

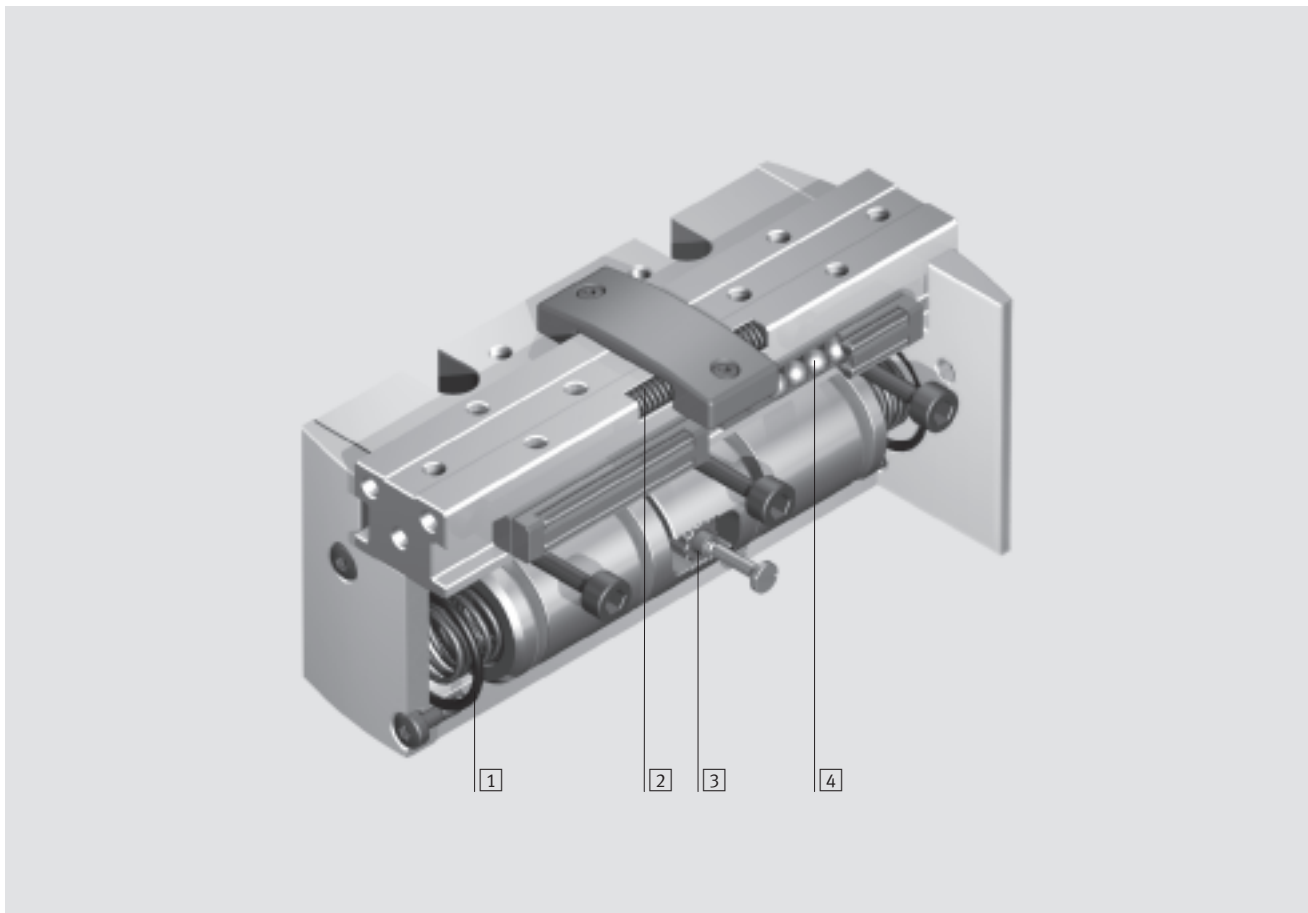
Parallel grippers HGPP, precision



Parallel grippers HGPP, precision

Key features

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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

