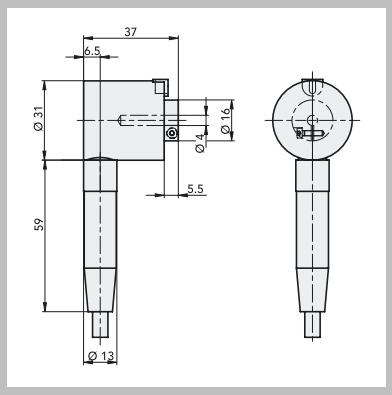
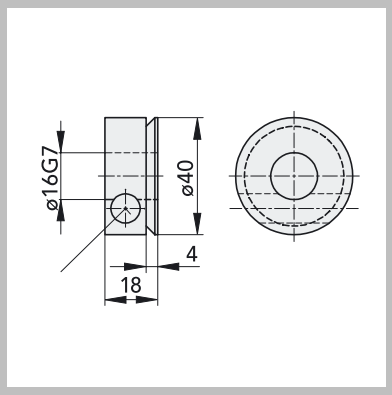
06/2006

GRIPPERS

GRIPPERS CONTENTS





PRECISION PARALLEL GRIPPERS GPP PRODUCT DESCRIPTION

The **Precision Parallel Gripper GPP** is used for demanding applications.

The GPP is designed for **internal and external gripping** and is **double-acting.** It can easily be converted between the functions «open when depressurized» and «closed when depressurized».

The end positions can be detected by means of **proximity switches.**

The gripper body contains **tapped holes** for fitting external positioners or part sensing devices.

Safety throttling orifices protect the grippers against overloading by high forces of the gripping fingers.

The high precision the ball bearings guarantee a high mechanical efficiency, a remarkably long life and high reliabilty.

APPLICATIONS

Revolver pivot unit;
with Rotary Drive DAP and two Grippers GPP for workpiece loading and unloading.

Precise gripping and rotary movement;
without radial deviation of the workpiece relative to the axis of rotation, realized by means of a Rotary Drive DAPI with internal air supply.

PRECISION PARALLEL GRIPPERS GPP/GPPI/GPP-ISO

Three sizes in three variants each.

With dovetail for easy mounting/adjustment and with standard pattern of holes for all sizes.

I version; for mounting on a Rotary Drive DAPI with internal air supply.

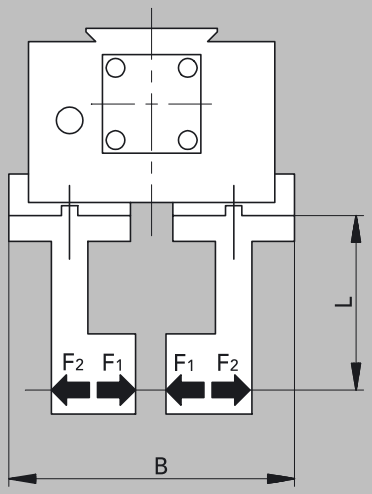
ISO version; gripper mounting according to ISO-9409-1-A40 for robots.

SCOPE OF DELIVERY
With clamping device for proximity switches and a spring. GPP-ISO with two exhaust throttles. Internal air versions without compressed air supplies.

SUITABLE ACCESSORIES

Special accessories	from page 94
Accessories	from page 302
Quick-Set®	from page 338

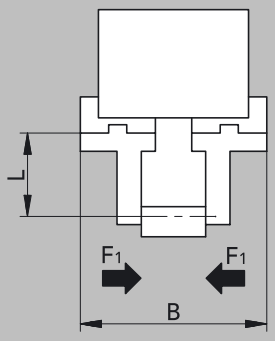
GRIPPING FORCE DIAGRAM EXAMPLES



F_1, F_2 = Gripping force per gripper finger

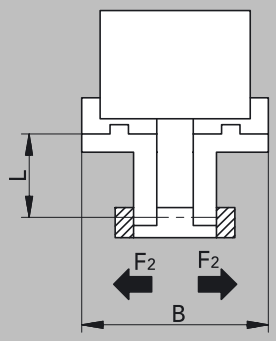
B in gripped state [mm]

Example GPP-1
External gripping
without spring
Operating pressure 5 bar
L = 70 mm
F_1 = 28 N



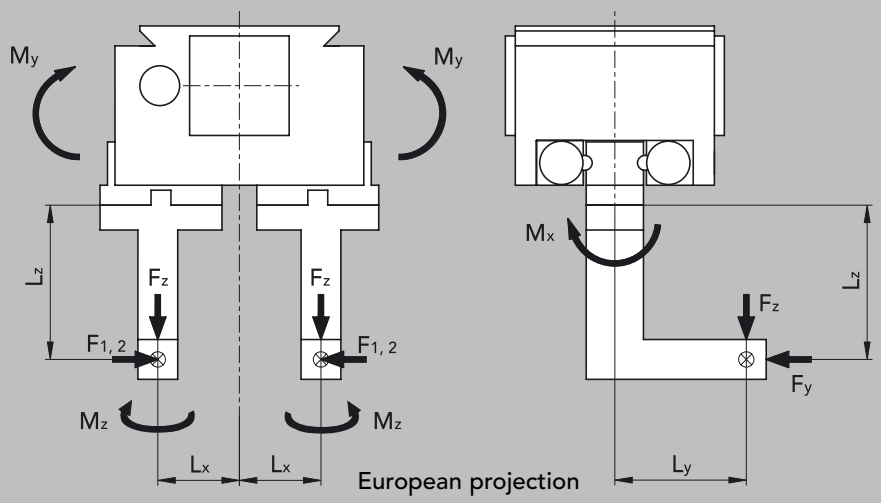
External gripping with spring
(closed when depressurized)
Operating pressure 5 bar
L = 60 mm
B = 53 mm
F_1 = 35 N
F_1 at 0 bar = 6 N

Example GPP-2
Internal gripping
without spring
Operating pressure 5 bar
L = 100 mm
F_2 = 82 N



Internal gripping with spring
(open when depressurized)
Operating pressure 5 bar
L = 80 mm
B = 80 mm
F_2 = 117 N
F_2 at 0 bar = 32 N

DEFINITION AND LOAD CALCULATIONS AT THE GPP-GRIPPER



European projection

$F_{1,2}$	Gripping force [N], as gripping force diagram
F_y, F_z	Outer, forces acting [N]
L_x, L_y, L_z	Distances of force application [m]
M_x, M_y, M_z	Load moments [Nm]
b	Load factor: **must not exceed the value 1!**
K_1, K_2, K_3	Load limit constants

	K_1	K_2	K_3
GPP-1	2.3	1.9	1.9
GPP-2	9	7.5	7.5
GPP-3	22	18	18

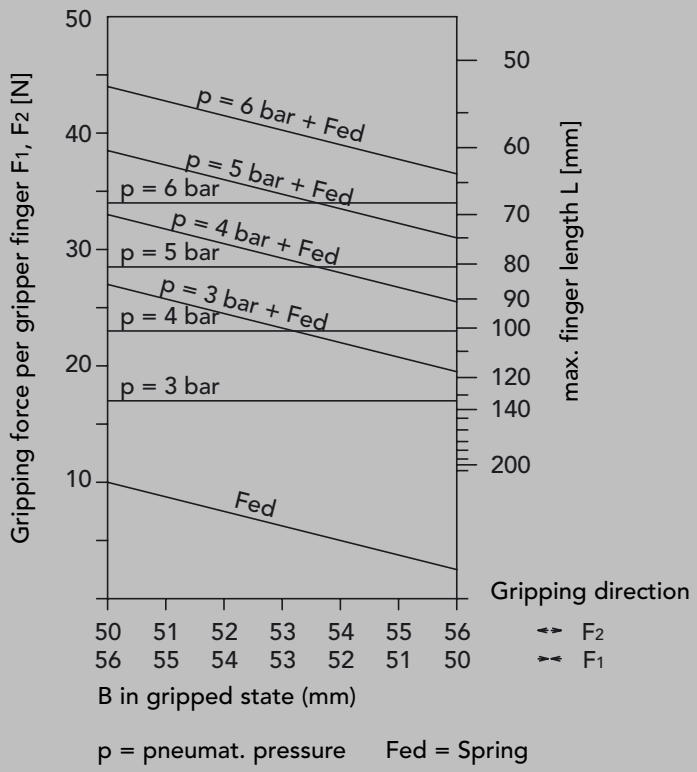
$$\left.\begin{aligned} M_x &= F_z \cdot L_y + F_y \cdot L_z \\ M_y &= F_{1,2} \cdot L_z + F_z \cdot L_x \\ M_z &= F_{1,2} \cdot L_y + F_y \cdot L_x \end{aligned}\right\} \quad b = \frac{M_x}{K_1} + \frac{M_y}{K_2} + \frac{M_z}{K_3} \leq 1$$

PRECISION PARALLEL GRIPPERS GPP/GPPI SIZE 1

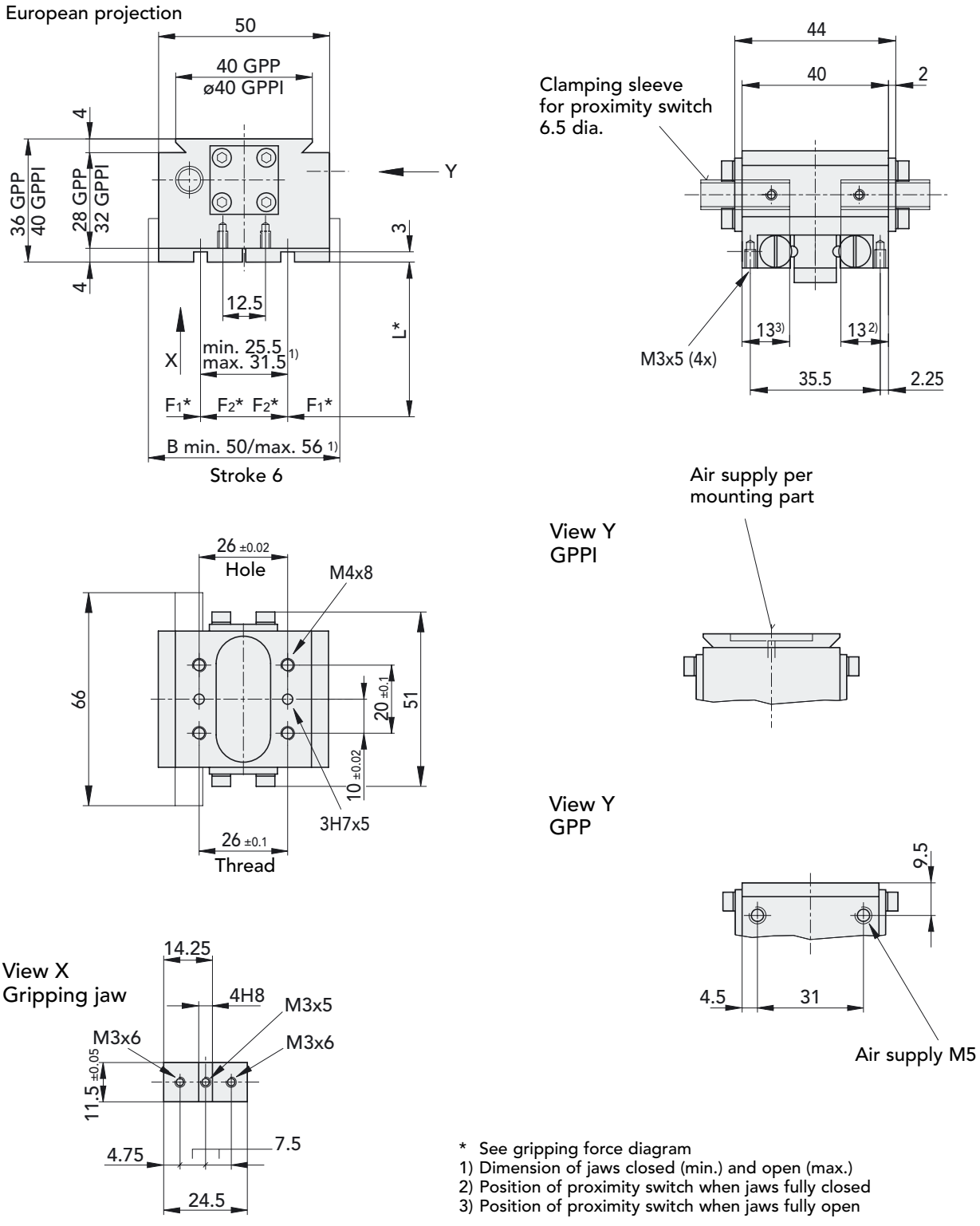
Gripping distance = stroke		[mm]	6
Gripping distance adjustable opening/closing			yes
Efficiency			0.77
Opening/Closing time	1)	[s]	0.015
Weight GPP/GPPI		[kg]	0.25/0.26
Mass moment of inertia J_z		[kgcm²]	0.87
Operating pressure		[bar]	3–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability	2)	[mm]	± 0.005
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection			M5
Thread for mounting positioners			4xM3
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			none needed
Mounting position			any
Material			aluminum, steel, bronze, plastic

1) Measured at max. travel between 3 and 6 bar, without spring
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

GRIPPING FORCE DIAGRAM



p = pneumat. pressure Fed = Spring



* See gripping force diagram
1) Dimension of jaws closed (min.) and open (max.)
2) Position of proximity switch when jaws fully closed
3) Position of proximity switch when jaws fully open

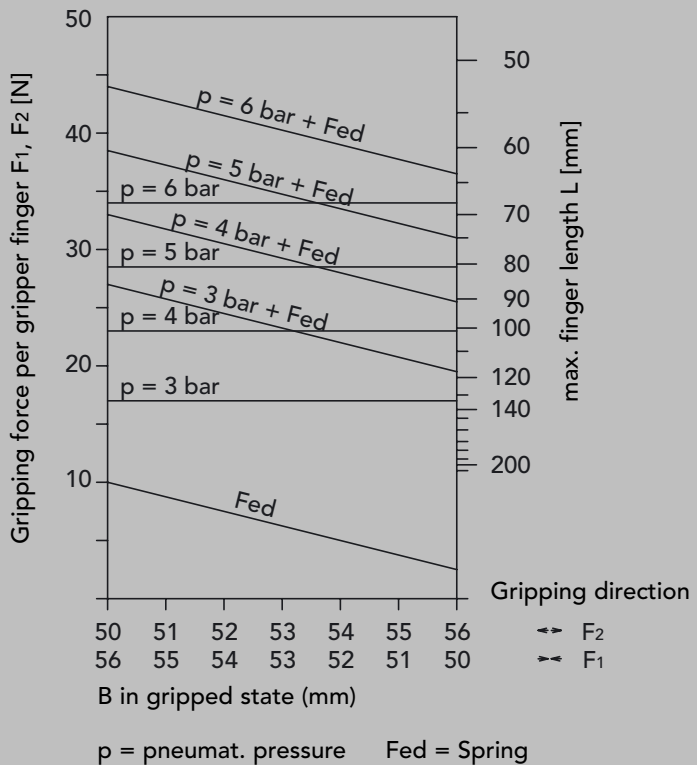
Ref. No.	
GPP-1	**41357**
GPPI-1	**41358**

