Parallel grippers HGPT, robust

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Parallel grippers HGPT, robust

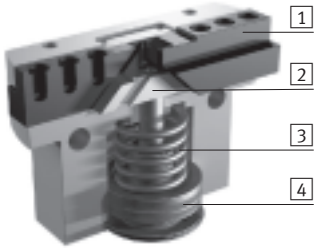
Key features

At a glance

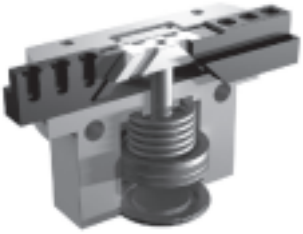
The force generated by the linear motion is translated into the gripper jaw movement via a wedge mechanism with guided motion sequence. This also guarantees synchronous movement of the gripper jaw. The virtually backlash-free slideway is realised using ground-in gripper jaws.

Flexible range of applications
- Double-acting gripper
- Compression spring for supplementary or retaining gripping forces
- For use as a single-acting gripper with only one compressed air connection
- Suitable for external and internal gripping

Gripper closed



Gripper open



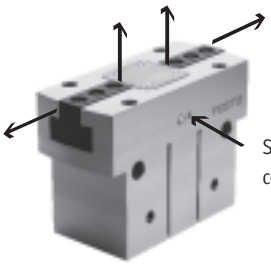
1 Gripper jaw
2 Wedge with restricted guidance
3 Spring
4 Piston with magnet

- Note

Sizing software
Gripper selection
➔www.festo.com

Sealing air connection

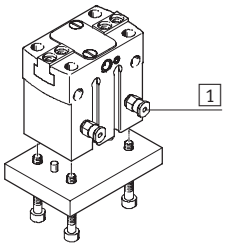
Compressed air flows past the gripper jaw when sealing air (max. 0.5 bar) is connected.
This prevents, for example, particles and soluble cutting oil from entering the gripper jaw guides.



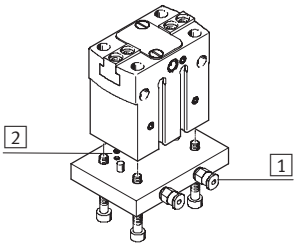
Sealing air connection

Versatile compressed air connections

Direct from the front



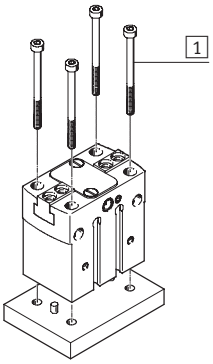
Via adapter plate from underneath



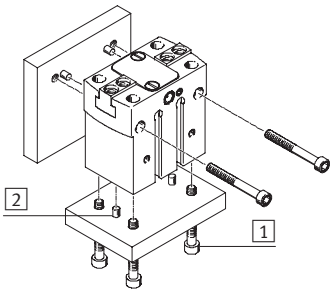
1 Compressed air connections
2 O-rings

Mounting options

Direct mounting from above



from underneath and from the side

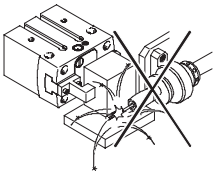


1 Mounting screws
2 Centring pins

- Note

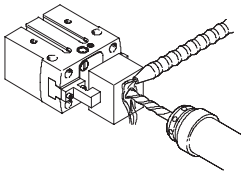
These grippers are not designed for the following application examples or only under limited conditions:

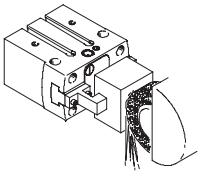
Not designed for



- Welding spatter

Designed for but under limited conditions



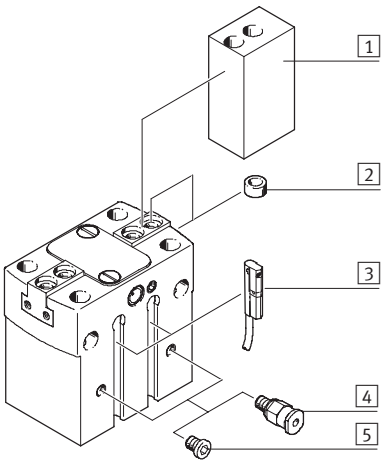


- Machining with sealing air possible
- Aggressive media only possible after consulting Festo

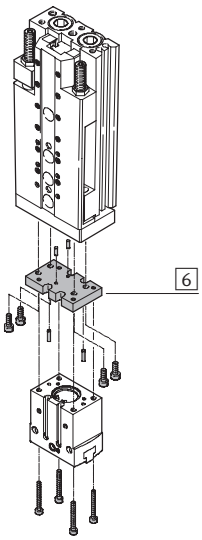
Parallel grippers HGPT, robust

Peripherals overview and type codes

Peripherals overview



System product for handling and assembly technology



Accessories

	Type	Brief description	➔ Page/Internet
1	Unmachined gripper finger BUB-HGPT	Unmachined part specially matched to the gripper jaws for custom building of gripper fingers	14
2	Centring sleeve ZBH	For centring when attaching gripper fingers	15
3	Proximity sensor SME/SMT-10	For sensing the piston position	15
4	Push-in fitting QS	For connecting compressed air tubing with standard external diameters	quick star
5	Blanking plug B	For sealing compressed air connections when using air connections at the front	15
6	–	Drive/gripper connections	adapter kit

Type codes

HGPT – 16 – A – G1

Type

HGPT	Parallel gripper

Size

Position sensing

A	For proximity sensing

Gripping force retention

G1	Opening
G2	Closing

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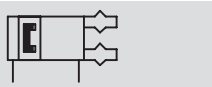
Technical data

