

# Handling modules HSW



## Handling modules HSW

Key features at a glance

### Range of applications

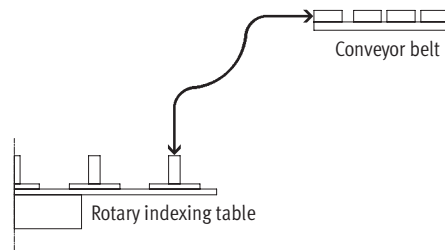
The handling module is a new generation of function modules for the automatic transfer, feed and removal of small parts in extremely confined spaces.

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 & 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

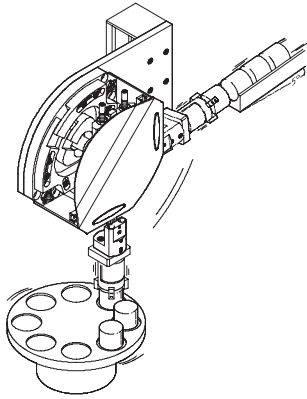
	Pneumatic: HSW-...-AP, with swivel module DSM	Electrical: HSW-...-AE, with motor unit MTR-DCI	Without drive: HSW-...-AS, with drive shaft
Advantages	<ul style="list-style-type: none"> <li>• Fast</li> <li>• Cost effective</li> <li>• Ready to install</li> <li>• No system planning required</li> <li>• Simple commissioning</li> </ul>	<ul style="list-style-type: none"> <li>• Freely positionable</li> <li>• Freely selectable speed</li> <li>• Smooth motion sequence</li> <li>• Ready to install</li> <li>• No system planning required</li> <li>• Simple commissioning using teach-in procedure</li> </ul>	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Universal applications</li> <li>• Variable drive interface</li> <li>• On request: Drive options in combination with servo motors MTR-AC</li> </ul>
<b>Technical data</b>			
Max. linear stroke at 90° swivel angle	[mm] 90 ... 175		
Working stroke	[mm] 9 ... 35		
Min. cycle time	[s] 0.6 ... 1.0	0.8 ... 1.2	Dependent on drive
Effective load	[g] 0 ... 1,600		
Repetition accuracy at end positions	[mm] ±0.02	±0.02	±0.02
Wait positions	Max. 2	Any	Dependent on drive
Function of wait position	Pushing via actuating cylinder	Freely approachable	Dependent on drive
Repetition accuracy at wait positions	[mm] < 1	< 2	Dependent on drive
Technical data	→ 9	→ 26	→ 36

# Handling modules HSW

Application examples

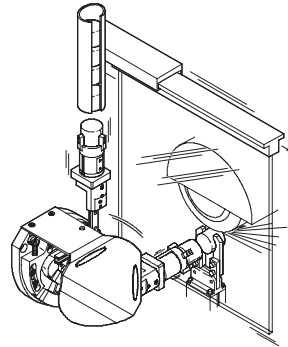
## HSW-...-AP, pneumatic / HSW-...-AE, electrical

Rotary indexing table



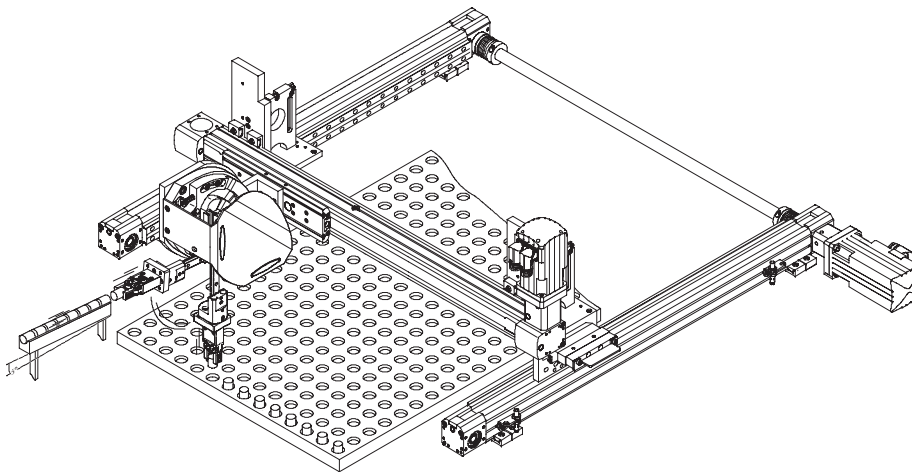
- Fast feed and removal at a linear transfer unit or rotary indexing table, for example

Machine equipment



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

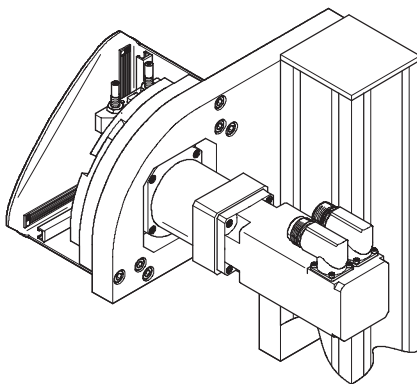
## Planar surface gantry



- Fast equipping of pallets

## HSW-...-AS, without drive

Rotary indexing table, linear transfer



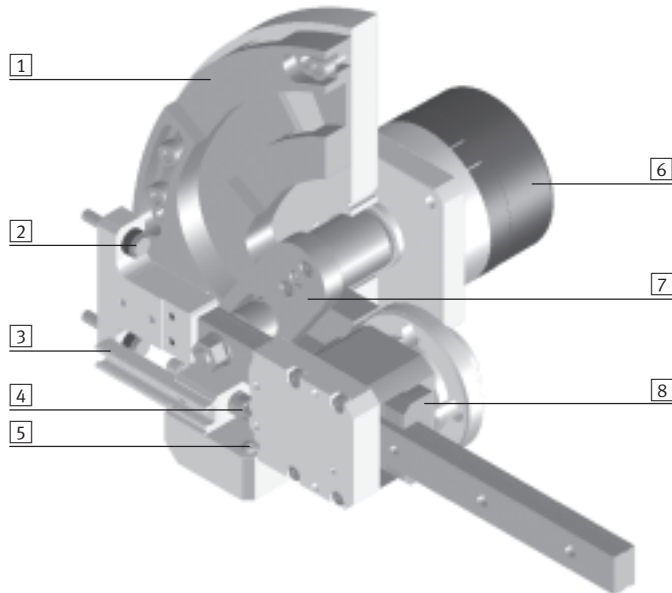
- Fast and flexible 90° pick & place unit with servo motor MTR-AC
- Electrical variant using third-party motor

# Handling modules HSW

Key features at a glance

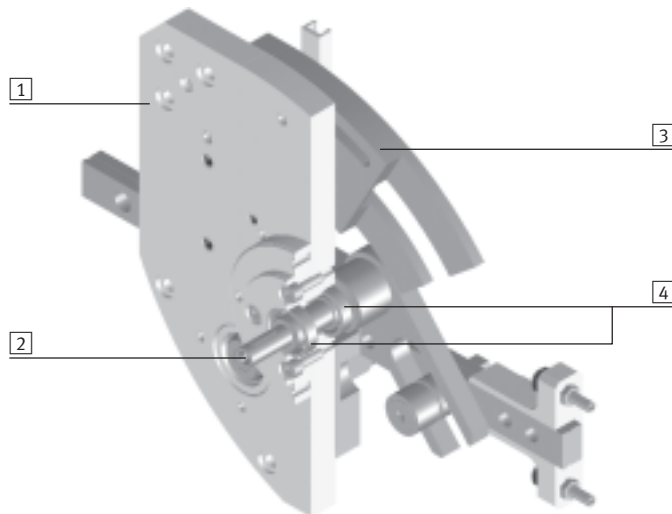
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## Design of HSW-...-AP – pneumatic variant with swivel module DSM



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

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

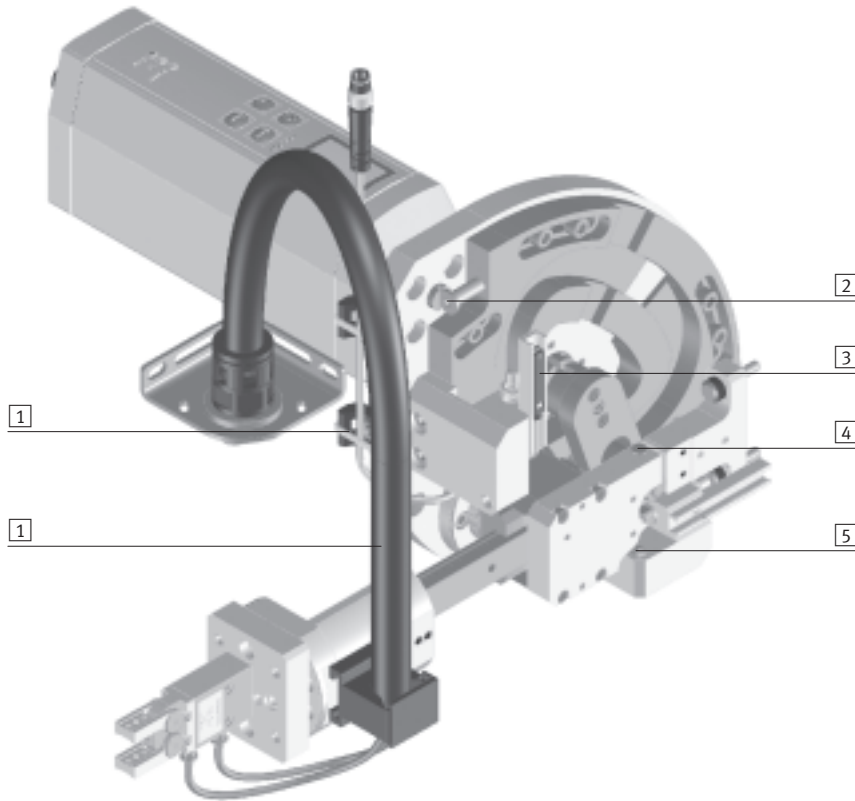


- 1 Base plate
- 2 Shaft with Woodruff key
- 3 Slotted guide plate
- 4 Ball bearings

# Handling modules HSW

Key features at a glance

## Design of HSW-...-AE – electrical variant with motor unit MTR-DCI-...-HM



### 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

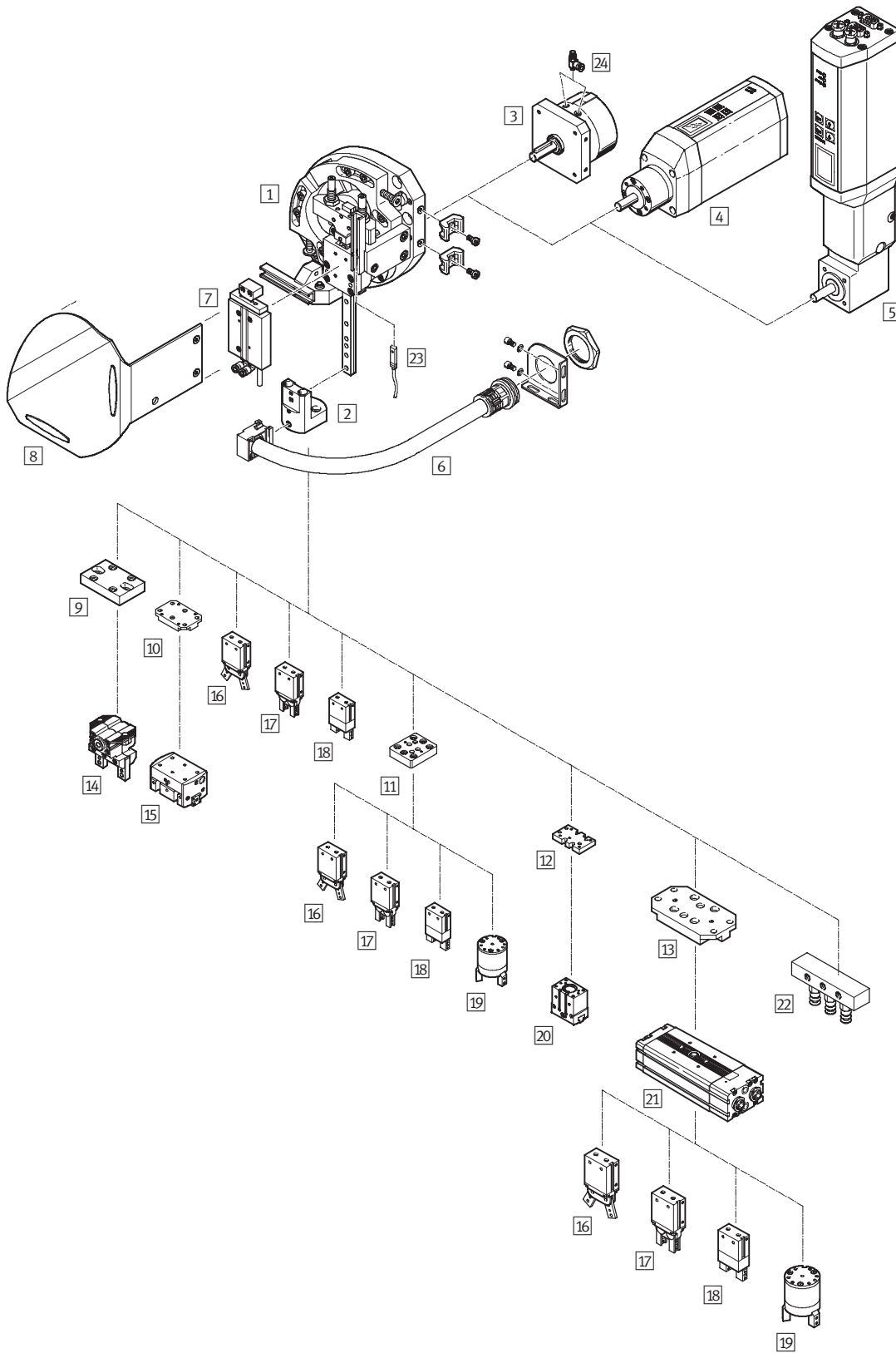


- 4+5 The stop element and pressure piece guarantee freedom from backlash and precision in the end positions and in the effective linear stroke.

