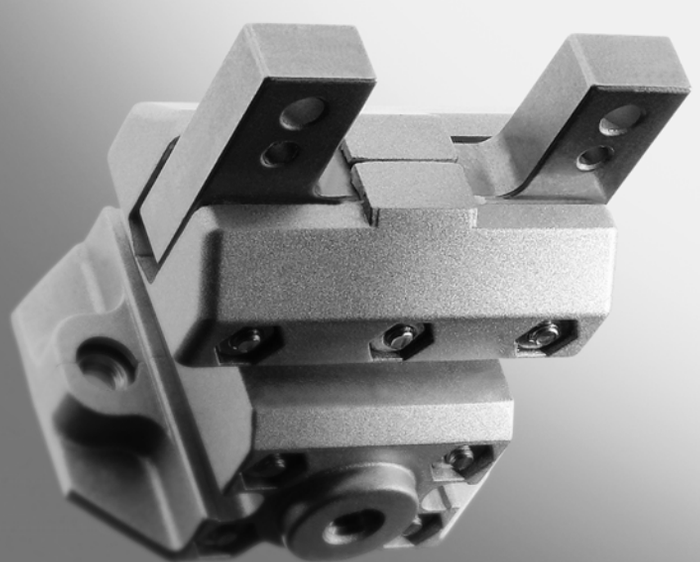
Parallel grippers HGPC

FESTO



- Low cost
- Compact
- Reliable thanks to gripping force retention

Parallel grippers HGPC

Key features

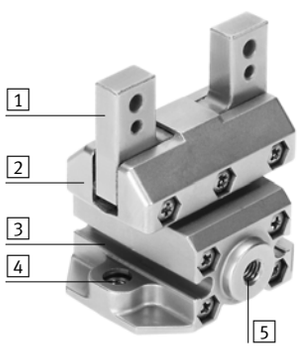
At a glance

General

The compact and low-cost parallel gripper consists of a two-part symmetrical housing. The piston moves traverse to the half-shell casing in an optimum housing design that guarantees reliable operation, long service life and convenient sensing. The gripper jaws move along the half shells in backlash-free, preloaded ball bearing guides.

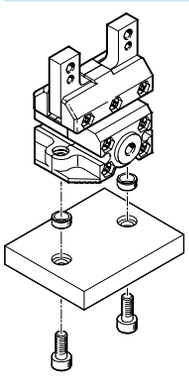
- Double-acting gripper
- Compression spring for supplementary or retaining gripping forces
- Internal fixed flow control, does away with the need for external flow control in 80% of applications
- High force with minimal volume
- Suitable for external and internal gripping
- Wide range of options for attaching drive units
- Repetition accuracy of 0.05 mm
- Slot for proximity sensor SME-/SMT-10

Details



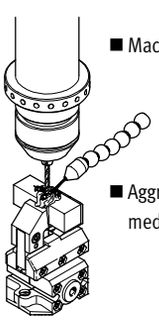
1 Gripper jaw with ball bearing guide
2 Housing based on half-shell principle
3 Slot for proximity sensor, for sensing the piston position
4 Mounting option
5 Supply port

Mounting option

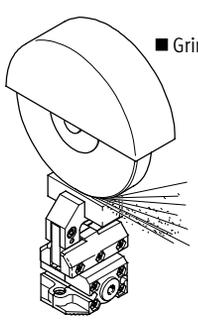


Note

Parallel grippers are not designed for the following applications:

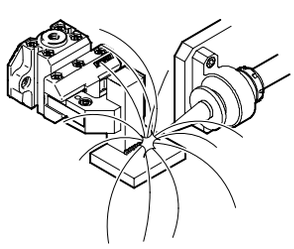


- Machining
- Aggressive media



- Grinding dust

- Welding spatter



Parallel grippers HGPC

Peripherals overview and type codes

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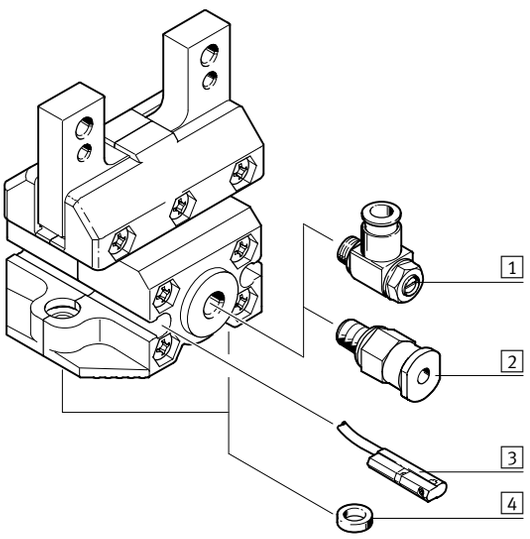
Peripherals overview



