

Handling modules HSW



Handling modules HSW

Key features at a glance



Range of applications

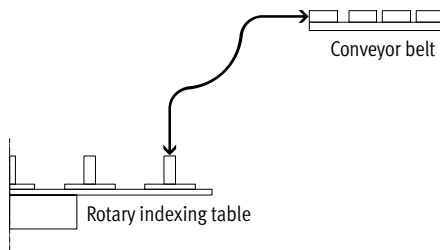
The handling module is a new generation of function modules for the automatic transfer, feed and removal of small parts in extremely confined spaces.

This is achieved by means of a guided swivel and linear motion sequence. A backlash-free guide with recirculating

ball bearing elements ensures high precision and good rigidity. The combination of a semi-rotary drive and a slotted guide system produces a compact unit for a complete pick and place cycle at an operating angle of 90°.

Special features

- Compact design
- Extremely short cycle times
- Cost optimised
- Simple commissioning
- For effective loads up to 1.6 kg
- Angle and stroke adjustment
- Wait positions possible
- No planning costs



Product range overview – Two drive variants are available

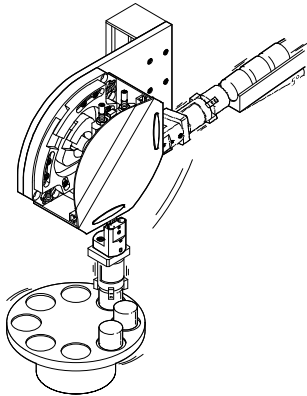
	Pneumatic: HSW-...-AP, with swivel module DSM	Without drive: HSW-...-AS, with drive shaft
Advantages		
	<ul style="list-style-type: none"> • Fast • Cost effective • Ready to install • No system planning required • Simple commissioning 	<ul style="list-style-type: none"> • Compact • Universal applications • Variable drive interface • On request: Drive options in combination with servo motors EMMS-AS
Technical data		
Max. linear stroke at 90° swivel angle	[mm] 90 ... 175	
Working stroke	[mm] 9 ... 35	
Min. cycle time	[s] 0.6 ... 1.0	Dependent on drive
Effective load	[g] 0 ... 1,600	
Repetition accuracy at end positions	[mm] ±0.02	
Wait positions	Max. 2	Dependent on drive
Function of wait position	Pushing via actuating cylinder (→ page 11)	Dependent on drive
Repetition accuracy at wait positions	[mm] < 1	Dependent on drive
Technical data	→ page 7	→ page 18

Handling modules HSW

Application examples

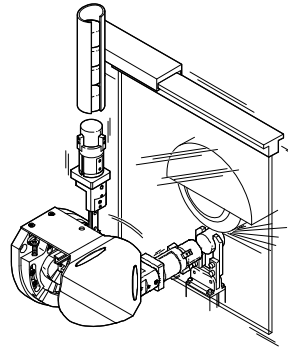
HSW...-AP, pneumatic

Rotary indexing table



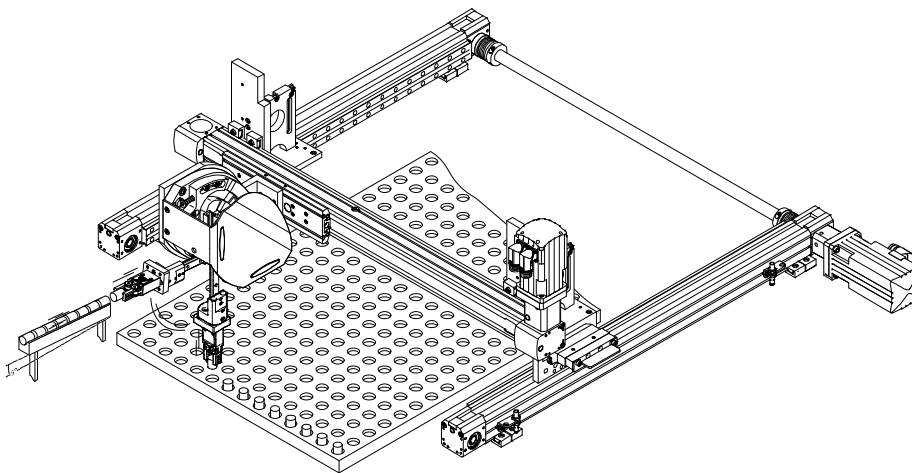
- Fast feed and removal at a linear transfer unit or rotary indexing table, for example

Machine equipment



- Loading and unloading of small parts on a grinding or injection moulding machine, for example

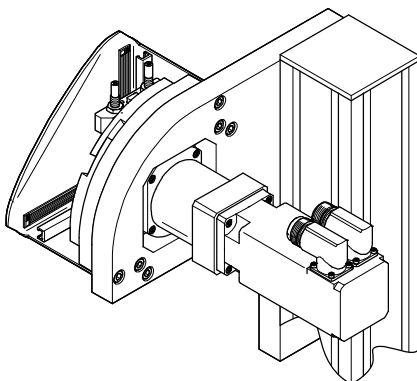
Planar surface gantry



- Fast equipping of pallets

HSW...-AS, without drive

Rotary indexing table, linear transfer

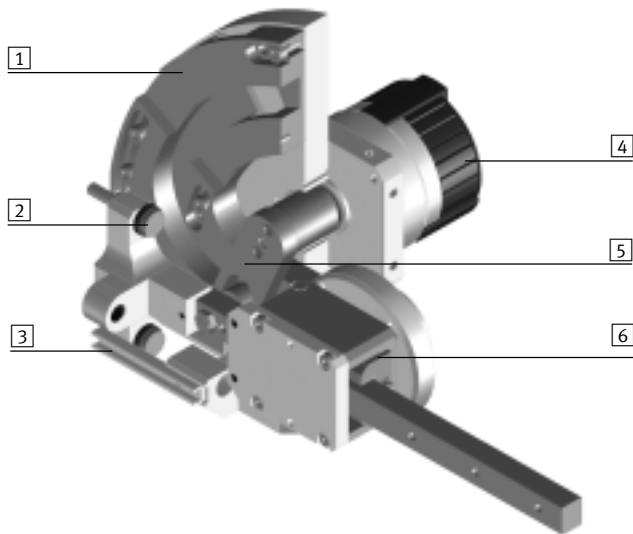


- Fast and flexible 90° pick and place unit with servo motor EMMS-AS
- Electrical variant using third-party motor

Handling modules HSW

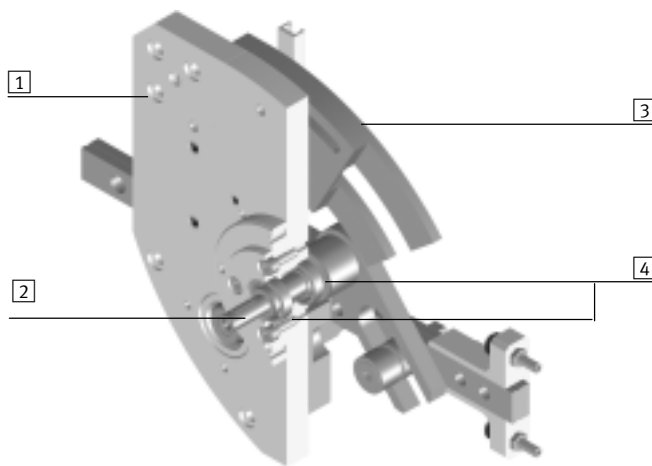
Key features at a glance

Design of HSW-...-AP – pneumatic variant with swivel module DSM



- 1 Slotted guide plate
- 2 Adjustable stop
- 3 Sensor rail
- 4 Swivel module DSM
- 5 Pressure piece
- 6 Guide with recirculating ball bearing element

Design of HSW-...-AS – variant without drive (rear side)



- 1 Base plate
- 2 Shaft with Woodruff key
- 3 Slotted guide plate
- 4 Ball bearings

Cable binder holder and protective conduit



- 1 Holder and protective conduit facilitate the secure routing of tubing and cables.