PRECISION PARALLEL GRIPPERS GPP-ISO SIZE 1

Gripping distance = stroke		[mm]	6
Gripping distance adjustable opening/closing			yes
Efficiency			0.77
Opening/Closing time	1)	[s]	0.015
Weight		[kg]	0.28
Mass moment of inertia J_z		[kgcm²]	0.87
Operating pressure		[bar]	3–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability	2)	[mm]	± 0.005
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection			adjustable exhaust throttles M5, with plug, hose-Ø 4 mm
Thread for mounting positioners			4xM3
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			none needed
Mounting position			any
Material			aluminum, steel, bronze, plastic

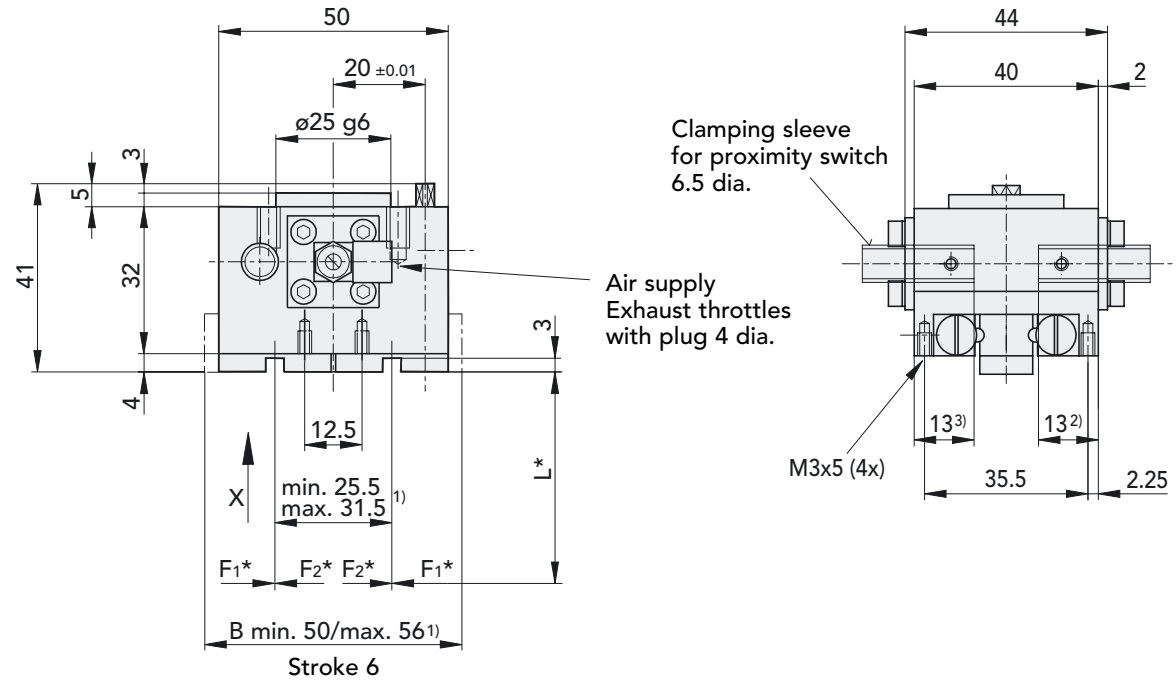
1) Measured at max. travel between 3 and 6 bar, without spring
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

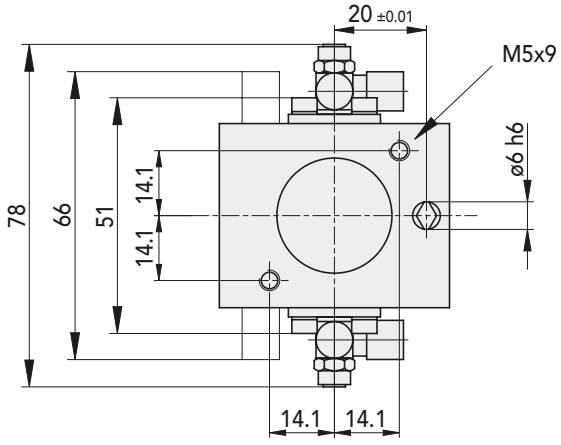
GRIPPING FORCE DIAGRAM



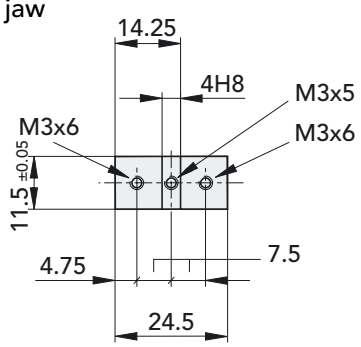
p = pneumat. pressure Fed = Spring

European projection





View X
Gripping jaw



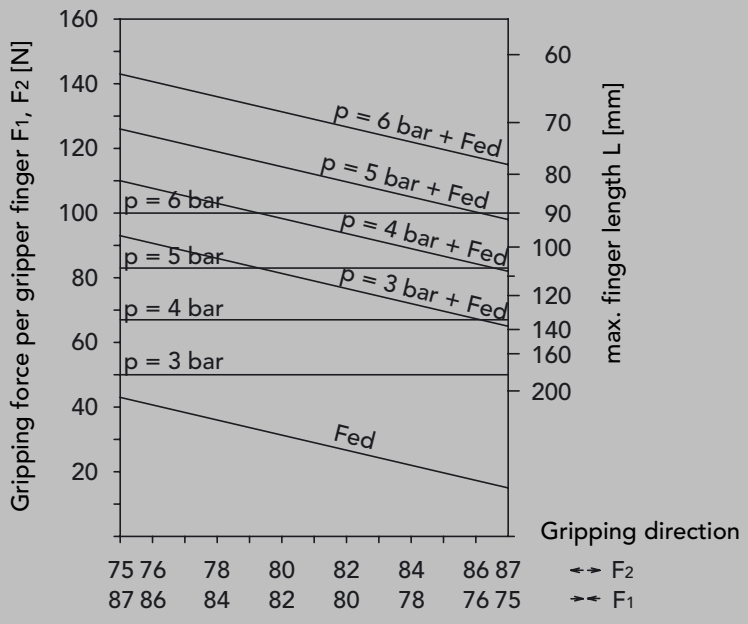
* See gripping force diagram
1) Dimension of jaws closed (min.) and open (max.)
2) Position of proximity switch when jaws fully closed
3) Position of proximity switch when jaws fully open

PRECISION PARALLEL GRIPPERS GPP/GPPI SIZE 2

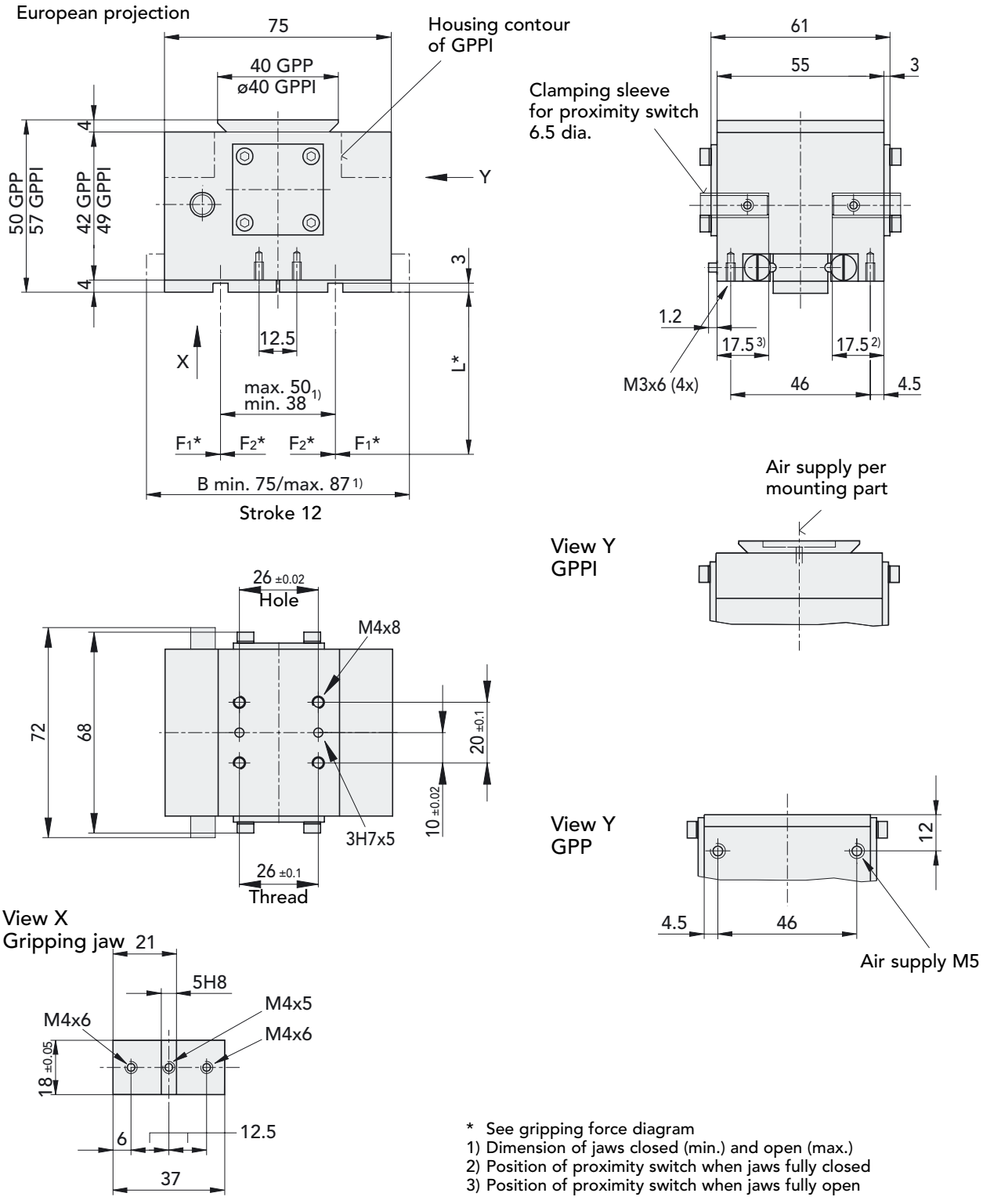
Gripping distance = stroke		[mm]	12
Gripping distance adjustable opening/closing			yes
Efficiency			0.82
Opening/Closing time	1)	[s]	0.045
Weight GPP/GPPI		[kg]	0.68/0.68
Mass moment of inertia J_z		[kgcm²]	4.3
Operating pressure		[bar]	3–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability	2)	[mm]	± 0.02
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection			M5
Thread for mounting positioners			4xM3
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			none needed
Mounting position			any
Material			aluminum, steel, bronze, plastic

1) Measured at max. travel between 3 and 6 bar, without spring
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

GRIPPING FORCE DIAGRAM



p = pneumat. pressure Fed = Spring



* See gripping force diagram
1) Dimension of jaws closed (min.) and open (max.)
2) Position of proximity switch when jaws fully closed
3) Position of proximity switch when jaws fully open

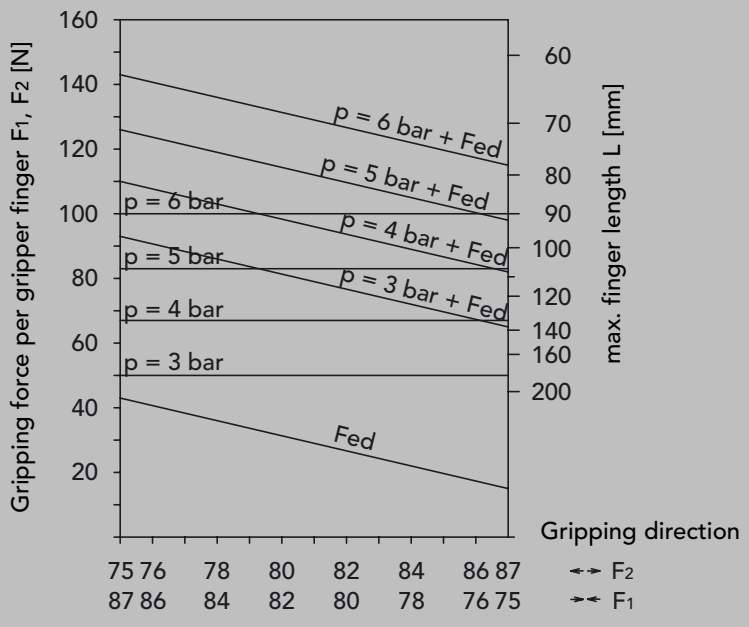
Ref. No.	
GPP-2	**41359**
GPPI-2	**41361**

PRECISION PARALLEL GRIPPERS GPP-ISO SIZE 2

Gripping distance = stroke		[mm]	12
Gripping distance adjustable opening/closing			yes
Efficiency			0.82
Opening/Closing time	1)	[s]	0.045
Weight GPP-ISO		[kg]	0.72
Mass moment of inertia J_z		[kgcm²]	4.3
Operating pressure		[bar]	3–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability	2)	[mm]	± 0.02
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection			adjustable exhaust throttles M5, with plug, hose-Ø 4 mm
Thread for mounting positioners			4xM3
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			none needed
Mounting position			any
Material			aluminum, steel, bronze, plastic

