

Handling module HSW

FESTO



Characteristics

At a glance

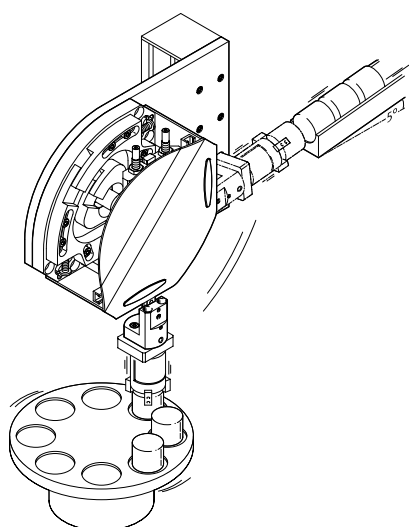
- The handling module is a new generation of function modules for automatically transferring, feeding in and removing small parts in very confined spaces
- This is achieved via a force-guided vertical and horizontal motion sequence. A backlash-free cross guide with recirculating ball bearing components ensures high precision and good rigidity
- By combining a semi-rotary drive with a slotted guide, a compact unit for a complete pick and place cycle is created
- Swivel angle of 90°

Advantages:

- Small installation space
- Extremely short cycle times
- Easy to commission

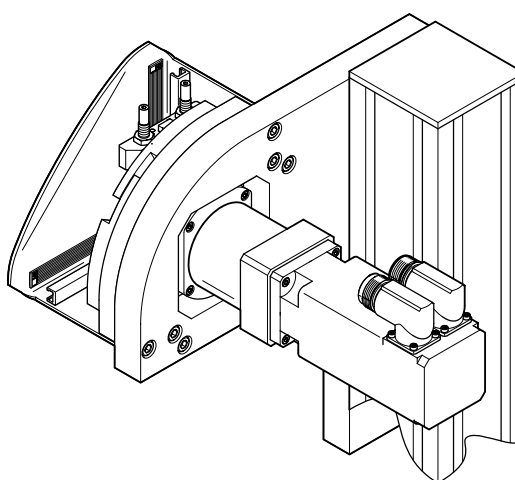
Drive system

[AP] Pneumatic semi-rotary drive



- With semi-rotary drive DSM
- Fast feeding and removal, e.g. at the linear transfer or at the rotary indexing table

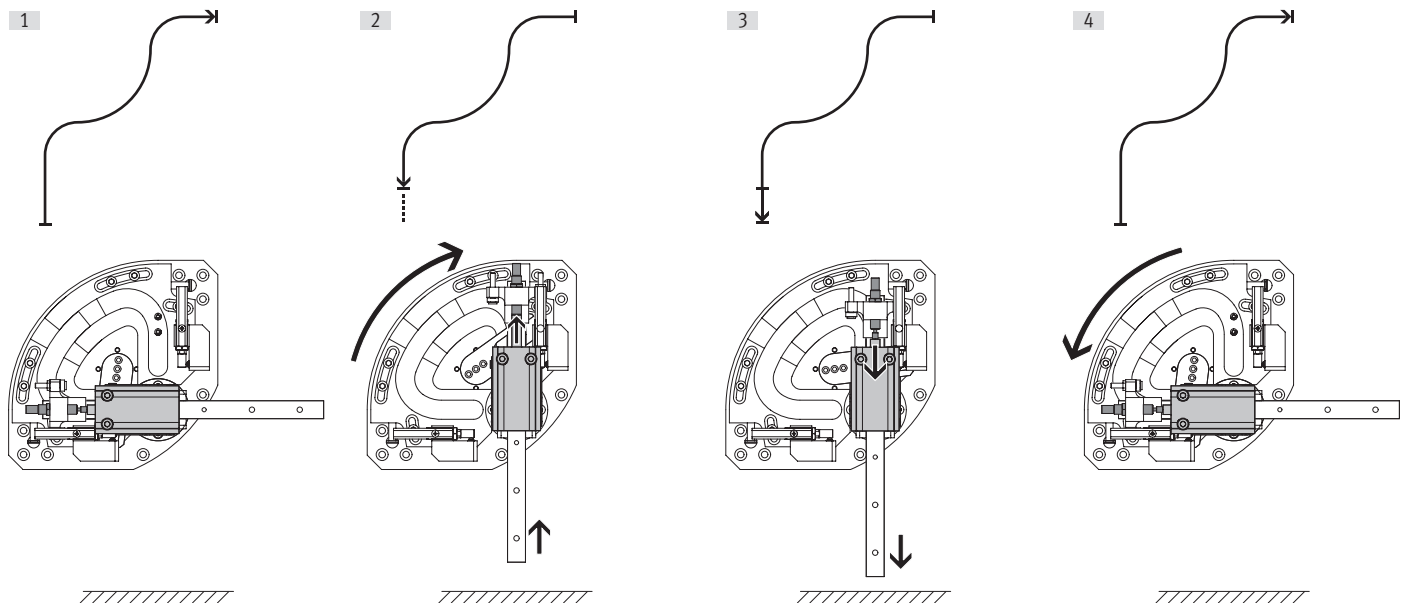
[AS] Drive shaft



- Without drive (flexible control possible)
- Fast and flexible 90° pick and place with servo motor