Stroke adjustment



- 2 The adjustable slotted guide plate permits precise adjustment of the swivel angle.

Adjustment of proximity sensors



- 3 The sensor rail facilitates readily accessible and easy adjustment of the proximity sensors.

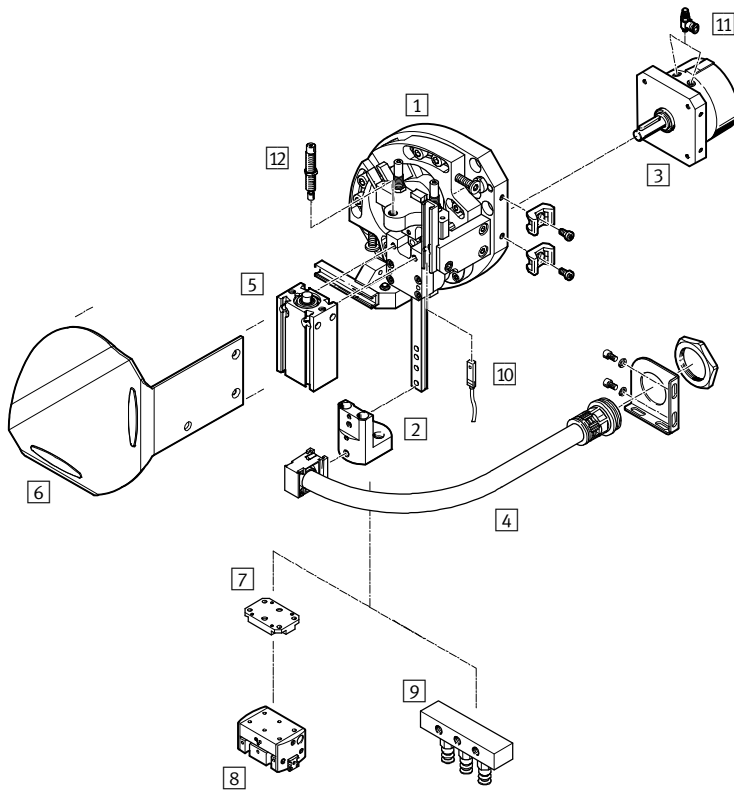
Stop element and pressure piece



- 4+5 The stop element and pressure piece guarantee freedom from backlash and precision in the end positions and in the effective linear stroke.

Handling modules HSW

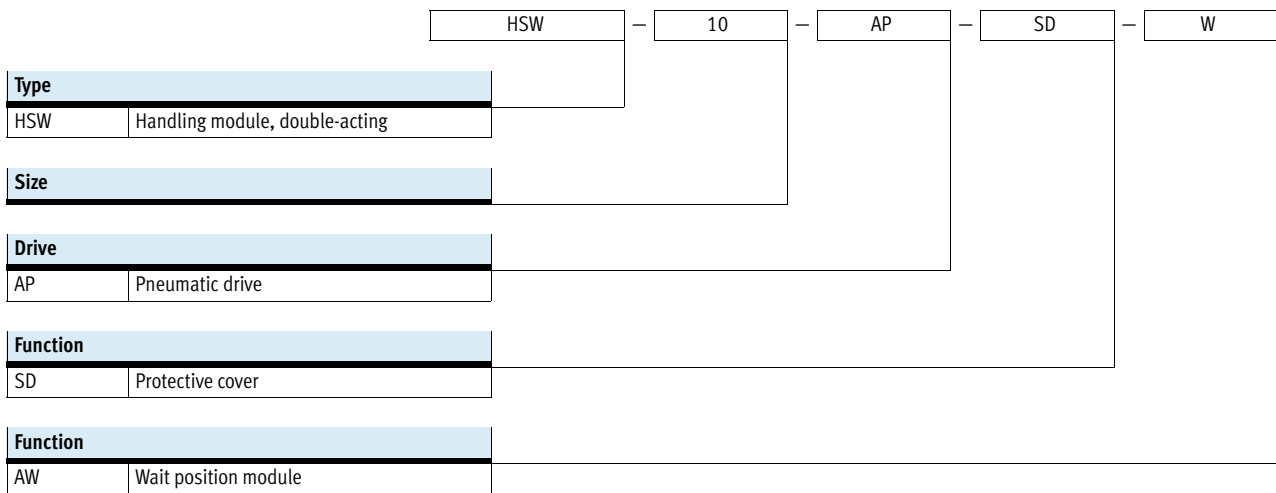
Peripherals overview



Accessories		Description	→ Page/Internet
1	Handling module HSW	Standard module without accessories	7
2	Adapter kit HAPG-...-B	Interface for grippers, semi-rotary drive, etc.	20
3	Swivel module DSM	Pneumatic drive, adapted to each size	dsm
4	Installation kit MKRP	Conduit to protect electrical cables and tubing	21
5	Wait position module BAW-HSW	With pneumatic drive: Pushes the swivel arm from the operating area	21
6	Cover kit BSD-HSW	To protect against accidental contact	21
7	Adapter kit	Interface between HSW and gripper	gripper
8	Gripper	Parallel/Three-point/Radial/Angle gripper, appropriate gripper for every application	gripper
9	Suction cups	Appropriate suction cup for every application	suction cup
10	Proximity sensor SME-/SMT-8	Sensing option for end positions	22
11	Non-return and flow control valve GRLA	For setting the speed of pneumatic drives	grla
12	Shock absorber DYSW/YSRW	<ul style="list-style-type: none"> • With path-controlled flow control function • Slowly increasing cushioning force curve 	22

Handling modules HSW, pneumatic

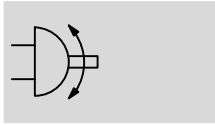
Type codes



Handling modules HSW, pneumatic




Technical data

Function



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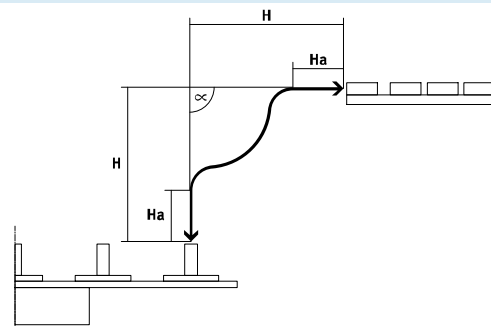


-  Size
10, 12 and 16
-  Swivel angle
80 ... 100
-  Stroke range
90 ... 175

General technical data			
Size	10	12	16
Pneumatic connection	M3	M5	
Mode of operation	Double-acting		
Constructional design	Swivel module		
	Linear guide plus ball bearing		
	Force-guided motion sequence		
Cushioning	Shock absorber at both ends, soft characteristic curve		
Position sensing	Via proximity sensor		
Type of mounting	Via through-holes		
	Via slot nuts		
Mounting position	Any		

Operating and environmental conditions	
Type	HSW...-AP
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:-:-]
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)
Operating pressure [bar]	4 ... 8
Ambient temperature [°C]	0 ... +60

Stroke [mm] and angle range [°]				
Size		10	12	16
Max. linear stroke at 90° swivel angle	H	90/90	142/142	175/175
Working stroke	Ha	9 ... 15	15 ... 25	20 ... 35
Angle range	α	80 ... 100		



Forces [N]			
Size	10	12	16
Along Y and Z axes (depending on lever position)			
Effective force at 6 bar	30	35	55
Along Y axes			
Permissible process force ¹⁾	30	35	50

1) Due to the pretension force on the guide

Handling modules HSW, pneumatic

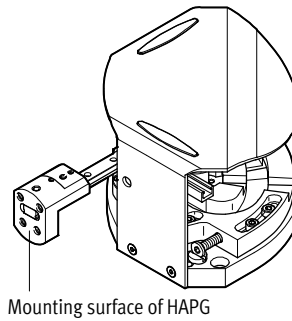
Technical data

Weight [g]			
Size	10	12	16
HSW-...-AP	1300	3000	5100
HSW-...-AP-SD	1400	3200	5400
HSW-...-AP-AW	1370	3060	5500
HSW-...-AP-SD-AW	1470	3400	5800

Repetition accuracy [mm]

To ensure low-vibration operation, the effective load should be mounted as close as possible to the guide rail of the handling module.
Repetition accuracy is guaranteed by

mounting the effective load (adapter plate, semi-rotary drive and/or gripper, gripper finger, workpiece) within the mounting surface of the adapter kit HAPG/HAPG-...-B.