FESTO

Function
Double-acting
HGPT-...-A



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

... closing HGPT-...-G2

- ⌀ - Size
16 ... 63 mm

- | - Stroke
6 ... 32 mm

General technical data								
Size		16	20	25	35	40	50	63
Design		Wedge mechanism						
		Guided motion sequence						
Mode of operation		Double-acting						
Gripper function		Parallel						
Number of gripper jaws		2						
Max. applied load per external gripper finger[1]	[N]	0.5	1	1.5	2	2.5	3	4
Stroke per gripper jaw	[mm]	3	4	6	8	10	12	16
Pneumatic connection		M3	M3	M5	M5	M5	G1⁄8	G1⁄8
Pneumatic connection Sealing air		M3	M3	M5	M5	M5	M5	M5
Repetition accuracy[2]	[mm]	< 0.03	< 0.04		< 0.05			
Max. interchangeability	[mm]	0.2						
Max. gripper jaw backlash[3]	[mm]	0.02						
Max. gripper jaw angular backlash	[°]	0.1						
Max. operating frequency	[Hz]	3				2		
Rotational symmetry	[mm]	< ⌀ 0.2						
Position sensing		For proximity sensing						
Type of mounting		Via through-hole and dowel pin						
		Via female thread and dowel pin						
Fitting position		Any						

1) Valid for unthrottled operation
2) End-position drift under constant conditions of use with 100 consecutive strokes in the direction of movement of the gripper jaws
3) In the direction of the gripper jaw movement
- | - Note: This product conforms with the ISO 1179-1 standard and the ISO 228-1 standard.

Operating and environmental conditions			
Min. operating pressure	HGPT-...-A	[bar]	3
	HGPT-...-G...	[bar]	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 normal industrial environment or media such as coolants or lubricating agents

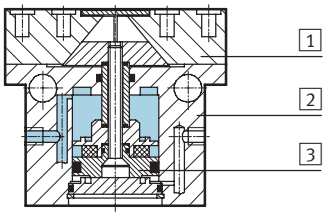
Parallel grippers HGPT, robust

Technical data

Weight [g]							
Size	16	20	25	35	40	50	63
HGPT-...-A	102	183	361	625	1209	1984	3633
HGPT-...-G1	104	186	371	645	1252	2102	3763
HGPT-...-G2	104	186	371	645	1252	2102	3763

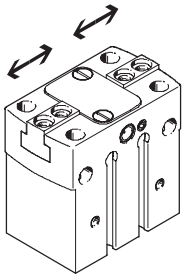
Materials

Sectional view



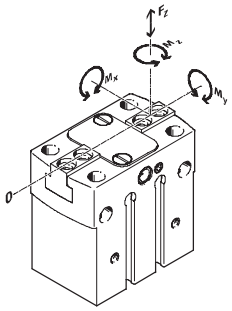
Parallel gripper		
1	Gripper jaw	Hardened steel
2	Housing	Aluminium, coated with CompCote
3	Piston	Gunmetal (red brass)
–	Seals	Nitrile rubber
–	Note on materials	Free of copper, PTFE and silicone
		Conforms to RoHS

Gripping force [N] at 6 bar



Size	16	20	25	35	40	50	63
Gripping force per gripper jaw							
Opening	42	75	110	250	300	480	825
Closing	36	70	100	230	270	440	770
Total gripping force							
Opening	84	150	220	500	600	960	1650
Closing	72	140	200	460	540	880	1540

Characteristic load values at the gripper jaws



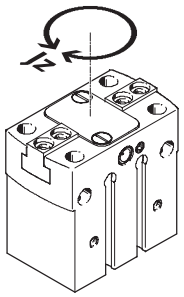
The indicated permissible forces and torques refer to a single gripper jaw. The indicated values include the lever arm, additional applied loads caused by the workpiece or external gripper fingers, as well as forces which occur during movement.
The zero coordinate line (gripper finger guide) must be taken into consideration for the calculation of torques.

Size		16	20	25	35	40	50	63
Max. permissible force F_z	[N]	200	300	500	900	1500	2500	4000
Max. permissible torque M_x	[Nm]	10	15	30	50	80	100	140
Max. permissible torque M_y	[Nm]	7	10	25	40	60	90	120
Max. permissible torque M_z	[Nm]	5	8	15	30	40	60	80

Parallel grippers HGPT, robust

Technical data

Mass moment of inertia [kgm²x10⁻⁴]

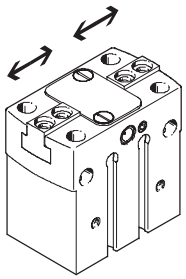


Mass moment of inertia [kgm²x10⁻⁴] for parallel grippers in relation to the central axis with no load.

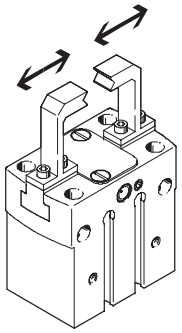
Size	16	20	25	35	40	50	63
HGPT-...-A	0.177	0.391	1.263	3.383	9.673	25.147	74.991
HGPT-...-G1	0.178	0.392	1.272	3.411	9.786	25.460	75.409
HGPT-...-G2	0.178	0.392	1.272	3.411	9.786	25.460	75.409

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 at 6 bar operating pressure with horizontally mounted gripper without external gripper fingers. The grippers must be throttled for greater applied loads. Opening and closing times must then be adjusted correspondingly.

