

- Reliable and accurate
- Highly flexible
- Versatile

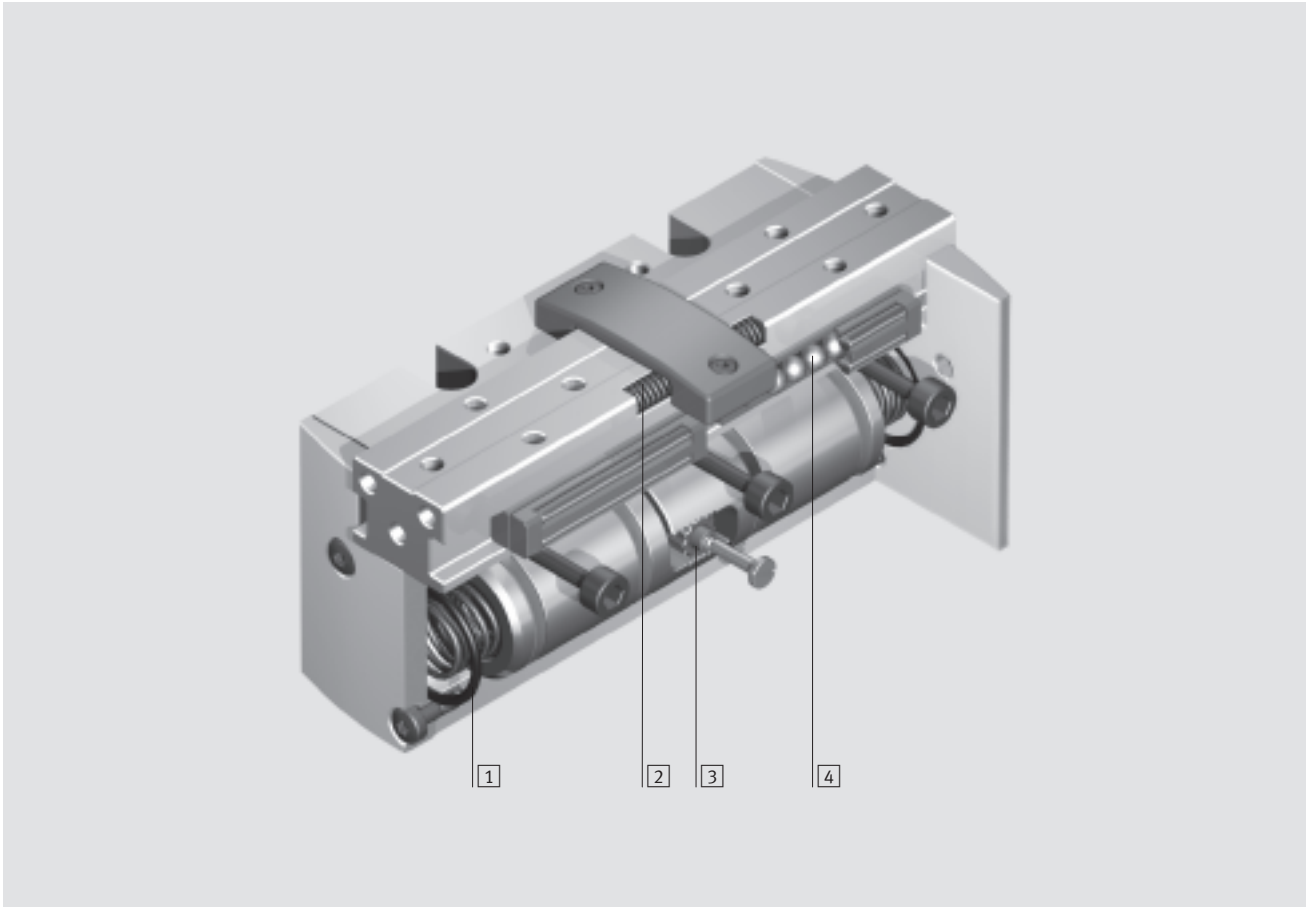
# Parallel grippers HGPP, precision

Key features

FESTO

Handling units  
Parallel grippers

7.6



## At a glance

- Wide range of variants for greater flexibility:
    - Double-acting piston drive HGPP-...-A.
    - Compression springs for supporting or retaining gripper forces, or for use as a single-acting gripper with only one compressed air connection
  - High precision gripper jaw guide
    - External gripping
    - Internal gripping
  - Multiple compressed air connections
  - Integrated sensing electronics
  - Adaptable proximity sensor via mounting bracket
  - Highly flexible thanks to versatile attachment, mounting and applications options
    - Drives
    - Externally adaptable gripper fingers
    - Guide plate
- 1 Compression spring closes gripper jaws: HGPP-...-G2
  - 2 Compression spring opens gripper jaws: HGPP-...-G1
  - 3 Synchronisation element
  - 4 Backlash-free guide bearing



Gripper selection software  
[www.festo.com/en/engineering](http://www.festo.com/en/engineering)

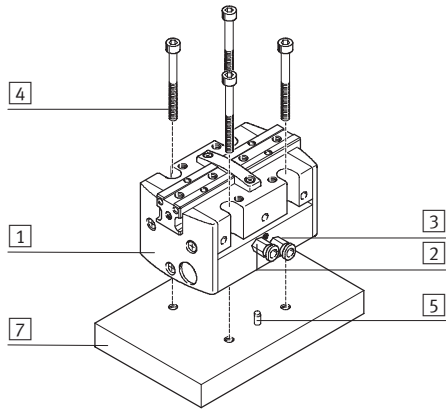
# Parallel grippers HGPP, precision

Features

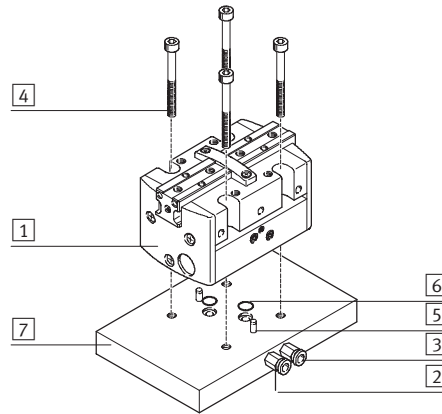


## Versatile air connections and mounting options

Supply port direct at the front,  
direct mounting from above



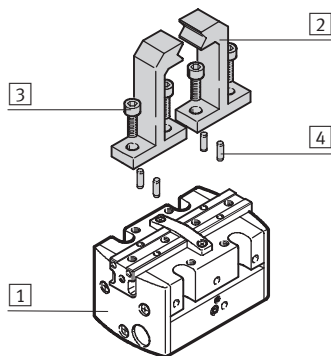
Supply port via adapter plate from underneath,  
direct mounting from above