Accessories

	Type	Brief description	➔ Page
1	One-way flow control valve GRLA	For speed regulation	Volume 2 www.festo.com
2	Push-in fitting QS	For connecting compressed air tubing with standard external diameters	Volume 3 www.festo.com
3	Proximity sensor SME-/SMT-10	For sensing the piston position	1 / 7.7-11
4	Centring sleeve ZBH	For centring when attaching to a drive	1 / 7.7-11
–		Drive/gripper connections	Volume 5 www.festo.com NO TAG

Type codes

HGPC – 12 – A – G2

Type	
HGPC	Parallel gripper

Piston ∅

Position sensing	
A	Via proximity sensor

Gripping force retention	
G2	Closed

Parallel grippers HGPC

Technical data

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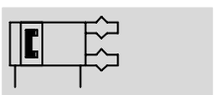
Function
Double-acting
HGPC-...-A



Variants
Single-acting or
with gripping force retention
closed HGPC-...-G2

Piston ∅
12 mm

Stroke
6 mm

General technical data		
Piston ∅		12
Constructional design		Wedge-shaped drive
		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]	0.2
Stroke per gripper jaw	[mm]	3
Pneumatic connection		M5
Repetition accuracy[2]	[mm]	≤ 0.05
Max. interchangeability	[mm]	≤ 0.2
Max. gripper jaw backlash[3]	[mm]	0
Max. gripper jaw angular backlash[4]	[°]	0
Max. operating frequency	[Hz]	4
Rotational symmetry	[mm]	< ∅ 0.2
Position sensing		Via proximity sensor
Type of mounting		With female thread and centring sleeve
Mounting 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) Perpendicular to the direction of motion of the gripper jaws.
4) Pretensioned, backlash-free ball bearing guide.

Operating and environmental conditions			
Min. operating pressure	HGPC-...-A	[bar]	2
	HGPC-...-G...	[bar]	4
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 1 according to Festo standard 940 070
Components requiring low corrosion resistance. Transport and storage protection. Parts that do not have primarily decorative surface requirements, e.g. in internal areas that are not visible or behind covers.

Parallel grippers HGPC

Technical data

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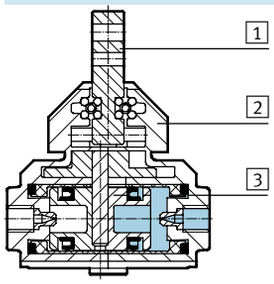
Weights [g]	
Piston ∅	12
HGPC-...-A	152
HGPC-...-G2	154

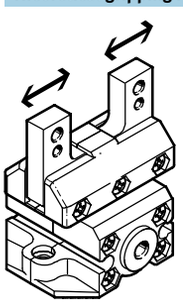
Materials

Sectional view



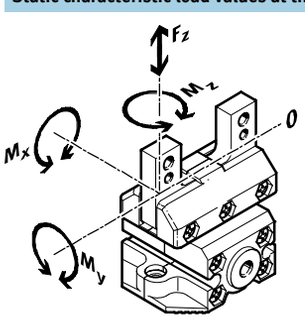
Gripper		
1	Gripper jaw	High-alloy steel
2	Housing	Die-cast zinc
3	Piston	Polyamide
–	Seals	Polyurethane, nitrile rubber
	Note on materials	Copper, PTFE and silicone-free

Theoretical gripping force [N] at 6 bar per gripper jaw



Piston ∅	12
Opening	34
Closing	34

Static characteristic load values at the gripper jaws



Indicated permissible forces and torques apply 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.

Piston ∅		12
Max. permissible force F_z	[N]	40
Max. permissible torque M_x	[Nm]	1
Max. permissible torque M_y	[Nm]	1
Max. permissible torque M_z	[Nm]	1

Parallel grippers HGPC

Technical data

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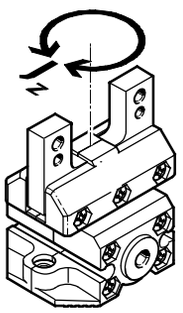
Mass moment of inertia [kgm^{2}x10^{-4}]

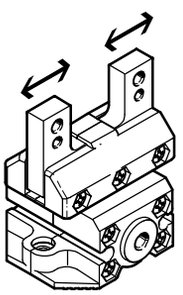


Mass moment of inertia [kgm^{2}x10^{-4}] of the parallel gripper in relation to the central axis with no load.