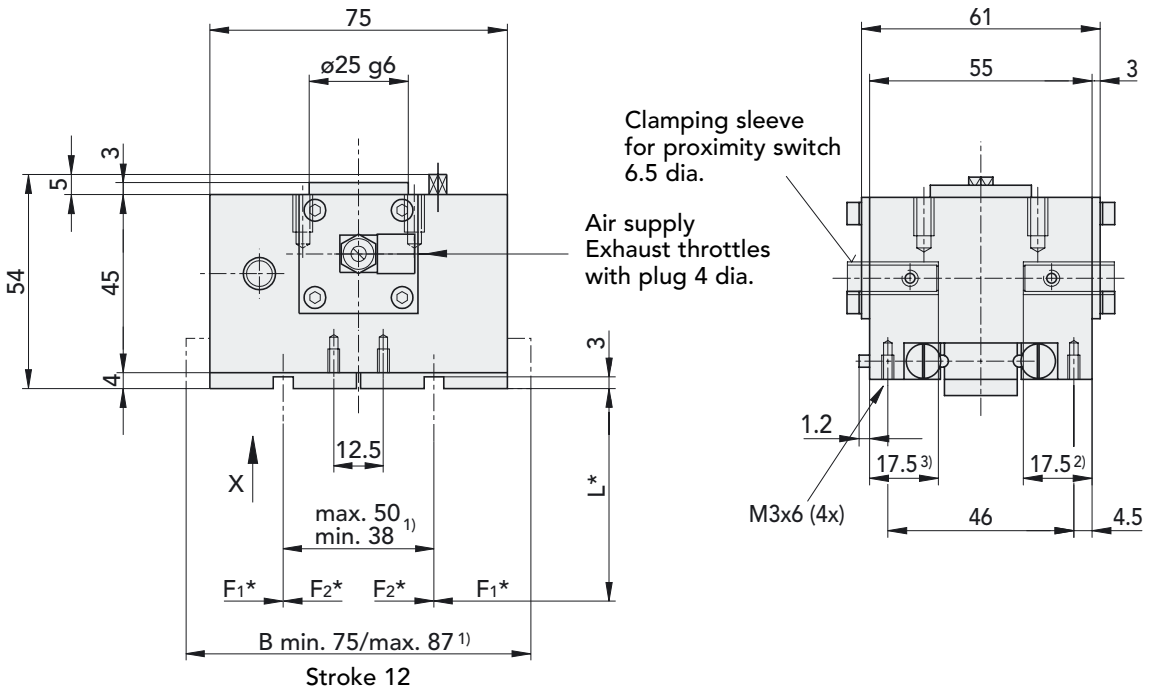
1) Measured at max. travel between 3 and 6 bar, without spring
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

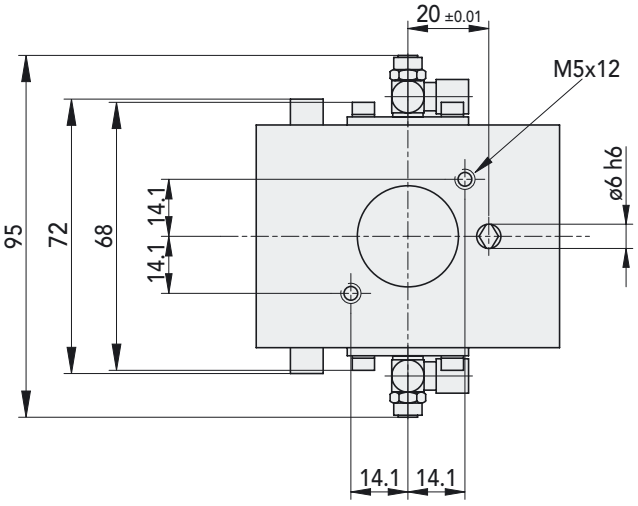
GRIPPING FORCE DIAGRAM

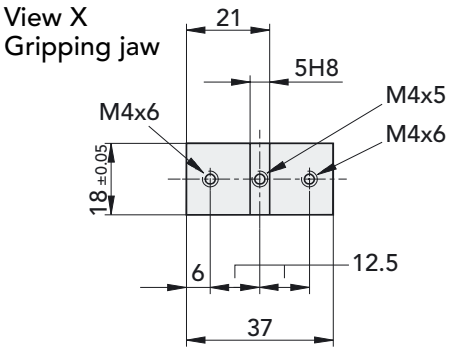


p = pneumat. pressure Fed = Spring

European projection







* See gripping force diagram
1) Dimension of jaws closed (min.) and open (max.)
2) Position of proximity switch when jaws fully closed
3) Position of proximity switch when jaws fully open

Ref. No.
GPP-2-ISO

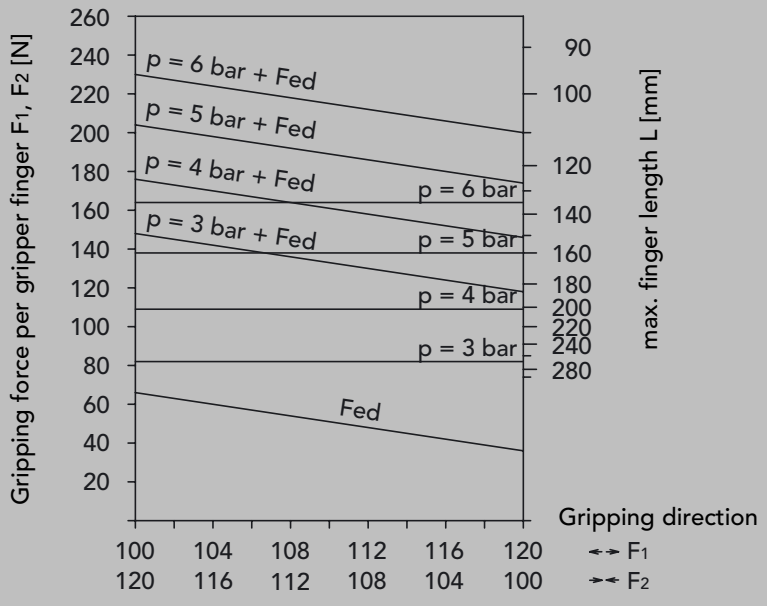
39817

PRECISION PARALLEL GRIPPERS GPP/GPPI SIZE 3

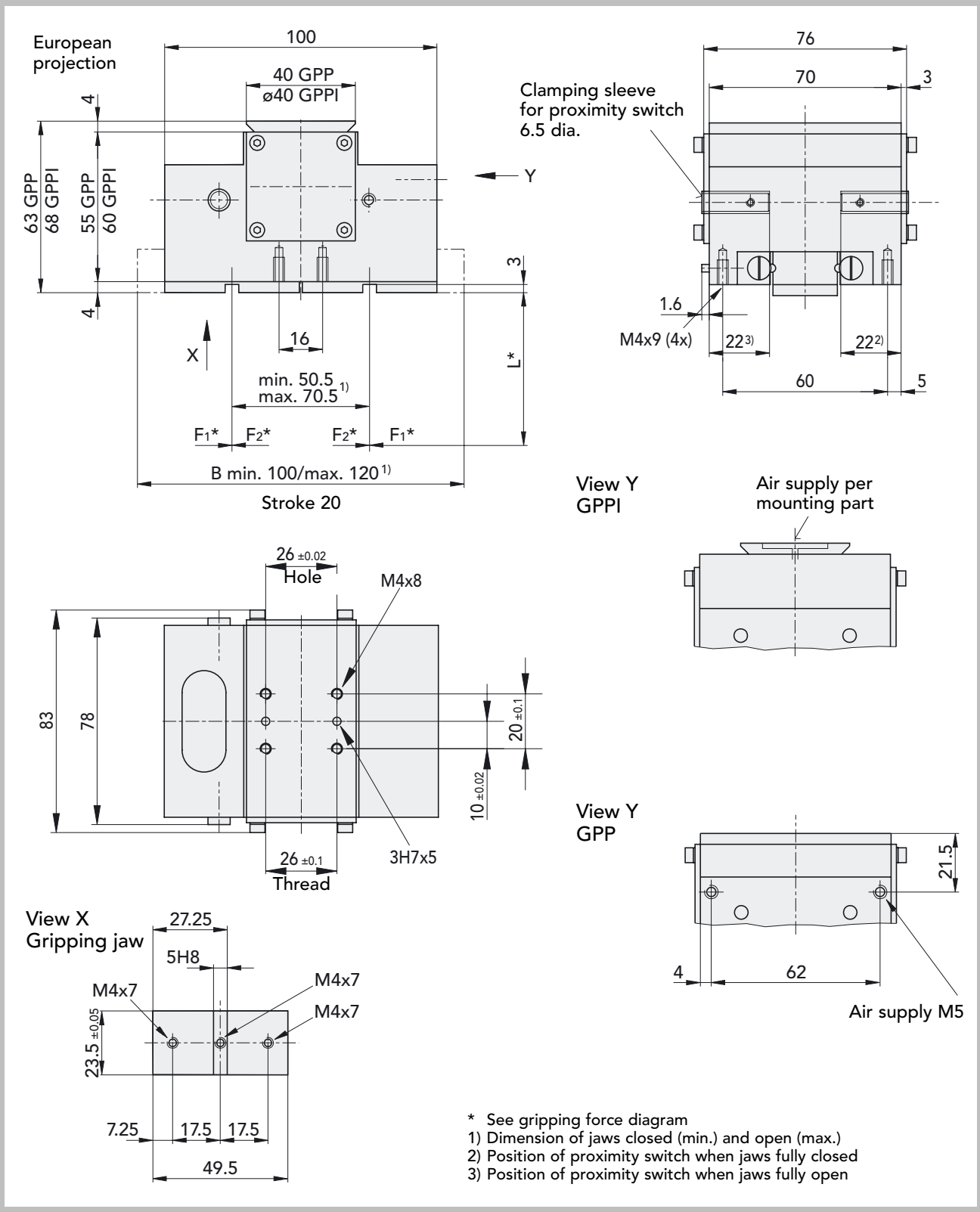
Gripping distance = stroke		[mm]	20
Gripping distance adjustable opening/closing			yes
Efficiency			0.86
Opening/Closing time	1)	[s]	0.12
Weight GPP/GPPI		[kg]	1.32/1.42
Mass moment of inertia J_z		[kgcm²]	14.0
Operating pressure		[bar]	3–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability	2)	[mm]	± 0.03
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection			M5
Thread for mounting positioners			4xM4
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			none needed
Mounting position			any
Material			aluminum, steel, bronze, plastic

1) Measured at max. travel between 3 and 6 bar, without spring
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

GRIPPING FORCE DIAGRAM



p = pneumat. pressure Fed = Spring



* See gripping force diagram
1) Dimension of jaws closed (min.) and open (max.)
2) Position of proximity switch when jaws fully closed
3) Position of proximity switch when jaws fully open

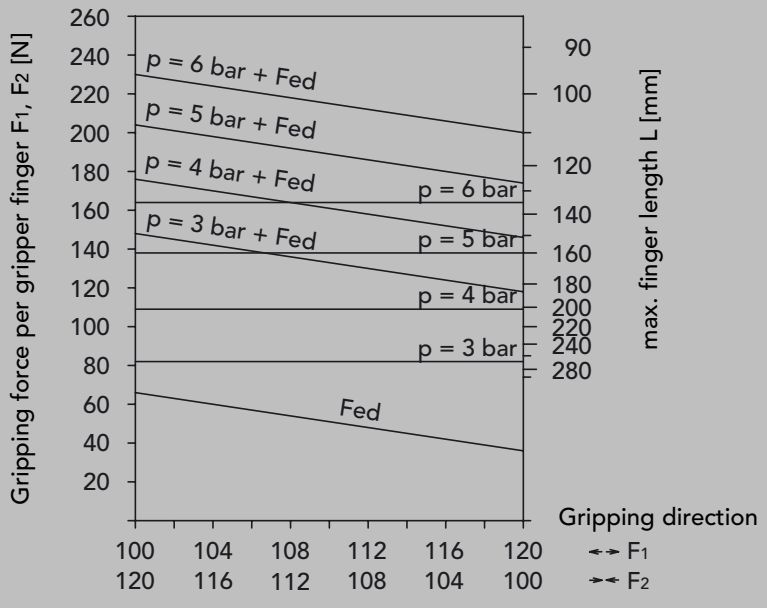
Ref. No.	
GPP-3	**41363**
GPPI-3	**41365**

PRECISION PARALLEL GRIPPERS GPP-ISO SIZE 3

Gripping distance = stroke		[mm]	20
Gripping distance adjustable opening/closing			yes
Efficiency			0.86
Opening/Closing time	1)	[s]	0.12
Weight GPP-ISO		[kg]	1.42
Mass moment of inertia J_z		[kgcm²]	14.0
Operating pressure		[bar]	3–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability	2)	[mm]	± 0.03
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection			M5
Thread for mounting positioners			4xM4
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			none needed
Mounting position			any
Material			aluminum, steel, bronze, plastic

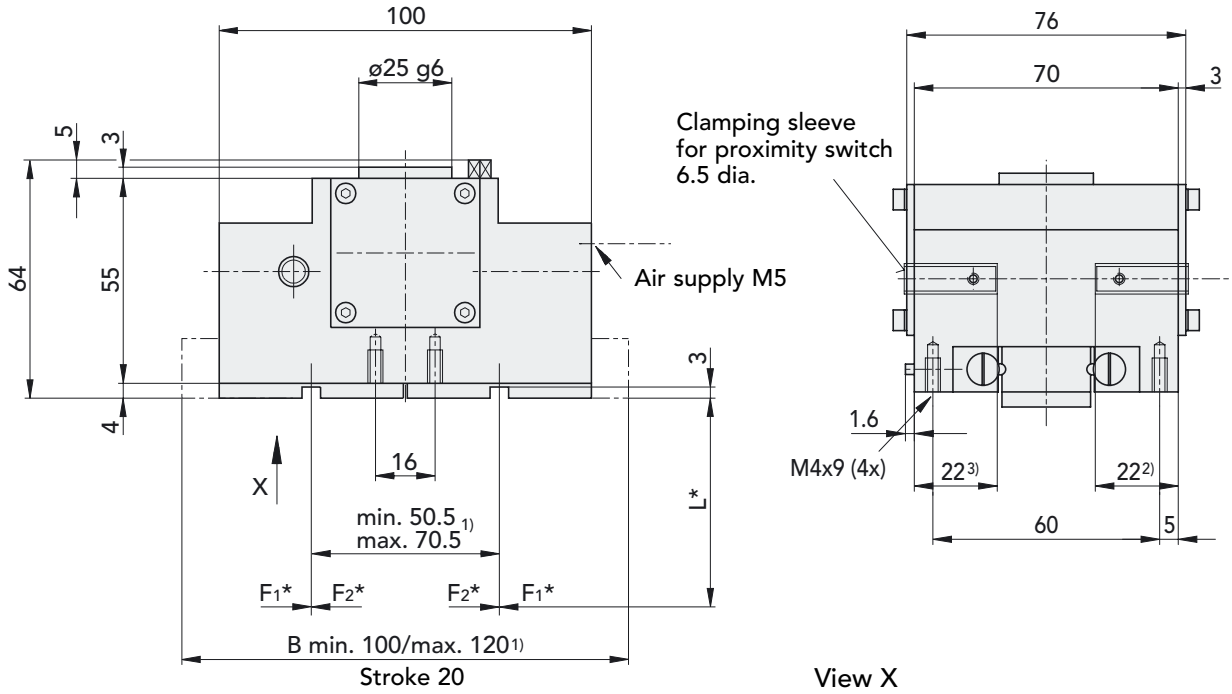
1) Measured at max. travel between 3 and 6 bar, without spring
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