-  - Note

Sizing software
Gripper selection
→ www.festo.com

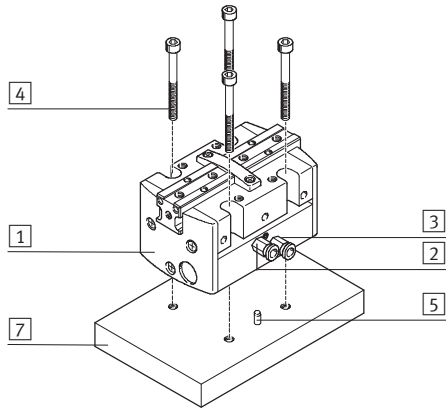
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Features

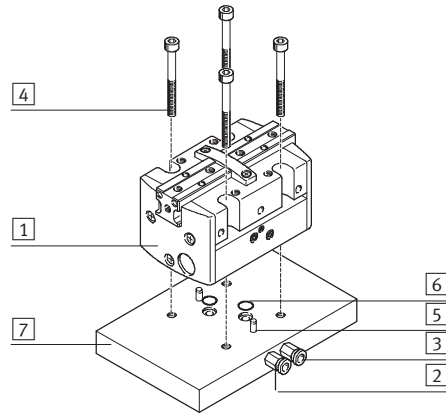
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Versatile air connections and mounting options

Supply port direct at the front, direct mounting from above



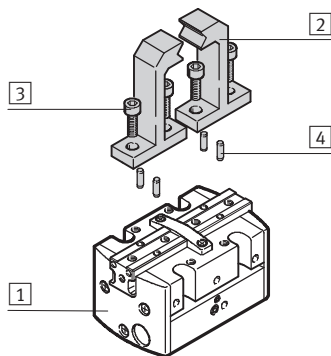
Supply port via adapter plate from underneath, direct mounting from above



- 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)

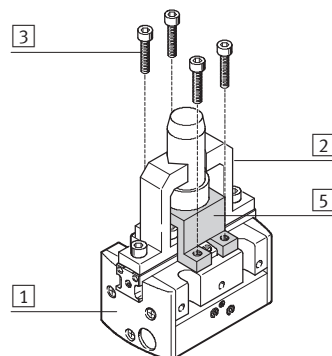
Range of applications (user-specific)

Attachment of external gripper fingers

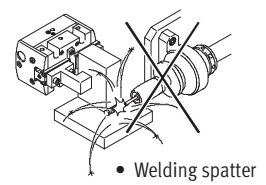
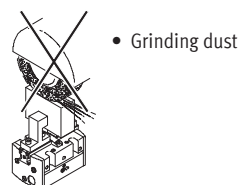
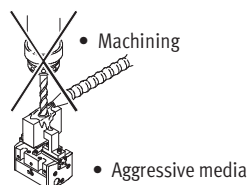


- 1 Parallel gripper
- 2 Gripper finger
- 3 Mounting screws
- 4 Locating pins
- 5 Guide plate