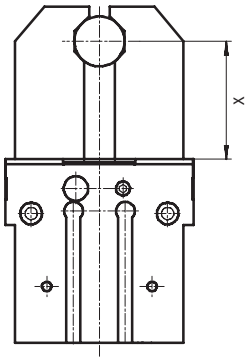
Size		16	20	25	35	40	50	63
without external gripper fingers								
HGPT-...-A	Opening	20	31	30	40	66	85	150
	Closing	21	31	33	40	61	76	135
HGPT-...-G1	Opening	10	26	30	39	57	65	123
	Closing	44	51	64	92	130	150	282
HGPT-...-G2	Opening	41	52	50	78	100	130	260
	Closing	21	31	30	39	61	70	130
with external gripper fingers as a function of applied load								
HGPT-...	1 N	100	–	–	–	–	–	–
	2 N	200	150	100	–	–	–	–
	3 N	300	250	200	150	100	–	–
	4 N	–	350	300	250	200	150	–
	5 N	–	–	400	350	300	250	200
	6 N	–	–	–	450	400	300	250
	8 N	–	–	–	–	–	450	400
	10 N	–	–	–	–	–	–	500

Parallel grippers HGPT, robust

Technical data

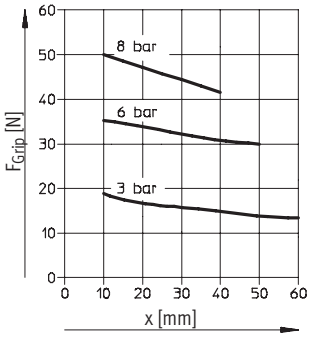
Gripping force F_{Grip} per gripper jaw as a function of operating pressure and lever arm x

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

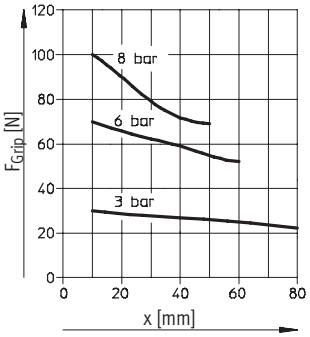


As external gripper: Closing operation

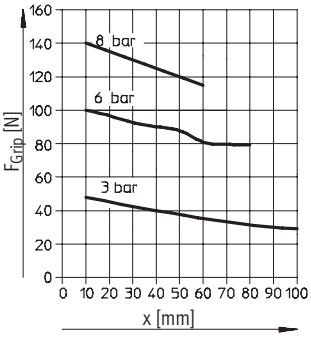
HGPT-16-A



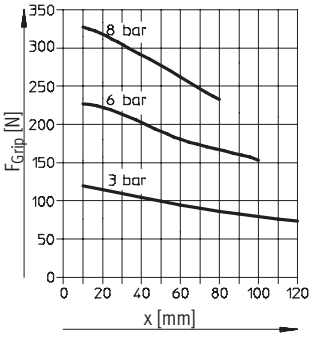
HGPT-20-A



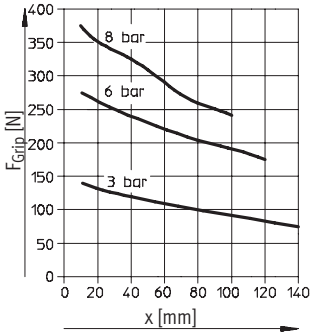
HGPT-25-A



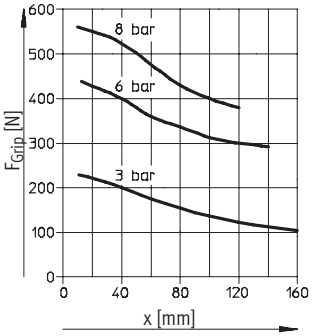
HGPT-35-A



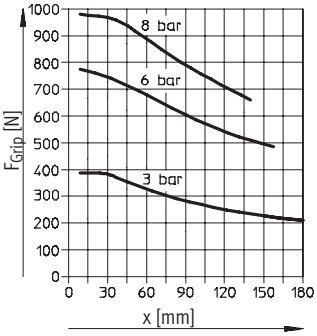
HGPT-40-A



HGPT-50-A

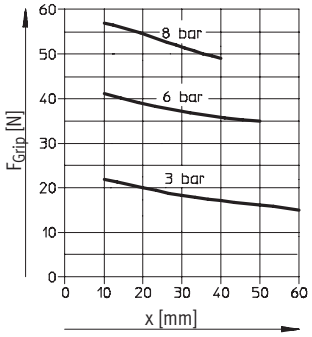


HGPT-63-A

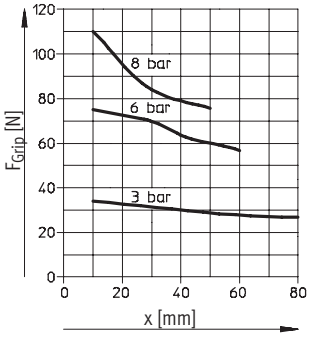


Gripping force F_{Grip} per gripper jaw as a function of operating pressure and lever arm x
As internal gripper: Opening operation

