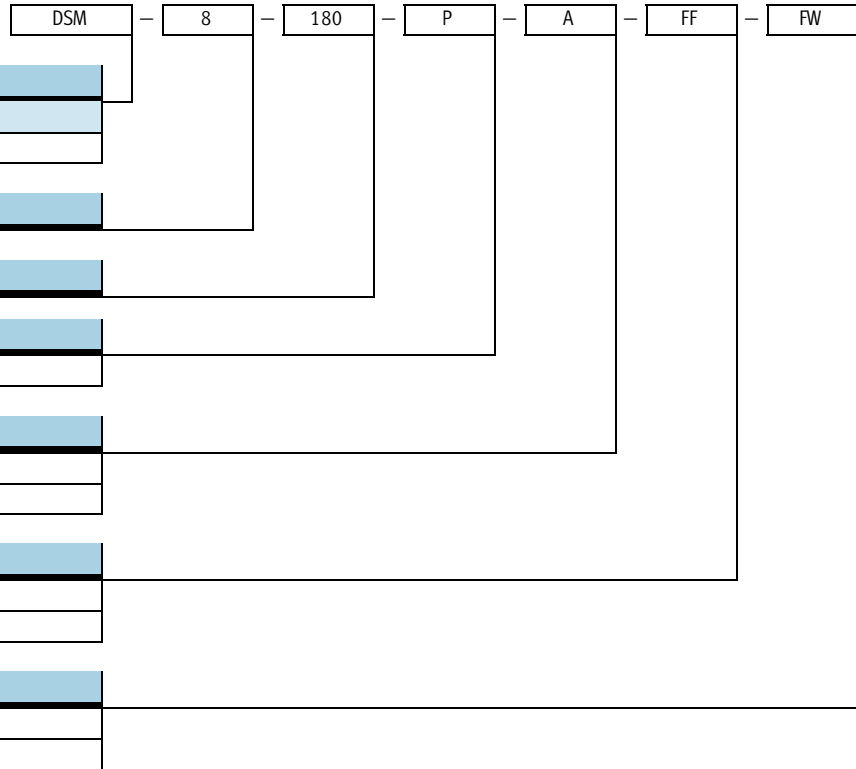


Accessories		
	Brief description	→ Page
1	Shock absorber retainer DSM-...-CL/CR	1 / 4.1-28
2	Shock absorber YSR	1 / 4.1-32
3	Mounting kit WSM-...-J-M...	1 / 4.1-32
4	Proximity sensor, inductive SIEN	1 / 4.1-32
5	Plug socket with cable SIM	1 / 4.1-32
6	Mounting plate HSM	1 / 4.1-29
7	Push-on flange FWSR	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

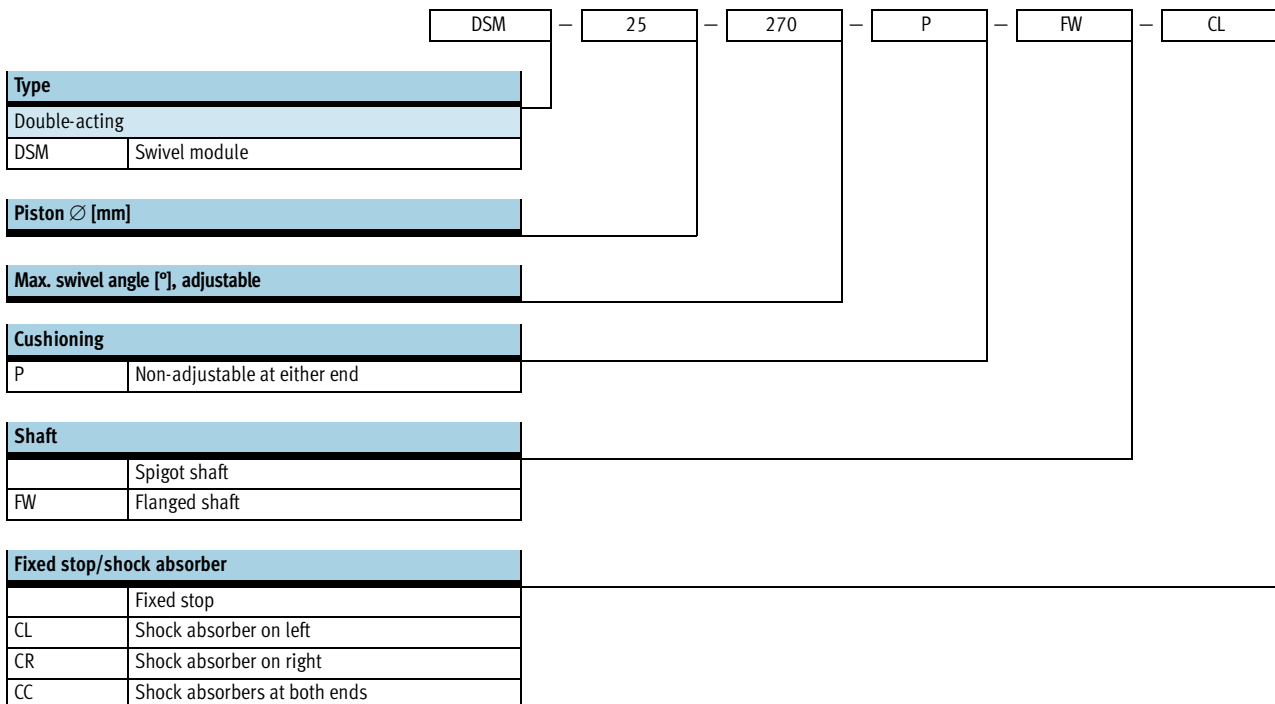
Swivel modules DSM

Type codes

Piston Ø 6 ... 10 mm



Piston Ø 12 ... 40 mm

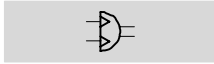


Swivel modules DSM

Technical data DSM-6 ... 10

FESTO

Function



⌀ - Diameter
6 ... 10 mm



General technical data				
Piston ⌀		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		
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 ⌀		6	8	10
Operating pressure		3.5 ... 8 bar		
Temperature range ¹⁾		0 ... +60 °C		

1) Note operating range of proximity sensors

Forces and torques				
Piston ⌀		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

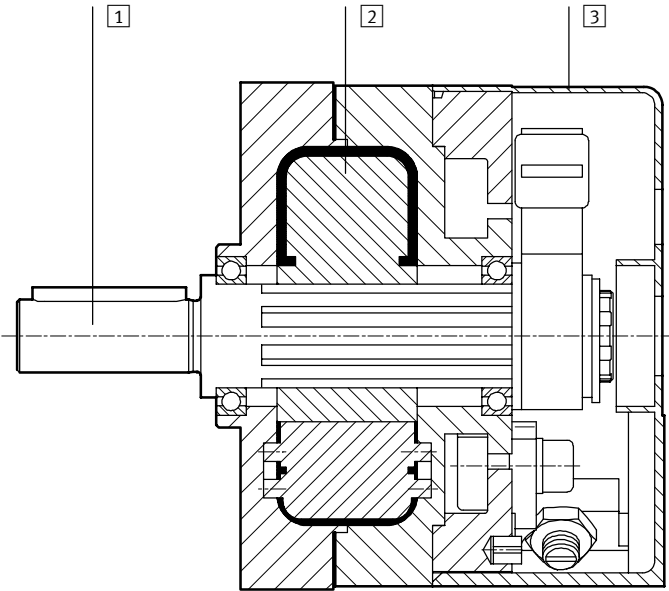
Weights [g]				
Piston ⌀		6	8	10
Basic variant		45	78	140

Swivel modules DSM

Technical data DSM-6 ... 10

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

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 $4.5 \times 10^{-4} \text{ kgm}^2$.

