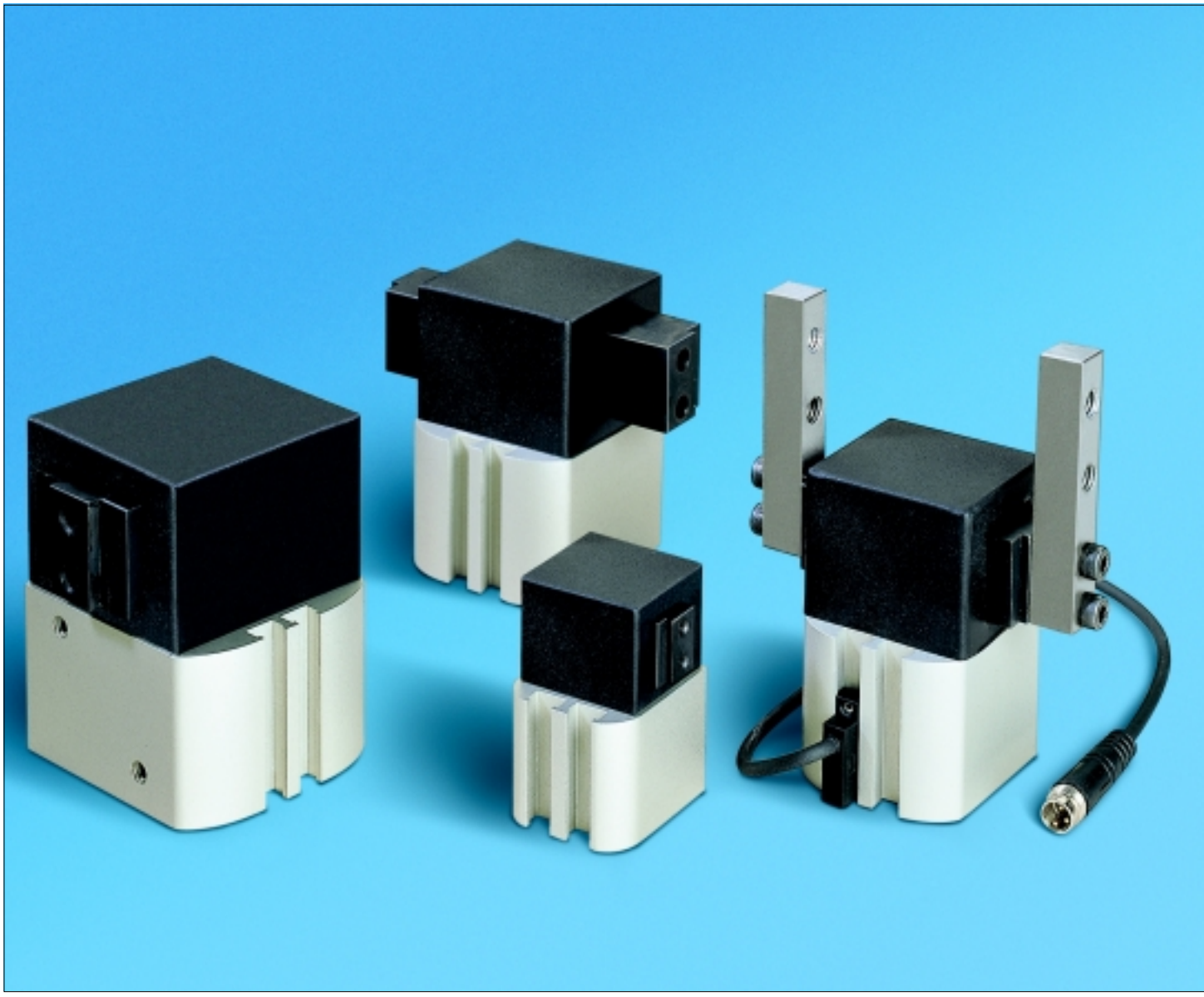
Parker
Pneumatic

Automation Products

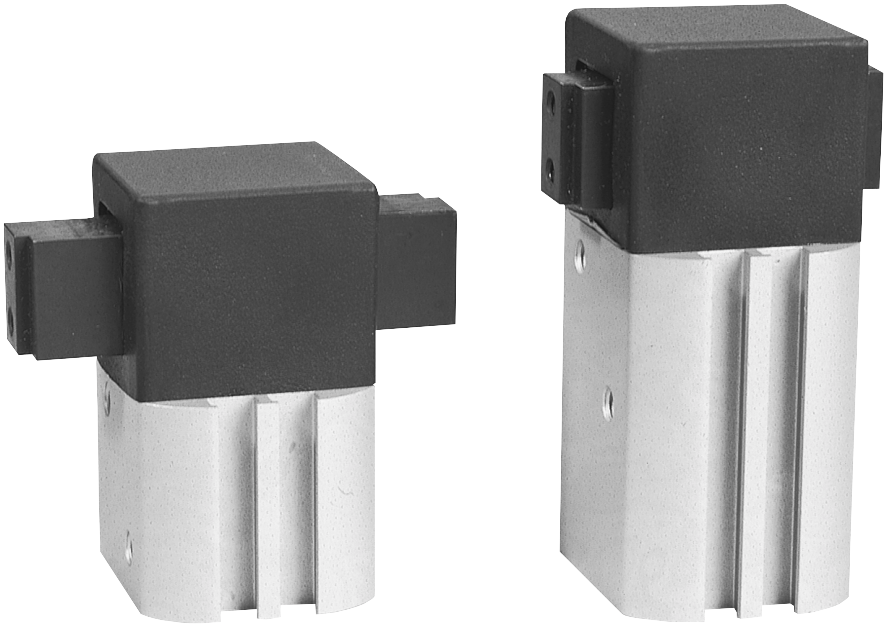
Automation Grippers
P5G-A range, parallel type

Catalogue 2260GB-1-po



Home

Features



High Grip Force
P5G-A Series has a high grip force to weight ratio. The extended travel jaw design permits longer travel without loss of grip force.

Multiple Function
The standard jaw design allows for grip open or grip close options with maximum force. Extended travel jaws have maximum force in either the grip open or grip close direction.

Lightweight Construction
The body is anodised aluminum for light weight. The jaws are hardened alloy steel for long life.

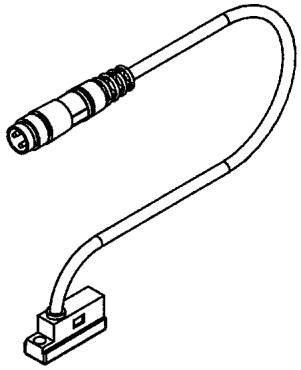
Convenient Mounting
Grippers may be mounted from the rear or side.

Electrical Position Sensing
Magnetic pistons are standard and all gripper bodies have standardised sensor grooves. Grippers can be ordered with electronic sensors.

Features

Magnetic Piston – Standard on all grippers.

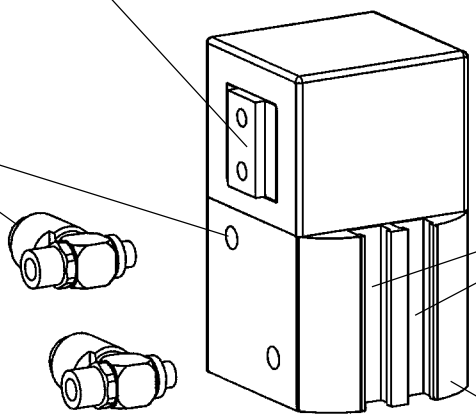
Sensors – Grippers may be ordered with sensors.



Bumpers – Reduce noise and dissipate energy, thus permitting faster cycle times and increased production rates.

Jaws – Hardened alloy steel jaws are available for standard or extended travel. Unique design permits maximum jaw travel without loss of grip force.

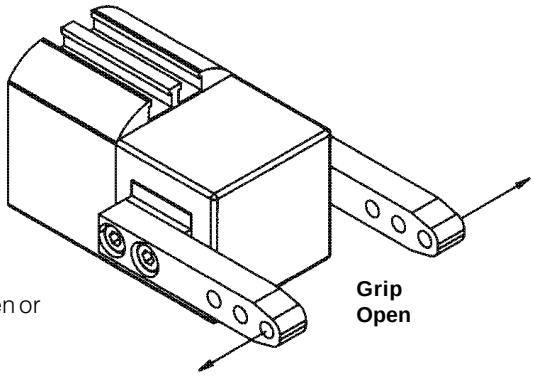
Ports - Standard M5 female ports or optional right angle flow controls.

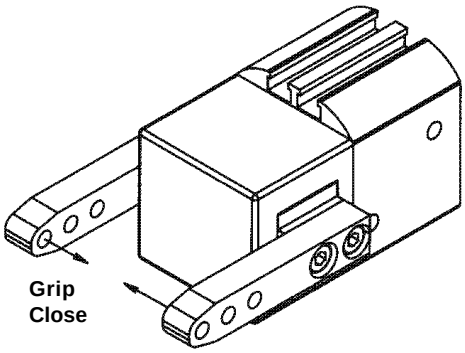


Sensor Grooves – All gripper sizes are equipped with two standardised sensor grooves.

Mounting - Combination side and rear tapped holes are standard and provide for design flexibility. Both mounting positions include dowel holes for alignment.

Body – machined from an aluminum extrusion that is anodised and permanently sealed. This results in a smooth, slick seal surface which guarantees long seal life and low breakaway pressure.





Multiple Function – Jaw travel either grip open or grip close.

Specifications

The Parker P5G-A range parallel grippers provide true parallel gripping motion. These globally available grippers are compact, precise and reliable. Designed specifically for factory automation service, this rugged, lightweight gripper has many important features:

- High grip force to weight ratio
- Extended travel jaws provide the same operating grip force as standard jaws with longer travel
- Spring assist option offers extra grip force or a fail-safe mode during power failure
- Spring return option allows single acting operation, saving on components
- Stroke adjust option on either end for adjustable and precision jaw location
- Mounting holes for rear or side mounting are standard allowing mounting alternatives

Of course all grippers are position sensor ready with magnetic pistons. Each size uses a standardised sensor groove to accommodate electronic sensors, making sensor inventory simple. Optional flow control fittings provide smooth and controlled jaw action. For high temperature service, fluorocarbon seals are available.

With compact size, low weight and a life in excess of 10 million cycles, the Parker P5G-A range gripper is the perfect solution for general purpose handling in confined spaces!

Specifications

- Operating pressure range: 0.3 to 7 bar
- Operating characteristics: double acting, single acting, spring assist
- Gripping force @ 5 bar: 120 to 943N
- Repeatability: 0.1 mm
- Mounting orientation: unrestricted
- Working ports: M5
- Operating temperature range:
  - Standard seals -20 to 80°C
  - Fluorocarbon seals* -20 to 120°C
- Filtration requirement: 40 micron filtered, dry air

Model Quick Reference

Type	Bore Size	Size	Force, N @ 5 bar		Jaw Travel mm		Mass kg	
			Total Force (F)	Grip Force (F/2)	Standard	Extended	Standard	Extended
No Spring	3	16 mm	120.0	60.0	5.3	9.4	0.11	0.12
	4	25 mm	294.0	147.0	8.0	14.0	0.23	0.27
	5	32 mm	440.0	220.0	9.2	15.6	0.37	0.39
	6	40 mm	754.0	377.0	10.5	17.9	0.53	0.56
Spring Return	3	16 mm	103.2	51.6	5.3	9.4	0.14	0.15
	4	25 mm	218.0	109.0	8.0	14.0	0.23	0.27
	5	32 mm	406.0	203.0	9.2	15.6	0.37	0.39
	6	40 mm	620.0	310.0	10.5	17.9	0.53	0.56
Spring Assist	3	16 mm	185.2	92.6	5.3	9.4	0.15	0.16
	4	25 mm	410.0	205.0	8.0	14.0	0.33	0.37
	5	32 mm	630.0	315.0	9.2	15.6	0.47	0.50
	6	40 mm	942.8	471.4	10.5	17.9	0.69	0.72

*See Fluorocarbon seal option for high temperature anomalies.

Sizing and Selection

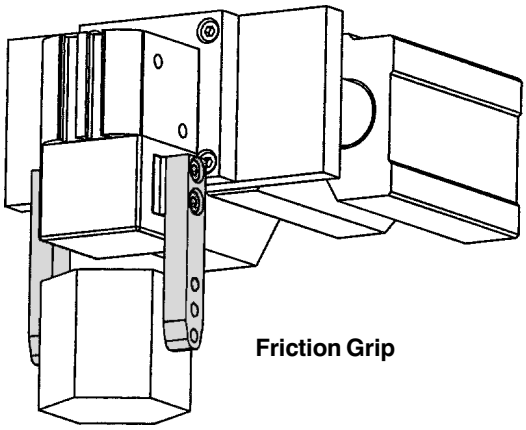
Force Requirements

When determining gripper force requirements, the gripper fingers must be able to control the workpiece under worst-case conditions. The specific workpiece needs to maintain a steady, constant position within the grasp of the fingers, and at the same time, care must be taken to ensure the workpiece will not deform.

There are two types of grips that determine the force required from a gripper: (1) friction grip and (2) encompassing grip.

(1) **Friction grip** depends on the frictional force of the gripper to maintain the position of the workpiece. Generally, this corresponds to tight tolerances and increased positional accuracy. This will vary depending on specific applications. A typical friction grip requires as much as four times the force to perform the same function as an encompassing grip.

(2) **Encompassing grip** uses the fingers to cradle the workpiece. This provides for more stability and safety



Friction Grip

because the fingers must be forced open to move the workpiece.

Total Force

Forces are additive when figuring out the total gripper holding force. The mass of the workpiece governs the required holding force. Forces can be broken down into:

- Mass – mass due to part plus tooling
- Acceleration – starting and stopping forces

Both forces are additive.

A factor of safety is needed for a precision machine. The factor of safety can vary depending on specific application. In general, the following factor of safety is suggested:

Friction grip	4
Encompassing grip	1.25

Example 1 uses gravitational force ($g = 9.81 mls^2$) to solve for gripper holding force.

Example 1:

A workpiece weighing 9kg is subject to be hold.

The grip force needed is :

$$9 \times 9.81 = 88.3\ N$$

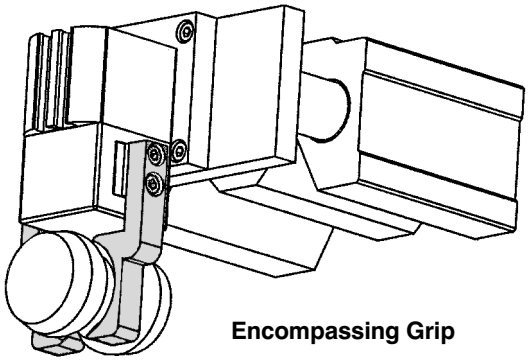
From the example, solve for grip force.

Friction grip $= 4 \times 88.3 = 353.2\ N$

Encompassing grip $= 1.25 \times 88.3 = 110.4\ N$

Use Gripping Force Relations on pages 8-9 to determine the correct gripper size.

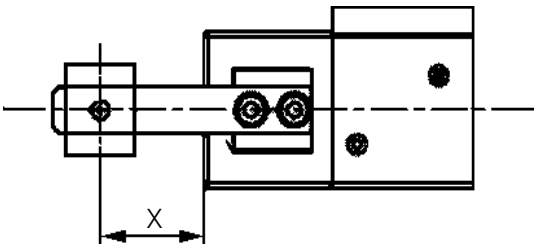
Note : friction between workpiece and jaws = 1



Encompassing Grip

Torque

The forces acting on the center of gravity of the workpiece at a distance (X) from the bottom of the gripper creates a moment arm.



The sum of the force components acting on the center of gravity can be broken down into:

- Force created by static load
- Force created from acceleration

Both forces are additive so that:

Sum of Force Components x Distance (X) = Total Torque

When solving for torque, be aware that forces will change depending on the orientation of the workpiece. To minimize torque, the workpiece should be gripped as close to the top of the gripper as possible.

Sizing and Selection

System Design Guidelines

The two main considerations are (1) throughput and productivity design and (2) reliability design. By overlapping each criteria, a design may concentrate on both production and reliability. Also, in multiple steps or functions, both design concentrations can be utilised to achieve a desired result. Each function in the system is unique and must be analyzed according to a specific design criteria.

Throughput and Productivity Criteria

1) Minimise dead space between gripper fingers and workpiece. This is the clearance between a fully open/ closed gripper and the workpiece. Use encompassing gripper fingers and minimal jaw travel.
2) Minimise weight of gripper to decrease acceleration forces.
3) Clamp workpiece securely. Use an encompassing grip to increase machine speeds.
4) Avoid time consuming tool changes. Use one gripper for various workpieces.
5) Use one gripper to perform multiple functions.

Reliability Criteria

1) Clamp workpiece securely. Minimise the possiblity of a dropped or misaligned workpiece.
2) Use encompassing type grip. Ensure precision and accuracy.
3) Regulate clamping force. Protect against deforming the workpiece.
4) Minimise finger length. The longer the tooling, the more the finger will deflect and lose grip force.
5) Provide sufficient deadspace to ensure clearance between the part and the fingers. Minimise the chance of the fingers crashing into a misaligned part.
6) Gripper fingers should properly align the workpiece on critical operations.
7) Surface materials of both gripper and workpiece should clamp at low friction to ensure precise and accurate placement of the workpiece.
8) Do not use parts in an assembled workpiece to maintain proper part alignment in the gripper – any tolerance in the assembled workpiece can affect the alignment.
9) Use a gripper dedicated to one function to perform multiple functions – minimises the chance of being mishandled since the workpiece never leaves the gripper.

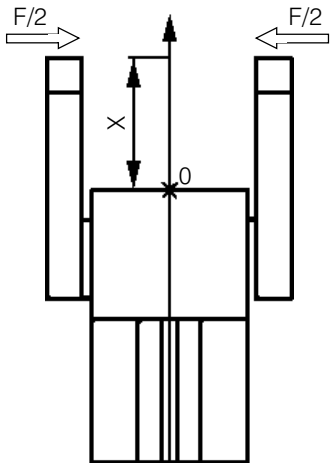
Engineering Data

Gripping Force Relations :

Grip force is defined as the sum of the forces applied by both jaws (F). Forces apply to both grip open and grip close options. Distance (X) is the distance from the top of the gripper to the center of contact on the workpiece.

NOTE :
The graph curves have been determined mathematically and verified by tests. Forces may deviate in practical applications from predetermined values. For maximum gripping force keep finger tooling as short as possible.

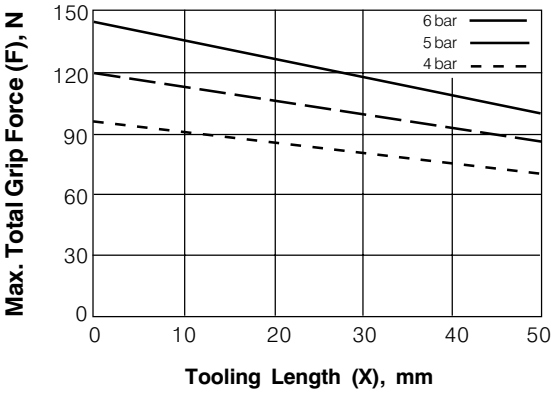
Maximum load that grippers can handle will vary depending on part size, texture, shape of finger tooling, speed, acceleration and air pressure.



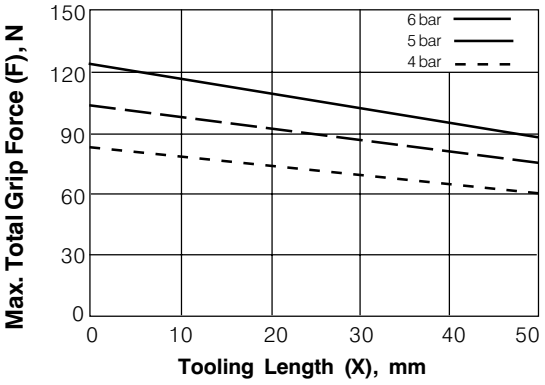
The Total Maximum Grip Force shown below (F) relates to both jaws. To solve for actual force, use the force of an individual jaw (F/2).

Size 3

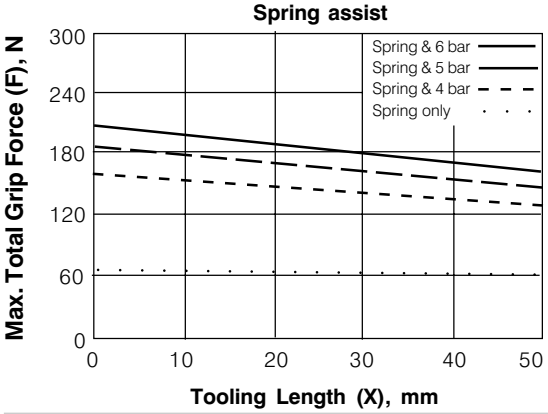
No Spring



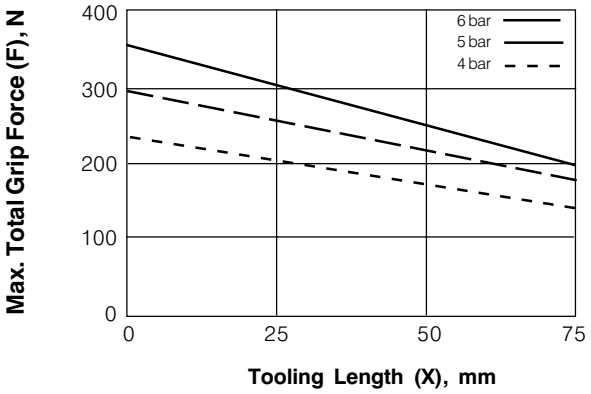
Spring return



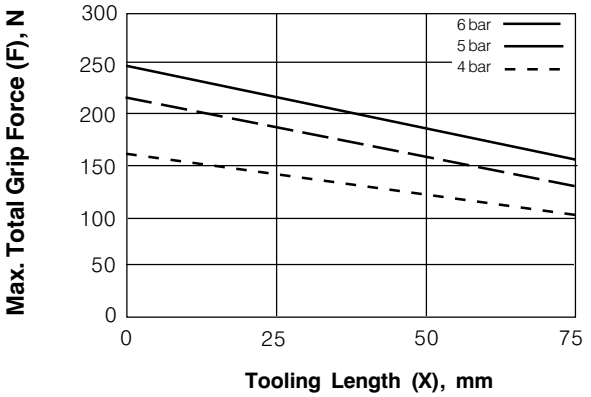
Spring assist

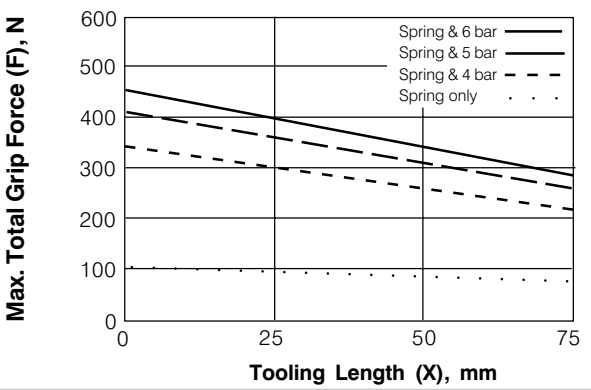


Size 4



Spring return





Engineering Data

Gripping Force Relations:

Grip force is defined as the sum of the forces applied by both jaws. Forces apply to both grip open and grip close options. Distance (X) is the distance from the top of the gripper to the center of contact on the workpiece.

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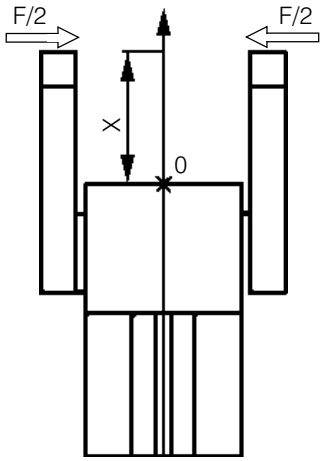
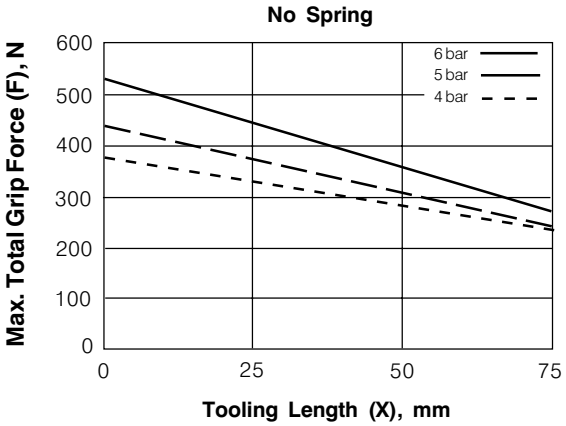
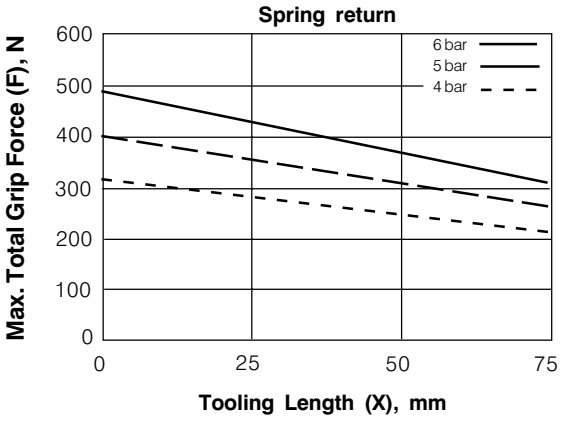
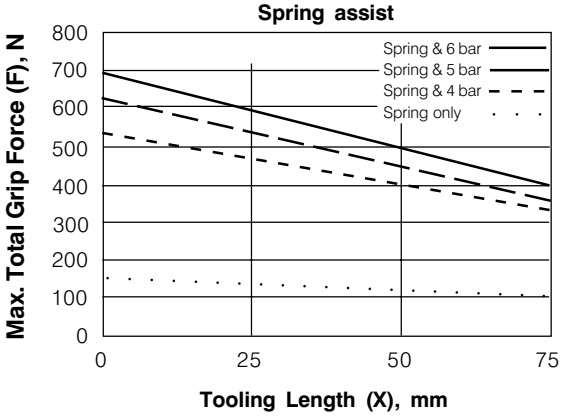


The Total Maximum Grip Force shown below (F) relates to both jaws. To solve for actual force, use the force of an individual jaw (F/2).