Used as guide plate



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

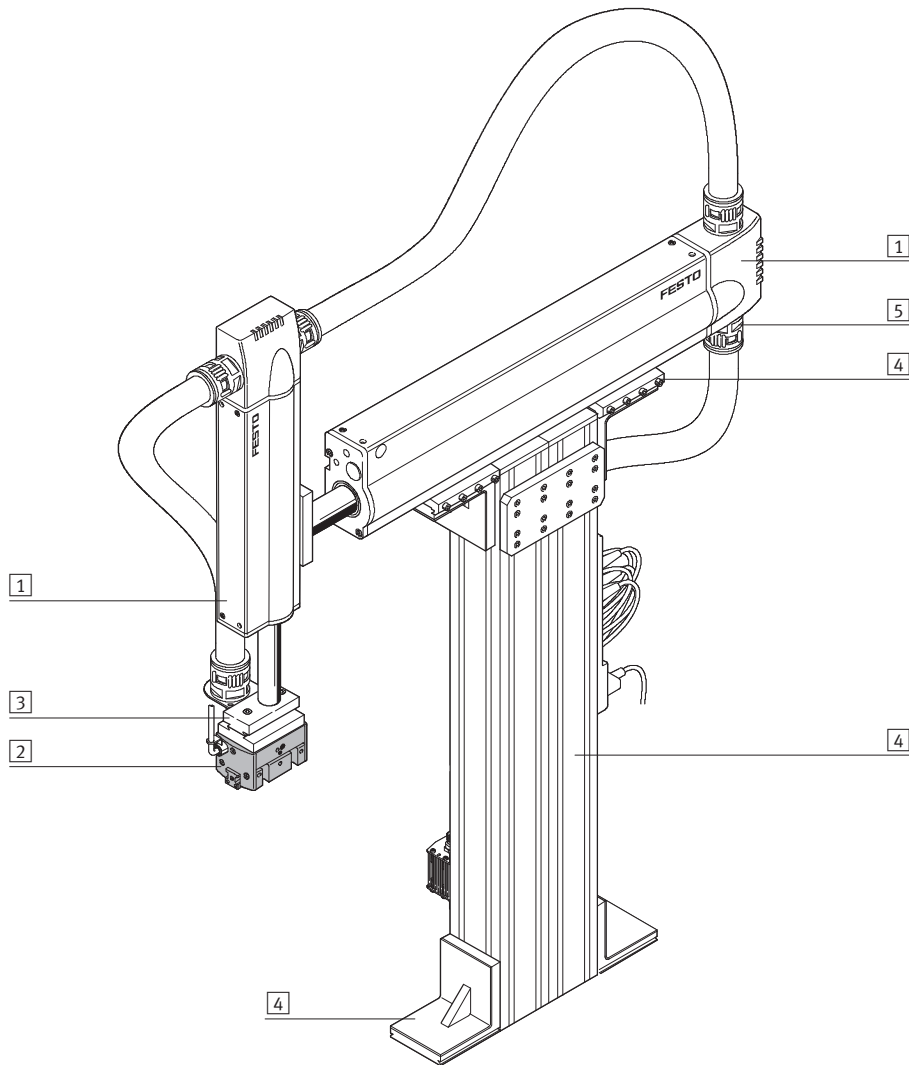


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System example

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System product for handling and assembly technology

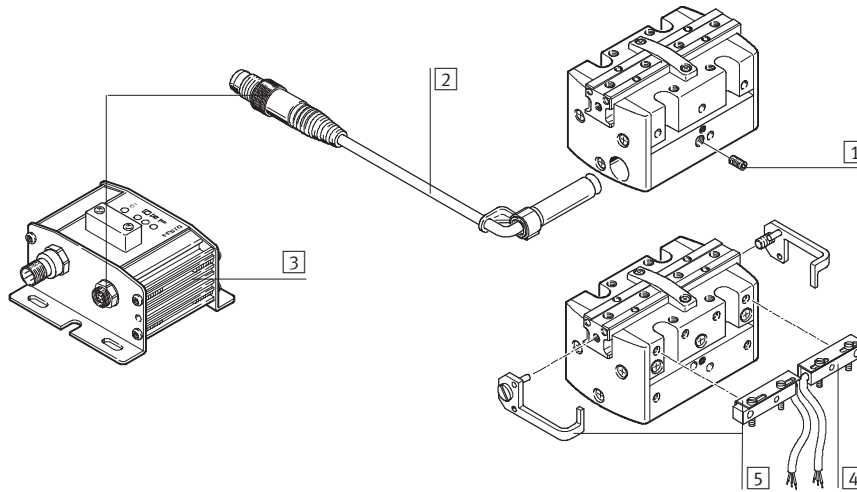


System elements and accessories		
	Brief description	→ Page/Internet
1	Drives	Wide range of combination options within handling and assembly technology drive
2	Gripper	Diverse variation options in handling and assembly technology gripper
3	Adapter	For drive/drive and drive/gripper connections adapter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

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Peripherals overview and type codes

Peripherals overview



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

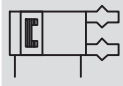
Type codes

		HGPP	-	16	-	A	-	G1
Type								
HGPP	Parallel gripper							
Size								
Position sensing								
A	For proximity sensing							
Gripping force retention								
G1	Opening							
G2	Closing							