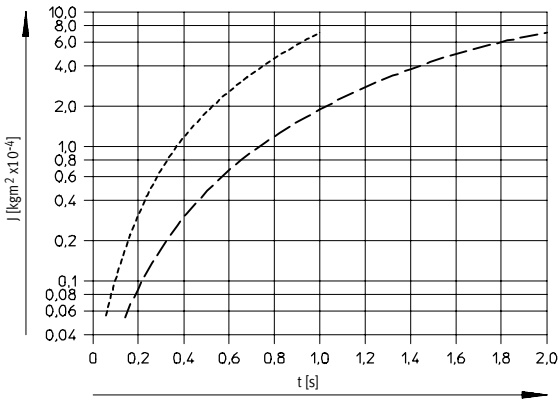
Question:
Is the value for the mass moment of inertia still permissible?

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!

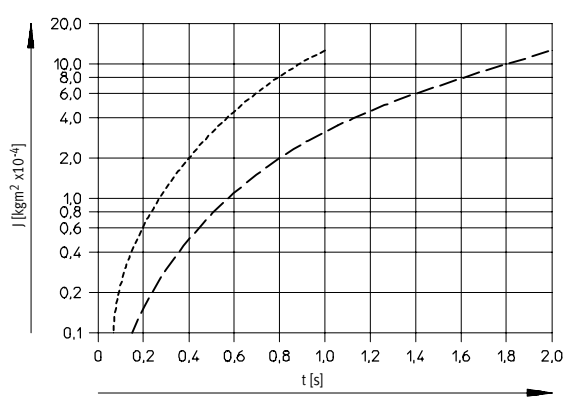
If the permissible mass moment of inertia had been exceeded in this example, it would be necessary to reduce the angular velocity by means of flow control valves, or to equip the DSM-25 with shock absorbers.

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

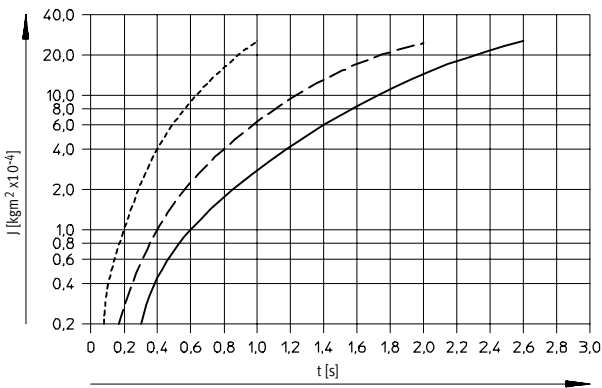
DSM-6



DSM-8



DSM-10



- - - - 90°
- · - · 180°
- 240°

Swivel modules DSM

Technical data DSM-6 ... 10



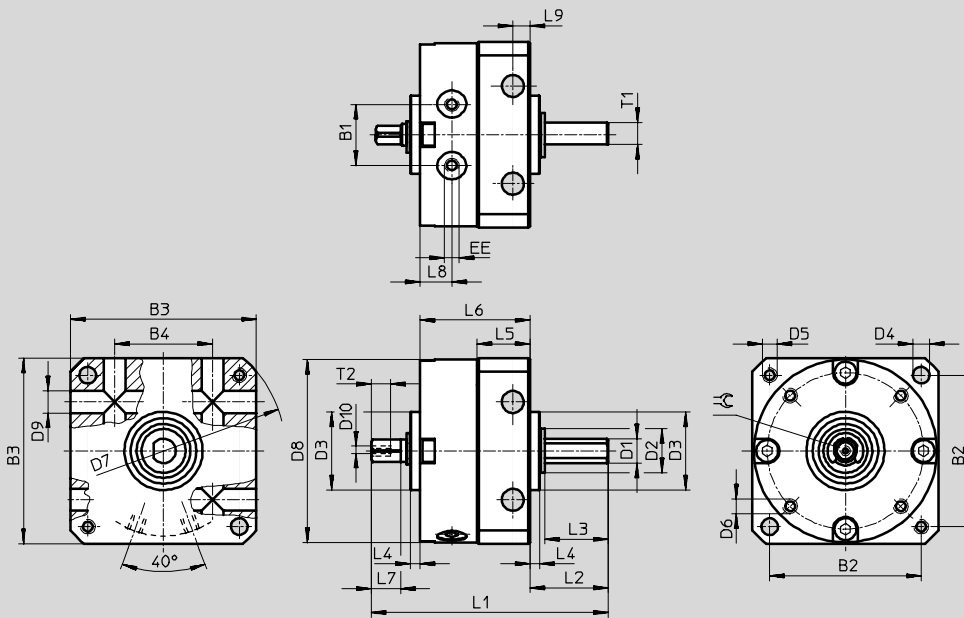
Swivel drives
Semi-rotary-vane drives

4.1

Dimensions

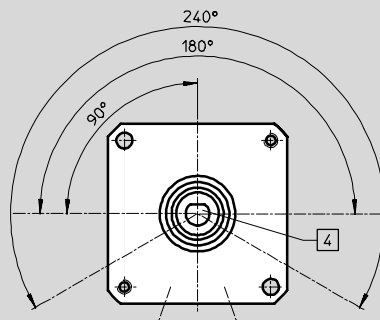
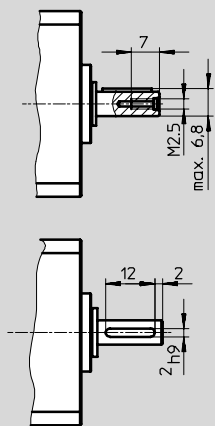
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with spigot shaft and fixed stop



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.

∅	B1	B2	B3	B4	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	EE
[mm]					∅ g7	∅	∅	∅ H12			∅ H12	∅	∅ 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

∅	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

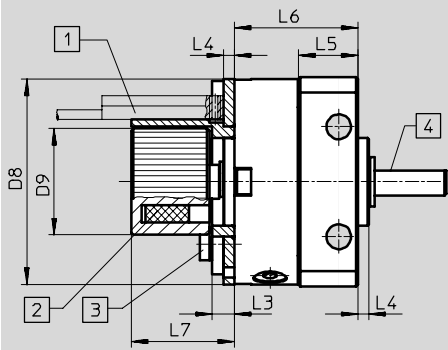
Technical data DSM-6 ... 10



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.

