Handling modules HSW

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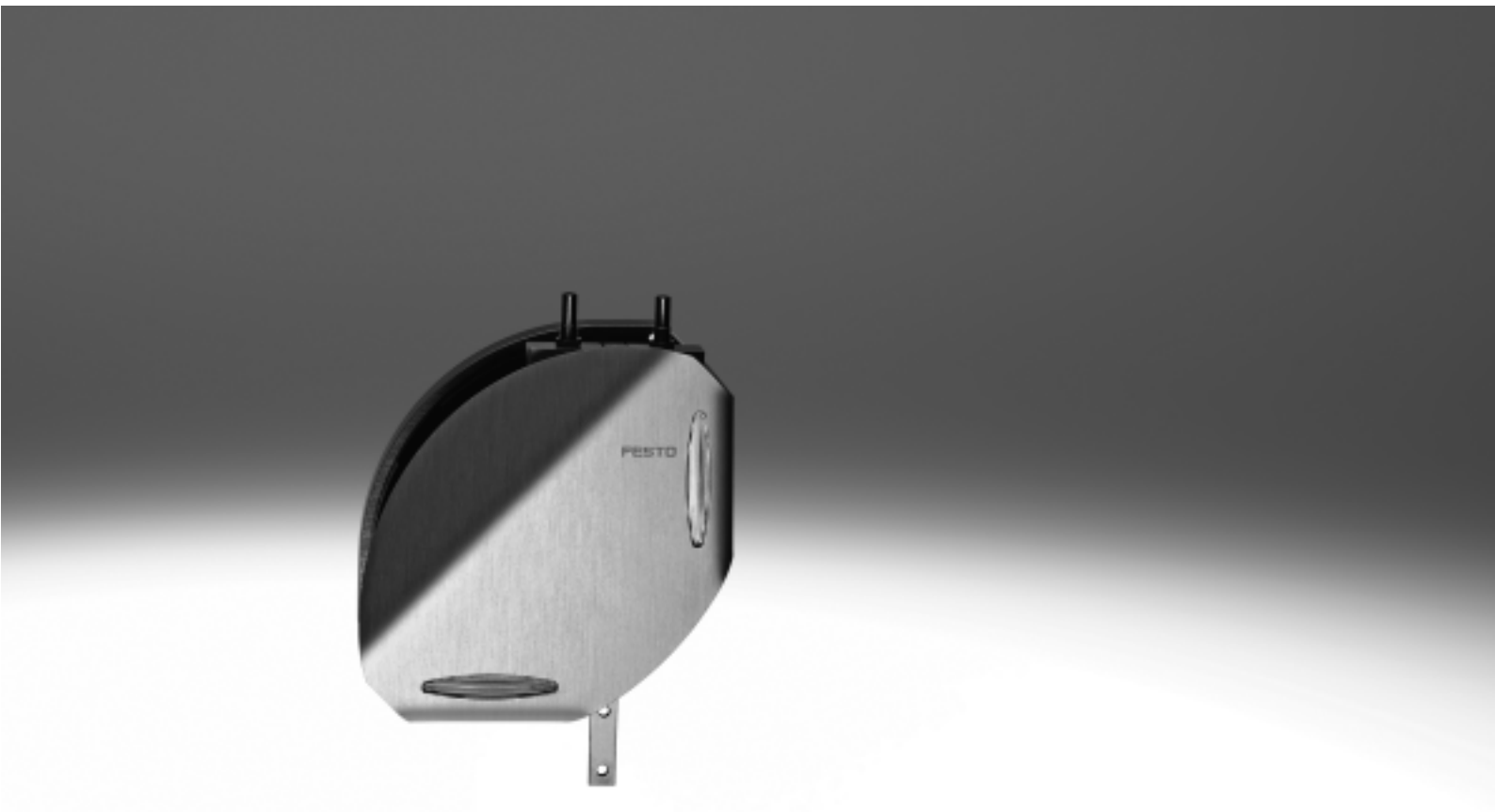


Handling modules HSW

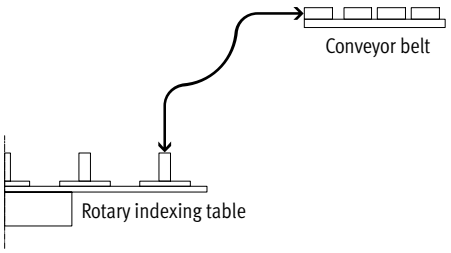
Key features at a glance

Range of applications

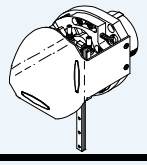
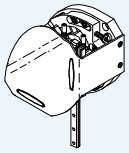
The handling module is a new generation of function modules for the automatic transfer, feed and removal of small parts in extremely confined spaces.
This is achieved by means of a guided swivel and linear motion sequence. A backlash-free guide with recirculating ball bearing elements ensures high precision 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

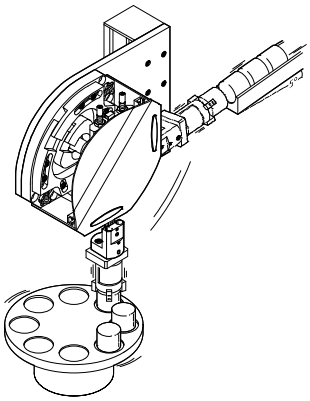
	Pneumatic: HSW-...-AP, with swivel module DSM	Without drive: HSW-...-AS, with drive shaft
		
Advantages		
	• Fast • Cost effective • Ready to install • No system planning required • Simple commissioning	• Compact • Universal applications • Variable drive interface • On request: Drive options in combination 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 (➔ 11)	Dependent on drive
Repetition accuracy at wait positions [mm]	< 1	Dependent on drive
Technical data	➔ 7	➔ 18

