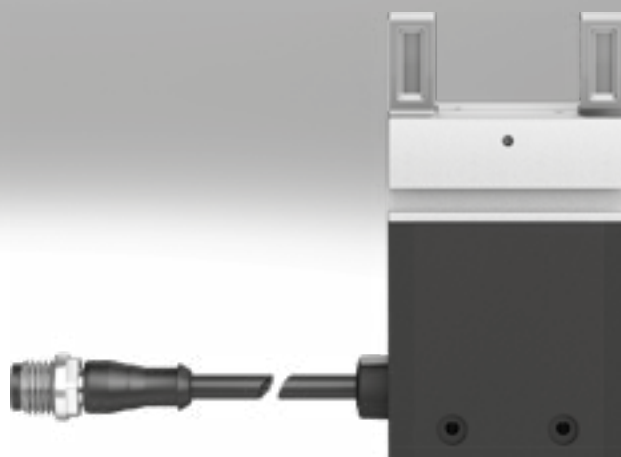


Parallel grippers EHPS, electric

FESTO



Characteristics

At a glance

Electrically actuated

- Minimal installation effort – no valves, tubing or air preparation required
- Low noise pollution
- Electrical safety to DIN EN 61010-1:2010

Actuation

- Via digital I/O or IO-Link
- No external controller required
- Connection options:
 - For digital I/O: connection via terminal strip to terminal CPX or controller CECC
 - For IO-Link: plug for direct connection to an IO-Link master

Adjustable gripping force (4 settings)

- Adaptation of the gripping force to sensitive workpieces
- Simple adjustment
- Very powerful

Sensing option of gripper jaws

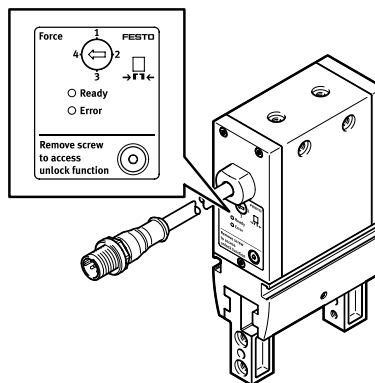
- For digital I/O: direct position sensing possible via external sensors on the gripper head
- For IO-Link: integrated position sensors for sensing the gripper jaws



Adjusting the gripping force for gripper with digital I/O

The gripping force of the gripper can be adjusted using the rotary switch. The switch has four settings and therefore four force levels, with no intermediate levels.

- Setting 1: approx. 50% of the max. force
- Setting 2: approx. 70% of the max. force
- Setting 3: approx. 85% of the max. force
- Setting 4: max. force

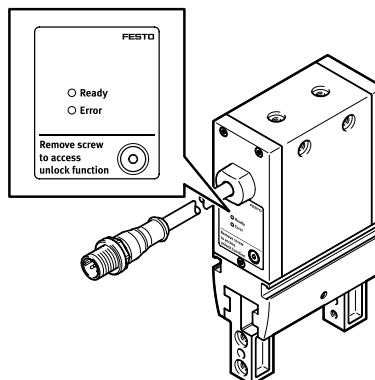


For grippers with IO-Link

The gripping force is set via an IO-Link master. The adjustment has four settings and therefore four force levels. There are no intermediate levels. (Values for settings 1 to 4 as for I/O version).

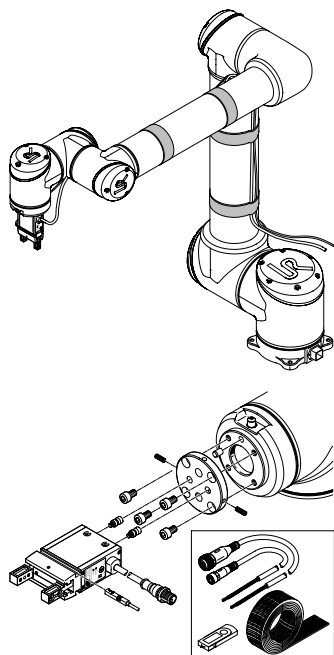
There are also three gripping modes to choose from. This allows a shorter gripping time in the application.

- External gripping: The object is gripped from the outside. The gripper jaws move with the specified gripping force/speed during the gripping process. On releasing, the gripper jaws move at the maximum speed
- Internal gripping: The object is gripped from the inside. The gripper jaws move with the specified gripping force/speed during the gripping process. On releasing, the gripper jaws move at the maximum speed
- Universal gripping: The specified gripping force is used in both directions of movement during the gripping process



Characteristics

Fast and intuitive integration on a robot arm



The gripper with robot connection EHPS-...-RA1 enables fast integration on a light-weight robot.

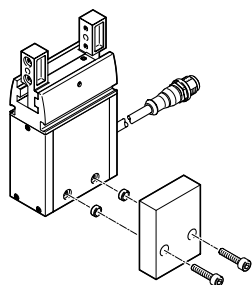
In order to mount the gripper on the robot arm, an adapter plate and the necessary mounting accessories are included in the kit, in addition to the gripper itself. It also contains the required proximity switches and a software plug-in (on a USB stick).

The plug-in is a simple means for integrating the gripper directly into the program sequence of the robot control system (→ page 5)

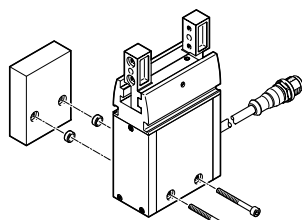
Mounting options

At the side

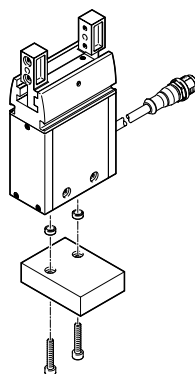
Via thread



Via through-hole

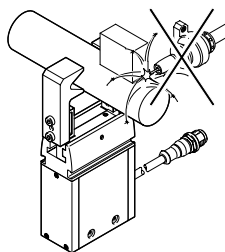


On the front

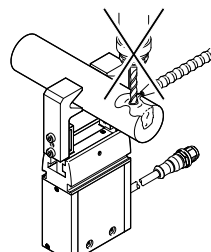


Note

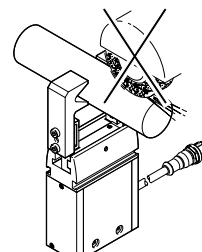
These grippers are not designed for the following or similar applications:



• Welding spatter



• Machining
• Aggressive media

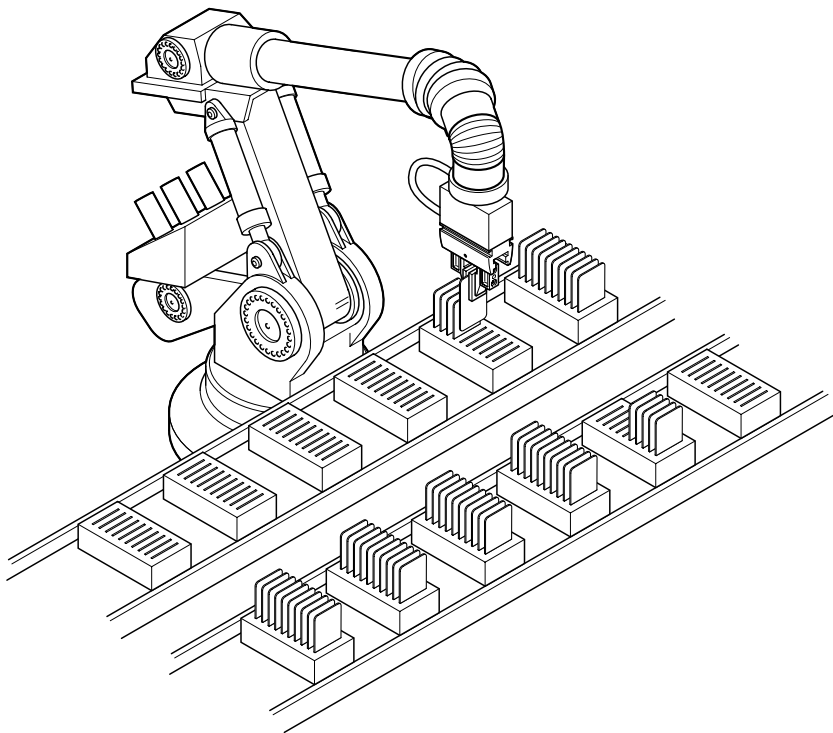


• Grinding dust

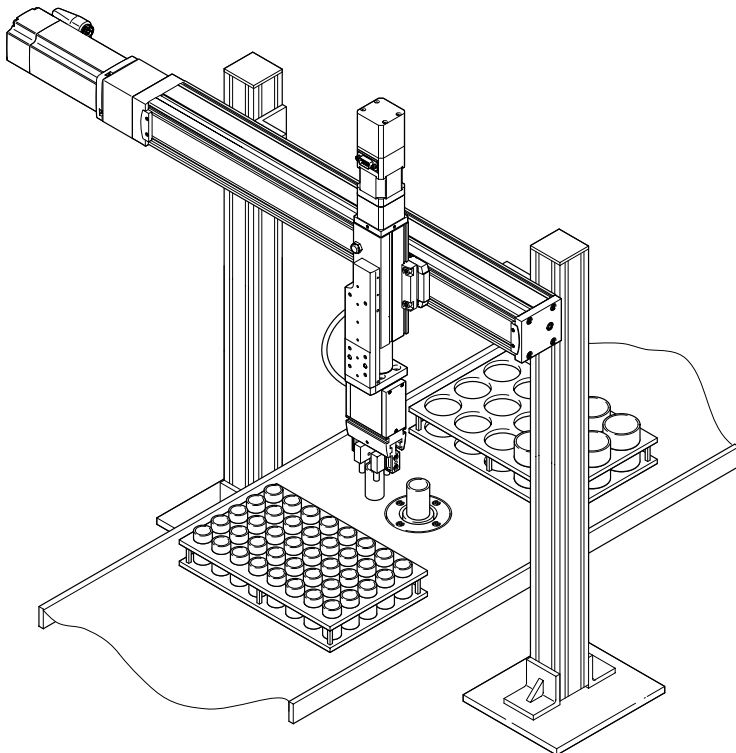
Key features

Application example

Card handling

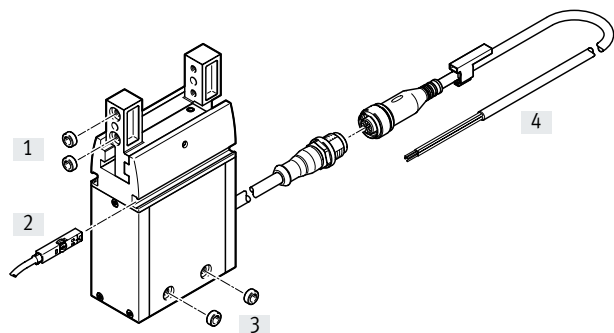


Sample preparation device with liquid dosing

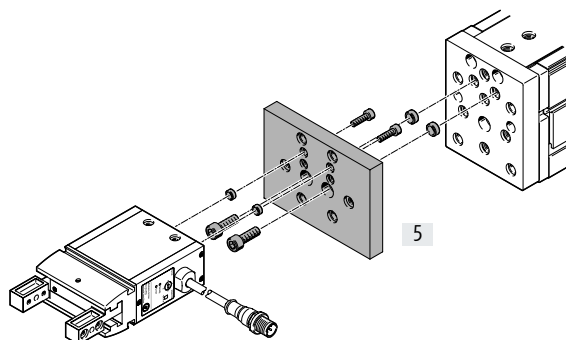


Peripherals overview

Peripherals overview



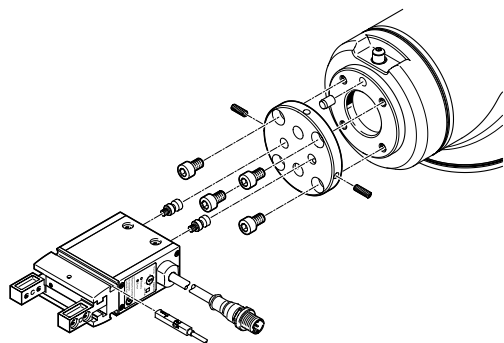
System product for handling and assembly technology