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

2 Magnet position

∅ [mm]	D8 ∅	D9 ∅	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

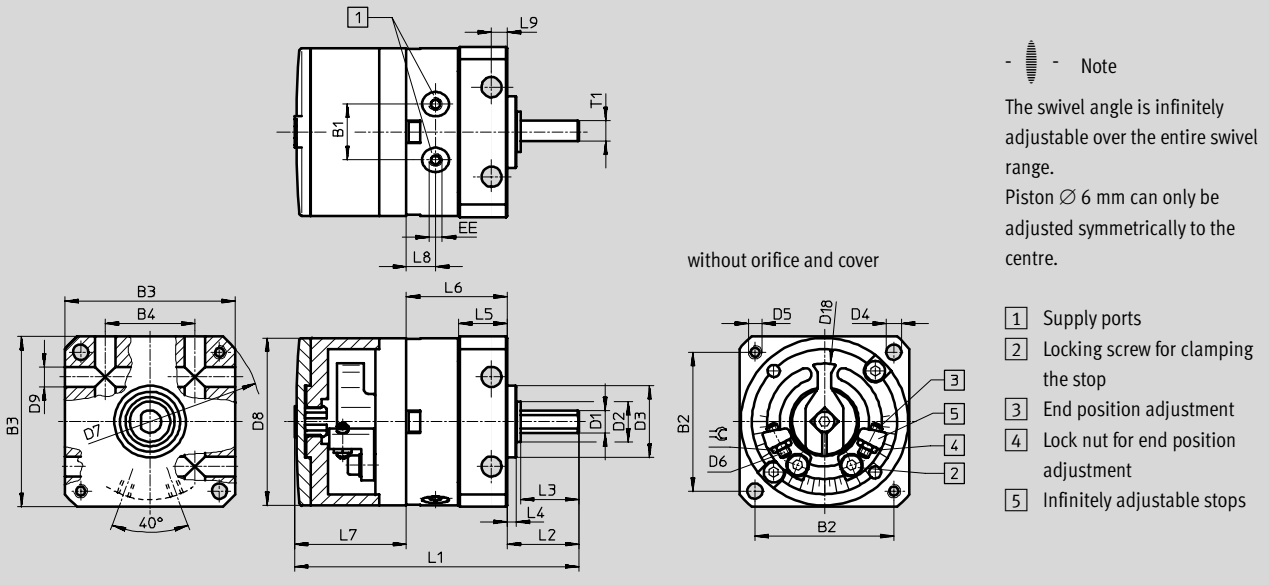
Technical data DSM-6 ... 10



Dimensions

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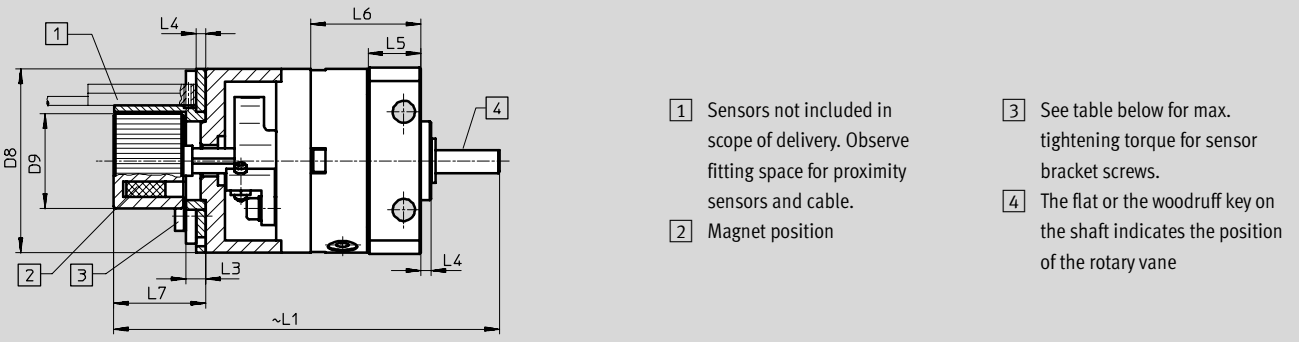
With spigot shaft, fixed stop and adjustable swivel angle



\varnothing	B1	B2	B3	B4	D1	D2	D3	D4	D5	D6	D7	D8	D9	D18	EE
[mm]					\varnothing g7	\varnothing	\varnothing	\varnothing H12			\varnothing H12	\varnothing	\varnothing H12	\varnothing	
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	L1	L2	L3	L4	L5	L6	L7	L8	L9	T1	\approx	Max. swivel angle	Precision adjustment both ends
[mm]													
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	D8	D9	L1	L3	L4	L5	L6	L7	Tightening torque [Nm]
[mm]	\varnothing								
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

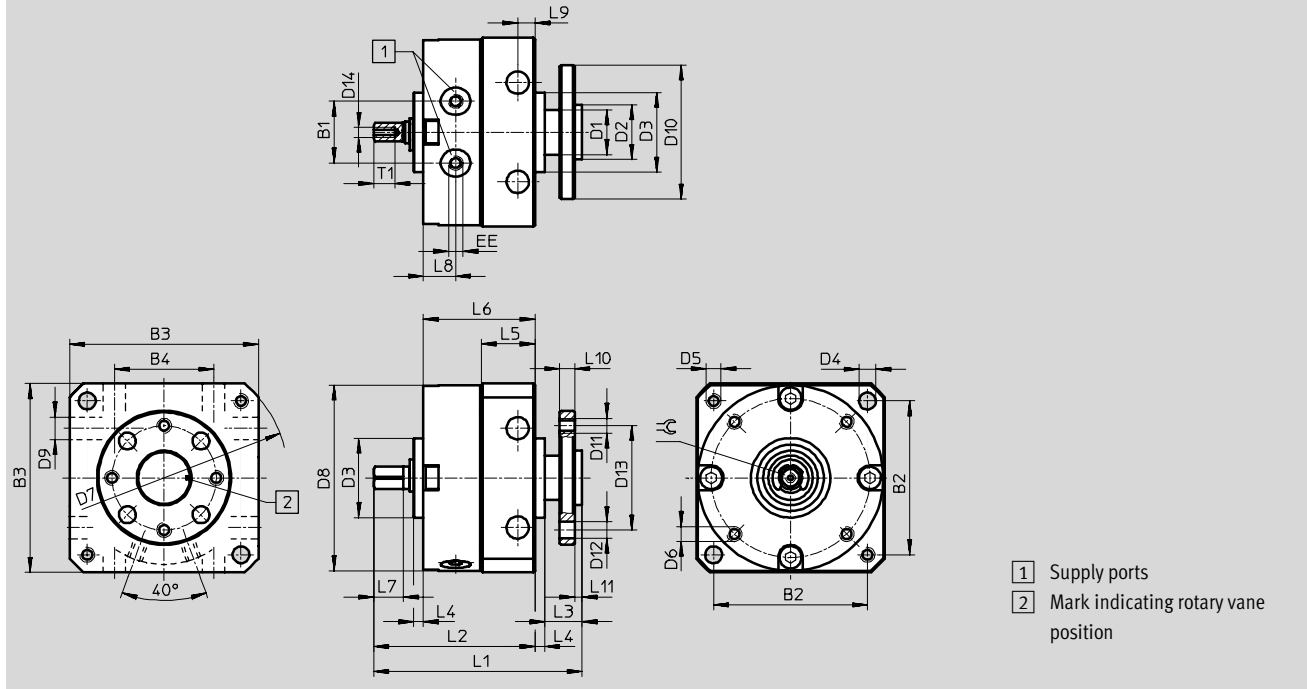


Swivel drives
Semi-rotary-vane drives

4.1

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With fixed stop and flanged shaft

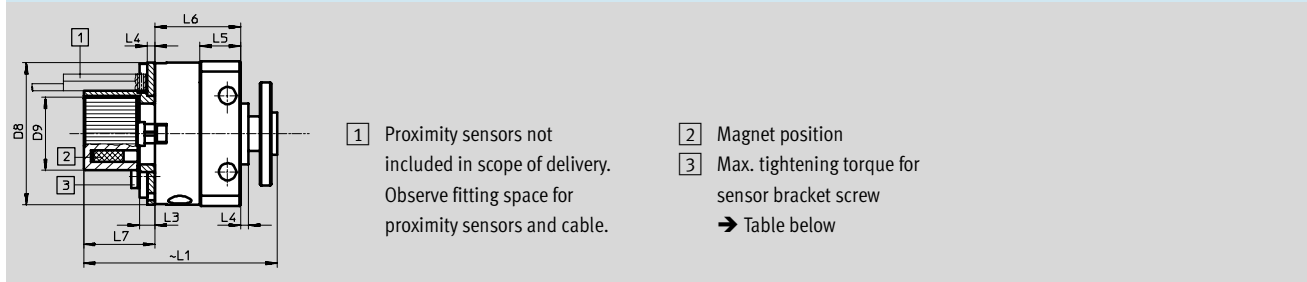


- 1 Supply ports
- 2 Mark indicating rotary vane position

∅	B1	B2	B3	B4	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13
[mm]					∅	g7	f8	∅			∅	∅	∅	∅		∅	∅
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