Handling modules HSW

Application examples

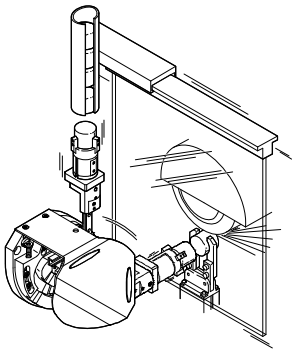
HSW-...-AP, pneumatic

Rotary indexing table



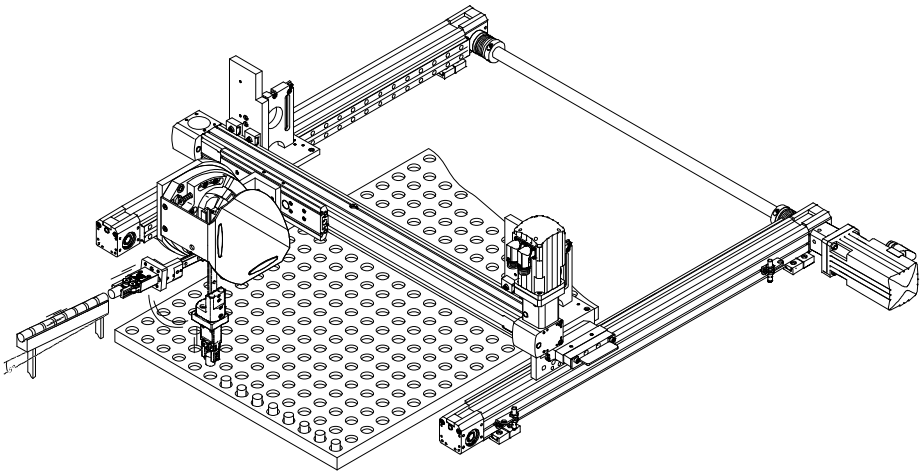
- Fast feed and removal at a linear transfer unit or rotary indexing table, for example

Machine equipment



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

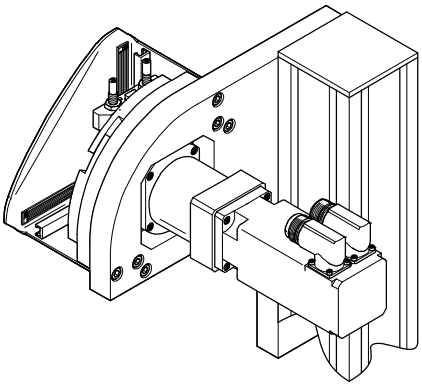
Planar surface gantry



- Fast equipping of pallets

HSW-...-AS, without drive

Rotary indexing table, linear transfer

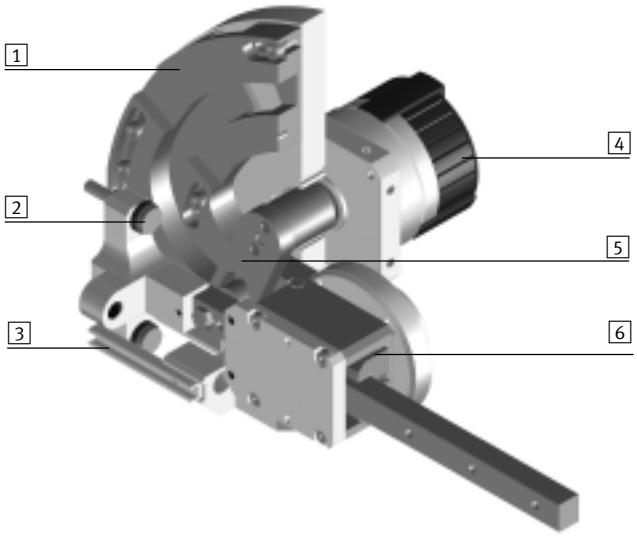


- Fast and flexible 90° pick and place unit with servo motor EMMS-AS
- Electrical variant using third-party motor

Handling modules HSW

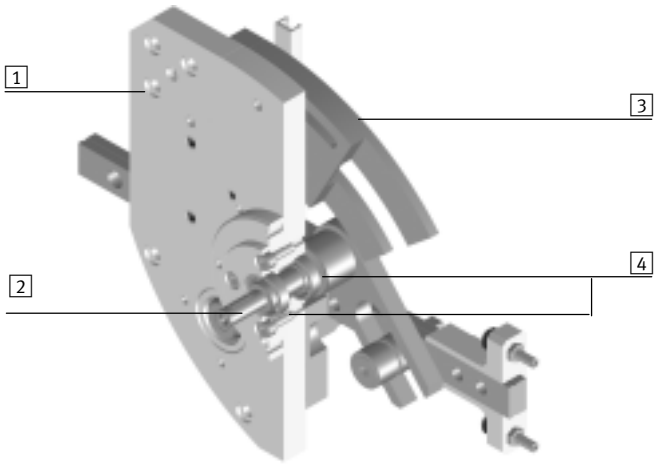
Key features at a glance

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

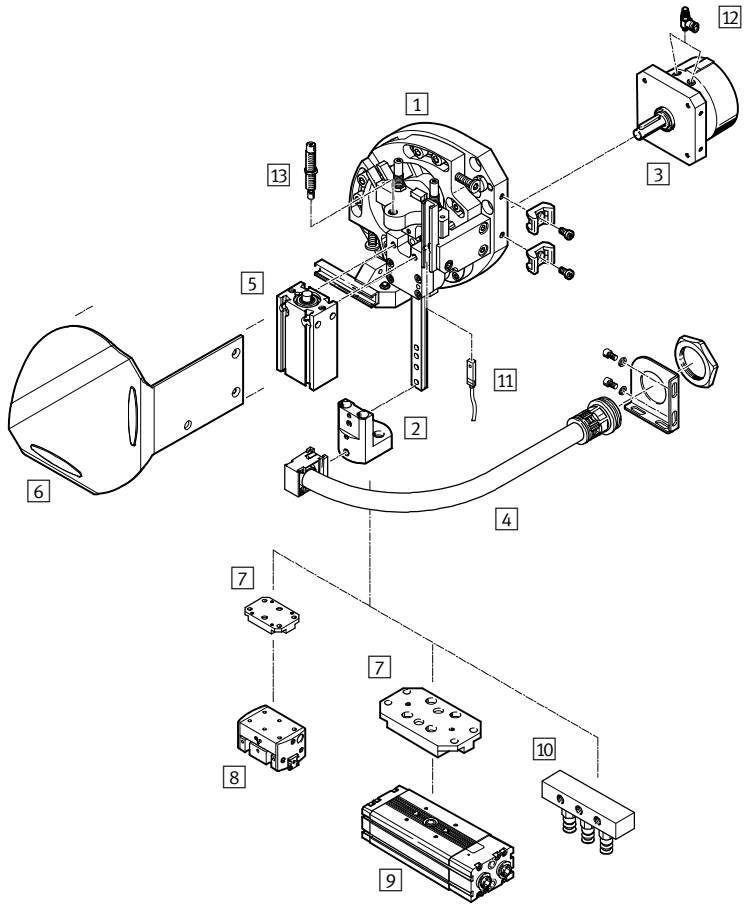
3 The sensor rail facilitates readily accessible and easy adjustment of the proximity sensors.