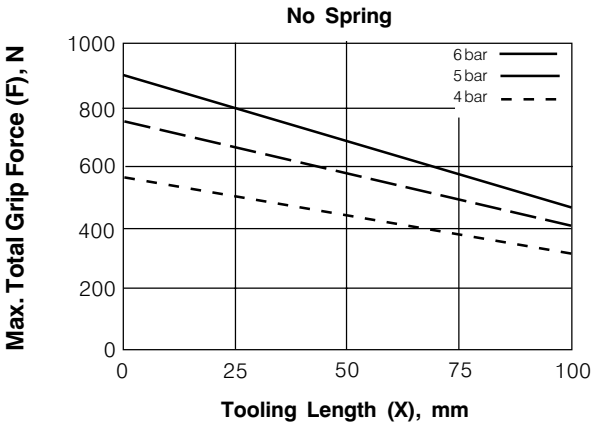
Size 5

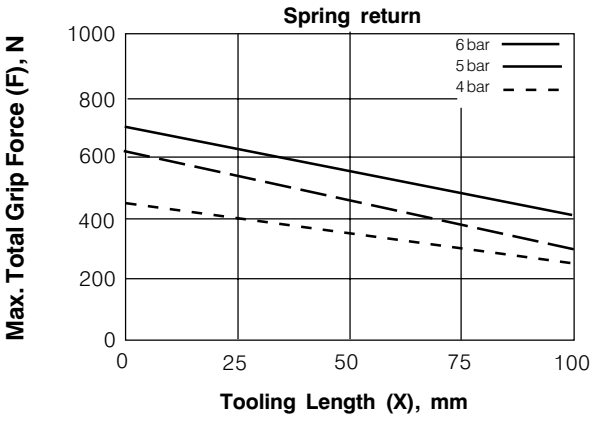


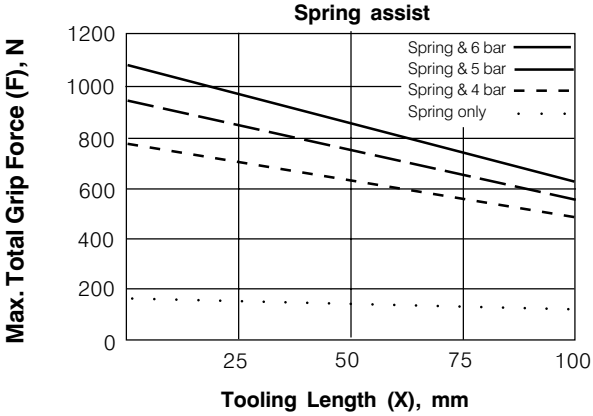




Size 6



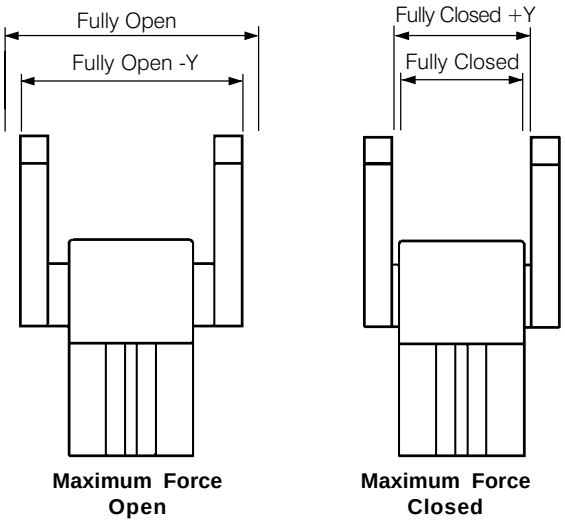




Engineering Data

Extended Jaw Travel

To utilize the extended travel jaws, ***the tooling must be designed to engage the workpiece in the maximum force portion of the travel (Y).***

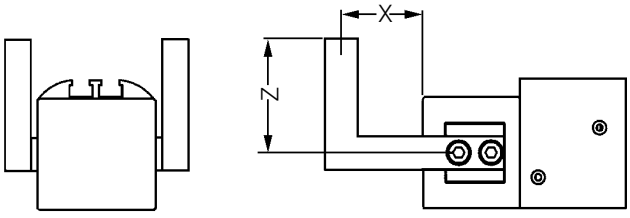


Spring Option	Model Size	Total Travel, mm	Engagement and Maximum Force Travel (Y), mm	Max. Grip Force * during Engagement Travel	Transitional Travel, mm	Grip Force * during Transitional Travel
No Spring	3	9.4	1.0	60.0	8.4	4.8
	4	14.0	3.0	147.0	11.0	11.7
	5	15.6	3.0	220.0	13.6	17.6
	6	17.9	3.0	377.0	14.9	30.1
Spring Return	3	9.4	1.0	51.6	8.4	4.1
	4	14.0	3.0	109.0	11.0	8.7
	5	15.6	3.0	203.0	13.6	16.2
	6	17.9	3.0	310.0	14.9	24.8
Spring Assist	3	9.40	1.0	92.6	8.4	7.4
	4	14.0	3.0	205.0	11.0	16.4
	5	15.6	3.0	315.0	13.6	25.2
	6	17.9	3.0	471.4	14.9	37.7

* Grip force (F/2) given in N at 5 bar.

Eccentric Gripping

The following chart shows distances (X, Z) as a function of an eccentric application of force. If the eccentric distance exceeds the maximum value recommended, the service life of the gripper will be reduced and component failure is possible.



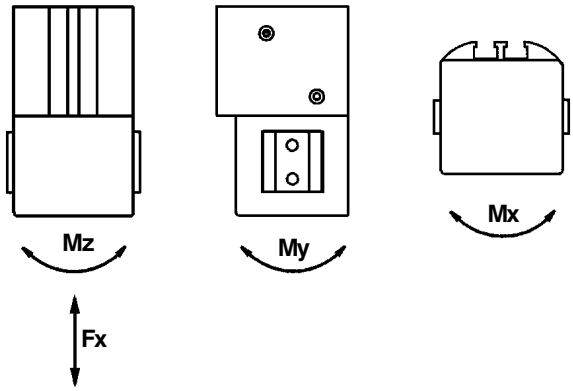
Maximum Suggested Eccentricity

Size	X	Z
	mm	mm
3	12	25
4	16	33
5	22	42
6	26	50

Engineering Data

Maximum Permissible Forces and Moments

Forces and moments listed are the total of all static forces due to tooling and part weights, and the forces due to acceleration. If the load limits are exceeded, the service life of the gripper will be reduced and component failure is possible.



Maximum Axial Force

Size	Fx
	N
3	88.0
4	175.0
5	306.0
6	482.0

Maximum Moments

Size	Mx	My	Mz
	Nm	Nm	Nm
3	4.2	4.3	4.3
4	4.5	5.5	5.5
5	5.9	9.0	8.5
6	8.4	13.7	13.0

Spring Assist/Spring Return

Size	Minimum Jaw Force (F/2) of Return Stroke with No Air Pressure (Spring Return), N	Miminum Air Pressure to Overcome Spring Force (Spring Return), bar	Minimum Air Pressure to Overcome Spring Force (Spring Assist), bar
3	6.1	0.7	4.6
4	10.8	0.5	3.7
5	12.6	0.3	3.7
6	18.0	0.3	3.0

Air Volume

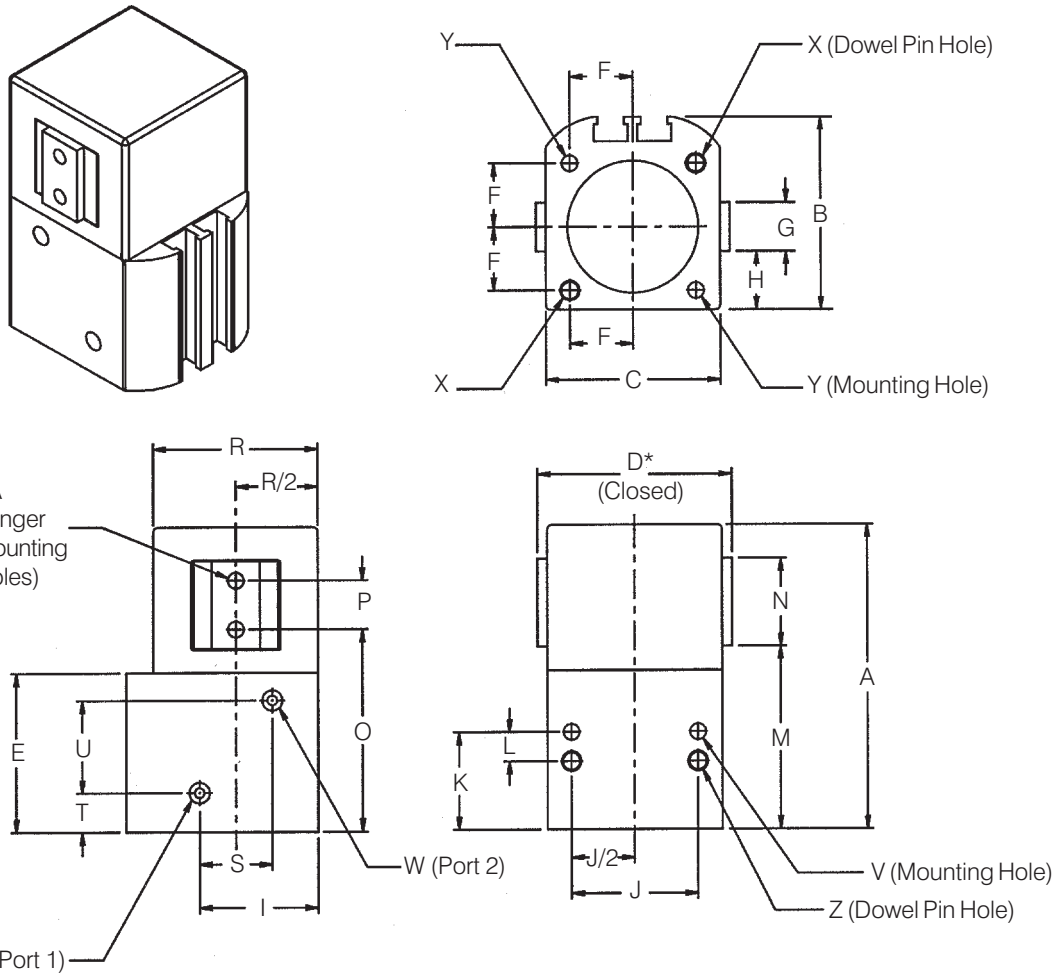
Size	Cylinder Volume, mm^3					
	No Springs		Spring Return		Spring Assist	
	Full Bore Side	Rod Side	Full Bore Side	Rod Side	Full Bore Side	Rod Side
3	1134	325	3286	325	3769	325
4	4891	3523	4891	3523	13874	3523
5	9540	6060	9540	6060	23147	6060
6	15003	11758	15003	11758	41242	11758

Unit Mass

Size	Unit Mass, kg					
	No Springs		Spring Return		Spring Assist	
	Standard	Extended Travel	Standard	Extended Travel	Standard	Extended Travel
3	0.11	0.12	0.14	0.15	0.15	0.16
4	0.23	0.27	0.23	0.27	0.33	0.37
5	0.37	0.39	0.37	0.39	0.47	0.50
6	0.53	0.56	0.53	0.56	0.69	0.72

Dimensional Data

Basic Dimensions



Size	A	B	C	D** Std.	D** Ext.	E	F	G	H	I	J	K	L	M	N	O
3	51	32.5	28	31	38.5	28.7	10	8	9.5	18	20	16.5	5.5	32.5	13	35.5
4	62.5	39.5	36	40	51	32.7	13	10	12.0	24.5	26	20	6	37.5	18	41.5
5	66.5	46.5	43	48	59	34	16	12	14.5	31.5	36	21	6	39.5	20	44
6	72	53.5	50	56	63	35.2	19	12	18.0	36	41	21	8	41.0	22	45

Size	P	R	S	T	U	V	W	X	Y	Z	AA
3	7	27	9	7	14.5	M4 x 7.0 DP*	M5	3.08 x 3.00 DP*	M4 x 7.0 DP*	3.08 x 3.00 DP*	M3 x 5.5 DP*
4	10	34	15	8	19	M4 x 7.0 DP*	M5	4.08 x 4.00 DP*	M4 x 7.0 DP*	4.08 x 4.00 DP*	M4 x 7.0 DP*
5	11	41	22	8	20	M5 x 11.0 DP*	M5	4.08 x 4.00 DP*	M5 x 11.0 DP*	4.08 x 4.00 DP*	M5 x 8.5 DP*
6	12	48	24	8	22	M6 x 9.5 DP*	M5	5.08 x 5.50 DP*	M6 x 13.0 DP*	5.08 x 5.50 DP*	M6 x 10.0 DP*

* Hole depth

** Jaws closed. Refer to table at right for stroke and dimension (D) with jaws fully open.

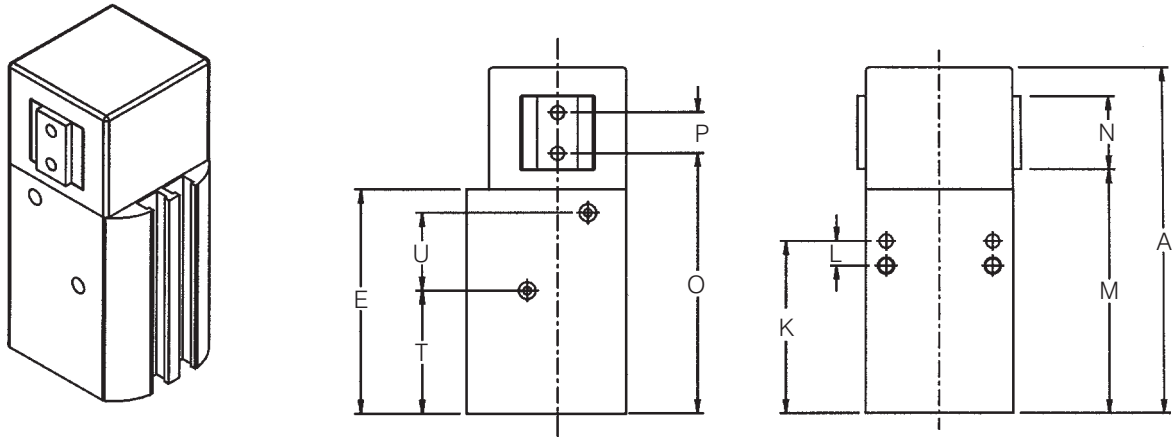
Size	Stroke		Jaws Fully Open (D)	
	Standard	Extended Travel	Standard	Extended Travel
3	5.3	9.4	36.3	47.9
4	8.0	14.0	48.0	65.0
5	9.2	15.6	57.2	74.6
6	10.5	17.9	66.5	80.9

All dimensions in mm

Dimensional Data

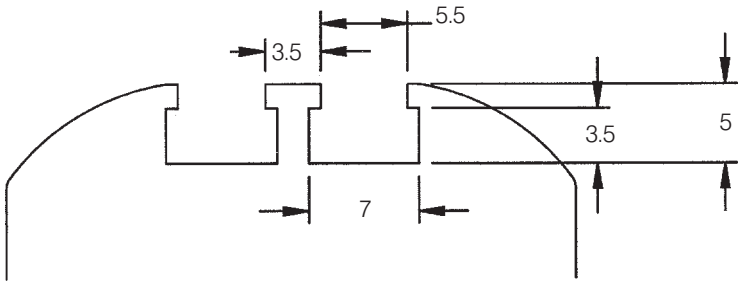
Body With Spring Assist

The spring assist option increases the main body length.



Size	A	E	K	L	M	N	O	P	T	U
3	67	44.7	32.5	5.5	48.5	13.0	51.5	7	23	14.5
4	84.5	54.7	42	6	59.5	18.0	63.5	10	30	19
5	86.5	54	41	6	59.5	20.0	64.0	11	28	20
6	97	60.2	46	8	66	22	71	12	33	22

Sensor Grooves



Mounting Holes

Size	Screw	Dowel Pin	Torque, Nm	Thread Depth
3	M4 x 0.7	3 mm x 3.00 DP	4.5	7.00
4	M4 x 0.7	4 mm x 4.00 DP	4.5	7.00
5	M5 x 0.8	4 mm x 4.00 DP	9.0	11.00
6	M6 x 1.0	5 mm x 5.50 DP	15.5	9.50

All dimensions in mm

Options

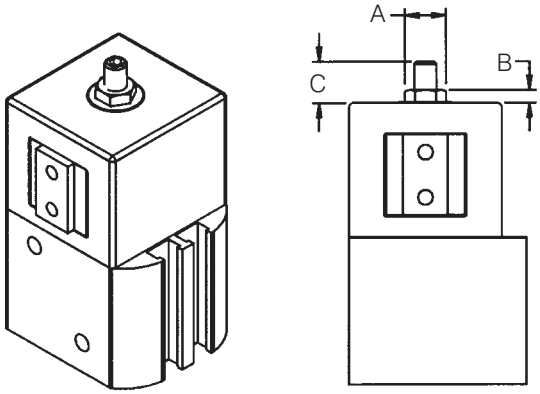
Stroke Adjust
(Option A, B, D, F, G) from order key

Use the stroke adjust option when you need exact travel distances. Fully adjustable internal stops permit precise stopping locations anywhere within the jaw travel. The stroke adjust option is available in two configurations:

- Stroke adjust front
- Stroke adjust rear

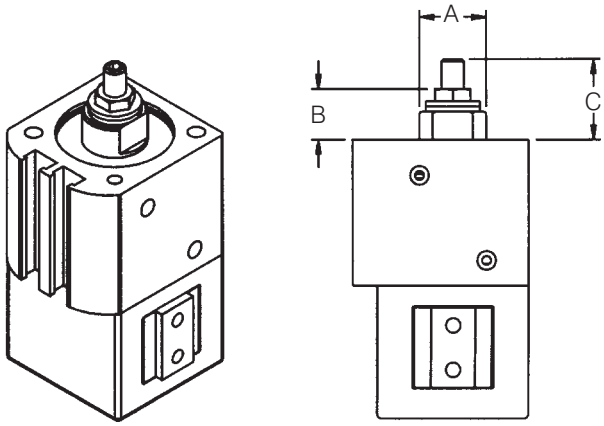
This gives the machine designer the flexibility to create the best possible design within limited space requirements.

Stroke Adjust Front



Size	A (mm)	B (mm)	C (mm)
3	8	3	7
4	9.5	3	11
5	9.5	3	11
6	9.5	3	12

Stroke Adjust Rear



Size	A (mm)	B (mm)	C (mm)
3	10.5	10	14.5
4	15	11.5	19
5	20	14	21.5
6	24	12.5	21.5

Notes:
Stroke adjust rear not available with spring return on Size 3.
Stroke adjust rear is not available with spring assist.

Adjustment Tools

Gripper Size	Socket Stroke Adjuster		Nut	
	Size	Allen Key	Size	Spanner
3	M4	2 mm	M4	7 mm
4	M5	2.5 mm	M5	8 mm
5	M5	2.5 mm	M5	8 mm
6	M5	2.5 mm	M5	8 mm

All dimensions in mm

Options

Spring Assist
(Option D, E from order key)

The spring assist option offers extra grip force and works as a fail-safe mode during a power failure. Spring assist is available with grip open or grip close, but is not available with the "stroke adjust rear" option.

See Engineering Data section for gripper forces with the spring assist option. *Spring Assist will increase the length of the gripper body. See page 13 for dimensions.*

Spring Return
(Option A, B, C from the order key)

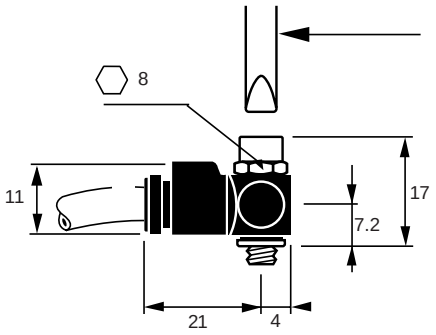
The spring return option allows for an automatic reset and jaw return. Selecting the spring return option creates a single-acting gripper component that reduces the number of directional control valves needed to operate automated machinery.

See Engineering Data section for gripper forces with the spring return option. *Spring Return will increase body length on Size 3 grippers as in Spring Assist. See page 13 for dimensions).* For all other sizes, see basic dimensions on page 12.

Right Angle Flow Control
(Option 3 from the order key)

Right angle flow control valves allow precise adjustment of speed by metering exhaust air flow. Presto-Lok push-in ports provide 360° orientation capability.

Flow Control : PWRE1445



All dimensions in mm

Fluorocarbon Seals
(Option F from the order key)

Standard abrasion resistant nitrile seals should be used for general purpose applications with temperatures of -20° to 82°C. Fluorocarbon seals are recommended for high temperature applications up to 121°C. The items shown in the table should be considered when planning high temperature applications.

	Temperature Range*
Magnets	-27° to 130°C
Bumpers	-27° to 90°C
Sensors	-25° to 75°C

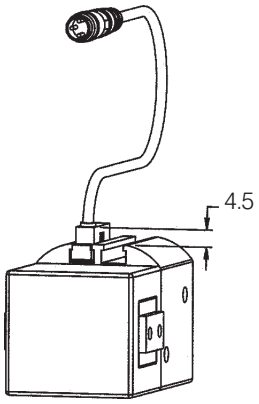
*Consult factory for higher temperature operation.

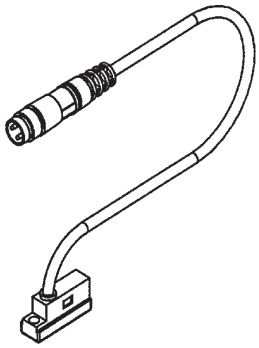
Sensors Data

Sensors for P5G-A grippers

Installation in T-groove

Sensors can be adjusted along T-grooves

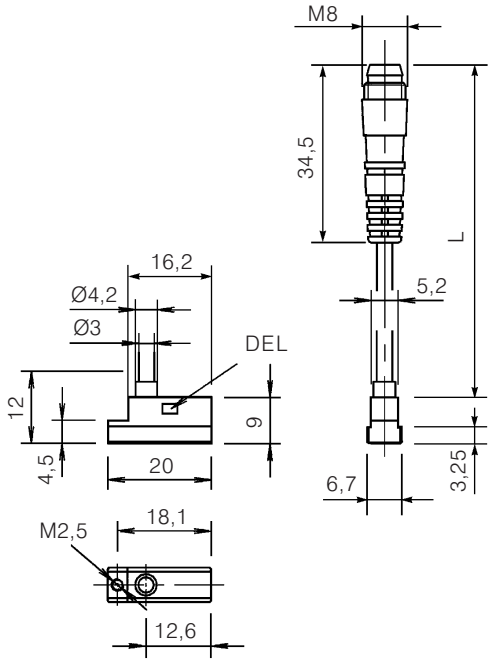




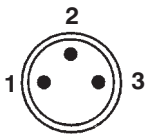
Technical data

Specifications	Reference PNP P8S-SPTHXD	P8S-SPELXD	P8S-SPETXD
	Reference NPN P8S-SNTHX	-	-
Mass (g)	7		
Cable length L (m)	Cable 90° 0,27 m **with** connector	Cable 90° 3 m **without** connector	Cable 90° 10 m **without** connector
Fixing in T-groove	M2,5 socket cap screws		
Working temperature (°C)	- 25 to + 75		
Encapsulation standard	IP67		
Switching frequency (kHz)	5		
Response time at 24 V (ms)	20		
Repeatability (mm)	⩽0,2		
Technology	magneto-inductive sensor		
Contact	normally open NO		
Breaking current (mA)	⩽150		
Supply voltage (VDC)	10 - 30		
Power consumption (mA)	10		
Hysteresis (mm)	<1,5		
Short circuit protection	YES		
Inverse polarity protection	YES		
Body	nylon PA12		
Cable	PUR		
Conductor	PVC 3 x 0,14 mm^2		

Dimensions (mm)



Wiring connection



Pin	Wire	Function
1	Brown	10-30 VDC
2	Black	Output signal
3	Blue	0V

Ordering Information

Model Code and Ordering Information

P	5	G	-	A	P	4	B	A	N	H	Y	S

Size	
3	16 mm
4	25 mm
5	32 mm
6	40 mm

Seals	
S	Standard
F	Fluocarbon

Port size	
B	M5 female
3	M5 with 4 mm flow control fittings

Sensors		
Code	Code	
NN		Without sensors

With 1 sensor per gripper		
PNP	NPN	
HY	**HW**	90° cable; 0,27 m with connector
KD		90° cable; 3 m without connector

With 2 sensors per gripper		
PNP	NPN	
HV	**HT**	90° cable; 0,27 m with connector
KB		90° cable; 3 m without connector

Function	
A	Standard travel, maximum grip close
B	Standard travel, maximum grip open
C	Extended travel, maximum grip close
D	Extended travel, maximum grip open

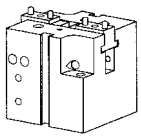
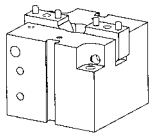
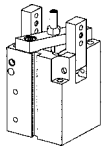
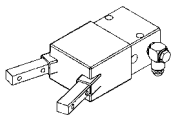
Spring / Stroke adjust Options			
Spring option	Spring adjust front	Spring adjust back	No stroke adjust
Single acting (spring return)	**A**	**B***	**C**
Automatic spring-loaded grip retention (spring assist)	**D**	**NN***	**E**
Without springs	**F**	**G**	**N**

* Option **B** not available for size 3 gripper.