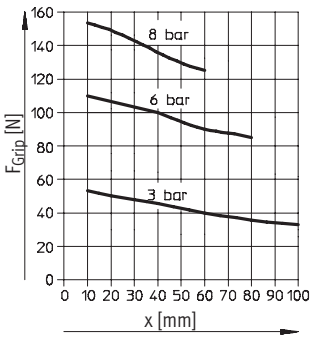
HGPT-16-A



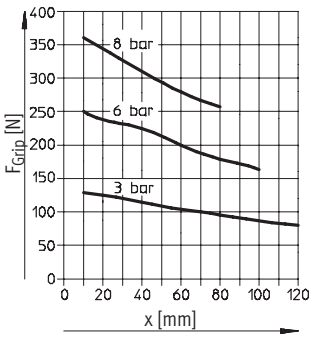
HGPT-20-A



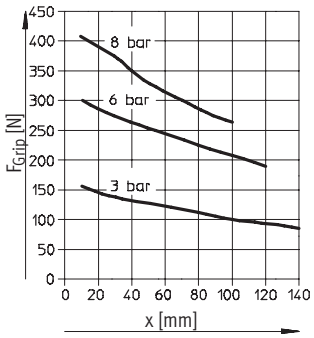
HGPT-25-A



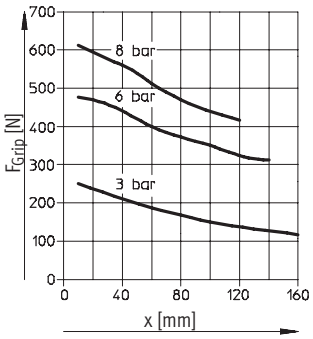
HGPT-35-A



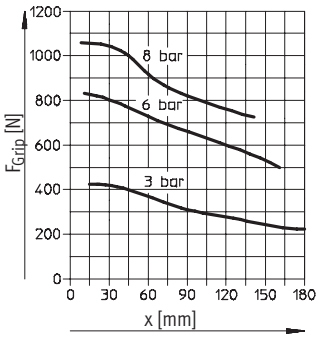
HGPT-40-A



HGPT-50-A



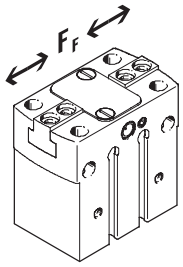
HGPT-63-A



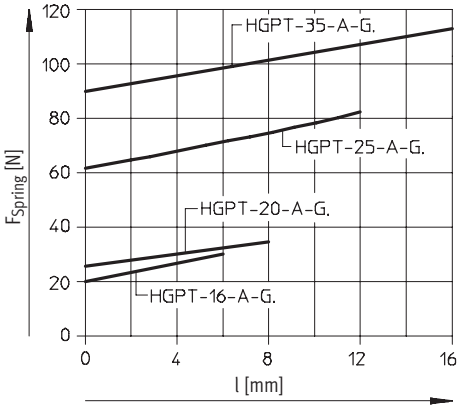
Spring force F_{Spring} as a function of gripper size and overall stroke l

Gripping force retention for HGPT-...-G...

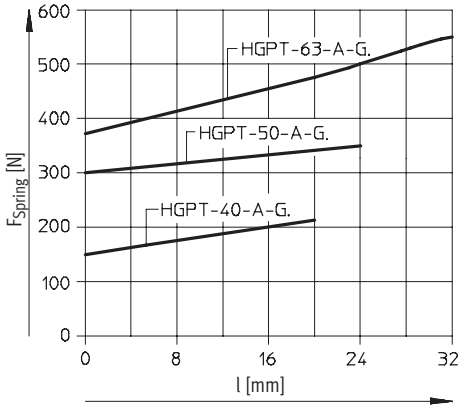
Spring forces F_{Spring} as a function of gripper size and overall stroke l can be determined for the various gripper types (HGPT-...-G...) using the following graphs.



Size 16 ... 35



Size 40 ... 63



The lever arm x must be taken into consideration when determining the actual spring force F_{Stotal}.
The formulae for calculating the spring force are provided in the table opposite.

Size	F_{Stotal} =
16	$-0.2 * x+0.8 * F_{Spring}$
20	$-0.375 * x+0.8 * F_{Spring}$
25	$-0.25 * x+0.8 * F_{Spring}$
35	$-1 * x+0.8 * F_{Spring}$
40	$-0.9 * x+0.8 * F_{Spring}$
50	$-1.36 * x+0.8 * F_{Spring}$
63	$-2.2 * x+0.8 * F_{Spring}$

Determination of the actual gripping forces F_{Gr} for HGPT-...-G1 and HGPT-...-G2 depending on the application

Parallel grippers with integrated spring type HGPT-...-G1 (opening gripping force retention) and HGPT-...-G2 (closing gripping force retention) can be used as:

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

depending on requirements.

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

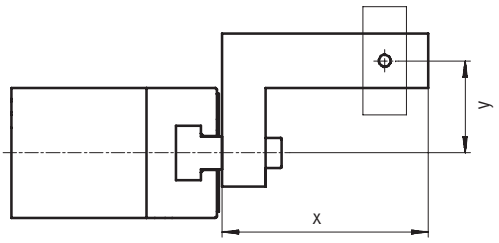
Application

Single-acting	Supplementary gripping force	Gripping force retention
• Gripping with spring force: $F_{Gr} = F_{Stotal}$	• Gripping with pressure and spring force: $F_{Gr} = F_{Grip} + F_{Stotal}$	• Gripping with spring force: $F_{Gr} = F_{Stotal}$
• Gripping with pressure force: $F_{Gr} = F_{Grip} - F_{Stotal}$		

Parallel grippers HGPT, robust

Technical data

Gripping force F_H per gripper jaw at 6 bar as a function of lever arm x and eccentricity y



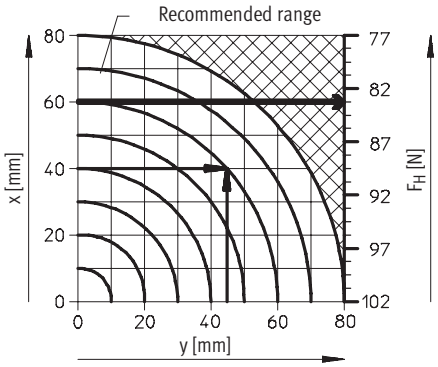
Gripping forces at 6 bar dependent upon eccentric application of force and the maximum permissible off-centre point of force application can be determined for the various sizes using the following graphs.