# Handling modules HSW

Peripherals overview

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# Handling modules HSW

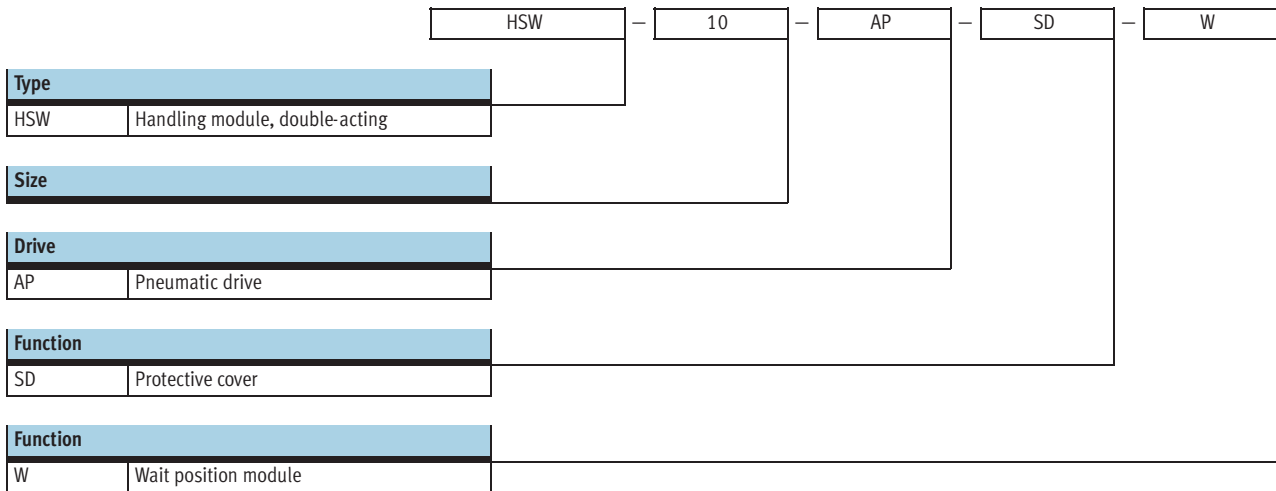
Peripherals overview



Accessories						
	Brief description	10	12	16	→ Page/Internet	
1	Handling module HSW	Standard module without accessories	■	■	■	9
2	Adapter kit HAPG-...-B	Interface for grippers, semi-rotary drive, etc.	■	■	■	38
3	Swivel module DSM	Pneumatic drive, adapted to each size	■	■	■	dsm
4	Motor unit MTR-DCI-...-HM	Servo motor with integrated power electronics	■	■	■	26
5	Motor unit MTR-DCI-...-HM	Servo motor with right-angle gear unit and integrated power electronics	■	■	■	26
6	Installation kit MKRP	Conduit to protect electrical cables and tubing	■	■	■	39
7	Wait position module BW-HSW	With pneumatic drive: Pushes the swivel arm from the operating area	■	■	■	39
8	Cover kit BSD-HSW	To protect against accidental contact	■	■	■	39
9	Adapter kit HAPG	Interface between HSW and parallel gripper HGPC	-	■	■	40
10	Adapter kit HAPG	Interface between HSW and parallel gripper HGPP	-	■	■	40
11	Adapter kit HAPG	Interface between HSW and gripper	■	■	■	40
12	Adapter kit HAPG	Interface between HSW and parallel gripper HGPT	-	■	■	40
13	Adapter kit HAPS	Interface between HSW and semi-rotary drive DRQD	-	■	■	40
14	Parallel gripper HGPC	Appropriate gripper for every application	-	■	■	40
15	Parallel gripper HGPP		-	■	■	40
16	Angle gripper HGW		■	■	■	40
17	Radial gripper HGR		■	■	■	40
18	Parallel gripper HGP		■	■	■	40
19	Three-point gripper HGD		-	-	■	40
20	Parallel gripper HGPT		-	■	■	40
21	Semi-rotary drive DRQD		Semi-rotary drive for transferring parts	-	■	■
22	Suction cups	Appropriate suction cup for every application	■	■	■	suction cup
23	Proximity sensor SME-/SMT-8	Sensing option for end positions	■	■	■	42
24	Non-return and flow control valve GRLA	For setting the speed of pneumatic drives	■	■	■	grla

# Handling modules HSW, pneumatic

Type codes



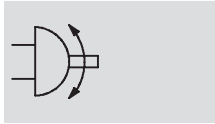


# Handling modules HSW, pneumatic

Technical data




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Function



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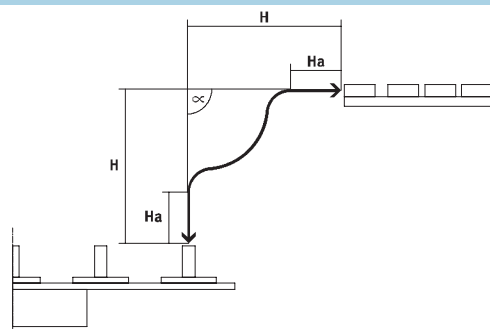
-  Size  
10, 12 and 16
-  Swivel angle  
80 ... 100
-  Stroke range  
90 ... 175

General technical data		10	12	16
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	Filtered compressed air, lubricated or unlubricated
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	$\alpha$	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 <sup>1)</sup>	30	35	50

1) Due to the pretension force on the guide

# Handling modules HSW, pneumatic

Technical data

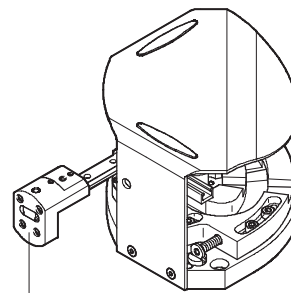


Weight [g]			
Size	10	12	16
HSW-...-AP	1,300	3,000	5,400
HSW-...-AP-SD	1,400	3,200	5,700
HSW-...-AP-W	1,350	3,140	5,550
HSW-...-AP-SD-W	1,450	3,340	5,850

## 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.



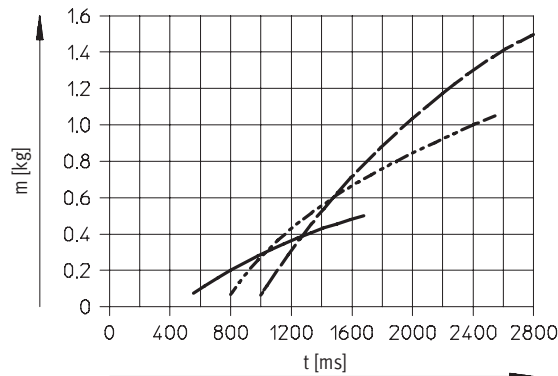
Mounting surface of HAPG

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.

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

Size	10	12	16
Min. cycle time	0.6	0.8	1.0

## 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:  
 $t = 800 \text{ ms}$

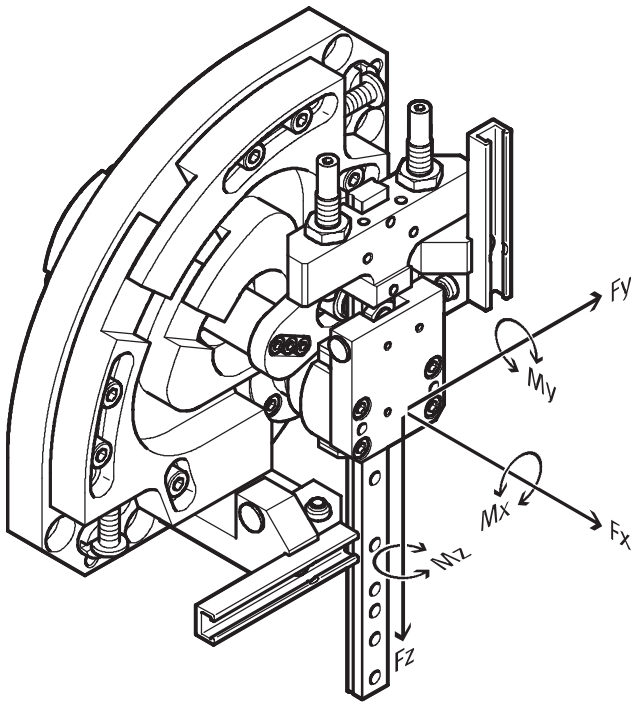
Step 3:  
This gives us a cycle time:  
 $t_t = 800 \text{ ms} + 700 \text{ ms}$   
 $= 1,500 \text{ ms}$

# 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]	0.6	1.5	2.5
$M_{xperm.}, M_{yperm.}, M_{zperm.}$			

# Handling modules HSW, pneumatic

Technical data

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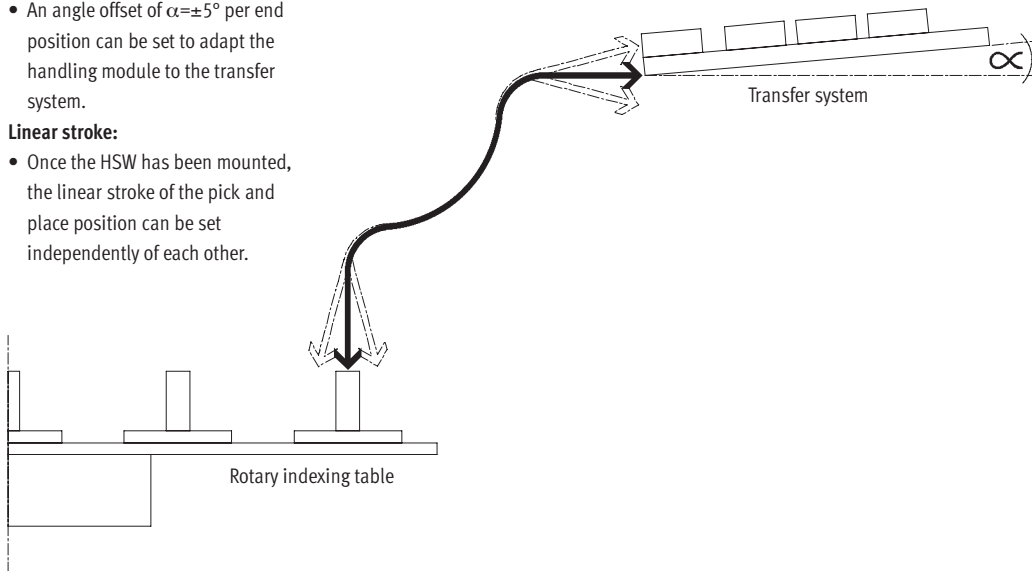
## Stroke adjustment

### 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.

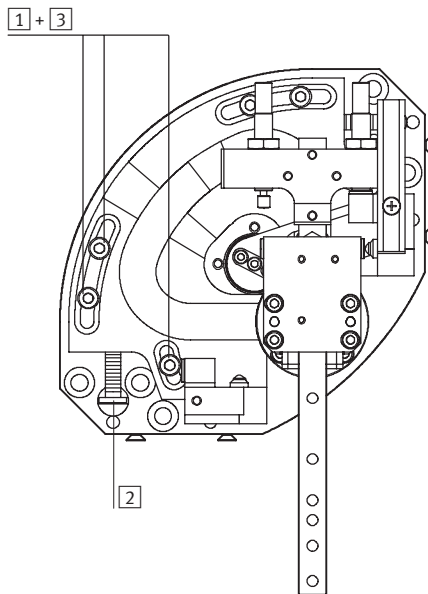
### Linear stroke:

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



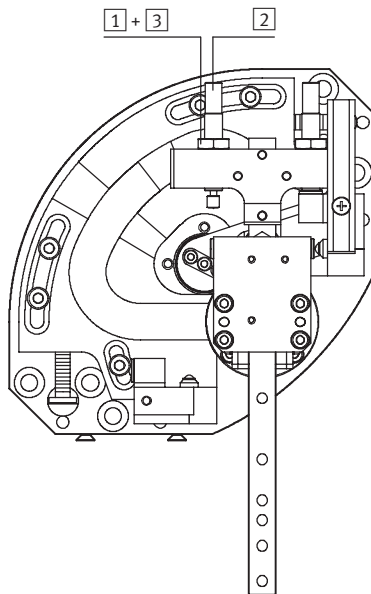
### Swivel angle

### Linear stroke



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



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

### Application and mode of operation

Figure 1:

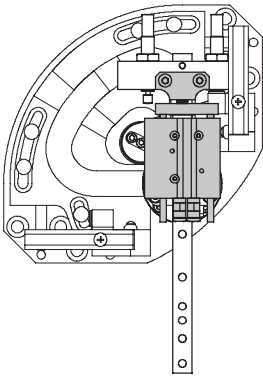


Figure 2:

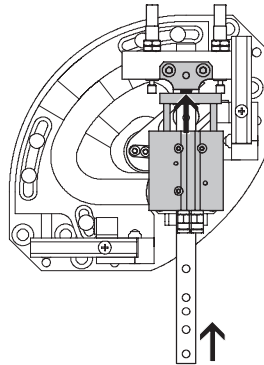
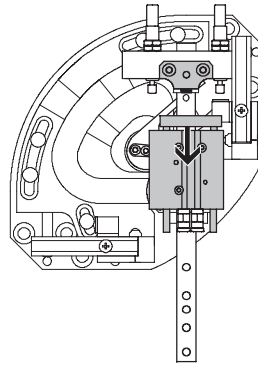
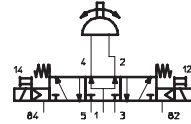


Figure 3:

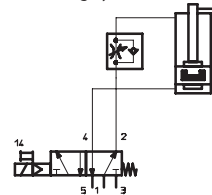


Circuit diagram for HSW with wait position module

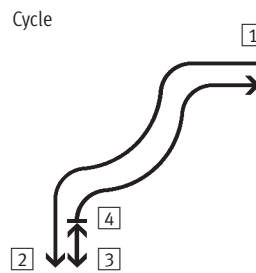
Handling modules HSW



Actuating cylinder



- 1 The handling module HSW is in the horizontal end position. The actuating cylinder is retracted in its initial position.
- 2 The 5/3-way valve is reset once the handling module reaches the vertical end position (Figure 1). The actuating cylinder must always be retracted before reaching an end position.
- 3 During extension the actuating cylinder pushes the handling module upwards into its wait position. The operating range is then free (Figure 2). The actuating cylinder can be used at both end positions.
- 4 From the wait position, the handling module can move either to the initial position or to the other end position (Figure 3).

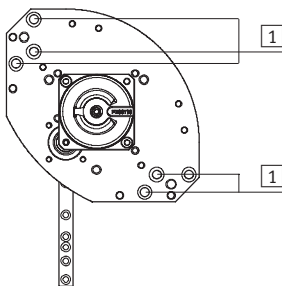


**Note**  
When used in combination with the wait position module, the handling module HSW must be actuated using a 5/3-way valve (normally pressurised). The actuating cylinder is actuated using a 5/2-way valve.