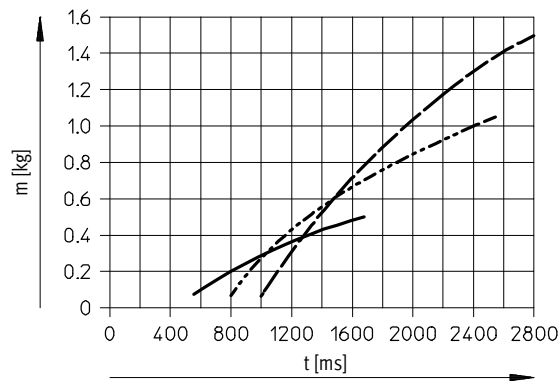


Size	10	12	16
Repetition accuracy at end positions	±0.02		

Travel times t as a function of effective load m with observance of repetition accuracy

The travel time t is the time taken for the handling module to move from one end position to the other and back again.

The effective load m is the load attached to the guide rail (e.g. adapter, gripper, semi-rotary drive and workpiece).



- HSW-10-AP
- - - HSW-12-AP
- · - HSW-16-AP

Note
Higher speeds are possible at a constant load with restriction of the repetition accuracy.

Cycle times [s]

The cycle time t_t comprises the travel time t and the dwell time t_e at the end positions.

$t_t = \text{travel time } t + \text{dwell time } t_e$
The value must not fall below the minimum cycle time.

Size	10	12	16
Min. cycle time	0.6	0.8	1.0
Min. cycle time with wait position module	0.7	1.1	1.2

Example for HSW-10-AP

Step 1:
The following values are assumed:
Effective load $m = 0.2 \text{ kg}$
Dwell time $t_e = 2 \times 350 \text{ ms}$
(350 ms per end position)

Step 2:
The travel time can be determined from the graph:
 $t = 800 \text{ ms}$

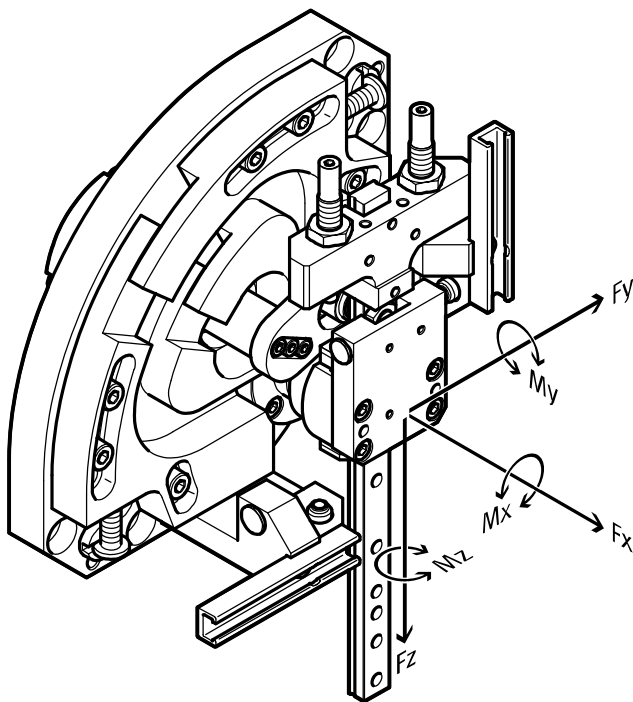
Step 3:
This gives us a cycle time:
 $t_t = 800 \text{ ms} + 700 \text{ ms}$
 $= 1500 \text{ ms}$

Handling modules HSW, pneumatic

Technical data

Permissible static/dynamic characteristic load values

Linear guide and ball bearing



-  - Note

The torques apply to the centre of the vertical guide.

Combined load

The following torque equation must be satisfied with combined load:

$$\frac{M_x}{M_{xperm.}} + \frac{M_y}{M_{yperm.}} + \frac{M_z}{M_{zperm.}} \leq 1$$

Dynamic characteristic load values

Size	10	12	16
Max. torques [Nm] $M_{xperm.}, M_{yperm.}, M_{zperm.}$	0.6	1.5	2.5

Handling modules HSW, pneumatic

Technical data

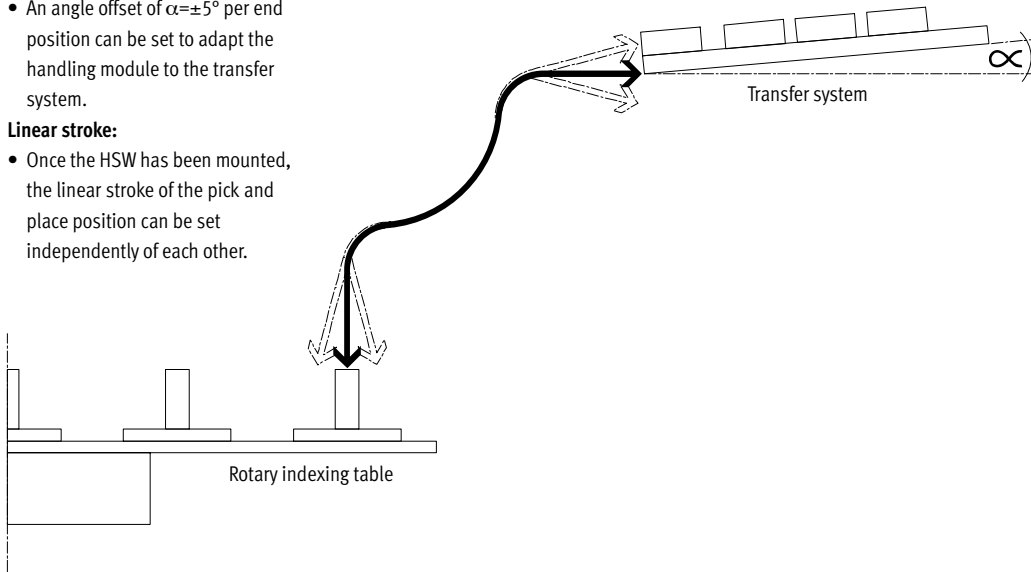
Stroke adjustment

Swivel angle:

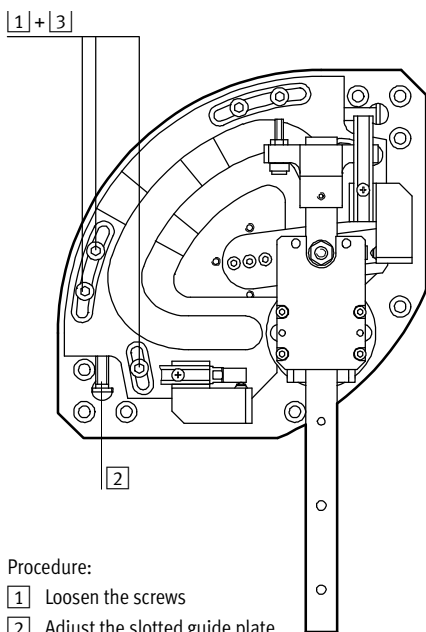
- An angle offset of $\alpha = \pm 5^\circ$ per end position can be set to adapt the handling module to the transfer system.