∅	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



- 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 screw → Table below

∅	D8	D9	L1	L3	L4	L5	L6	L7	Tightening torque [Nm]
[mm]	∅	∅							
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

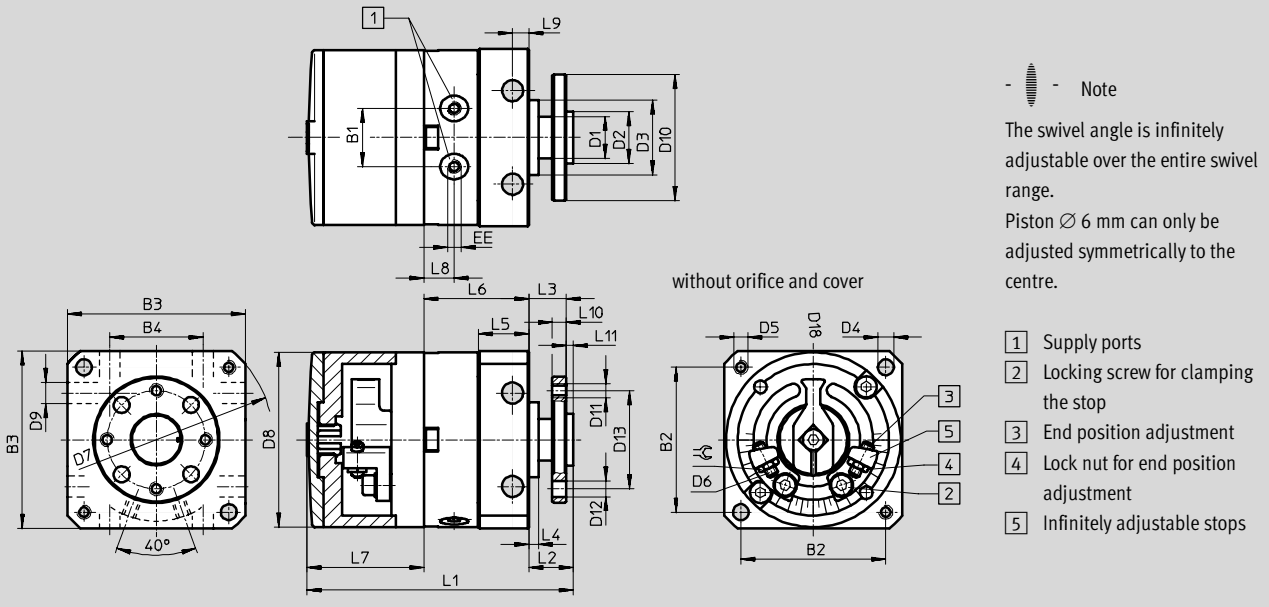


Swivel drives
Semi-rotary-vane drives
4.1

Dimensions

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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

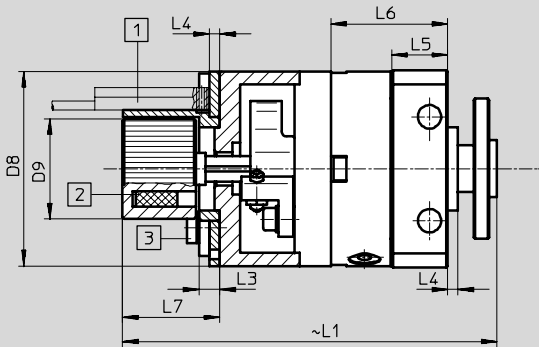
\varnothing	L5	L6	L7	L8	L9	L10	L11	\approx	Max. swivel angle	Precision adjustment both ends
[mm]										
6	9.8	21	17.8	6	3	3	1.5	4	180° +5°	+1°/-5°
8	11.3	23	24.9	6.5	3	3	1.5	5	180° +5°	+1°/-5°
10	14.3	28.4	28.2	7.5	4	3	1.6	5.5	200° +5°	+1°/-5°

Swivel modules DSM

Technical data DSM-6 ... 10

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

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

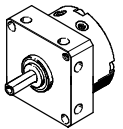
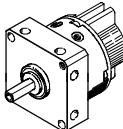
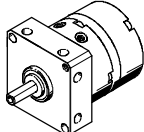
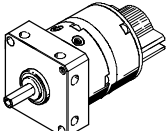
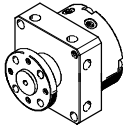
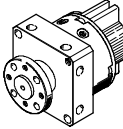
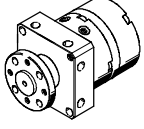
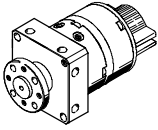
- - Note
 The swivel angle is infinitely adjustable over the entire swivel range.
 Piston \varnothing 6 mm can only be adjusted symmetrically to the centre.

\varnothing [mm]	D8 \varnothing	D9 \varnothing	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



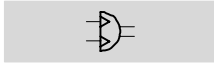
Ordering data					
Swivel module	Key features	Max. swivel angle	∅ [mm]	Part No.	Type
Spigot shaft					
	■ Fixed stop	90°	6 8 10	173 188 173 190 173 192	DSM-6-90-P DSM-8-90-P DSM-10-90-P
		180°	6 8 10	173 189 173 191 173 193	DSM-6-180-P DSM-8-180-P DSM-10-180-P
		240°	10	173 194	DSM-10-240-P
	■ Fixed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

FESTO

Function



⌀ - Diameter
12 ... 40 mm

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General technical data		12	16	25	32	40
Piston ⌀		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 bar ¹⁾		82 cm ³	163 cm ³	288 cm ³	632 cm ³	1,168 cm ³

1) Theoretical values

Operating and environmental conditions		12	16	25	32	40
Piston ⌀		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		12	16	25	32	40
Piston ⌀		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



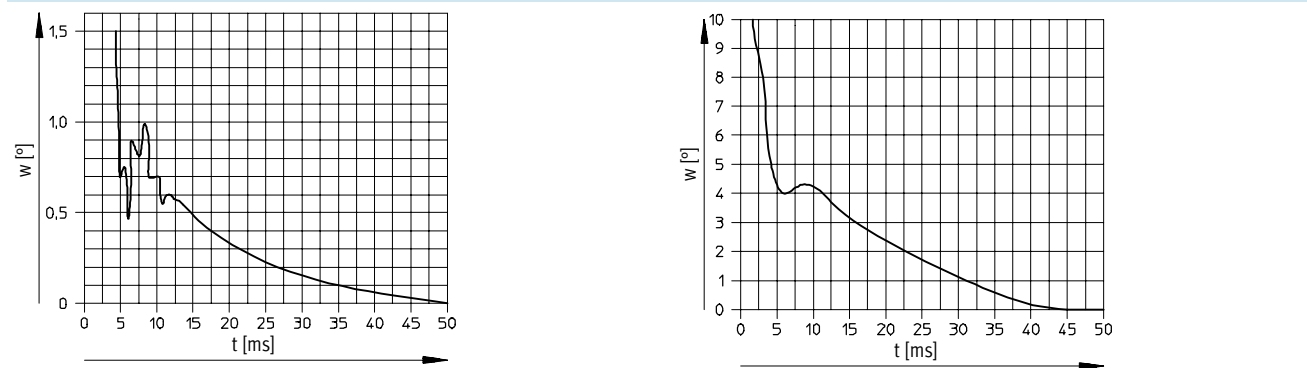
Swivel drives
Semi-rotary-vane drives

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

4.1

Cushioning (cushioning angle w as a function of swivel time t)



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 $4.5 \times 10^{-4} \text{ kgm}^2$.

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.