- 1 Parallel gripper
- 2 Compressed air connection, opening
- 3 Compressed air connection, closing
- 4 Mounting screws
- 5 Locating pins
- 6 O-rings
- 7 Plate (user-specific)

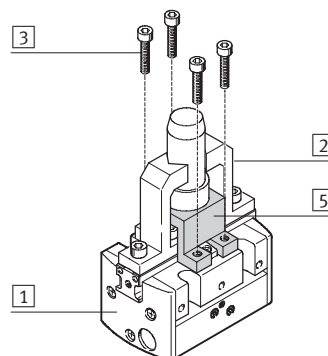
## Range of applications (user-specific)


Attachment of external gripper fingers

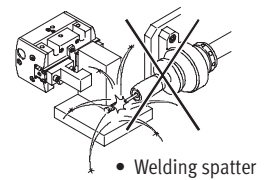
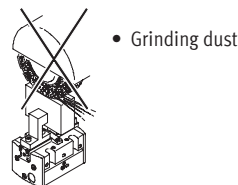
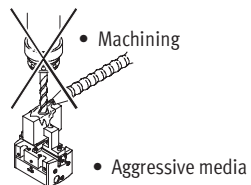


- 1 Parallel gripper
- 2 Gripper finger
- 3 Mounting screws
- 4 Locating pins
- 5 Guide plate

Used as guide plate



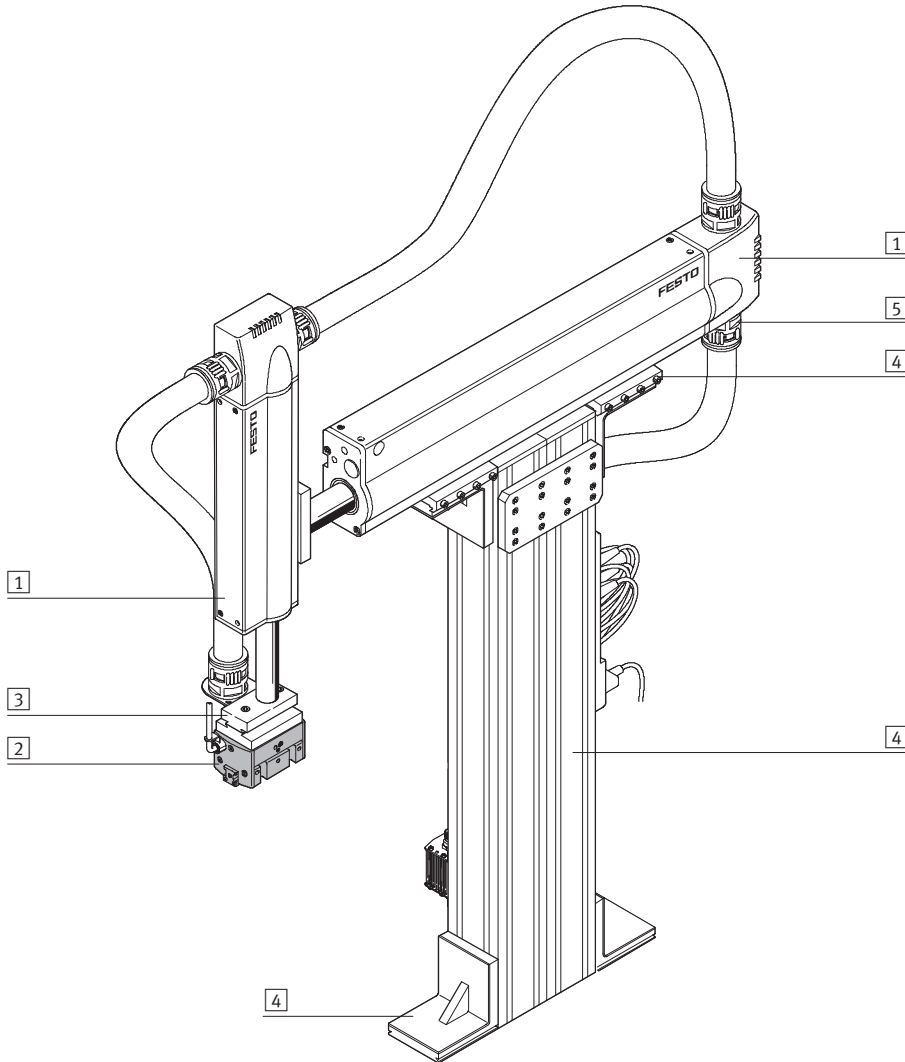
 Note  
Grippers are not suitable for the following, or for similar applications:



# Parallel grippers HGPP, precision

System example

System product for handling and assembly technology

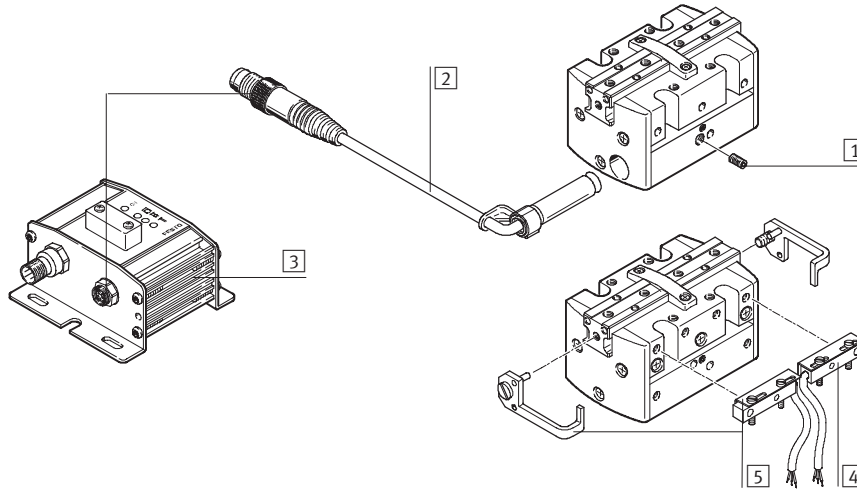


System elements and accessories			
	Brief description	→ Page	
1	Drives	Wide range of combination options within handling and assembly technology	Volume 1
2	Gripper	Diverse variation options in handling and assembly technology	Volume 1
3	Adapter	For drive/drive and drive/gripper connections	Volume 5
4	Basic mounting components	Profiles and profile connections as well as profile/drive connections	Volume 5
5	Installation components	For achieving a clear-cut, safe layout of electrical cables and tubing	Volume 5
-	Axes	Diverse possible combinations in handling and assembly technology	Volume 5
-	Motors	Servo and stepper motors, with or without gearing	Volume 5

# Parallel grippers HGPP, precision

Peripherals overview and type codes

## Peripherals overview



Accessories			
	Brief description	→ Page	
1	Threaded pin	For securing position sensors SMH-S1	-
2	Position sensor SMH-S1	Can be integrated in the gripper	1 / 7.6-14
3	Evaluation unit SMH-AE1	For position sensor SMH-S1, for sensing 3 positions	1 / 7.6-14
4	Proximity sensor SIES-Q5B	Can be assembled with mounting bracket HGPP-HWS-Q5	1 / 7.6-14
5	Mounting bracket HGPP-HWS-Q5	For mounting proximity sensors SIES-Q5B, comprising 1 bracket and 1 switch lug with mounting screws	1 / 7.6-15

## Type codes

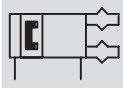
HGPP		-	16	-	A	-	G1
<b>Type</b>							
HGPP	Parallel gripper						
<b>Size</b>							
<b>Position sensing</b>							
A	For proximity sensing						
<b>Gripping force retention</b>							
G1	Open						
G2	Closed						

# Parallel grippers HGPP, precision

Technical data



Function  
Double-acting  
HGPP-...-A



Single-acting or  
with gripping force retention ...  
... open HGPP-...-G1



... closed HGPP-...-G2



∅ - Size  
10 ... 32 mm

I - Stroke  
4 ... 25 mm

[www.festo.com/en/Spare\\_parts\\_service](http://www.festo.com/en/Spare_parts_service)  
Wearing parts kits  
➔ 1 / 7.6-14



General technical data						
Size	10	12	16	20	25	32
Design	Rack and pinion					
Mode of operation	Double-acting					
Gripper function	Parallel					
Number of gripper jaws	2					
Max. applied load per external gripper finger <sup>1)</sup> [N]	< 0.5	< 1	< 1.5	< 2	< 2.5	< 3
Stroke per gripper jaws [mm]	2	2.5	5	7.5	10	12.5
Pneumatic connection	M3		M5		G1/8/M5 <sup>2)</sup>	
Repetition accuracy <sup>3)</sup> [mm]	< 0.02		< 0.015		< 0.01	
Max. interchangeability [mm]	0.2					
Max. gripper jaw backlash [mm]	0					
Max. gripper jaw angular lash [°]	0					
Max. operating frequency [Hz]	4					
Centring precision [mm]	< ∅ 0.05					
Position sensing	For proximity sensing					
Type of mounting	With through-hole and locating pin With female thread and locating pin					

- 1) Valid for unthrottled operation
  - 2) Supply port on side G1/8; supply port on ground M5
  - 3) End-position drift under constant conditions of use with 100 consecutive strokes in the direction of movement of the gripper jaws
- | - Note: This product conforms with the ISO 1179-1 standard and the ISO 228-1 standard.

Operating and environmental conditions		
Min. operating pressure	HGPP-...-A [bar]	2
	HGPP-...-G... [bar]	5
Max. operating pressure	[bar]	8
Operating medium	Filtered compressed air, lubricated or unlubricated	
Ambient temperature <sup>1)</sup>	[°C]	+5 ... +60
Corrosion resistance class CRC <sup>2)</sup>	2	

- 1) Note operating range of proximity sensors
- 2) Corrosion resistance class 2 according to Festo standard 940 070  
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents

# Parallel grippers HGPP, precision

Technical data



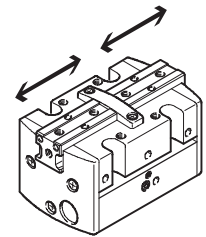
Weights [g]						
Size	10	12	16	20	25	32
HGPP-...-A	126	172	315	604	884	1,408
HGPP-...-G1	127	173	316	611	910	1,438
HGPP-...-G2	127	173	317	615	898	1,427

## Materials

Sectional view

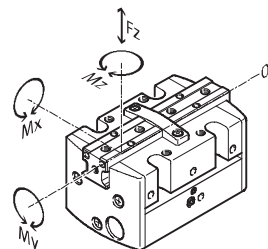
Parallel gripper		
1	Housing	Anodised aluminium
2	Gripper jaw	Nickel-plated aluminium
3	Cover cap	Polyacetate
4	Plug cap	Anodised aluminium
–	Note on material	Free of copper, PTFE and silicone

## Gripping force [N] at 6 bar



Size	10	12	16	20	25	32
Gripping force per gripper jaw						
Opening	40	58	102	170	250	415
Closing	40	58	102	170	250	415
Total gripping force						
Opening	80	116	204	340	500	830
Closing	80	116	204	340	500	830

## Characteristic load values at the gripper jaws



Indicated permissible forces and torques apply to a single gripper jaw. Static forces and torques relate to additional applied loads caused by the workpiece or external gripper fingers, as well as forces which occur

during handling. The zero co-ordinate line (gripper jaws point of rotation) must be taken into consideration for the calculation of torques. Additionally, max. permissible forces

which may be applied to the housing have been entered as well, which, for example, can be absorbed by a guide plate during pressing-in operations.