Linear stroke:

- Once the HSW has been mounted, the linear stroke of the pick and place position can be set independently of each other.



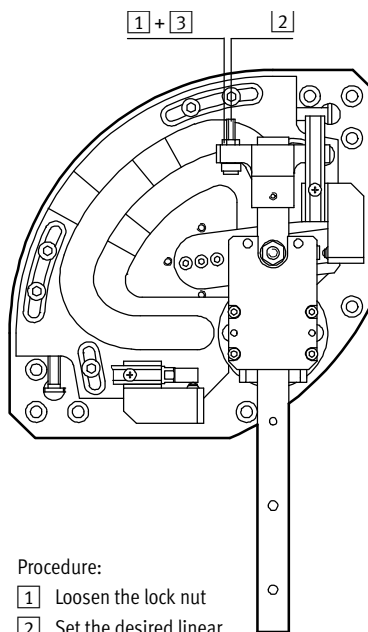
Swivel angle



Procedure:

- 1 Loosen the screws
- 2 Adjust the slotted guide plate using the adjusting screw (the slotted guide plate must always make contact with the guide ring)
- 3 Tighten the screws

Linear stroke



Procedure:

- 1 Loosen the lock nut
- 2 Set the desired linear stroke using the cushioning component/adjusting screw
- 3 Tighten the lock nut

Handling modules HSW, pneumatic

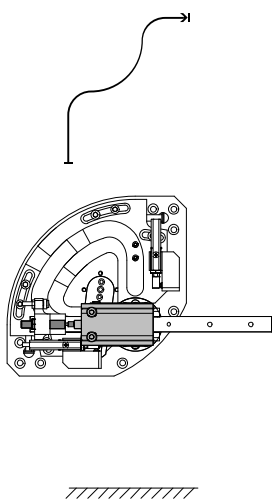
Technical data

Wait position module

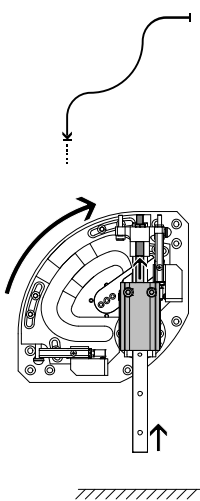
- Enables a movement to be paused before the end position, outside of the operating range (→ Step 2)
- The wait position module can be approached dynamically from the end position. This greatly reduces the cycle time
- Flexible adjustment within the adjustment range (working stroke) possible
- The wait position module may only be used with shock absorbers due to the high dynamic forces that occur
- The handling module HSW and actuating cylinder are actuated via a 5/2-way valve
- The valve for the wait position module should be activated with a time delay compared with the valve for the handling module

Cycle sequence

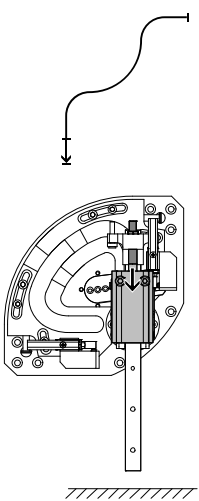
Step 1:
Handling module is in the horizontal end position.
Wait position module is retracted.



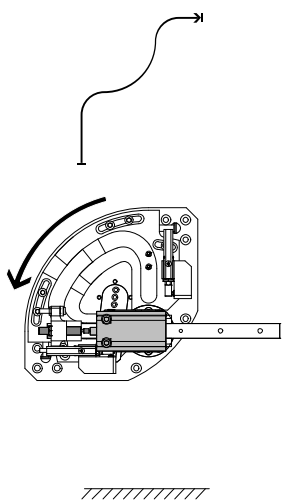
Step 2:
Handling module moves to the vertical end position.
Wait position module advances with time delay.
Handling module pauses outside the operating range.



Step 3:
Wait position module retracts.
Handling module moves into the operating range.



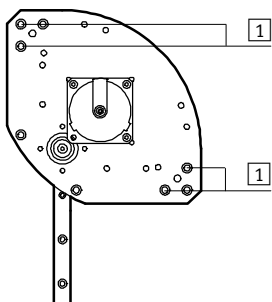
Step 4:
Handling module moves to the horizontal end position.



Size	10	12	16
Max. stroke of wait position module	10	15	25

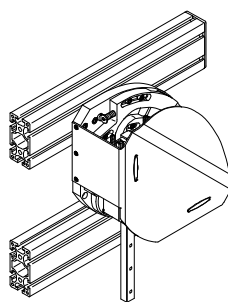
Mounting options

Directly via through-holes

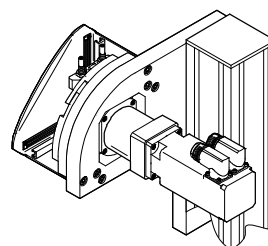


1 With or without centring rings

Via slot nuts on profile supports



User-specific



Note

The handling module HSW-10 can also be attached with the adjusting unit HMX-1.

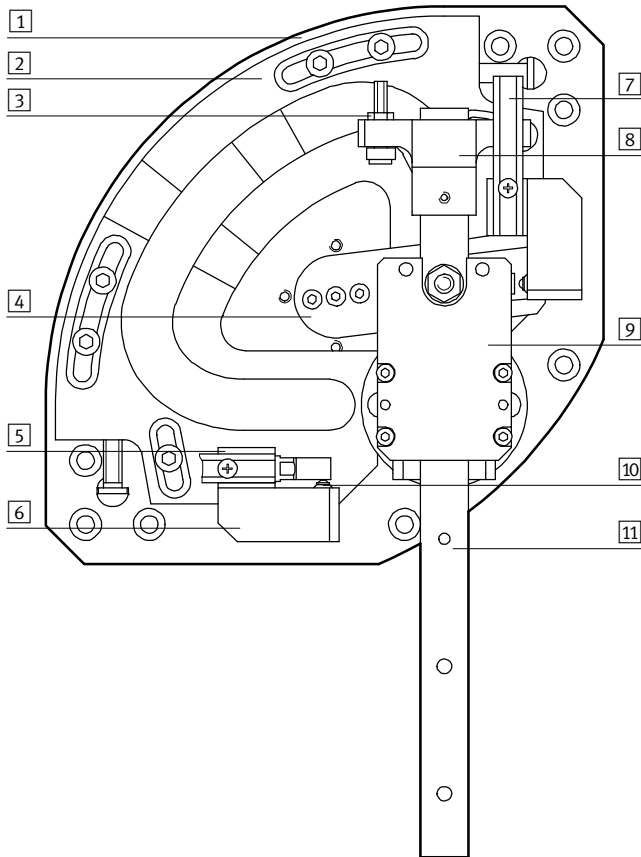
Handling modules HSW, pneumatic

Technical data

FESTO

Materials

Sectional view of handling module HSW



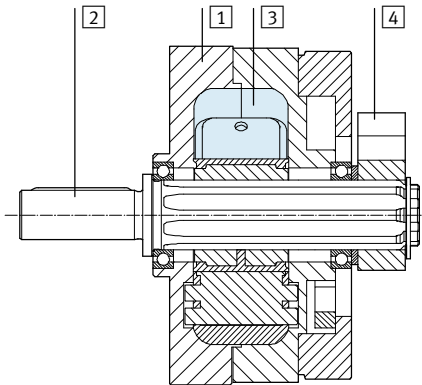
Size	10	12	16
1 Back plate	Wrought aluminium alloy, anodised		
2 Slotted guide plate	Case-hardened steel		
3 Adjusting screw	–	High-alloy steel	
4 Swivel lever	Case-hardened steel		
5 Stop sleeve	High-alloy steel		
6 Retainer	Wrought aluminium alloy, anodised		
7 Sensor rail	Wrought aluminium alloy, anodised		
8 Flange	Wrought aluminium alloy, anodised		
9 Top plate	Wrought aluminium alloy, anodised		
10 Pressure piece	High-alloy steel		
11 Guide	Tempered steel		
– Housing	Wrought aluminium alloy, anodised		
Note on materials	Free of copper and PTFE		