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

Swivel modules DSM

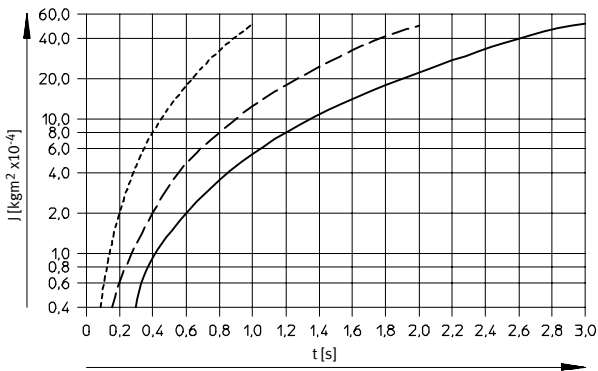
Technical data DSM-12 ... 40



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

Without shock absorber

DSM-12-270-P

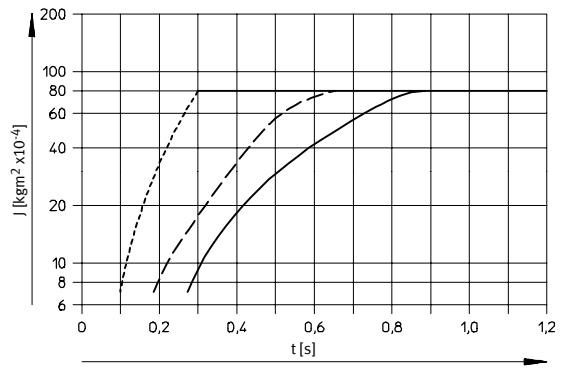


With shock absorber

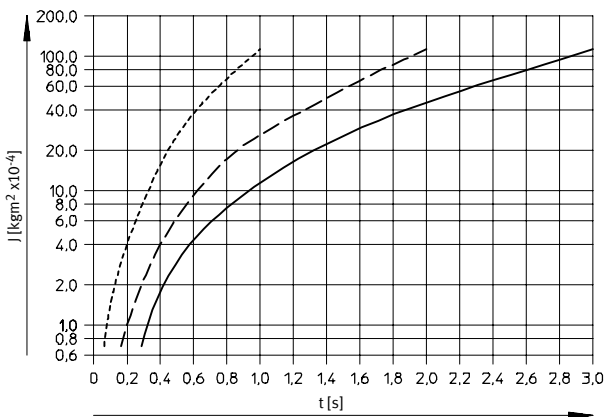
DSM-12-270-P-CL/CR/CC

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



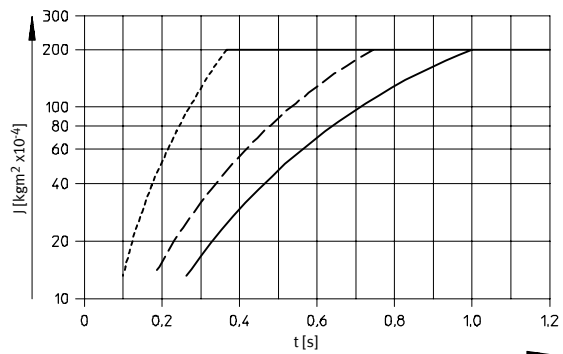
DSM-16-270-P



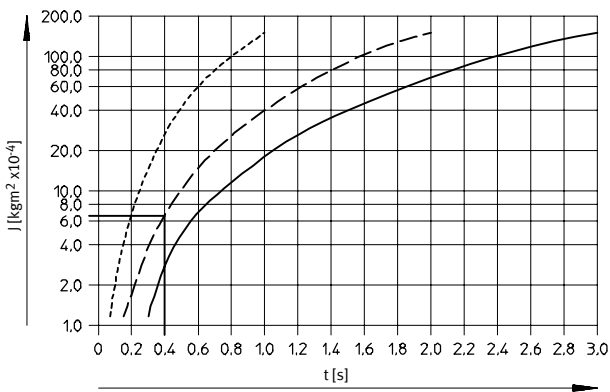
DSM-16-270-P-CL/CR/CC

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



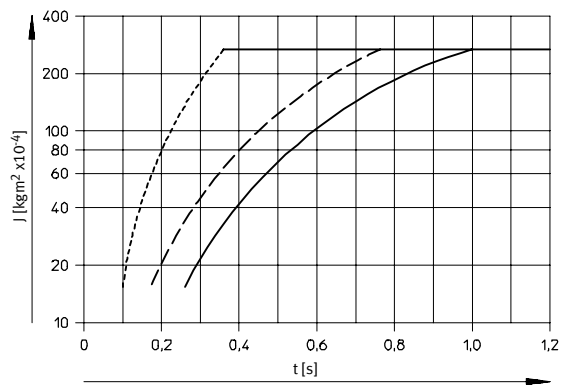
DSM-25-270-P



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



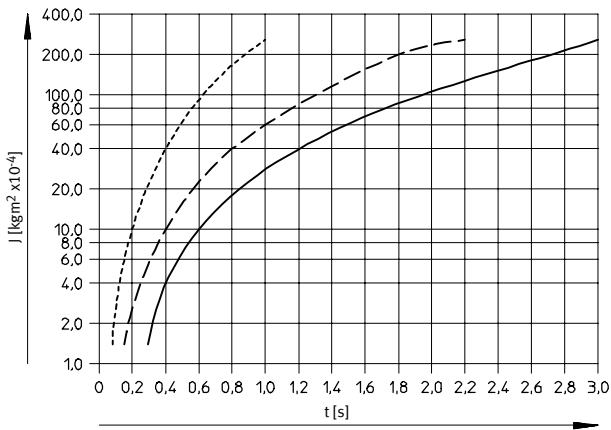
Swivel drives
Semi-rotary-vane drives

4.1

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

Without shock absorber

DSM-32-270-P

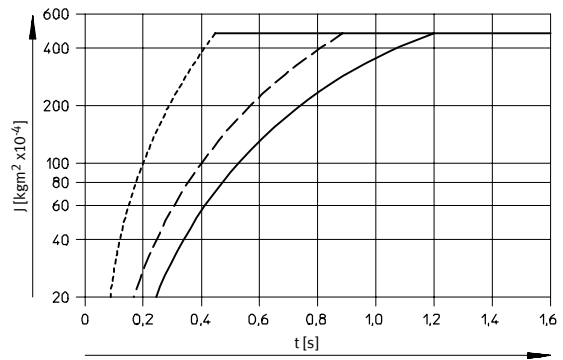


With shock absorber

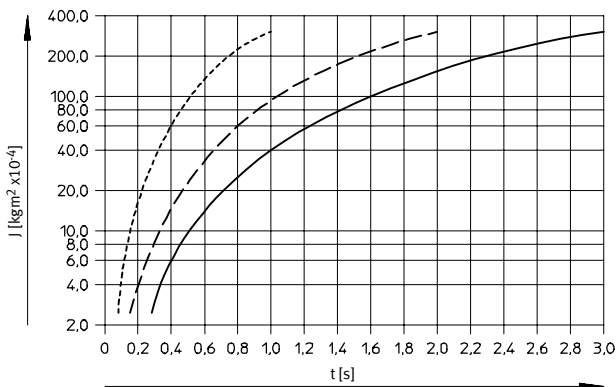
DSM-32-270-P-CL/CR/CC

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



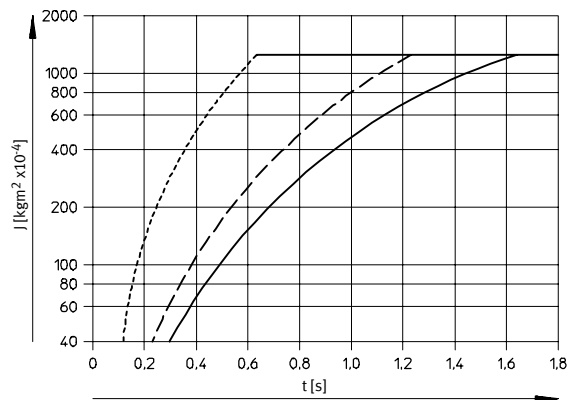
DSM-40-270-P



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°

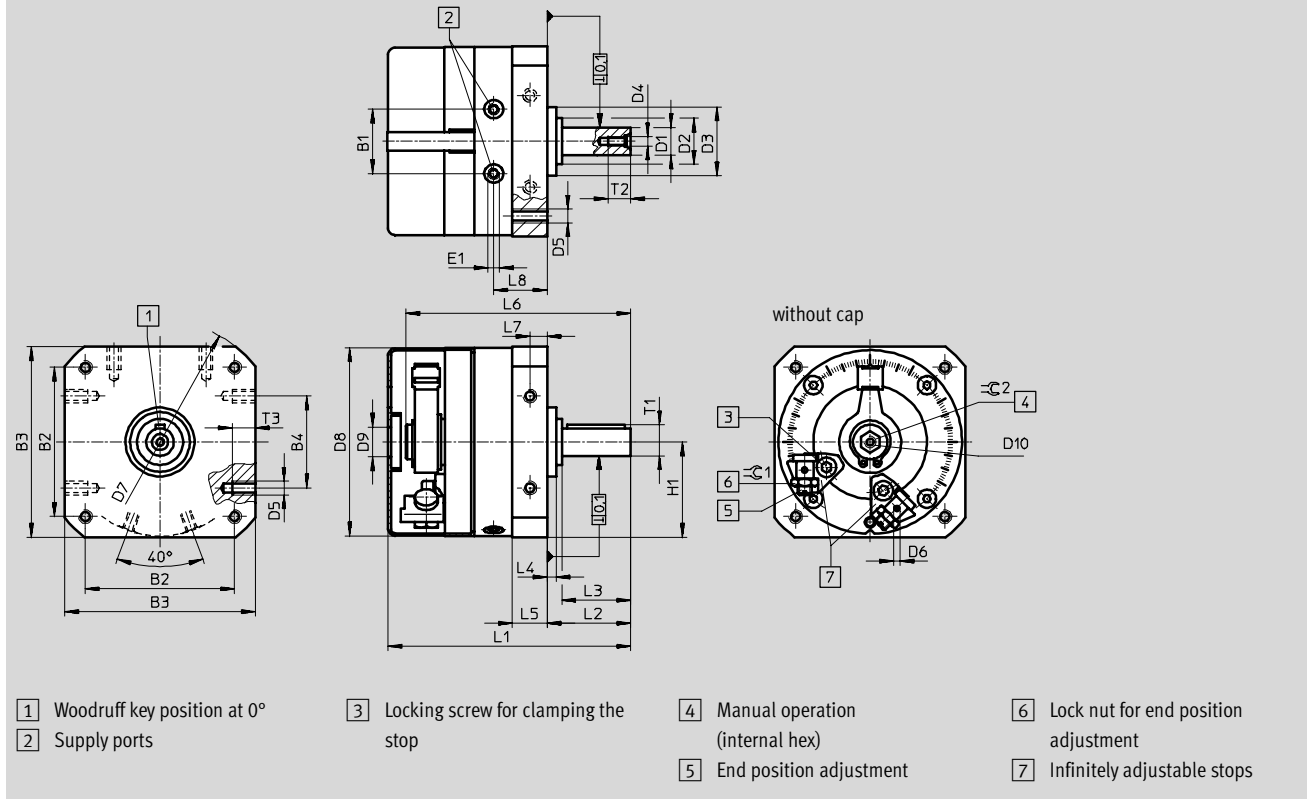