GRIPPING FORCE DIAGRAM

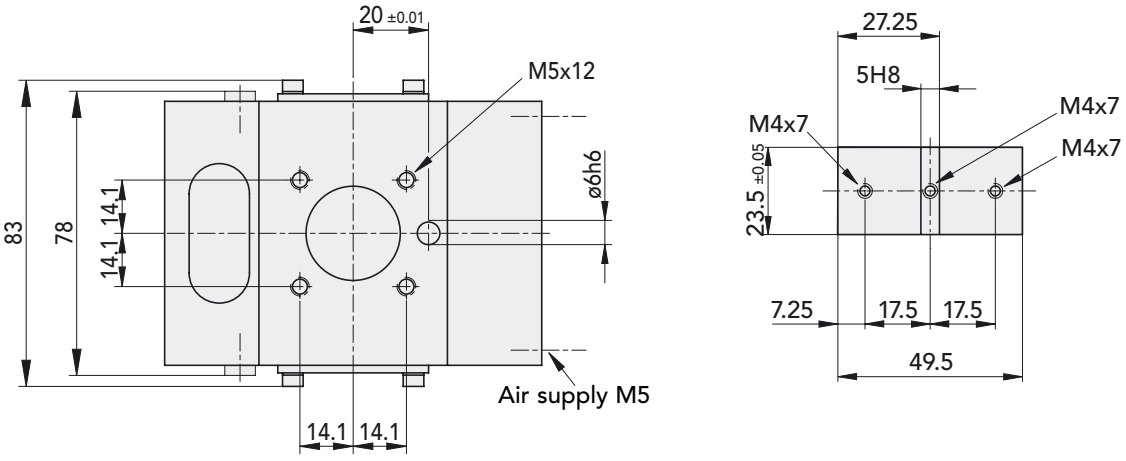


p = pneumat. pressure Fed = Spring

European projection



View X
Gripping jaw

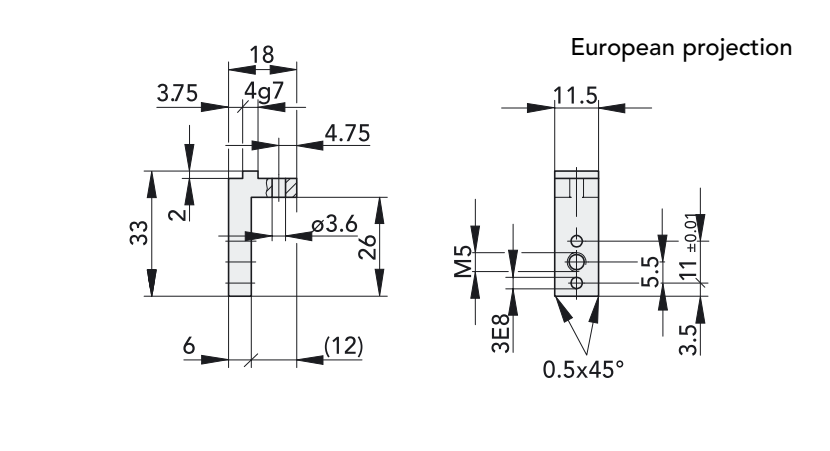


* See gripping force diagram
1) Dimension of jaws closed (min.) and open (max.)
2) Position of proximity switch when jaws fully closed
3) Position of proximity switch when jaws fully open

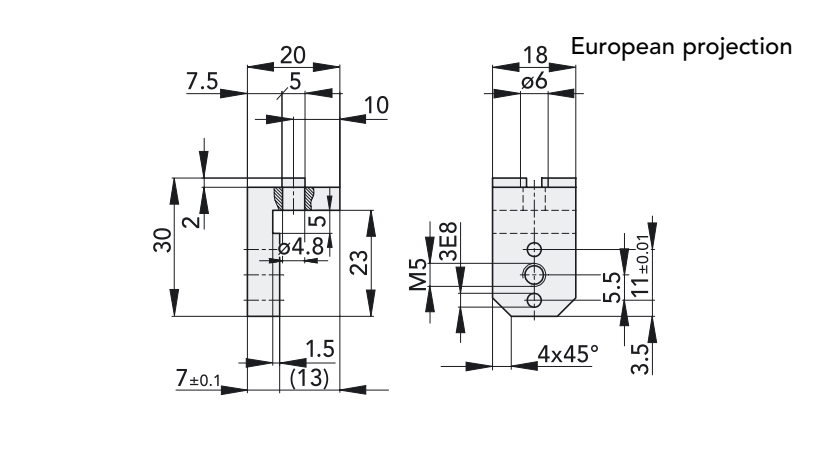
SPECIAL ACCESSORIES FOR GPP

ADAPTERS

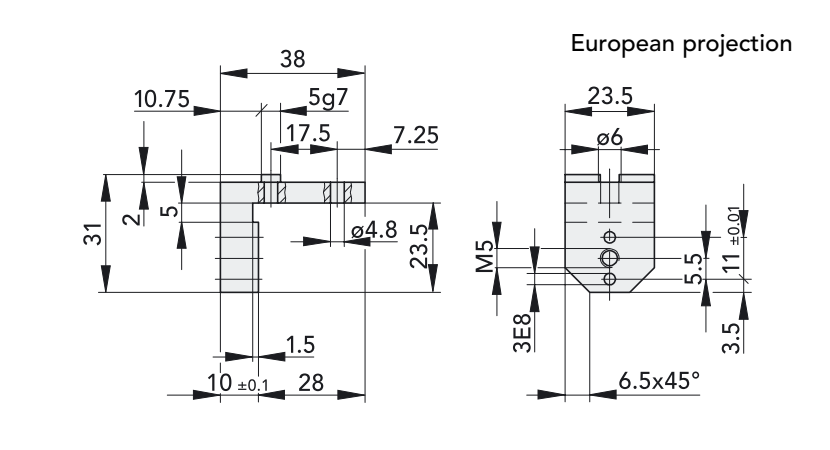
for attaching fingers to GPP grippers



for GPP-1 **39025**



for GPP-2 **39026**



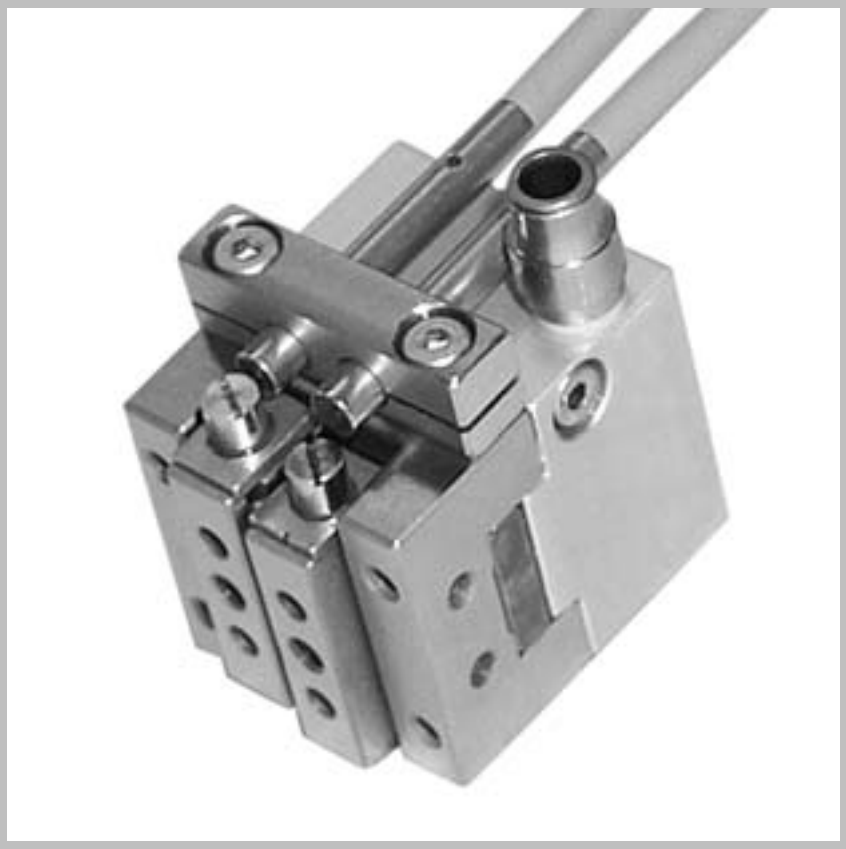
for GPP-3 **39027**

PRECISION PARALLEL MINI GRIPPERS GPPM PRODUCT DESCRIPTION

The **Precision Mini Gripper GPPM** was developed for handling small parts in confined installation conditions.

The GPPM is dual-acting; it can be used for internal or external spans.

At the heart of the Precision Mini Gripper is a precise ball guide (patented) which ensures advanced operational safety, longevity, high precision and a high degree of mechanical efficiency.



Compressed air can be supplied along or across the guide direction or from above. In this way, all requirements can be met, including arrangement of components in a row without any gaps between them.

As an option, the end positions can be queried with proximity switches which are attached to the housing by means of an attachment set.

Installation of the gripper is either by means of attachment drill holes or with optional adapters with Quick-Set® size 20 (see page 401 onwards).

PRECISION PARALLEL MINI GRIPPERS GPPM-X, GPPM-Y, GPPMI

Two sizes in three variants each.

GPPM-X; air infeed and installation of proximity switches along the guide direction.

GPPM-Y; air infeed and installation of proximity switches across the guide direction.

GPPMI; air infeed from above, without installation of proximity switches[1)].

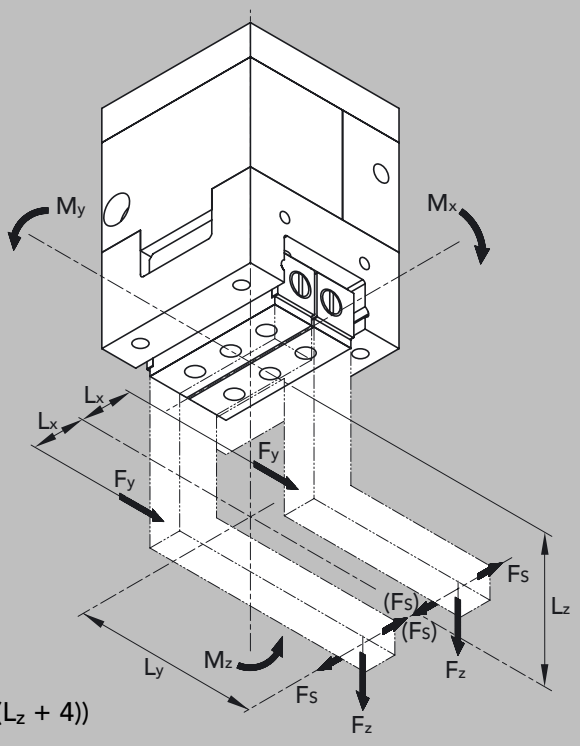
1) Versions GPPMI-X and GPPMI-Y are intended for operation with proximity switches.

SCOPE OF DELIVERY
GPPMX and GPPMY: with clamping device for proximity switches and two plug-type connections.
GPPMI-X and GPPMI-Y: with clamping device for proximity switches.

SUITABLE ACCESSORIES

Special accessories page 111
Accessories from page 302
Quick-Set® from page 338

DEFINITION AND CALCULATION



$M_{0x} = 0.001 \cdot (F_{0z} \cdot L_y + F_{0y} \cdot (L_z + 4))$

$M_{0y} = 0.001 \cdot (F_s \cdot (L_z + 4) + F_{0z} \cdot L_x)$

$M_{0z} = 0.001 \cdot (F_s \cdot L_y + F_{0y} \cdot L_x)$

Combined loading

$$B_0 = \frac{M_{0x}}{K_1} + \frac{M_{0y}}{K_2} + \frac{M_{0z}}{K_3} \leq 1$$

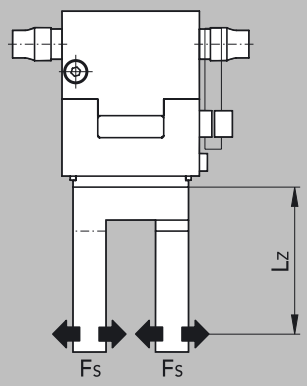
	K_1	K_2	K_3	$F_{0y\ max}$ [N]	$F_{0z\ max}$ [N]
GPPM-1	1.66	0.66	0.66	14	14
GPPM-2	2.15	1.46	1.46	20	20

F_s:	Gripping force [N] (as gripping force diagram)
F_{0y}, F_{0z}:	Forces acting [N]
$F_{0y\ max}$, $F_{0z\ max}$:	Max. permissible static forces per jaw [N]
L_x, L_y, L_z:	Distances of force application [mm]
M_{0x}, M_{0y}, M_{0z}:	Static load moments [Nm]
K_1, K_2, K_3:	Load limit constants
B_0:	Load factor: **must not exceed the value 1!**

PRECISION PARALLEL MINI GRIPPERS

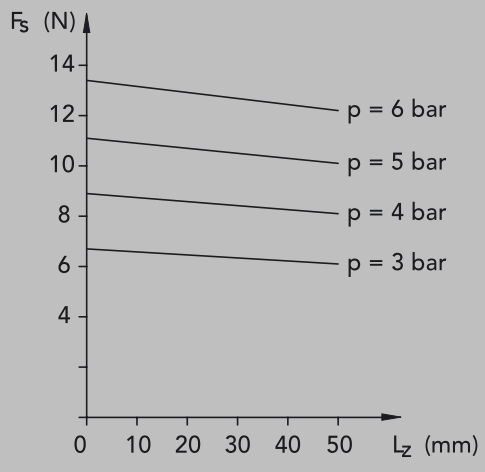
			GPPM-1	GPPM-2
Gripping distance = stroke		[mm]	4	6
Opening/Closing time	1)	[s]	0.01	0.01
Weight		[kg]	0.05	0.10
Mass moment of inertia J_z		[kgcm^2]	0.033	0.104
Operating pressure		[bar]	3–6	3–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C	
Repeatability	2)	[mm]	± 0.02	± 0.025
Check on end position open/closed	3)		inductive proximity switches	
Pneumatic connection			M3 with plug-type connection for hose Ø 3 mm	
Thread for mounting positioners	4)		4 x M2	4 x M2.5
Ambient: Temperature		[°C]	10–50	
Rel. humidity			< 95% (without condensation)	
Air purity			normal workshop atmosphere	
Warranty			2 years from the date of delivery	
Maintenance			none needed	
Mounting position			any	
Material			aluminum, steel, bronze	

1) Measured at max. stroke and a pressure of 5 bar
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302
4) At GPPMX, GPPMI and GPPMI-X