Accessories

Type/order code	Description	→ Page/Internet
[1] Centring sleeve ZBH	<ul style="list-style-type: none"> For centring the gripper fingers on the gripper jaws 4 centring sleeves included in the scope of delivery of the gripper 	18
[2] Proximity switch SMT-8M-A, SMT-8G	<ul style="list-style-type: none"> For sensing the gripper jaw position 	18
Position transmitter SMAT-8M	<ul style="list-style-type: none"> Continuously senses the position of the gripper jaws. It has an analogue output with an output signal that is proportional to the gripper jaw position 	19
[3] Centring sleeve ZBH	<ul style="list-style-type: none"> For centring the gripper during mounting 2 centring sleeves included in the scope of delivery of the gripper 	18
[4] Connecting cable NEBU-M12G5	<ul style="list-style-type: none"> For controlling the parallel gripper 	18
[5] Adapter kit DHAA-G-H1	<ul style="list-style-type: none"> Connecting plate between drive and gripper 	17

System product for robot connection



If feature EHPS-...-RA1 is used, the delivery includes all the connection components in addition to the gripper:

- Proximity switch
- Connecting cable for connecting the gripper and proximity switches
- Velcro strip for fixing the connecting cables in place
- Adapter kit for mounting on the robot arm
- USB stick for plug-in

Ordering data → page 16

Type codes

001	Series	
EHPS	Electric parallel gripper	

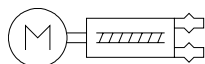
002	Size	
16	16	
20	20	
25	25	

003	Position sensing	
A	For proximity sensor	

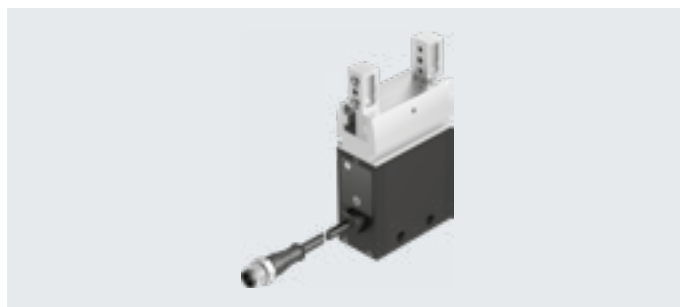
004	Bus protocol/activation	
	None	
LK	IO-Link®	

005	Robot connection	
	None	
RA1	Universal Robots	

Data sheet



- Ø - Size
16 ... 25
- I - Stroke per gripper jaw
10 ... 16 mm



General technical data					
Size	16		20		25
Design	Worm gear				
	Gear rack/pinion				
Guide	Plain-bearing guide with T-slot				
Control elements	Latched switch				
Ready status indication	LED				
Gripper function	Parallel				
Number of gripper jaws	2				
Stroke per gripper jaw	[mm]	10	13	16	
Max. mass per gripper finger	[g]	100	150	230	
Max. switching frequency ¹⁾	[Hz]	2.2	1.7	1.3	
Repetition accuracy	[mm]	≤ 0.03	≤ 0.01	≤ 0.01	
Max. interchangeability	[mm]	≤ 0.2			
Rotational symmetry	[mm]	≤ 0.2			
Max. gripper jaw backlash	[mm]	≤ 0.05	≤ 0.05	≤ 0.04	
Max. gripper jaw angular backlash	[°]	0.4	0.3	0.3	
Minimum travel	[mm]	0.5			
Position sensing	For proximity switch and position transmitter				
	Via IO-Link				
Type of mounting	Via through-holes and centring sleeves				
	Via female thread and centring sleeves				
Electrical connection	M12x1, 5-pin				
	Cable with plug				
Mounting position	Any				
Product weight	[g]	296	532	904	

1) At the maximum switching frequency, the gripper heats up to above 60°C.

**Note**

The maximum gripping force is only achieved if the gripper jaws are moved through the minimum travel (see above) with no load.

Data sheet

Electrical data			
Size		16	20
Motor type		DC servo motor	
Nominal operating voltage	[V DC]	24 ±10%	
Max. current consumption ¹⁾	[A]	1	2
Quiescent current	[mA]	30	

1) During the movement.

Operating and environmental conditions	
Ambient temperature	[°C] +5 ... +60
Degree of protection	IP40
Noise level	[dB(A)] 70
Corrosion resistance CRC ¹⁾	1
CE marking (see declaration of conformity) ³⁾	To EU EMC Directive ²⁾
	To EU RoHS Directive
KC mark	KC-EMV
Certification	RCM compliance mark

1) Corrosion resistance class CRC 1 to Festo standard FN 940070

Low corrosion stress. Dry internal application or transport and storage protection. Also applies to parts behind coverings, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

2) The product is suitable for industrial purposes only (Class A). Measures to suppress radio interference may be required in residential areas (Class B).

3) Additional information www.festo.com/sp → Certificates.

Technical data – IO-Link	
SIO-mode support	No
Communication mode	COM3 (230.4 kBaud)
Port class	Device B
Number of ports	Device 1
Process data width OUT	[bytes] 8
Process data content OUT	[bit] 16 (ControlWord)
	[bit] 16 (GrippingPosition)
	[bit] 8 (GrippingForce)
	[bit] 8 (GrippingMode)
	[bit] 8 (GrippingTolerance)
	[bit] 8 (WorkpieceNo)
Process data width IN	[bytes] 6
Process data content IN	[bit] 16 (ActualPosition)
	[bit] 16 (ErrorNumber)
	[bit] 16 (StatusWord)
Minimum cycle time	[ms] 5
Data memory required	[Kilobyte] 0.5
Protocol version	Device V 1.1

Data sheet

Opening and closing times [ms] as a function of setting 1 ... 4

The opening and closing times stated have been measured with vertically mounted gripper, gripper jaws pointing up and without gripper fingers.