Swivel modules DSM

Technical data DSM-12 ... 40



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

With spigot shaft and fixed stop



∅	B1	B2	B3	B4	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	E1	H1
[mm]					∅ g7	∅	∅ f8				∅	∅	∅			
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

∅	L1	L2	L3	L4	L5	L6	L7	L8	T1	T2	T3	≙C1	≙C2	Woodruff key to DIN 6885
[mm]									max.					
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

Swivel modules DSM

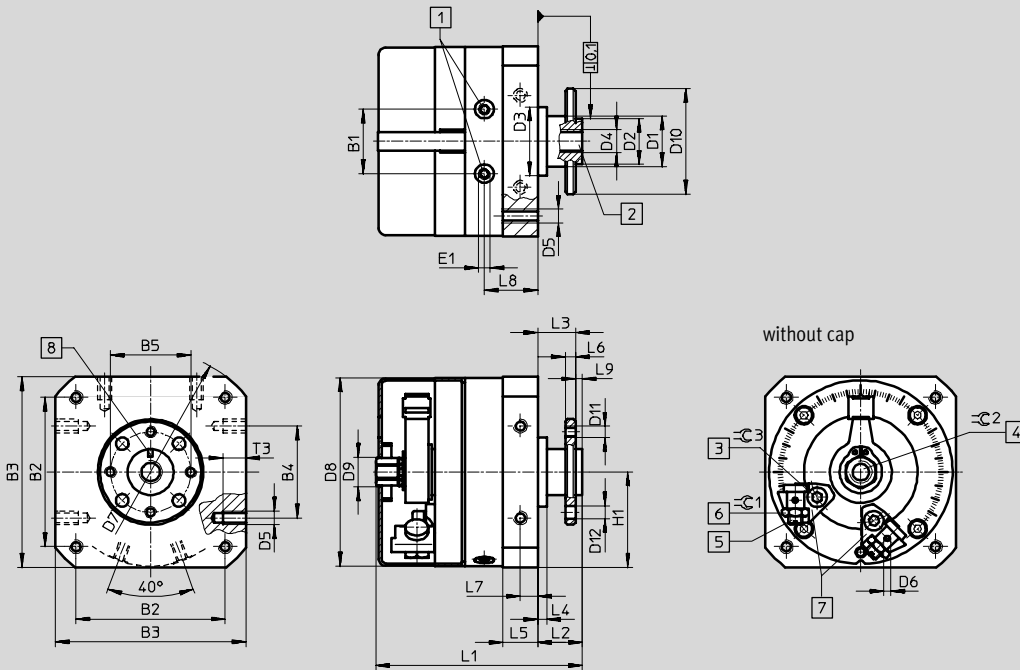
Technical data DSM-12 ... 40



Dimensions

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

With fixed stop and flanged shaft



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

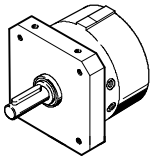
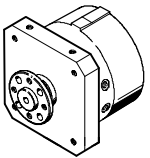
∅	B1	B2	B3	B4	B5	D1	D2	D3	D4	D5	D6	∅	D8	D9	∅	D11
[mm]						∅	∅ f8	∅ f8					∅	∅		
12	19.8	48	59	30	25	15	14	24	M5	M4	M3	78	58	9	33	M3
16	23.5	57	70	40	28	18	16	28	M5	M5	M3	91	69	12.5	38	M4
25	28	65	83	40	35	20	20	30	G1/8	M6	M3	106	82	13	46	M5
32	35.5	85	105	60	45	27	28	42	G1/8	M8	M3	135	104	16.5	60	M6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

∅	D12	E1	H1	L1	L2	L3	L4	L5	L6	L7	L8	L9	T3	≈C1	≈C2	≈C3
[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