** Spring assist with stroke ajust rear is not available.

Example : Gripper size 5, port size M5, standard travel, without springs, with 2 sensors PNP (90° cable; 0,27 m with connector) and standard seals.

Order code : P5G-AP5BAFHVS

	Parallel grippers P5G-RA					Angular grippers P5G-RC					180°radial grippers P5G-RB			30° angular gripper 3H2		
Size	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**S.A. (1)**	**2 D.F. (2)**	**D.A. (3)**
Total jaw travel (mm)	4	6	10	13	18											
Total opening angle (°)						33	34	35	43	43	0 to180			30		
Clamping torque* (Nm)						0.7	2.7	11.9	22.4	44.5	1.3	4.4	13.5	8.5	16.2	15.5
Clamping force* (N)	97	252	715	1128	1767											
Ø piston bore (mm)	16	25	40	50	63	16	25	40	50	63	16	25	40	25		
Ø port size	M5	M5	M5	G1/8	G1/8	M5	M5	M5	G1/8	G1/8	M5	M5	M5	M5		
Air consumption (cm^3/cycle)*	0.75	2.75	11.8	24.2	53.6	0.75	2.75	11.8	24.2	53.6	3.65	11.7	36.1	4.6	9.2	9
Repeatability (mm)	0.05					0.05					0.1			0.2		
Min. opening time (s)	0.01	0.01	0.02	0.02	0.03	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.02	0.02	0.02
Min. closing time (s)	0.01	0.01	0.02	0.02	0.03	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.03	0.03	0.02
Mass (kg)	0.09	0.21	0.45	0.73	1.25	0.08	0.19	0.38	0.65	1.17	0.12	0.29	0.65	0.35	0.47	0.48
Max. jaw length (mm)	27	37	52	73	95	60	83	103	139	173	48	63	82	100		
Single acting (S.A.) (1)														●		
Single acting, double force (D.F.) (2)															●	
Double acting (D.A.) (3)	●	●	●	●	●	●	●	●	●	●	●	●	●			●
Automatic grip retention, spring loaded	●	●	●	●	●	●	●	●	●	●						
Automatic grip retention, mechanical											●	●	●			

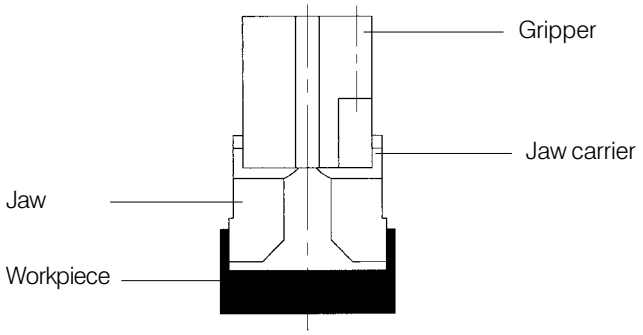
* at 6 bar
Cycle = opening + closing

Options

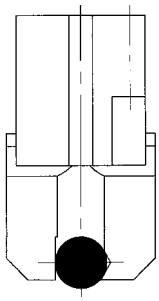
Dust protection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Square jaws	●	●	●	●	●	●	●	●	●	●	Standard			Standard		
Sensors	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Without springs	●	●	●	●	●	●	●	●	●	●	Standard			Not available		

Choice of grippers

Types of grip

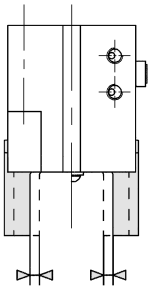


Internal grip

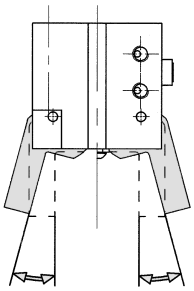


External grip

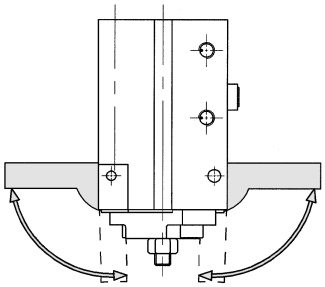
Types of clamping



Parallel clamping
Workpieces of different diameters or thicknesses

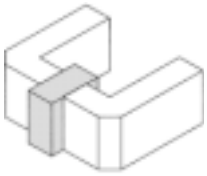


Angular clamping
Jaw release
Longer jaws

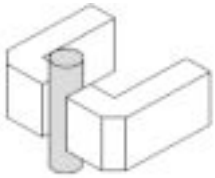


180° clamping
Total jaw release

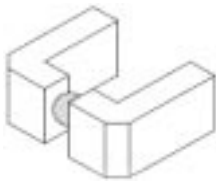
Contact between workpiece and jaw



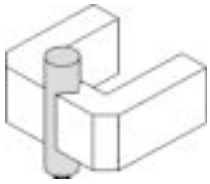
Surface/surface



Line/surface



Point/surface



Double line/surface

Main parameters to consider in selecting grippers:

- the weight of the workpiece to be moved
- geometry and volume of workpiece
- type of gripper (angular or parallel)
- dynamic movement of workpiece and gripper combination
- environment (shocks, additional external forces etc.)
- coefficient of friction between workpiece and jaws (see the table below)

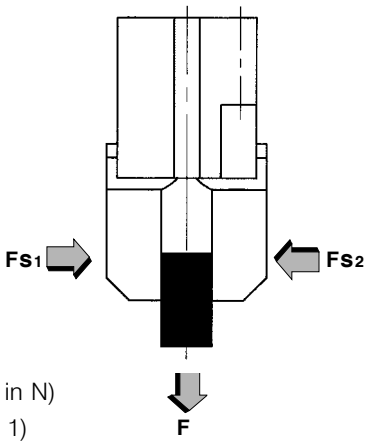
Workpiece material	Jaw material	Coefficient of friction μ
Steel	Steel	0.20
Steel	Aluminium	0.35
Steel	Plastic	0.50
Aluminium	Aluminium	0.49
Aluminium	Plastic	0.70
Plastic	Plastic	1

Formula for calculating clamping force

For internal and external grip

Fs1 = Fs2

$$Fs = Fs1 + Fs2 = \frac{F}{\mu} \times So$$

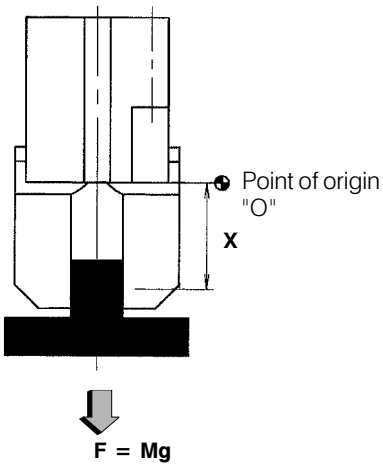


Fs : clamping force (N)
F : force acting of jaws (N)
(when static, F is equivalent to the weight of the workpiece in N)
μ : coefficient of friction between the workpiece and jaws ($\mu < 1$)
So : safety factor (between 2 and 4, see the table below)

Safety factor So	Type of use
2	normal use
3	movement in several directions slow accelerations or decelerations
4	shocks, fast accelerations or decelerations

Examples

Compact parallel gripper in vertical position



Data	
Jaw length **X** (mm)	20
Mass of workpiece to grip M (kg)	0.15
Pressure (bar)	6
Safety factor So	2
Coefficient of friction μ	0.2
Mass acceleration g (m/s²)	9.81

Calculation of clamping force:

$$Fs = \frac{0.15 \times 9.81}{0.2} \times 2$$

$$= 14.72 \text{ N}$$

Checking clamping force Fs:

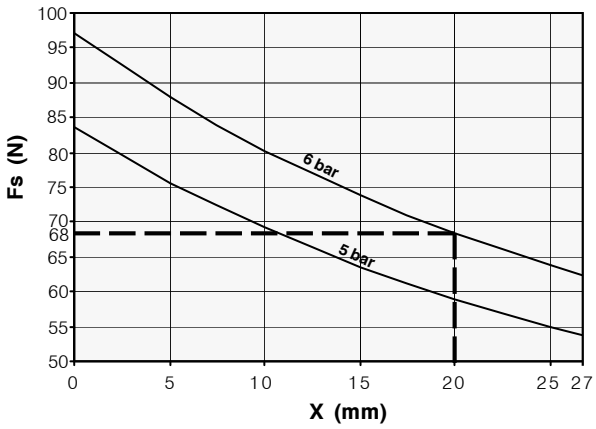
At P = 6 bar and x = 20 mm, the clamping force read from the graph opposite (parallel gripper size 1, see page 9) is Fs = 68N.
Since 68N > 14.72N
Size 1 is sufficient.

Checking tractive force Fx on jaw carrier:

(see table on page 8)

F= Mg= 0.15 x 9.81 = 1.48 N
F = Mg = 0.15 x 9.81 = 1.48N
For a parallel gripper size 1, Fx = 80N
Since 80N > 1.48N
The choice of size 1 is correct.

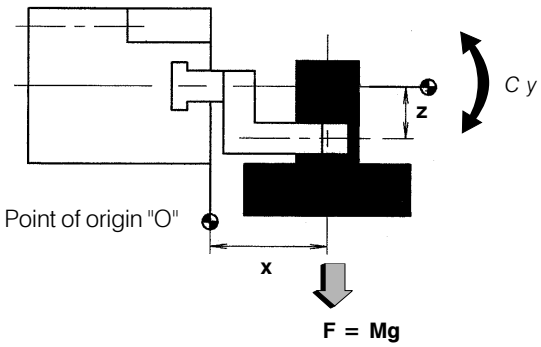
Clamping force / jaw length:



Compact parallel gripper in horizontal position

Data

Jaw length **x** (mm)	30
Offset distance **z** (mm)	12
Mass of workpiece to grip M (kg)	0.50
Pressure (bar)	6
Safety factor So	2
Coefficient of friction μ	0.15
Mass acceleration g (m/s^2)	9.81



Calculation of clamping force:

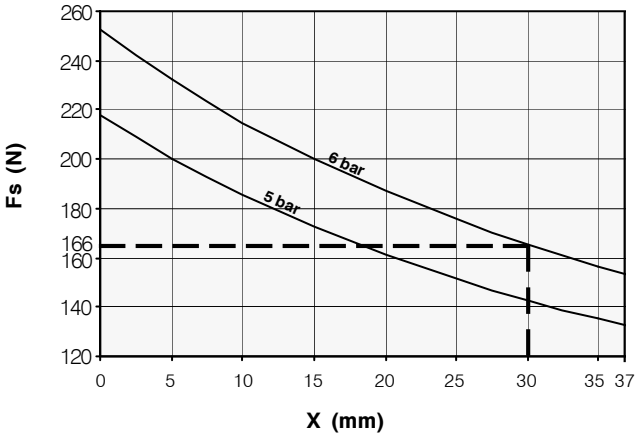
$$Fs = \frac{0.50 \times 9.81}{0.15} \times 2$$

$$= 65.4 \text{ N}$$

Checking clamping force Fs:

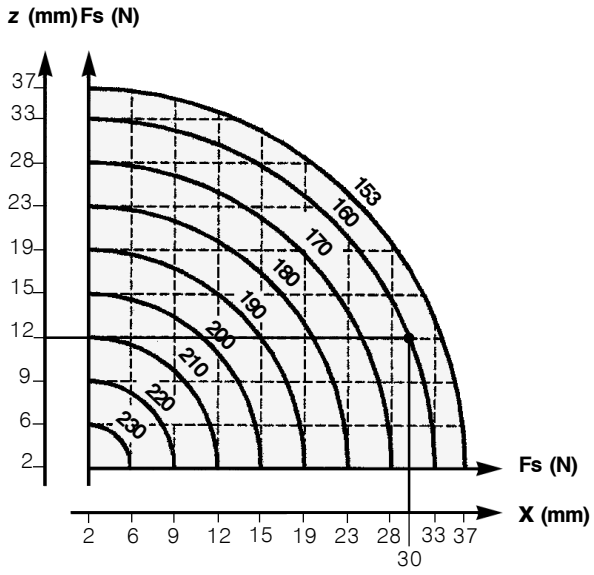
At P = 6 bar and x = 30 mm, the clamping force read from the graph opposite (parallel gripper size 2, see page 116) is Fs = 166N.
Since 166N > 65.4N
Size 2 is sufficient.

Clamping force / jaw lenght:



Checking the offset *z*:
At P = 6 bar, x = 30 mm and offset z = 12 mm, Fs calculated should be < maximum clamping force Fs read from the graph opposite (parallel gripper size 2, see page 116).
Since 160N > 65.4N
Size 2 is sufficient.

Clamping force / jaw length/offset:
(at 6 bar)

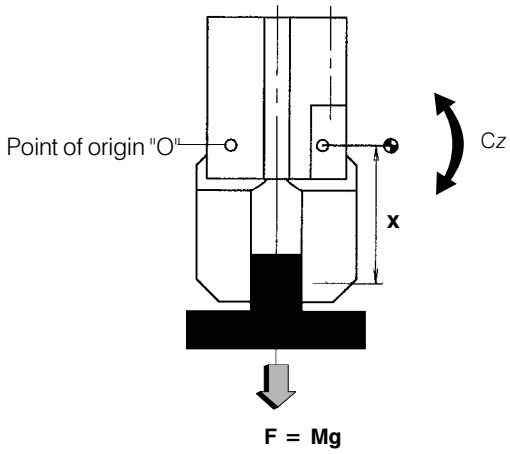


Checking torque My exerted on the jaw carrier:
(see table on page 114)
The torque exerted on axis "Oy" is:
Cy = F x X = 0.50 x 9.81 x 0.03
= 0.15 Nm
Cy should be < max torque My read from the table on page 8 for a size 2 gripper.
Since 0.15Nm < 1.2 Nm
The choice of size 2 is correct.

Compact angular gripper in vertical position

Data

Length of jaws **x** (mm)	40
Mass of workpiece to grip M (kg)	0.15
Pressure (bar)	6
Safety factor So	2
Coefficient of friction μ	0.2
Mass acceleration g (m/s^2)	9.81



Calculation of clamping force :

$$Fs = \frac{0.15 \times 9.81}{0.2} \times 2$$

$$= 14.72 \text{ N}$$

Checking clamping force Fs:
At P = 6 bar, and x = 40 mm the clamping force read from the graph opposite (angular gripper size 1, see page 125)
$Fs_{6\,bar} = 19$ N

Checking torque Mz exerted on the jaw carrier:
(see table on page 124)

The torque exerted on axis "Oz" is:

$Cz = Fs_{6\,bar} \times \mathbf{x}$
$= 19 \times 0.04$
$= 0.76$ Nm

Cz should be < maximum torque Mz read from the table page 124.
Choose a gripper size with a value Mz > C and $Fs_{6\,bar} > Fs$
Since 2.7 Nm > 0.76 Nm and 14.72 N < 19 N
Choice of size 2 is required.

Checking tractive force Fx on jaw carrier:
(see table on page 124)

F = Mg = 0.15 x 9.81 = 1.48 N
2 Fx = 160 N for angular grippers size 2.
As 160 N > 1.48 N
Choice of size 2 is correct.

Checking torque MZ:

$CZ = Fs_{6\,bar} \times \mathbf{x}$
$= 70 \times 0.04 = 2.8$ Nm

CZ should be < maximum torque MZ read from the table on page 124.
Since 2.8 Nm > 2.7 Nm the pressure should be reduced from 6 to 5 bar.

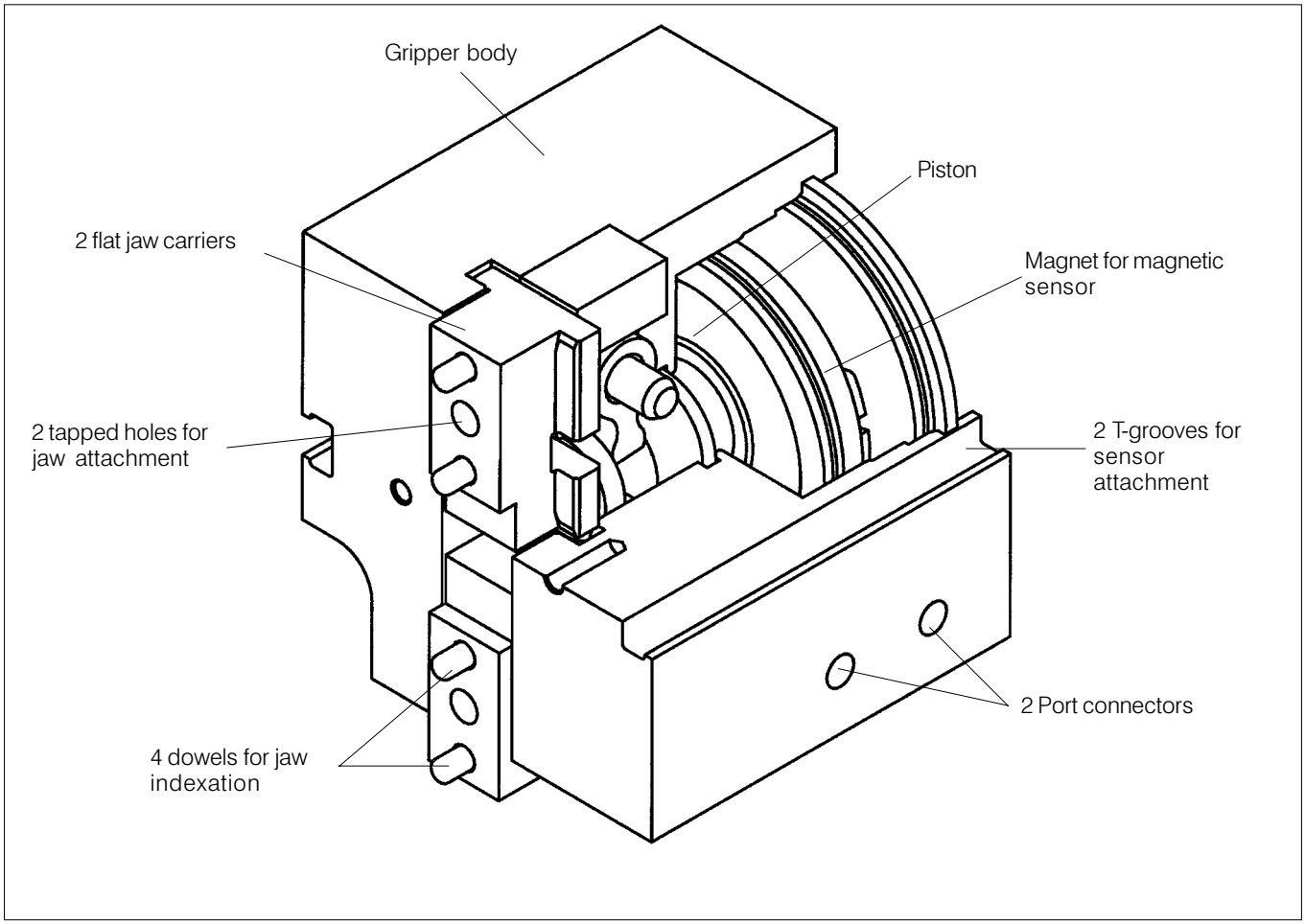
$CZ = Fs_{5\,bar} \times \mathbf{x}$
$= 60 \times 0.04$
$= 2.4$ Nm
Since 2.4 Nm < 2.7 Nm
Choice of gripper size 2 is still required.

Note: angular gripper size 1 may be suitable provided that the pressure is reduced from 6 to 4.5 bar.

Parameters not considered in selecting grippers:

- the mass of the jaws
- shape and position of the centres of gravity of jaws
- additional loads and torques (shocks etc.)
- dynamic movement of gripper and workpiece combination
- desirable opening and closing times
- ambient working conditions

Note: Software for calculating the clamping force is available on CD-ROM.



Compact parallel grippers

These grippers which are used for materials handling and precision assembly, are part of the Parker Pneumatic automation product range.
5 sizes are available and can be used in most applications.

Versions and sensors

There are 2 versions, 2 flat jaw carriers or 2 square jaw carriers. One or two magneto-inductive sensors can be mounted on all sizes to control opening and closing of the grippers.

Protection

The gripper body is made of hard anodised aluminium and the two jaw carriers are of pre-treated steel.
Additional cover protection can be added for use in difficult environments.

Safety

In the standard version, internal springs ensure that the grippers remain closed if the air supply is cut off.

Mounting

By socket cap screws at the front of the gripper.
By tapped holes at the rear of the gripper.
Precise location of gripper through centring and dowel holes.

Connection

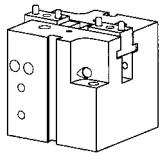
Pneumatic port connections on one side of the gripper and on the rear for face to face sealing.

Reliability

The grippers have been designed for 10 million operations under normal working conditions.

Range

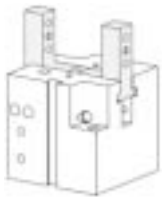
Flat jaw carrier standard gripper
Gripper is opened and closed by air supply.
Automatic closed grip retention by springs.
5 sizes available.



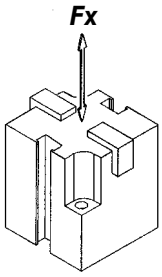
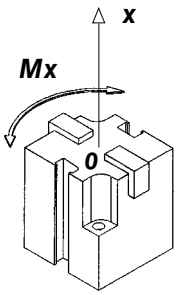
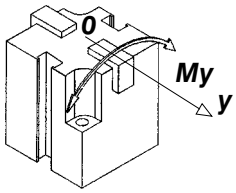
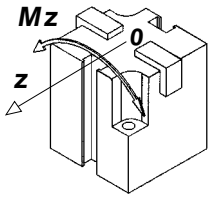
Standard gripper with sensor option
Check on opening and closing of the gripper by means of magneto-inductive sensors.

Standard gripper with protection option
Additional protection makes it possible to seal the gripper from swarf.

Standard gripper with square jaw carrier option
Jaw carriers of different shapes increase mounting options.



Permissible forces on jaw carriers

Size				
1	80 N	2 Nm	0.5 Nm	3.8 Nm
2	220 N	13 Nm	1.2 Nm	25.2 Nm
3	580 N	29 Nm	4.4 Nm	56.8 Nm
4	900 N	36 Nm	8 Nm	72 Nm
5	1400 N	44 Nm	15 Nm	87.4 Nm

Mz at 6 bar pressure.

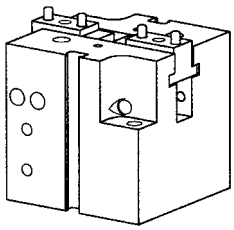
The permissible forces and torques are shown **for two jaw carriers**.
These values should not be exceeded if:
- any extra forces are exerted on the workpiece and the jaws in addition to the force or clamping torque.
- handling forces (acceleration, shocks etc.) are also added.

These values are cumulative if the forces act in different directions at the same time.