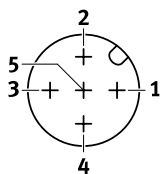
Size Setting	16	20	25
1	337	470	580
2	291	408	507
3	271	362	449
4	245	295	404

Materials

Housing	Anodised aluminium
Gripper jaw	High-alloy stainless steel
O-ring	NBR

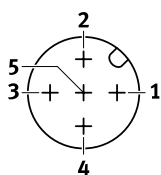
Pin allocation of the connector plug

For digital I/O

**Plug M12, 5 pin**

Pin	Connection	Function
1	+24 V DC	Supply voltage
2	Input 1	Gripper jaw opening (with external gripping)
3	0 V	–
4	Input 2	Gripper jaw closing (with external gripping)
5	n.c.	Not connected

For IO-Link

**Plug M12, 5 pin**

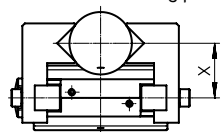
Pin	Connection	Function
1	+24 V DC sensor	Sensor: Supply voltage for IO-Link communication
2	+24 V DC actuator	Actuator: supply voltage
3	GND sensor	Sensor: Supply voltage for IO-Link communication
4	C/Q	IO-Link communication
5	GND actuator	Actuator: supply voltage

Deviation from the specification IO-Link port class B, without galvanic isolation between primary and secondary power supply. This can lead to malfunction or damage of the IO-Link master and the connected IO-Link devices.

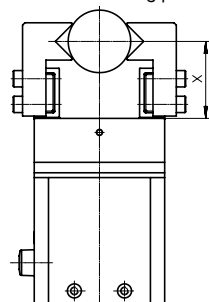
Data sheet

Total gripping force F_H as a function of lever arm x , mounting position, external/internal gripping and setting 1 ... 4

Horizontal mounting position



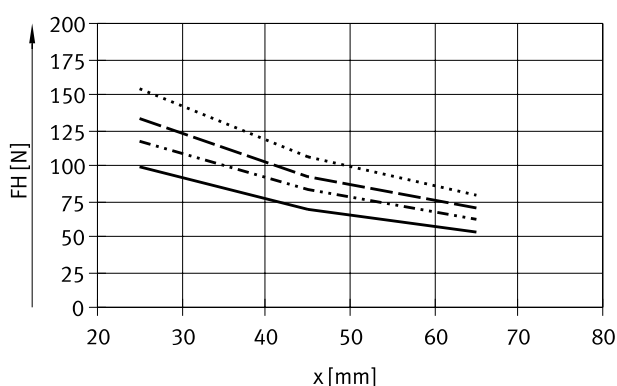
Vertical mounting position



Setting 1
Setting 2
Setting 3
Setting 4

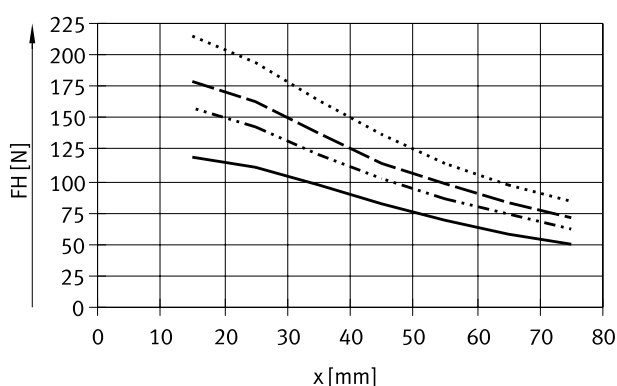
EHPS-16

External gripping, horizontal



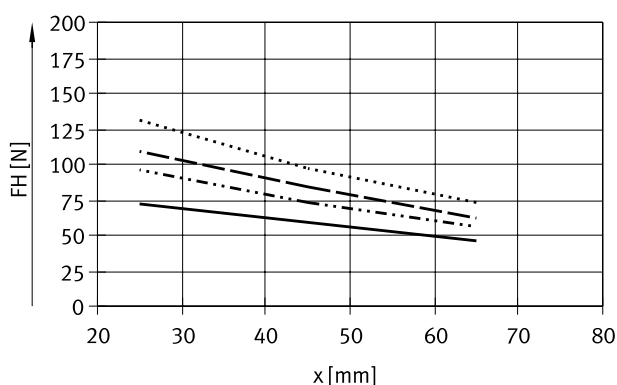
Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
25	98	116	132	154
45	68	84	92	106
65	54	62	70	78

External gripping, vertical



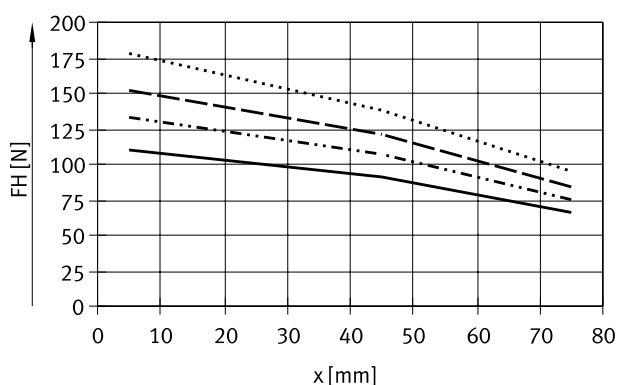
Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
15	118	158	178	214
45	82	102	114	138
75	50	62	72	84

Internal gripping, horizontal



Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
25	72	96	108	130
45	58	72	84	96
65	46	56	62	74

Internal gripping, vertical

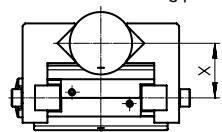


Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
15	110	134	152	178
45	90	108	122	138
75	66	74	84	94

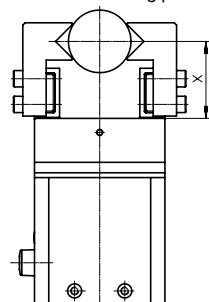
Data sheet

Total gripping force F_H as a function of lever arm x , mounting position, external/internal gripping and setting 1 ... 4