Calculation example

Given:
Lever arm x = 40 mm
Eccentricity y = 45 mm
To be found:
Gripping force at 6 bar

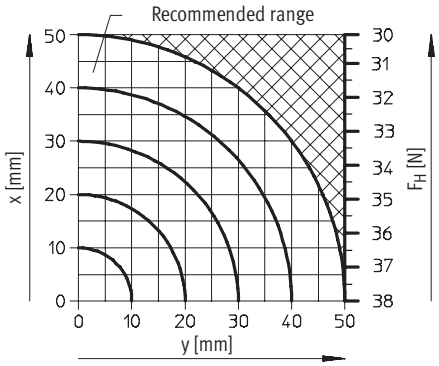
Procedure:
- Determine the intersection xy between lever arm x and eccentricity y in the graph for HGPT-25-A-...
- Draw an arc (with centre at origin) through intersection xy
- Determine the intersection between the arc and the X axis
- Read the gripping force

Result:
Gripping force = approx. 83 N

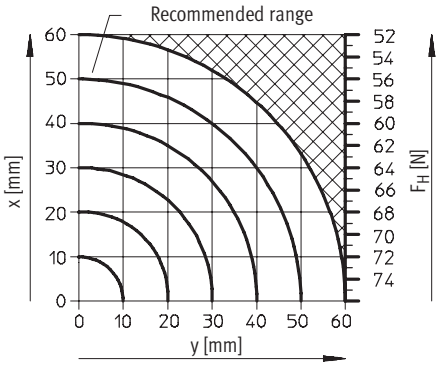


As external gripper: Closing operation

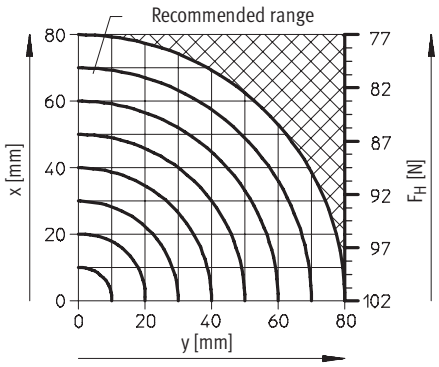
HGPT-16-A



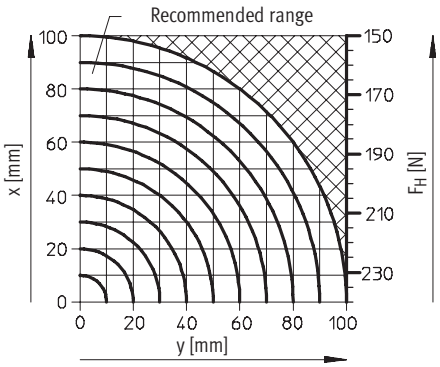
HGPT-20-A



HGPT-25-A

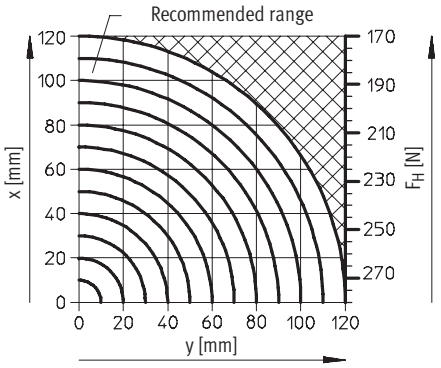


HGPT-35-A

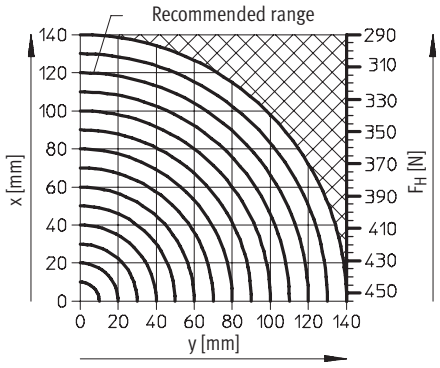


Gripping force F_H per gripper jaw at 6 bar as a function of lever arm x and eccentricity y