Ordering data					
Swivel module	Key features	Max. swivel angle	∅ [mm]	Part No.	Type
Spigot shaft					
	<ul style="list-style-type: none"> ■ 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	
	<ul style="list-style-type: none"> ■ Shock absorber on left ■ Adjustable swivel angle 	254°	12	164 321	DSM-12-270-P-CL
		254°	16	163 000	DSM-16-270-P-CL
		258°	25	163 002	DSM-25-270-P-CL
		258°	32	163 004	DSM-32-270-P-CL
		255°	40	163 006	DSM-40-270-P-CL
	<ul style="list-style-type: none"> ■ Shock absorber on right ■ Adjustable swivel angle 	254°	12	164 322	DSM-12-270-P-CR
		254°	16	163 001	DSM-16-270-P-CR
		258°	25	163 003	DSM-25-270-P-CR
		258°	32	163 005	DSM-32-270-P-CR
		255°	40	163 007	DSM-40-270-P-CR
	<ul style="list-style-type: none"> ■ Shock absorbers on both sides ■ Adjustable swivel angle 	238°	12	164 323	DSM-12-270-P-CC
238°		16	161 746	DSM-16-270-P-CC	
246°		25	161 747	DSM-25-270-P-CC	
246°		32	161 748	DSM-32-270-P-CC	
240°		40	161 749	DSM-40-270-P-CC	
Flanged shaft					
	<ul style="list-style-type: none"> ■ 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	
	<ul style="list-style-type: none"> ■ Shock absorber on left ■ Adjustable swivel angle 	254°	12	170 080	DSM-12-270-P-FW-CL
		254°	16	170 083	DSM-16-270-P-FW-CL
		258°	25	170 086	DSM-25-270-P-FW-CL
		258°	32	170 089	DSM-32-270-P-FW-CL
		255°	40	170 092	DSM-40-270-P-FW-CL
	<ul style="list-style-type: none"> ■ Shock absorber on right ■ Adjustable swivel angle 	254°	12	170 081	DSM-12-270-P-FW-CR
		254°	16	170 084	DSM-16-270-P-FW-CR
		258°	25	170 087	DSM-25-270-P-FW-CR
		258°	32	170 090	DSM-32-270-P-FW-CR
		255°	40	170 093	DSM-40-270-P-FW-CR
	<ul style="list-style-type: none"> ■ Shock absorbers at both ends ■ Adjustable swivel angle 	238°	12	170 079	DSM-12-270-P-FW-CC
238°		16	170 082	DSM-16-270-P-FW-CC	
246°		25	170 085	DSM-25-270-P-FW-CC	
246°		32	170 088	DSM-32-270-P-FW-CC	
240°		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 ... 40 hardened steel

Sleeve: \varnothing 6, 8 steel

\varnothing 10 ... 40 hardened steel



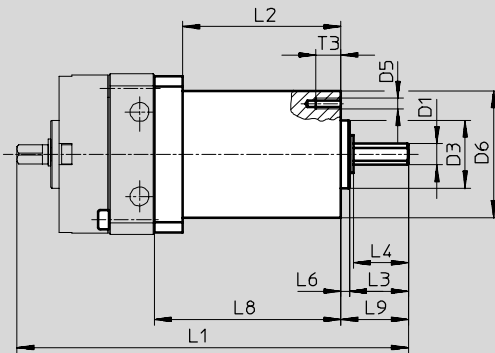
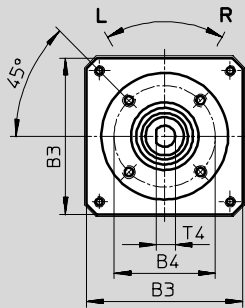
Note

The minimum possible swivel angle is 3°.

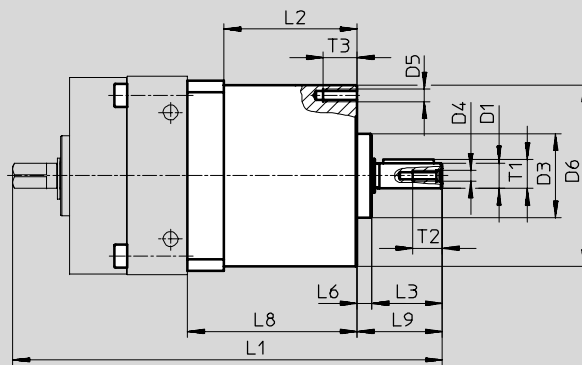
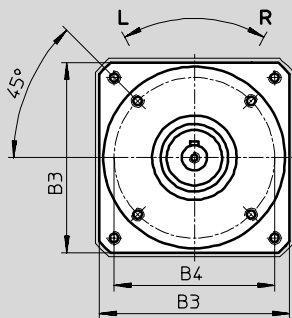
Switching accuracy is, however, dependent on speed and load.

Dimensions

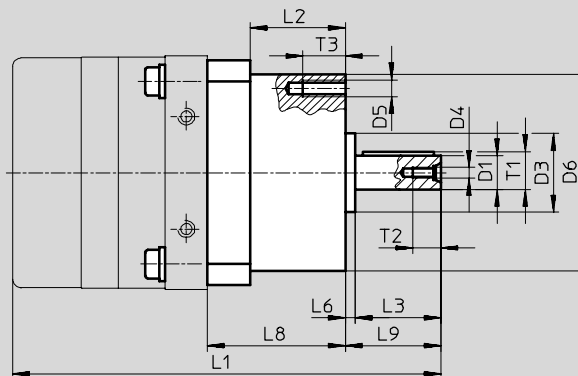
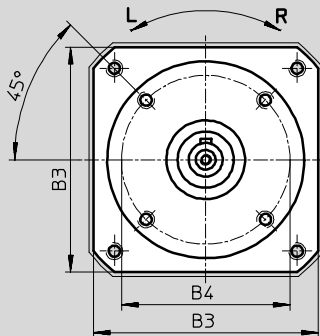
FLSM-6/8



FLSM-10



FLSM-12 ... 40



Swivel modules DSM

Accessories



Dimensions and ordering data													
For \varnothing	B3	B4	D1	D3	D4	D5	D6	L1	L2	L3	L4	L6	L8
[mm]		± 0.15	\varnothing g7	\varnothing h8			\varnothing ± 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 \varnothing	L9	T1	T2	T3	T4	Woodruff key to DIN 6885	CRC ¹⁾	Weight	Rotation ²⁾	Part No.	Type
[mm]								[g]			
6	12.8	–	–	5	3.5	–	2	100	Indexing left	188 523	FLSM-6-L
									Indexing right	188 522	FLSM-6-R
8	16	–	–	6	4.5	–	2	125	Indexing left	188 525	FLSM-8-L
									Indexing right	188 524	FLSM-8-R
10	20.2	6.8	7	8	–	A2x2x12	2	160	Indexing left	188 527	FLSM-10-L
									Indexing right	188 526	FLSM-10-R
12	24.5	8.8	9	8	–	A2x2x16	2	300	Indexing left	164 229	FLSM-12-L
									Indexing right	164 234	FLSM-12-R
16	27.4	11.2	9	10	–	A3x3x18	2	450	Indexing left	164 230	FLSM-16-L
									Indexing right	164 235	FLSM-16-R
25	34	13.5	10	15	–	A4x4x25	2	650	Indexing left	164 231	FLSM-25-L
									Indexing right	164 236	FLSM-25-R
32	48.5	18	12.5	15	–	A5x5x36	2	1 500	Indexing left	164 232	FLSM-32-L
									Indexing right	164 237	FLSM-32-R
40	58	22.5	16	15	–	A6x6x45	2	2 350	Indexing left	164 233	FLSM-40-L
									Indexing right	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.