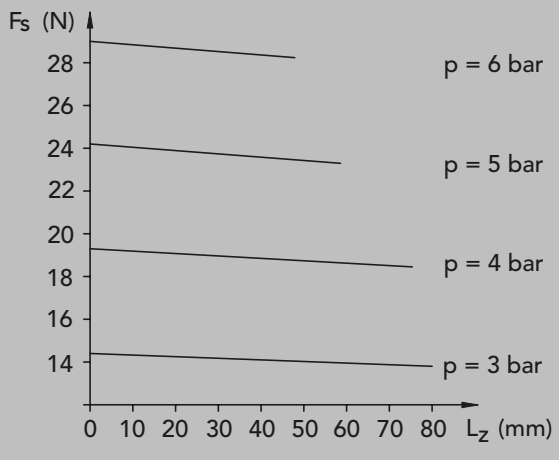


GRIPPING FORCE DIAGRAM GPPM

GPPM-1



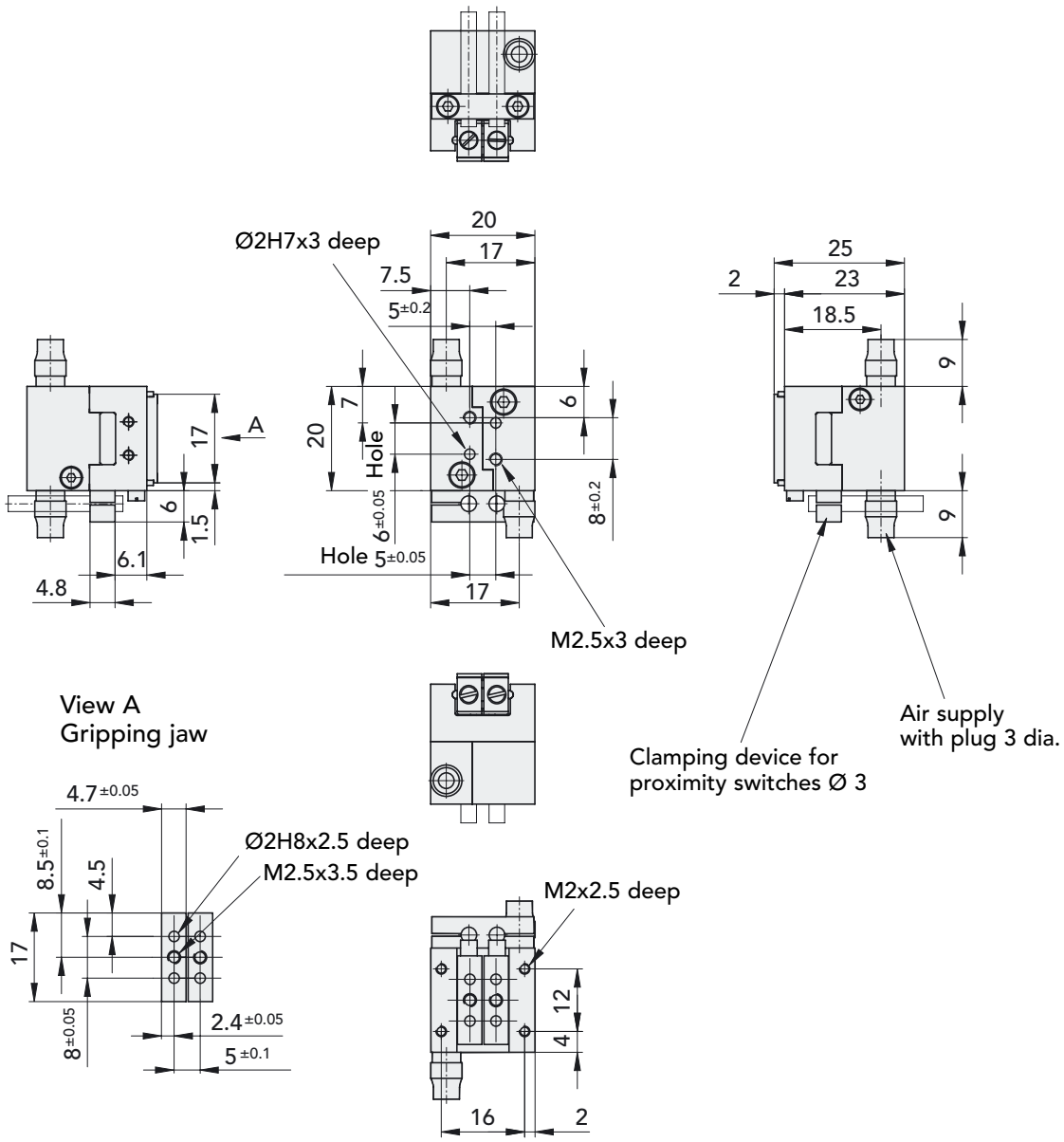
GPPM-2



Gripping force per gripper finger Fs = f (Lz, p)