Horizontal mounting position



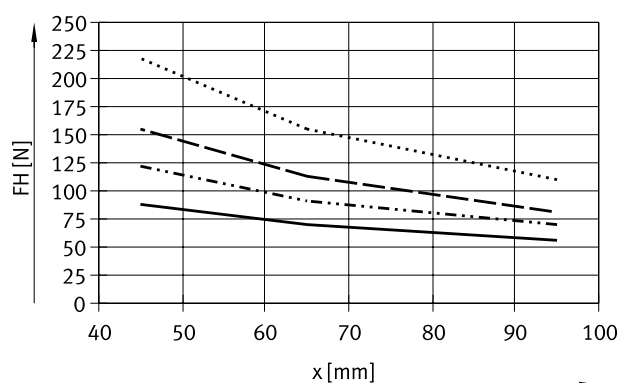
Vertical mounting position



— Setting 1
 - - - Setting 2
 - - - Setting 3
 Setting 4

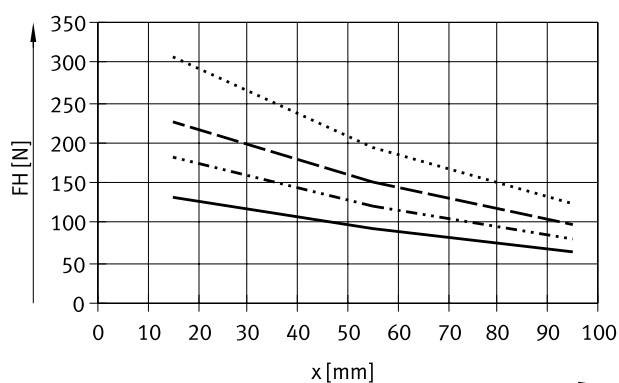
EHPS-20

External gripping, horizontal



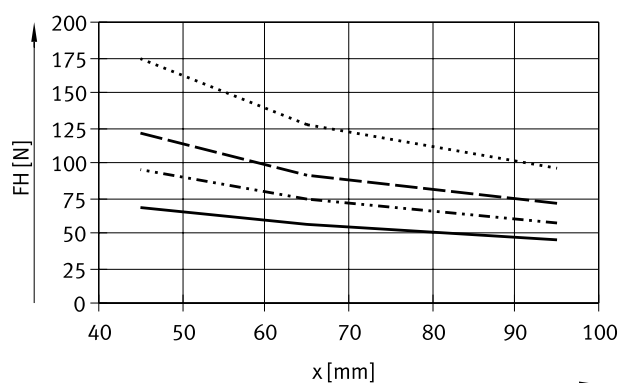
Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
45	88	122	156	218
65	70	90	114	154
95	56	70	82	110

External gripping, vertical



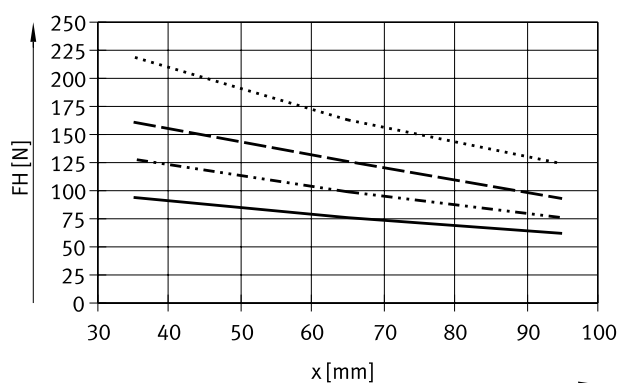
Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
15	132	182	226	306
55	94	120	150	194
95	64	80	98	124

Internal gripping, horizontal



Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
45	68	96	120	174
65	56	74	92	128
95	46	58	72	96

Internal gripping, vertical

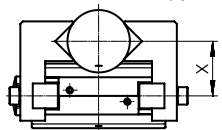


Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
35	94	128	160	220
65	76	100	126	162
95	62	76	92	124

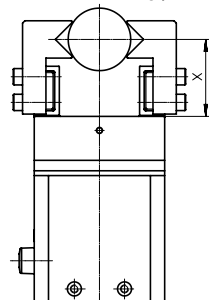
Data sheet

Total gripping force F_H as a function of lever arm x , mounting position, external/internal gripping and setting 1 ... 4

Horizontal mounting position



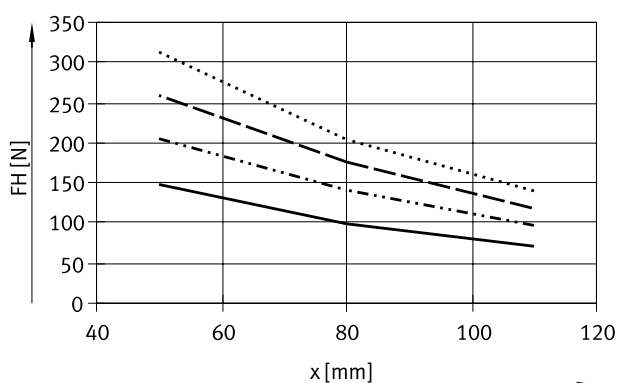
Vertical mounting position



- Setting 1
- · - · - Setting 2
- - - Setting 3
- Setting 4

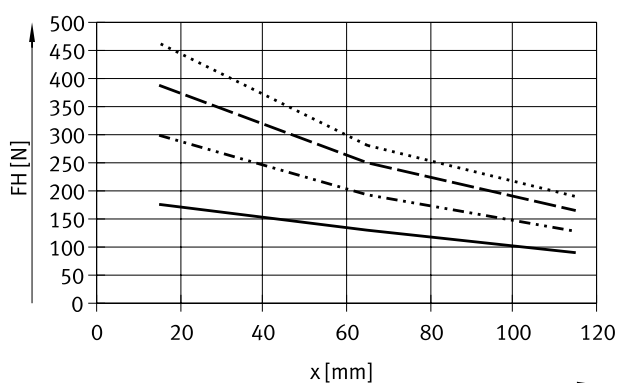
EHPS-25

External gripping, horizontal



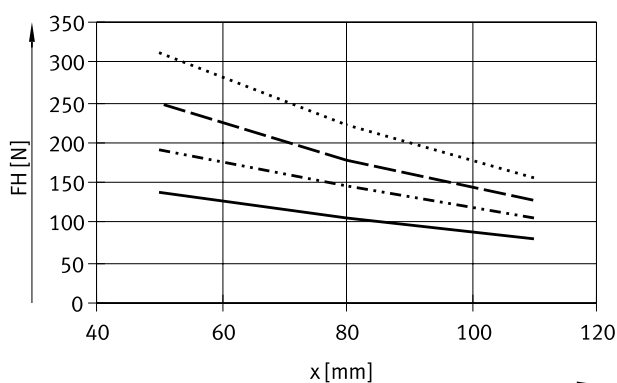
Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
50	148	204	260	312
80	98	140	176	204
110	70	96	118	140