Handling modules HSW, pneumatic

Technical data

Materials

Sectional view of swivel module DSM



Swivel module		
1	Housing	Wrought aluminium alloy
2	Shaft	Steel with nickel-plated surface
3	Rotary vane	Fibreglass-reinforced plastic
4	Stop lever	Anodised aluminium
-	Cap	Fibreglass-reinforced plastic
-	Seals	Polyurethane
-	Note on materials	Free of copper and PTFE

Handling modules HSW, pneumatic

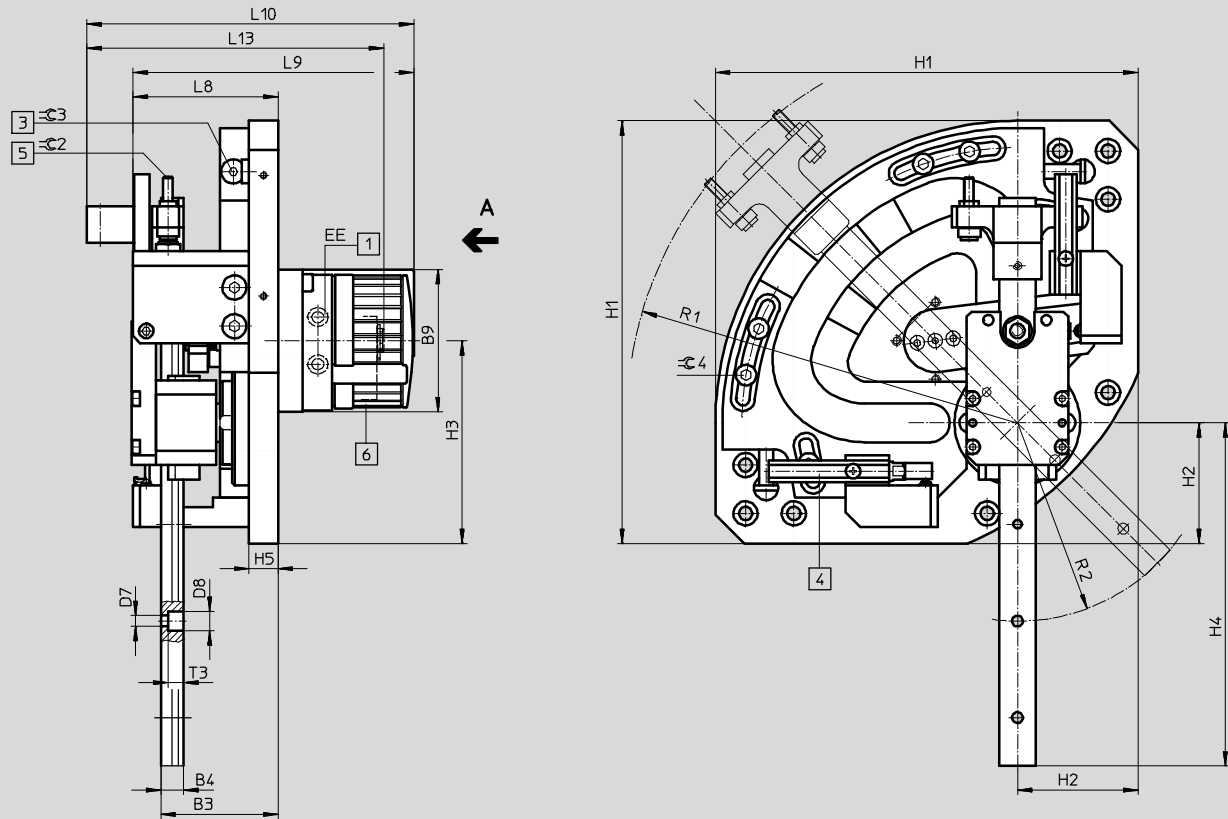
Technical data

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Dimensions

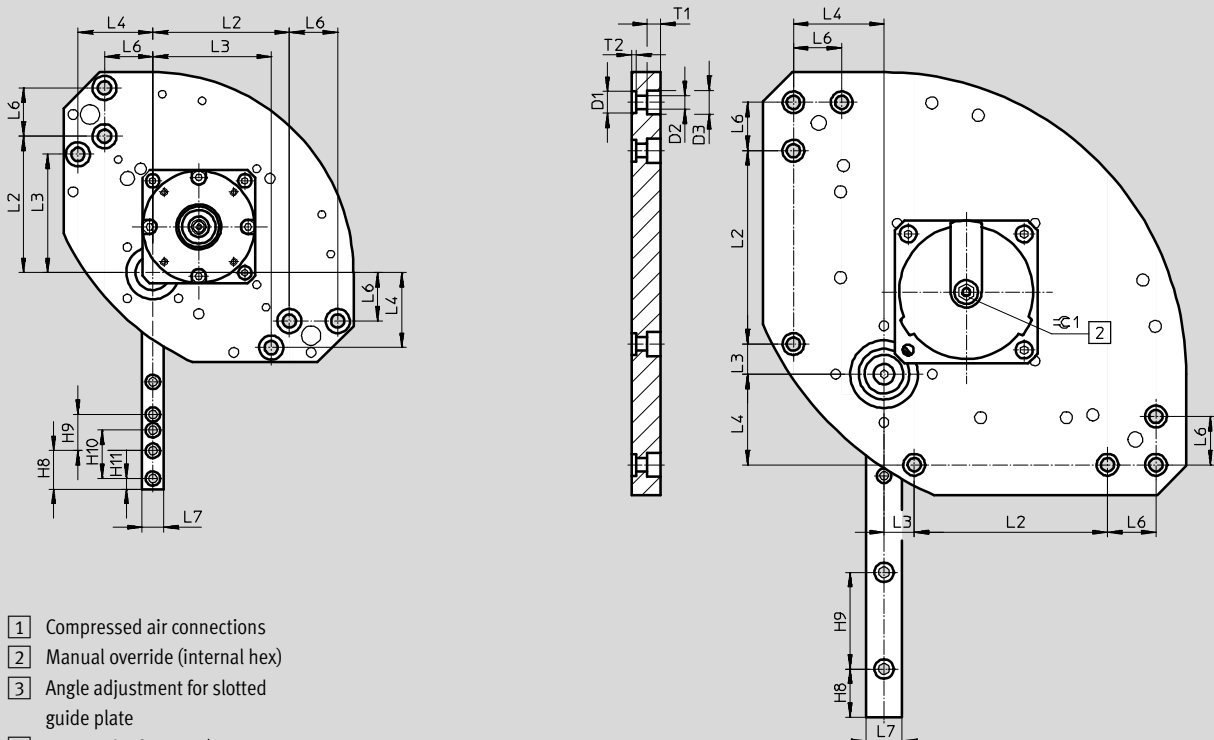
with swivel module DSM

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View A
HSW-10

HSW-12
HSW-16



- 1 Compressed air connections
- 2 Manual override (internal hex)
- 3 Angle adjustment for slotted guide plate
- 4 Sensor slot for SME-/SMT-8
- 5 Stroke adjustment
- 6 HSW-10 without cover cap