European projection

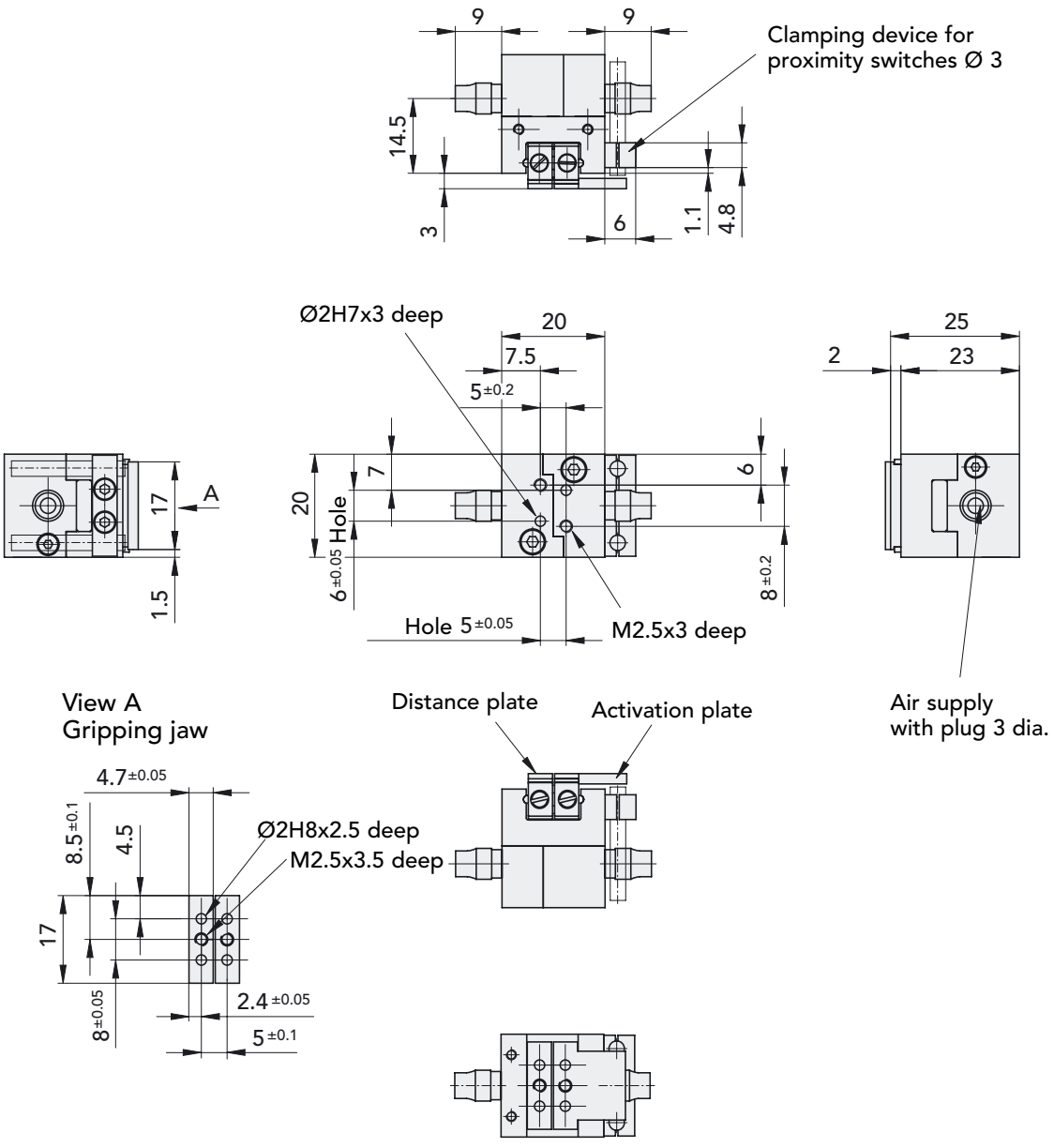
GPPM-1X



Ref. No.
GPPM-1X

49276

GPPM-1Y



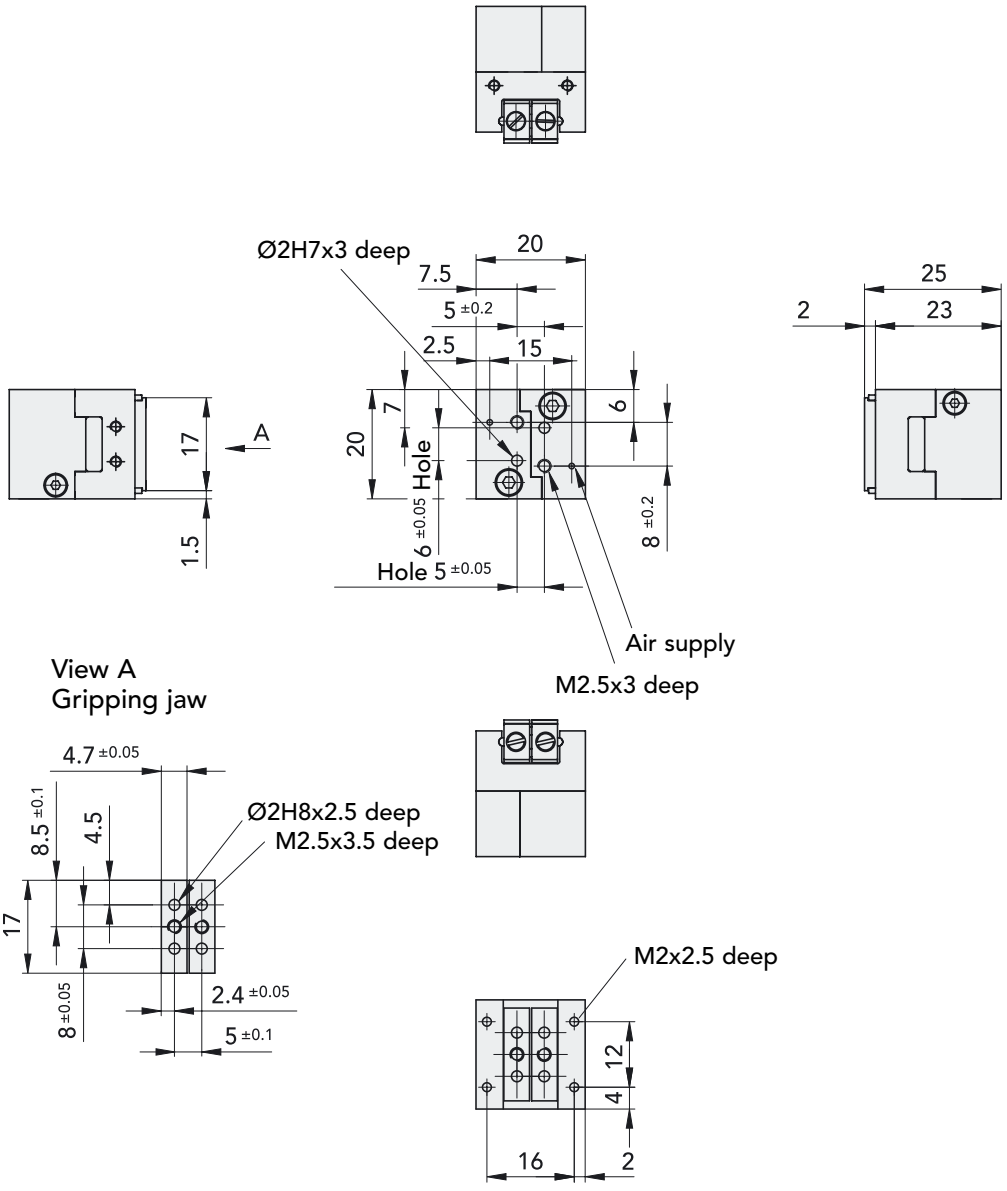
European projection

Ref. No.
GPPM-1Y

50413

European projection

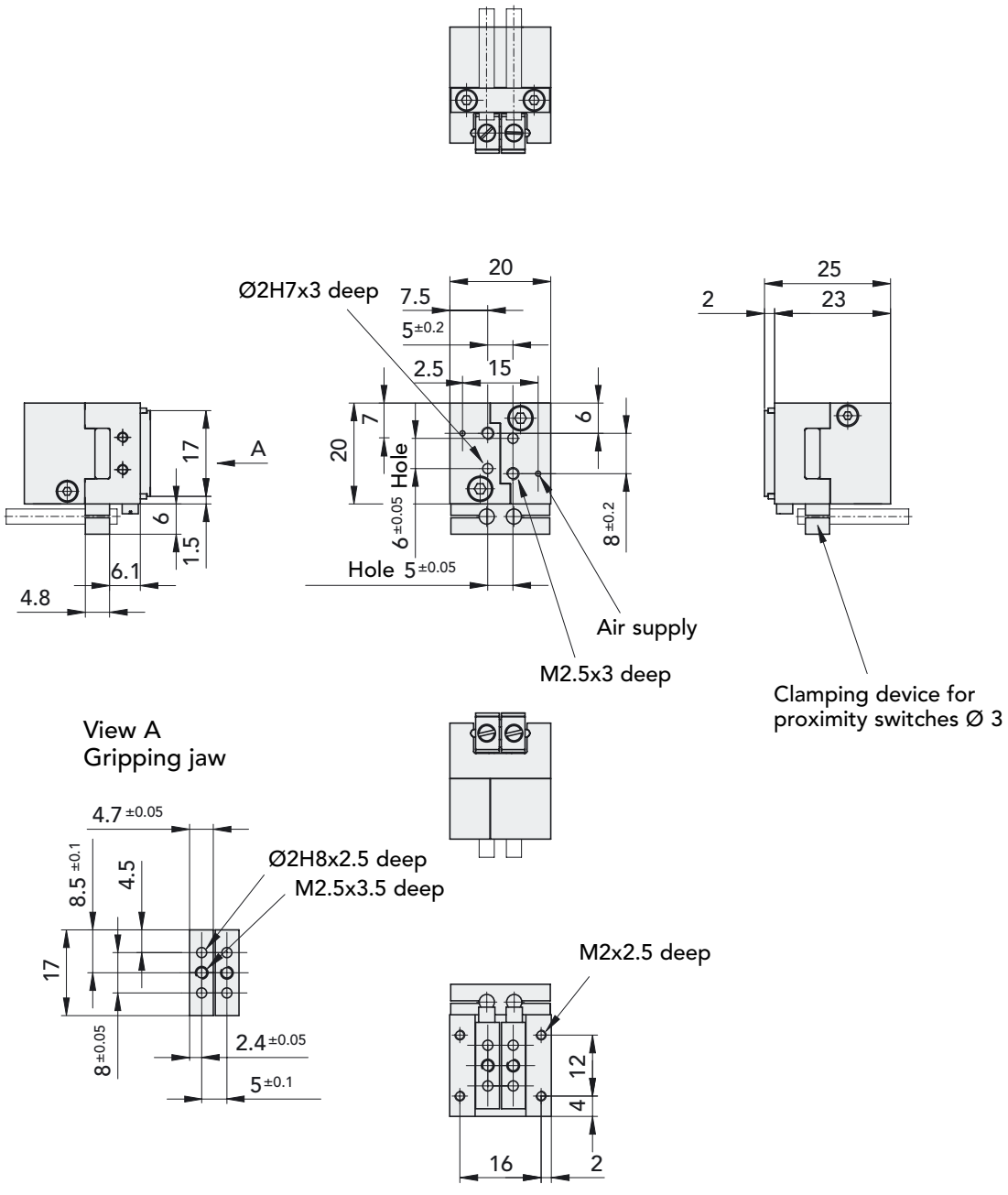
GPPMI-1



Ref. No.
GPPMI-1

50414

GPPMI-1X



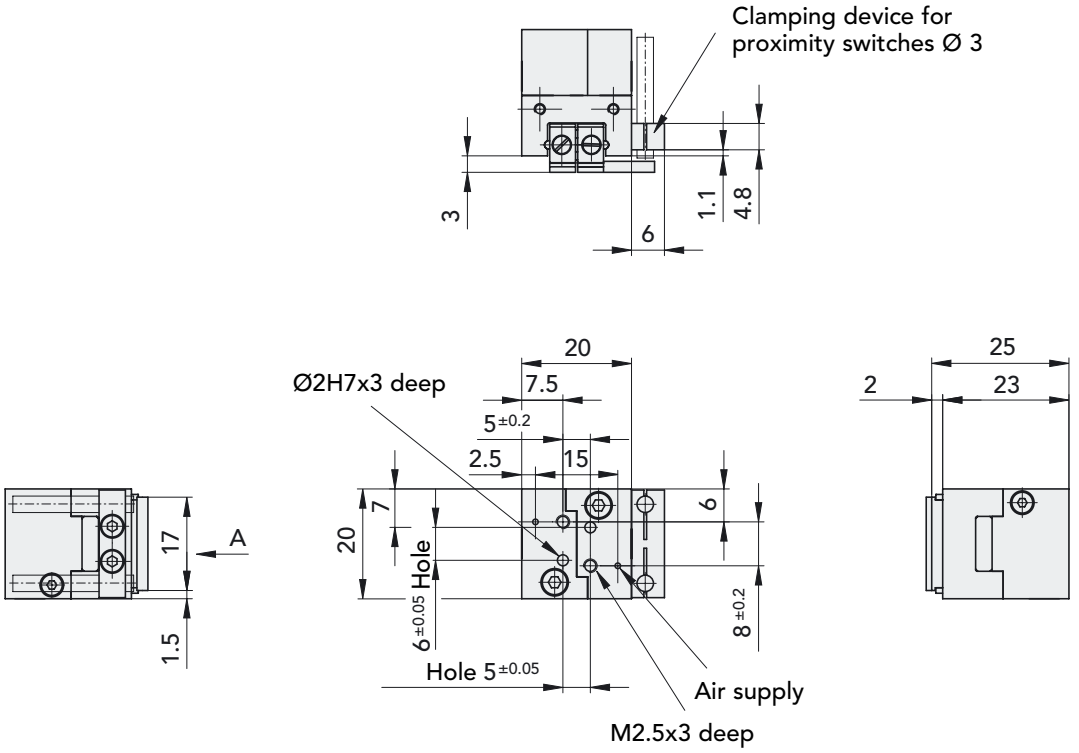
European projection

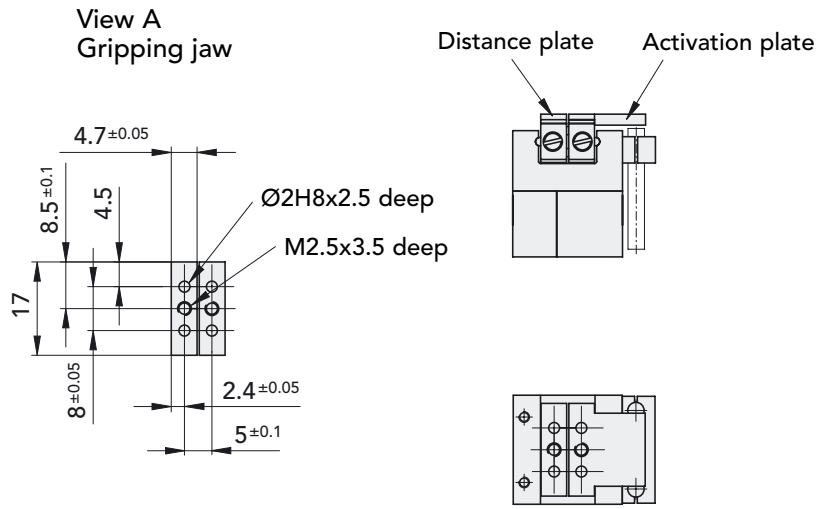
Ref. No.
GPPMI-1X

50424

European projection

GPPMI-1Y

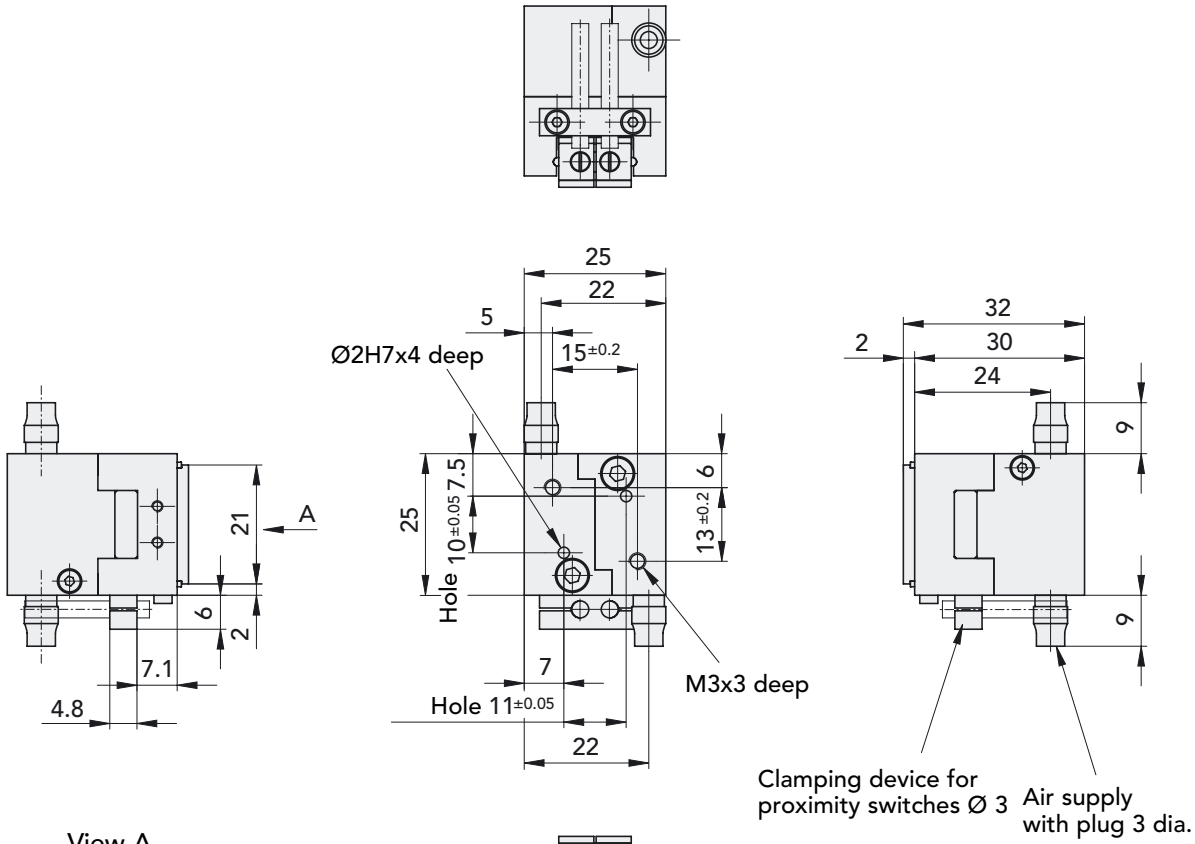




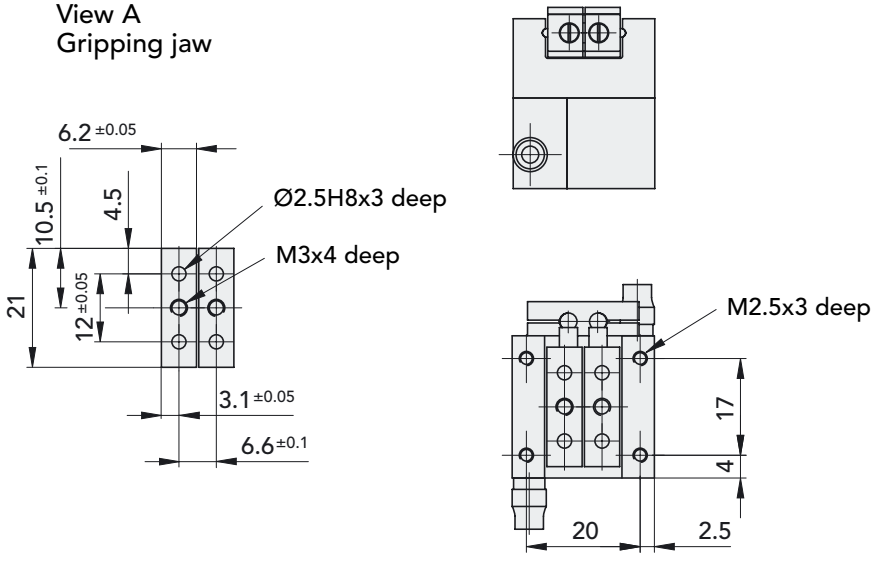
Ref. No.
GPPMI-1Y

50426

GPPM-2X



View A
Gripping jaw

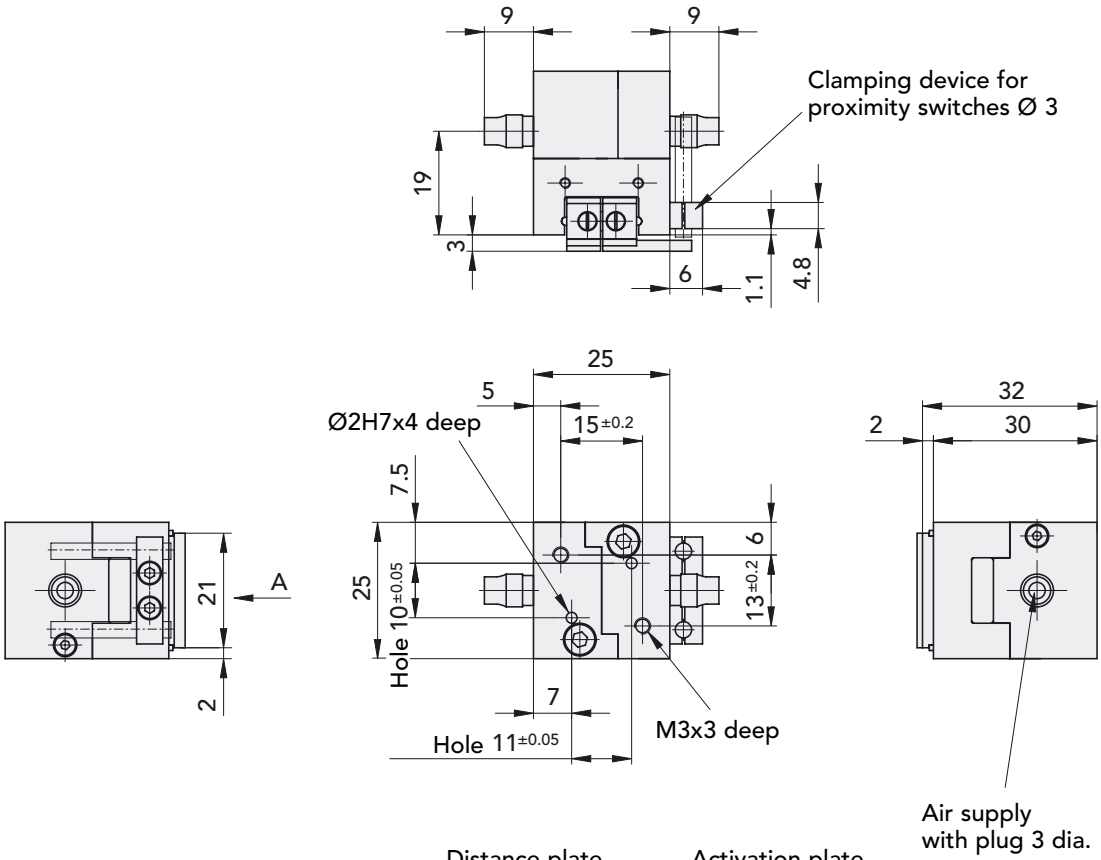


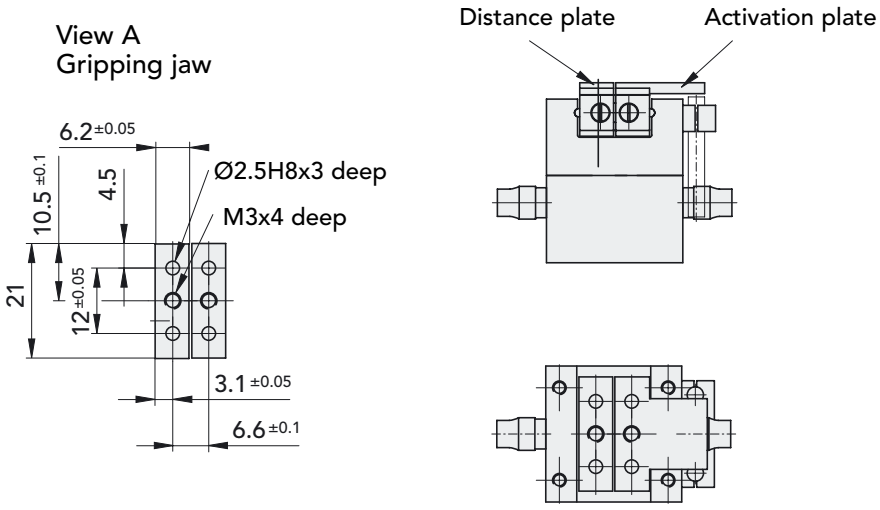
European projection

Ref. No.
GPPM-2X

European projection

GPPM-2Y

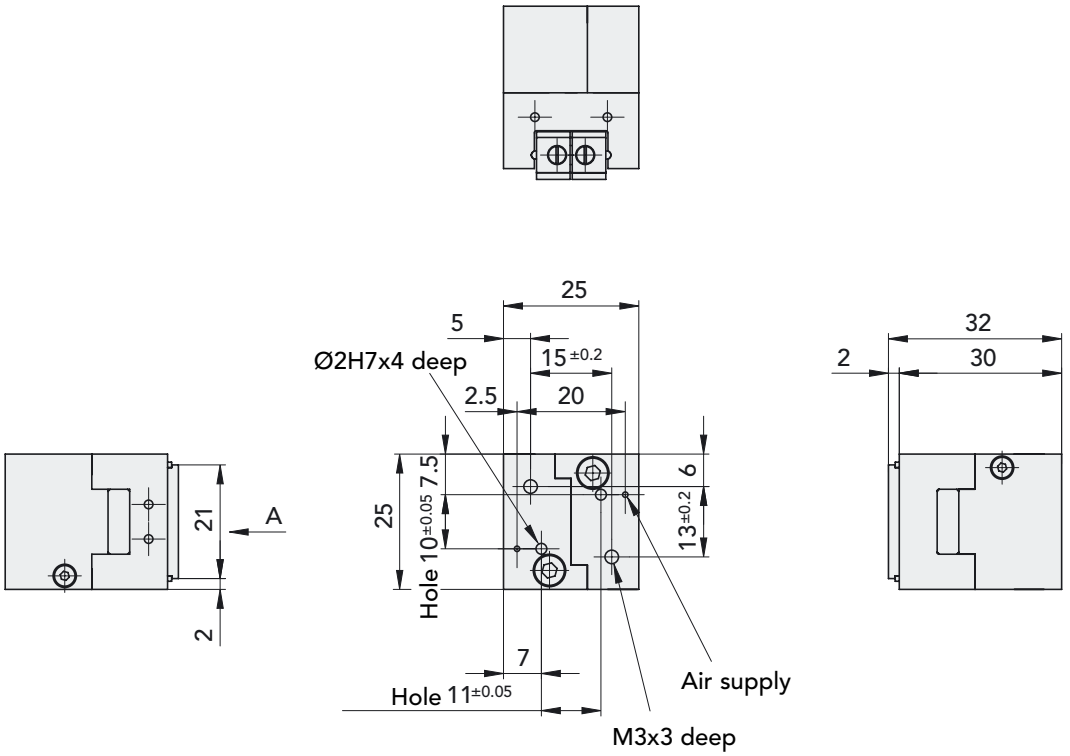


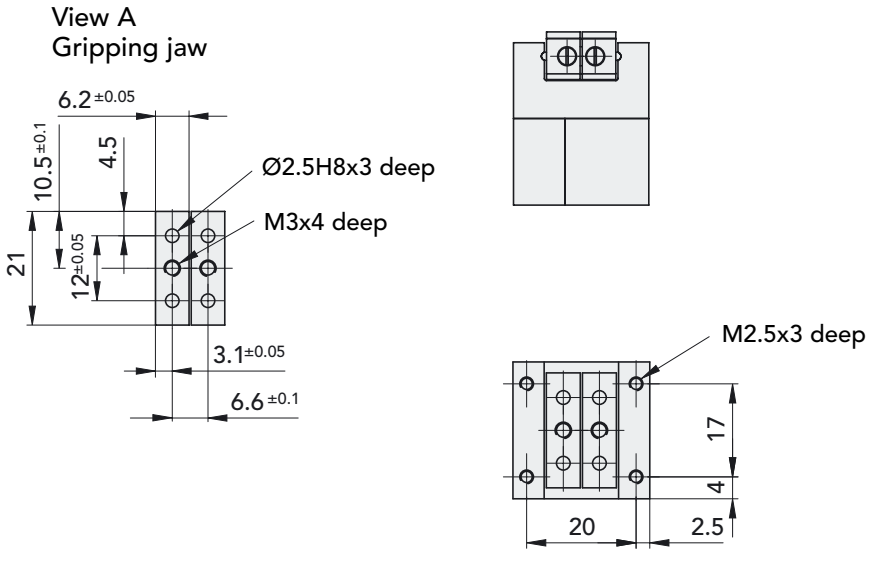


Ref. No.
GPPM-2Y

50415

GPPMI-2





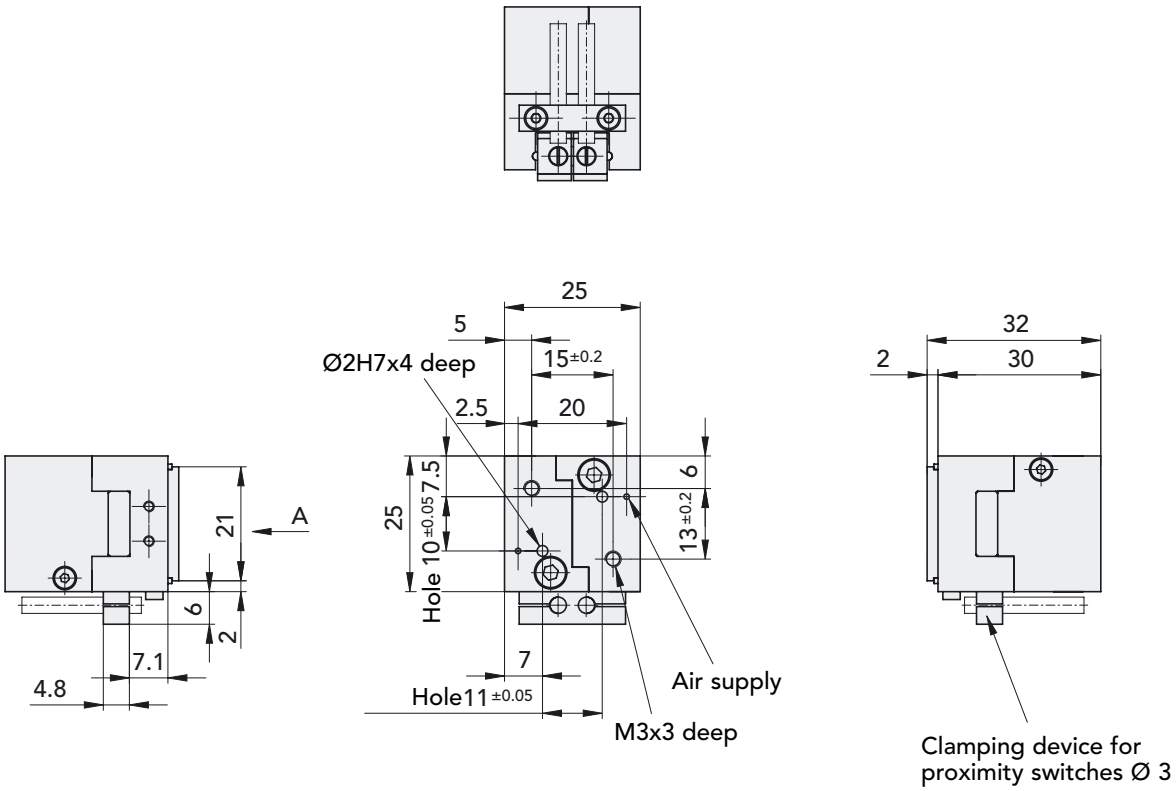
European projection

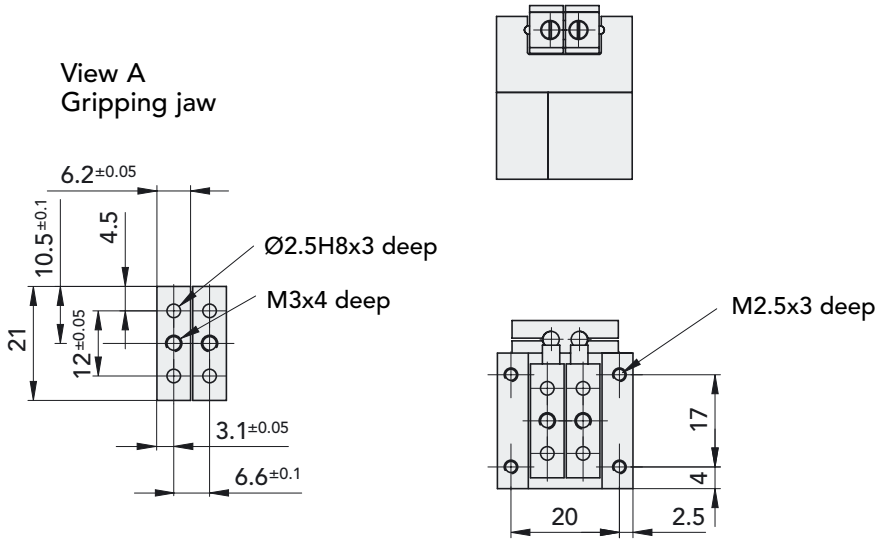
Ref. No.
GPPMI-2

50416

European projection

GPPMI-2X

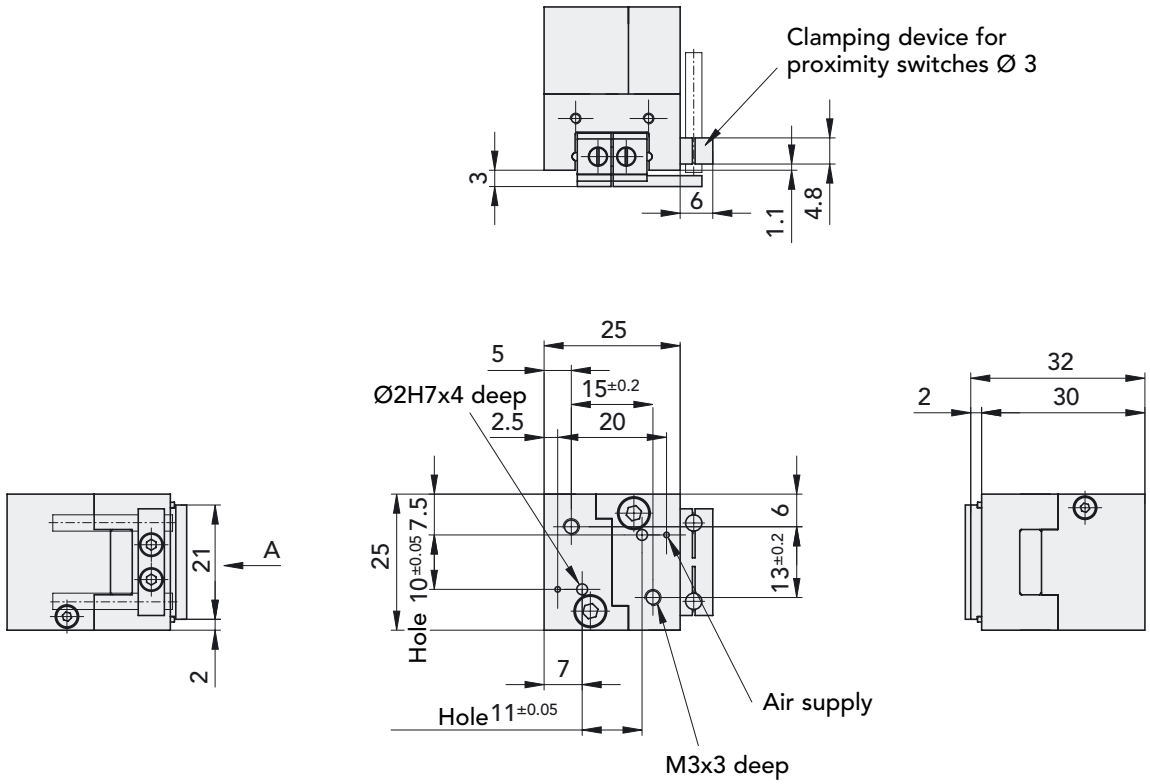


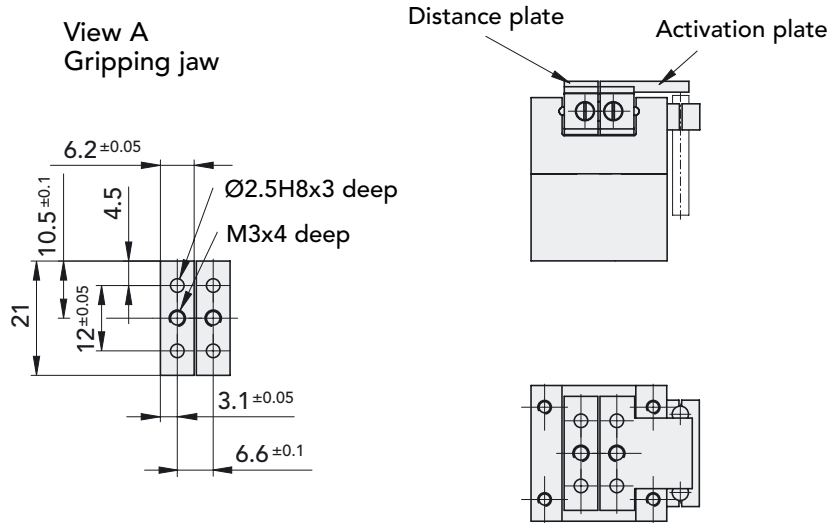


Ref. No.
GPPMI-2X