Characteristics

Waiting position



Cycle sequence

- [1] Handling module is in the horizontal end position. Wait position module is retracted
- [2] Handling module moves to vertical end position. Wait position module extends with a time delay. Handling module stops outside the work area
- [3] Wait position module retracts. Handling module moves into the work area
- [4] Handling module moves to horizontal end position

- Enables stopping before the end position, outside the work area [2]
- The wait position can be approached dynamically from the end position. This significantly reduces the cycle time
- Flexible adjustment possible within the setting range (working stroke)
- The wait position module must only be used with a shock absorber because of the high dynamic forces that occur.
- Handling module HSW and actuating cylinder are controlled by a 5/2-way valve
- The valve for the wait position module should be switched relative to the valve for the handling module using a time delay

Max. Z-stroke wait position: see datasheet 'Wait position module'

Type code

001	Series	
HSW	Handling module	
002	Size [mm]	
10	10	
12	12	
16	16	
003	Drive system	
AP	Pneumatic semi-rotary drive	
AS	Drive shaft	

004	Protective devices	
	None	
SD	Protective cover	
005	Waiting position	
AW	With	
	None	

Datasheet

General technical data

Series	Handling module [HSW]					
Drive system	Drive shaft [AS]			Pneumatic semi-rotary drive [AP]		
Size	10	12	16	10	12	16
Pneumatic connection	–			M3	M5	
Design	Drive shaft Linear guide plus ball bearing Force pilot operated motion sequence			Linear guide plus ball bearing Semi-rotary drive Force pilot operated motion sequence		
Max. effective load	0.5 kg	1 kg	1.5 kg	0.5 kg	1 kg	1.5 kg
Cushioning	Noise reduction via buffers			Shock absorber at both ends, Soft characteristic curve		
Position detection	Via proximity switch					
Type of mounting	Via through-hole and centring sleeve					
Mounting position	optional					

Operating and environmental conditions

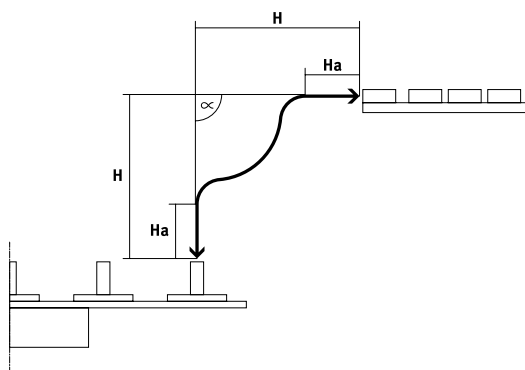
Operating and environmental conditions		
Series	Handling module [HSW]	
Drive system	Drive shaft [AS]	Pneumatic semi-rotary drive [AP]
Operating medium	–	Compressed air to ISO 8573-1:2010 [7:::]
Note on operating and pilot medium	–	Lubricated operation possible (in which case lubricated operation will always be required)
Operating pressure	–	4 ... 8 bar
Ambient temperature	0 ... 60°C	

Weight

Series	Handling module [HSW]					
Drive system	Drive shaft [AS]			Pneumatic semi-rotary drive [AP]		
Size	10	12	16	10	12	16
Product weight ¹⁾	1,200 ... 1,300 g	2,800 ... 3,000 g	4,900 ... 5,200 g	1,250 ... 1,460 g	2,840 ... 3,260 g	5,100 ... 5,800 g

1) Without protective hood / with protective hood

Stroke adjustment



Swivel angle:

- Angle range: 80... 100°
- An angular offset of +5° per end position can be set to adapt the handling module to the transfer system

Linear stroke:

- Once the HSW is mounted, the linear stroke of the pick & place position can be adjusted independently of each other.

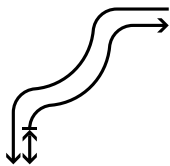
H = max. linear stroke at 90° swivel angle

Ha = working stroke

Series	Handling module [HSW]		
Size	10	12	16
Max. linear stroke with 90° swivel angle	90/90 mm	142/142 mm	175/175 mm
Working stroke	9 ... 15 mm	15 ... 25 mm	20 ... 35 mm

Datasheet

Wait position module



Series	Handling module [HSW]		
Size	10	12	16
Max. Z stroke waiting position	10 mm	15 mm	25 mm

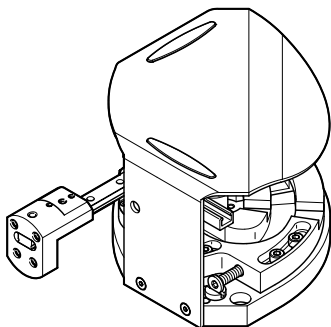
Materials

Material base plate	Wrought aluminium alloy, Anodised
Material slotted guide plate	Case-hardened steel, Burnished, Hardened
Material swivel lever	Case-hardened steel, Burnished
Material retaining bracket	Wrought aluminium alloy, Anodised
Material bar	Wrought aluminium alloy, Anodised
Material setting screw	High-alloy steel
Material stops	High-alloy steel
Material cross-guide	Tempered steel
Material sensor rail	Wrought aluminium alloy, Anodised