Compact parallel Grippers size 1

Technical information

Total stroke (mm)	4
Max clamping force (N)	97
Max jaw length (mm)	27
Ø piston bore (mm)	16
Ø port size (mm)	M5
Air consumption at 6 bar (cm^3 / cycle)	0.75
Repeatability (mm)	0.05
Min. opening time (s)	0.01
Min. closing time (s)	0.01
Mass with flat jaw carrier (kg)	0.09
Mass with square jaw carrier (kg)	0.10
Min automatic grip retention at mid jaw travel (N)	11



Material

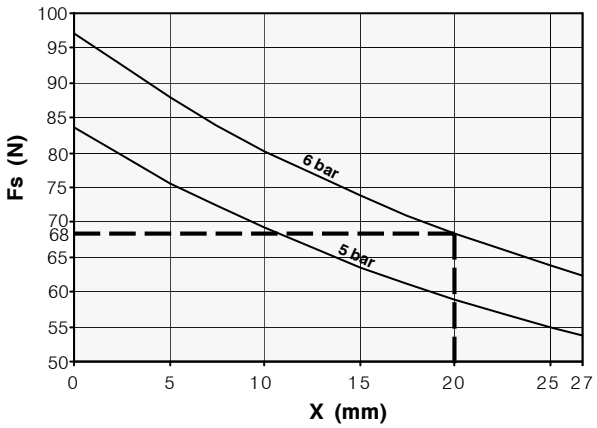
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 40 CMD8
Seals	nitrile butadiene rubber (NBR)

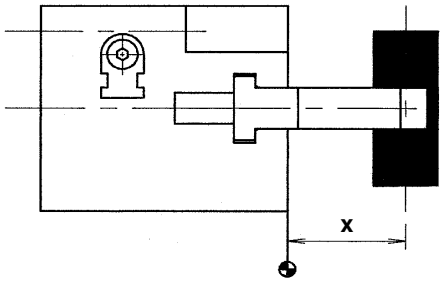
General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

Clamping force / jaw length

(at mid jaw travel)

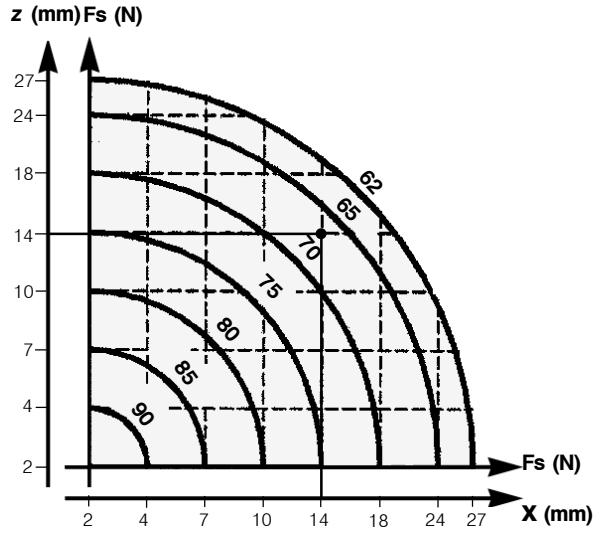


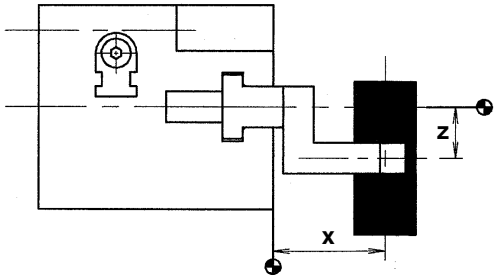


Example : where **x** = 20 mm, Fs = 68 N

Clamping force / length / jaw offset

(at 6 bar)



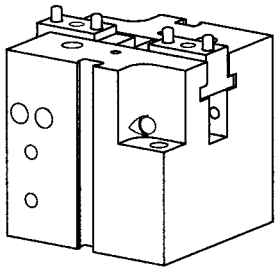


Example : where **x** = 14 mm and **z** = 14 mm, Fs = 67 N

Compact parallel Grippers size 2

Technical information

Total stroke (mm)	6
Max clamping force (N)	252
Max jaw length (mm)	37
Ø piston bore (mm)	25
Ø port size (mm)	M5
Air consumption at 6 bar (cm^3 / cycle)	2.75
Repeatability (mm)	0.05
Min. opening time (s)	0.01
Min. closing time (s)	0.01
Mass with flat jaw carrier (kg)	0.21
Mass with square jaw carrier (kg)	0.23
Min automatic grip retention at mid jaw travel (N)	28



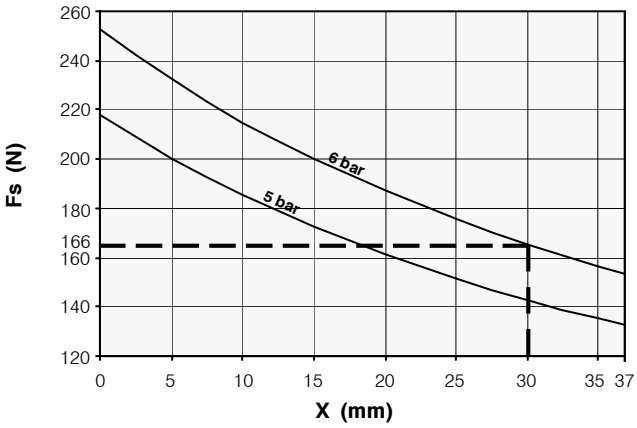
Material

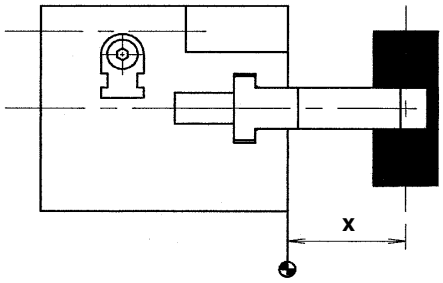
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 40 CMD8
Seals	nitrile butadiene rubber (NBR)

General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

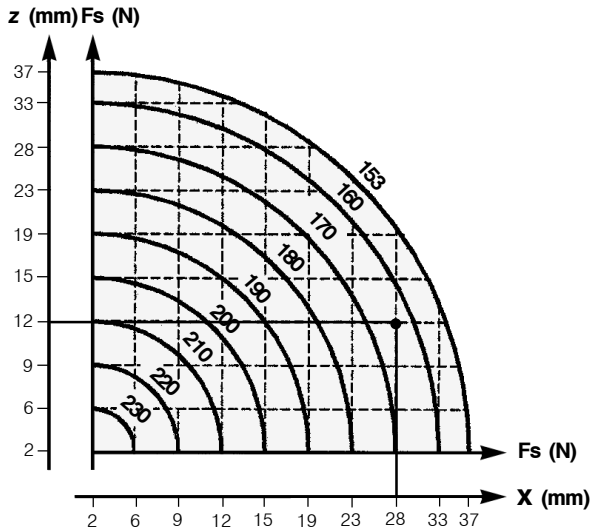
Clamping force / jaw length
(at mid jaw travel)

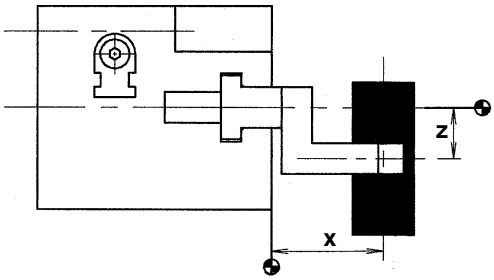




Example : where **x** = 30 mm, Fs = 166 N

Clamping force / length / jaw offset
(at 6 bar)



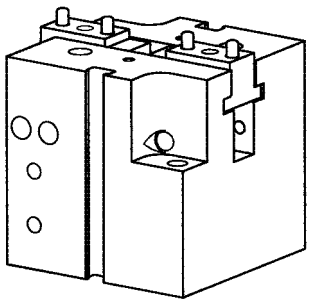


Example : where **x** = 28 mm and **z** = 12 mm, Fs = 165 N

Compact parallel Grippers size 3

Technical information

Total stroke (mm)	10
Max clamping force (N)	715
Max jaw length (mm)	52
Ø piston bore (mm)	40
Ø port size (mm)	M5
Air consumption at 6 bar (cm^3 / cycle)	11.8
Repeatability (mm)	0.05
Min. opening time (s)	0.02
Min. closing time (s)	0.02
Mass with flat jaw carrier (kg)	0.45
Mass with square jaw carrier (kg)	0.49
Min automatic grip retention at mid jaw travel (N)	104



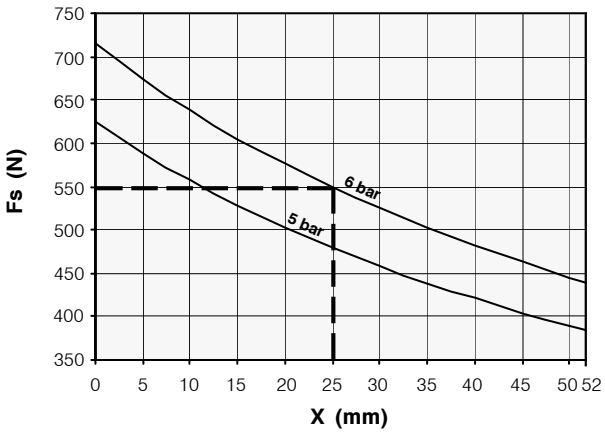
Material

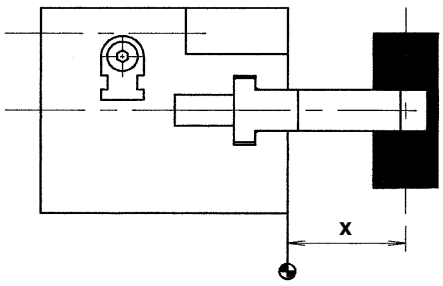
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 40 CMD8
Seals	nitrile butadiene rubber (NBR)

General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

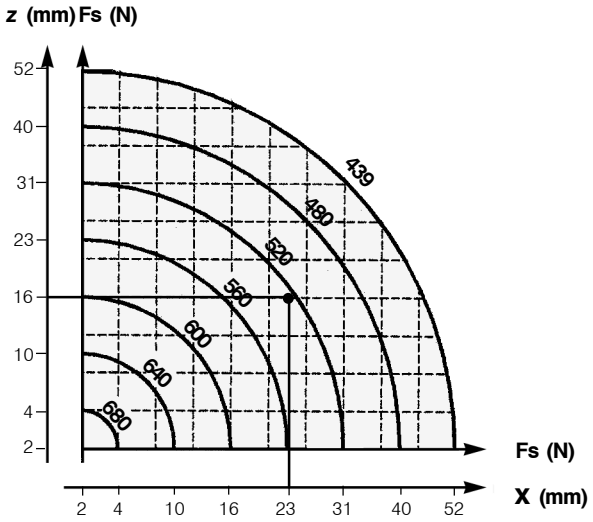
Clamping force / jaw length
(at mid jaw travel)

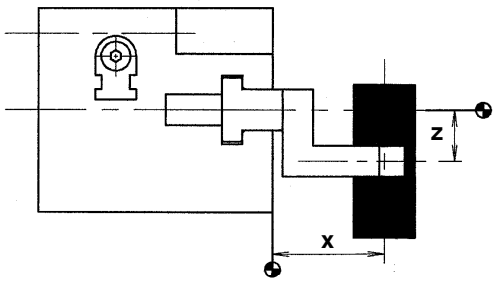




Example : where **x** = 25 mm, Fs = 550 N

Clamping force / length / jaw offset
(at 6 bar)



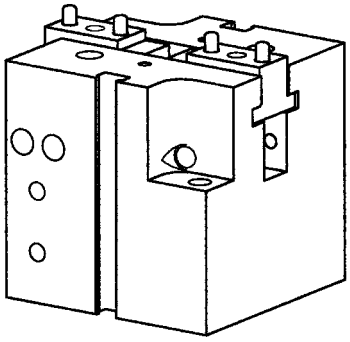


Example : where **x** = 23 mm and **z** = 16 mm, Fs = 525 N

Compact parallel Grippers size 4

Technical information

Total stroke (mm)	13
Max clamping force (N)	1128
Max jaw length (mm)	73
Ø piston bore (mm)	50
Ø port size (mm)	G1/8
Air consumption at 6 bar (cm^3 / cycle)	24.2
Repeatability (mm)	0.05
Min. opening time (s)	0.02
Min. closing time (s)	0.02
Mass with flat jaw carrier (kg)	0.73
Mass with square jaw carrier (kg)	0.78
Min automatic grip retention at mid jaw travel (N)	142



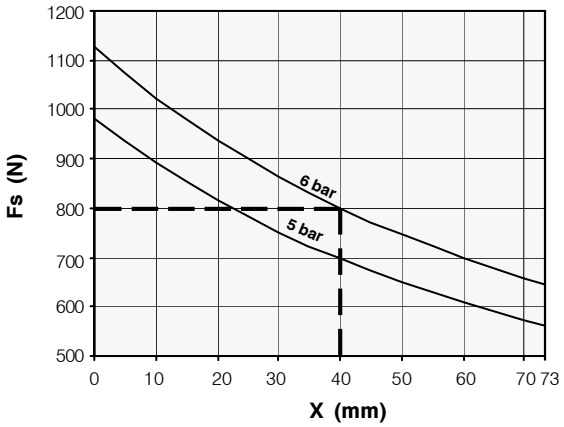
Material

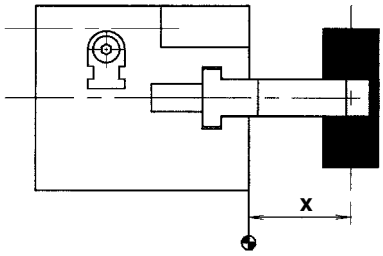
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 40 CMD8
Seals	nitrile butadiene rubber (NBR)

General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

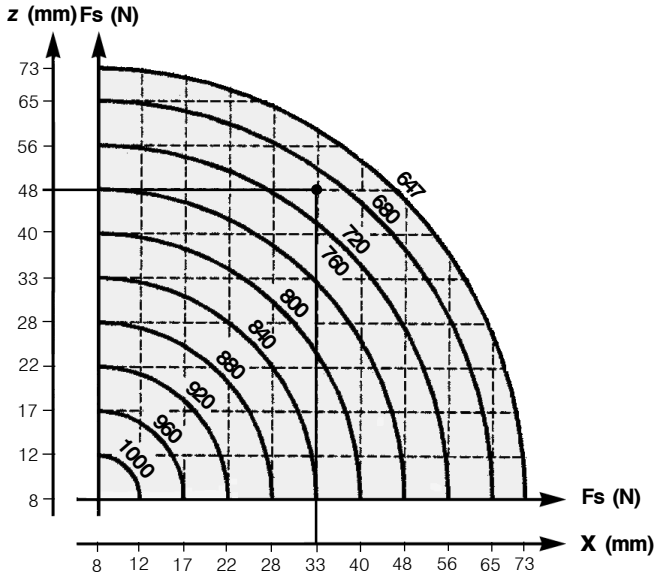
Clamping force / jaw length
(at mid jaw travel)

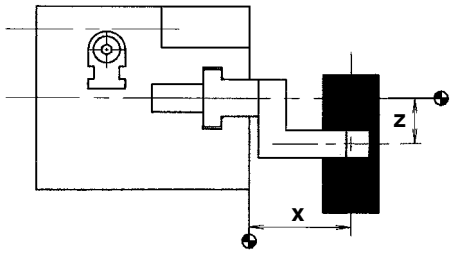




Example : where **x** = 40 mm, Fs = 800 N

Clamping force / length / jaw offset
(at 6 bar)



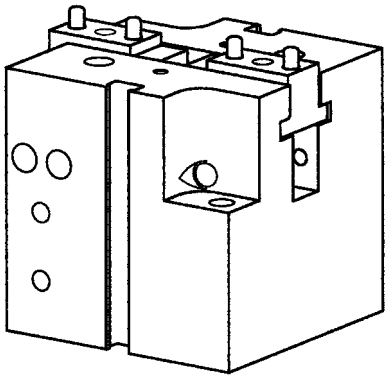


Example : where **x** = 33 mm and **z** = 48 mm, Fs = 700 N

Compact parallel Grippers size 5

Technical information

Total stroke (mm)	18
Max clamping force (N)	1767
Max jaw length (mm)	95
Ø piston bore (mm)	63
Ø port size (mm)	G1/8
Air consumption at 6 bar (cm^3 / cycle)	53.6
Repeatability (mm)	0.05
Min. opening time (s)	0.03
Min. closing time (s)	0.03
Mass with flat jaw carrier (kg)	1.25
Mass with square jaw carrier (kg)	1.33
Min automatic grip retention at mid jaw travel (N)	198



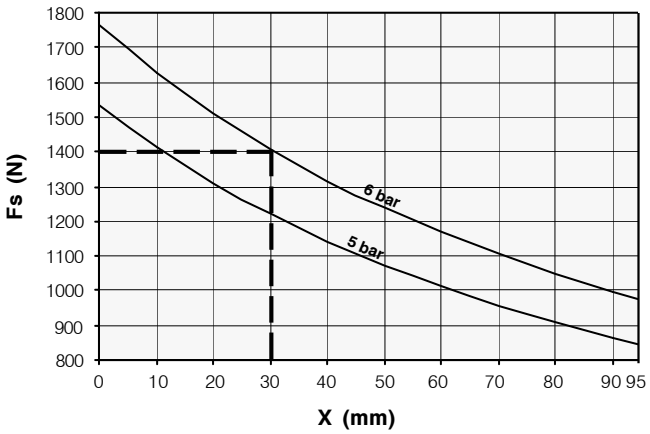
Material

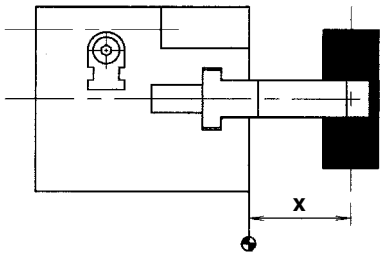
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 40 CMD8
Seals	nitrile butadiene rubber (NBR)

General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

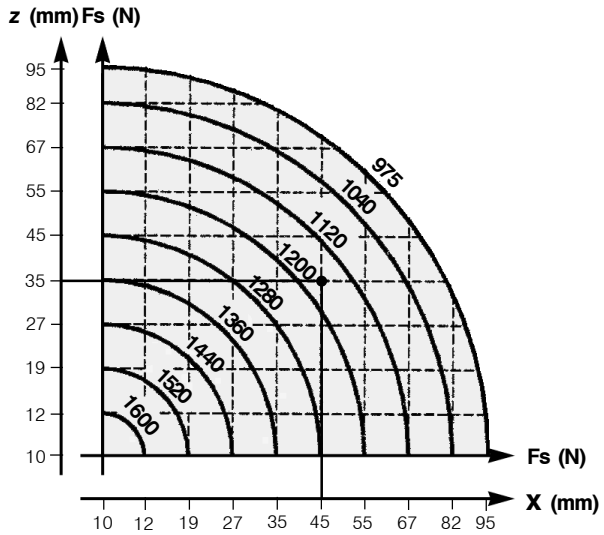
Clamping force / jaw length
(at mid jaw travel)

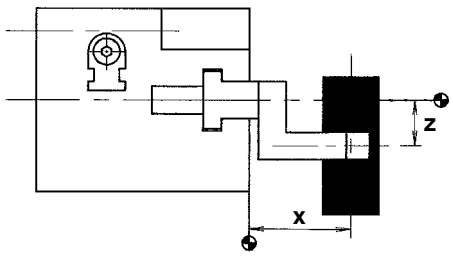




Example : where **x** = 30 mm, Fs = 1400 N

Clamping force / length / jaw offset
(at 6 bar)

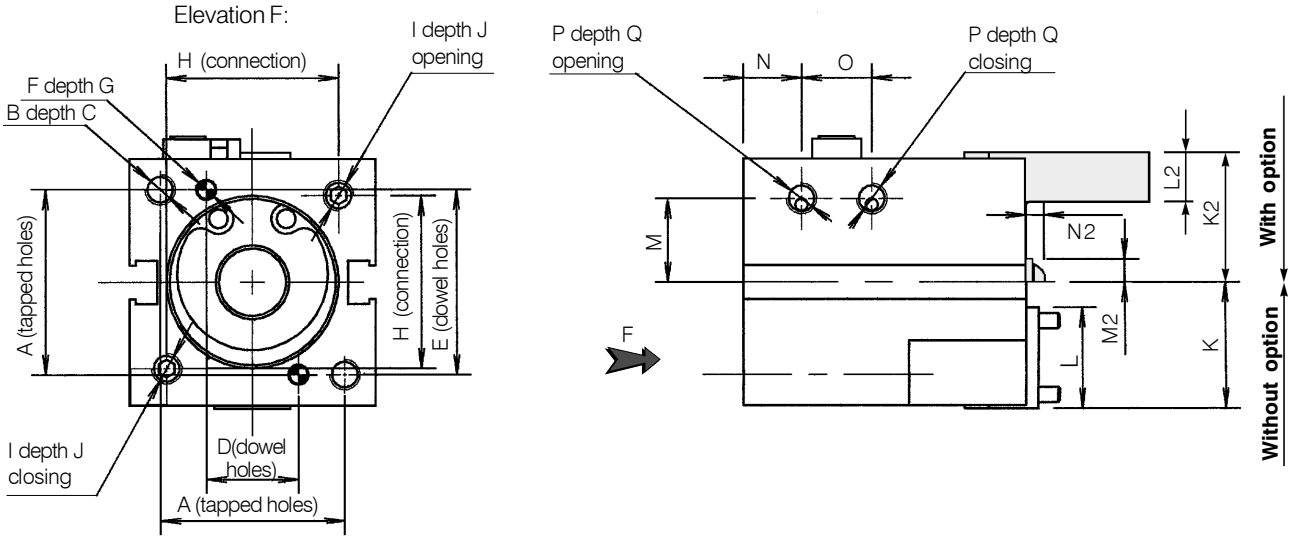




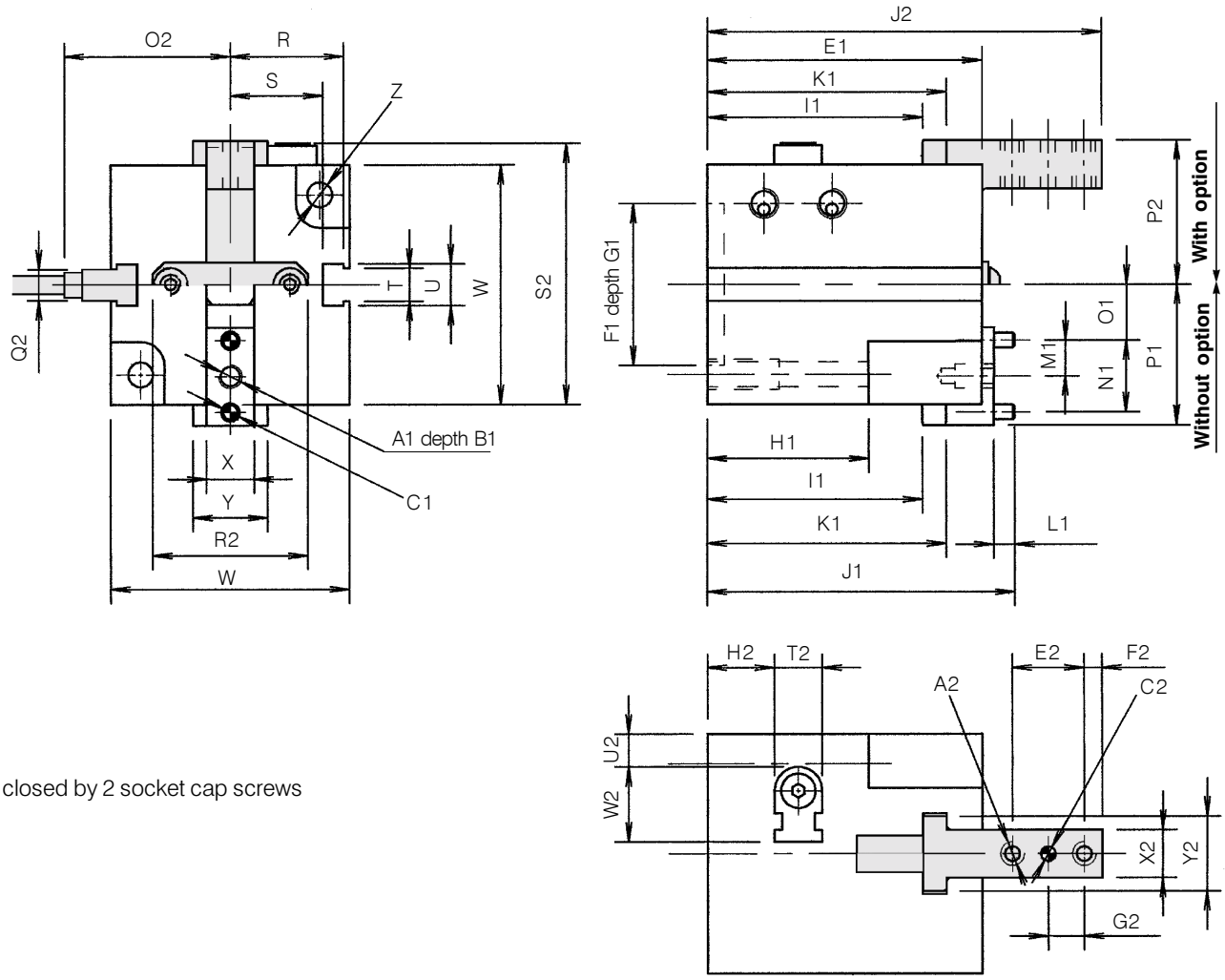
Example : where **x** = 45 mm et **z** = 35 mm, Fs = 1180 N