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

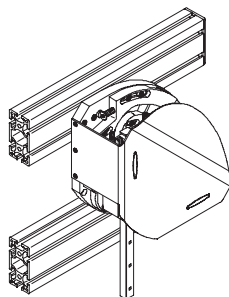
## Mounting options

### Directly via through-holes

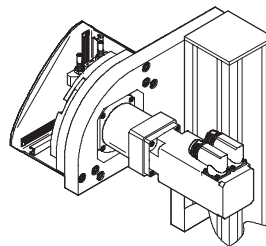


- 1 With or without centring rings

### Via slot nuts on profile supports



### User-specific



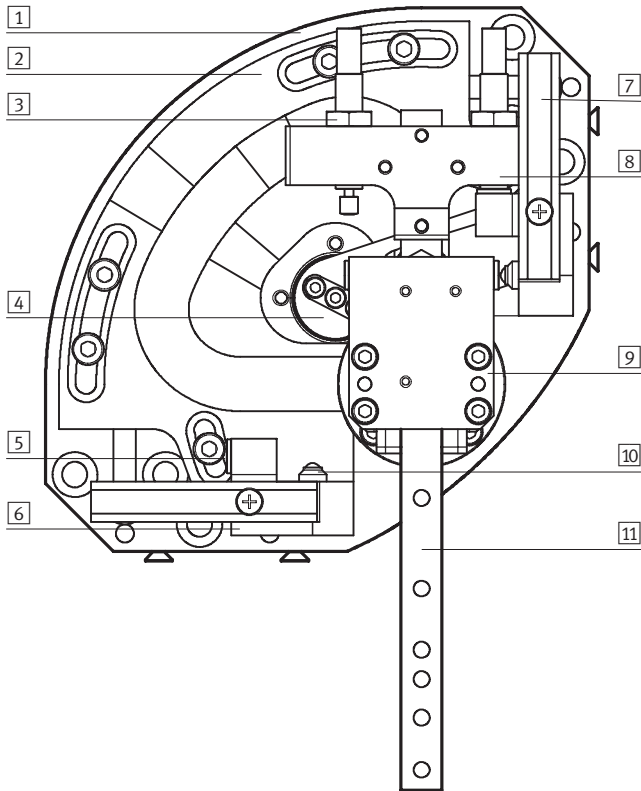
**Note**  
The handling module HSW-10 can also be attached with the adjusting unit HMX-1.

# Handling modules HSW, pneumatic

Technical data

## Materials

Sectional view of handling module HSW



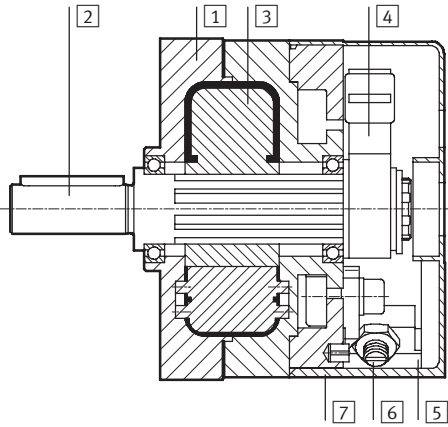
Size	10	12	16
1	Back plate Wrought aluminium alloy, anodised		
2	Slotted guide plate Case-hardened steel		
3	Adjusting screw –		High-alloy steel
4	Swivel lever Case-hardened steel		
5	Stop sleeve High-alloy steel		
6	Retainer Wrought aluminium alloy, anodised		
7	Sensor rail Wrought aluminium alloy, 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, PTFE and silicone	

# 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
5	Stop/shock absorber retainer	Stainless steel
6	Stop screw	Stainless steel
7	Cap	Fibreglass-reinforced plastic
-	Seals	Polyurethane
Note on materials		Free of copper, PTFE and silicone

# Handling modules HSW, pneumatic

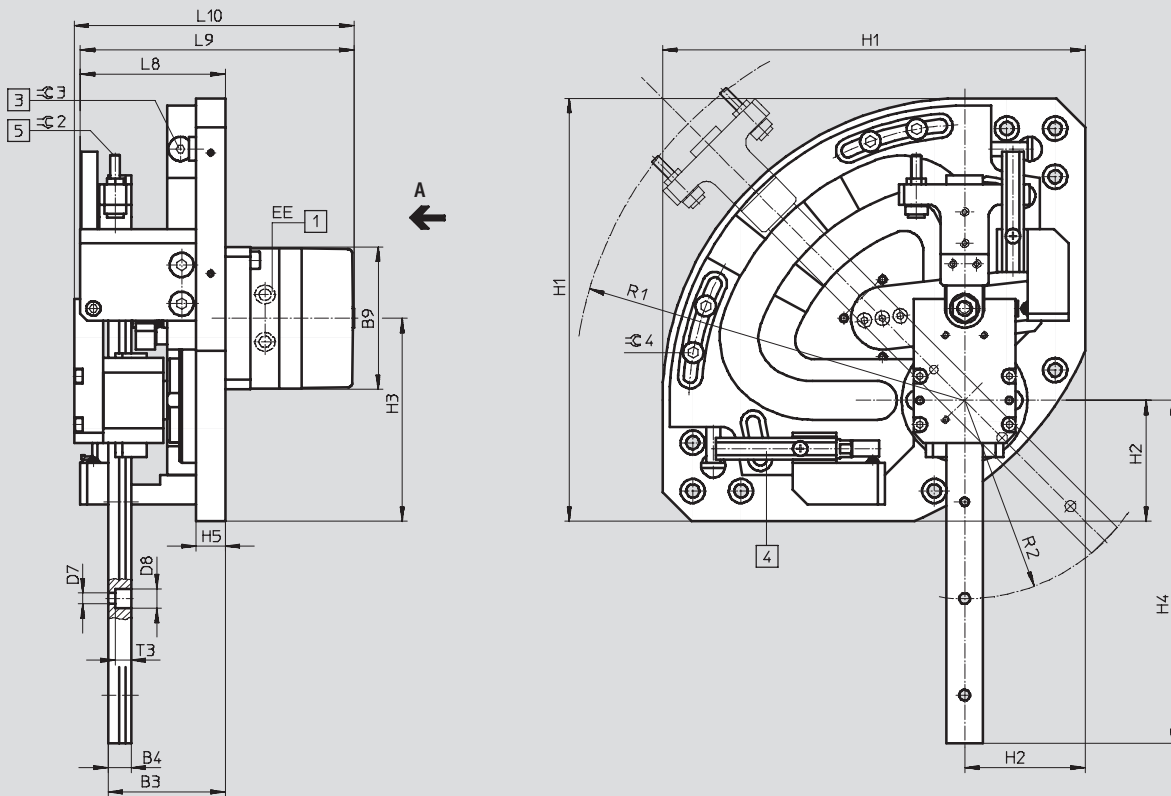
Technical data

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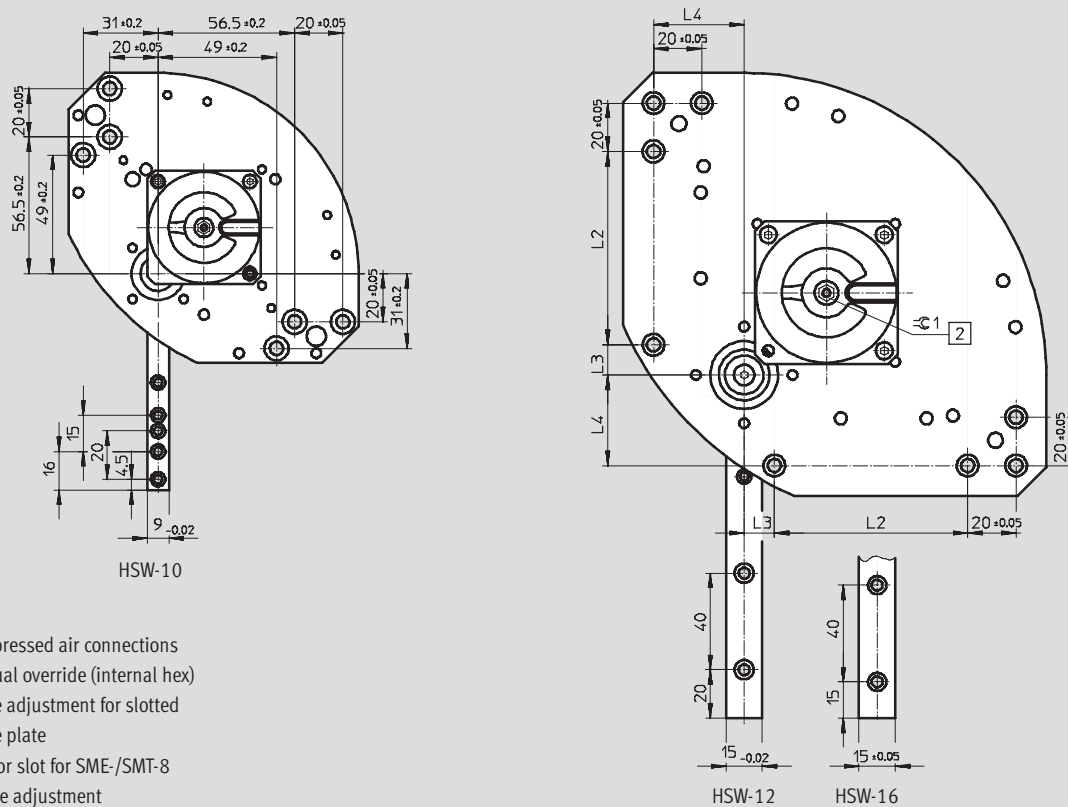
## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

with swivel module DSM



## View A



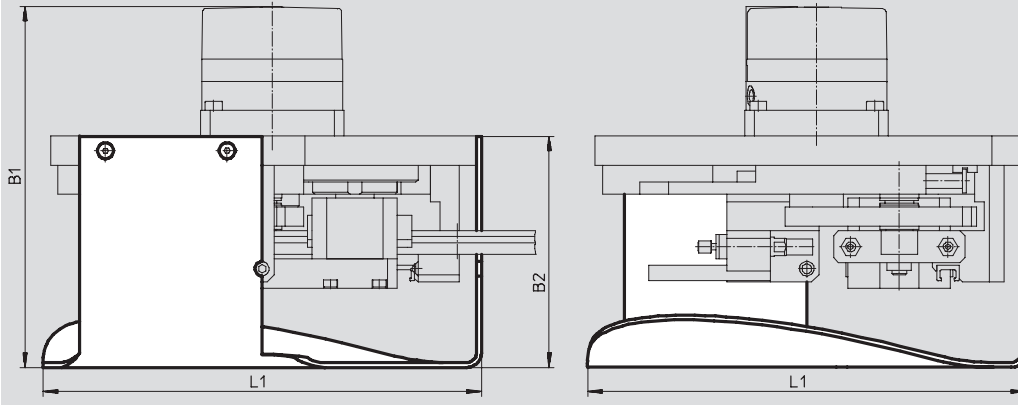
- 1 Compressed air connections
- 2 Manual override (internal hex)
- 3 Angle adjustment for slotted guide plate
- 4 Sensor slot for SME-/SMT-8
- 5 Stroke adjustment



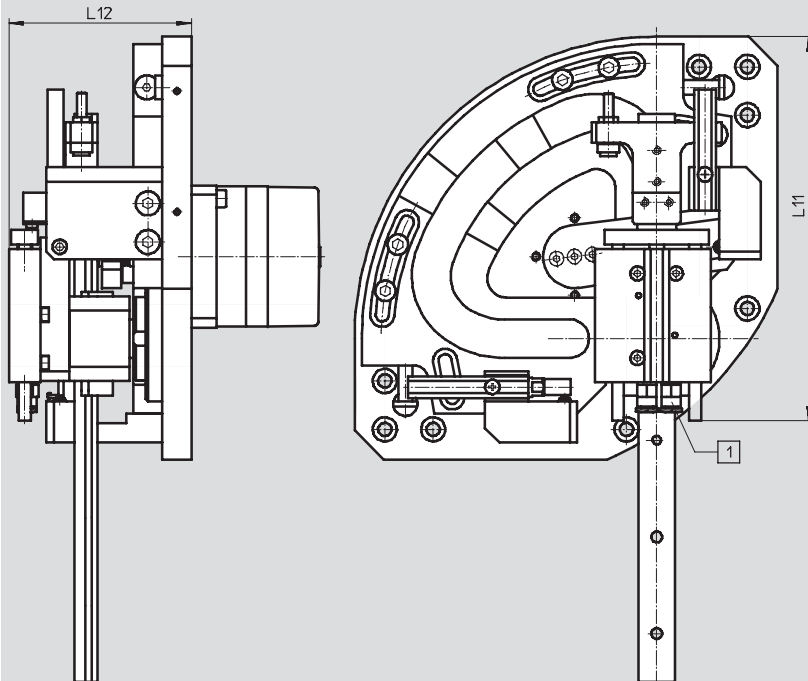
# Handling modules HSW, pneumatic

Technical data

with swivel module DSM and protective cover



with wait position module



1 Compressed air connections

Size	B1	B2	B3	B4	B9	D7	D8	EE	H1	H2	H3	H4	H5	L1	L2
	±2	±3	±0.5			∅	∅		±0.3	±0.2	±0.5	±1		±2	±0.2
10	121	80	45	5.5	47	3.5	6	M3	120	37	56	89.6	12	123	-
12	148	95	48.5	9.5	59	4.5	8	M5	175	50	84	142	12	180	80
16	168	105	57	12.5	70	4.5	7.5	M5	215	58.5	103.5	174	12	219	100

Size	L3	L4	L8	L9	L10	L11	L12	R1	R2	T3	∅C1	∅C2	∅C3	∅C4
	±0.2	±0.2	±2	±3		max.	±2	±3	±3					
10	-	-	62	103	95	102.5	61.8	113	55	3.3	4.5	2	3	3
12	12.5	37.5	60	113	116	159	75.5	162	82	6.5	6	2	3	4
16	12	50	71.5	134	131	202.5	80.8	200	100	5.3	8	2.5	4	4