External gripping, vertical



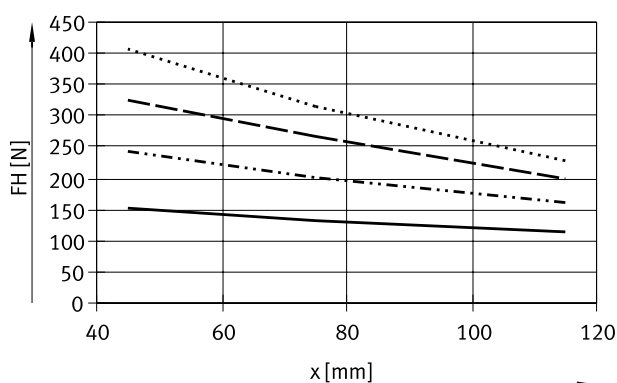
Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
15	176	298	388	462
65	130	194	250	280
115	90	128	166	190

Internal gripping, horizontal



Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
50	138	192	250	312
80	106	146	178	222
110	80	106	128	156

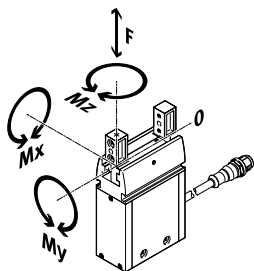
Internal gripping, vertical



Lever arm [mm]	F_H [N] at setting			
	1	2	3	4
45	152	242	326	406
75	132	200	266	314
115	114	162	198	228

Data sheet

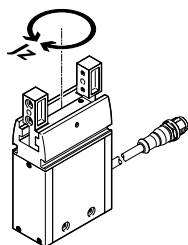
Static characteristic load values at the gripper jaws



The indicated permissible forces and torques apply to a single gripper jaw. They include the lever arm, additional applied loads due to the workpiece or external gripper fingers and acceleration forces occurring during movement. The zero coordinate line (gripper jaw guide slot) must be taken into consideration when calculating the torques.

Size		16	20	25
Max. permissible force F_z	[N]	200	325	450
Max. permissible torque M_x	[Nm]	7	13	28
Max. permissible torque M_y	[Nm]	4.4	8	16
Max. permissible torque M_z	[Nm]	7	13	28

Mass moment of inertia



Under the following conditions:

- The reference point is the central axis
- Without external gripper fingers
- In a load-free state

Size		16	20	25
Mass moment of inertia	[kgcm ²]	0.78	2.02	5.24

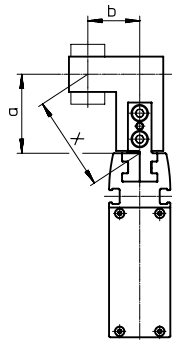
Data sheet

Gripping force F_H per gripper jaw as a function of lever arm x and eccentricity a and b

The following formula must be used to calculate the lever arm x with eccentric gripping:

$$x = \sqrt{a^2 + b^2}$$

The gripping force F_H can be read from the graphs (→ page 10) using the calculated value x .



Calculation example

Given:

Distance $a = 40$ mm

Distance $b = 50$ mm

To be calculated:

The gripping force in setting 4, with an EHPS-16-A, used as an external gripper and in horizontal mounting position.

Approach:

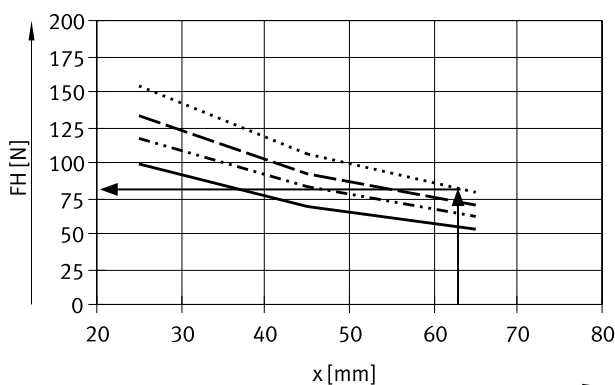
Calculating the lever arm x

$$x = \sqrt{40^2 + 50^2}$$

$x = 64$ mm

The graph (→ page 10)

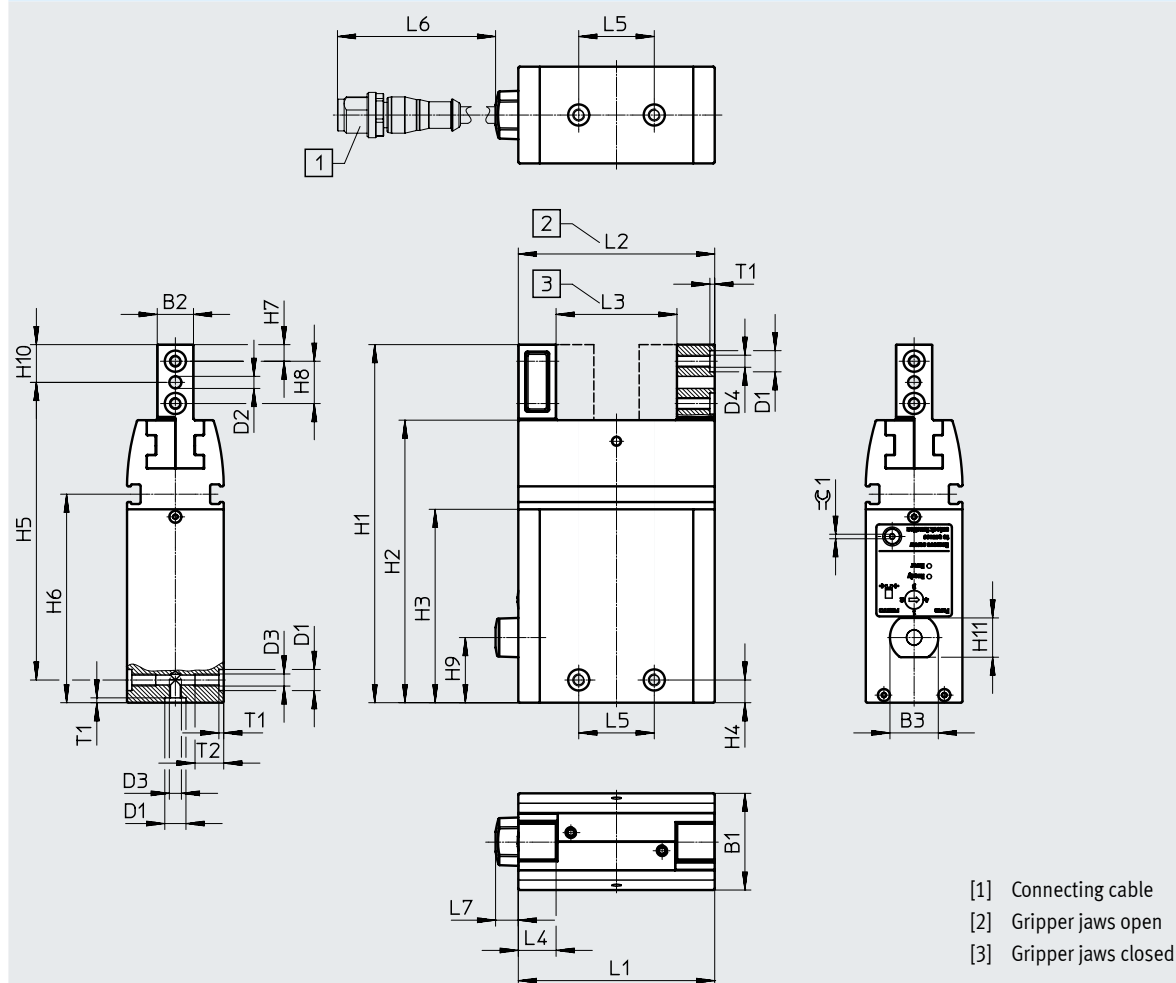
gives a value of $F_H = \text{approx. } 77$ N for the gripping force.