Size

Gripper shown with jaw carrier closed:



Gripper shown with jaw carrier opened:



I : closed by 2 socket cap screws

Dimensions (mm)

Size	Total stroke	A	ØB	C	D (js8)	E (js8)	ØF (H9)	G	H	ØI	J	K	L
1	4	23	M4	10	10	23	2,5	5	18	M3	3,5	15,5	12
2	6	30	M5	12	15	30	3	6	28	M5	6	20,5	16,5
3	10	44	M6	15	26	44	4	8	38	M5	6	27	20
4	13	52	M8	20	28	56	5	10	48	M5	6	32,5	23
5	18	63	M10	25	35	70	6	12	60	M5	6	38,5	28

Size	M	N	O	ØP	Q	R	S	T	U	W	X (g6)	Y	ØZ
1	9	6	10	M5	6	14,5	11	5,5	7	30	6	9	3,1
2	13,5	9,5	11,5	M5	6	19	15,5	5,5	7	40	8	12,5	4,1
3	19	12	14.5	M5	6	26,5	23	5,5	7	55	11	17	5,1
4	24	15	19	G1/8	8	31,5	28	5,5	7	65	13	21	6,1
5	30	16	23	G1/8	8	38,5	35	5,5	7	80	16	23,5	8,1

Size	ØA1	B1	ØC1 $^{0}_{-0.01}$	E1	ØF1 (H10)	G1	H1	I1	J1	K1	L1	M1	N1 (js8)	O1	P1
1	M3	5	2	35	18	1,5	19	27,5	39,5	30,5	2,5	4,5	9	7	17,5
2	M4	6,5	2,5	46	27	2,5	27	36	51,5	40	3,5	6	12	9,5	23,5
3	M5	8	3	56	43	3,5	34	45	62	49	4	7	14	15	32
4	M6	12	4	65	53	4,5	40	53,5	78	57,5	5	8	16	19,5	39
5	M8	15	5	75	67	4,5	45	61	91	66	6	10,5	21	23	47,5

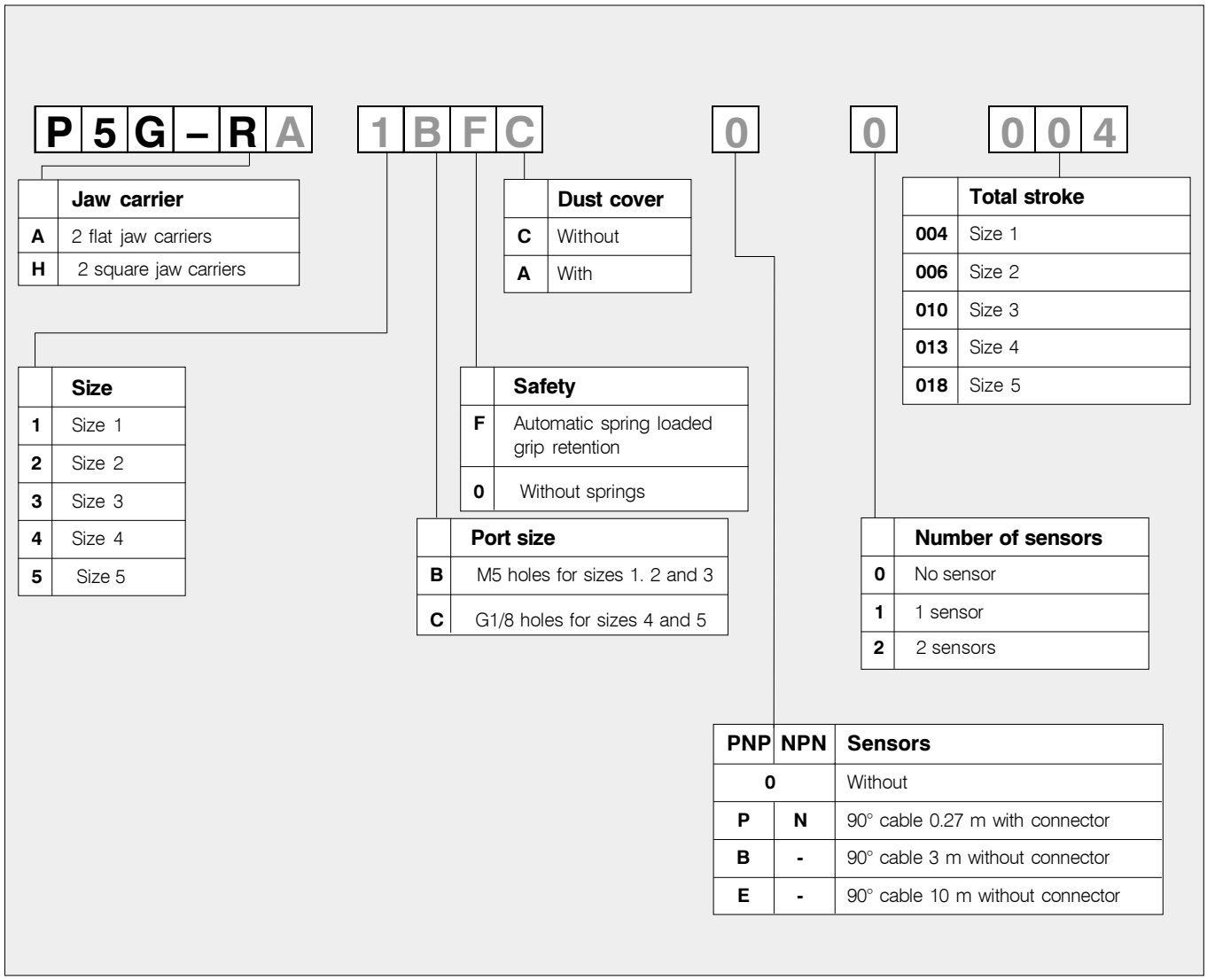
Options

Dimensions (mm)

Size	ØA2	ØC2 (E7)	E2	F2	G2	H2	J2	K2	L2	M2	N2
1	M3	2	9	2	4,5	7	50	14	6	3	3
2	M4	2,5	12	3	6	11	66	18	8	4	3
3	M5	3	14	6	7	15	84	27	11	6	3
4	M6	4	16	6	8	21	97	32,5	13	8	4
5	M8	5	21	8	10,5	24	115,5	38,5	16	10	4

Size	O2	P2	Q2	R2	S2	T2	U2	W2	X2 (g6)	Y2
1	23	16	5	20	34	8	3,5	12,5	6	9
2	28	21	5	26	44	8	5,5	12,5	8	12,5
3	35	32	5	36	59	8	6,5	12,5	11	17
4	40,5	39	5	46	69	8	8,5	12,5	13	21
5	47,5	47,5	5	50	84	8	13	12,5	16	23,5

Order code



	Jaw carrier
A	2 flat jaw carriers
H	2 square jaw carriers

	Dust cover
C	Without
A	With

	Total stroke
004	Size 1
006	Size 2
010	Size 3
013	Size 4
018	Size 5

	Size
1	Size 1
2	Size 2
3	Size 3
4	Size 4
5	Size 5

	Safety
F	Automatic spring loaded grip retention
0	Without springs

	Port size
B	M5 holes for sizes 1. 2 and 3
C	G1/8 holes for sizes 4 and 5

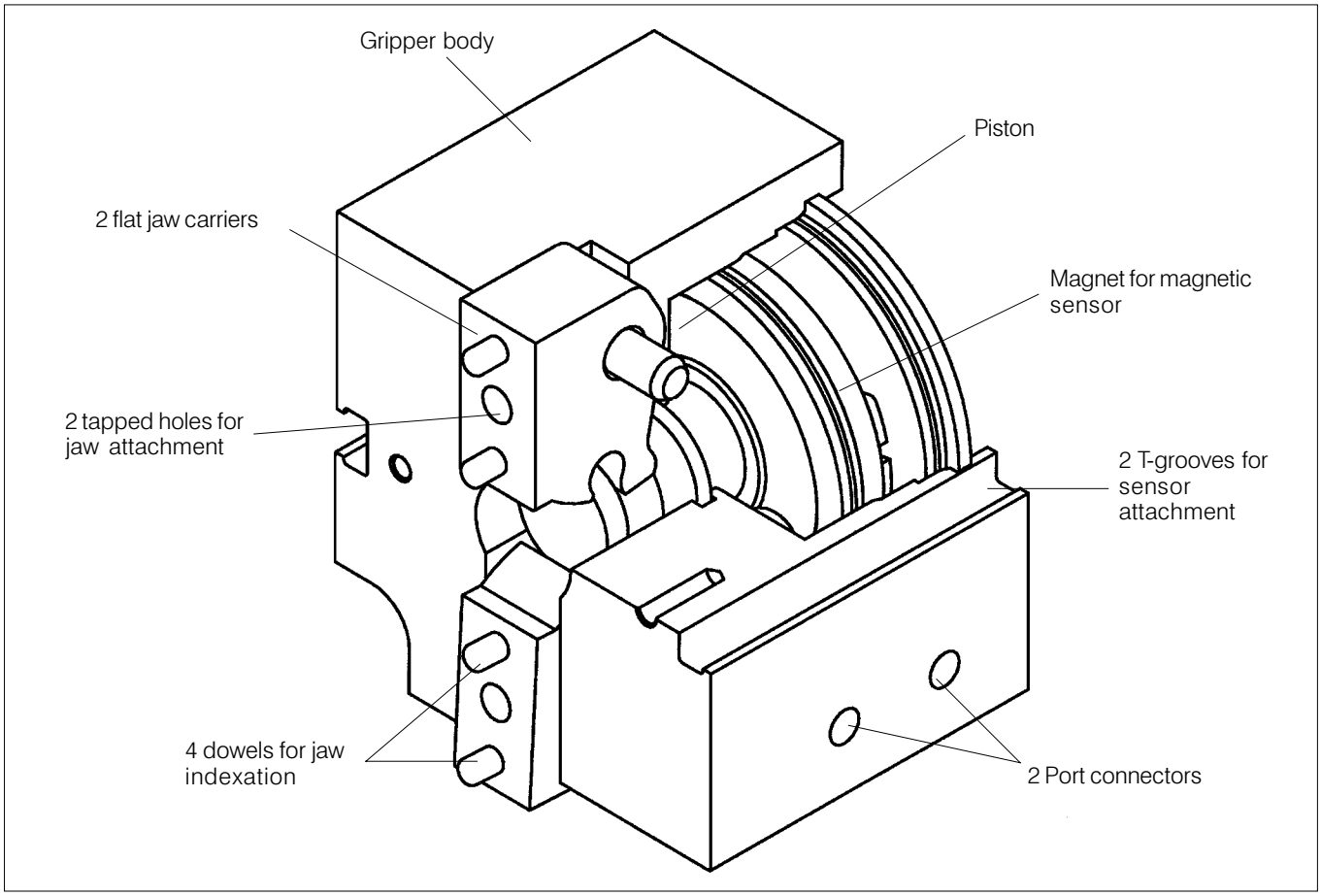
	Number of sensors
0	No sensor
1	1 sensor
2	2 sensors

PNP	NPN	Sensors
0		Without
P	N	90° cable 0.27 m with connector
B	-	90° cable 3 m without connector
E	-	90° cable 10 m without connector

Note: All grippers complete with magnet for sensing.

Example: compact parallel gripper, flat jaw carrier, size 3, spring loaded closing safety, without cover, fitted with 2 PNP sensors and 90° cable 0.27 m with connector:

Order code: P5G-RA3BFCP2010



Compact angular grippers

These grippers which are used for materials handling and precision assembly, are part of the Parker Pneumatic automation product range.
5 sizes are available and can be used in most applications.

Versions and sensors

There are 2 versions, 2 flat jaw carriers or 2 square jaw carriers. One or two magneto-inductive sensors can be mounted on all sizes to control opening and closing of the grippers.

Protection

The gripper body is made of hard anodised aluminium and the two jaw carriers are of pre-treated steel.
Additional cover protection can be added for use in difficult environments.

Safety

In the standard version, internal springs ensure that the grippers remain closed if the air supply is cut off.

Mounting

By socket cap screws at the front of the gripper.
By tapped holes at the rear of the gripper.
Precise location of gripper through centring and dowel holes.

Connection

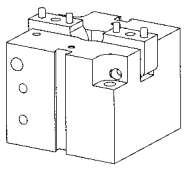
Pneumatic port connections on one side of the gripper and on the rear for face to face sealing.

Reliability

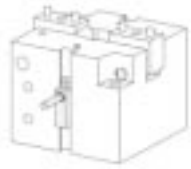
The grippers have been designed for 10 million operations under normal working conditions.

Range

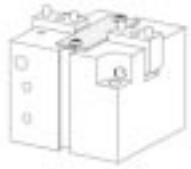
Flat jaw carrier standard gripper
Gripper is opened and closed by air supply.
Automatic closed grip retention by springs.
5 sizes available.



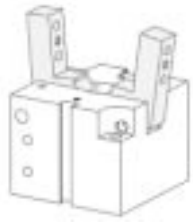
Standard gripper with sensor option
Check on opening and closing of the gripper by means of magneto-inductive sensors.



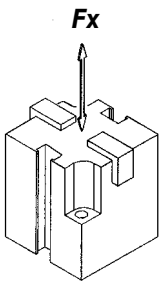
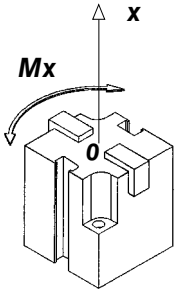
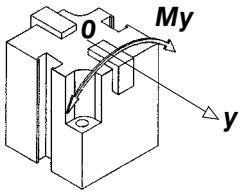
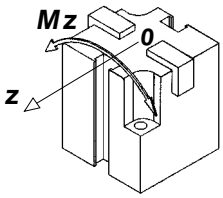
Standard gripper with protection option
Additional protection makes it possible to seal the gripper from swarf.



Standard gripper with square jaw carrier option
Jaw carriers of different shapes increase mounting options.



Permissible forces on jaw carriers

Size	 Fx	 Mx	 My	 Mz
1	34 N	1.2 Nm	1.2 Nm	0.7 Nm
2	160 N	4.6 Nm	4.6 Nm	2.7 Nm
3	260 N	19.2 Nm	19.2 Nm	11.9 Nm
4	480 N	36 Nm	36 Nm	22.4 Nm
5	620 N	73.2 Nm	73.2 Nm	44.5 Nm

MZ at 6 bar pressure, parallel jaw carriers.

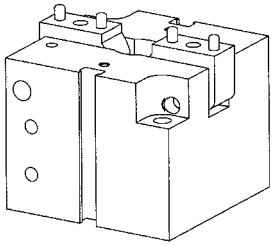
The permissible forces and torques are shown **for two jaw carriers**.
These values should not be exceeded if:
- any extra forces are exerted on the workpiece and the jaws in addition to the force or clamping torque.
- handling forces (acceleration, shocks etc.) are also added.

These values are cumulative if the forces act in different directions at the same time.

Compact angular grippers size 1

Technical information

Opening angle (°)	33
Max clamping torque (Nm)	0.7
Max jaw length (mm)	60
Ø piston bore (mm)	16
Ø port size (mm)	M5
Air consumption at 6 bar (cm^3 / cycle)	0.75
Repeatability (mm)	0.05
Min. opening time (s)	0.01
Min. closing time (s)	0.01
Mass with flat jaw carrier (kg)	0.08
Mass with square jaw carrier (kg)	0.09
Min automatic grip retention at mid jaw travel (N)	0.1



Material

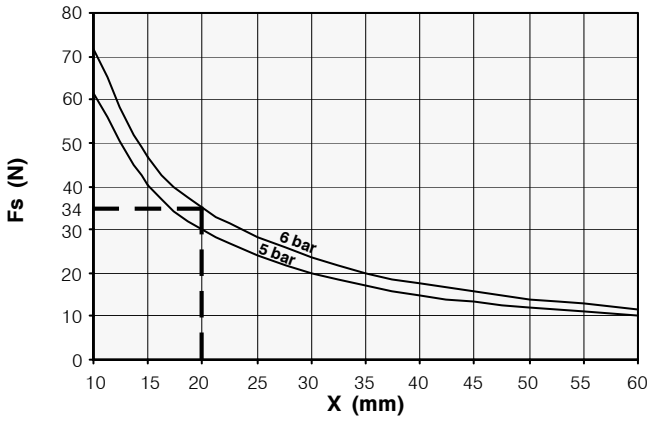
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 30 CD12
Seals	nitrile butadiene rubber (NBR)

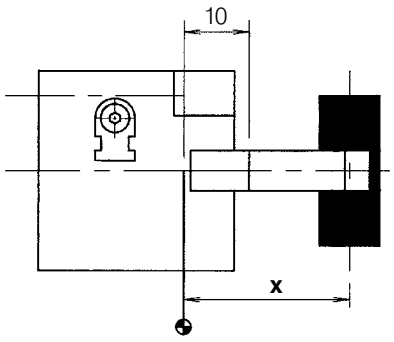
General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

Clamping force / jaw length

(parallel jaws)

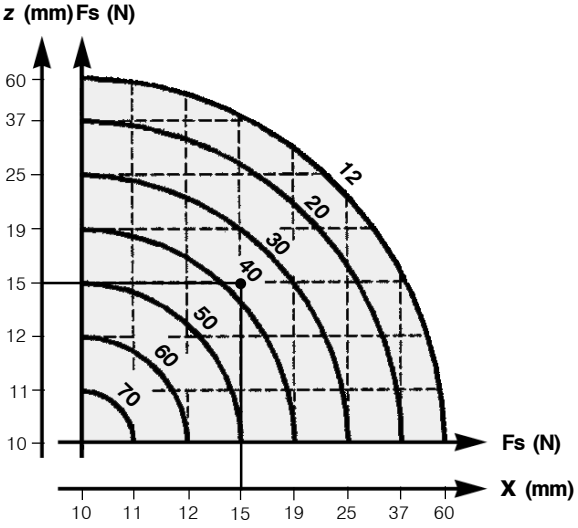


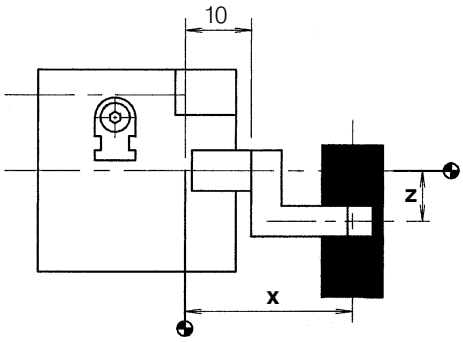


Example : where **x** = 20 mm, Fs = 34 N

Clamping force / length / jaw offset

(at 6 bar)



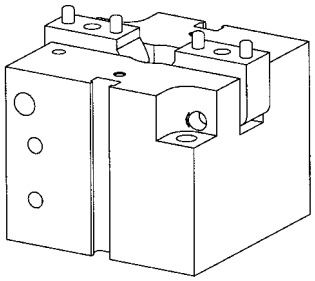


Example : where **x** = 15 mm and **z** = 15 mm, Fs = 38 N

Compact angular grippers size 2

Technical information

Opening angle (°)	34
Max clamping torque (Nm)	2.7
Max jaw length (mm)	83
Ø piston bore (mm)	25
Ø port size (mm)	M5
Air consumption at 6 bar (cm^3 / cycle)	2.75
Repeatability (mm)	0.05
Min. opening time (s)	0.01
Min. closing time (s)	0.01
Mass with flat jaw carrier (kg)	0.19
Mass with square jaw carrier (kg)	0.2
Min automatic grip retention at mid jaw travel (N)	0.4



Material

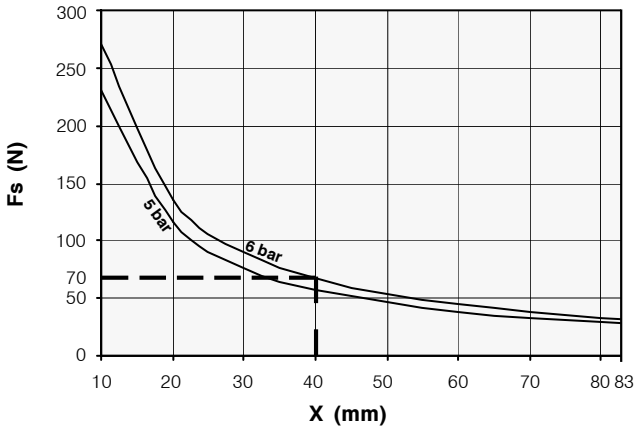
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 30 CD12
Seals	nitrile butadiene rubber (NBR)

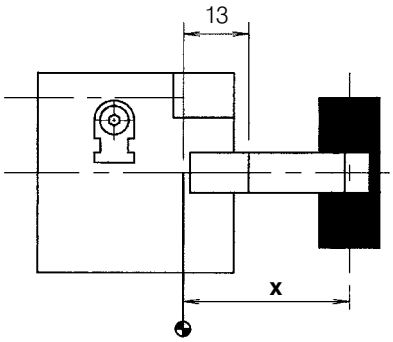
General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

Clamping force / jaw length

(parallel jaws)

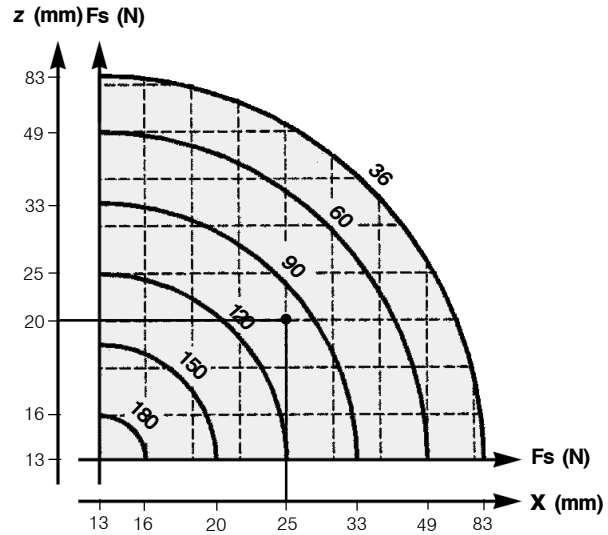


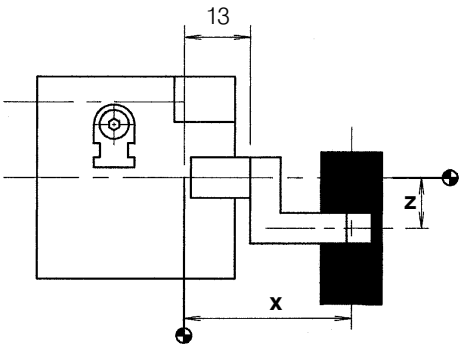


Example : where **x** = 40 mm, Fs = 70 N

Clamping force / length / jaw offset

(at 6 bar)



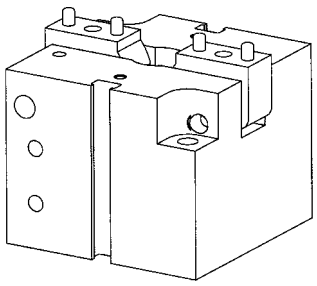


Example : where **x** = 25 mm and **z** = 20 mm, Fs = 95 N

Compact angular grippers size 3

Technical information

Opening angle (°)	35
Max clamping torque (Nm)	11.9
Max jaw length (mm)	103
Ø piston bore (mm)	40
Ø port size (mm)	M5
Air consumption at 6 bar (cm^3 / cycle)	11.8
Repeatability (mm)	0.05
Min. opening time (s)	0.02
Min. closing time (s)	0.02
Mass with flat jaw carrier (kg)	0.38
Mass with square jaw carrier (kg)	0.42
Min automatic grip retention at mid jaw travel (N)	2.3



Material

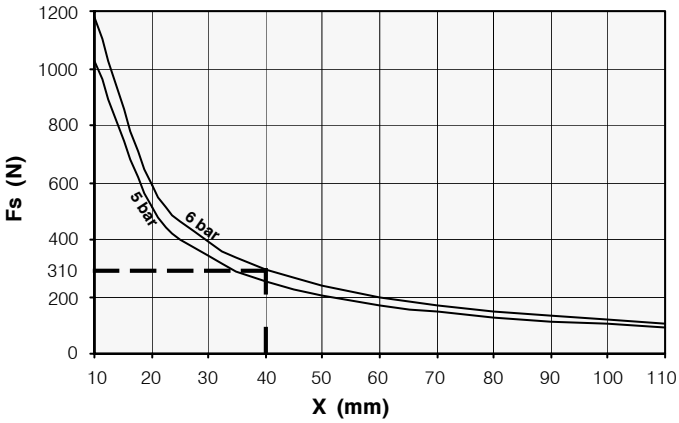
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 30 CD12
Seals	nitrile butadiene rubber (NBR)