# Handling modules HSW, pneumatic

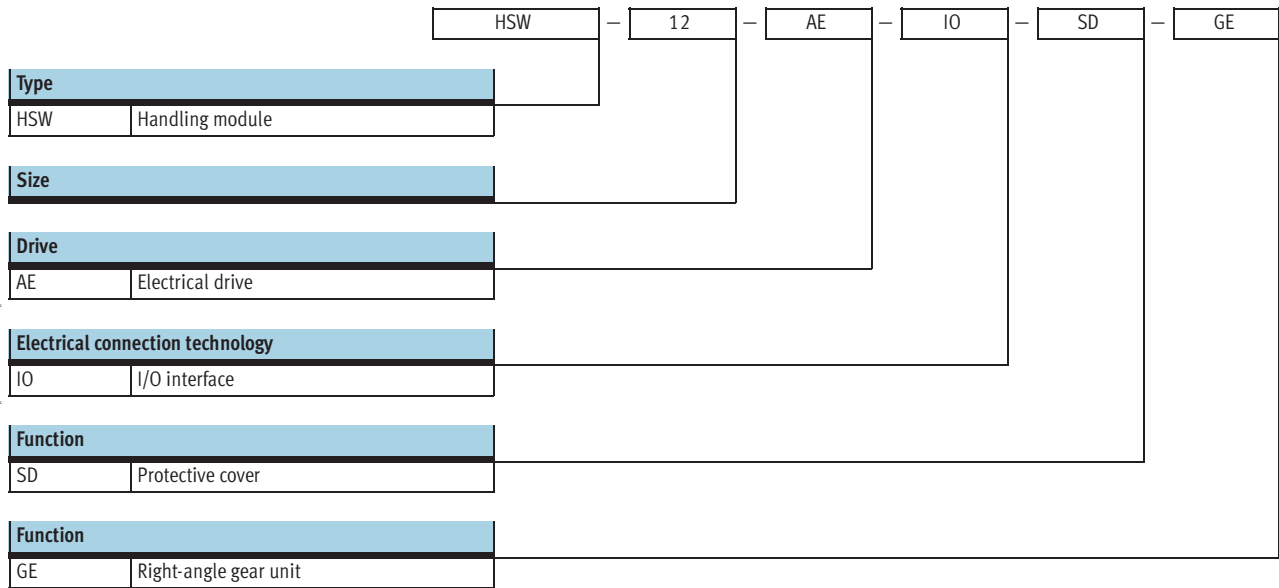


Technical data

Ordering data for HSW-...-AP						
Size	10		12		16	
	Part No.	Type	Part No.	Type	Part No.	Type
Without protective cover						
–	540 222	HSW-10-AP	540 228	HSW-12-AP	540 234	HSW-16-AP
Wait position module	540 225	HSW-10-AP-W	540 231	HSW-12-AP-W	540 237	HSW-16-AP-W
With protective cover						
–	540 223	HSW-10-AP-SD	540 229	HSW-12-AP-SD	540 235	HSW-16-AP-SD
Wait position module	540 224	HSW-10-AP-SD-W	540 230	HSW-12-AP-SD-W	540 236	HSW-16-AP-SD-W

# Handling modules HSW, electrical

Type codes



# Handling modules HSW, electrical




Technical data

Function



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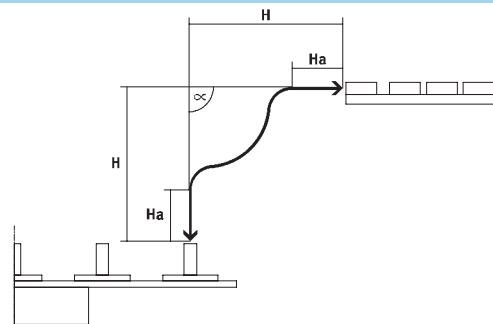


-  Size  
10, 12 and 16
-  Swivel angle  
80 ... 100
-  Stroke range  
90 ... 175

General technical data	
Type	HSW-...-AE
Constructional design	Motor unit
	Linear guide plus ball bearing
	Force-guided motion sequence
Cushioning	Noise reduction via buffers
Type of mounting	Via through-holes
	Via slot nuts
Mounting position	Any

Operating and environmental conditions	
Type	HSW-...-AE
Ambient temperature [°C]	0 ... +50
Protection class of motor	IP54
CE marking (see declaration of conformity)	In accordance with EU EMC directive

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



Forces [N]			
Size	10	12	16
Along Y and Z axes (depending on lever position)			
Effective force at 80 % of the nominal motor force	15	30	50
Along Y axes			
Permissible process force <sup>1)</sup>	30	35	50

1) Due to the pretension force on the guide

# Handling modules HSW, electrical

Technical data

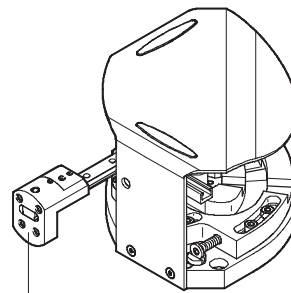
Weight [g]			
Size	10	12	16
HSW-...-AE	2,000	4,500	8,900
HSW-...-AE-SD	2,110	4,700	9,200
HSW-...-AE-GE	2,410	5,000	10,000
HSW-...-AE-SD-GE	2,520	5,200	10,300

## 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.



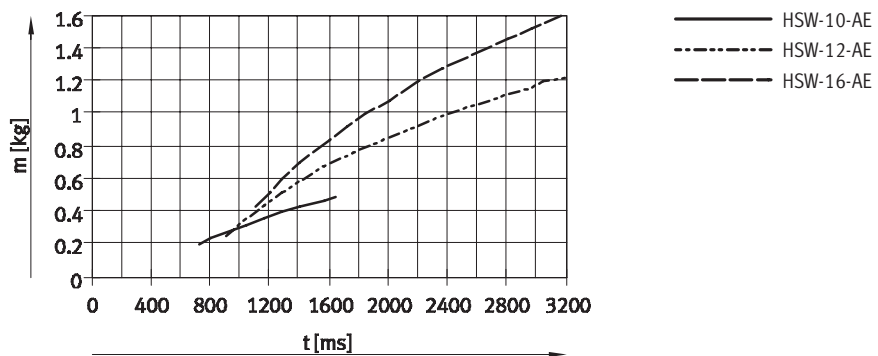
Mounting surface of HAPG

Size		10	12	16
Repetition accuracy	At end positions	±0.02		
	Intermediate positions	< 2		

## Travel times t as a function of effective load m

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 vertical guide rail (e.g. adapter, gripper, semi-rotary drive and workpiece)

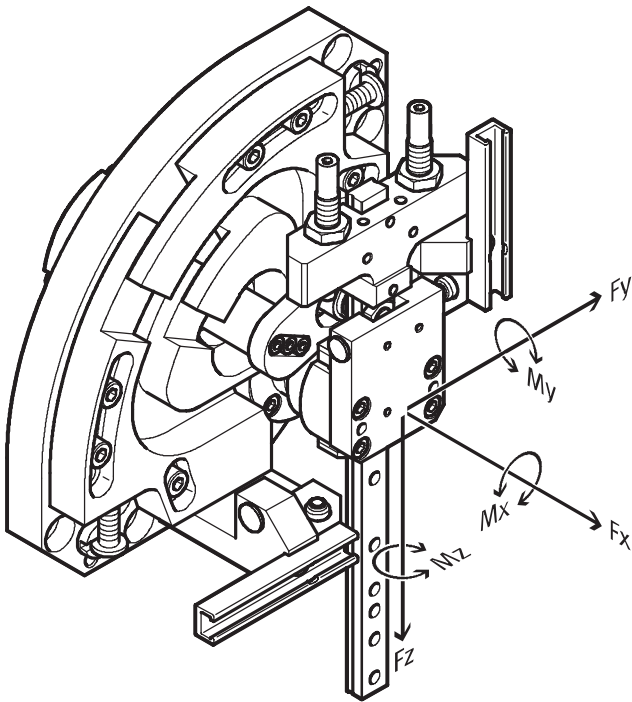



# Handling modules HSW, electrical

Technical data

**Permissible static/dynamic characteristic load values**

Cross-guide



 Note  
The torques apply to the centre of the vertical guide.

**Combined load**

The following torque equation must be satisfied with combined load:

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

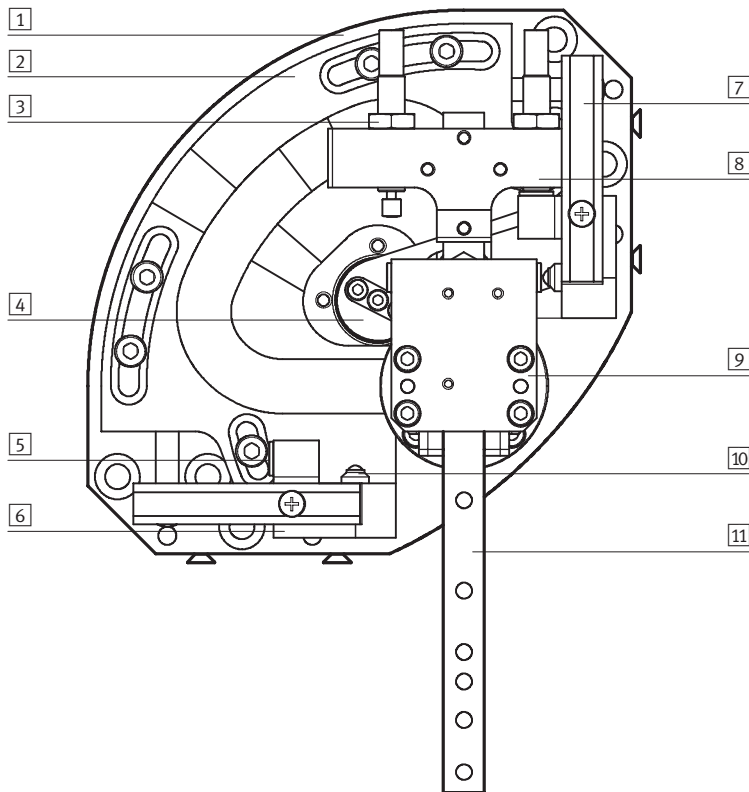
Dynamic characteristic load values				
Size		10	12	16
Max. torques	[Nm]	0.6	1.5	2.5
$M_{xperm.}, M_{yperm.}, M_{zperm.}$				

# Handling modules HSW, electrical

Technical data

**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, PTFE and silicone		

# Handling modules HSW, electrical

Technical data

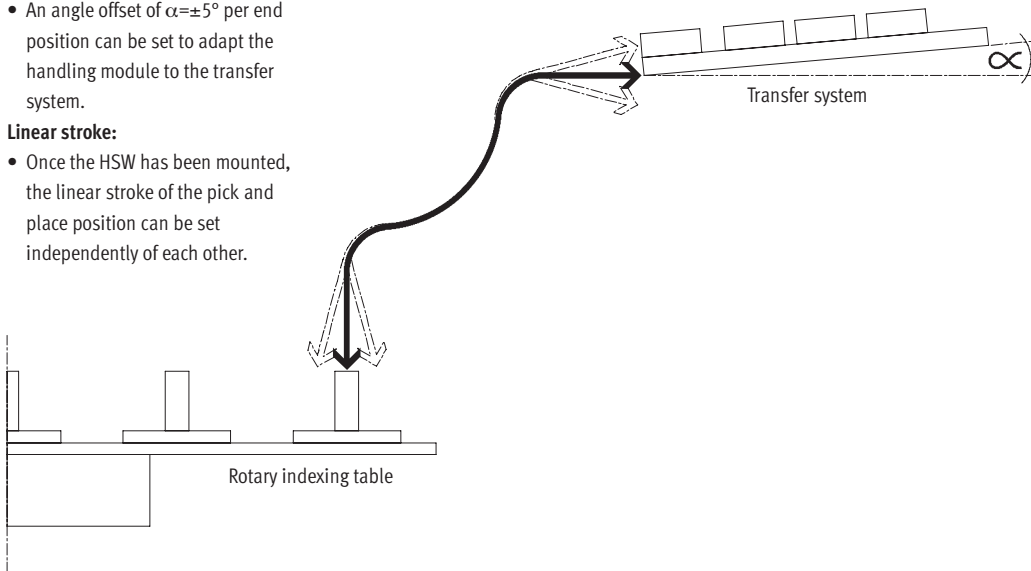
## Stroke adjustment

### 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.

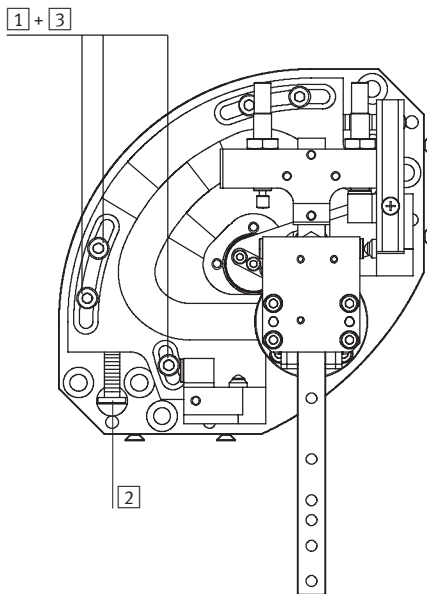
### Linear stroke:

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



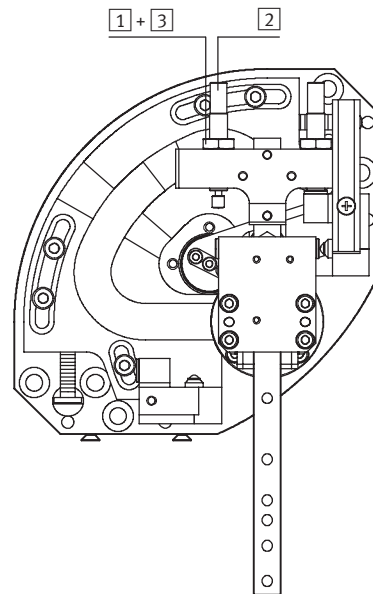
### Swivel angle

### Linear stroke



#### 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



#### 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, electrical

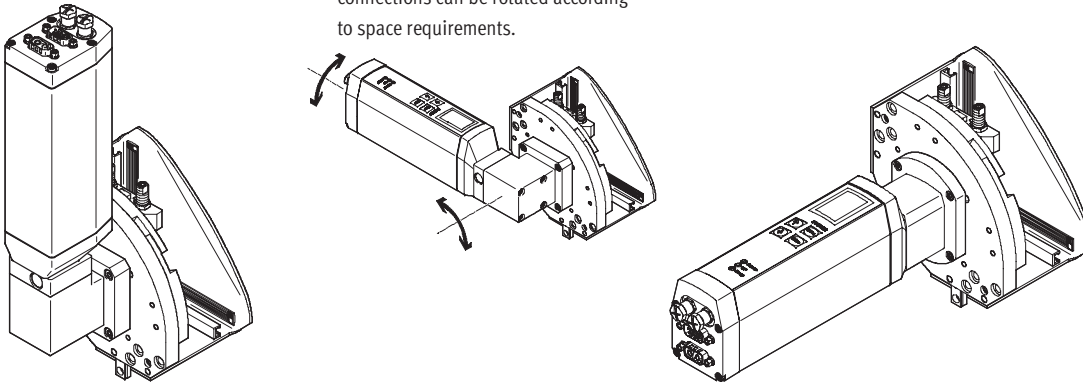
Technical data

## Motor mounting variants

Motor pointing upwards/to side

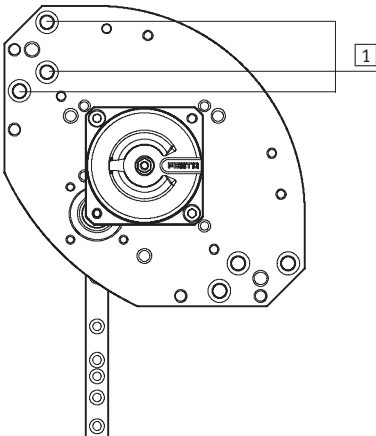
Motor towards rear

Control panel and access to the connections can be rotated according to space requirements.