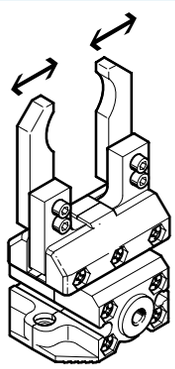
Piston ∅	12
HGPC-...-A	0.272
HGPC-...-G2	0.274

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 additional gripper fingers. The grippers must be throttled for greater applied loads. Opening and closing times must then be adjusted correspondingly.

Piston ∅		12
without external gripper fingers		
HGPC-...-A	Opening	30
	Closing	30
HGPC-...-G2	Opening	30
	Closing	30
with external gripper fingers as a function of applied load		
HGPC-...	0.4 N	40
	0.5 N	60
	0.6 N	80
	0.7 N	100

Parallel grippers HGPC

Technical data

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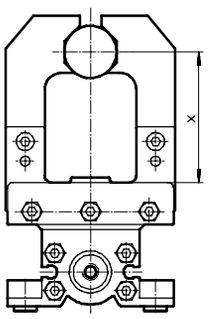
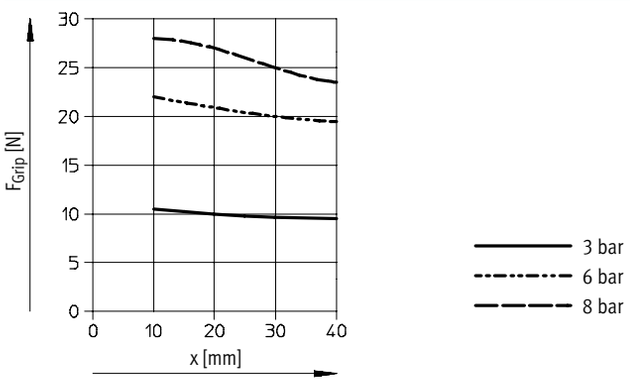
Gripping force F_{Grip} per gripper jaw as a function of operating pressure and lever arm x

Gripping forces as a function of the operating pressure and the lever arm can be determined for the size using the following graph.



HGPC-12-A



Parallel grippers HGPC

Technical data

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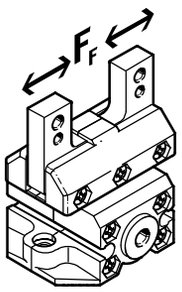
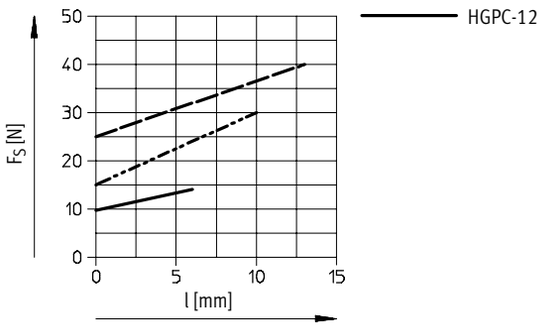
Spring force F_S as a function of the gripper size and the overall stroke l

Gripping force retention for HGPC-...-G...

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





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} =
12	$-0.02 * x + 0.5 * F_S$

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

Parallel grippers with integrated spring type HGPC-...-G2 (closing gripping force retention) can be used as:
- single-acting grippers
- grippers with supplementary gripping force
- grippers with gripping force retention

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 HGPC

Technical data

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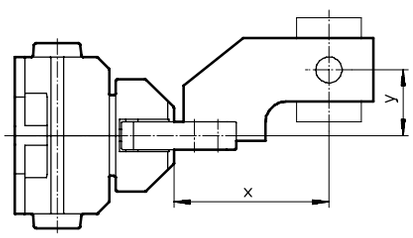
Gripping force F_{Grip} per gripper jaw at 6 bar as a function of lever arm x and eccentricity y



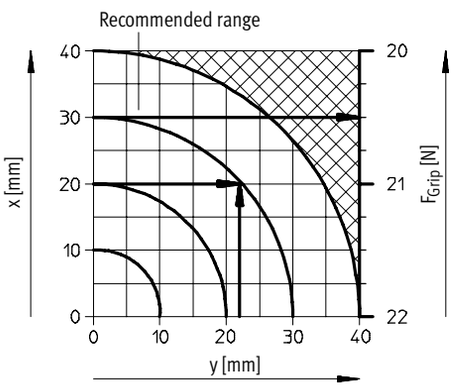
Gripping forces at 6 bar dependent upon eccentric application of force and the maximum permissible off-centre point of force application can be determined for the size using the following graph.