Forces, HSW-...-AP

Series	Handling module [HSW]		
Drive system	Pneumatic semi-rotary drive [AP]		
Size	10	12	16
Theoretical force at 0.6 MPa (6 bar, 87 psi)	30 N	35 N	55 N
Max. process force in Y direction	30 N	35 N	50 N

Repetition accuracy, HSW-...-AP



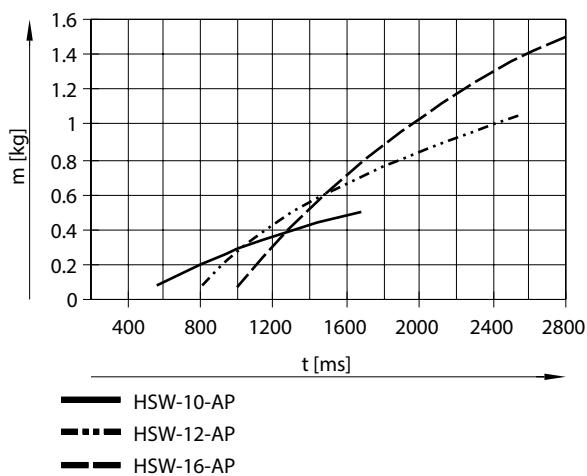
For low-vibration operation, the payload should be mounted as close as possible to the guide rail of the handling module.

Repetition accuracy is ensured if the payload (adapter plate, semi-rotary drive and/or gripper, gripper fingers, workpiece) is mounted within the mounting surface of the adapter kit HAPG.

Series	Handling module [HSW]		
Drive system	Pneumatic semi-rotary drive [AP]		
Size	10	12	16
Repetition accuracy end positions	±0.02 mm		

Datasheet

Travel time t as a function of payload m while maintaining the repetition accuracy, HSW-...-AP



The travel time t refers to the time the handling module requires to travel from one end position to the other and back.

The payload m refers to the mass fastened on the vertical guide rail (e.g. adapter, gripper, semi-rotary drive and workpiece).

Note:

It is possible to obtain higher speeds with the same mass by limiting the repetition accuracy.

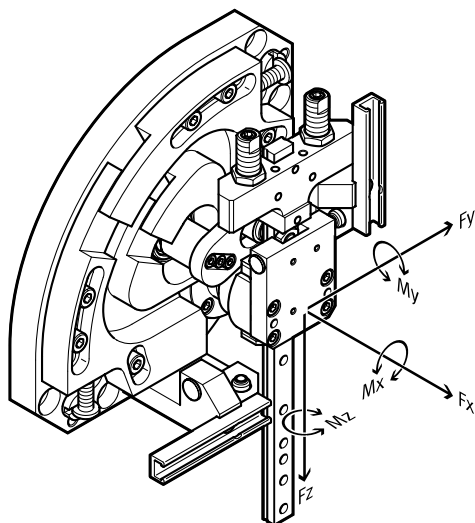
Cycle times, HSW-...-AP

The cycle time t_t is the sum of the travel time t and the dwell time t_e in the end positions.

The minimum cycle time must be adhered to.

Series	Handling module [HSW]		
Drive system	Pneumatic semi-rotary drive [AP]		
Size	10	12	16
Min. cycle time	0.6 s	0.8 s	1 s

Load characteristics, HSW-...-AP



The torques apply to the centre of the guide carriage.

Drive system	Pneumatic semi-rotary drive [AP]		
Series	Handling module [HSW]		
Size	10	12	16
Max. moment M_x	0.6 Nm	1.5 Nm	2.5 Nm
Max. moment M_y	0.6 Nm	1.5 Nm	2.5 Nm
Max. moment M_z	0.6 Nm	1.5 Nm	2.5 Nm

Calculation of the load comparison factor, HSW-...-AP

$$f_v = \frac{|M_{x1}|}{M_{x2}} + \frac{|M_{y1}|}{M_{y2}} + \frac{|M_{z1}|}{M_{z2}} \leq 1$$

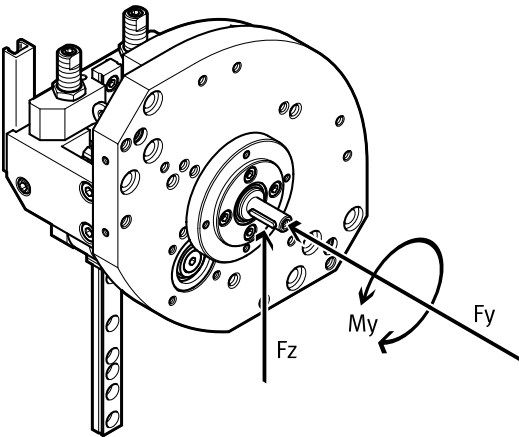
The torque equation for the combined load must be satisfied:

M_1 = dynamic value

M_2 = maximum value

Datasheet

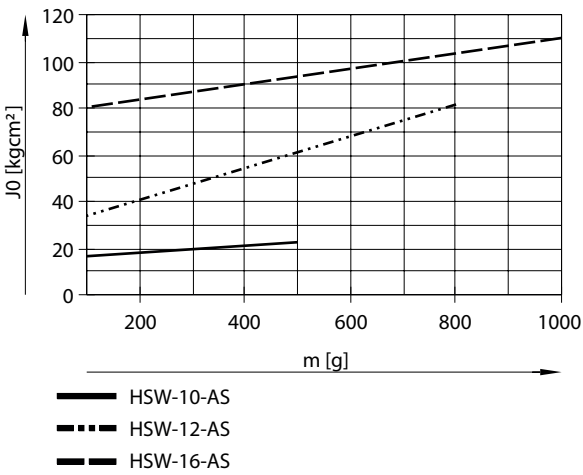
Load characteristics, HSW-...-AS



The torques apply to the centre of the shaft.

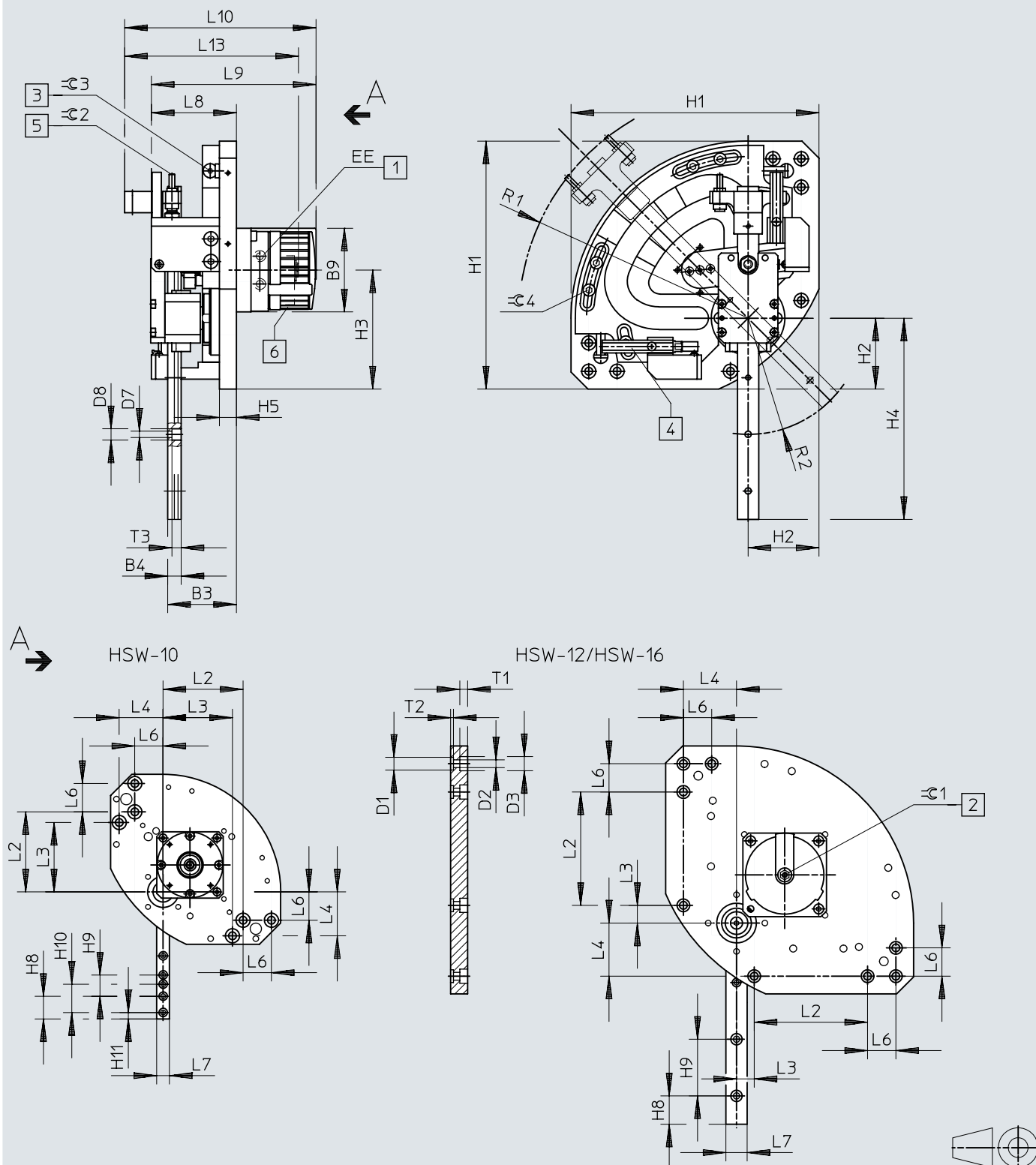
Series	Handling module [HSW]		
Drive system	Drive shaft [AS]		
Size	10	12	16
Max. axial force at drive shaft	10 N	18 N	30 N
Max. radial force at drive shaft	30 N	45 N	75 N
Max. drive torque at drive shaft	0.85 Nm	1.25 Nm	2.5 Nm

Mass moment of inertia J_0 as a function of payload m (for drive design), HSW-...-AS