## Mounting options

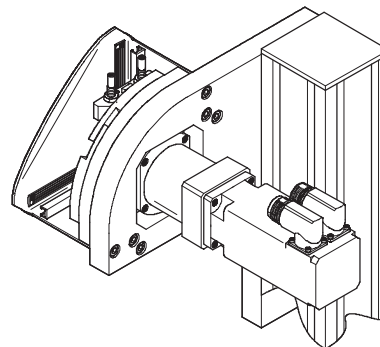
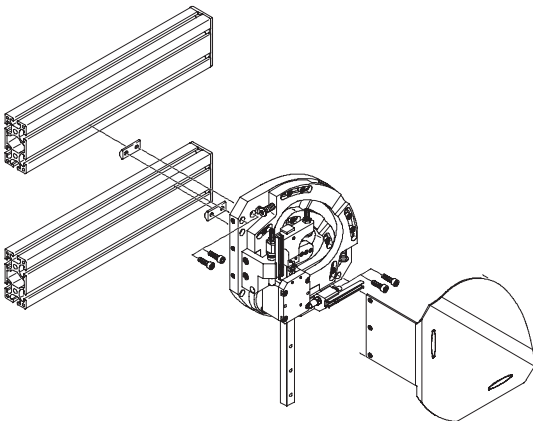
1 Directly via through-holes



## Examples:

Via slot nuts on profile supports

User-specific



## Handling modules HSW, electrical

Technical data

### Motor unit MTR-DCI-...-HM



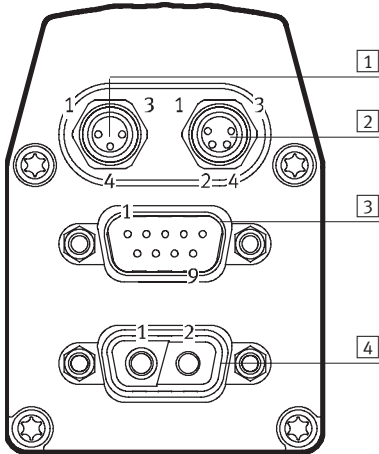
General technical data				→ Internet: mtr-dci
Type	MTR-DCI-32-...-HM	MTR-DCI-42-...-HM	MTR-DCI-52-...-HM	
For handling module	HSW-10-...-AE	HSW-12-...-AE	HSW-16-...-AE	
Rotary position generator	Optical encoder			
No. of increments/revolution	300	500		
Temperature monitoring	Silicon absolute temperature sensor, switches off at temperatures >80 °C			
Display resolution	128 x 64 pixels			
Type of mounting	Can be bolted on or clamped to gear unit flange			
Gear unit type	Planetary gearing			
Gear unit ratio	13.73 (14:1), 2-stage			

Electrical data				→ Internet: mtr-dci
Type	MTR-DCI-32-...-HM	MTR-DCI-42-...-HM	MTR-DCI-52-...-HM	
For handling module	HSW-10-...-AE	HSW-12-...-AE	HSW-16-...-AE	
Nominal voltage	[V DC]	24 ±10%		
Nominal current (motor)	[A]	0.73	2	5.1
Peak current	[A]	2.1	3.8	7.7
Nominal power (motor)	[W]	17.5	48	122.4
Max. current (digital logic outputs)	[mA]	200	200	60
No. of digital logic inputs (with I/O interface)	-	6		
No. of digital logic outputs (with I/O interface)	-	2		
Parameterisation interface	RS232; 9,600 baud			

# Handling modules HSW, electrical

Technical data

## Pin allocation



### 1 3-pin M8 socket

Pin	Function
1	Unused
3	Unused
4	Unused
-	

### 2 RS232 interface, 4-pin M8 socket

Pin	Function
1	0 V
2	Transmitted data (TxD)
3	Received data (RxD)
4	-

### 3 I/O interface, 9-pin SUB-D plug

Pin	Function
1	Traversing record coding, bit 0
2	Traversing record coding, bit 1
3	Traversing record coding, bit 2
4	Traversing record coding, bit 3
5	Start bit
6	Enable bit
7	Ready signal output
8	MC signal output
9	0 V

### 4 Power supply, 2-pin plug

Pin	Function
1	24 V DC
2	0 V
-	
-	
-	
-	
-	
-	
-	

# Handling modules HSW, electrical

Technical data



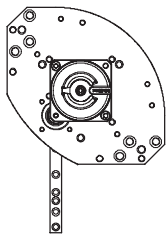
## Simple solution for your application

Advantages of the handling module HSW-...-AE for installation and commissioning

- Handling module is supplied with motor already attached.
- Less wiring required thanks to integration of controller concept.
- Motor with gear unit, controller and power electronics are all fitted in one housing. This means that only one unit has to be taken into consideration when planning the system.
- Only one voltage supply of 24 V is required for commissioning.
- Commissioning via:
  - Control panel on handling module.
  - PC using FESTO Configuration Tool (FCT) software.

## Installation and commissioning

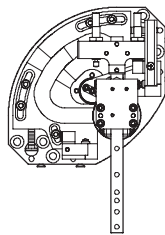
Step 1: Mount the handling module



- Wide choice of mounting options

→ 25

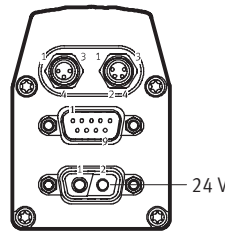
Step 2: Mechanically adjust the end positions



- Set the desired linear stroke using the cushioning component and adjusting screw

→ 24

Step 3: Connect the 24 V voltage supply

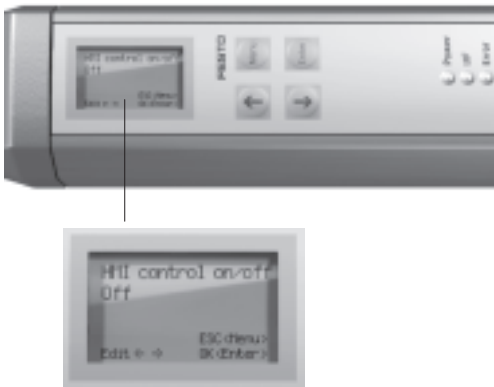


- Plug and work: Connect the voltage – HSW is ready for operation

→ 26

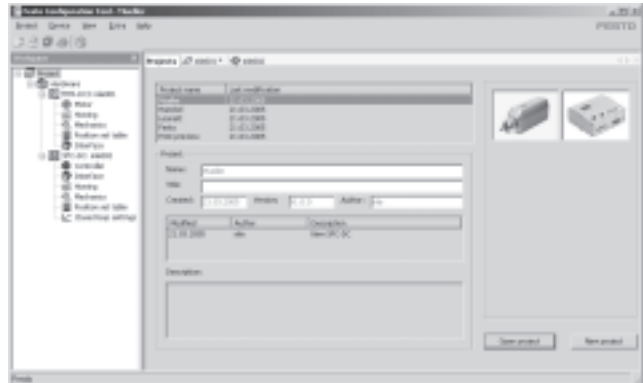
Step 4: Parameterisation either via control panel on motor or using FCT software

Control panel on motor



- Clearly arranged LCD display
- All data is entered and saved using 4 keys:
  - Menu key
  - Arrow keys for changing parameter values or traversing records
  - Key for confirming the entered actions

FCT software – Festo Configuration Tool

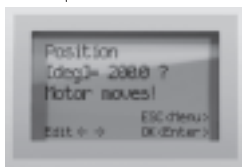


- All the drives in a system can be managed and archived in a common project
- Project and data management for all supported device types
- Simple to use thanks to graphically supported parameter entry
- Universal mode of operation for all drives
- Working offline at your desk or online at the machine

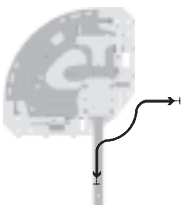
# Handling modules HSW, electrical

Technical data

Step 5: Selection of predefined motion sequences (HSW mode) via the control panel or using the FCT software

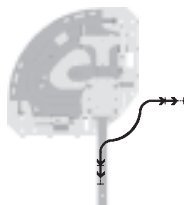


HSW mode 1



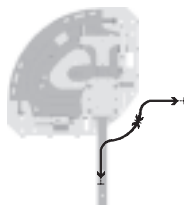
- Precise travel to the mechanical end position

HSW mode 2



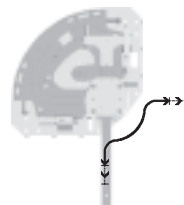
- Additional adjustable wait position module directly above workpiece/ workpiece carrier
- Handling of parts with different heights
- Insertion procedures at different speeds

HSW mode 3



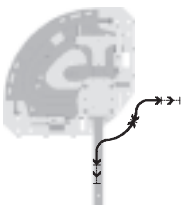
- Additional ejector station for reject parts or quality inspection
- Precise travel to end position via setup position

HSW mode 4



- Insertion procedures with defined force
- Continued travel from wait position with adjustable torque

HSW mode 5



- Insertion procedures with defined force and additional intermediate position
- Continued travel from wait position with adjustable torque

Step 6: Fine adjustment

- Adjustment of preset positions, speeds and torques
- Addition of new traversing records (where necessary)

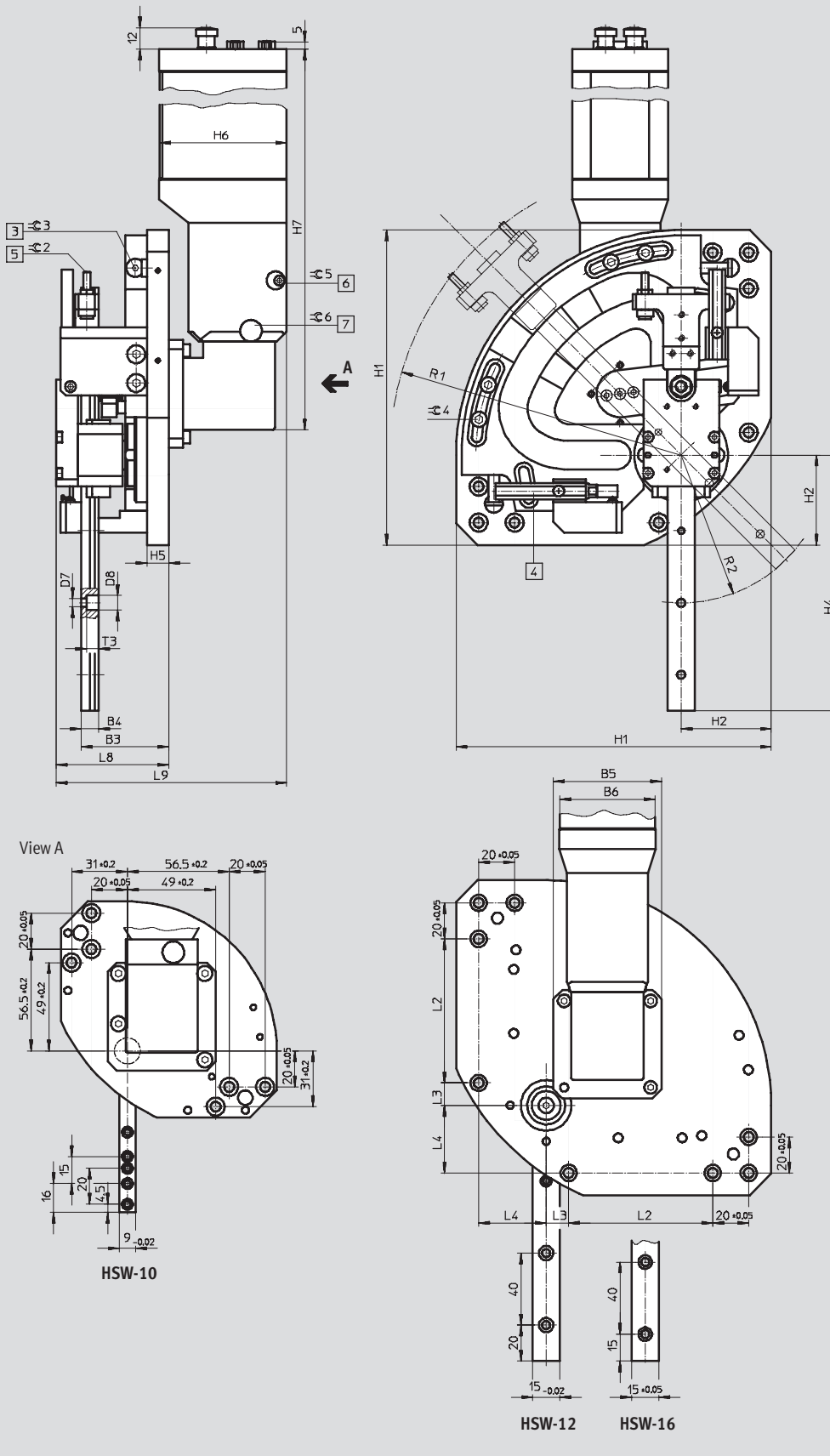
# Handling modules HSW, electrical

Technical data

**Dimensions**

Download CAD data → [www.festo.com](http://www.festo.com)

with motor unit pointing upwards



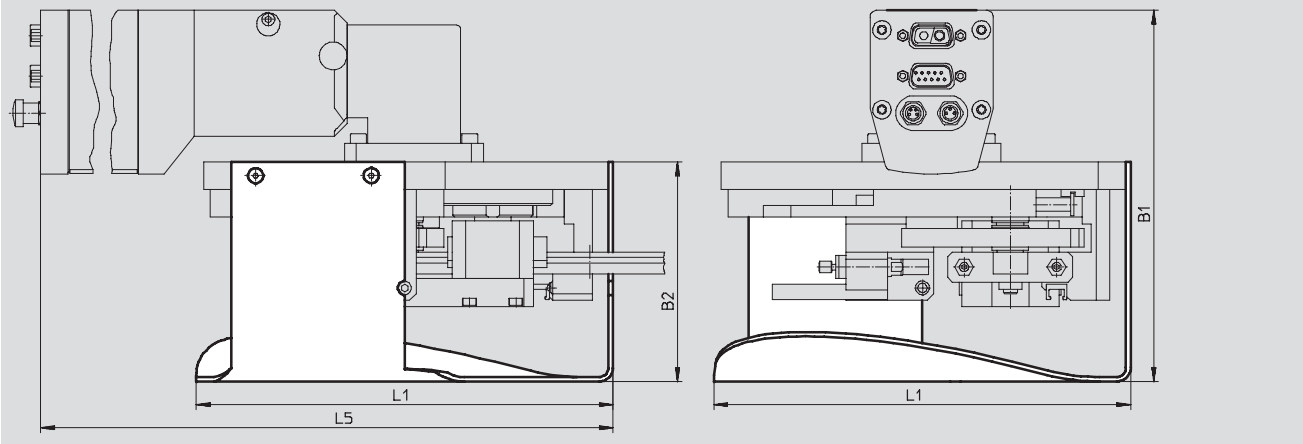
# Handling modules HSW, electrical

Technical data

**Dimensions**

Download CAD data → [www.festo.com](http://www.festo.com)

with motor unit pointing upwards and protective cover



Size	B1	B2	B3	B4	B5	B6	D7
	±3	±3	±0.5				∅
10	148	80	45	5.5	60	46	3.5
12	160.5	95	48.5	9.5	60	53.3	4.5
16	193	105	57	12.5	100	69.5	4.5