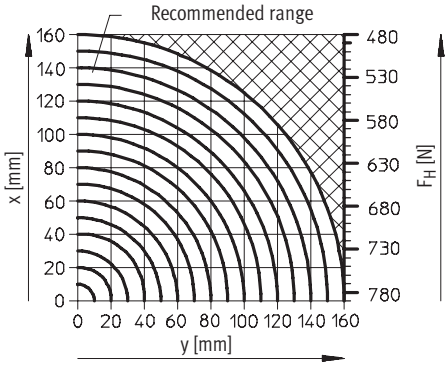
HGPT-40-A



HGPT-50-A

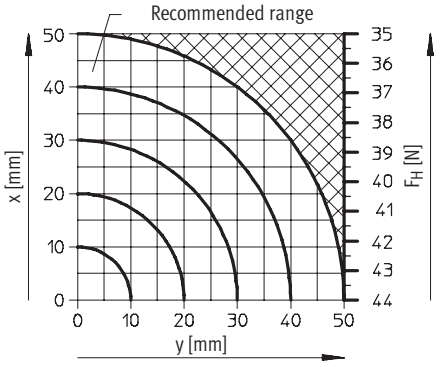


HGPT-63-A

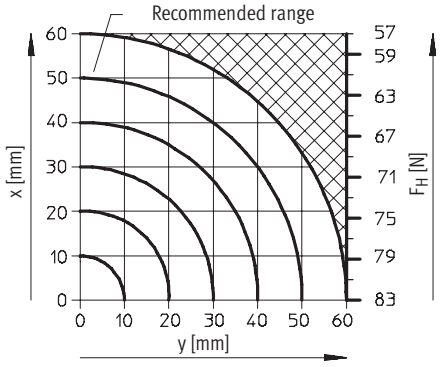


As internal gripper: Opening operation

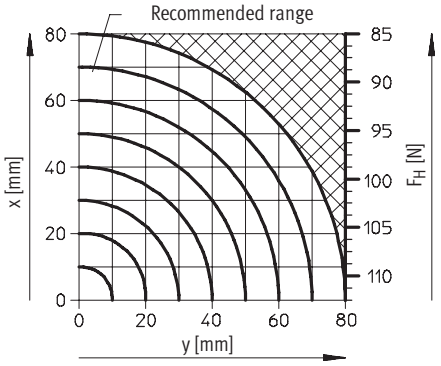
HGPT-16-A



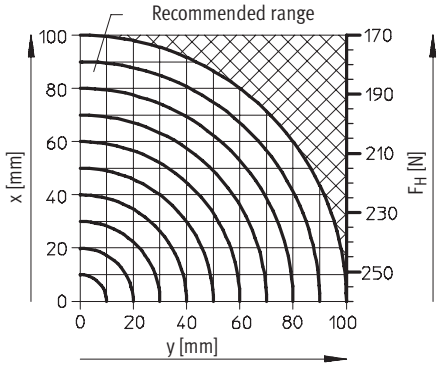
HGPT-20-A



HGPT-25-A



HGPT-35-A

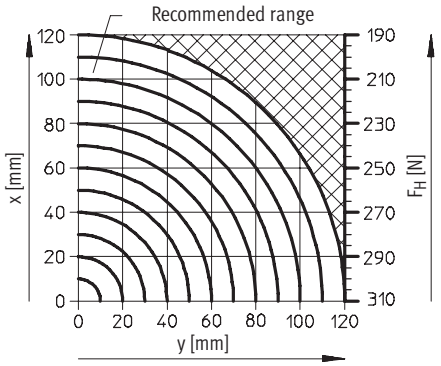


Parallel grippers HGPT, robust

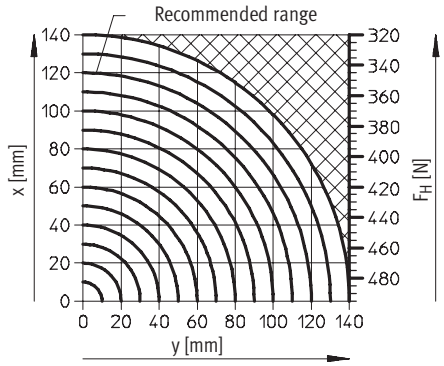
Technical data

Gripping force F_H per gripper jaw at 6 bar as a function of lever arm x and eccentricity y