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

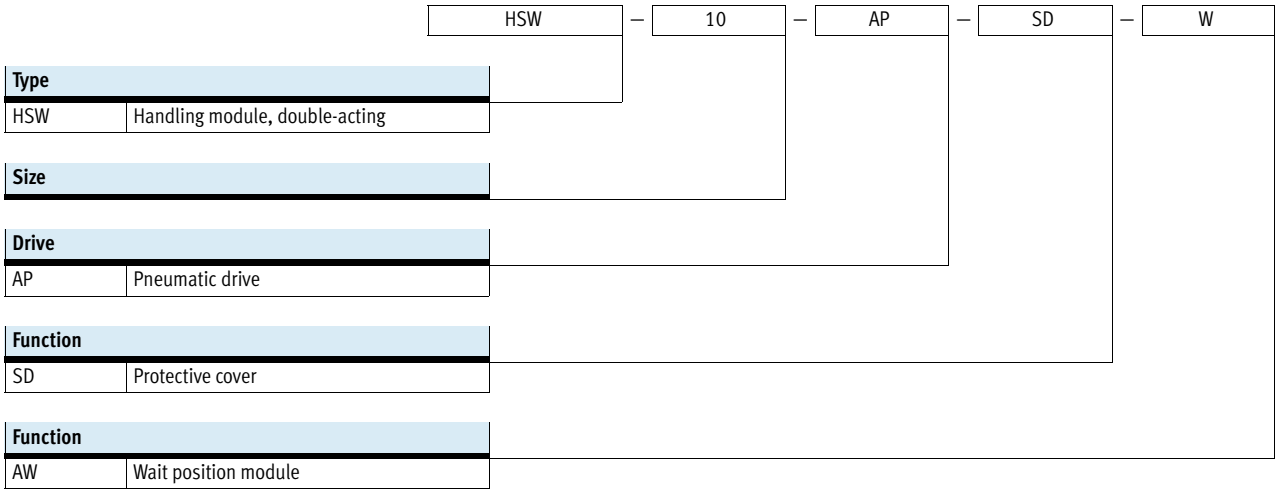
Peripherals overview



Accessories			
		Brief 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 or semi-rotary drive	gripper drqd
8	Gripper	Parallel/Three-point/Radial/Angle gripper, appropriate gripper for every application	gipper
9	Semi-rotary drive DRQD	Semi-rotary drive for transferring parts	drqd
10	Suction cups	Appropriate suction cup for every application	suction cup
11	Proximity sensor SME-/SMT-8	Sensing option for end positions	22
12	Non-return and flow control valve GRLA	For setting the speed of pneumatic drives	grla
13	Shock absorber DYSW/YSRW	• With path-controlled flow control function • Slowly increasing cushioning force curve	22

Handling modules HSW, pneumatic

Type codes



Type	
HSW	Handling module, double-acting

Size	

Drive	
AP	Pneumatic drive

Function	
SD	Protective cover

Function	
AW	Wait position module

Handling modules HSW, pneumatic

Technical data

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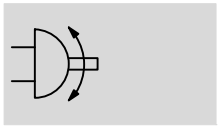
Function



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

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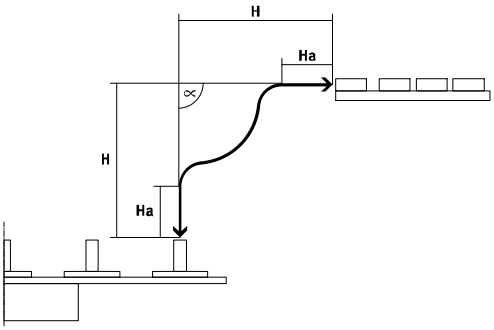
General technical data			
Size	10	12	16
Pneumatic connection	M3	M5	
Mode of operation	Double-acting		
Constructional design	Swivel module		
	Linear guide plus ball bearing		
	Force-guided motion sequence		
Cushioning	Shock absorber at both ends, soft characteristic curve		
Position sensing	Via proximity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



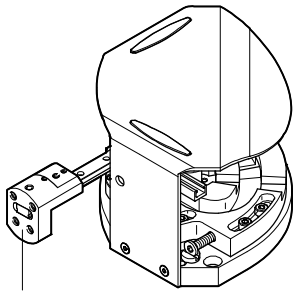
Forces [N]			
Size	10	12	16
Along Y and Z axes (depending on lever position)			
Effective force at 6 bar	30	35	55
Along Y axes			
Permissible process force[1)]	30	35	50

1) Due to the pretension force on the guide

Weight [g]			
Size	10	12	16
HSW-...-AP	1,300	3,000	5,100
HSW-...-AP-SD	1,400	3,200	5,400
HSW-...-AP-AW	1,370	3,060	5,500
HSW-...-AP-SD-AW	1,470	3,400	5,800

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.



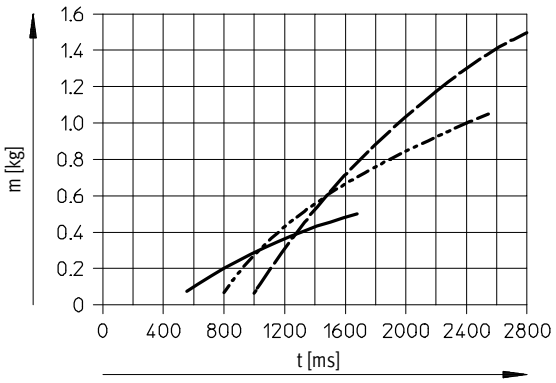
Mounting surface of HAPG

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 = travel time t + 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

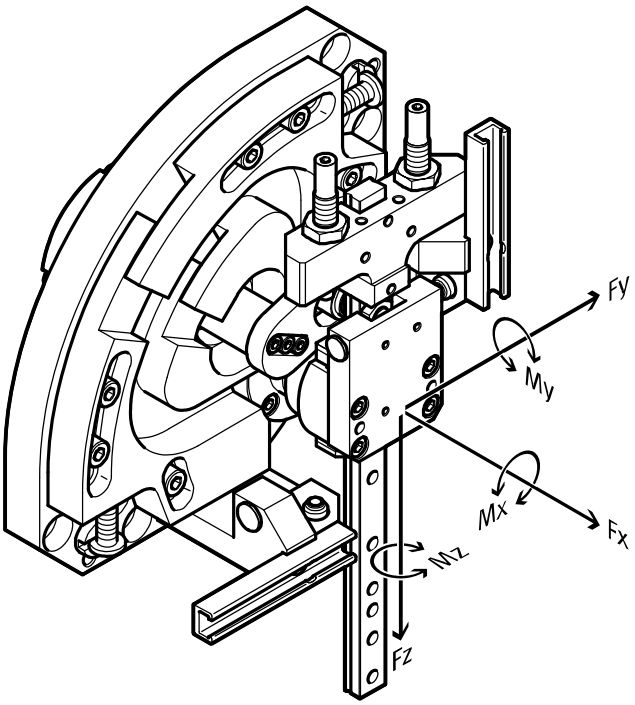
Step 1:
The following values are assumed:
Effective load m = 0.2 kg
Dwell time t_e= 2x 350 ms
(350 ms per end position)