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Technical data

Function
Double-acting
HGPP-...-A



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



... closing HGPP-...-G2



⌀ - Size
10 ... 32 mm

— | - Stroke
4 ... 25 mm

— T - www.festo.com
Wearing parts kits
→ 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. weight force per external gripper finger ¹⁾ [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 ²⁾	
Repetition accuracy ³⁾ [mm]	< 0.02	< 0.015		< 0.01	< 0.02	
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 to ISO 1179-1 and to ISO 228-1

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

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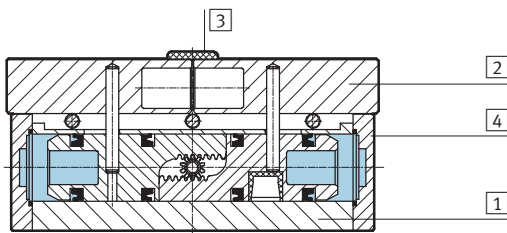
Technical data

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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

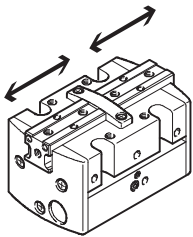
Materials

Sectional view



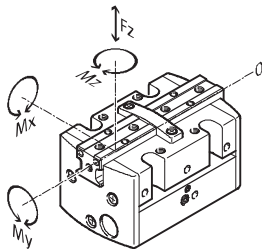
Parallel gripper	
1	Housing Anodised aluminium
2	Gripper jaw Nickel-plated aluminium
3	Cover cap Polyacetate
4	Plug cap Anodised aluminium
-	Note on material Free of copper, PTFE and silicone Conforms to RoHS

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.

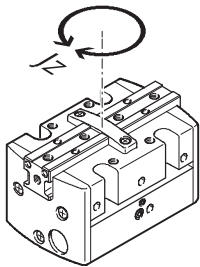
Size	10	12	16	20	25	32
Max. permissible force $F_{Z\text{Gripper jaws}}$ [N]	40	70	130	220	380	720
Max. permissible force $F_{ZHousing}$ [N]	200	400	600	800	1,000	1,200
Max. permissible torque M_x [Nm]	1.5	3	7	14	21	30
Max. permissible torque M_y [Nm]	1.5	3	7	14	21	30
Max. permissible torque M_z [Nm]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

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Technical data



Mass moment of inertia [kgm²x10⁻⁴]



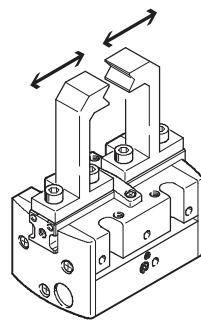
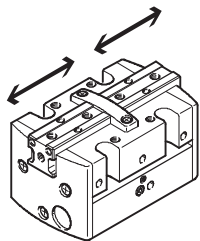
Mass moment of inertia [kgm²x10⁻⁴]
for parallel grippers in relation to the
central axis, without load.

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.

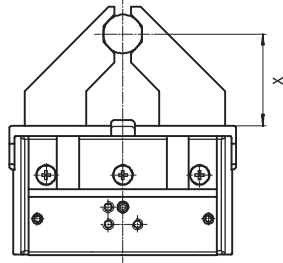
Size		10	12	16	20	25	32
Without external gripper fingers							
HGPP-...-A	Opening	22	27	40	44	64	76
	Closing	34	40	53	59	92	110
HGPP-...-G1	Opening	24	30	34	45	58	64
	Closing	95	70	70	92	164	173
HGPP-...-G2	Opening	26	37	57	62	105	103
	Closing	32	40	46	58	90	101
With external gripper fingers as a function of the weight force							
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

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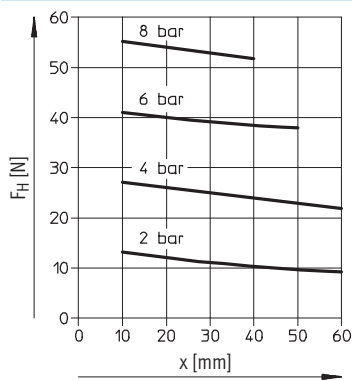
Technical data

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

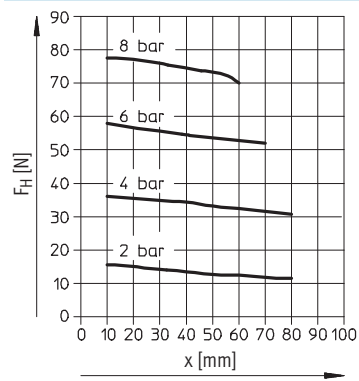
Gripping forces related to operating pressure and lever arm can be determined for the various sizes with the following graphs.