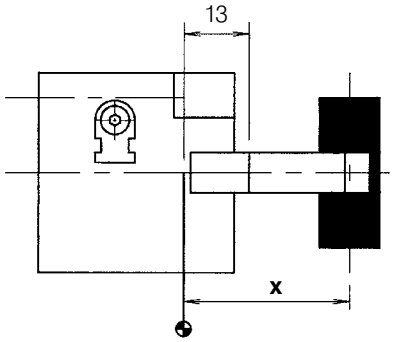
General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

Clamping force / jaw length

(parallel jaws)

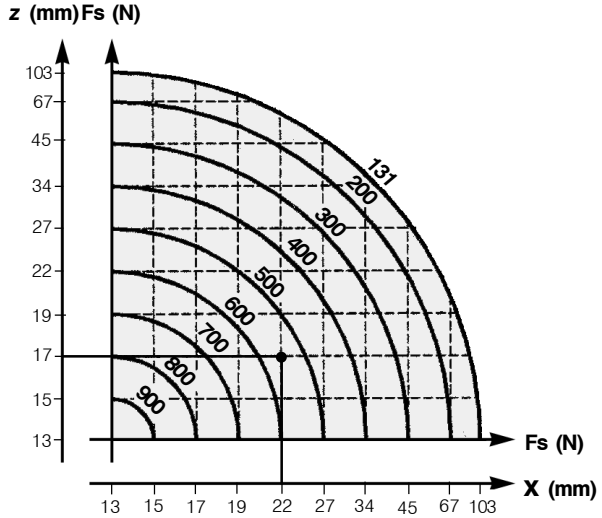


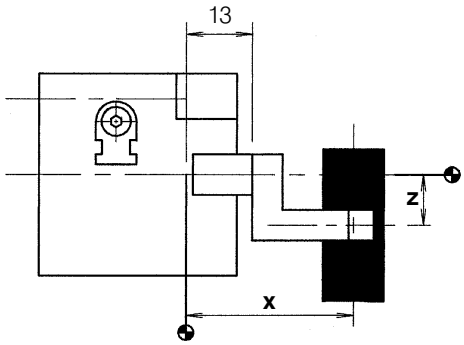


Example : where **x** = 40 mm, Fs = 310 N

Clamping force / length / jaw offset

(at 6 bar)



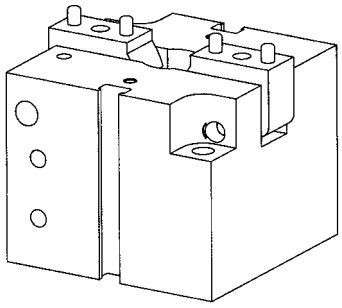


Example : where **x** = 22 mm and **z** = 17 mm, Fs = 550 N

Compact angular grippers size 4

Technical information

Opening angle (°)	43
Max clamping torque (Nm)	22.4
Max jaw length (mm)	139
Ø piston bore (mm)	50
Ø port size (mm)	G1/8
Air consumption at 6 bar (cm^3 / cycle)	24.2
Repeatability (mm)	0.05
Min. opening time (s)	0.02
Min. closing time (s)	0.02
Mass with flat jaw carrier (kg)	0.65
Mass with square jaw carrier (kg)	0.73
Min automatic grip retention at mid jaw travel (N)	4.4



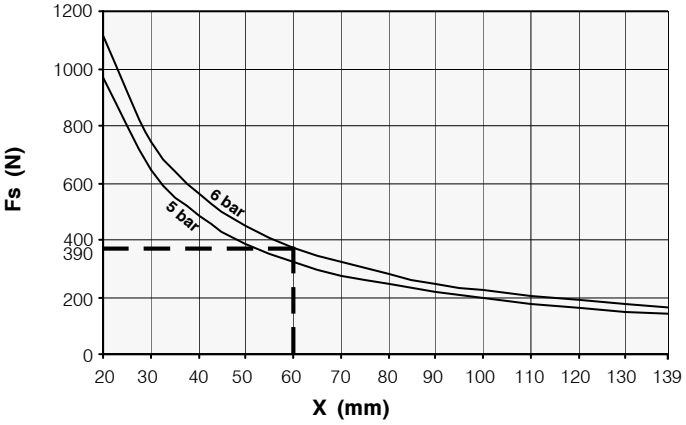
Material

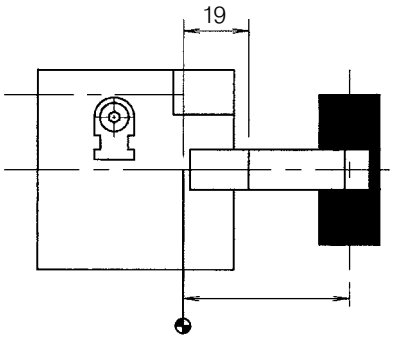
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 30 CD12
Seals	nitrile butadiene rubber (NBR)

General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

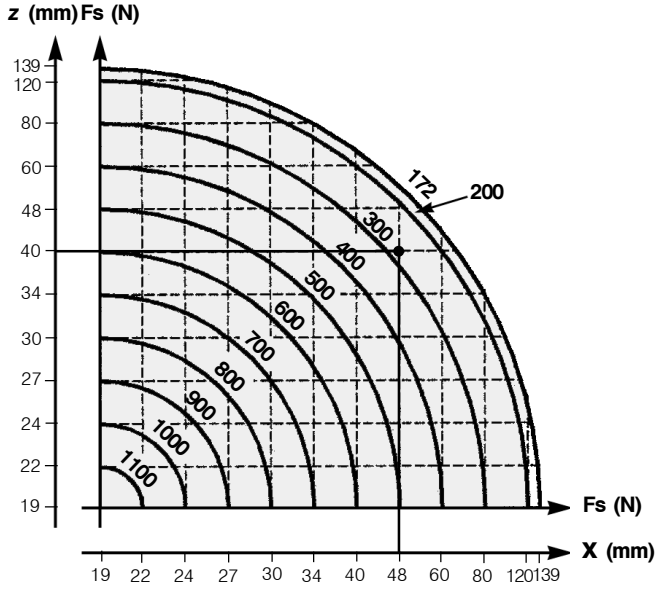
Clamping force / jaw length
(parallel jaws)

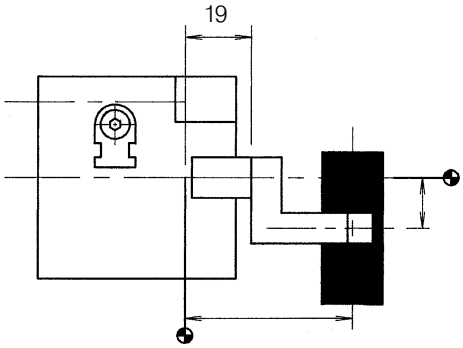




Example : where **x** = 60 mm, Fs = 390 N

Clamping force / length / jaw offset
(at 6 bar)



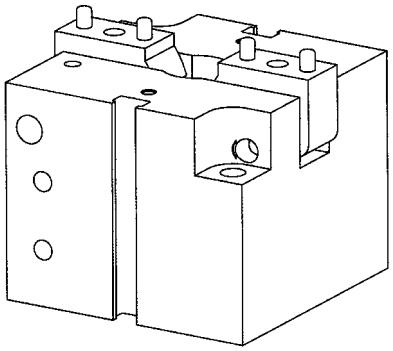


Example : where **x** = 48 mm and **z** = 40 mm, Fs = 290 N

Compact angular grippers size 5

Technical information

Opening angle (°)	43
Max clamping torque (Nm)	44.5
Max jaw length (mm)	173
Ø piston bore (mm)	63
Ø port size (mm)	G1/8
Air consumption at 6 bar (cm^3 / cycle)	53.6
Repeatability (mm)	0.05
Min. opening time (s)	0.03
Min. closing time (s)	0.03
Mass with flat jaw carrier (kg)	1.17
Mass with square jaw carrier (kg)	1.30
Min automatic grip retention at mid jaw travel (N)	7.9



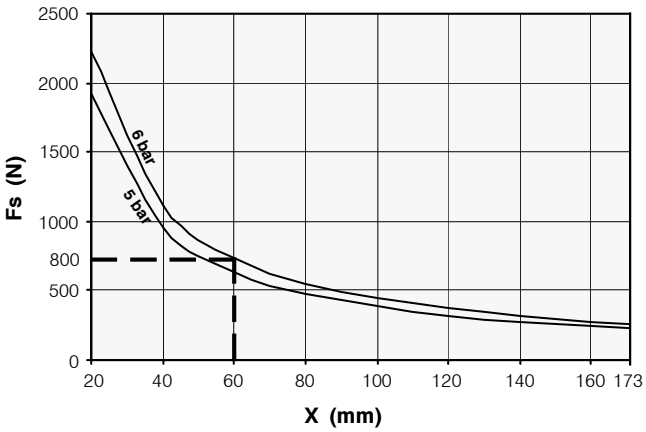
Material

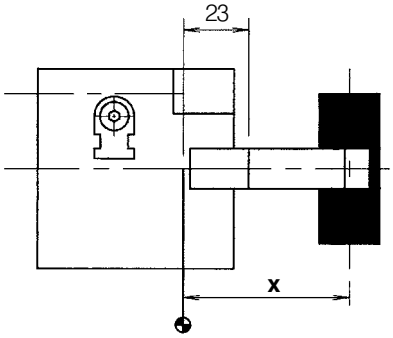
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 30 CD12
Seals	nitrile butadiene rubber (NBR)

General information

Pressure (bar)	3 to 8
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

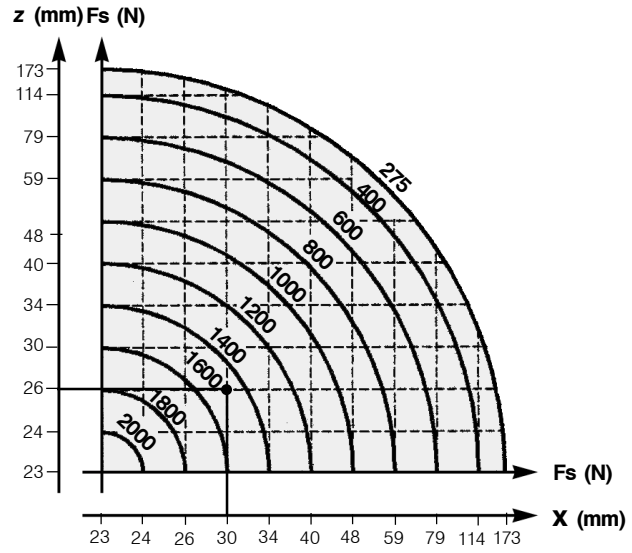
Clamping force / jaw length
(parallel jaws)

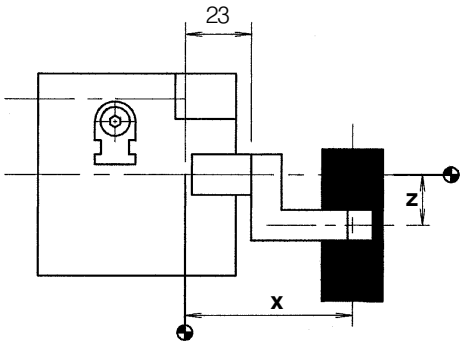




Example : where **x** = 60 mm, Fs = 800 N

Clamping force / length / jaw offset
(at 6 bar)

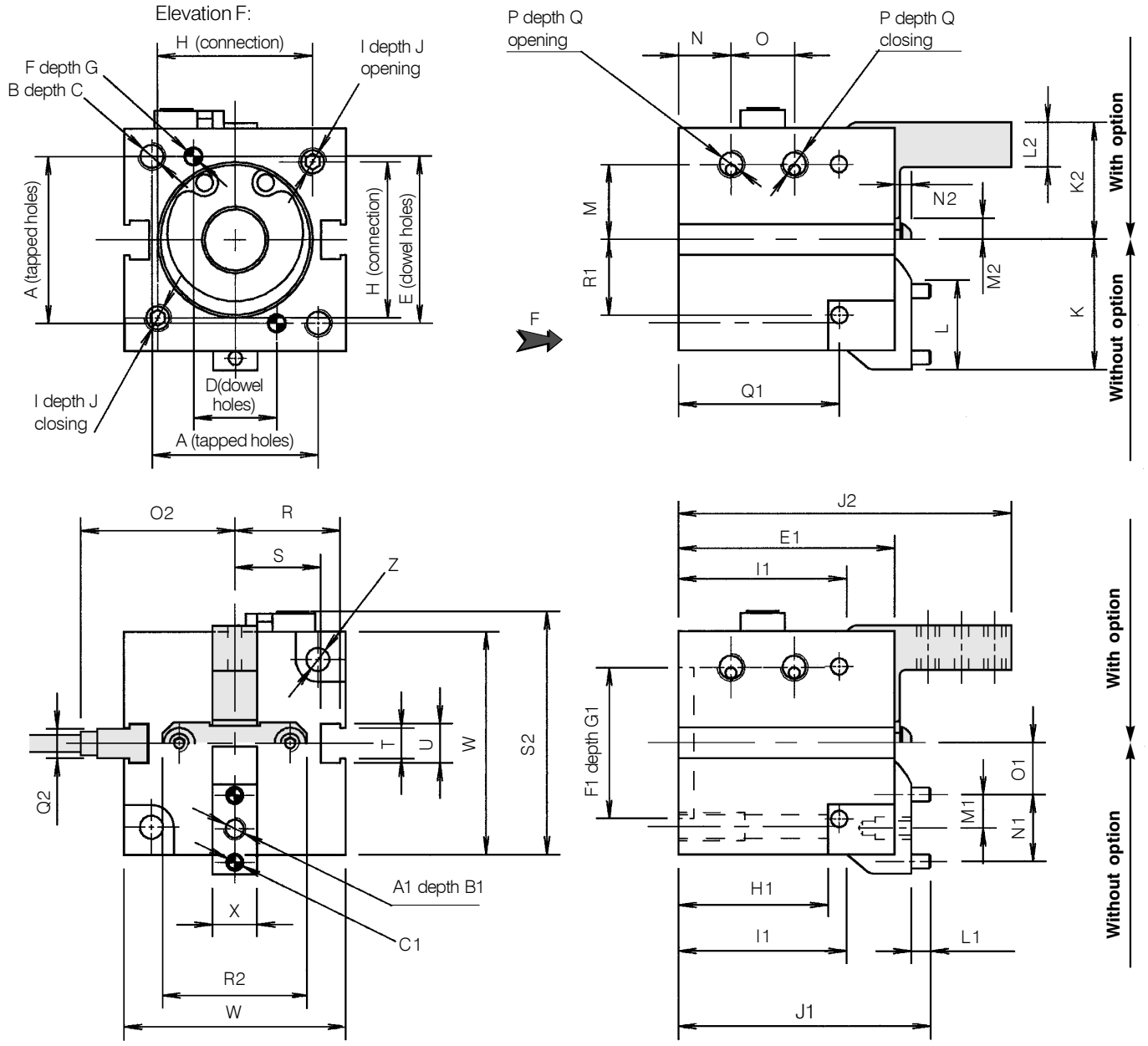




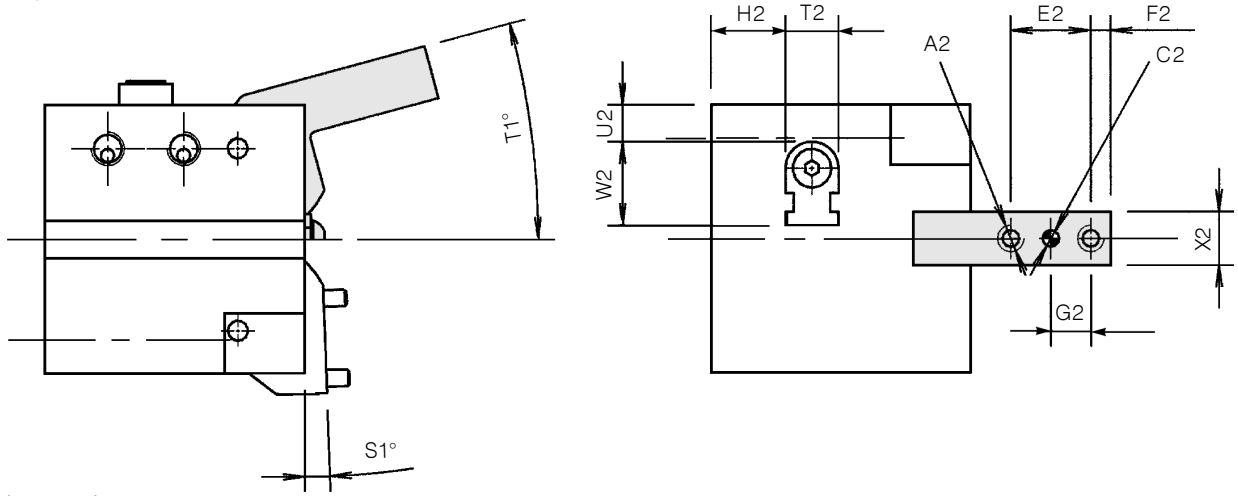
Example : where **x** = 30 mm and **z** = 26 mm, Fs = 1480 N

Sizes

Gripper shown with jaw carriers parallel



Gripper shown with one square jaw carrier opened and one flat jaw carrier closed:



I : closed by 2 socket cap screws

Dimensions (mm)

Size	Total opening angle(°)	A	ØB	C	D (js8)	E (js8)	F (H9)	G	H	ØI	J	K
1	33	23	M4	10	10	23	2,5	5	18	M3	3,5	17,5
2	34	30	M5	12	15	30	3	6	28	M5	6	23,5
3	35	44	M6	15	26	44	4	8	38	M5	6	29,5
4	43	52	M8	20	28	56	5	10	48	M5	6	32,5
5	43	63	M10	25	35	70	6	12	60	M5	6	40

Size	L	M	N	O	ØP	Q	R	S	T	U	W	X (g6)	ØZ
1	12	9	6	10	M5	6	14,5	11	5,5	7	30	6	3,1
2	16	13,5	9,5	11,5	M5	6	19	15,5	5,5	7	40	8	4,1
3	21	19	12	14,5	M5	6	26,5	23	5,5	7	55	11	5,1
4	23	24	15	19	G1/8	8	31,5	28	5,5	7	65	13	6,1
5	28	30	16	23	G1/8	8	38,5	35	5,5	7	80	16	8,1

Size	ØA1	B1	ØC1 $\binom{0}{0.01}$	E1	ØF1 (H10)	G1	H1	I1	J1	L1	M1	N1 (js8)	O1	Q1	R1	S1 (°)	T1 (°)
1	M3	5	2	35	18	1,5	19	30	40	2,5	4,5	9	7	27,5	10	1,6	15
2	M4	6,5	2,5	39	27	2,5	27	30,5	45,5	3,5	6	12	9,5	29	13,5	2	15
3	M5	8	3	46	43	3,5	34	33,5	54	4	7	14	12	37	22	2,6	15
4	M6	12	4	58	53	4,5	40	38	68	5	8	16	13	44	24	6,4	15
5	M8	15	5	69	67	4,5	45	44	81	6	10,5	21	15,5	52	31	6,6	15

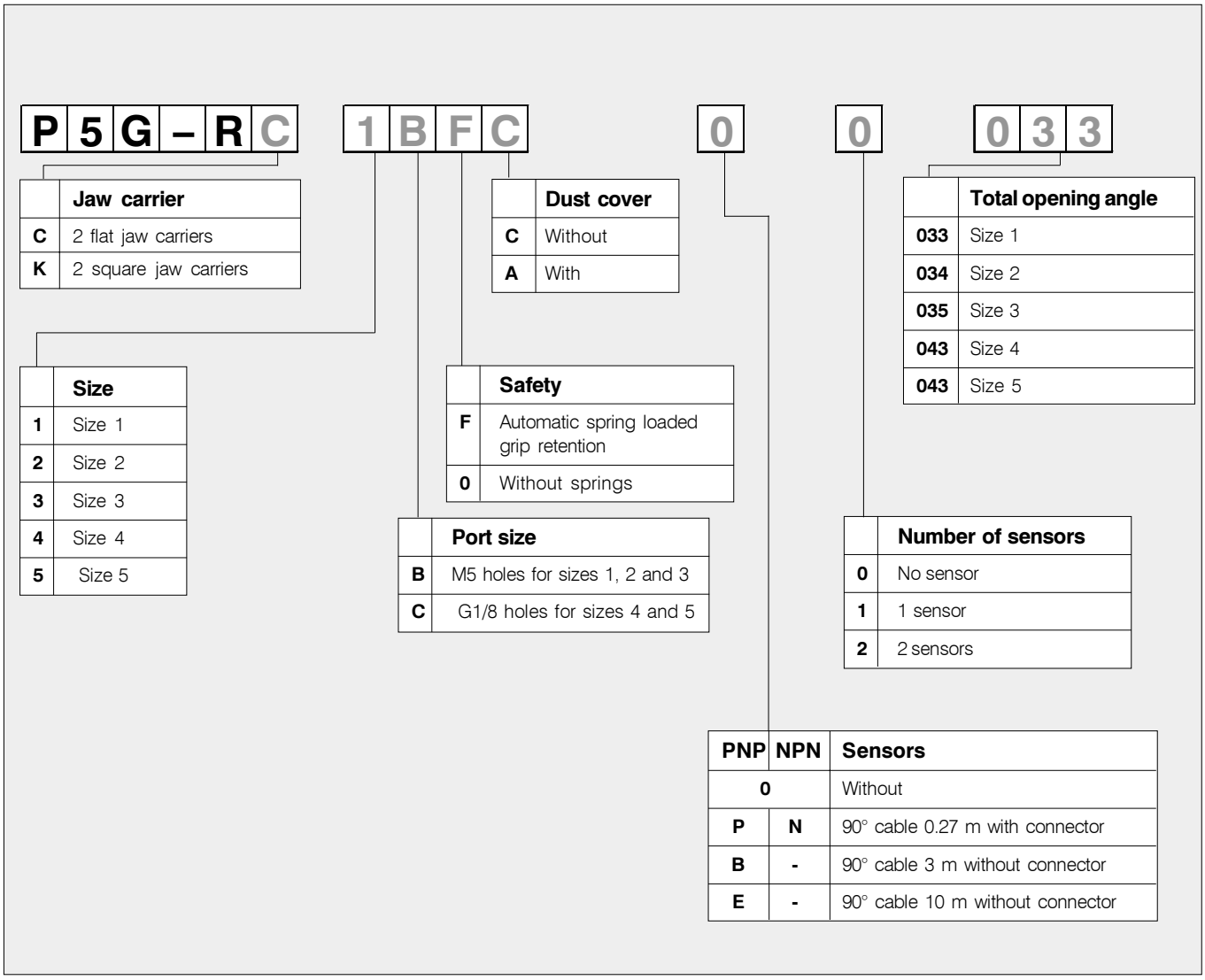
Options

Dimensions (mm)

Size	ØA2	ØC2 (E7)	E2	F2	G2	H2	J2	K2	L2	M2
1	M3	2	9	2	4,5	7	50,5	16	6	3
2	M4	2,5	12	3	6	11	60	21	8	4
3	M5	3	14	6	7	15	77	29,5	11	6
4	M6	4	16	6	8	21	94	32,5	13	8
5	M8	5	21	8	10,5	24	113,5	40	16	10

Size	N2	O2	Q2	R2	S2	T2	U2	W2	X2 (g6)
1	3	23	5	20	34	8	3,5	12,5	6
2	3	28	5	26	44	8	5,5	12,5	8
3	3	35	5	36	59	8	6,5	12,5	11
4	4	40,5	5	46	69	8	8,5	12,5	13
5	4	47,5	5	50	84	8	13	12,5	16

Order code



	Jaw carrier
C	2 flat jaw carriers
K	2 square jaw carriers

	Dust cover
C	Without
A	With

	Total opening angle
033	Size 1
034	Size 2
035	Size 3
043	Size 4
043	Size 5

	Size
1	Size 1
2	Size 2
3	Size 3
4	Size 4
5	Size 5

	Safety
F	Automatic spring loaded grip retention
0	Without springs

	Port size
B	M5 holes for sizes 1, 2 and 3
C	G1/8 holes for sizes 4 and 5

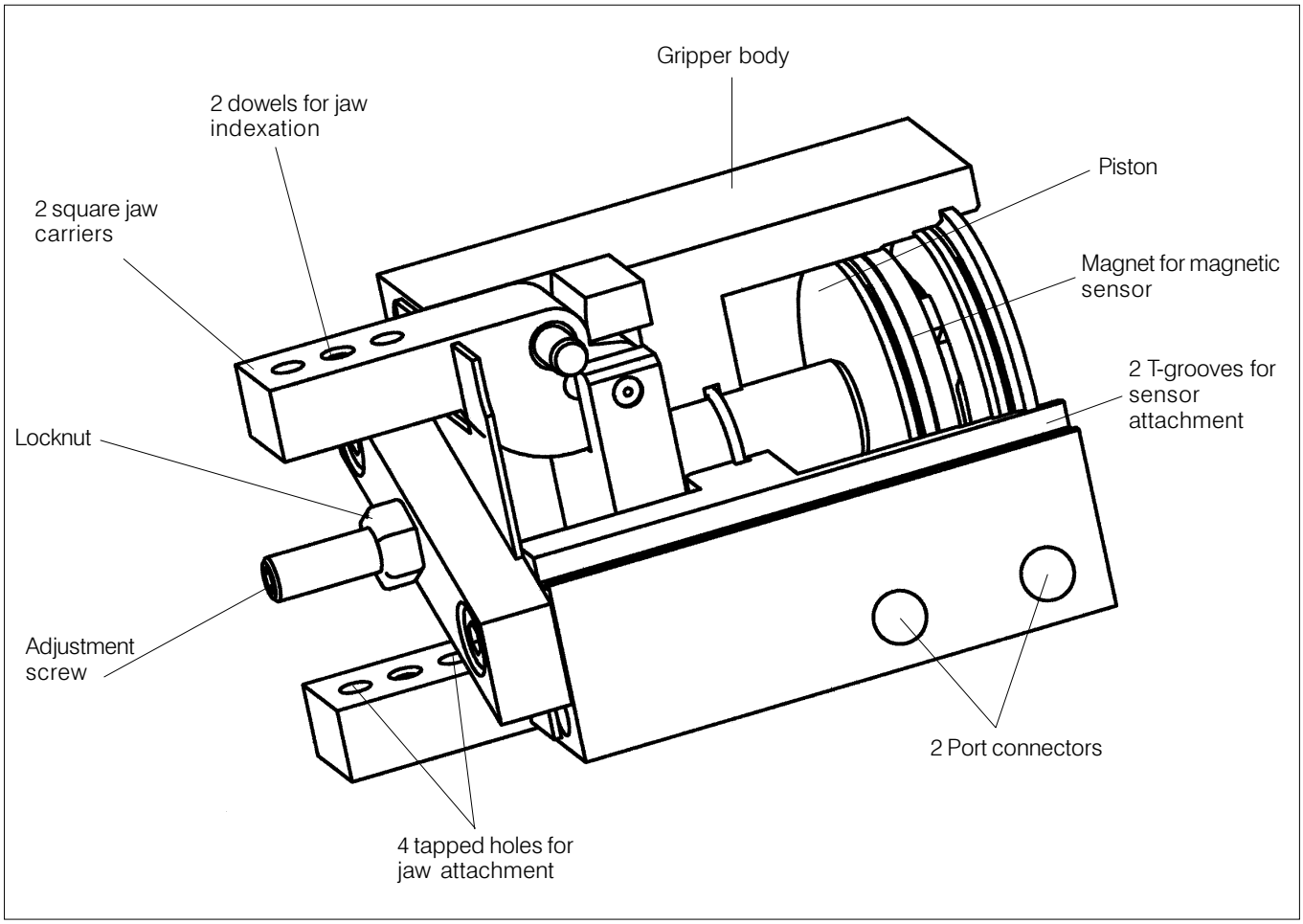
	Number of sensors
0	No sensor
1	1 sensor
2	2 sensors

PNP	NPN	Sensors
0		Without
P	N	90° cable 0.27 m with connector
B	-	90° cable 3 m without connector
E	-	90° cable 10 m without connector

Note: All grippers complete with magnet for sensing.