Step 2:
The travel time can be determined from the graph:
t = 800 ms

Step 3:
This gives us a cycle time:
t_t = 800 ms + 700 ms
= 1,500 ms

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:

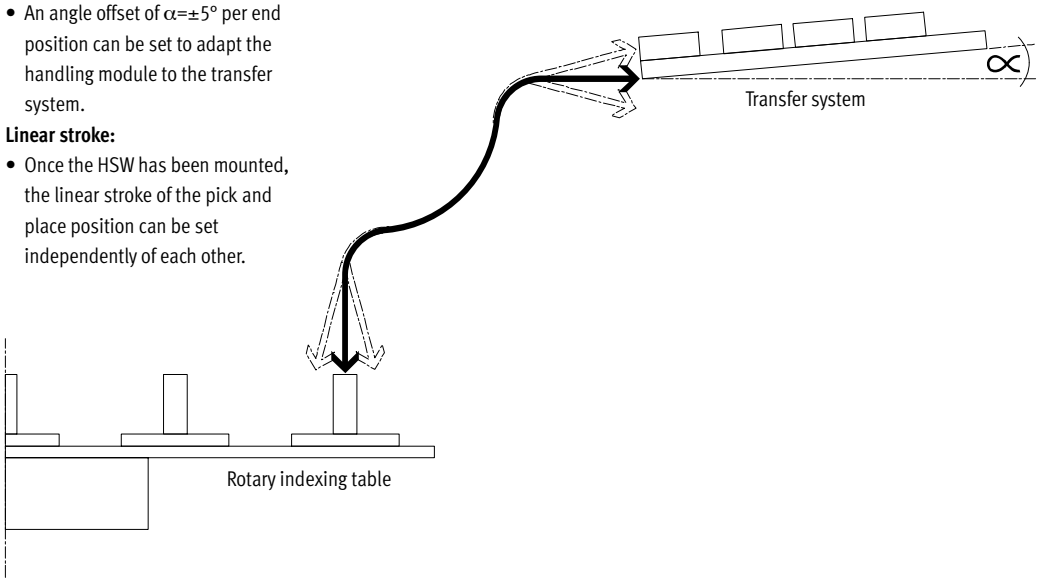
$$\frac{M_x}{Mx_{perm.}} + \frac{M_y}{My_{perm.}} + \frac{M_z}{Mz_{perm.}} \leq 1$$

Dynamic characteristic load values			
Size	10	12	16
Max. torques [Nm] $Mx_{perm.}$, $My_{perm.}$, $Mz_{perm.}$	0.6	1.5	2.5

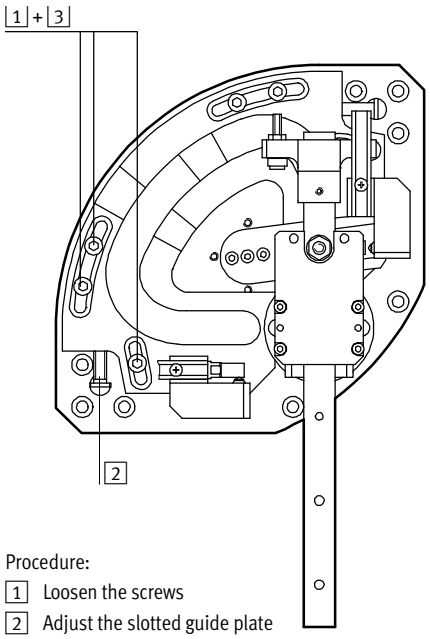
Stroke adjustment

Swivel angle:
- An angle offset of α=±5° 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.

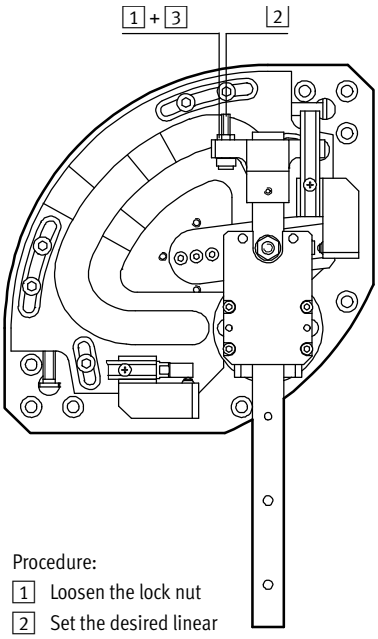


Swivel angle



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

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

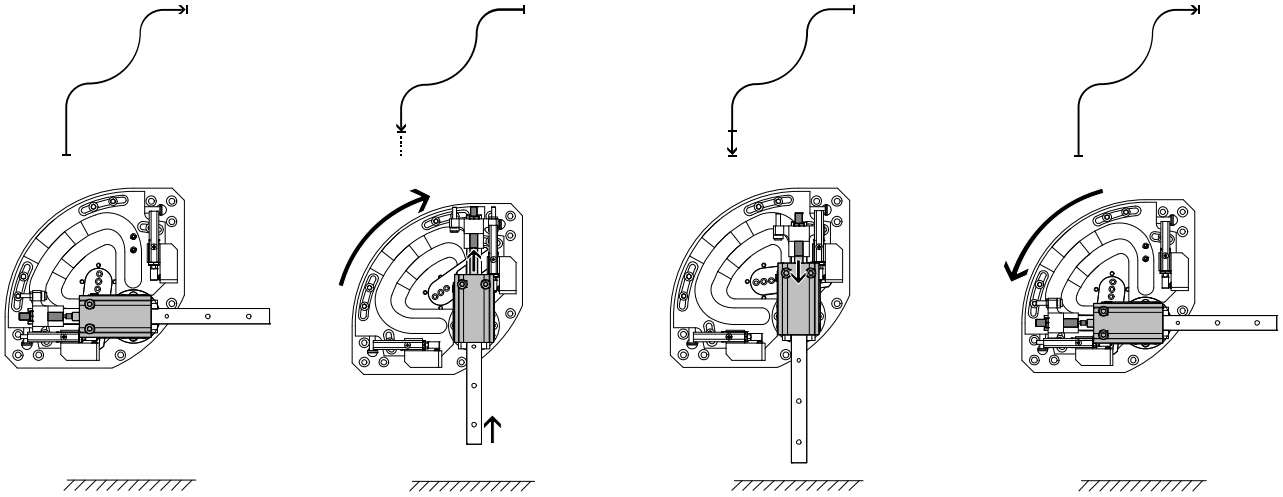
Cycle sequence

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.