50425

GPPMI-2Y





European projection

Ref. No.
GPPMI-2Y

50427

SPECIAL ACCESSORIES FOR GPPM

ADAPTERS

for installation with Quick-Set® size 20

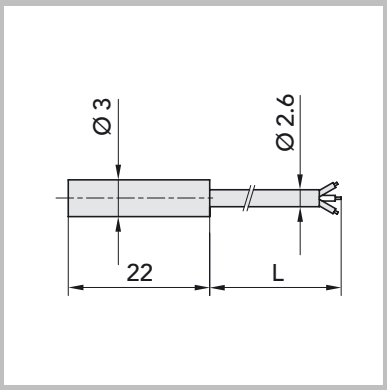
for GPPM-1X/GPPM-1Y	**50420**
for GPPM-2X/GPPM-2Y	**50421**

ACCESSORIES

INDUCTIVE PROXIMITY SWITCH

Ø 3 mm PNP, short-circuit and reverse polarity protected, sensing distance 0.6 mm, flush-mountable, with LED

L = 2000 mm	**508846**



PNEUMATICS CONNECTIONS

1	Threaded outgoing air-throttle M3, with angled swivel connection, pluggable, Ø 3 mm	**507518**
2	Angled screw connector M3, pluggable, Ø 3 mm	**507517**
3	Screw-connector M3, straight, pluggable, Ø 3 mm	**507516**

UNIVERSAL PARALLEL GRIPPERS GPU/GPUI PRODUCT DESCRIPTION

The Universal Parallel Gripper GPU/GPUI possess an extremely robust, low-friction **guide system for the jaws,** in which the main forces are transferred by cylindrical rollers. The **efficiency is very high.**

The grippers are extremely **compact** and the pneumatic connections plus the proximity switches are arranged on the narrow side. As a result, several grippers can be mounted side by side in a very small space.