Example: compact angular gripper, flat jaw carrier, size 4, spring loaded closing safety, without cover, fitted with 2 PNP sensors and 90° cable 0.27 m with connector:

Order code: P5G-RC4CFAP1043



180° radial grippers

These grippers which are used for materials handling and precision assembly, are part of the Parker Pneumatic automation product range.
3 sizes are available and can be used in most applications.

Sensors

One or two magneto-inductive sensors can be mounted on all sizes to control opening and closing of the grippers.

Protection

The gripper body is made of hard anodised aluminium and the two square jaw carriers are of pre-treated steel.
Additional cover protection can be added for use in difficult environments.

Adjustment

Adjustment of opening angle by means of a central screw and flexible end piece to clamp the end of opening travel.

Safety

A mechanical system ensures that the grippers remain closed if the air supply is cut off in the last degrees of movement.

Mounting

By socket cap screws at the front of the gripper.
By tapped holes at the rear of the gripper.
Precise location of gripper through centring and dowel holes.

Connection

Pneumatic port connections on one side of the gripper and on the rear for face to face sealing.

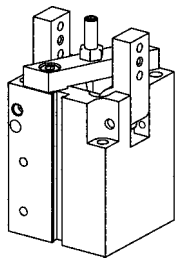
Reliability

The grippers have been designed for 10 million operations under normal working conditions.

Range

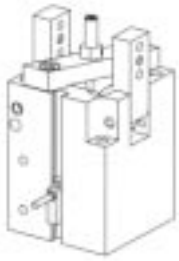
Flat jaw carrier standard gripper

Gripper is opened and closed by air supply.
Automatic grip retention by mechanical system.
3 sizes available.
Adjustment of opening angle by means of central screw and locking by nut.



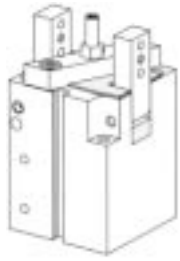
Standard gripper with sensor option

Check on opening and closing of the gripper by means of magneto-inductive sensors.

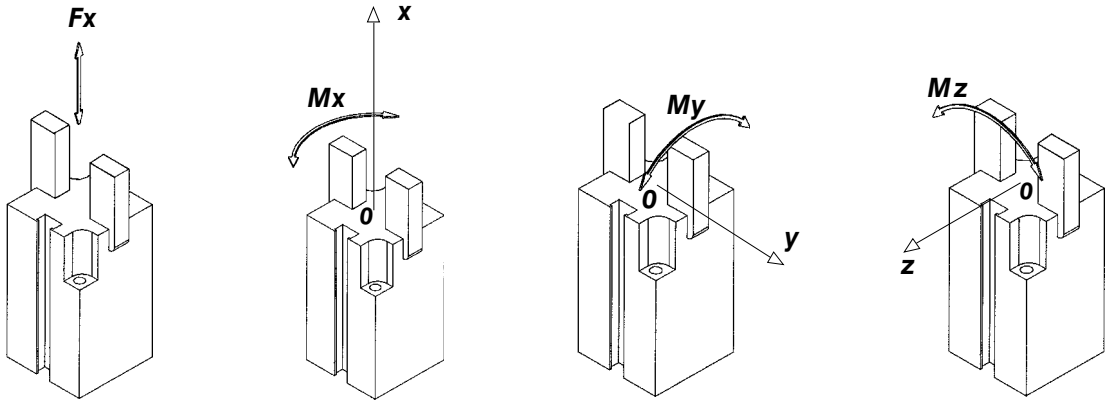


Standard gripper with protection option

Additional protection makes it possible to seal the gripper from swarf.



Permissible forces on jaw carriers



Size				
1	50 N	2 Nm	2 Nm	1.3 Nm
2	200 N	6 Nm	6 Nm	4.4 Nm
3	320 N	18 Nm	18 Nm	16.5 Nm

MZ at 6 bar pressure, parallel jaw carriers.

The permissible forces and torques are shown **for two jaw carriers**.

These values should not be exceeded if:

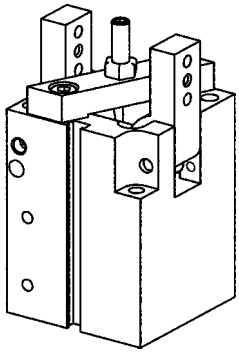
- any extra forces are exerted on the workpiece and the jaws in addition to the force or clamping torque.
- handling forces (acceleration, shocks etc.) are also added.

These values are cumulative if the forces act in different directions at the same time.

180° radial grippers size 1

Technical information

Opening angle (°)	0 to 180
Max clamping torque (Nm)	1.3
Max jaw length (mm)	48
Ø piston bore (mm)	16
Ø port size (mm)	M5
Air consumption at 6 bar (cm^3 / cycle)	3.65
Repeatability (mm)	0.1
Min. opening time (s)	0.04
Min. closing time (s)	0.04
Mechanical safety of closing jaws parallel (°)	±1.5
Mass with square jaw carrier (kg)	0.12
Max. mass of workpiece to handle (kg)	0.3



Material

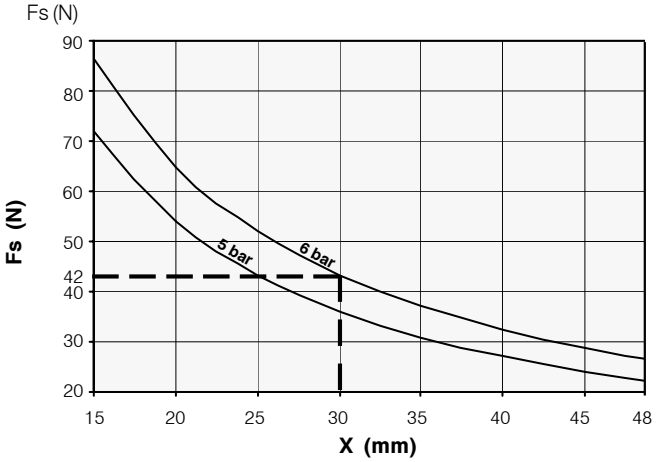
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 32 CDV
Seals	nitrile butadiene rubber (NBR)

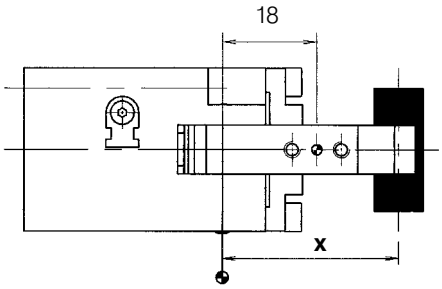
General information

Pressure (bar)	2 to 7
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

Clamping force / jaw length

(parallel jaws)

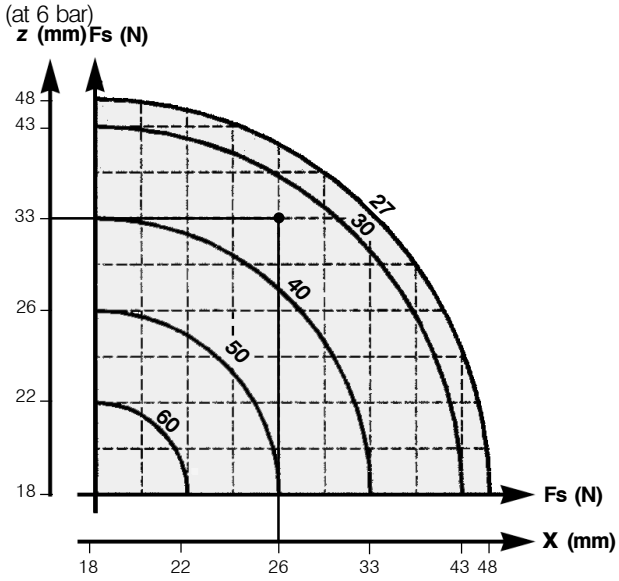


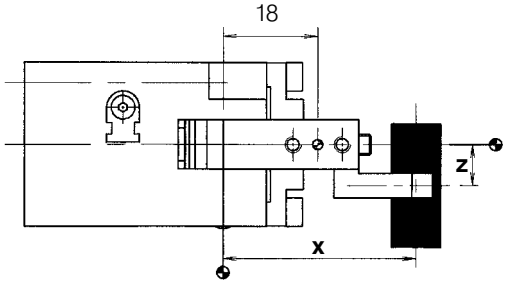


Example : where **x** = 30 mm, Fs = 42 N

Clamping force / length / jaw offset

(at 6 bar)



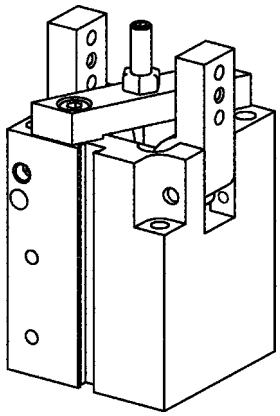


Example : where **x** = 26 mm and **z**= 33 mm, Fs = 33 N

180° radial grippers size 2

Technical information

Opening angle (°)	0 to 180
Max clamping torque (Nm)	4.4
Max jaw length (mm)	63
Ø piston bore (mm)	25
Ø port size (mm)	M5
Air consumption at 6 bar (cm^3 / cycle)	11.7
Repeatability (mm)	0.1
Min. opening time (s)	0.06
Min. closing time (s)	0.06
Mechanical safety of closing jaws parallel (°)	±1.5
Mass with square jaw carrier (kg)	0.29
Max. mass of workpiece to handle (kg)	0.7



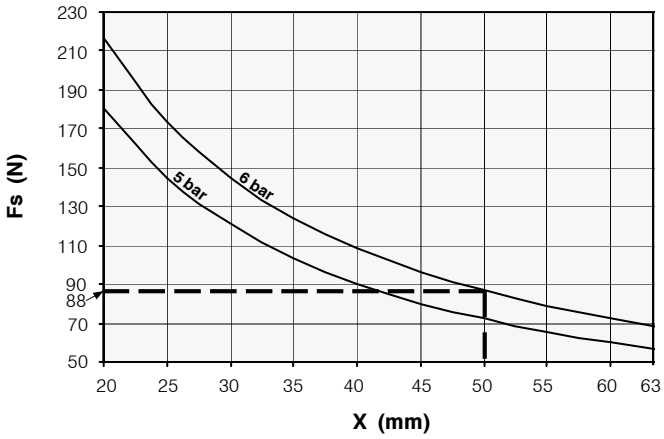
Material

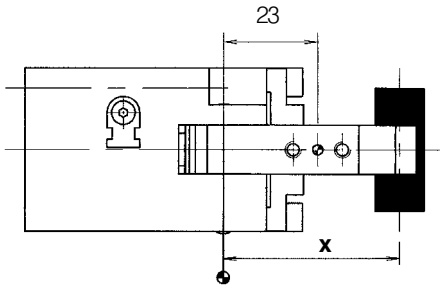
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 32 CDV
Seals	nitrile butadiene rubber (NBR)

General information

Pressure (bar)	2 to 7
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

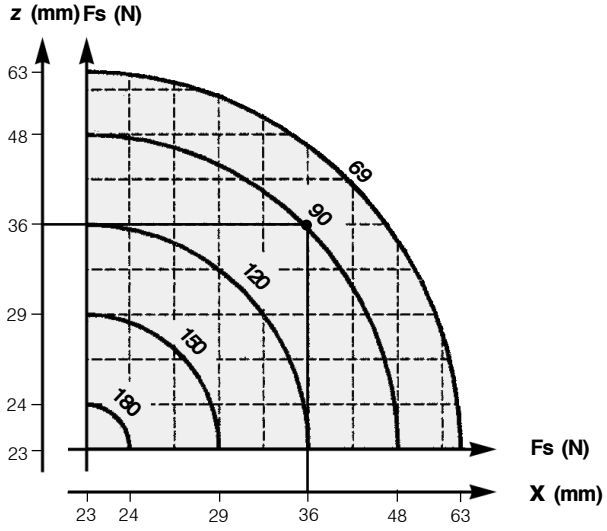
Clamping force / jaw length
(parallel jaws)

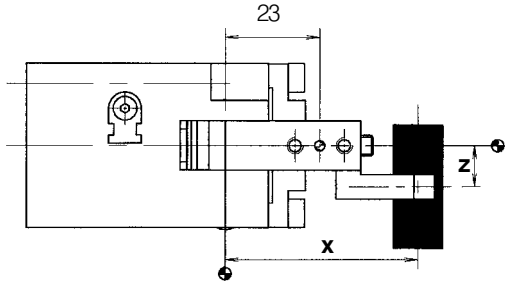




Example : where **x** = 50 mm, Fs = 88 N

Clamping force / length / jaw offset
(at 6 bar)



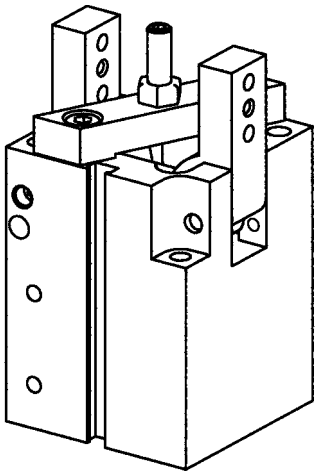


Example : where **x** = 36 mm and **z** = 36 mm, Fs = 90 N

180° radial grippers size 3

Technical information

Opening angle (°)	0 to 180
Max clamping torque (Nm)	13.5
Max jaw length (mm)	82
Ø piston bore (mm)	40
Ø port size (mm)	M5
Air consumption at 6 bar (cm^3 / cycle)	36.1
Repeatability (mm)	0.1
Min. opening time (s)	0.08
Min. closing time (s)	0.08
Mechanical safety of closing jaws parallel (°)	±1.5
Mass with square jaw carrier (kg)	0.65
Max. mass of workpiece to handle (kg)	1.3



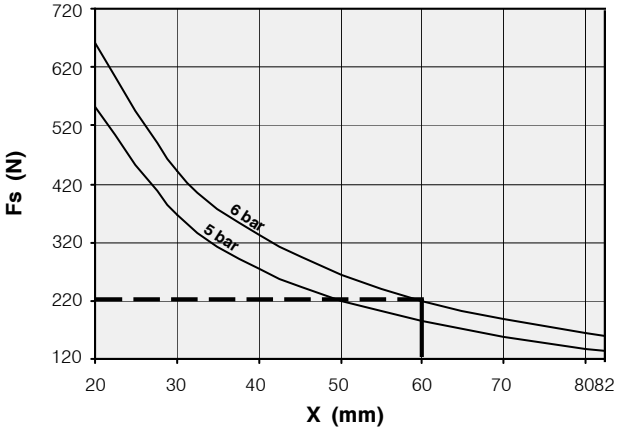
Material

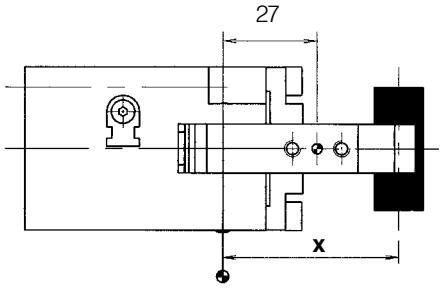
Body	hard anodised aluminium
Jaw carrier	pre-treated steel 32 CDV
Seals	nitrile butadiene rubber (NBR)

General information

Pressure (bar)	2 to 7
Operating temperature (°C) (with or without sensors)	-20 to +70
Operation	dry air lubricated or unlubricated

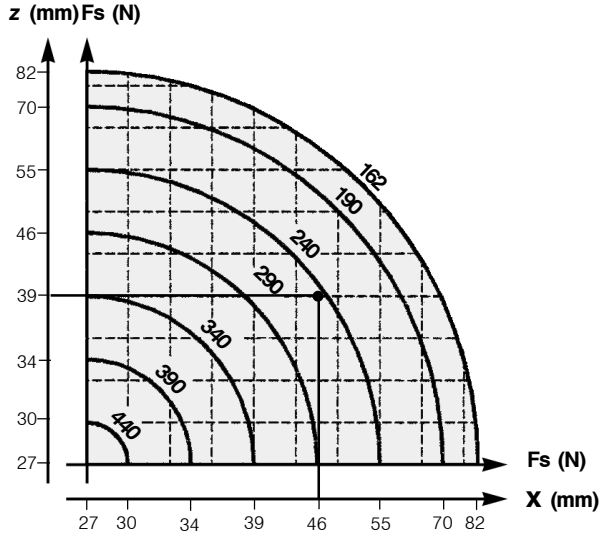
Clamping force / jaw length
(parallel jaws)

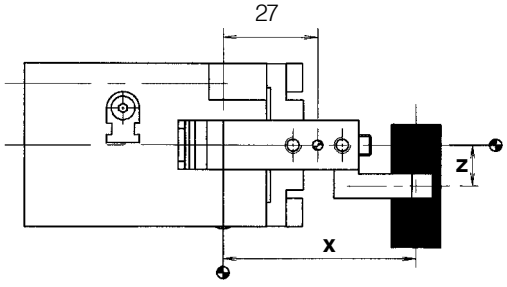




Example : where **x** = 60 mm, Fs = 220 N

Clamping force / length / jaw offset
(at 6 bar)

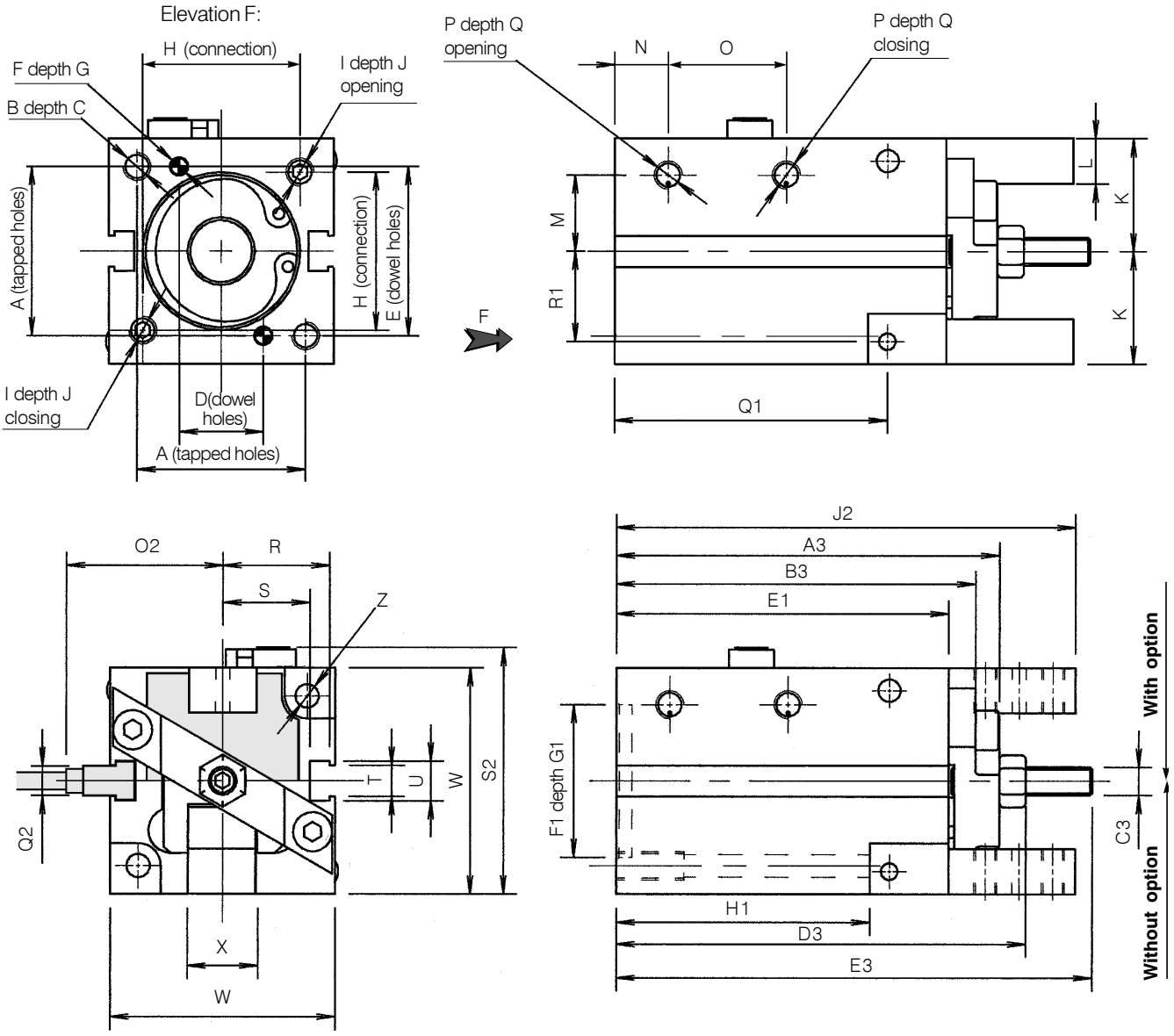




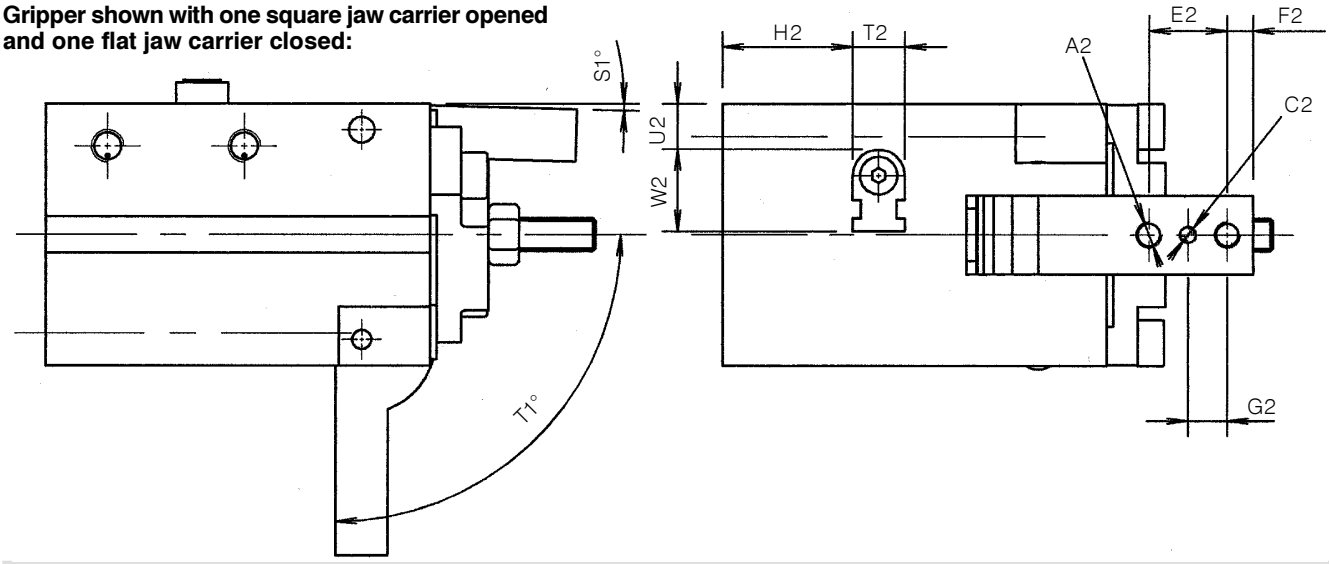
Example : where **x** = 46 mm and **y** = 39 mm, Fs = 246 N