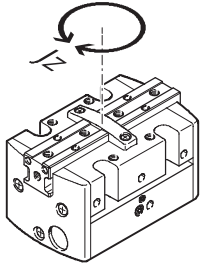
Size	10	12	16	20	25	32
Max. permissible force $F_{Z\text{Gripper jaws}}$ [N]	40	70	130	220	380	720
Max. permissible force $F_{ZHousing}$ [N]	200	400	600	800	1,000	1,200
Max. permissible torque $M_x$ [Nm]	1.5	3	7	14	21	30
Max. permissible torque $M_y$ [Nm]	1.5	3	7	14	21	30
Max. permissible torque $M_z$ [Nm]	1.5	3	7	14	21	30

# Parallel grippers HGPP, precision

Technical data



## Mass moment of inertia [kgm<sup>2</sup>x10<sup>-4</sup>]



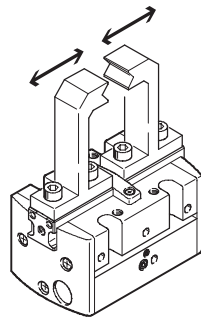
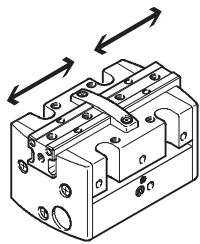
Mass moment of inertia [kgm<sup>2</sup>x10<sup>-4</sup>]  
for parallel grippers in relation to the  
central axis, without load.

Size	10	12	16	20	25	32
HGPP-...-A	0.43	0.73	2.39	6.22	16.68	38.34
HGPP-...-G1	0.45	0.76	2.58	6.71	17.45	39.21
HGPP-...-G2	0.43	0.74	2.45	6.27	16.85	38.63

## Opening and closing times [ms] at 6 bar

without external gripper fingers

with external gripper fingers



The indicated opening and closing times [ms] have been measured at room temperature and 6 bar operating pressure with vertically mounted gripper and without external gripper fingers. Load is increased if external gripper fingers are attached. This means that kinetic energy is also increased, as this is determined by gripper finger weight and velocity. If permissible kinetic energy is exceeded, various parts of the gripper may be damaged. This occurs when

the applied load reaches the end-position and the cushioning is only able to partially convert the kinetic energy into potential energy and heat energy. It thus becomes apparent that the indicated max. permissible applied load due to the external gripper fingers must be checked and maintained. The grippers must be throttled for greater applied loads. Opening and closing times must then be adjusted accordingly.

Size		10	12	16	20	25	32
<b>Without external gripper fingers</b>							
HGPP-...-A	Opening	22	27	40	44	64	76
	Closing	34	40	53	59	92	110
HGPP-...-G1	Opening	24	30	34	45	58	64
	Closing	95	70	70	92	164	173
HGPP-...-G2	Opening	26	37	57	62	105	103
	Closing	32	40	46	58	90	101
<b>With external gripper fingers as a function of the applied load</b>							
HGPP	1 N	100	–	–	–	–	–
	2 N	200	100	50	–	–	–
	3 N	300	200	100	50	100	–
	4 N	–	300	200	100	150	100
	5 N	–	–	300	200	200	150
	6 N	–	–	–	–	300	250

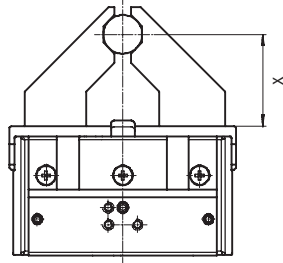


# Parallel grippers HGPP, precision

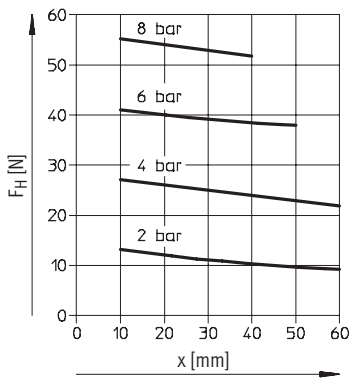
Technical data

## Gripping force $F_H$ as a function of operating pressure and the lever arm $x$

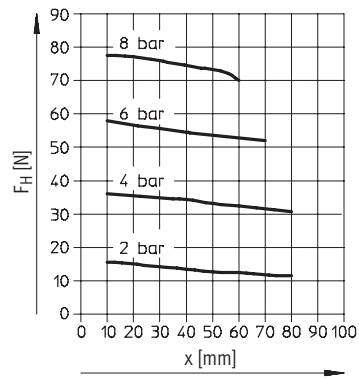
Gripping forces related to operating pressure and lever arm can be determined for the various sizes with the following graphs.