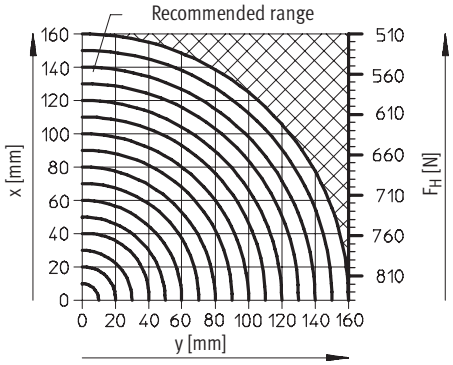
HGPT-40-A



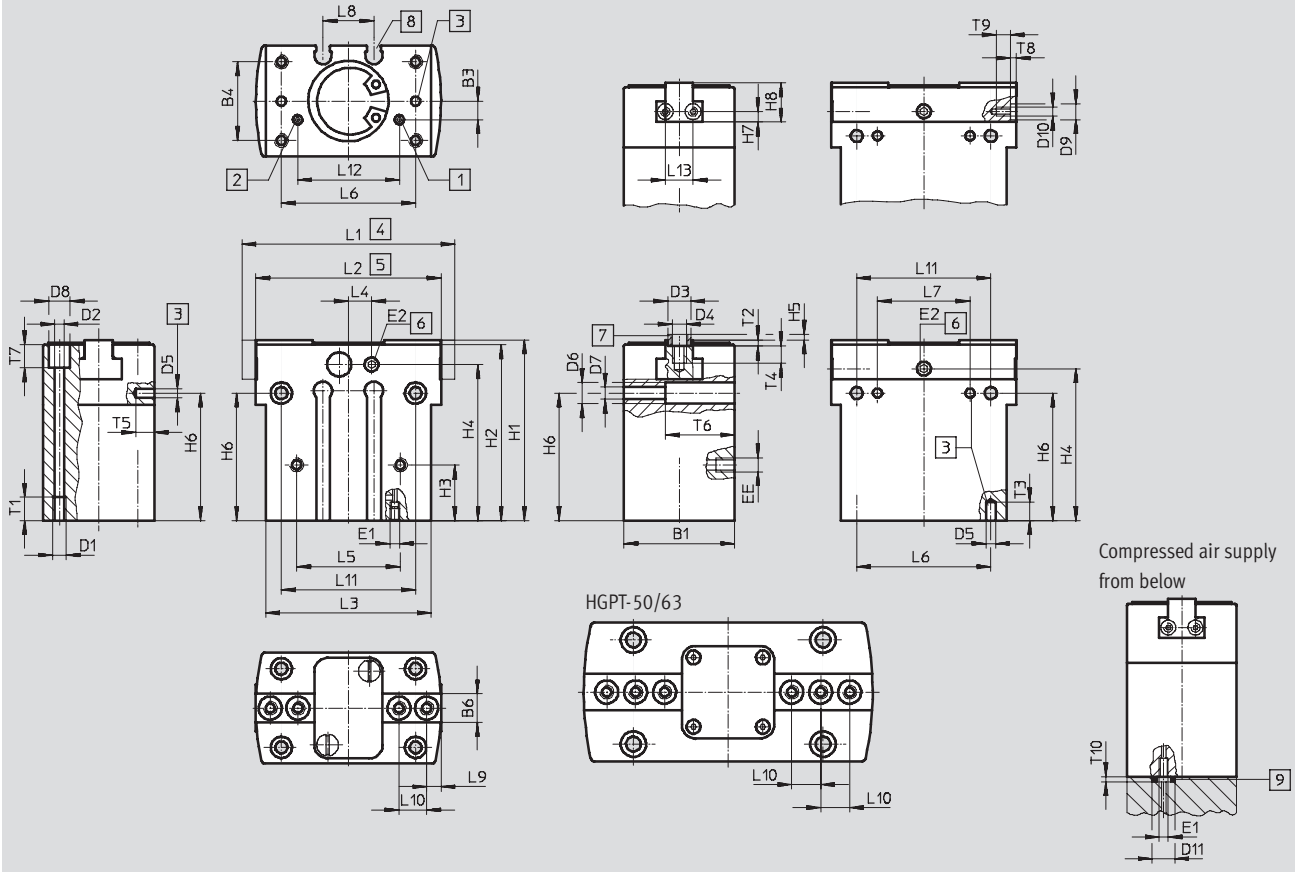
HGPT-50-A



HGPT-63-A



Dimensions Download CAD data ➔ **www.festo.com**



Parallel grippers HGPT, robust

Technical data

FESTO

1 Compressed air connection opening, either on the side or bottom (bottom connection sealed on delivery)
2 Compressed air connection closing, either on the side or bottom (bottom connection sealed on delivery)
3 Hole for dowel pin (not included in scope of delivery)
4 Gripper jaw open
5 Gripper jaw closed
6 Sealing air connection (sealed on delivery)
7 Centring sleeves ZBH (4 included in scope of delivery)
8 Slot for proximity sensor
9 O-ring for parallel grippers
HGPT-16: ∅ 2x1.5
HGPT-20: ∅ 3x1.5
HGPT-25: ∅ 3x1.5
HGPT-35: ∅ 4x1.5
HGPT-40: ∅ 5x1.5
HGPT-50: ∅ 5x1.5
HGPT-63: ∅ 5x1.5

Size [mm]	B1 ±0.05	B3 ±0.1	B4 ±0.1	B6 −0.05 −0.1	D1	D2 ∅	D3 ∅ H8/h7	D4	D5 ∅ H7	D6 ∅	D7 ∅	D8 ∅
16	24	4	17	6	M3	2.6	5	M3	2	$4.6^{+0.1}$	2.6	$4.6^{+0.1}$
20	28	7	22	6.5	M4	3.2	5	M3	3	$6^{+0.2}$	3.2	$6^{+0.2}$
25	36	10	27	10	M5	4.2	7	M4	4	$8^{+0.3}$	4.2	$8^{+0.3}$
35	42	9	32	12	M5	4.2	9	M6	4	$10^{+0.3}$	5.3	$8^{+0.3}$
40	50	13	38	14	M6	5.1	9	M6	5	$11^{+0.3}$	6.4	$9^{+0.3}$
50	60	14	45	15.5	M8	6.4	9	M6	6	$13.5^{+0.3}$	8.4	$11^{+0.3}$
63	72	12	56	20	M8	6.4	12	M8	6	$13.5^{+0.3}$	8.4	$11^{+0.3}$

Size [mm]	D9 ∅ H8	D10	D11 ∅	EE	E1	E2	H1 ±0.05	H2 ±0.05	H3 ±0.1	H4	H5 −0.3	H6 ±0.02[1] ±0.1[2]
16	–	M2	5	M3	M2	M3	39	38	12	33.7	1.2	27.5
20	5	M3	6	M3	M3	M3	46	45	15	37	1.2	24
25	5	M3	6	M5	M3	M5	57	56	20	46	1.4	34
35	7	M5	7	M5	M4	M5	67	66	28	53	1.9	38
40	7	M5	8	M5	M5	M5	83	82	36	68	1.9	53
50	7	M5	8	G⅛	M5	M5	97	96	30	78	1.9	61
63	7	M5	8	G⅛	M5	M5	117	116	26	92	2.4	67

Size [mm]	H7 ±0.02[1] ±0.1[2]	H8 −0.02	L1 ±0.5	L2 ±0.5	L3 ±0.1	L4	L5 ±0.1	L6 ±0.02[1] ±0.1[2]	L7 ±0.02	L8 +0.1	L9 ±0.02[1] ±0.1[2]	L10 ±0.02[1] ±0.1[2]
16	2.25	8.5	46	40	35.8	3.8	22.4	29	20	11	3	6
20	3	12	58	50	44	–	28	35	24	18	4	8
25	4.5	16	76	64	52	–	28	42	20	17	5	12
35	5.5	19	96	80	64	–	40	52	40	24	6	15
40	5.5	22	120	100	80	–	48	66	50	32	10	18
50	7.5	25.5	149	125	100	–	56	82	60	32	10	12.5
63	9	32	192	160	125	–	74	100	76	34	10	18

Size [mm]	L11 ±0.1	L12 ±0.1	L13 ±0.02[1] ±0.1[2]	T1 min.	T2 +0.1	T3 min.	T4 min.	T5 min.	T6	T7 +0.2	T8 +0.1	T9	T10
16	29	22	6	5	1.3	4	5	4	15	24	–	3	1.2
20	35	24	6	6	1.3	4	5	4	19	11	1.3	6	1.2
25	42	28	6	10	1.6	4	5	4	24	16	1.3	6	1.2
35	52	40	13	10	2.1	6	10	4	27	19	1.6	9	1.2
40	66	44	13	12	2.1	6	10	6	33	20	1.6	9	1.2
50	82	56	13	12	2.1	8	10	8	43	23	1.6	9	1.2
63	100	70	13	12	2.6	10	12	10	55	35	1.6	9	1.2

1) For centring
2) For through-and threaded hole
Note: This product conforms with the ISO 1179-1 standard and the ISO 228-1 standard.

Parallel grippers HGPT, robust

Technical data and accessories

FESTO

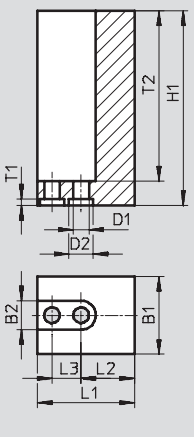
Ordering data						
Size	Double-acting		Single-acting or with gripping force retention			
	without compression spring		opening		closing	
[mm]	Part No.	Type	Part No.	Type	Part No.	Type
16	**535 858**	**HGPT-16-A**	**535 859**	**HGPT-16-A-G1**	**535 860**	**HGPT-16-A-G2**
20	**535 861**	**HGPT-20-A**	**535 862**	**HGPT-20-A-G1**	**535 863**	**HGPT-20-A-G2**
25	**535 864**	**HGPT-25-A**	**535 865**	**HGPT-25-A-G1**	**535 866**	**HGPT-25-A-G2**
35	**535 867**	**HGPT-35-A**	**535 868**	**HGPT-35-A-G1**	**535 869**	**HGPT-35-A-G2**
40	**535 870**	**HGPT-40-A**	**535 871**	**HGPT-40-A-G1**	**535 872**	**HGPT-40-A-G2**
50	**535 873**	**HGPT-50-A**	**535 874**	**HGPT-50-A-G1**	**535 875**	**HGPT-50-A-G2**
63	**535 876**	**HGPT-63-A**	**535 877**	**HGPT-63-A-G1**	**535 878**	**HGPT-63-A-G2**