Size

Gripper shown with jaw carriers horizontal



Gripper shown with one square jaw carrier opened and one flat jaw carrier closed:



Dimensions (mm)

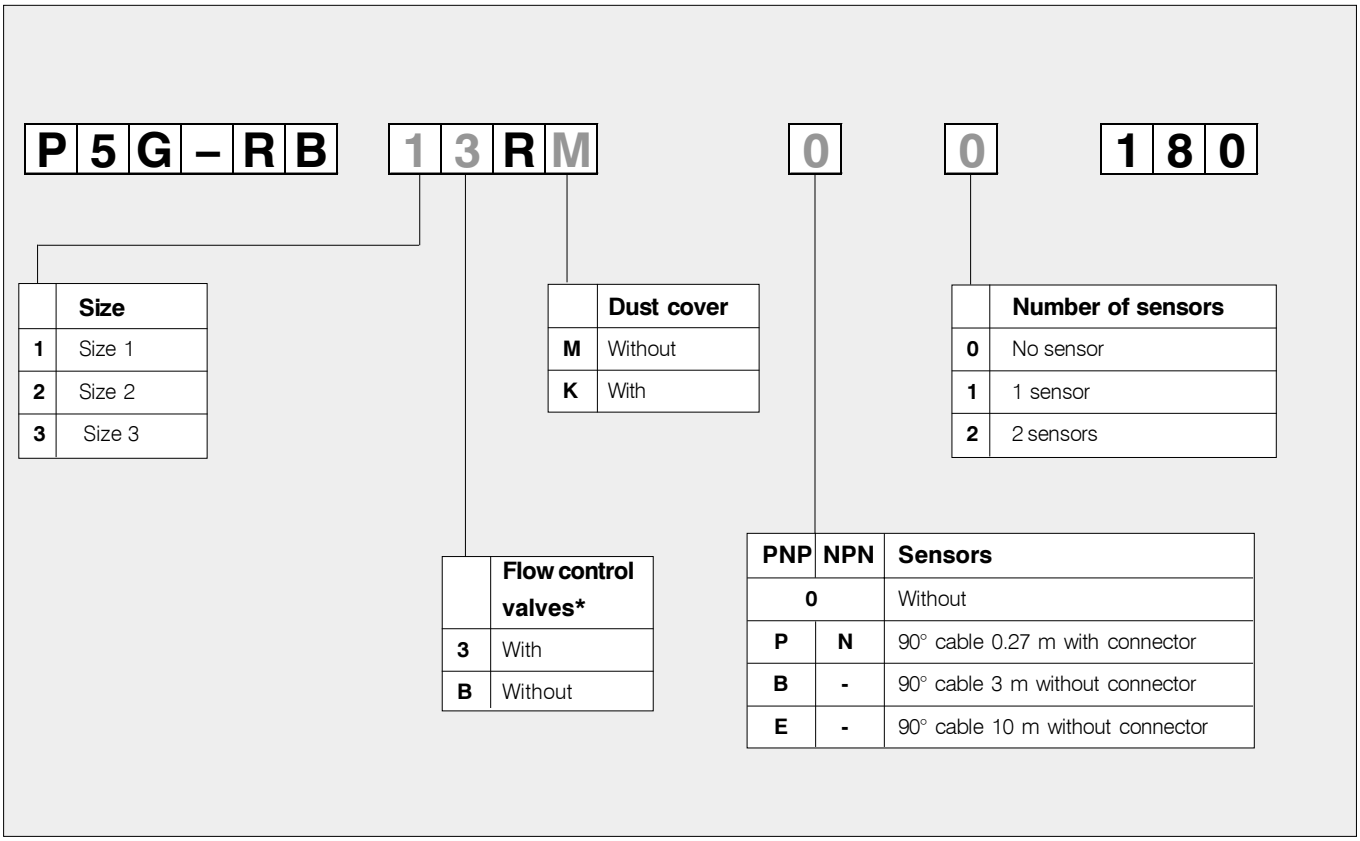
Size	Total opening angle(°)	A	B	C	D (js8)	E (js8)	ØF (H9)	G	H	I	J	K
1	180	23	M4	10	10	23	2,5	5	23	M3	3,5	15
2	180	30	M5	12	15	30	3	6	28	M5	6	20
3	180	44	M6	15	26	44	4	8	38	M5	6	27,5

Size	L	M	N	O	P	Q	R	S	T	U	W	X (g6)	Ø Z
1	6	9	7	16,5	M5	6	14,5	11	5,5	7	30	8	3,1
2	8	13,5	9,5	21	M5	6	19	15,5	5,5	7	40	12	4,1
3	10	19	12	25	M5	6	26,5	23	5,5	7	55	15	5,1

Size	E1	F1 (H10)	G1	H1	Q1	R1	S1 (°)	T1 (°)	Ø A2	Ø C2 (E7)	E2	F2	G2
1	47	18	1,5	33	39	12	1,5	90	M3	2	9	2,5	4,5
2	59	27	2,5	45	48,5	16	1,5	90	M4	2,5	12	4	6
3	75	43	3,5	55	62,5	22,5	1,5	90	M5	3	14	5	7

Size	H2	J2	O2	Q2	S2	T2	U2	W2	A3	B3	C3	D3	E3
1	11	64	23	5	34	8	3,5	12,5	55	52	M4	58	66
2	20	81,5	28	5	44	8	7	12,5	68	64	M5	73	84,5
3	20	101,5	35	5	59	8	7	12,5	85	-	M6	90	105

Order code



	Size
1	Size 1
2	Size 2
3	Size 3

	Dust cover
M	Without
K	With

	Number of sensors
0	No sensor
1	1 sensor
2	2 sensors

	Flow control valves*
3	With
B	Without

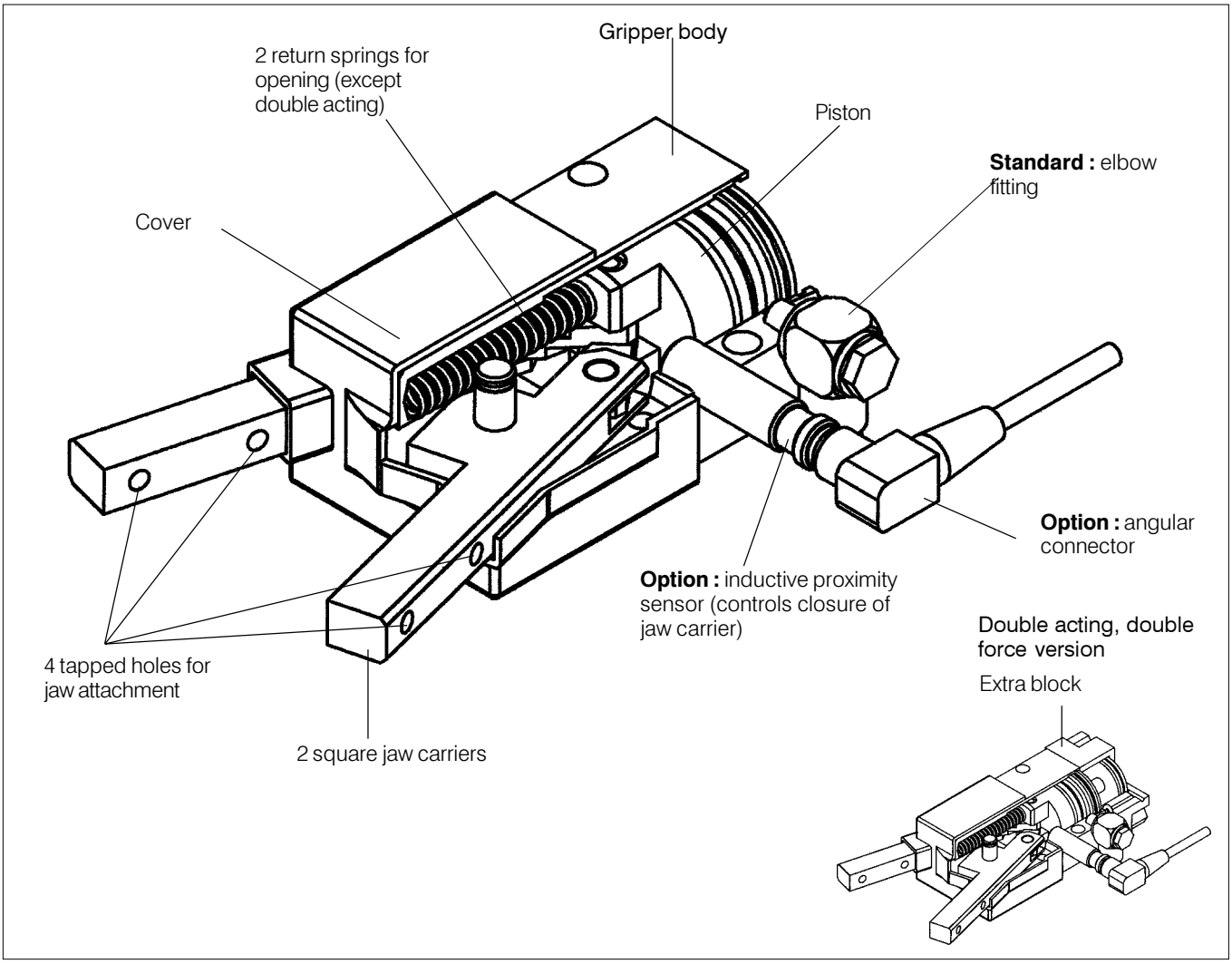
PNP	NPN	Sensors
0		Without
P	N	90° cable 0.27 m with connector
B	-	90° cable 3 m without connector
E	-	90° cable 10 m without connector

*Adding the jaws on the jaw carriers increases the mass to be moved.
For this reason, **you should compensate the opening and closing times by means of flow controls**.
Adjusting the flow also allows you to avoid shocks at the end of rotation on closing and above all opening the gripper.
Flow controls M5 for Ø4 90° elbow push in adjustable connection.

Note: All grippers complete with magnet for sensing.

Example : 180° radial gripper size 1, flow controls, without cover, fitted with two PNP sensors and 90° cable 0.27 m with connector:

Order code: P5G-RB13RMP2180



30° angular grippers

These grippers, which are used for material handling and precision assembly, are part of the Parker Pneumatic automation product range.

Versions and sensors

There are three versions of grippers: single acting, single acting double force (jaw carrier open at rest), and double acting.
An inductive proximity sensor can be mounted on all versions, to monitor opening and closing of the grippers.

Protection

The gripper body is made of nickel-coated aluminium and the two jaw carriers are made of pre-treated, blackened steel. The gripper has a PVC (polyvinyl chloride) cover for extra protection.

Fixing

The jaws can be fixed on two faces of the jaw carrier, in order to suit a multitude of applications. The gripper body can be fixed on 3 faces.

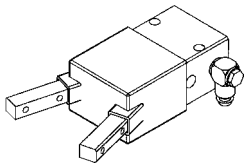
Air supply

The gripper is supplied with an M5 elbow fitting for Ø4 tubes a quick release 90° adjustable position elbow.

Range

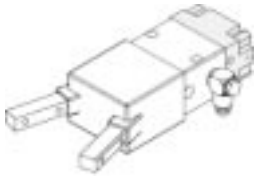
Single acting gripper

The gripper is closed by the air supply.
Opening by spring.
The gripper is protected by a PVC UMU cover.



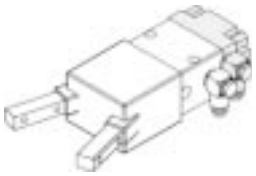
Single acting, double force gripper

The gripper is closed by the air supply.
Opening by spring.
Closing force is increased by the addition of a second piston.
The gripper is protected by a PVC UMU cover.



Double acting gripper

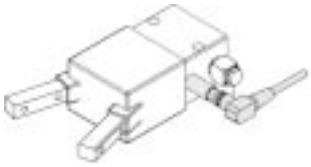
The gripper is opened and closed by the air supply.
The gripper is protected by a PVC UMU cover.



Options

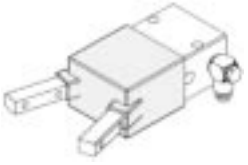
Sensors

Check on closing of gripper by plug-in PNP or NPN NO inductive sensor (supplied with 90° plug-in elbow connector 3 metres cable 9878009.



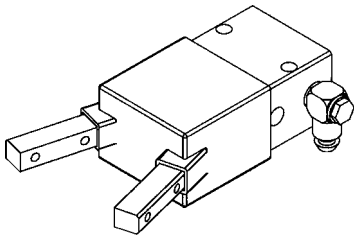
Cover

Protective housing of the jaw carrier can be supplied in a translucent PVC FCO (for use with cutting oil).



Technical data

Types of gripper	SA*	DF*	DA*
Opening angle (°)		30	
Clamping torque at 6 bar (jaws closed) (Nm)	8.5	16.2	15.5
Max jaw length (mm)		100	
Ø piston bore (mm)		25	
Ø port size (mm)		M5	
Air consumption at 6 bar (cm^3 / cycle)	4.6	9.2	9
Repeatability (mm)		0.2	
Min opening time (s)	0.02	0.02	0.02
Min closing time (s)	0.03	0.03	0.02
Mass with square jaw carrier (kg)	0.35	0.47	0.48



* SA: single acting

DF: single acting double force

DA: double acting

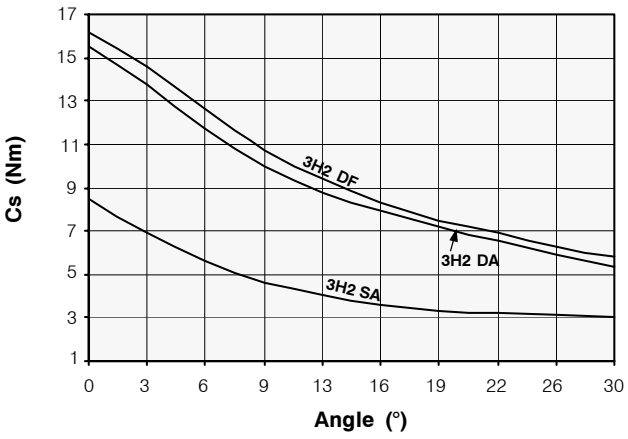
Material

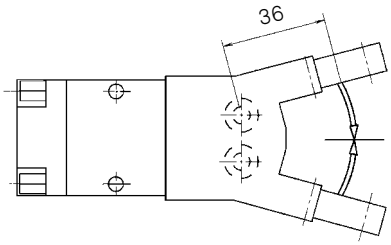
Body	nickel coated aluminium
Cover	black PVC UMU (polyvinyl chloride)
Jaw carrier	blackened 35 NDC16 steel
Seals	nitrile butadiene rubber (NBR)

Operating information

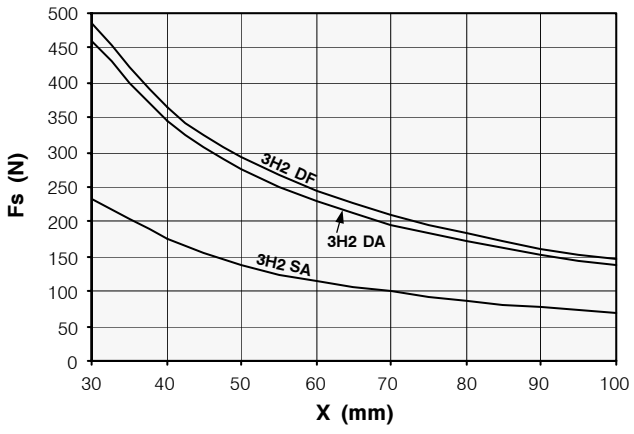
Operating pressure (bar)	2 to 8
Operating temperature (°C)	0 to +65
Operation	Air lubricated or unlubricated

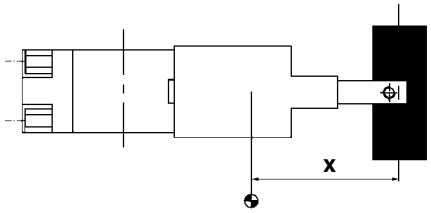
Clamping force / closing angle of jaws
(at 6 bar)



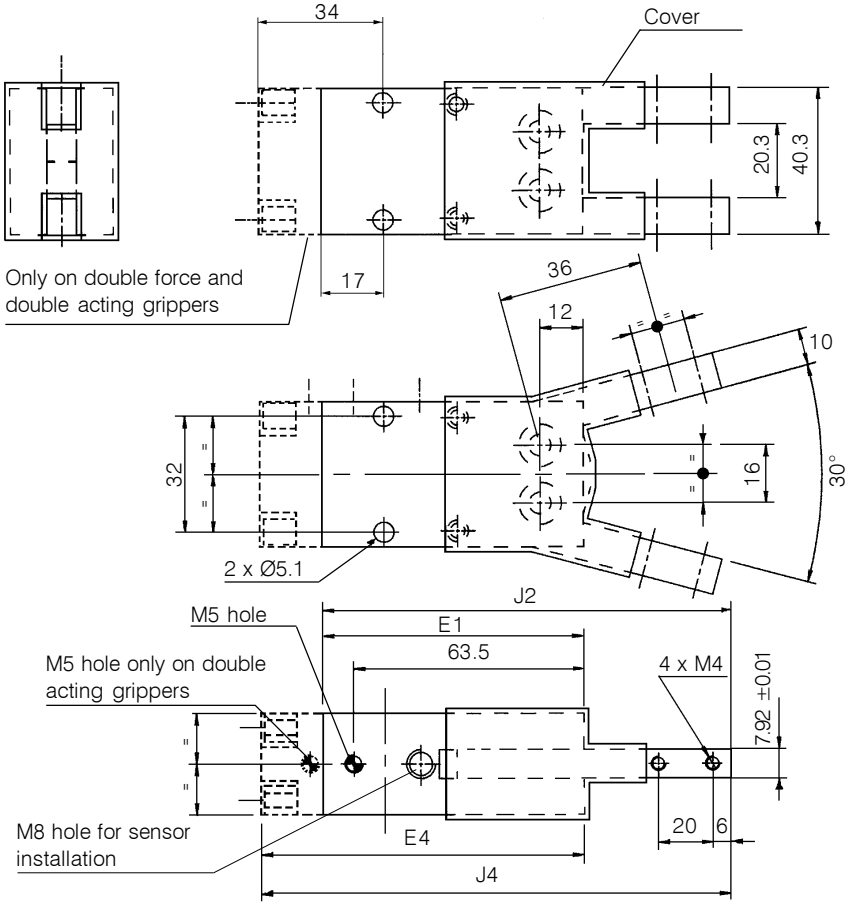


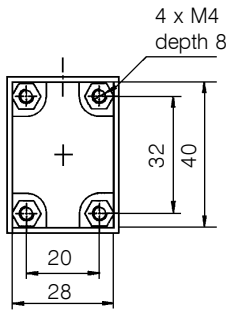
Clamping force / jaw length
(at 6 bar)



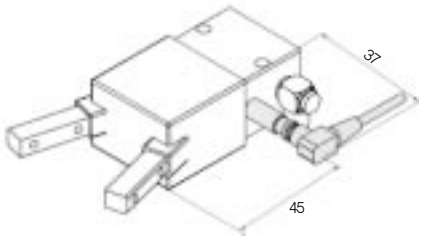


Dimensions (mm)





Option: gripper with inductive sensor



Types of gripper	E1	E4	J2	J4
Single acting gripper	72	-	112,5	-
Single acting, double force gripper	-	89	-	129,5
Double acting gripper	-	89	-	129,5

Order code

3 H 2 | S | N 0 1 0 | P | – | D 3 0

	Type**
S	Single acting
B	Double force
D	Double acting

	Cover
1	Standard cover
2	PVC FCO cover

	Sensor*
0	None
P	PNP
N	NPN

** The gripper is delivered with a plug in elbow fitting for Ø4 tubing

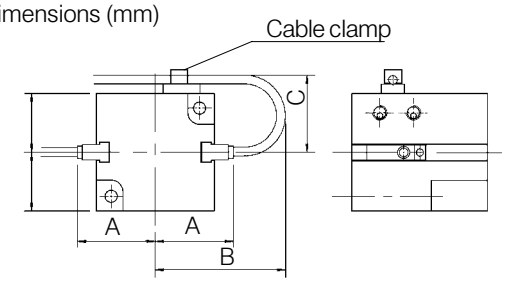
* To check closing

Sensors for P5G-R gripper

Installation in T-groove

Sensors can be adjusted along T-grooves

Dimensions (mm)

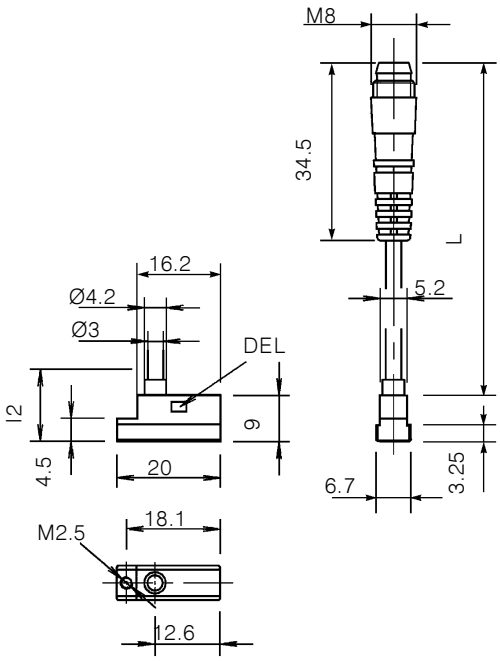


Size (mm)	1	2	3	4	5
A	23	28	35	40,5	47,5
B	36	43	54	62	72,5
C	22	27	34,5	39,5	47

Technical data

Specifications	Reference PNP P8S-SPTHXD	P8S-SPELXD	P8S-SPETXD
	Reference NPN P8S-SNTHX	-	-
Mass (g)	7		
Cable length L (m)	Cable 90° 0,27 m **with** connector	Cable 90° 3 m **without** connector	Cable 90° 10 m **without** connector
Fixing in T-groove	M2,5 socket cap screws		
Working temperature (°C)	- 25 to + 75		
Encapsulation standard	IP67		
Switching frequency (kHz)	5		
Response time at 24 V (ms)	20		
Repeatability (mm)	≤ 0,2		
Technology	magneto-inductive sensor		
Contact	normally open NO		
Breaking current (mA)	≤150		
Supply voltage (VDC)	10 - 30		
Power consumption (mA)	10		
Hysteresis (mm)	≤1,5		
Short circuit protection	YES		
Inverse polarity protection	YES		
Body	nylon PA12		
Cable	PUR		
Conductor	PVC 3 x 0,14 mm²		

Dimensions (mm)



Sensors for 3H2 grippers

Specifications	Reference 9878034	9878035
Type	M8 x 33 PNP NO	M8 x 33 NPN NO
Technology	Inductive proximity sensor (IPS), 3 wire without connector	
System Voltage (VDC)	10 - 30	
Max breaking current (mA)	200	
Working temperature (°C)	0 to 65	
Sensor range (mm)	1,5 on steel	
Connector	90° plug-in elbow, 5 m cable (ref. 9878025)	
Leakage current (mA)	10