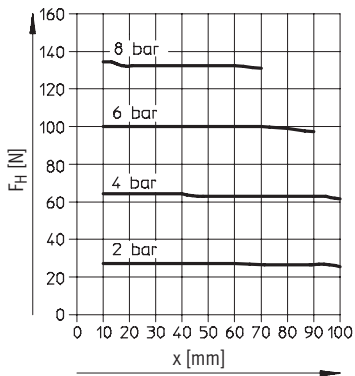
HGPP-10-A



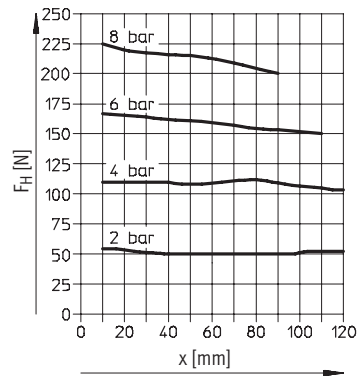
HGPP-12-A



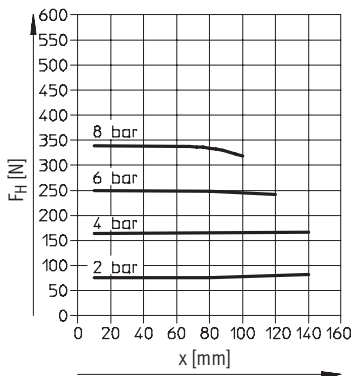
HGPP-16-A



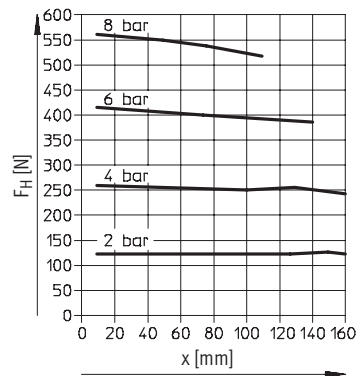
HGPP-20-A



HGPP-25-A



HGPP-32-A

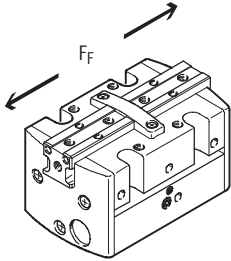


# Parallel grippers HGPP, precision

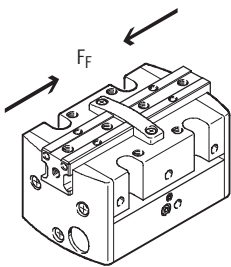
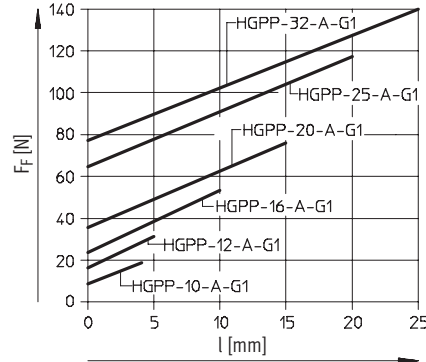
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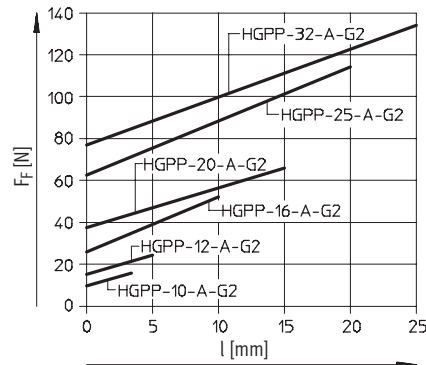
## Spring force $F_F$ as a function of the gripper size and overall stroke length $l$



Gripper retention force, opening: the spring forces  $F_F$  of the parallel gripper HGPP-...-G1 can be determined from the following graphs.



Gripper retention force, closing: the spring forces  $F_F$  of the parallel gripper HGPP-...-G2 can be determined from the following graphs.



## Determination of actual gripping forces for HGPP-...-G1 and HGPP-...-G2 depending upon the application

The parallel grippers with integrated spring can be used as:

- single-acting grippers
- grippers with supplementary gripping force and
- grippers with gripping force retention

In order to calculate available gripping forces  $F_{Gr}$  (per gripper jaw), gripping force ( $F_H$ ) and spring force ( $F_F$ ) must be combined accordingly.

### Application

The resulting gripping force  $F_{Gr}$ , conditional on the application, depends on the gripping action (external/internal gripping) and the gripper design (with/without spring return). The spring force is supplemented in accordance with the design and gripping action.

Application	Single-acting	Supplementary gripping force	Gripping force retention
	<ul style="list-style-type: none"> <li>• Gripping with spring force: <math>F_{Gr} = F_F</math></li> <li>• Gripping with pressure force: <math>F_{Gr} = F_H - F_F</math></li> </ul>	<ul style="list-style-type: none"> <li>• Gripping with pressure and spring force: <math>F_{Gr} = F_H + F_F</math></li> </ul>	<ul style="list-style-type: none"> <li>• Gripping with spring force: <math>F_{Gr} = F_F</math></li> </ul>

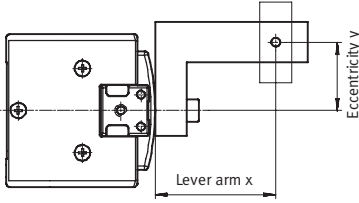
		Pressurised (in gripping action)	Unpressurised
HGPP-...-A	Internal gripping	$F_{Gr} = F_H$	$F_{Gr} = 0$
	External gripping	$F_{Gr} = F_H$	$F_{Gr} = 0$
HGPP-...-G1	Internal gripping	$F_{Gr} = F_H + F_F$	$F_{Gr} = F_F$
	External gripping	$F_{Gr} = F_H - F_F$	$F_{Gr} = 0$
HGPP-...-G2	Internal gripping	$F_{Gr} = F_H - F_F$	$F_{Gr} = 0$
	External gripping	$F_{Gr} = F_H + F_F$	$F_{Gr} = F_F$

# Parallel grippers HGPP, precision

Technical data



## Gripping force $F_H$ at 6 bar as a function of lever arm $x$ and eccentricity $y$



Gripping forces at 6 bar dependent upon eccentric application of force and the maximum permissible off-centre point of force application can be determined for the various sizes using the following graphs.

### Calculation example

Given:

Gripper HGPP-12-A

Lever arm  $x = 20$  mm

Eccentricity  $y = 22$  mm

To be found:

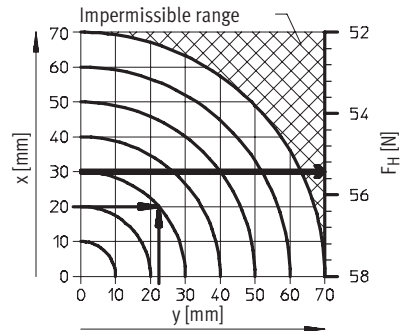
Gripping force at 6 bar

Procedure:

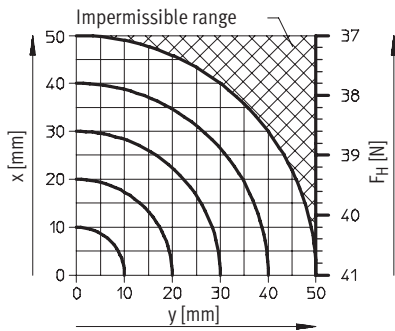
- Determine the intersection  $xy$  between lever arm  $x$  and eccentricity  $y$  in the graph for HGPP-12-A
- Draw an arc (with centre at origin) through intersection  $xy$
- Determine the intersection between the arc and the X axis
- Read gripping force