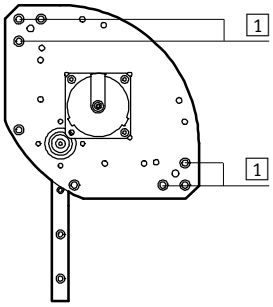
Step 4:
Handling module moves to the horizontal end position.



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

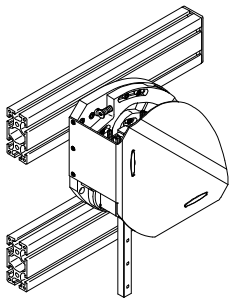
Mounting options

Directly via through-holes

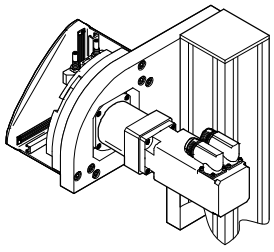


1 With or without centring rings

Via slot nuts on profile supports



User-specific

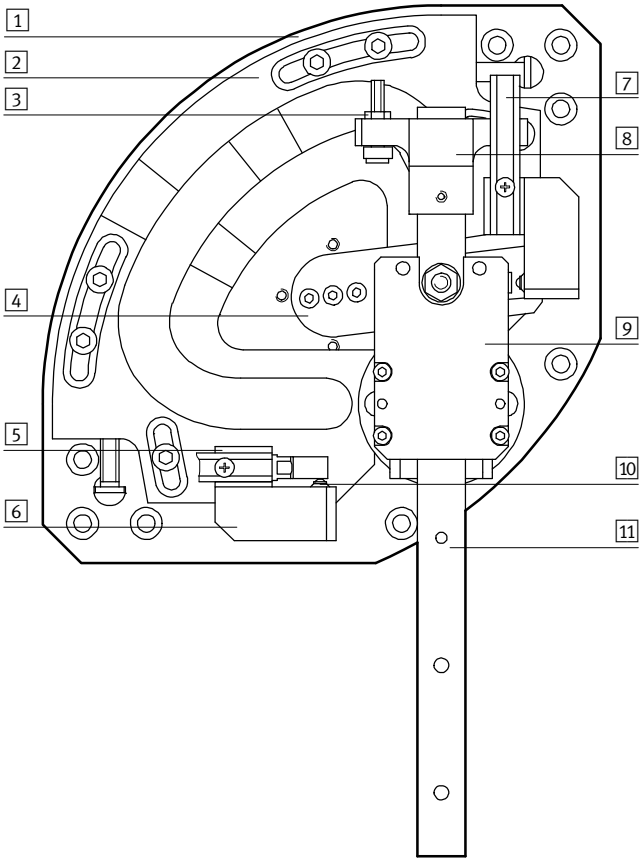


- Note

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

Materials

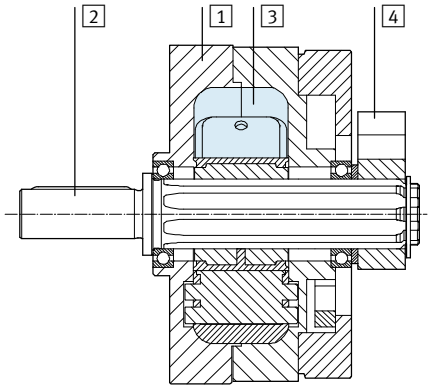
Sectional view of handling module HSW



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		

Materials

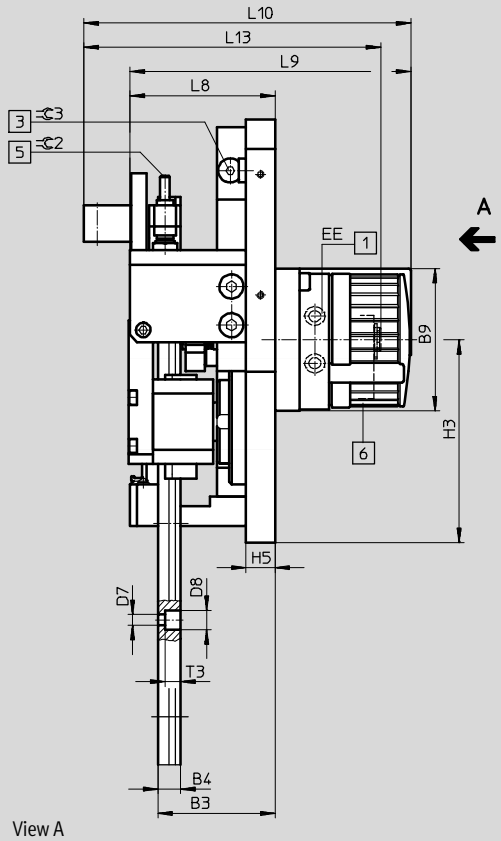
Sectional view of swivel module DSM



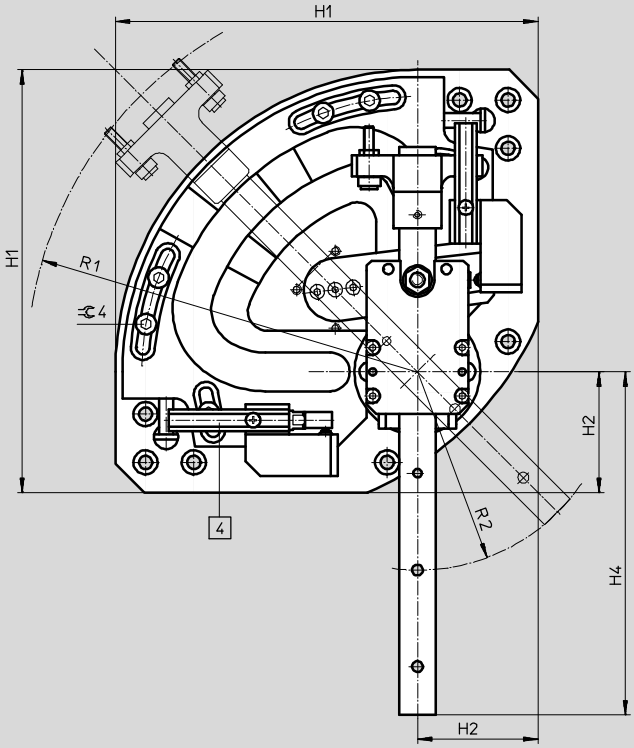
Swivel module		
1	Housing	Wrought aluminium alloy
2	Shaft	Steel with nickel-plated surface
3	Rotary vane	Fibreglass-reinforced plastic
4	Stop lever	Anodised aluminium
–	Cap	Fibreglass-reinforced plastic
	Seals	Polyurethane
	Note on materials	Free of copper and PTFE