Size	D8	H1	H2	H4 <sup>1)</sup>	H5	H6	H7
	∅	±0.3	±0.2	±1		±0.4	±3
10	6	120	37	89.6	12	66	239
12	8	175	50	142	12	70.8	291
16	7.5	215	58.5	174	12	94.8	344.5

Size	L1	L2	L3	L4	L5	L8	L9
	±2	±0.2	±0.2	±0.2	±3	±2	±3
10	123	-	-	-	276	62	121
12	180	80	12.5	37.5	357	60	128
16	219	100	12	50	420	71.5	156

Size	R1 <sup>1)</sup>	R2 <sup>1)</sup>	T3	≈C2	≈C3	≈C4	≈C5	≈C6
	±3	±3						
10	113	55	3.3	2	3	3	2.5	2.5
12	162	82	6.5	2	3	4	2.5	2.5
16	200	100	5.3	2.5	4	4	5	3

1) Maximum stroke and 90° angle

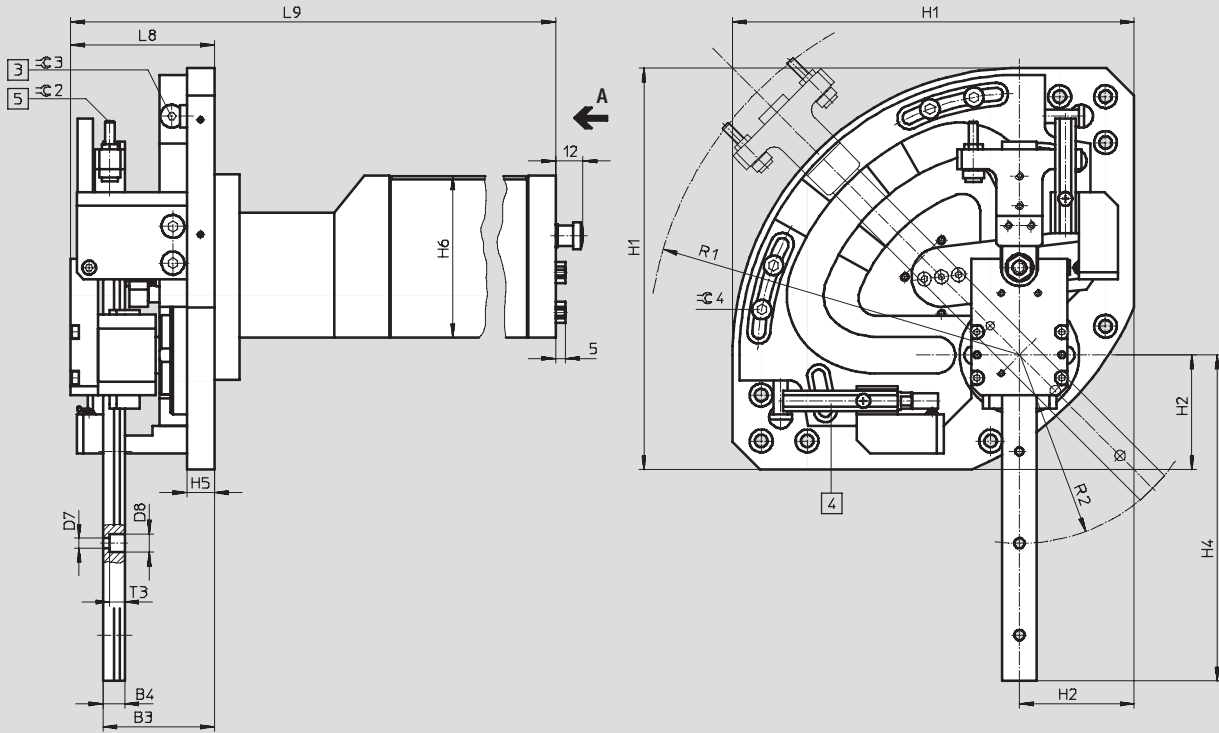
# Handling modules HSW, electrical

Technical data

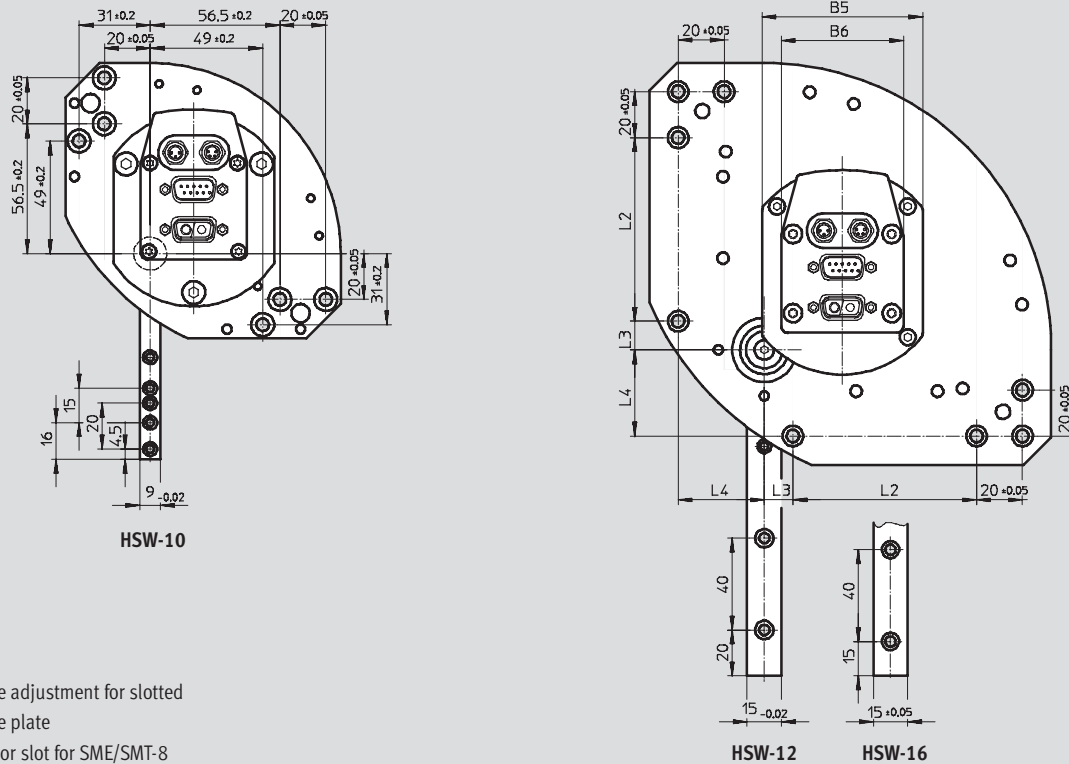
**Dimensions**

Download CAD data → [www.festo.com](http://www.festo.com)

with motor unit towards the rear



View A



- 3 Angle adjustment for slotted guide plate
- 4 Sensor slot for SME/SMT-8
- 5 Stroke adjustment

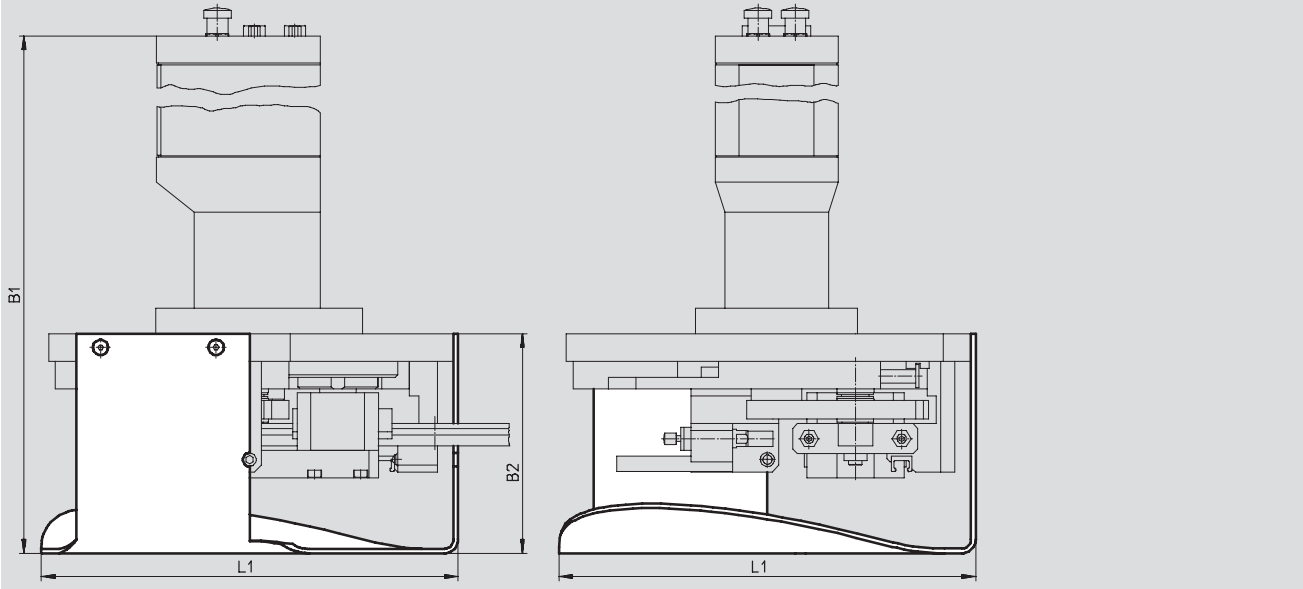


# Handling modules HSW, electrical

Technical data

**FESTO**

with motor unit towards the rear and protective cover



Size	B1	B2	B3	B4	B6	D7
	±3	±2	±0.5			∅
10	263	80	45	5.5	46	3.5
12	323	95	48.5	9.5	53.3	4.5
16	363	105	57	12.5	69.5	4.5

Size	D8	H1	H2	H4 <sup>1)</sup>	H5	H6
		±0.3	±0.2	±1		±0.4
10	6	120	37	89.6	12	66
12	8	175	50	142	12	70.8
16	7.5	215	58.5	174	12	94.8

Size	L1	L2	L3	L4	L8	L9
	±2	±0.2	±0.2	±0.2	±2	±3
10	123	-	-	-	62	245
12	180	80	12.5	37.5	60	290
16	219	100	12	50	71.5	328.5

Size	R1 <sup>1)</sup>	R2 <sup>1)</sup>	T3	≈C2	≈C3	≈C4
	±3	±3				
10	113	55	3.3	2	3	3
12	162	82	6.5	2	3	4
16	200	100	5.3	2.5	4	4

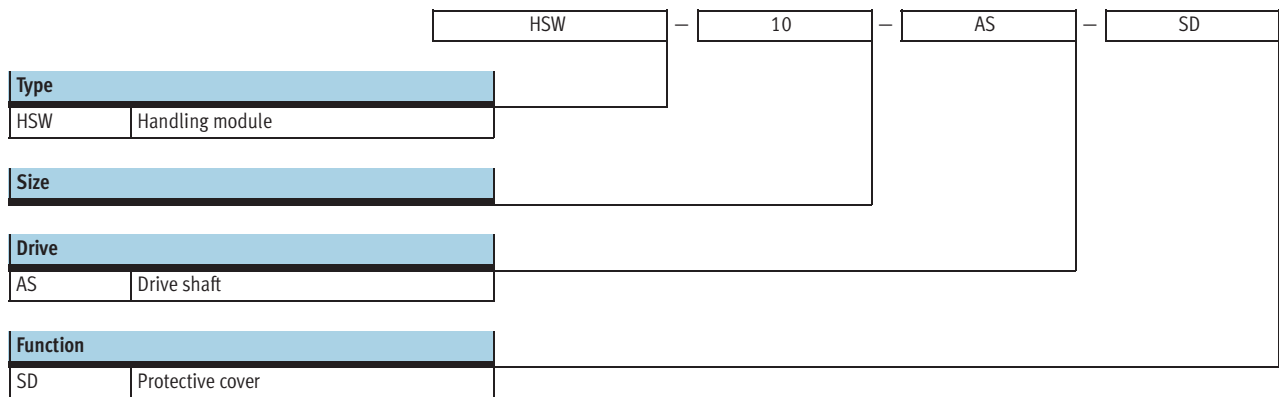
## Handling modules HSW, electrical

Technical data

Ordering data for HSW-...-AE						
Size	10		12		16	
	Part No.	Type	Part No.	Type	Part No.	Type
I/O interface						
without gear unit						
without protective cover	540 250	HSW-10-AE-IO	540 266	HSW-12-AE-IO	540 282	HSW-16-AE-IO
with protective cover	540 252	HSW-10-AE-IO-SD	540 268	HSW-12-AE-IO-SD	540 284	HSW-16-AE-IO-SD
with right-angle gear unit						
without protective cover	540 251	HSW-10-AE-IO-GE	540 267	HSW-12-AE-IO-GE	540 283	HSW-16-AE-IO-GE
with protective cover	540 253	HSW-10-AE-IO-SD-GE	540 269	HSW-12-AE-IO-SD-GE	540 285	HSW-16-AE-IO-SD-GE