Dimensions

Dimensions – HSW-...-AP with semi-rotary drive DSM

Download CAD data www.festo.com

- [1] Compressed air ports
- [2] Manual override (internal hex)
- [3] Angle adjustment of link
- [4] Sensor slot for SME-/SMT-8
- [5] Stroke adjustment
- [6] HSW-10 without cover cap

Dimensions

	B3 ±0,5	B4	B9	D1 ∅ H7	D2 ∅	D3 ∅	D7 ∅	D8 ∅	EE
HSW-10	45	5,5	47	9	5,5	10	3,5	6	M3
HSW-12	48,5	9,5	59	9	5,5	10	4,5	8	M5
HSW-16	57	12,5	70	9	5,5	10	4,5	7,5	M5

	H1 ±0,3	H2 ±0,2	H3 ±0,5	H4 ¹⁾ ±1	H5	H8	H9	H10	H11
HSW-10	120	37	56	89,6	12	16	15	20	4,5
HSW-12	175	50	84	142	12	20	40	–	–
HSW-16	215	58,5	103,5	174	12	15	40	–	–

	L1 ±2	L2 ±0,2	L3 ±0,2	L4	L6 ±0,2	L7	L8 ±2	L9 ±3	L13
HSW-10	123	56,5	49	31	20	9 _{-0,02}	62	–	113
HSW-12	180	80	12,5	37,5	20	15 _{-0,02}	60	117	123
HSW-16	219	100	12	50	20	15 _{±0,05}	71,5	140	143

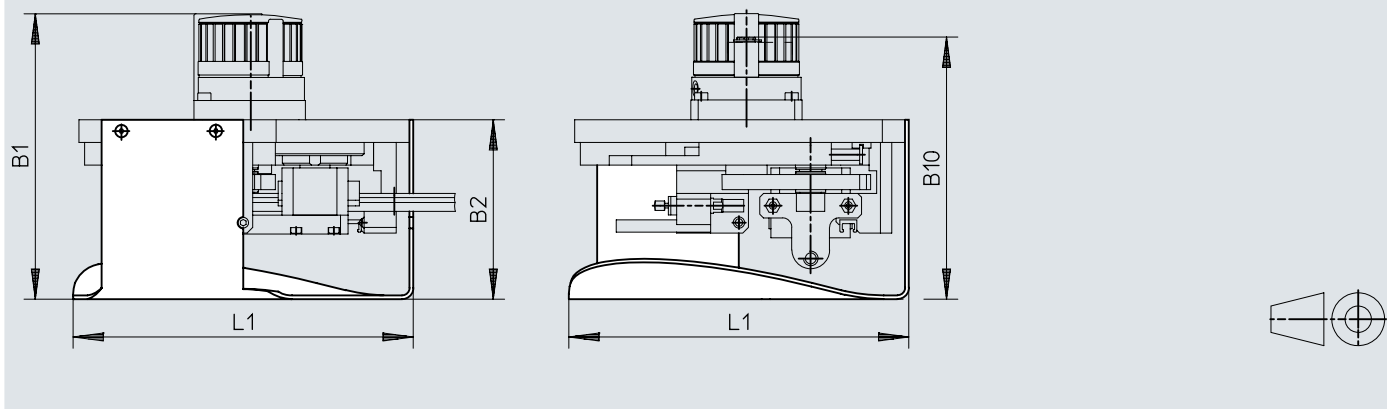
	R1 ¹⁾		R2 ¹⁾	T3	≈G1	≈G2	≈G3	≈G4
	±3	AW ±3	±3					
HSW-10	113	116	55	3,3	4,5	2	3	3
HSW-12	162	177	82	6,5	6	2	3	4
HSW-16	200	206	100	5,3	8	2,5	4	4