Dimensions Download CAD data ➔ **www.festo.com**

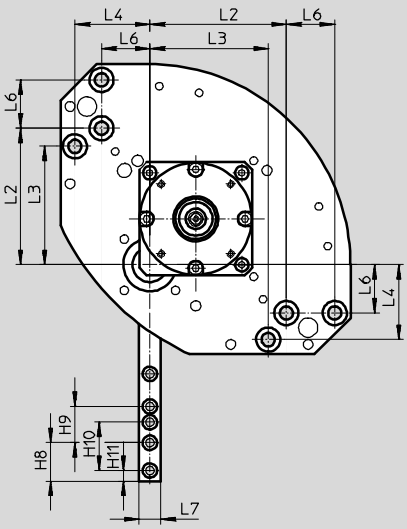
with swivel module DSM

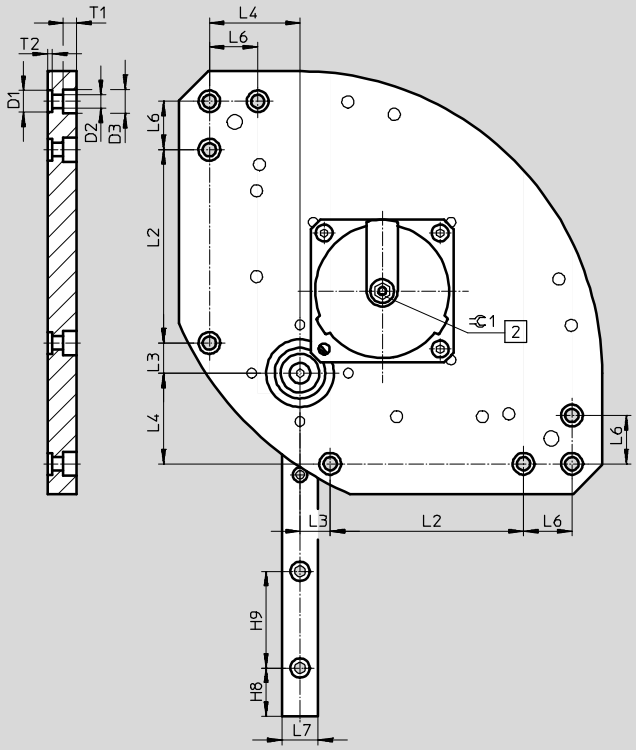


View A
HSW-10



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

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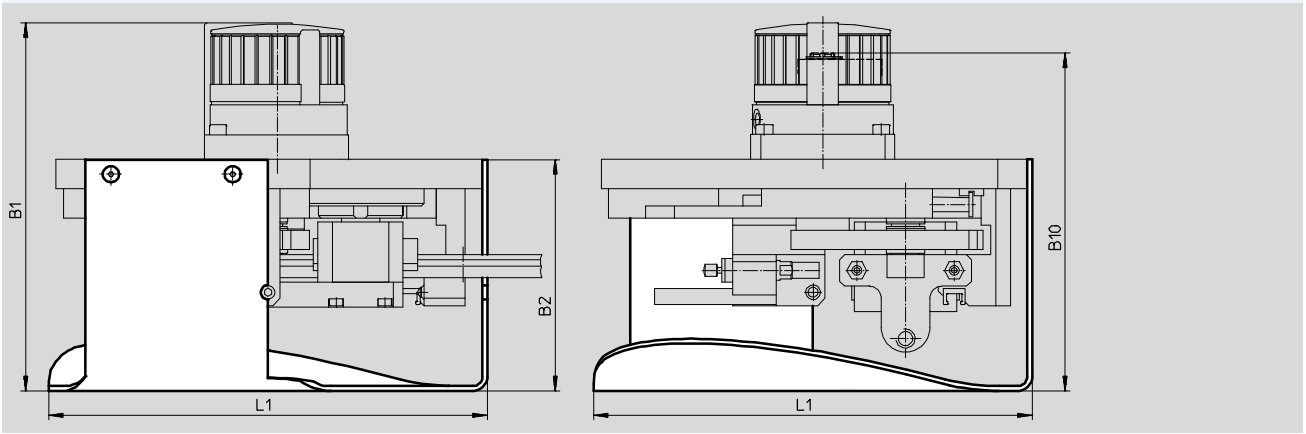
with swivel module DSM and protective cover



Size	B1 ±2	B2 ±1	B3 ±0.5	B4	B9	B10 ±2	D1 ∅ H7	D2 ∅	D3 ∅	D7 ∅
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	–

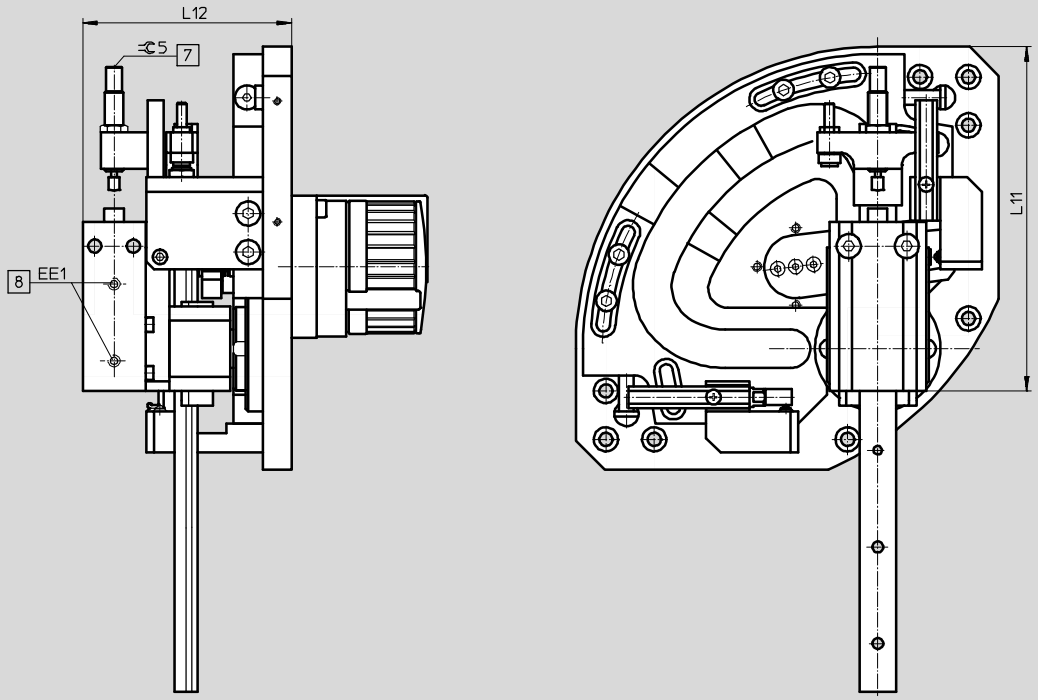
Size	H11	L1 ±2	L2 ±0.2	L3 ±0.2	L4	L6 ±0.2	L7	L8 ±2	L9 ±3	L10
10	4.5	123	56.5	49	31	20	$9_{-0.02}$	62	–	–
12	–	180	80	12.5	37.5	20	$15_{-0.02}$	60	117	136
16	–	219	100	12	50	20	$15_{\pm 0.05}$	71.5	140	158