Handling modules HSW, pneumatic

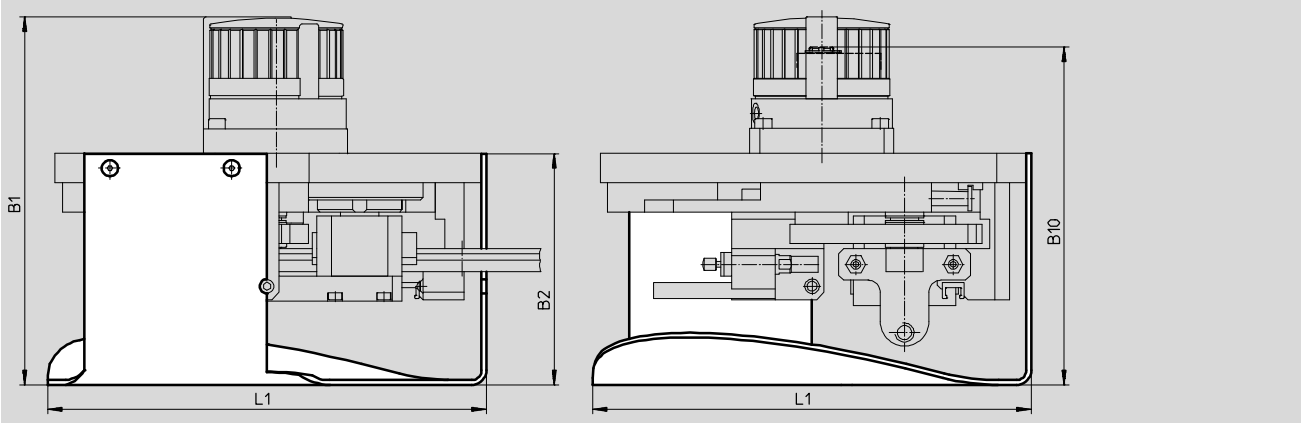
Technical data

FESTO

Dimensions

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with swivel module DSM and protective cover



Size	B1	B2	B3	B4	B9	B10	D1 ∅	D2 ∅	D3 ∅	D7 ∅
	±2	±1	±0.5			±2	H7			
10	–	85	45	5.5	47	126	9	5.5	10	3.5
12	157	100	48.5	9.5	59	144	9	5.5	10	4.5
16	179	110	57	12.5	70	163	9	5.5	10	4.5

Size	D8 ∅	EE	H1 ±0.3	H2 ±0.2	H3 ±0.5	H4 ¹⁾ ±1	H5	H8	H9	H10
10	6	M3	120	37	56	89.6	12	16	15	20
12	8	M5	175	50	84	142	12	20	40	–
16	7.5	M5	215	58.5	103.5	174	12	15	40	–

Size	H11	L1 ±2	L2 ±0.2	L3 ±0.2	L4	L6 ±0.2	L7	L8 ±2	L9 ±3	L10
10	4.5	123	56.5	49	31	20	9 _{-0.02}	62	–	–
12	–	180	80	12.5	37.5	20	15 _{-0.02}	60	117	136
16	–	219	100	12	50	20	15 _{±0.05}	71.5	140	158

Size	L13	R1 ¹⁾		R2 ¹⁾ ±3	T3	≈C1	≈C2	≈C3	≈C4
		±3	AW ±3						
10	113	113	116	55	3.3	4.5	2	3	3
12	123	162	177	82	6.5	6	2	3	4
16	143	200	206	100	5.3	8	2.5	4	4

1) Maximum stroke and 90° angle

Handling modules HSW, pneumatic

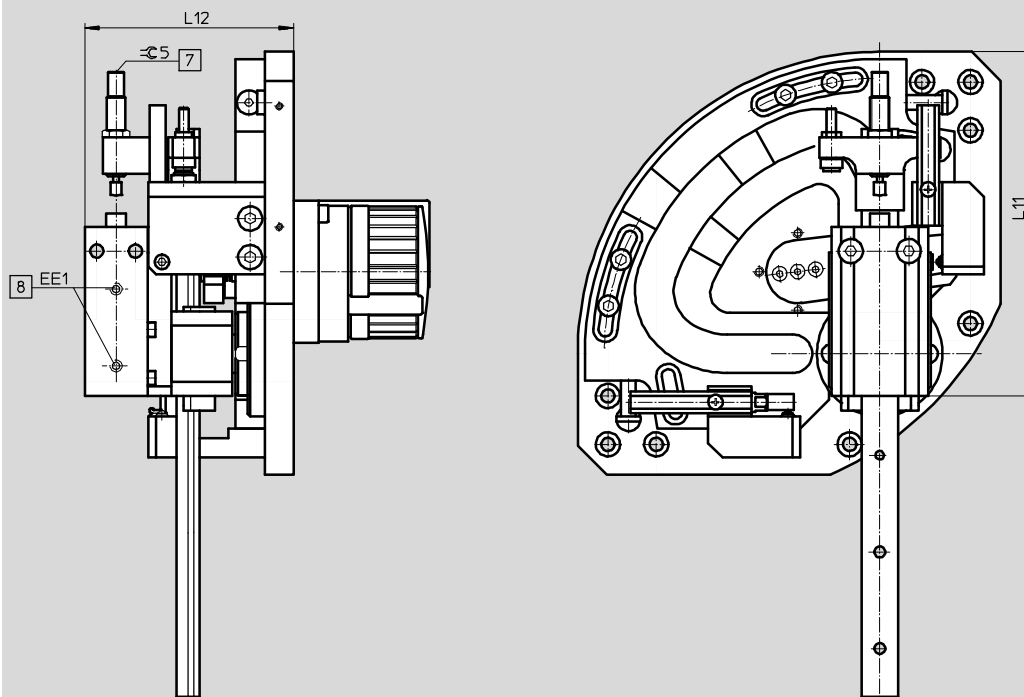
Technical data

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Dimensions

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with wait position module



- 7 Shock absorber for wait position module
- 8 Compressed air connections for wait position module

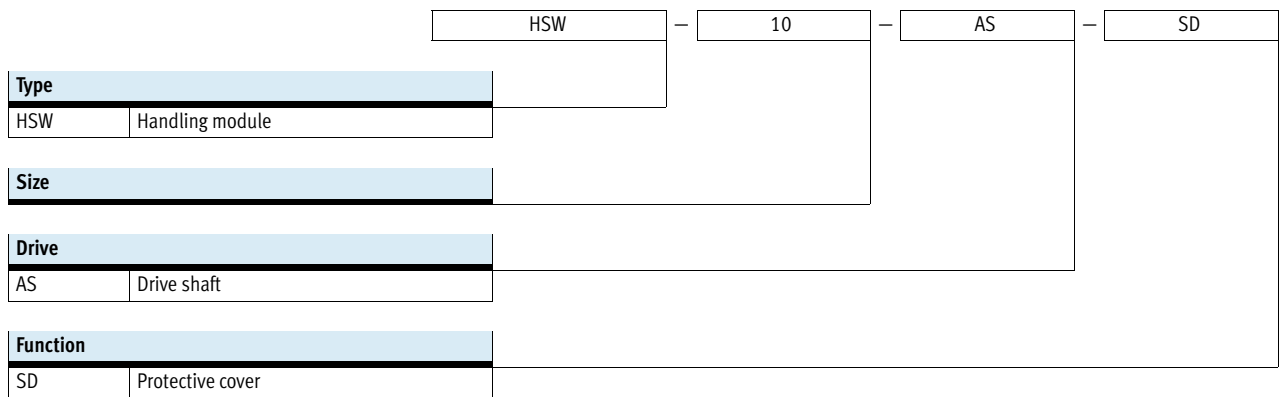
Size	EE1	L11	L12	±5
		max.	±2	
10	M5	115	75.5	2
12	M5	142.5	86.5	2.5
16	M5	190.5	98	13

Ordering data for HSW-...-AP

Size	10		12		16	
	Part No.	Type	Part No.	Type	Part No.	Type
Without protective cover						
-	540222	HSW-10-AP	540228	HSW-12-AP	540234	HSW-16-AP
Wait position module	562559	HSW-10-AP-AW	562560	HSW-12-AP-AW	562561	HSW-16-AP-AW
With protective cover						
-	540223	HSW-10-AP-SD	540229	HSW-12-AP-SD	540235	HSW-16-AP-SD
Wait position module	562562	HSW-10-AP-SD-AW	562563	HSW-12-AP-SD-AW	562564	HSW-16-AP-SD-AW