Result:

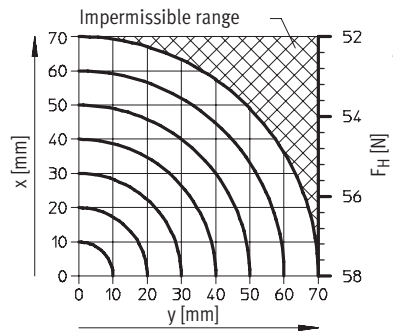
Gripping force = approx. 55 N



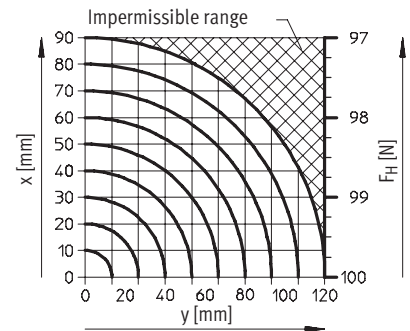
### HGPP-10-A



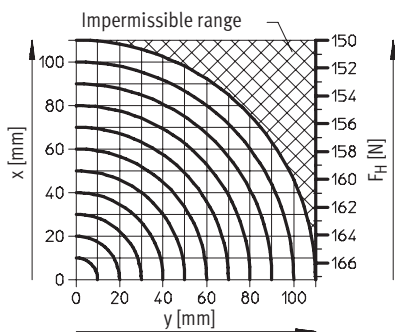
### HGPP-12-A



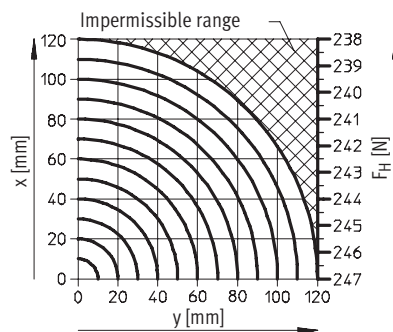
### HGPP-16-A



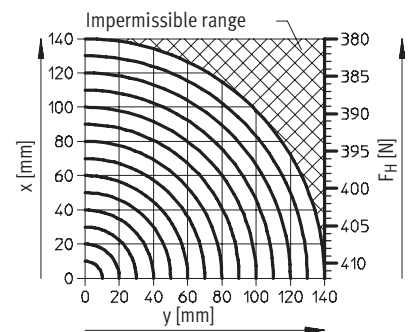
### HGPP-20-A



### HGPP-25-A



### HGPP-32-A



# Parallel grippers HGPP, precision

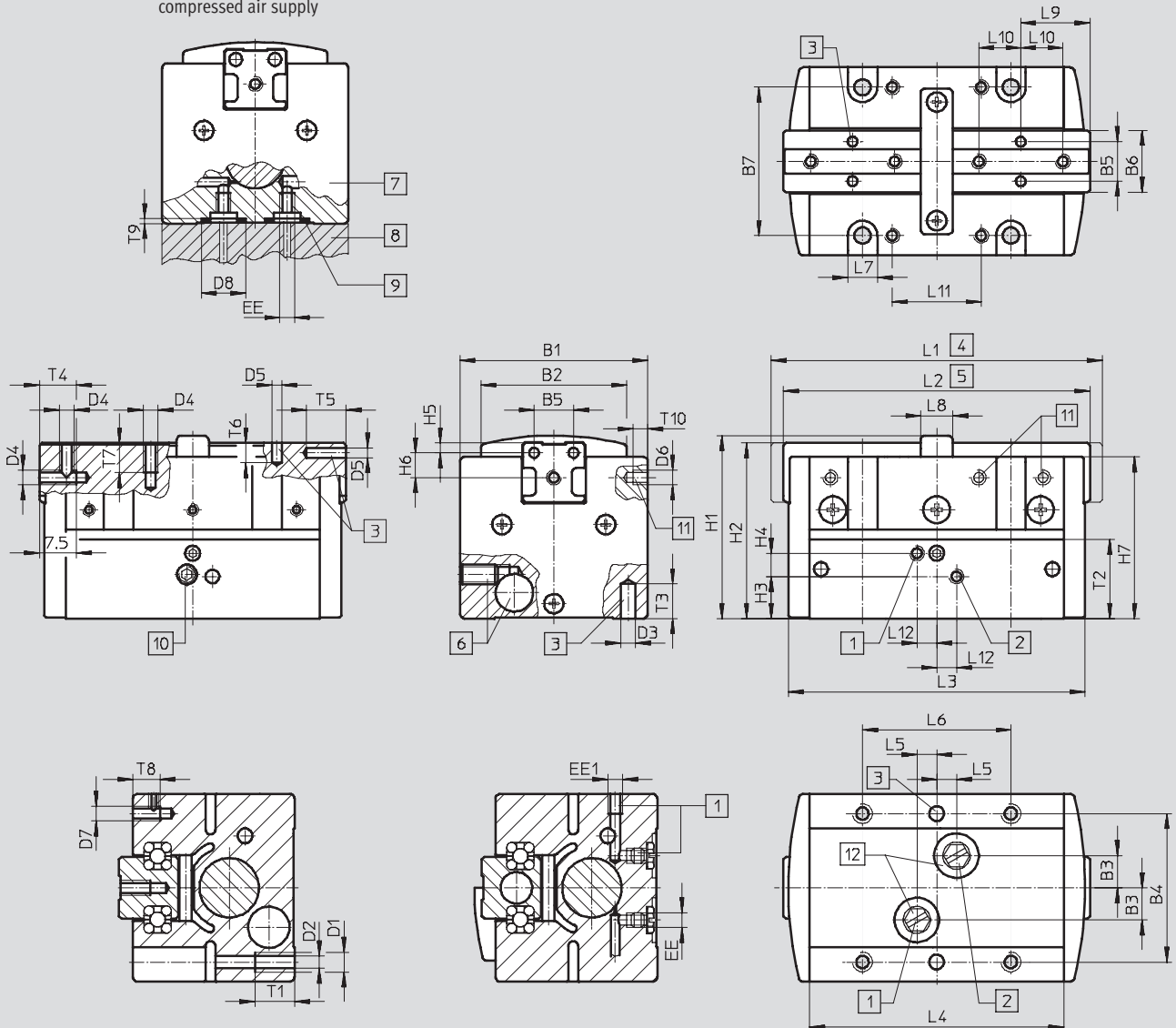
Technical data

FESTO

## Dimensions

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

Mounting example for direct compressed air supply



- |  |  |   |  |
|--|--|---|--|
| <p>1 Compressed air connection, opening</p> <p>2 Compressed air connection, closing</p> <p>3 Hole for locating pin (Locating pins are not included in scope of delivery.)</p> <p>4 Gripper jaws open</p> | <p>5 Gripper jaws closed</p> <p>6 Hole for sensor kit</p> <p>7 Parallel gripper</p> <p>8 Adapter (e. g. customer-specific)</p> | <p>9 O-ring for parallel grippers:<br/> HGPP-10: <math>\varnothing</math> 5.5x1.5<br/> HGPP-12: <math>\varnothing</math> 5.5x1.5<br/> HGPP-16: <math>\varnothing</math> 8.13x1.78<br/> HGPP-20: <math>\varnothing</math> 8.13x1.78<br/> HGPP-25: <math>\varnothing</math> 8.13x1.78<br/> HGPP-32: <math>\varnothing</math> 8.13x1.78<br/> (Not included in scope of delivery)</p> | <p>10 Set screw for mounting position sensor SMH-S1</p> <p>11 Thread for securing the mounting bracket HGPP-HWS-Q5</p> <p>12 Supply ports on base sealed on delivery</p> |
|--|--|---|--|

Handling units  
Parallel grippers

7.6

# Parallel grippers HGPP, precision

Technical data

FESTO

Size	B1	B2	B3	B4 ±0.02 <sup>1)</sup>	B5	B6	B7	D1	D2 ∅
[mm]	+0.3	±0.1	±0.05	±0.1 <sup>2)</sup>	±0.02	±0.1	±0.1		+0.1
10	33	26	6.5	27	8	12.5	27	M4	3.3
12	38	29.5	6.5	30	8	12.5	30	M4	3.3
16	42	30.5	8.5	32	10	16	32	M4	3.3
20	48	36.5	10	40	12	20	40	M5	4.2
25	55	42	12	45	15	25	45	M6	5.1
32	62	45	14	52	18	30	52	M6	5.1

Size	D3 ∅	D4	D5 ∅	D6	D7	D8 ∅	EE	EE1	H1