1) Maximum stroke and 90° angle

Dimensions

Dimensions – HSW-...-AP with semi-rotary drive DSM and protective hood

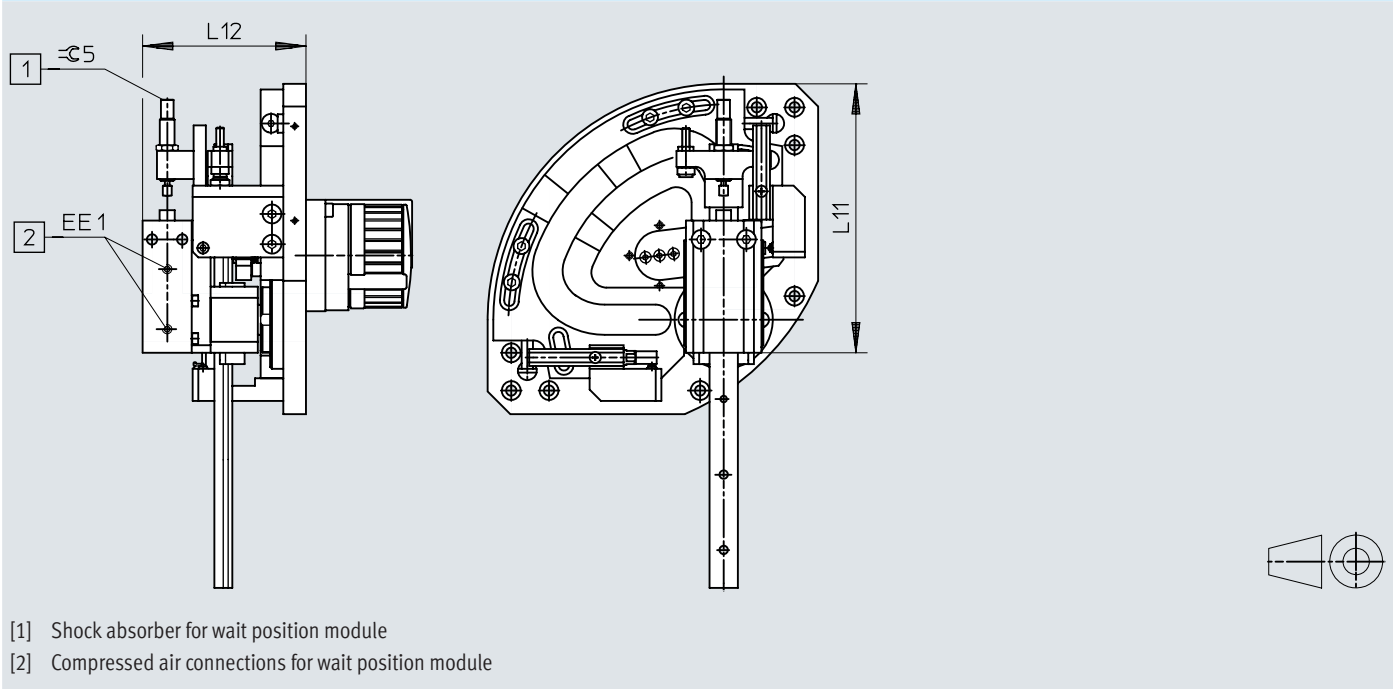
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	B1	B2	B10	L1
	±2	±1	±2	±2
HSW-10	–	85	126	123
HSW-12	157	100	144	180
HSW-16	179	110	163	219

Dimensions

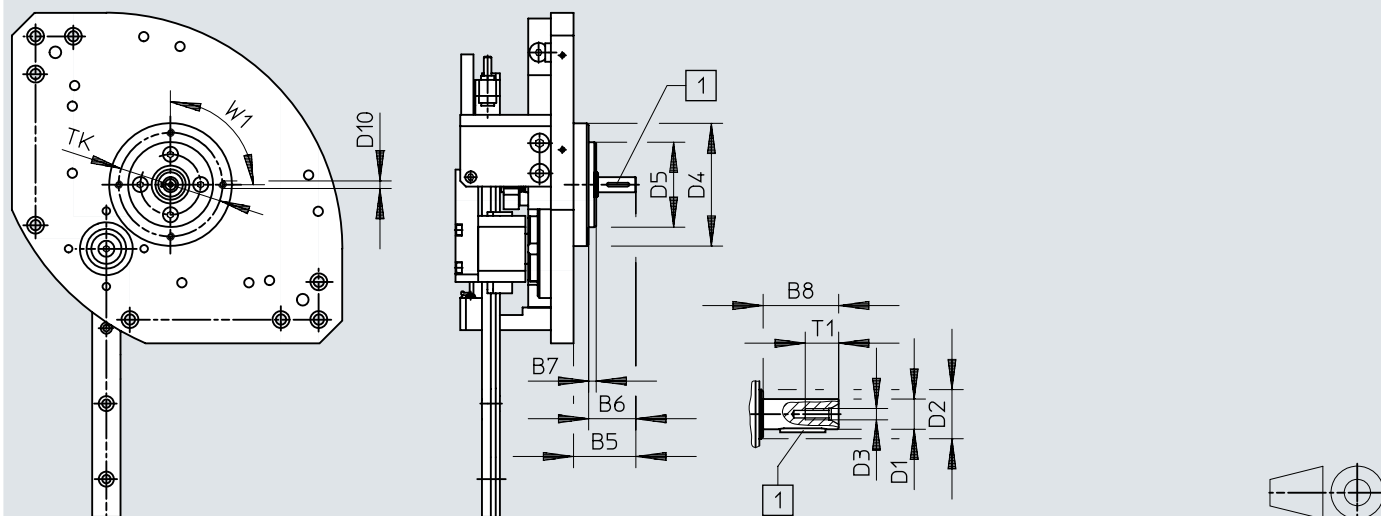
Dimensions – HSW-...-AP with waiting position module Download CAD data www.festo.com



	EE1	L11	L12	Ø5
		max.	±2	
HSW-10	M5	115	75,5	2
HSW-12	M5	142,5	86,5	2,5
HSW-16	M5	190,5	98	13

Dimensions

Dimensions – HSW-...-AS

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[1] Featherkey

	B5	B6	B7	B8	D1 ø g7	D2 ø	D3	D4 ø	D5 ø f8	D10	T1	TK ±0,1
HSW-10	25	19	2	16	6	12	M2,5	46	32	M3	6,8	39
HSW-12	33	25	4	20	8	13	M3	65	45	M4	8,8	55
HSW-16	36,5	28,5	4	23	10	16	M3	70	50	M4	10,6	60