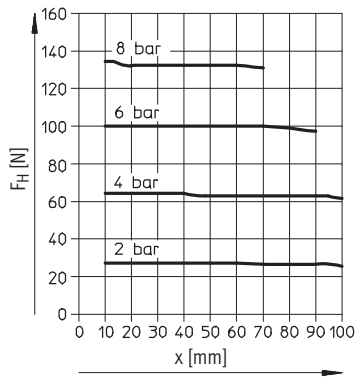
HGPP-10-A



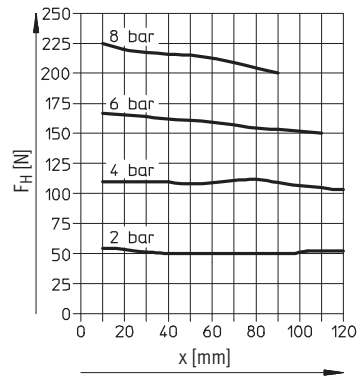
HGPP-12-A



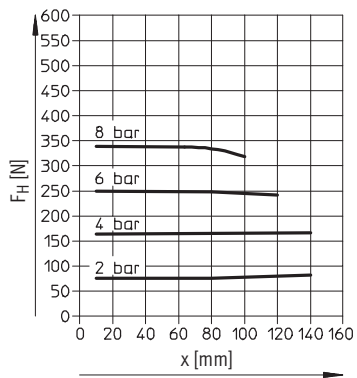
HGPP-16-A



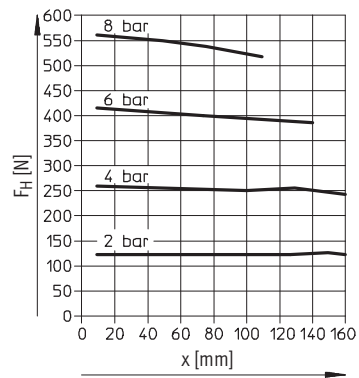
HGPP-20-A



HGPP-25-A



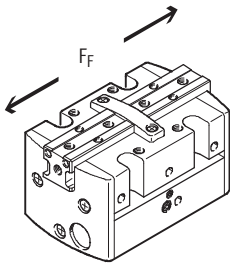
HGPP-32-A



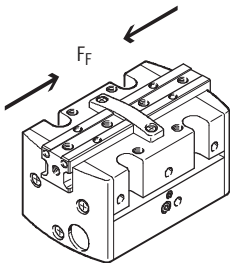
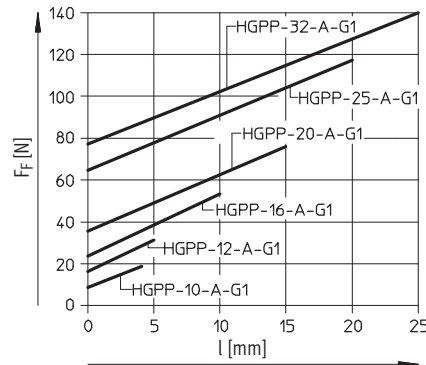
Parallel grippers HGPP, precision

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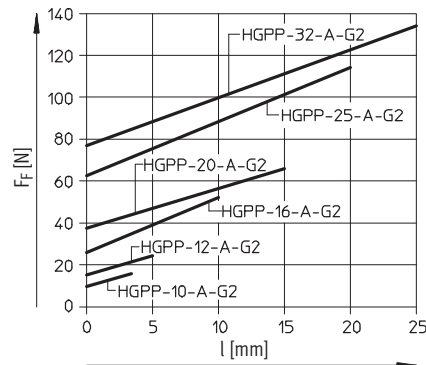
Spring force F_F as a function of the gripper size and overall stroke length l



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.