Calculation example

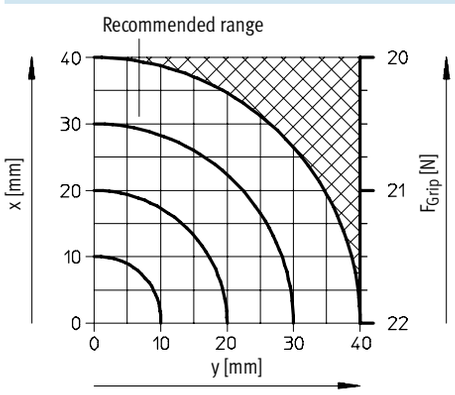
Given:
Lever arm x = 20 mm
Eccentricity y = 22 mm
To be found:
Gripping force at 6 bar

Procedure:
- Determine the intersection xy between lever arm x and eccentricity y in the graph for HGPC-12-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 F = approx. 20.5 N



HGPC-12-A



Parallel grippers HGPC

Technical data

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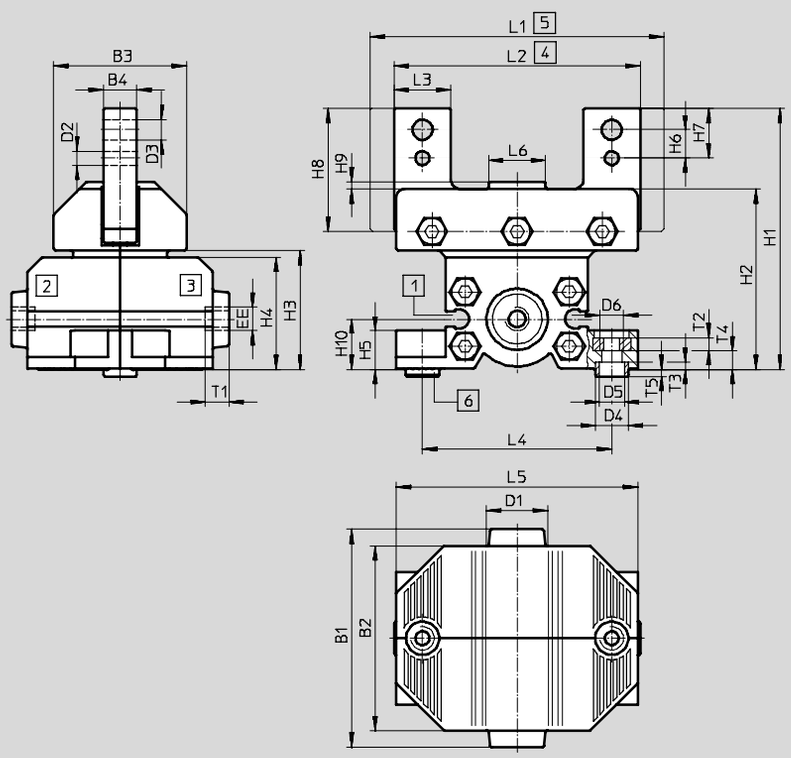
Dimensions

Download CAD data ➔ **www.festo.com/en/engineering**



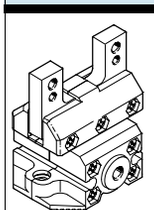
1 Sensor slot for proximity sensor
2 Supply port, opening
3 Supply port, closing
4 Gripper jaw closed
5 Gripper jaw open
6 Centring sleeves ZBH
(2 included in scope of delivery)

∅	B1	B2	B3	B4	D1	D2	D3	D4	D5	D6	EE	H1	H2	H3	H4	H5
						+0.04		∅	∅	∅						
[mm]				±0.1		+0.01		F9/h7								
12	38	33	22.4	6	12	2.5	3.3	7	5.3	M4	M5	48.2	33.6	21.7	20.2	6.9

∅	H6	H7	H8	H9	H10	L1	L2	L3	L4[1)]	L5	L6	T1	T2	T3	T4	T5
	+0.05	+0.05						−0.02								+0.1
[mm]	−0.1	−0.1	−0.2			±0.5	±0.5	−0.06				max.				−0.3
12	5	9	25	1.2	9.2	45	39	10	33	42	10	4.5	2.2	1.7	3.1	1.3