Setting 1
Setting 2
Setting 3
Setting 4

Data sheet

Dimensions

Download CAD data → www.festo.com

Size	B1 ±0.03	B2 ±0.05	B3	D1 ∅ H8	D2 ∅ H8	D3	D4	H1 ±0.1	H2
16	26	10	16	7	3	M4	M4	99.5	78
20	32	12	16	7	4	M4	M4	118.5	93.5
25	39	15	16	9	4	M6	M5	139.5	110

Size	H3	H4 ¹⁾	H5 ±0.2	H6	H7 ¹⁾	H8 ¹⁾	H9	H10	H11
16	55	7.5	82	59.8	4.5	11	14.5	10	13
20	64	7.5	98.5	69	5.5	14	21.6	12.5	32
25	75	12.5	112	80	7	16	28.6	15	39

Size	L1 ±0.3	L2 +1	L3 ±0.5	L4 ±0.05	L5 ¹⁾	L6	L7	T1 +0.1	T2 min.	≈C 1
16	53.8	53.8	33.8	10.5	25	300	7.5	1.6	9.5	1.5
20	65	65	39	12.5	25	300	7.5	1.6	9.5	1.5
25	79.4	79.4	47.4	15	29	300	7.5	2.1	12	2

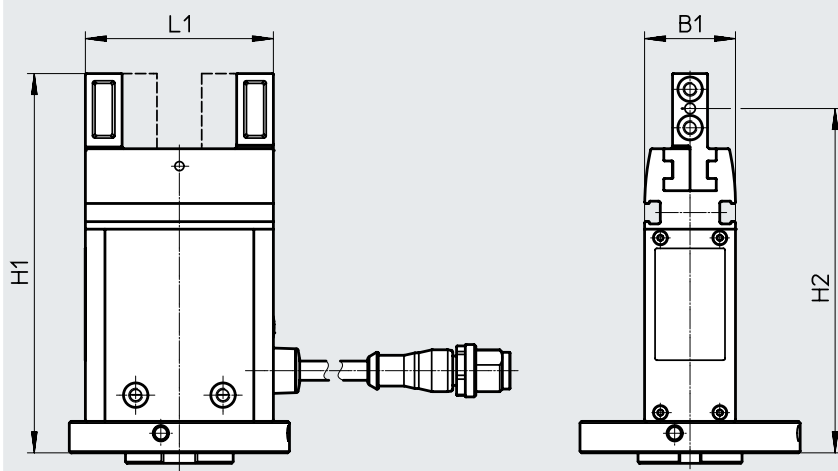
1) Tolerance for centring hole ±0.02 mm
Tolerance for thread ±0.1 mm

Data sheet

Dimensions

Download CAD data → www.festo.com

With robot connection



Size	B1	H1	H2	L1
16	26	108.5	98.5	53.8
20	32	127.5	115	65
25	39	148.5	133.5	79.4

Ordering data

	Size	Part no.	Type
	With I/O interface		
	16	8070832	EHPS-16-A
	20	8070831	EHPS-20-A
	25	8070830	EHPS-25-A
	With IO-Link		
	16	8103809	EHPS-16-A-LK
	20	8103810	EHPS-20-A-LK
	25	8103811	EHPS-25-A-LK
	With robot connection		
	16	8119111	EHPS-16-A-RA1
	20	8119112	EHPS-20-A-RA1
	25	8119113	EHPS-25-A-RA1

Accessories

Adapter kit
DHAA, HAPG, HMSV

Material:
Wrought aluminium alloy
Free of copper and PTFE
RoHS-compliant



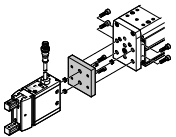
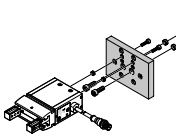
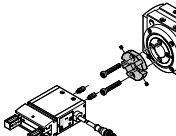
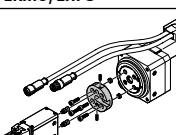
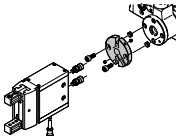
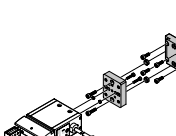


Note

The kit includes the individual mounting interface as well as the necessary mounting material.