Size	L13	R1[1)]		R2[1)]	T3	⫧C1	⫧C2	⫧C3	⫧C4
		±3	AW ±3	±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

Dimensions Download CAD data ➔ **www.festo.com**

with wait position module



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

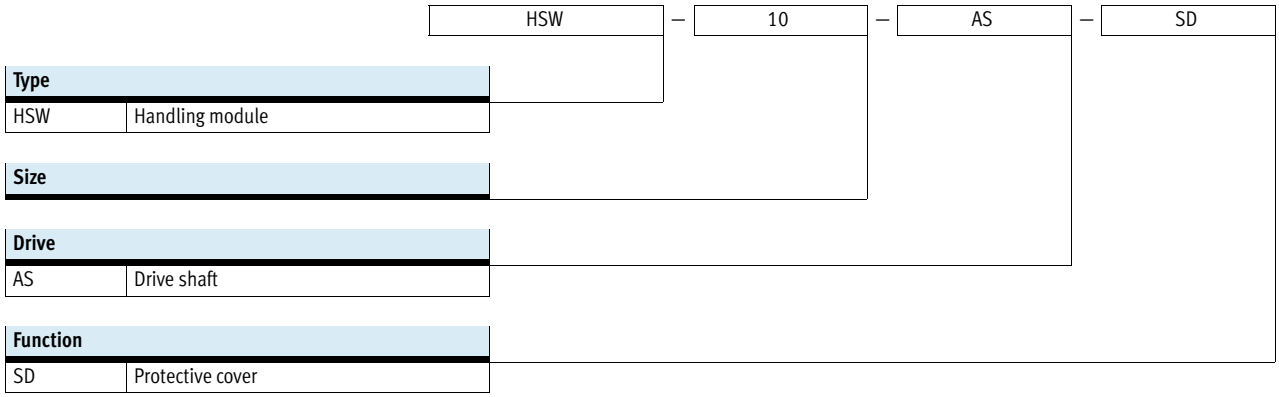
Size	EE1	L11 max.	L12 ±2	⌀5
10	M5	115	75.5	2
12	M5	142.5	86.5	2.5
16	M5	190.5	98	13

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-16-AP-SD-AW**	**562564**	**HSW-16-AP-SD-AW**

Handling modules HSW, without drive

Type codes



Handling modules HSW, without drive

Technical data

FESTO

Function

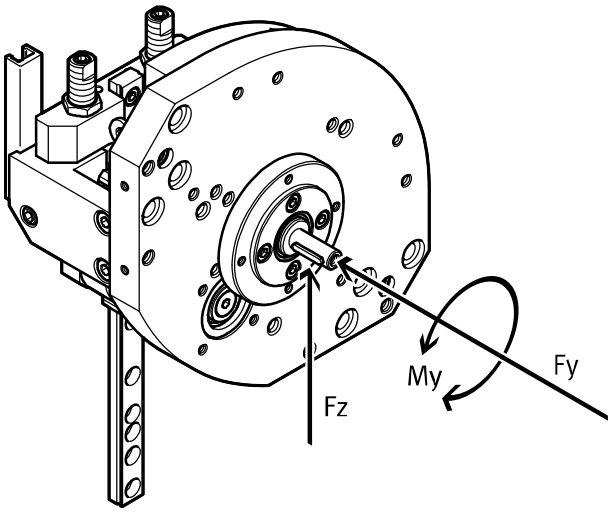
www.festo.com

- 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	1,200	2,800	4,900
HSW-...-AS-SD	1,300	3,000	5,200

Permissible static/dynamic characteristic load values

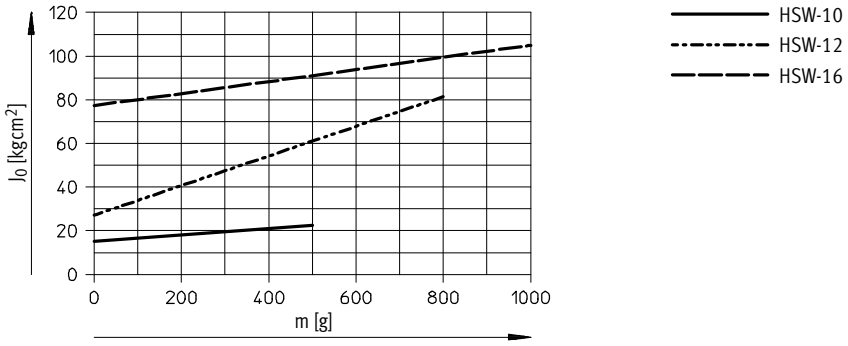


- Note

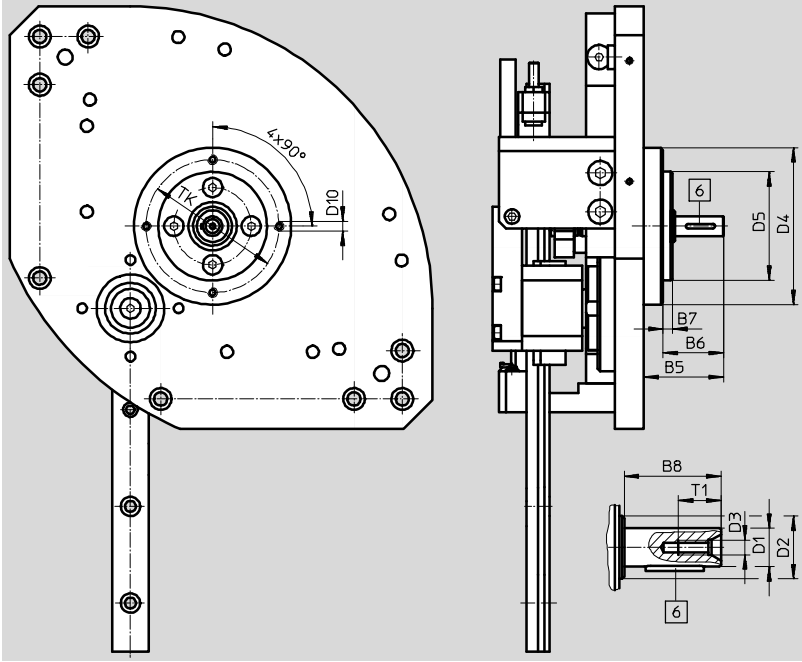
Technical data for mechanical components ➔ 9.