# Handling modules HSW, without drive

Type codes



# Handling modules HSW, without drive

Technical data

Function



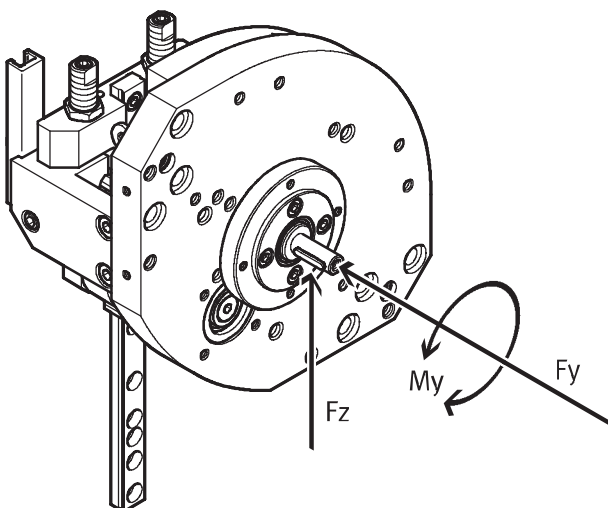
- - Size  
10, 12 and 16
- - Swivel angle  
80 ... 100
- - Stroke range  
90 ... 175



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	5,200
HSW...-AS-SD	1,300	3,000	5,500

## Permissible static/dynamic characteristic load values



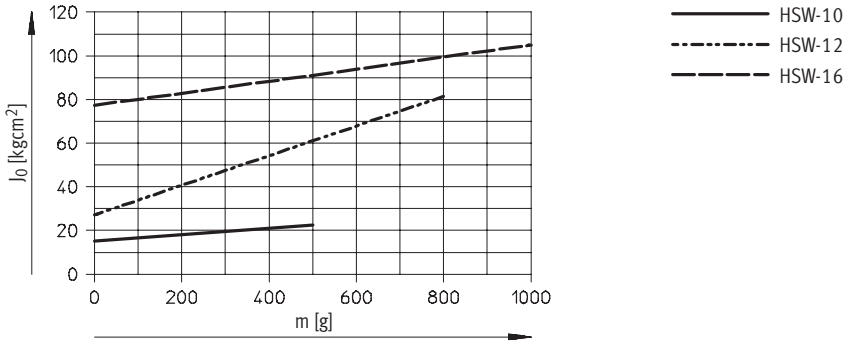
- - Note  
Technical data for mechanical components → 11.

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

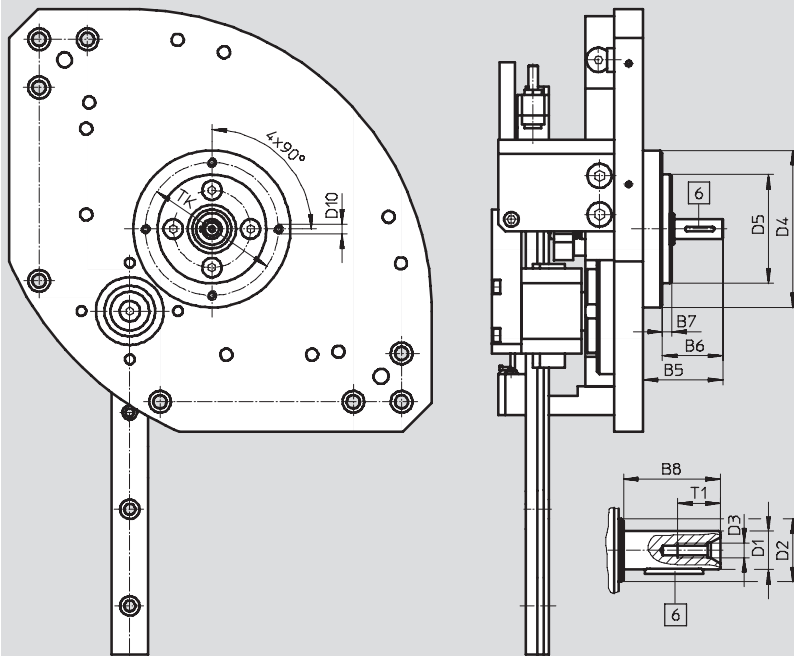
Technical data

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



## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



Basic dimensions

→ 16

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	540 226	HSW-10-AS	540 232	HSW-12-AS	540 238	HSW-16-AS
with protective cover	540 227	HSW-10-AS-SD	540 233	HSW-12-AS-SD	540 239	HSW-16-AS-SD

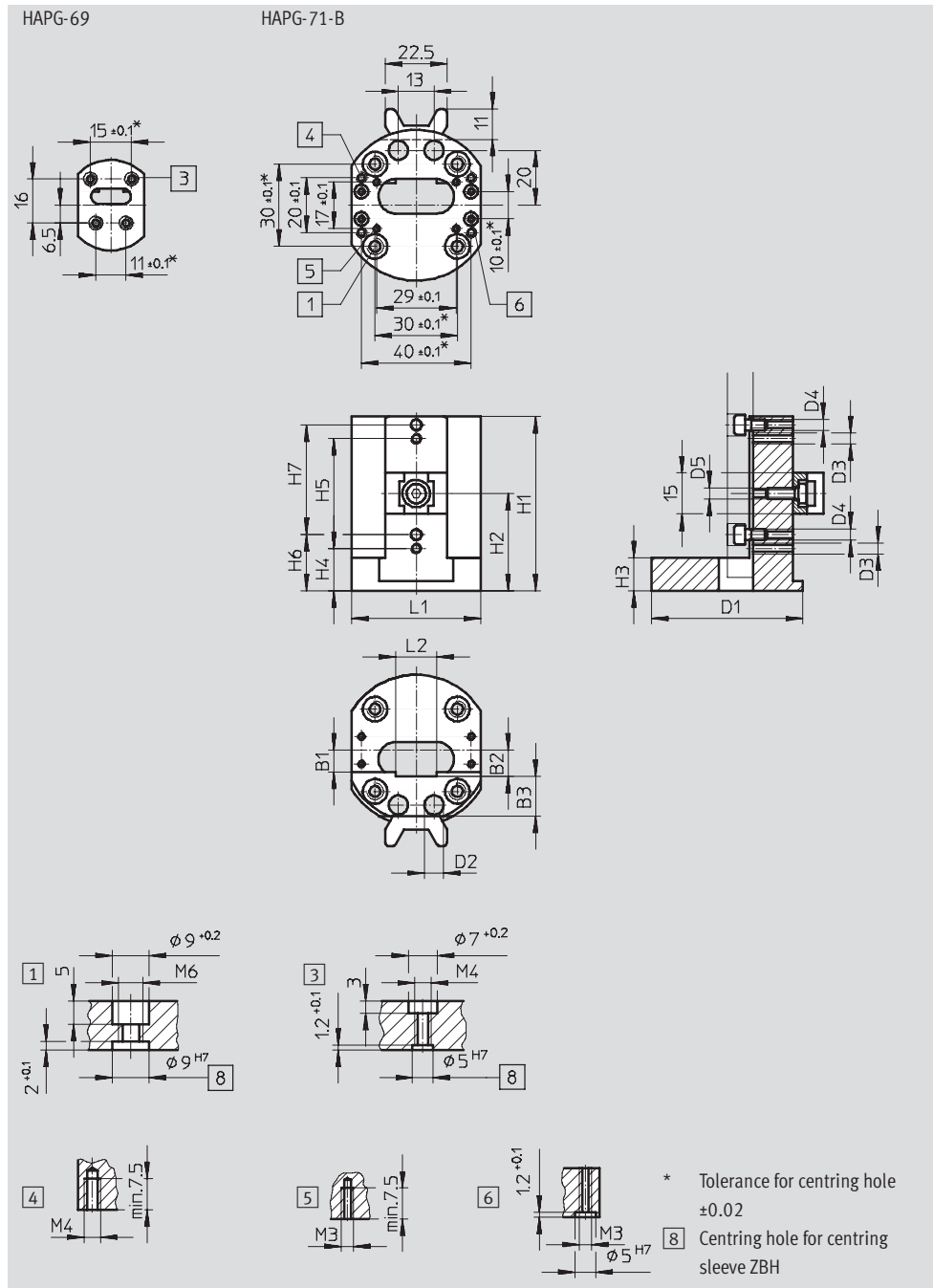
# Handling modules HSW

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

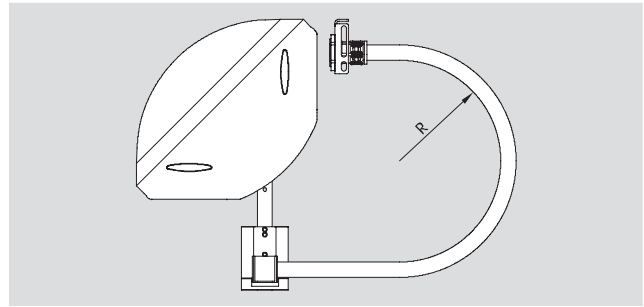
For size	H3	H4	H5	H6	H7	L1	L2	Weight	Part No.	Type
		+0.2	±0.2	+0.2	±0.2		+0.1	[g]		
10	10	5	20.5	16.5	15	24	9	25	540 249	HAPG-69
12, 16	12	15.5	40	20.5	40	47	15	110	540 882	HAPG-71-B

# 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 <sup>1)</sup> R [mm]	Tubing I.D. [mm]	Weight [g]	Part No.	Type
10, 12	55	12	140	540 247	MKRP-5
12, 16	75	16.5	150	540 248	MKRP-6

1) The conduit must not be filled beyond 70%

## Cover kit BSD-HSW

Material:  
 Wrought aluminium alloy, anodised



Dimensions → 17

Ordering data			
For size	Weight [g]	Part No.	Type
10	100	540 240	BSD-HSW-10
12	200	540 241	BSD-HSW-12
16	300	540 242	BSD-HSW-16

## Wait position module BW-HSW for HSW-...-AP

Material:  
 Wrought aluminium alloy, anodised



Dimensions → 17

Ordering data			
For size	Weight [g]	Part No.	Type
10	50	540 243	BW-HSW-10
12	140	540 244	BW-HSW-12
16	150	540 245	BW-HSW-16

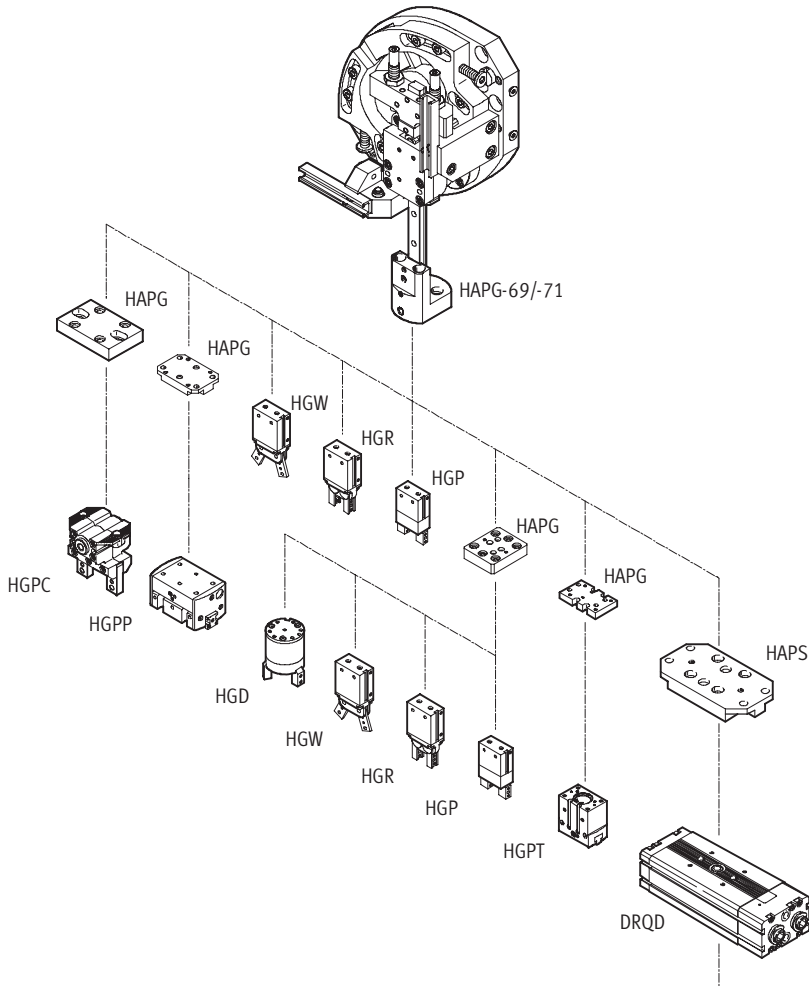
# Handling modules HSW

Accessories

FESTO

## Adapter kits for grippers

For combining HSW with grippers HG... or semi-rotary drive DRQD



Gripper		Adapter kit		Required mounting attachments	B1	D1	D2	H1	L1
Part No.	Type	Part No.	Type						
HSW-10-... with HAPG-69									
174 815	HGP-06-A	–	–	M3 x 14 (2x)	–	–	–	–	–
174 817	HGR-10-A	–	–	M3 x 16 (2x)	–	–	–	–	–
174 818	HGW-10-A	–	–	M3 x 16 (2x)	–	–	–	–	–
HSW-12-... with HAPG-71-B									
174 815	HGP-06-A	192 706	HAPG-37-S1	–	12	M3	M5	42	50
174 817	HGR-10-A	–	–	–	–	–	–	–	–
174 818	HGW-10-A	–	–	–	–	–	–	–	–
1)	DRQD-8-...	178 448	HAPS-2 <sup>2)</sup>	–	8	M4	M4	28	48
1)	DRQD-12-...	–	–	–	–	–	–	–	–
197 542	HGP-10-A-B	192 705	HAPG-36-S1	–	12	M3	M5	42	50
161 829	HGR-16-A	–	–	–	–	–	–	–	–
161 833	HGW-16-A	–	–	–	–	–	–	–	–
525 658	HGPP-10-A	529 017	HAPG-57	–	8	M3	M4	33	49.6
539 269	HGPC-16-A	191 901	HAPG-55	–	10	M3	M5	40	62
535 858	HGPT-16-A	537 169	HAPG-75	–	8	M2.5	M3	27	49.6