Permissible drive/gripper combinations with adapter kit


Download CAD data → www.festo.com

Combination	Drive Size	Gripper Size	Mounting option		Adapter kit		
					CRC ¹⁾	Part no.	Type
EGSC/EHPS	EGSC	EHPS			HMSV		
	60	16, 20	■	■	2	8106581	DHAA-G-E8-60-B18-16
EGSL/EHPS	EGSL	EHPS			HMSV		
	45, 55	16	■	■	2	548785	HMSV-55
	75	20, 25	■	■		548786	HMSV-56
ERMB/EHPS	ERMB	EHPS			HAPG		
	20	16, 20	■	■	2	184479	HAPG-SD2-3
	25	16, 20	■	■		184482	HAPG-SD2-6
	20	25	■	■		184480	HAPG-SD2-4
	25	25	■	■		184483	HAPG-SD2-7
	32	25	■	■		184485	HAPG-SD2-9
ERMO/EHPS	ERMO	EHPS			DHAA		
	16	16	■	■	2	8079173	DHAA-G-R3-16-B18-16
	25	16, 20	■	■		8071956	DHAA-G-R3-25-B18-16
	32	20	■	■		8079214	DHAA-G-R3-32-B18-20
	32	25	■	■		8079208	DHAA-G-R3-32-B18-25
EHMB/EHPS	EHMB	EHPS			HAPG		
	20	25	■	■	2	184485	HAPG-SD2-9
	25, 32	25	■	■		8078739	DHAA-G-H1-25-B18-25
DGPL/EHPS	DGPL	EHPS			HMVA, HAPG, HMSV		
	Direct mounting						
	25, 32	16	■	■	2	196788	HMVA-DLA18/25
						193922	HAPG-37-S4
	40	16	■	■		196790	HMVA-DLA40
						193922	HAPG-37-S4
	Dovetail mounting						
	25	16	■	■	2	196788	HMVA-DLA18/25
						177768	HMSV-28
	40	16, 20	■	■		196790	HMVA-DLA40
						177768	HMSV-28
	40	25	■	■		196790	HMVA-DLA40
						177769	HMSV-29

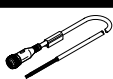
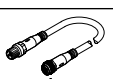
1) Corrosion resistance class CRC 2 to Festo standard FN 940070



Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

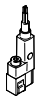
Accessories



Ordering data						
	For size [mm]	Description	Weight [g]	Part no.	Type	PU ¹⁾
Centring sleeve ZBH						
			Data sheets → Internet: zbh			
	16, 20	Included in the scope of delivery of the gripper:	1	186717	ZBH-7	10
	25	4 centring sleeves for the gripper jaws and 2 for mounting the gripper	1	150927	ZBH-9	

1) Packaging unit

Ordering data – Connecting cables for the gripper's connector plugs						
	Electrical connection, left	Electrical connection, right	Cable length [m]	Part no.	Type	
	Straight socket, M12x1, 5-pin	Cable, open end, 4-wire	2.5	550326	NEBU-M12G5-K-2.5-LE4	
			5	541328	NEBU-M12G5-K-5-LE4	
	Angled socket, M12x1, 5-pin	Cable, open end, 4-wire	2.5	550325	NEBU-M12W5-K-2.5-LE4	
			5	541329	NEBU-M12W5-K-5-LE4	
	Straight socket, M12x1, 5-pin	Straight socket, M12x1, 5-pin	5	574321	NEBU-M12G5-E-5-Q8N-M12G5	
			7.5	574322	NEBU-M12G5-E-7.5-Q8N-M12G5	
	Straight socket, M12x1, 5-pin	Angled socket, M12x1, 5-pin	0.5	8003617	NEBU-M12G5-K-0.5-M12W5	
			2	8003618	NEBU-M12G5-K-2-M12W5	

Ordering data – Proximity switches for T-slot, magneto-resistive						Data sheets → Internet: smt
	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part no.	Type
N/O contact						
	Inserted in the slot from above, 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
		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						
	Inserted in the slot from above, short design	PNP	Cable, 3-wire	7.5	574340	SMT-8M-A-PO-24V-E-7,5-OE

Ordering data – Proximity switches for T-slot, magneto-resistive						
	Type of mounting	Switching output	Electrical connection, outlet direction of connection	Cable length [m]	Part no.	Type
N/O contact						
	Insertable in the slot length-wise	PNP	Cable, 3-wire, lateral	2.5	547859	SMT-8G-PS-24V-E-2,5Q-OE
			Plug M8x1, 3-pin, lateral	0.3	547860	SMT-8G-PS-24V-E-0,3Q-M8D
		NPN	Cable, 3-wire, lateral	2.5	8065028	SMT-8G-NS-24V-E-2,5Q-OE
			Plug M8x1, 3-pin, lateral	0.3	8065027	SMT-8G-NS-24V-E-0,3Q-M8D

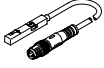
Ordering data – Connecting cables						
	Electrical connection, left	Electrical connection, right	Cable length [m]	Part no.	Type	
	Straight socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541333	NEBU-M8G3-K-2.5-LE3	
			5	541334	NEBU-M8G3-K-5-LE3	
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541338	NEBU-M8W3-K-2.5-LE3	
			5	541341	NEBU-M8W3-K-5-LE3	

Accessories



Position transmitter

The position transmitter continuously senses the position of the gripper jaws. It has an analogue output with an output signal that is proportional to the gripper jaw position.

Ordering data – Position transmitters for T-slot

	For size	Position measuring range	Analogue output [V]	Type of mounting	Electrical connection	Cable length [m]	Part no.	Data sheets → Internet: position transmitter Type
	10 ... 35	0 ... 40	0 ... 10	Inserted in slot from above	Plug M8x1, 4-pin, in-line	0.3	553744	SMAT-8M-U-E-0,3-M8D

Ordering data – Connecting cables

	Electrical connection, left	Electrical connection, right	Cable length [m]	Part no.	Data sheets → Internet: nebu Type
	Straight socket, M8x1, 4-pin	Cable, open end, 4-wire	2.5	541342	NEBU-M8G4-K-2.5-LE4
			5	541343	NEBU-M8G4-K-5-LE4
	Angled socket, M8x1, 4-pin	Cable, open end, 4-wire	2.5	541344	NEBU-M8W4-K-2.5-LE4
			5	541345	NEBU-M8W4-K-5-LE4