Ordering data

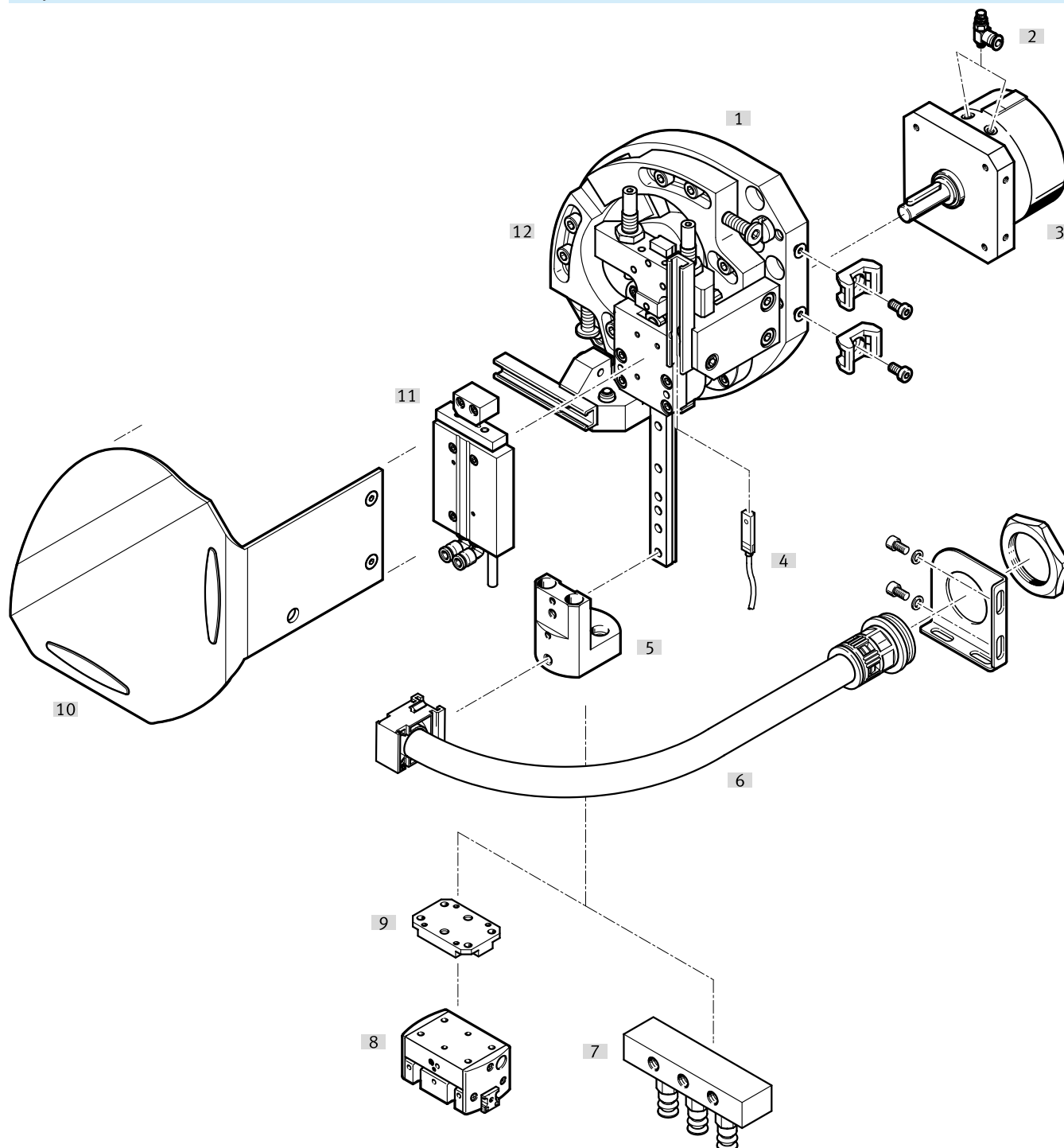
HSW-...-AP, without protective hood				
	Size	Waiting position	Part no.	Type
	10	With	562559	HSW-10-AP-AW
		None	540222	HSW-10-AP
	12	With	562560	HSW-12-AP-AW
		None	540228	HSW-12-AP
	16	With	540234	HSW-16-AP
		With	562561	HSW-16-AP-AW

HSW-...-AP, with protective hood				
	Size	Waiting position	Part no.	Type
	10	With	562562	HSW-10-AP-SD-AW
		None	540223	HSW-10-AP-SD
	12	With	540229	HSW-12-AP-SD
		With	562563	HSW-12-AP-SD-AW
	16	With	562564	HSW-16-AP-SD-AW
		None	540235	HSW-16-AP-SD

HSW-...-AS				
	Size	Protective devices	Part no.	Type
	10	None	540226	HSW-10-AS
		Protective cover	540227	HSW-10-AS-SD
	12	None	540232	HSW-12-AS
		Protective cover	540233	HSW-12-AS-SD
	16	None	540238	HSW-16-AS
		Protective cover	540239	HSW-16-AS-SD