Single-acting

- Gripping with spring force:
 $F_{Gr} = F_F$
- Gripping with pressure force:
 $F_{Gr} = F_H - F_F$

Supplementary gripping force

- Gripping with pressure and spring force:
 $F_{Gr} = F_H + F_F$

Gripping force retention

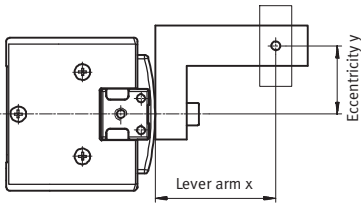
- Gripping with spring force:
 $F_{Gr} = F_F$

		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:

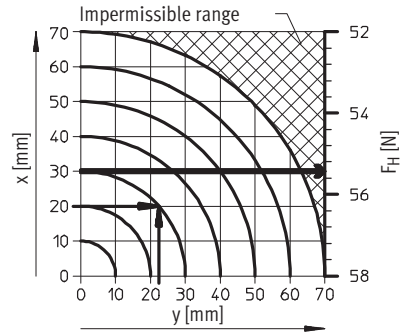
Gripping force at 6 bar

Procedure:

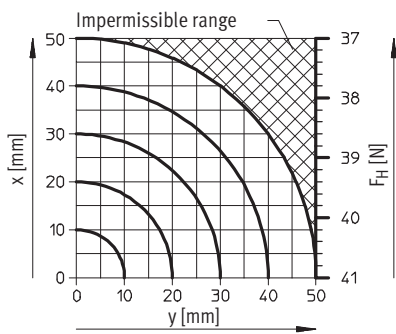
- Determine the intersection xy between lever arm x and eccentricity y in the graph for HGPP-12-A
- Draw an arc (with centre at origin) through intersection xy
- Determine the intersection between the arc and the X axis
- Read gripping force

Result:

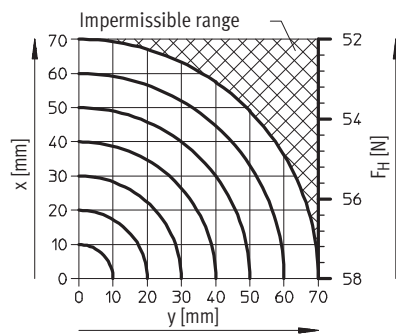
Gripping force = approx. 55 N



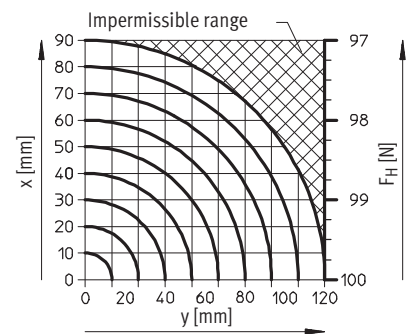
HGPP-10-A



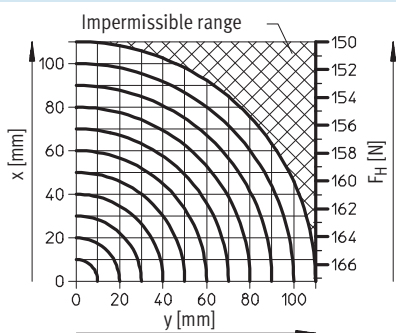
HGPP-12-A



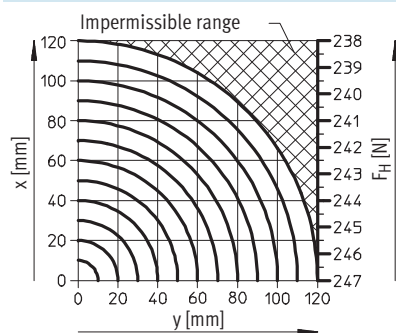
HGPP-16-A



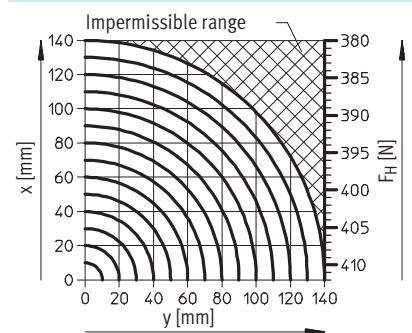
HGPP-20-A



HGPP-25-A



HGPP-32-A



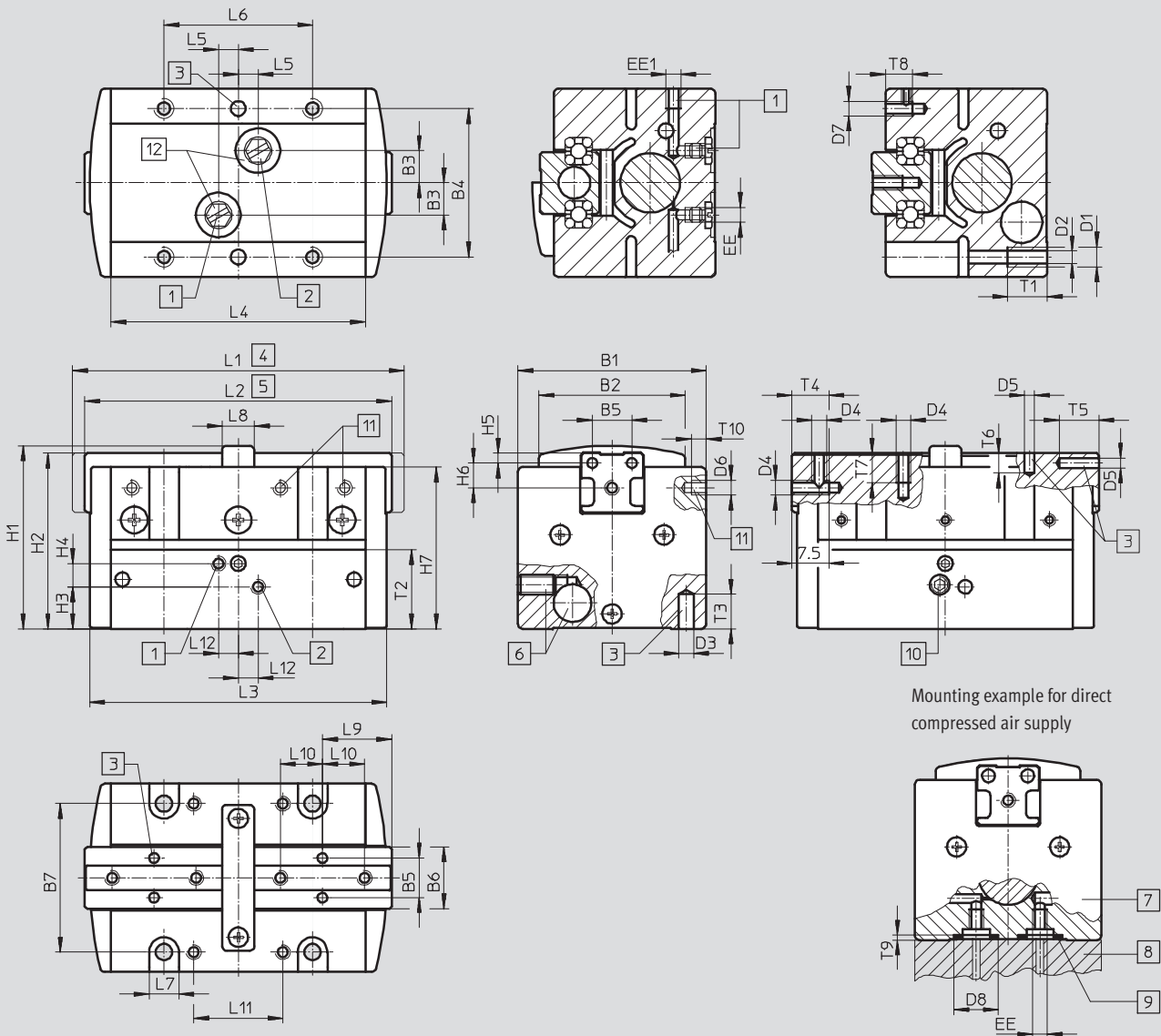
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Technical data