Handling modules HSW, without drive

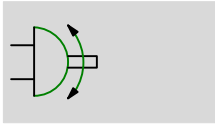
Type codes



Handling modules HSW, without drive




Technical data

Function



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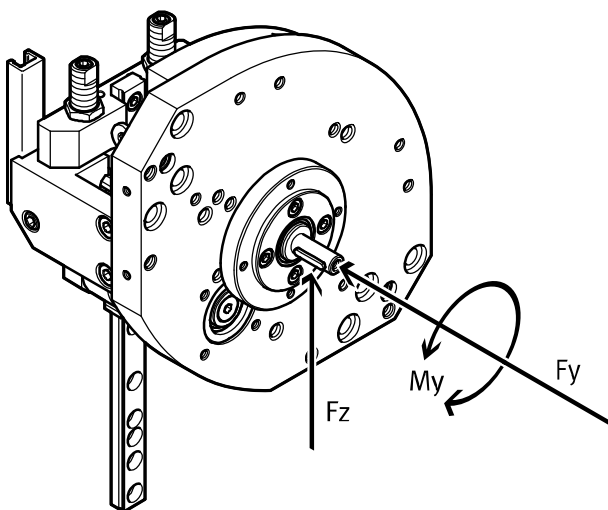



-  Size
10, 12 and 16
-  Swivel angle
80 ... 100
-  Stroke range
90 ... 175

General technical data	
Type	HSW-...-AS
Constructional design	Drive shaft
	Linear guide plus ball bearing
	Force-guided motion sequence
Cushioning	Noise reduction via buffers
Type of mounting	Via through-holes
	Via centring sleeves
Mounting position	Any

Weight [g]			
Size	10	12	16
HSW-...-AS	1200	2800	4900
HSW-...-AS-SD	1300	3000	5200

Permissible static/dynamic characteristic load values



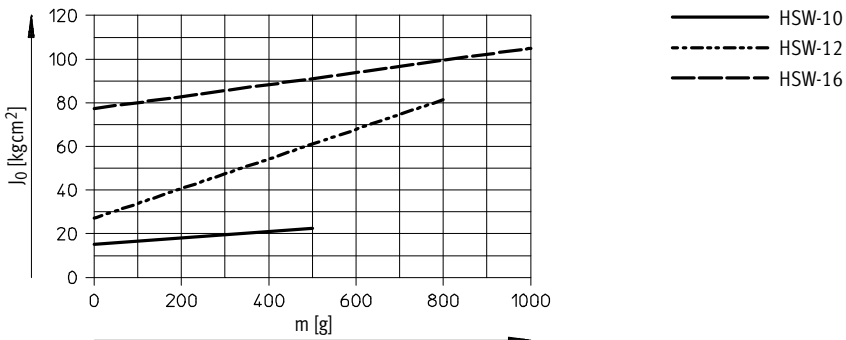
 Note
Technical data for mechanical components → page 9.

Characteristic load values				
Size		10	12	16
Max. axial force $F_{yperm.}$	[Nm]	10	18	30
Max. radial force $F_{zperm.}$	[Nm]	30	45	75
Max. drive torque $M_{yperm.}$	[Nm]	0.85	1.25	2.5

Handling modules HSW, without drive

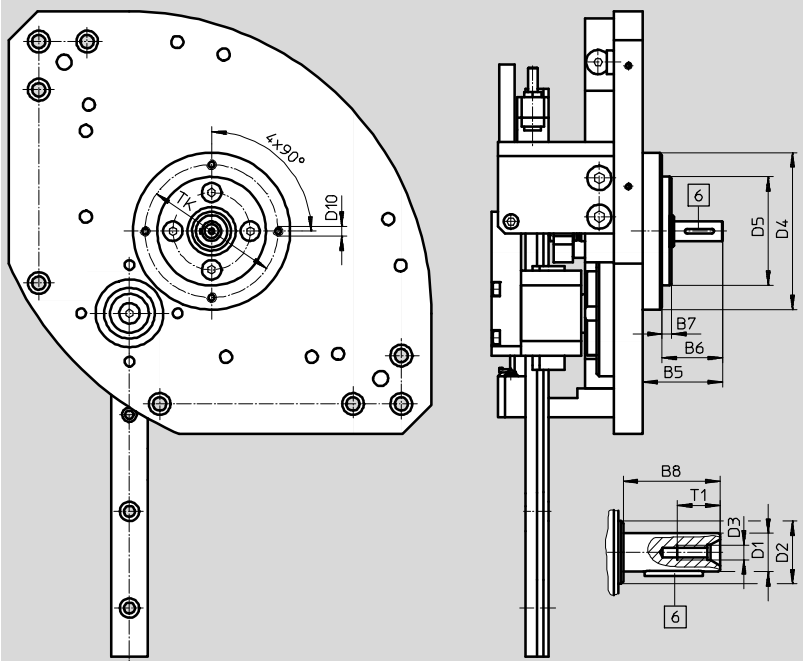
Technical data

Mass moment of inertia J_0 as a function of effective load m (for sizing drive)



Dimensions

Download CAD data → www.festo.com



Basic dimensions

→ page 14

6 Woodruff key

Size	B5	B6	B7	B8	D1 ∅ g7	D2 ∅	D3	D4 ∅	D5 ∅ f8	D10	T1	TK ±0.1
10	25	19	2	16	6	12	M2.5	46	32	M3	6.8	39
12	33	25	4	20	8	13	M3	65	45	M4	8.8	55
16	36.5	28.5	4	23	10	16	M3	70	50	M4	10.6	60

Ordering data for HSW-...-AS

Size	10		12		16	
	Part No.	Type	Part No.	Type	Part No.	Type
without protective cover	540226	HSW-10-AS	540232	HSW-12-AS	540238	HSW-16-AS
with protective cover	540227	HSW-10-AS-SD	540233	HSW-12-AS-SD	540239	HSW-16-AS-SD