Peripherals

Peripherals overview



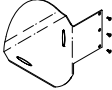
Accessories		→ Link
Type/order code	Description	
[1] Handling module HSW	Standard module without accessories	hsw
[2] One-way flow control valve GRLA	Speed adjustment for pneumatic actuators	grla
[3] Semi-rotary drive DSM	Pneumatic drive, adapted to each size	dsm
[4] Proximity switch SME-8	Sensing option for end positions	17
[4] Proximity switch SMT-8	Sensing option for end positions	17
[5] Adapter kit HAPG	Interface for grippers, semi-rotary drives, etc.	17
[6] Installation kit MKRP	Conduit for protecting electrical cables and tubing	17
[7] Suction cup with connection	The right suction cup for every application	vakuumsauger

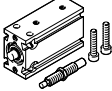
Peripherals

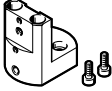
Accessories		→ Link
Type/order code	Description	
[8] Gripper	Parallel/three-point/radial/angle grippers can be attached to the HSW. The appropriate gripper for every application	greifer
[9] Adapter kit	Interface between HSW and gripper	greifer
[10] Cover kit BSD-HSW	To protect against contact	17
[11] Wait position module BAW-HSW	With pneumatic drive: Function for pulling the swivel arm out of the working area	17
[12] Shock absorbers DYSW/YSRW	• With path-controlled flow control function • Slowly increasing cushioning force curve	17

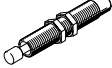
Accessories

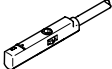
Installation kit MKRP				
	Description	Product weight	Part no.	Type
	For sizes 12, 16	150 g	540248	MKRP-6
	For size 10, 12	140 g	540247	MKRP-5

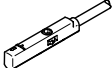
Cover kit BSD-HSW				
	Description	Product weight	Part no.	Type
	For size 12	200 g	540241	BSD-HSW-12
	For size 10	100 g	540240	BSD-HSW-10
	For size 16	300 g	540242	BSD-HSW-16

Wait position module BAW-HSW for HSW-...-AP				
	Description	Product weight	Part no.	Type
	For size 12	220 g	562590	BAW-HSW-12
	For size 10	110 g	562589	BAW-HSW-10
	For size 16	400 g	562591	BAW-HSW-16

Adapter kit HAPG				
	Description	Product weight	Part no.	Type
	For size 10	25 g	540249	HAPG-69
	For sizes 12, 16	110 g	540882	HAPG-71-B

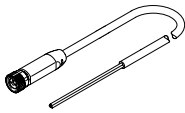
Shock absorber				
	Description	Product weight	Part no.	Type
	For size 12	11 g	548071	DYSW-5-8-Y1F
	For size 10	6 g	548070	DYSW-4-6-Y1F
	For size 16	18 g	191193	YSRW-7-10

Proximity switch SMT-8M for T-slot, magneto-resistive						Link smt
	Type of mounting	Switching output	Electrical connection	Cable length	Part no.	Type
	Screw-clamped, Insertable in the slot from above	3-wire NPN N/O contact	Open end	2.5 m	★ 574338	SMT-8M-A-NS-24V-E-2,5-OE
			Plug M8, A-coded	0.3 m	★ 574339	SMT-8M-A-NS-24V-E-0,3-M8D
		3-wire PNP N/C contact	Open end	7.5 m	574340	SMT-8M-A-PO-24V-E-7,5-OE
				2.5 m	★ 574335	SMT-8M-A-PS-24V-E-2,5-OE
		3-wire PNP N/O contact	Plug M8, A-coded	0.3 m	★ 574334	SMT-8M-A-PS-24V-E-0,3-M8D

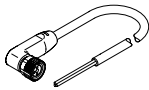
Proximity switch SME-8M for T-slot, magnetic reed						Link sme
	Type of mounting	Switching output	Electrical connection	Cable length	Part no.	Type
	Screw-clamped, Insertable in the slot from above	3-wire N/O contact	Open end	2.5 m	543862	SME-8M-DS-24V-K-2,5-OE
				5 m	543863	SME-8M-DS-24V-K-5,0-OE
		2-wire PNP N/O contact	Plug M8, A-coded	0.3 m	543861	SME-8M-DS-24V-K-0,3-M8D
			Open end	2.5 m	543872	SME-8M-ZS-24V-K-2,5-OE

Accessories

Connecting cables NEBA, straight

	Electrical connection 1, connector system	Electrical connection 2, connector system	Electrical connection 2, number of connections/cores	Cable length	Part no.	Type
	M8x1, A-coded, to EN 61076-2-104	Open end	3	2.5 m	★ 8078223	NEBA-M8G3-U-2.5-N-LE3
				5 m	★ 8078224	NEBA-M8G3-U-5-N-LE3

Connecting cables NEBA, angled

	Electrical connection 1, connector system	Electrical connection 2, connector system	Electrical connection 2, number of connections/cores	Cable length	Part no.	Type
	M8x1, A-coded, to EN 61076-2-104	Open end	3	2.5 m	★ 8078230	NEBA-M8W3-U-2.5-N-LE3
				5 m	★ 8078231	NEBA-M8W3-U-5-N-LE3