1) Tolerance for centring hole ±0.03
Tolerance for thread ±0.1

Ordering data – Parallel grippers

	Piston ∅	Double-acting Without compression spring		Single-acting or with gripping force retention Closed	
	[mm]	Part No.	Type	Part No.	Type
	12	**539 267**	**HGPC-12-A**	**539 268**	**HGPC-12-A-G2**

Parallel grippers HGPC

Technical data and accessories

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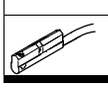
Ordering data – Centring sleeves Technical data ➔ NO TAG
Ordering data – Centring sleeves Technical data ➔ www.festo.com

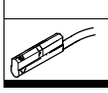
	for ∅ [mm]	Weight [g]	Part No.	Type	PU[1]
	12	1	**186 717**	**ZBH-7**	10

1) Packaging unit quantity

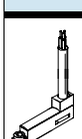
Ordering data – Proximity sensors for slot type 10, magneto-resistive Technical data ➔ NO TAG
Ordering data – Proximity sensors for slot type 10, magneto-resistive Technical data ➔ www.festo.com

	Assembly	Switch output	Electrical connection		Cable length [m]	Connection direction	Part No.	Type
			Cable	Plug M8				
NO contact								
	Insertable from above	PNP	3-core	–	2.5	In-line	**525 915**	**SMT-10F-PS-24V-K2,5L-OE**
			–	3-pin	0.3	In-line	**525 916**	**SMT-10F-PS-24V-K0,3L-M8D**
						Lateral	**526 675**	**SMT-10F-PS-24V-K0,3Q-M8D**
	Insertable from end	PNP	–	3-pin	0.3	In-line	**173 220**	**SMT-10-PS-SL-LED-24**
			3-core	–	2.5		**173 218**	**SMT-10-PS-KL-LED-24**

Ordering data – Proximity sensors for slot type 10, magnetic reed Technical data ➔ NO TAG
Ordering data – Proximity sensors for slot type 10, magnetic reed Technical data ➔ www.festo.com

	Assembly	Electrical connection		Cable length [m]	Connection direction	Part No.	Type
		Cable	Plug M8				
NO contact							
	Insertable from above	–	3-pin	0.3	In-line	**525 914**	**SME-10F-DS-24V-K0,3L-M8D**
		3-core	–	2.5	In-line	**525 913**	**SME-10F-DS-24V-K2,5L-OE**
		2-core				**526 672**	**SME-10F-ZS-24V-K2,5L-OE**
	Insertable from end	–	3-pin	0.3	In-line	**173 212**	**SME-10-SL-LED-24**
		3-core	–	2.5		**173 210**	**SME-10-KL-LED-24**

Ordering data – Proximity sensors for slot type 10, connecting cable at right angles Technical data ➔ NO TAG
Ordering data – Proximity sensors, connecting cable at right angles Technical data ➔ www.festo.com

	Electrical connection		Cable length [m]	Part No.	Type
	Cable	Plug M8			
	NO contact, magneto-resistive				
	3-core	–	2.5	**526 674**	**SMT-10F-PS-24V-K2,5Q-OE**
	2-core			**526 676**	**SMT-10F-ZS-24V-K2,5Q-OE**
	–	3-pin	0.3	**526 675**	**SMT-10F-PS-24V-K0,3Q-M8D**
	NO contact, magnetic reed				
	3-core	–	2.5	**526 670**	**SME-10F-DS-24V-K2,5Q-OE**
	2-core			**526 673**	**SME-10F-ZS-24V-K2,5Q-OE**
	–	3-pin	0.3	**526 671**	**SME-10F-DS-24V-K0,3Q-M8D**

Ordering data – Plug sockets Technical data ➔ NO TAG
Ordering data – Plug sockets Technical data ➔ www.festo.com

	Assembly	Switch output		Connection	Cable length [m]	Part No.	Type
		PNP	NPN				
Straight socket							
	Union nut M8	■	■	3-pin	2.5	**159 420**	**SIM-M8-3GD-2,5-PU**
					5	**159 421**	**SIM-M8-3GD-5-PU**
Angled socket							

Angled socket						
	Union nut M8	■	■	3-pin	2.5	**159 422 SIM-M8-3WD-2,5-PU**
					5	**159 423 SIM-M8-3WD-5-PU**