[mm]	H8		H8			H11			
10	3	M3	2	M2	M3	9	M3	M3	32.7 ±0.15
12	3	M3	2	M2	M3	9	M3	M3	37 +0.3/-0.1
16	3	M3	2.5	M2	M3	12.1	M5	M5	42.5 +0.4/-0.1
20	3	M4	3	M2	M3	12.1	M5	M5	55.5 +0.4/-0.1
25	5	M5	4	M2	M3	12.1	M5	M5	57.5 ±0.15
32	5	M6	5	M2	M4	12.1	M5	G <sup>1</sup> / <sub>8</sub>	68.6 ±0.15

Size	H2	H3	H4	H5	H6	H7	L1	L2	L3	L4
[mm]	±0.1		±0.1	±0.02	±0.12	-0.3	±0.5	±0.5	±0.25	±0.05
10	31.4	8.9 ±0.25	3.7	2	2.6	28.7	62	58	56	47.4
12	35.5	8.5 ±0.3	4.7	2	5	32.7	67	62	60	51.4
16	40.9	8.3 ±0.2	6.8	3	5	37.1	98	88	86	76
20	53.48	15.5 ±0.2	8	3	7	48.5	120	105	103	92
25	56	12.5 ±0.25	7.5	4	8	51	163	143	139.4	127.4
32	67	12.5 ±0.25	11	5	9	60.5	197.4	172.4	169.4	155.4

Size	L5	L6	L7	L8	L9	L10	L11	L12	T1
[mm]	±0.05	±0.1		±0.1	±0.02	±0.05	±0.1	±0.05	
10	5	27	6	6	13.5	7.5	15	4	8
12	4	30	6	6.5	14	8.5	18	4	8
16	6.5	40	6	12	17.5	11.5	24	6.5	10
20	7.5	40	8	18	21	13.5	26	7.5	12
25	12	45	9	22	29.8	17	28	12	12
32	15	52	9	27	33.5	20	35	15	12

Size	T2	T3	T4	T5	T6	T7	T8	T9	T10
[mm]								+0.1	
10	14.85	6	8	5	4	6	3.8	1	3
12	16	6	7.5	5	4	6	5.5	1	3
16	19.5	7	8	6	4.5	6	5	1.3	4
20	28.5	7	10	8	7	8	6	1.3	7
25	27	10	10	8	8	10	6	1.3	8
32	34.5	10	10	10	10	10	8	1.3	8

1) For locating hole

2) For thread and through-holes

- | - Note: This product conforms with the ISO 1179-1 standard and the ISO 228-1 standard.




# Parallel grippers HGPP, precision

Ordering data and accessories



Ordering data					
Size [mm]	Double-acting Without compression spring		Single-acting or with gripping force retention		
	Part No.	Type	open		closed
	Part No.	Type	Part No.	Type	Part No. Type
10	525 658	HGPP-10-A	525 659	HGPP-10-A-G1	525 660 HGPP-10-A-G2
12	187 867	HGPP-12-A	187 868	HGPP-12-A-G1	187 869 HGPP-12-A-G2
16	187 870	HGPP-16-A	187 871	HGPP-16-A-G1	187 872 HGPP-16-A-G2
20	187 873	HGPP-20-A	187 874	HGPP-20-A-G1	187 875 HGPP-20-A-G2
25	525 661	HGPP-25-A	525 662	HGPP-25-A-G1	525 663 HGPP-25-A-G2
32	525 664	HGPP-32-A	525 665	HGPP-32-A-G1	525 666 HGPP-32-A-G2