2) Viewed from drive shaft side

FLSM-...-L: Anticlockwise rotation

FLSM-...-R: Clockwise rotation

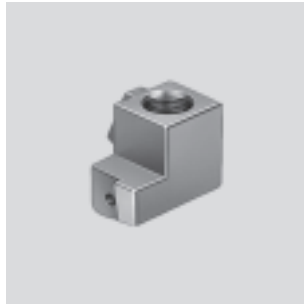
Swivel modules DSM

Accessories



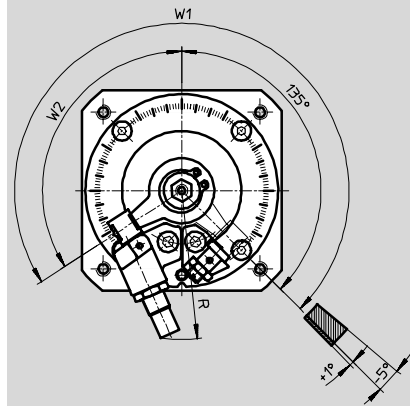
Shock absorber retainer DSM-...-CL/CR

Material:
Galvanised steel
Free of copper, PTFE and silicone

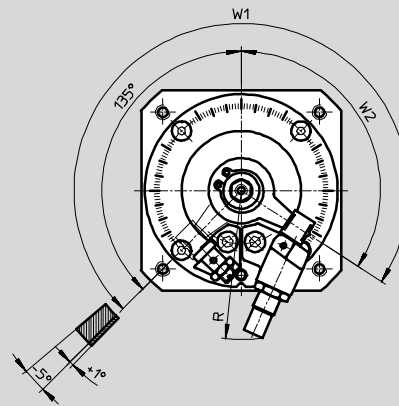


Dimensions

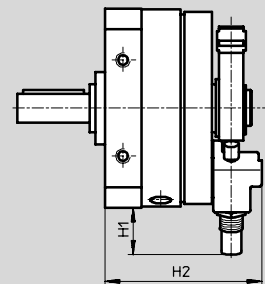
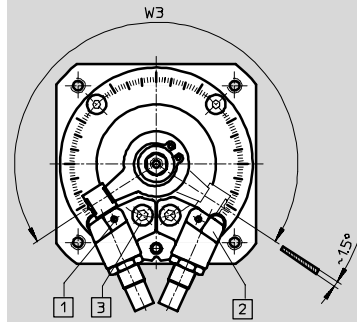
CL variants



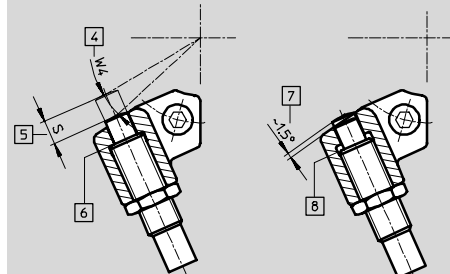
CR variants



CC variants



Precision adjustment



- | | | | |
|---|---|---|---|
| <p>1 Mounting thread for end position sensing</p> <p>2 Infinitely adjustable shock absorber retainer for adjustment of swivel angle</p> | <p>3 Locking screw for tightening the shock absorber retainer</p> <p>4 Cushioning angle</p> | <p>5 Cushioning length</p> <p>6 Shock absorber at internal stop in retainer</p> | <p>7 Precision adjustment (not with DSM-12)</p> <p>8 Shock absorber unscrewed</p> |
|---|---|---|---|

Swivel modules DSM

Accessories

FESTO

Swivel drives
Semi-rotary-vane drives

4.1

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°

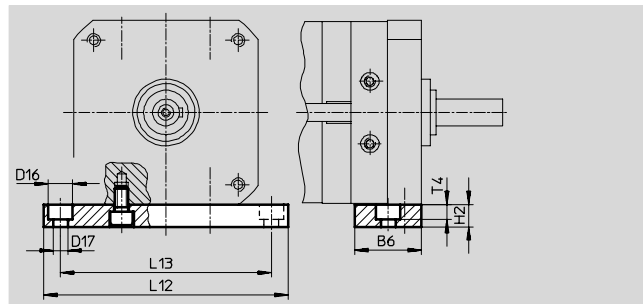
For Ø	W3	W4	Woodruff key to DIN 6885	CRC ¹⁾	Weight [g]	For shock absorbers	Part No.	Type
[mm]	max.							
12	238°	13°	A2x2x16	2	30	Left	164 324	DSM-12-CL
						Right	164 325	DSM-12-CR
16	238°	12°	A3x3x18	2	50	Left	161 184	DSM-16-CL
						Right	161 185	DSM-16-CR
25	246°	10°	A4x4x25	2	51	Left	161 186	DSM-25-CL
						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

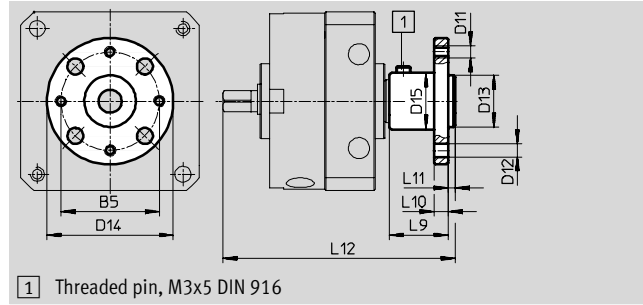
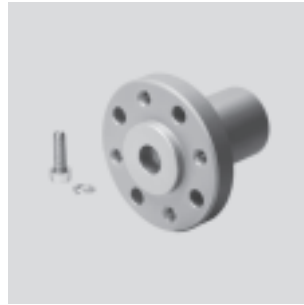
Accessories



Push-on flange FWSR

for piston \varnothing 6/8

Material:
Wrought aluminium alloy, anodised
Free of copper, PTFE and silicone



1 Threaded pin, M3x5 DIN 916

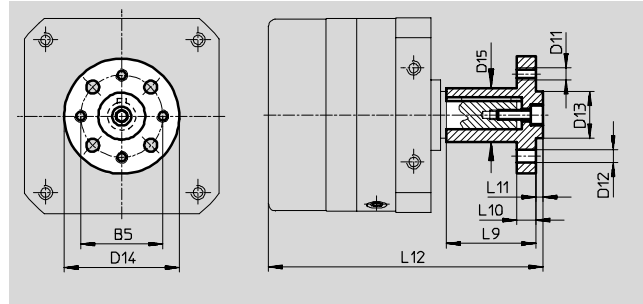
Dimensions and ordering data														
For \varnothing	B5	D11	D12	D13	D14	D15	L9	L10	L11	L12	CRC ¹⁾	Weight	Part No.	Type
[mm]			\varnothing	\varnothing	\varnothing	\varnothing						[g]		
6	16	M3	3.4	8	23	10	10.5	3	1.5	45	2	6	185 948	FWSR-6
8	21	M3	3.4	11	27	12	12.5	3	1.5	51	2	8	185 949	FWSR-8

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.


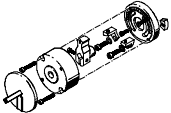
Dimensions and ordering data														
For \varnothing	B5	D11	D12	D13	D14	D15	L9	L10	L11	L12	CRC ¹⁾	Weight	Part No.	Type
[mm]			\varnothing	\varnothing	\varnothing	\varnothing						[g]		
10	21	M3	3.4	11	30	12	22	3	1.6	68.6	2	14	32 798	FWSR-10
12	25	M3	3.4	14	35	15	25	3	3	85.5	2	32	14 659	FWSR-12
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





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 slot type 10, magneto-resistive							Data sheets → 1 / 10.2-53		
	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 slot type 10, magnetic reed							Data sheets → 1 / 10.2-55		
	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	–	–	Lateral	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		
		2-core	–	2.5	Longitudinal	173 214	SME-10-ZS-KL-LED-24		
				–	Lateral	173 215	SME-10-ZS-KQ-LED-24		
		–	3-pin ¹⁾	0.3	Longitudinal	173 216	SME-10-ZS-SL-LED-24		
				–	Lateral	173 217	SME-10-ZS-SQ-LED-24		

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

 Core Range

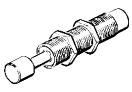
Swivel modules DSM


Accessories


FESTO



Swivel drives
Semi-rotary-vane drives


4.1

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

Ordering data – Plug sockets with cable					Data sheets → 1 / 10.2-100		
	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				Data sheets → 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	GRLA-1/8-QS-3-D	
		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	

 Core Range