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Dimensions

Download CAD data → www.festo.com



Mounting example for direct compressed air supply

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

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Technical data

Size	B1	B2	B3	B4 ±0.02 ¹⁾ ±0.1 ²⁾	B5	B6	B7	D1	D2 ∅ +0.1
[mm]	+0.3	±0.1	±0.05		±0.02	±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 ∅ H8	D4	D5 ∅ H8	D6	D7	D8 ∅ H11	EE	EE1	H1
[mm]									
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 ¹ / ₈	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 to ISO 1179-1 and to ISO 228-1




Parallel grippers HGPP, precision

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Ordering data and accessories

Ordering data					
Size [mm]	Double-acting Without compression spring		Single-acting or with gripping force retention		
	Part No.	Type	Opening Part No. Type		Closing 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 Technical data → Internet: smh-s1				
	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 Technical data → Internet: smh-ae1				
	10 ... 32	170	175 708	SMH-AE1-PS3-M12
		170	175 709	SMH-AE1-NS3-M12
Proximity sensor SIES-Q5B Technical data → Internet: sies				
	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

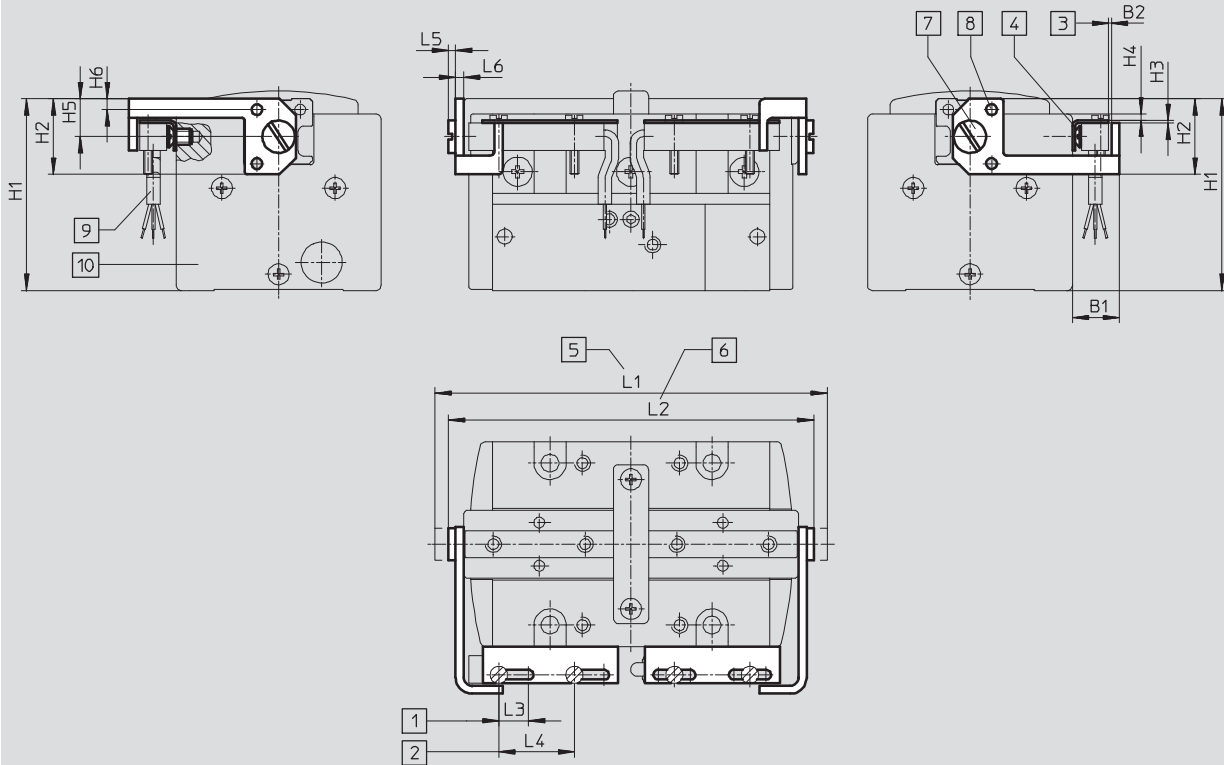
Accessories

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Dimensions – Mounting bracket

Download CAD data → www.festo.com

HGPP-HWS-Q5



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

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