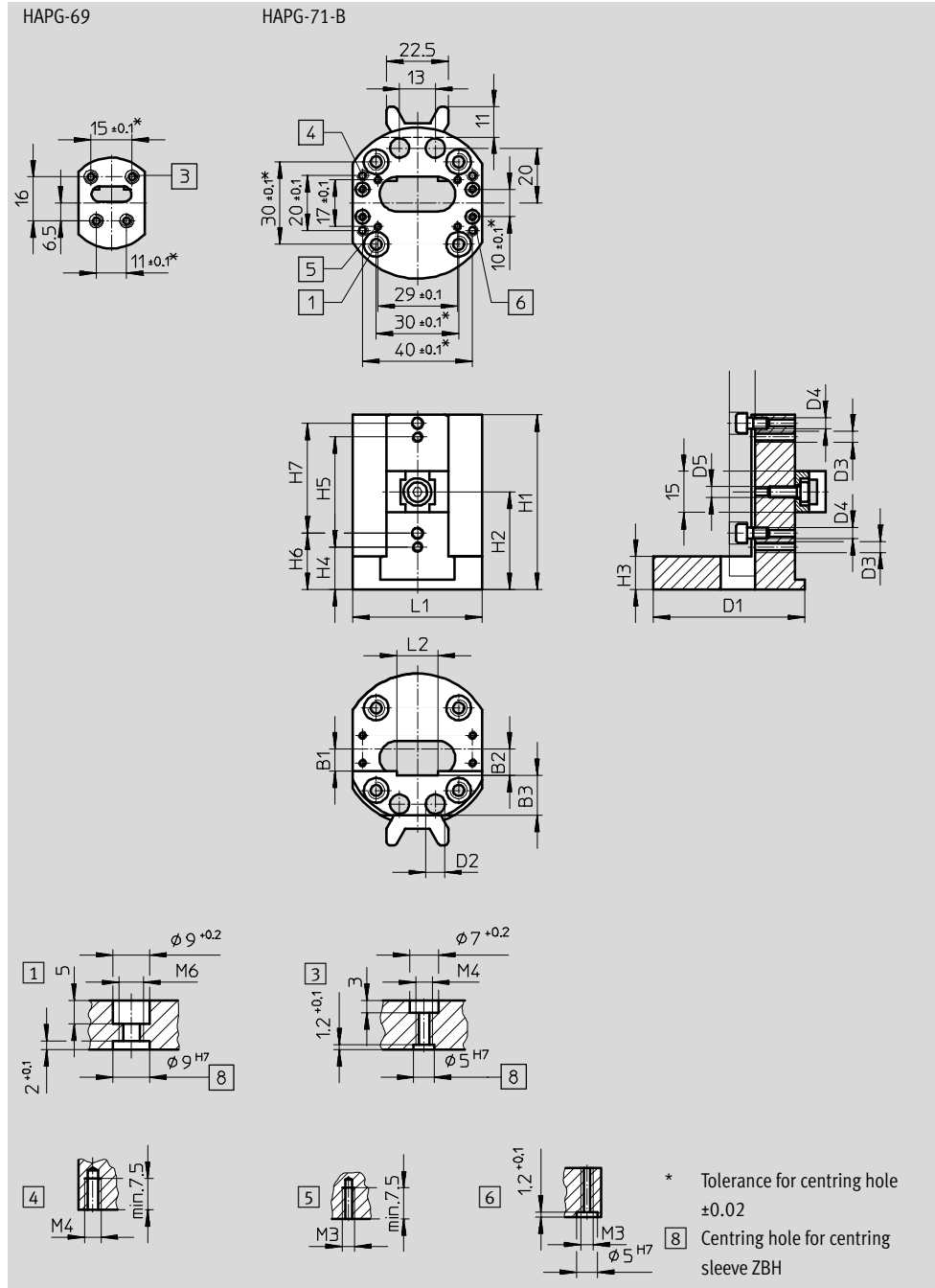
Handling modules HSW

Accessories



Adapter kit HAPG/HAPG-B

Material:
Wrought aluminium alloy, anodised



Dimensions and ordering data										
For size	B1	B2	B3	D1	D2	D3	D4	D5	H1	H2
		±0.2		∅	∅					
10	5	6	8	33	-	M4	M3	-	34	-
12, 16	8	9.5	14.5	56	7	M4	M4	M4	63.5	35.5

For size	H3	H4	H5	H6	H7	L1	L2	Weight	Part No.	Type
		+0.2	±0.2	+0.2	±0.2		+0.1	[g]		
10	10	5	20.5	16.5	15	24	9	25	540249	HAPG-69
12, 16	12	15.5	40	20.5	40	47	15	110	540882	HAPG-71-B

Handling modules HSW

Accessories

Installation kit MKRP

Material:

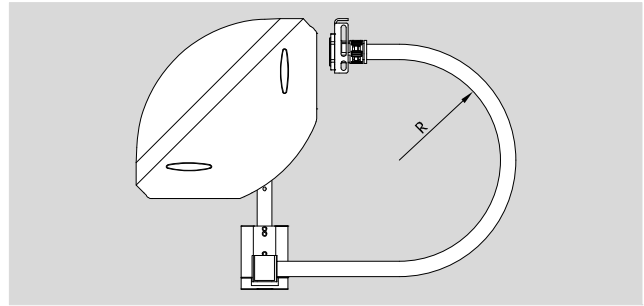
Conduit/fitting: Polyamide

Reducer/lock nut:

Nickel-plated brass

Adapter plate/bracket:

Powder-coated steel



Ordering data					
For size	Max. bending radius for conduit ¹⁾ R [mm]	Tubing I.D. [mm]	Weight [g]	Part No.	Type
10, 12	55	12	140	540247	MKRP-5
12, 16	75	16.5	150	540248	MKRP-6

1) The conduit must not be filled beyond 70%

Cover kit BSD-HSW

Material:

Wrought aluminium alloy, anodised



Dimensions → page 15

Ordering data					
For size	Weight [g]	Part No.	Type		
10	100	540240	BSD-HSW-10		
12	200	540241	BSD-HSW-12		
16	300	540242	BSD-HSW-16		

Wait position module BAW-HSW for HSW-...-AP

Material:

Wrought aluminium alloy, anodised




Dimensions → page 15

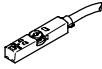
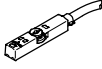
Ordering data					
For size	Weight [g]	Part No.	Type		
10	110	562589	BAW-HSW-10		
12	220	562590	BAW-HSW-12		
16	400	562591	BAW-HSW-16		

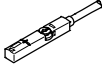
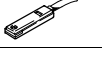
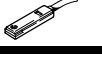
Handling modules HSW



Accessories

FESTO

Ordering data – Shock absorber			Technical data → Internet: dysw; ysrw	
	For size	Weight [g]	Part No.	Type
	10	6	548070	DYSW-4-6-Y1F
	12	11	548071	DYSW-5-8-Y1F
	16	18	191193	YSRW-7-10

Ordering data – Proximity sensors for T-slot, magneto-resistive					Technical data → Internet: smt	
	Type of mounting	Switch output	Electrical connection	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in the slot from above, flush with cylinder profile, short design	PNP	Cable, 3-wire	2.5	574335	SMT-8M-A-PS-24V-E-2,5-OE
			Plug M8x1, 3-pin	0.3	574334	SMT-8M-A-PS-24V-E-0,3-M8D
			Plug M12x1, 3-pin	0.3	574337	SMT-8M-A-PS-24V-E-0,3-M12
		NPN	Cable, 3-wire	2.5	574338	SMT-8M-A-NS-24V-E-2,5-OE
			Plug M8x1, 3-pin	0.3	574339	SMT-8M-A-NS-24V-E-0,3-M8D
N/C contact						
	Insertable in the slot from above, flush with cylinder profile, short design	PNP	Cable, 3-wire	7.5	574340	SMT-8M-A-PO-24V-E-7,5-OE

Ordering data – Proximity sensors for T-slot, magnetic reed					Technical data → Internet: sme	
	Type of mounting	Switch output	Electrical connection	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in the slot from above, flush with cylinder profile	Contacting	Cable, 3-wire	2.5	543862	SME-8M-DS-24V-K-2,5-OE
				5.0	543863	SME-8M-DS-24V-K-5,0-OE
			Cable, 3-wire	2.5	543872	SME-8M-ZS-24V-K-2,5-OE
			0.3	543861	SME-8M-DS-24V-K-0,3-M8D	
			Insertable in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	2.5
Plug M8x1, 3-pin	0.3				150857	SME-8-S-LED-24
N/C contact						
	Insertable in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	7.5	160251	SME-8-O-K-LED-24

Ordering data – Connecting cables				Technical data → Internet: nebu	
	Electrical connection, left	Electrical connection, right	Cable length [m]	Part No.	Type
	Straight socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541333	NEBU-M8G3-K-2.5-LE3
			5	541334	NEBU-M8G3-K-5-LE3
	Straight socket, M12x1, 5-pin	Cable, open end, 3-wire	2.5	541363	NEBU-M12G5-K-2.5-LE3
			5	541364	NEBU-M12G5-K-5-LE3
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541338	NEBU-M8W3-K-2.5-LE3
			5	541341	NEBU-M8W3-K-5-LE3
	Angled socket, M12x1, 5-pin	Cable, open end, 3-wire	2.5	541367	NEBU-M12W5-K-2.5-LE3
			5	541370	NEBU-M12W5-K-5-LE3