Accessories

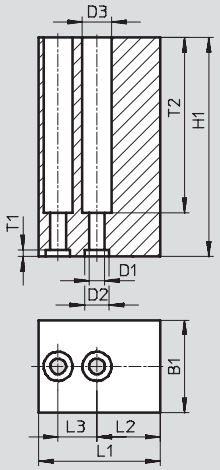
Unmachined gripper finger
BUB-HGPT
(Scope of delivery: 2 pcs.)

Material:
Aluminium

BUB-HGPT-16



BUB-HGPT-20 ... 63



Dimensions and ordering data							
For size	B1	B2	D1 ∅	D2 ∅	D3 ∅	H1	L1
[mm]	±0.05	+0.22	H13	H8	+0.22	±0.05	±0.05
16	16	6	3.2	5	–	40	20
20	19	–	3.2	5	6	45	25
25	24	–	4.3	7	8	60	32
35	28	–	6.4	9	11	70	40
40	34	–	6.4	9	11	75	50
50	40	–	6.4	9	11	100	62.5
63	50	–	8.4	12	13.5	120	80

For size	L2	L3	T1	T2	Weight per unmachined gripper finger	Part No.	Type
[mm]	±0.02[1] ±0.1[2]	±0.01[1] ±0.1[1]	+0.1		[g]		
16	11	6	1.3	35	28	**537 198**	**BUB-HGPT-16**
20	13	8	1.3	36	53	**537 199**	**BUB-HGPT-20**
25	15	12	1.6	51	112	**537 200**	**BUB-HGPT-25**
35	19	15	2.1	61	182	**537 201**	**BUB-HGPT-35**
40	22	18	2.1	71	312	**537 202**	**BUB-HGPT-40**
50	27.5	25	2.1	91	638	**537 203**	**BUB-HGPT-50**
63	34	36	2.6	110	1 230	**537 204**	**BUB-HGPT-63**

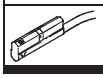
1) For centring
2) For through-hole

Ordering data

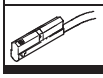
	For size [mm]	Remarks	Weight [g]	Part No.	Type	PU[1]
Centring sleeve ZBH					Technical data ➔ Internet: zbh	
	16, 20	For centring unmachined gripper jaws/gripper fingers on the gripper jaws	1	**189 652**	**ZBH-5**	10
	25		1	**186 717**	**ZBH-7**	10
	35, 40, 50		1	**150 927**	**ZBH-9**	10
	63		1	**189 653**	**ZBH-12**	10
	20, 25	For lateral centring of gripper fingers on the gripper jaws	1	**189 652**	**ZBH-5**	10
	35, 40, 50, 63		1	**186 717**	**ZBH-7**	10
Blanking plug B					Technical data ➔ Internet: b	
	16, 20	For sealing the compressed air connections	0.6	**30 979**	**B-M3-S9**	10
	25, 35, 40		1	**174 308**	**B-M5-B**	10
	50, 63		5	**3 568**	**B-⅛**	10

1) Packaging unit quantity

Ordering data – Proximity sensors for C-slot, magneto-resistive Technical data ➔ Internet: smt

	Type of mounting	Switch output	Electrical connection, connection direction	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in the slot from above, flush with cylinder profile	PNP	Cable, 3-wire, in-line	2.5	**525 915**	**SMT-10F-PS-24V-K2,5L-OE**
			Plug M8x1, 3-pin, in-line	0.3	**525 916**	**SMT-10F-PS-24V-K0,3L-M8D**
			Cable, 3-wire, lateral	2.5	**526 674**	**SMT-10F-PS-24V-K2,5Q-OE**
			Plug M8x1, 3-pin, lateral	0.3	**526 675**	**SMT-10F-PS-24V-K0,3Q-M8D**
	Insertable in the slot lengthwise	PNP	Plug M8x1, 3-pin, in-line	0.3	**173 220**	**SMT-10-PS-SL-LED-24**
			Cable, 3-wire, in-line	2.5	**173 218**	**SMT-10-PS-KL-LED-24**

Ordering data – Proximity sensors for C-slot, magnetic reed Technical data ➔ Internet: sme

	Type of mounting	Switch output	Electrical connection, connection direction	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in the slot from above, flush with cylinder profile	Contacting	Plug M8x1, 3-pin, in-line	0.3	**525 914**	**SME-10F-DS-24V-K0,3L-M8D**
			Cable, 3-wire, in-line	2.5	**525 913**	**SME-10F-DS-24V-K2,5L-OE**
			Plug M8x1, 3-pin, lateral	0.3	**526 671**	**SME-10F-DS-24V-K0,3Q-M8D**
			Cable, 3-wire, lateral	2.5	**526 670**	**SME-10F-DS-24V-K2,5Q-OE**
	Insertable in the slot lengthwise	Contacting	Plug M8x1, 3-pin, in-line	0.3	**173 212**	**SME-10-SL-LED-24**
			Cable, 3-wire, in-line	2.5	**173 210**	**SME-10-KL-LED-24**

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	**541 333**	**NEBU-M8G3-K-2.5-LE3**
			5	**541 334**	**NEBU-M8G3-K-5-LE3**
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	**541 338**	**NEBU-M8W3-K-2.5-LE3**
			5	**541 341**	**NEBU-M8W3-K-5-LE3**