Ordering data – Wearing parts kits		
Size [mm]	Part No.	Type
10	673 172	HGPP-10
12	673 173	HGPP-12
16	673 174	HGPP-16
20	673 175	HGPP-20
25	673 176	HGPP-25
32	673 177	HGPP-32

Ordering data – Accessories				
	Size [mm]	Weight [g]	Part No.	Type
Position sensor SMH-S1 <span style="float: right;">Technical data → 50</span>				
	10, 12	20	189 040	SMH-S1-HGPP10/12
	16	20	189 041	SMH-S1-HGPP16
	20, 25	20	189 042	SMH-S1-HGPP20/25
	32	20	526 895	SMH-S1-HGPP32
Evaluation unit SMH-AE1 <span style="float: right;">Technical data → LEERER MERKER</span>				
	10 ... 32	170	175 708	SMH-AE1-PS3-M12
		170	175 709	SMH-AE1-NS3-M12
Proximity sensor SIES-Q5B <span style="float: right;">Technical data → Volume 4</span>				
	10 ... 32	22	178 291	SIES-Q5B-PS-K-L
		22	174 549	SIES-Q5B-PO-K-L
		22	178 290	SIES-Q5B-NS-K-L
		22	174 548	SIES-Q5B-NO-K-L

# Parallel grippers HGPP, precision

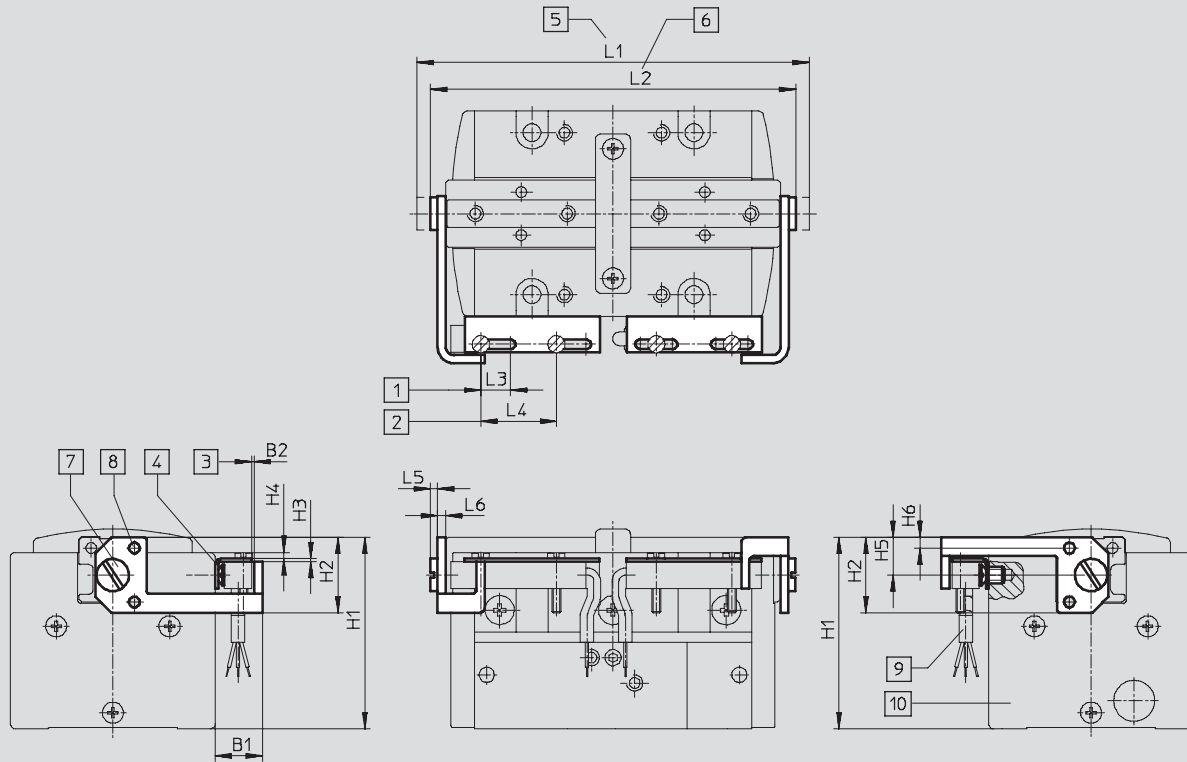
Accessories



## Dimensions – Mounting bracket

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

HGPP-HWS-Q5



- 1 Adjusting range for position sensing
- 2 Mounting space for proximity sensor SIES-Q5B
- 3 Switching distance
- 4 Mounting for sensor bracket
- 5 Gripper jaws position, open
- 6 Gripper jaws position, closed
- 7 Fixing screw for mounting bracket
- 8 Locating pin
- 9 Proximity sensor SIES-Q5B (to be ordered separately)
- 10 Parallel grippers HGPP

For size	B1	B2	H1	H2	H3	H4	H5	H6
[mm]								
10	8.7	0.5	35.5	14	0.5	1.2	7	2
12	8.7	0.5	35.5	14	0.5	1.2	7	2
16	8.5	0.5	35.4	16	0.5	1.2	8	3
20	8.5	0.5	36	20	0.5	2	10	3
25	9.5	0.55	46.3	24	1	3.7	12	4
32	9.5	0.55	55.5	28	1	4	14	5

For size	L1	L2	L3	L4	L5	L6	Weight	Part No.	Type
[mm]							[g]		
10	67.6	63.6	5.5	14	1.8	1.5	4.2	532 272	HGPP-HWS-Q5-1
12	73.6	68.6	5.5	14	1.8	1.5	5.6	532 273	HGPP-HWS-Q5-2
16	105.6	95.6	8.5	14	1.8	2	8.3	532 274	HGPP-HWS-Q5-3
20	126.8	111.8	8.5	14	2.4	2	11.4	532 275	HGPP-HWS-Q5-4
25	171	151	28	14	3	2	17.6	532 276	HGPP-HWS-Q5-5
32	206.6	181.6	28	14	3.6	2	24.6	532 277	HGPP-HWS-Q5-6