1) The semi-rotary drive DRQD is a modular product; for information on configuration and ordering visit [www.festo.com](http://www.festo.com)

2) The centring sleeves for attaching to the adapter kit HAPG-71-B are not required



# Handling modules HSW

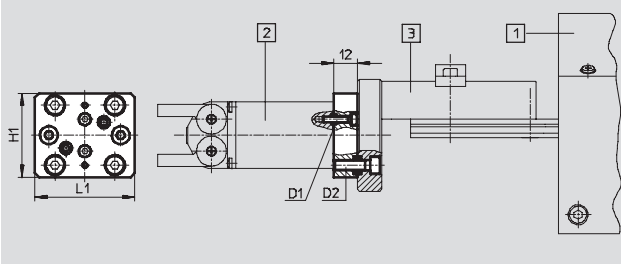
Accessories



Gripper		Adapter kit		Required mounting attachments	B1	D1	D2	H1	L1
Part No.	Type	Part No.	Type						
HSW-16-... with HAPG-71-B									
174 815	HGP-06-A	192 706	HAPG-37-S1	-	12	M3	M5	42	50
174 817	HGR-10-A								
174 818	HGW-10-A								
1)	DRQD-8-...	178 448	HAPS-2 <sup>2)</sup>	-	8	M4	M4	28	48
1)	DRQD-12-...								
197 542	HGP-10-A-B	192 705	HAPG-36-S1	-	12	M3	M5	42	50
161 829	HGR-16-A								
161 833	HGW-16-A								
174 819	HGD-16-A								
525 658	HGPP-10-A	529 017	HAPG-57 <sup>2)</sup>	-	8	M3	M4	33	49.6
187 867	HGPP-12-A	191 900	HAPG-54	-	12	M3	M5	44	52
187 870	HGPP-16-A	191 901	HAPG-55	-	10	M3	M5	40	62
539 269	HGPC-16-A	-	-	-	-	-	-	-	-
535 858	HGPT-16-A	537 169	HAPG-75	-	8	M2.5	M3	27	49.6
535 861	HGPT-20-A								

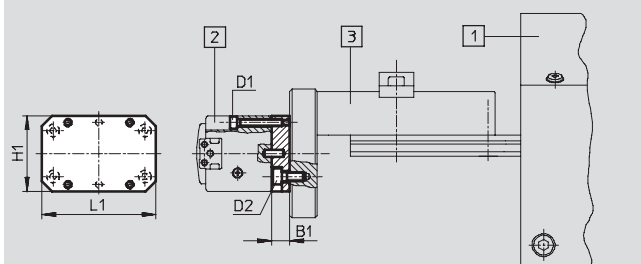
- 1) The semi-rotary drive DRQD is a modular product; for information on configuration and ordering visit [www.festo.com](http://www.festo.com)  
 2) The centring sleeves for attaching to the adapter kit HAPG-71-B are not required

Adapter kit HAPG-36/-37



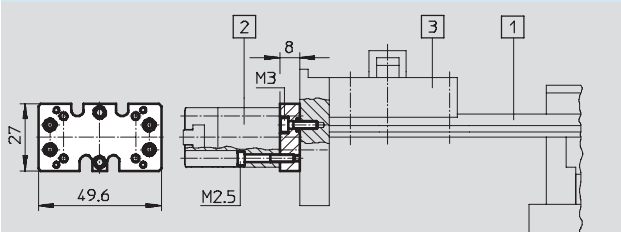
- 1 Handling module HSW
- 2 Gripper HG...
- 3 Adapter kit HAPG

Adapter kit HAPG-54/-55/-57



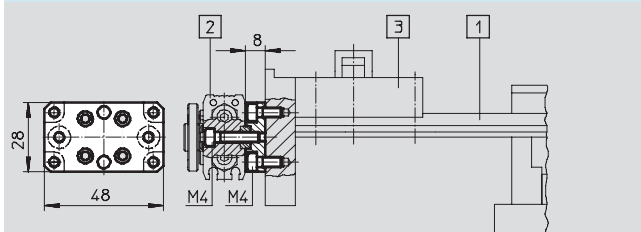
- 1 Handling module HSW
- 2 Parallel gripper HGP...
- 3 Adapter kit HAPG

Adapter kit HAPG-75



- 1 Handling module HSW
- 2 Parallel gripper HGPT
- 3 Adapter kit HAPG

Adapter kit HAPS-2

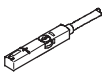

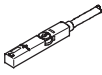


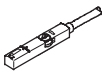


- 1 Handling module HSW
- 2 Semi-rotary drive DRQD
- 3 Adapter kit HAPG



# Handling modules HSW

Accessories

**FESTO**

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
<b>N/O contact</b>						
	Insertable in the slot from above, flush with cylinder profile	PNP	Cable, 3-wire	2.5	<b>543 867</b>	<b>SMT-8M-PS-24V-K-2,5-OE</b>
			Plug M8x1, 3-pin	0.3	<b>543 866</b>	<b>SMT-8M-PS-24V-K-0,3-M8D</b>
			Plug M12x1, 3-pin	0.3	<b>543 869</b>	<b>SMT-8M-PS-24V-K-0,3-M12</b>
		NPN	Cable, 3-wire	2.5	<b>543 870</b>	<b>SMT-8M-NS-24V-K-2,5-OE</b>
Plug M8x1, 3-pin	0.3		<b>543 871</b>	<b>SMT-8M-NS-24V-K-0,3-M8D</b>		
	Insertable in the slot lengthwise, flush with the cylinder profile	PNP	Cable, 3-wire	2.5	<b>175 436</b>	<b>SMT-8-PS-K-LED-24-B</b>
			Plug M8x1, 3-pin	0.3	<b>175 484</b>	<b>SMT-8-PS-S-LED-24-B</b>
<b>N/C contact</b>						
	Insertable in the slot from above, flush with cylinder profile	PNP	Cable, 3-wire	7.5	<b>543 873</b>	<b>SMT-8M-PO-24V-K7,5-OE</b>



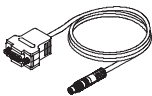
Ordering data – Proximity sensors for T-slot, magnetic reed					Technical data → Internet: sme		
	Type of mounting	Switch output	Electrical connection	Cable length [m]	Part No.	Type	
<b>N/O contact</b>							
	Insertable in the slot from above, flush with cylinder profile	Contacting	Cable, 3-wire	2.5	<b>543 862</b>	<b>SME-8M-DS-24V-K-2,5-OE</b>	
				5.0	<b>543 863</b>	<b>SME-8M-DS-24V-K-5,0-OE</b>	
			Plug M8x1, 3-pin	Cable, 3-wire	2.5	<b>543 872</b>	<b>SME-8M-ZS-24V-K-2,5-OE</b>
				0.3	<b>543 861</b>	<b>SME-8M-DS-24V-K-0,3-M8D</b>	
	Insertable in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	2.5	<b>150 855</b>	<b>SME-8-K-LED-24</b>	
			Plug M8x1, 3-pin	0.3	<b>150 857</b>	<b>SME-8-S-LED-24</b>	
<b>N/C contact</b>							
	Insertable in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	7.5	<b>160 251</b>	<b>SME-8-O-K-LED-24</b>	


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	<b>541 333</b>	<b>NEBU-M8G3-K-2.5-LE3</b>
			5	<b>541 334</b>	<b>NEBU-M8G3-K-5-LE3</b>
	Straight socket, M12x1, 5-pin	Cable, open end, 3-wire	2.5	<b>541 363</b>	<b>NEBU-M12G5-K-2.5-LE3</b>
			5	<b>541 364</b>	<b>NEBU-M12G5-K-5-LE3</b>
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	<b>541 338</b>	<b>NEBU-M8W3-K-2.5-LE3</b>
			5	<b>541 341</b>	<b>NEBU-M8W3-K-5-LE3</b>
	Angled socket, M12x1, 5-pin	Cable, open end, 3-wire	2.5	<b>541 367</b>	<b>NEBU-M12W5-K-2.5-LE3</b>
			5	<b>541 370</b>	<b>NEBU-M12W5-K-5-LE3</b>

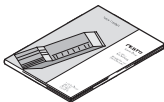
# Handling modules HSW

Accessories

**FESTO**

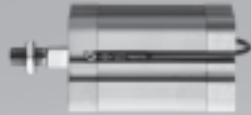
Ordering data – Cables for HSW-AE				
	Brief description	Cable length	Part No.	Type
	Supply cable	2.5 m	537 931	KPWR-MC-1-SUB-9HC-2,5
		5 m	537 932	KPWR-MC-1-SUB-9HC-5
		10 m	537 933	KPWR-MC-1-SUB-9HC-10
	Control cable for I/O connection to any PLC controller	2.5 m	537 923	KES-MC-1-SUB-9-2,5
		5 m	537 924	KES-MC-1-SUB-9-5
		10 m	537 925	KES-MC-1-SUB-9-10
	Programming cable	2.5 m	537 926	KDI-MC-M8-SUB-9-2,5

Ordering data – Software for HSW-AE			
	Brief description	Part No.	Type
	The operator's package: – CD-ROM – With user's manual in the languages DE, EN, ES, FR, IT, SV – With configuration package FCT (Festo Configuration Tool) – Brief description The operator's package is included in the delivery.	541 951	P.BP-HSP_HSW-AE

Ordering data – Documentation for HSW-AE				
	Brief description	Language	Part No.	Type
	Description User's manual in paper form is not included in the scope of delivery.	DE	553 133	P.BE-HSW-AE-IO-DE
		EN	553 134	P.BE-HSW-AE-IO-EN
		ES	553 135	P.BE-HSW-AE-IO-ES
		FR	553 136	P.BE-HSW-AE-IO-FR
		IT	553 137	P.BE-HSW-AE-IO-IT
		SV	553 138	P.BE-HSW-AE-IO-SV

## Products and services – everything from a single source

Products incorporating new ideas are created when enthusiasm for technology and efficiency come together. Tailor-made service goes without saying when the customer is the focus of attention.



### Pneumatic and electrical drives

- Pneumatic cylinders
- Semi-rotary drives
- Handling modules
- Servopneumatic positioning systems
- Electromechanical drives
- Positioning controllers and controllers



### Valves and valve terminals

- Standard valves
- Universal and application-optimised valves
- Manually and mechanically actuated valves
- Shut-off, pressure control and flow control valves
- Proportional valves
- Safety valves

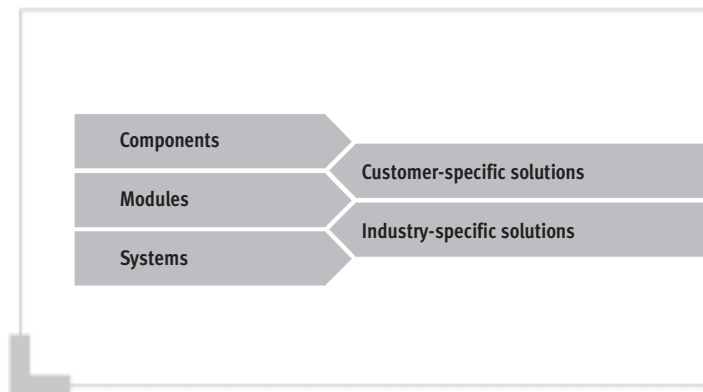
### Fieldbus systems/ electrical peripherals

- Fieldbus Direct
- Installation system CP/CPI
- Modular electrical terminal CPX



### Compressed air preparation

- Service unit combinations
- Filter regulators
- Filters
- Pressure regulators
- Lubricators
- On-off and soft-start valves
- Dryers
- Pressure amplifiers
- Accessories for compressed air preparation



## Services from Festo to increase your productivity – across the entire value creation sequence



### Engineering – for greater speed in the development process

- CAD models
- 14 engineering tools
- Digital catalogue
- FluidDRAW®
- More than 1,000 technical consultants and project engineers worldwide
- Technical hotlines



### Supply chain – for greater speed in the procurement process

- E-commerce and online shop
- Online order tracking
- Euro special manufacturing service
- Logistics optimisation



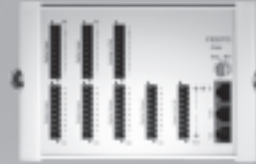
### Gripping and vacuum technology

- Vacuum generators
- Vacuum grippers
- Vacuum security valves
- Vacuum accessories
- Standard grippers
- Micro grippers
- Precision grippers
- Heavy-duty grippers



### Sensors and monitoring units

- Proximity sensors
- Pressure and flow sensors
- Display and operating units
- Inductive and optical proximity sensors
- Displacement encoders for positioning cylinders
- Optical orientation detection and quality inspection



### Controllers/bus systems

- Pneumatic and electropneumatic controllers
- Programmable logic controllers
- Fieldbus systems and accessories
- Timers/counters
- Software for visualisation and data acquisition
- Display and operating units



### Accessories

- Pipes
- Tubing
- Pipe connectors and fittings
- Electrical connection technology
- Silencers
- Reservoirs
- Air guns

### All in all, 100% product and service quality

A customer-oriented range with unlimited flexibility: Components combine to produce ready-to-install modules and systems. Included in this are special designs – since at Festo, most industry-specific products and customer-specific solutions are based on the 23,000 plus catalogue products. Combined with the services for the entire value creation sequence, the end result is unbeatable economy.



### Assembly – for greater speed in the assembly/commissioning process

- Prepack
- Preassembly
- Turnkey pneumatics
- Handling solutions



### Operation – for greater speed in the operational process

- Spare parts service
- Energy saving service
- Compressed air consumption analysis
- Compressed air quality analysis
- Customer service

## What must be observed when using Festo components?

Specified limit values for technical data and any specific instructions must be adhered to by the user in order to ensure recommended operating conditions.

When pneumatic components are used, the user shall ensure that they are operated using correctly prepared compressed air without aggressive media.

When Festo components are used in safety-oriented applications, the user shall ensure that all applicable

national and local safety laws and regulations, for example the machine directive, together with the relevant references to standards are observed. Unauthorised conversions or modifications to products and systems from Festo involve a safety risk and are thus not permissible.

Festo does not accept any liability for resulting damages.

You should contact Festo's advisors if one of the following apply to your application:

- The ambient conditions and conditions of use or the operating medium differ from the specified technical data.
- The product is to perform a safety function.
- A risk or safety analysis is required.
- You are unsure about the product's suitability for use in the planned application.
- You are unsure about the product's suitability for use in safety-oriented applications.

All technical data applies at the time of going to print.

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