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

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
➔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

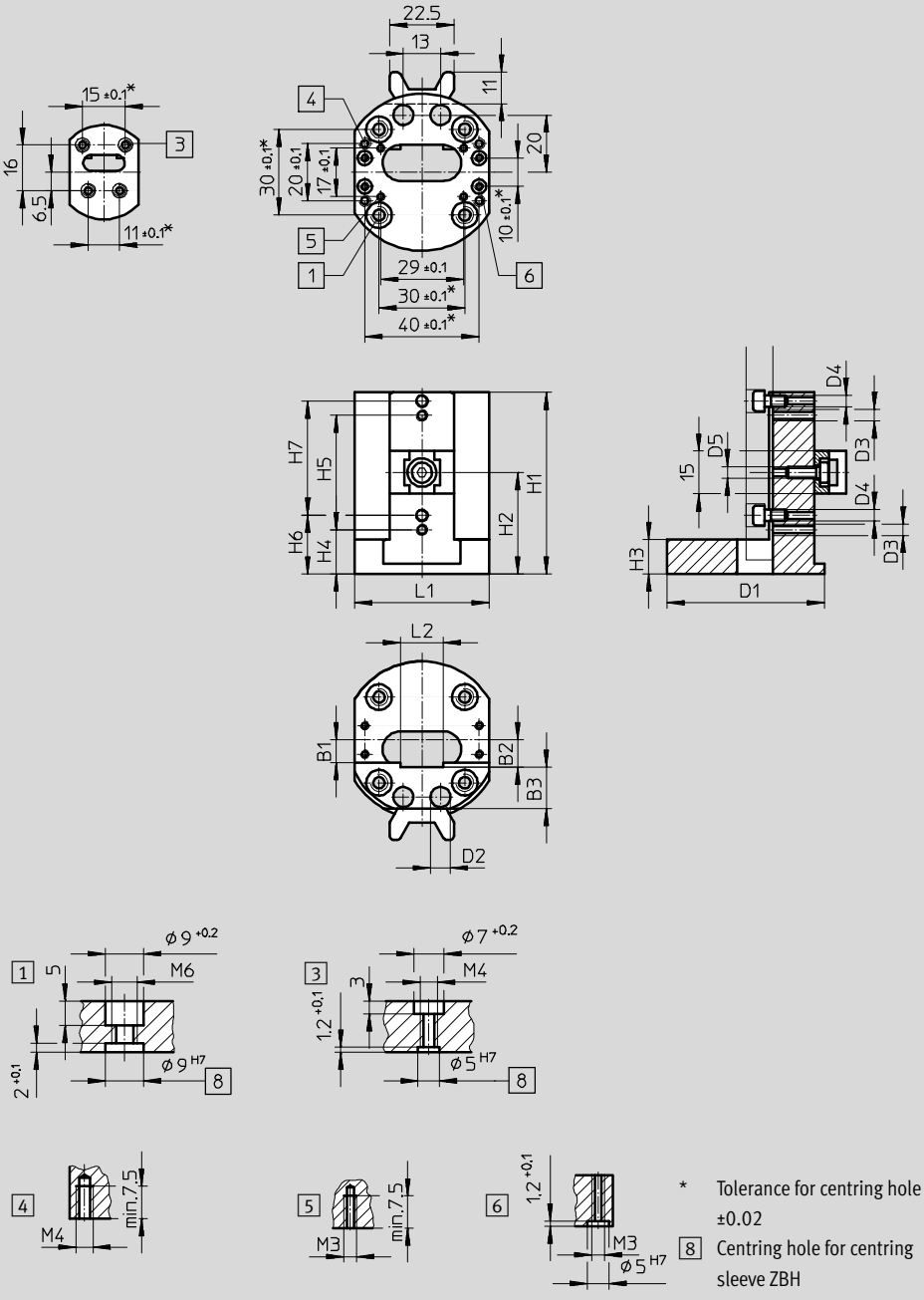
Ordering data for HSW-...-AS

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**

Adapter kit HAPG/HAPG-B

Material:
Wrought aluminium alloy, anodised

HAPG-69 HAPG-71-B



* Tolerance for centring hole ±0.02

8 Centring hole for centring sleeve ZBH

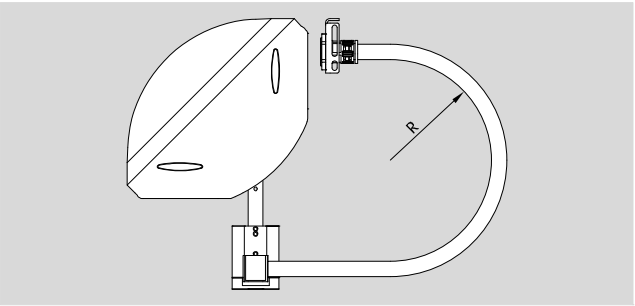
Dimensions and ordering data

For size	B1	B2 ±0.2	B3	D1 ∅	D2 ∅	D3	D4	D5	H1	H2
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 +0.2	H5 ±0.2	H6 +0.2	H7 ±0.2	L1	L2 +0.1	Weight [g]	Part No.	Type
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**

Installation kit MKRP

Material:
Conduit/fitting: Polyamide
Reducer/lock nut:
Nickel-plated brass
Adapter plate/bracket:
Powder-coated steel



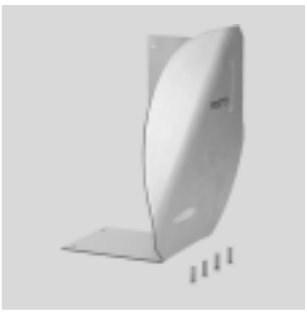
Ordering data

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 ➔ 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 ➔ 15

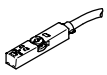
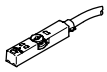
Ordering data

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**

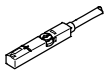
Ordering data – Shock absorber — Technical data ➔ Internet: dysw; ysrw

	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**
			Plug M8x1, 3-pin	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	**150855**	**SME-8-K-LED-24**
			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**