The **high repeatability,** combined with the **high gripping force per gripper weight,** can also convince demanding users.

A **safety orifice** protects the gripper against overloading by unduly high mass force of the gripping fingers.

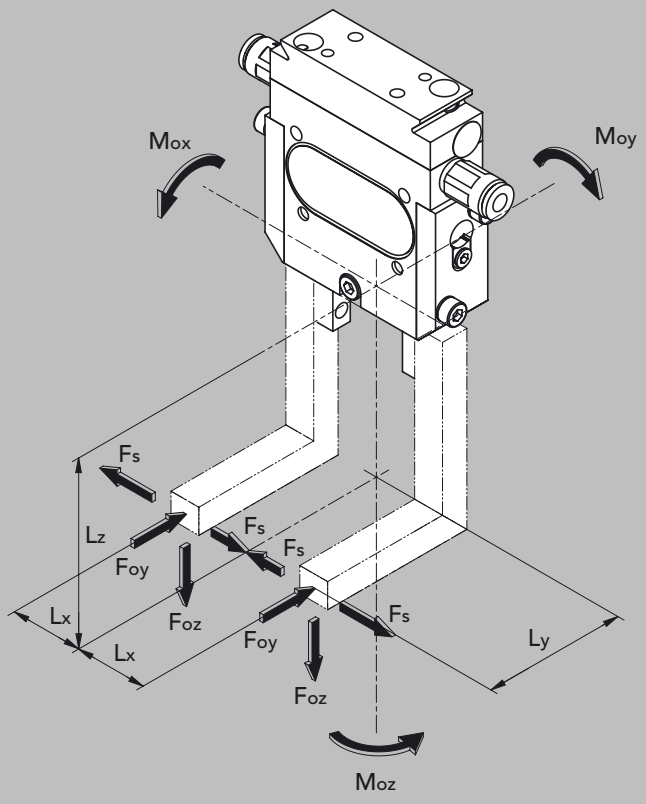
SCOPE OF DELIVERY

With clamping device for proximity switches and a plug-type connection. I versions without exhaust throttles.

SUITABLE ACCESSORIES

Accessories from page 302
Quick-Set® from page 338

DEFINITION OF LOAD



		GPU/GPUI-10	GPU/GPUI-14	GPU/GPUI-20	GPU/GPUI-25
$F_{S\ perm.}$	[N]	see gripping force diagram			
$F_{oy\ perm.}$	[N]	25	50	75	100
$F_{oz\ perm.}$	[N]	30	50	80	120
$L_{x\ perm.}$	[mm]	40	60	80	100
$L_{y\ perm.}$	[mm]	40	60	80	100
$L_{z\ perm.}$	[mm]	50	75	100	125
$(L_x + L_y)_{perm.}$	[mm]	40	60	80	100
$(L_y + L_z)_{perm.}$	[mm]	50	75	100	125
$(L_z + L_x)_{perm.}$	[mm]	50	75	100	125
$M_{ox\ perm.} = (F_{oy} \cdot L_z) + (F_{oz} \cdot L_y)$	[Nmm]	250	750	1500	2500
$M_{oy\ perm.} = (F_S \cdot L_z) + (F_{oz} \cdot L_x)$	[Nmm]	1000	3000	5000	11500
$M_{oz\ perm.} = (F_S \cdot L_y) + (F_{oy} \cdot L_x)$	[Nmm]	800	2300	4000	9000

F_S: Gripping force per gripper finger [N]
F_{oy}, F_{oz}: Static forces [N]
L_x, L_y, L_z: Distances of force application [mm]
M_{ox}, M_{oy}, M_{oz}: Static load moments [Nmm]

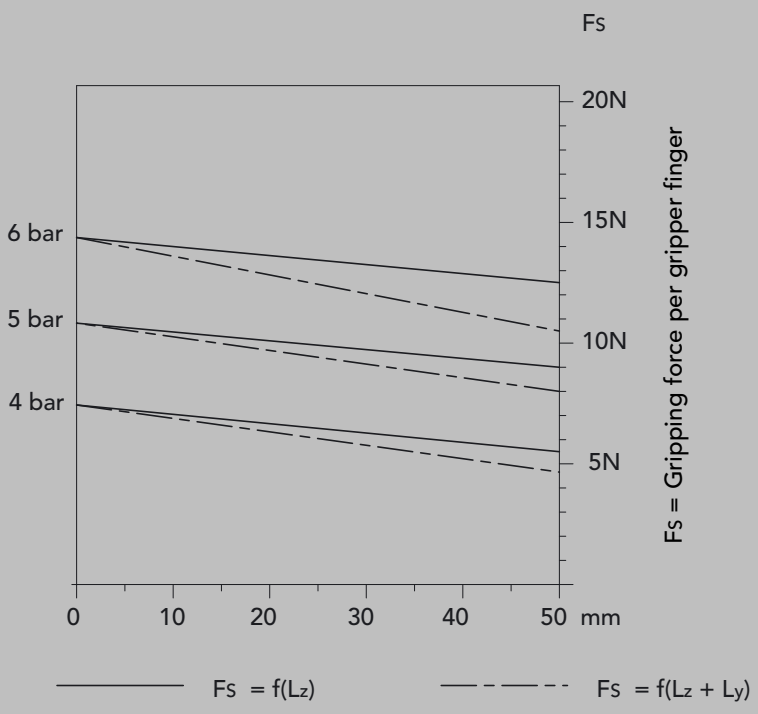
When M_{ox}, M_{oy}, M_{oz} act simultaneously, each may attain its permitted maximum.

UNIVERSAL PARALLEL GRIPPERS GPU-10/GPUI-10

Gripping distance = stroke		[mm]	5
Piston diameter		[mm]	10
Opening time at 5 bar	1)	[s]	0.015
Closing time at 5 bar	1)	[s]	0.02
Weight GPU/GPUI		[kg]	0.15
Mass moment of inertia J_z		[kgcm²]	0.23
Max. cycles per minute			max. 80 double stroke per minute
Operating pressure		[bar]	4–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability at 5 bar	2)	[mm]	± 0.02
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection pluggable			hose-Ø 4 mm
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			after 10 mio. cycles
Mounting position			any
Material			aluminum, steel, bronze

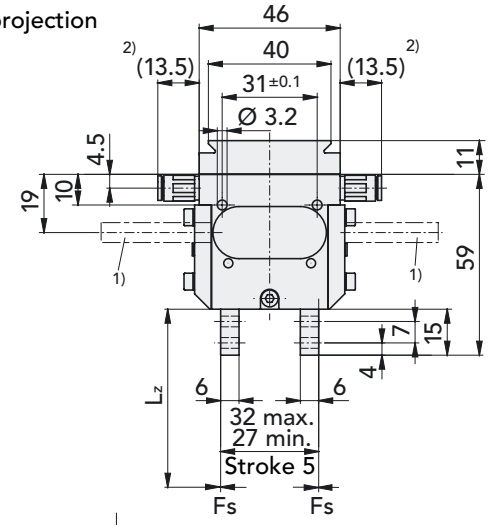
1) Measured at max. stroke (open when depressurized)
Comment: for closed when depressurized → interchange times
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

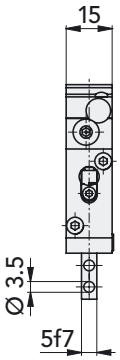
GRIPPING FORCE DIAGRAM GPU-10/GPUI-10



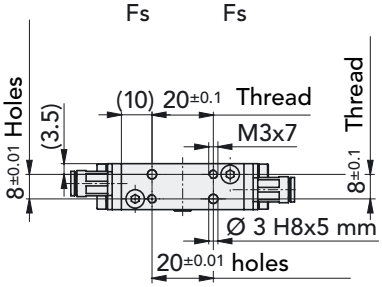
Gripping force diagram: equivalent «gripping force closed against spring» (open when depressurized).

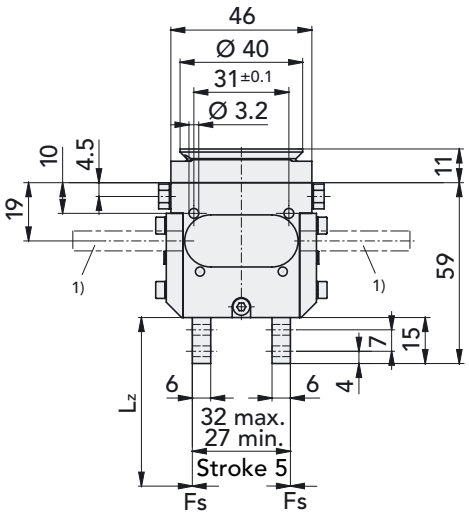
European projection

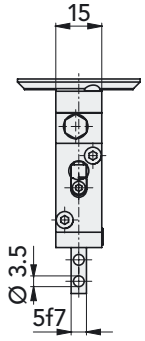




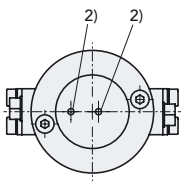
GPU-10







GPUI-10



1) Inductive proximity switches
Ø 6.5 mm installation depth 5.5 mm
2) Air supply

The gripping jaws must be designed to touch the part 0.5 mm before the closing stroke ends.

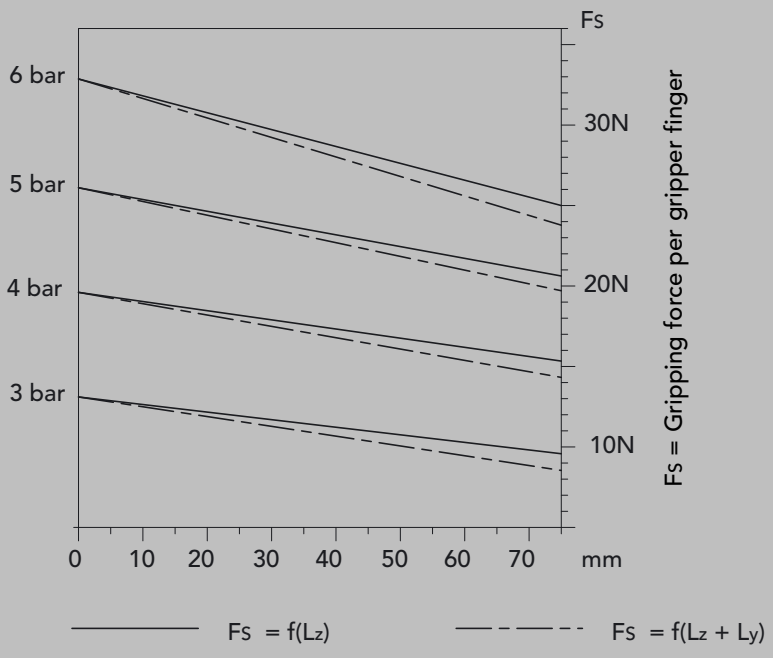
Ref. No.	
GPU-10	**56244**
GPUI-10	**56533**

UNIVERSAL PARALLEL GRIPPERS GPU-14/GPUI-14

Gripping distance = stroke		[mm]	8
Piston diameter		[mm]	14
Opening time at 5 bar	1)	[s]	0.02
Closing time at 5 bar	1)	[s]	0.025
Weight GPU/GPUI		[kg]	0.25
Mass moment of inertia J_z		[kgcm²]	0.63
Max. cycles per minute			max. 80 double stroke per minute
Operating pressure		[bar]	3–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability at 5 bar	2)	[mm]	± 0.03
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection pluggable			hose-Ø 4 mm
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			after 10 mio. cycles
Mounting position			any
Material			aluminum, steel, bronze

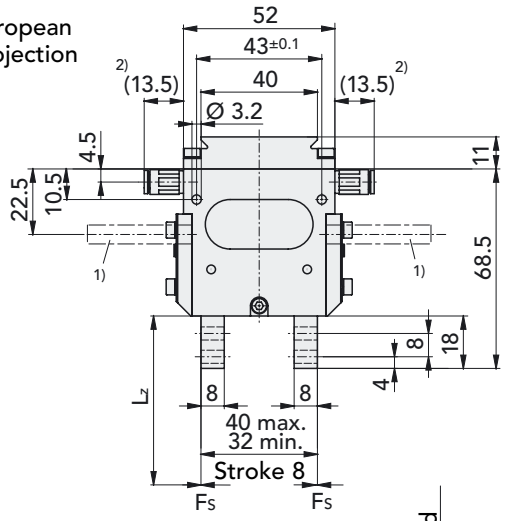
1) Measured at max. stroke (open when depressurized)
Comment: for closed when depressurized → interchange times
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

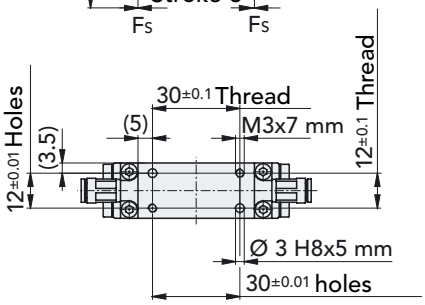
GRIPPING FORCE DIAGRAM GPU-14/GPUI-14

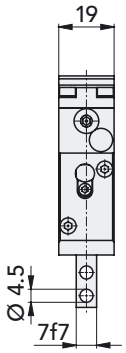


Gripping force diagram: equivalent «gripping force closed against spring» (open when depressurized).

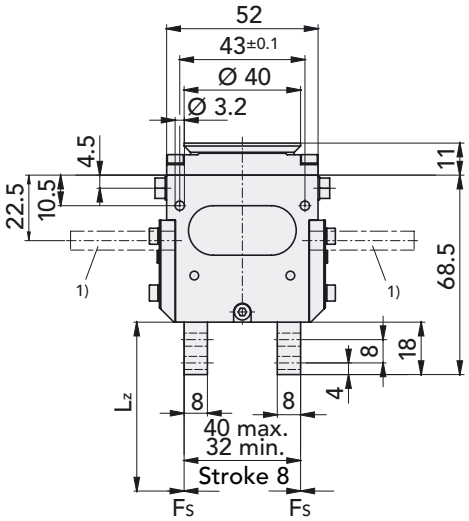
European projection

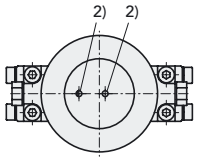


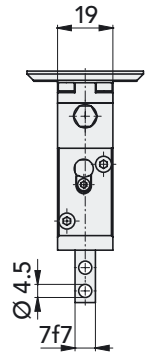




GPU-14







GPUI-14

1) Inductive proximity switches
Ø 6.5 mm installation depth 5.5 mm
2) Air supply

The gripping jaws must be designed to touch the part 0.5 mm before the closing stroke ends.

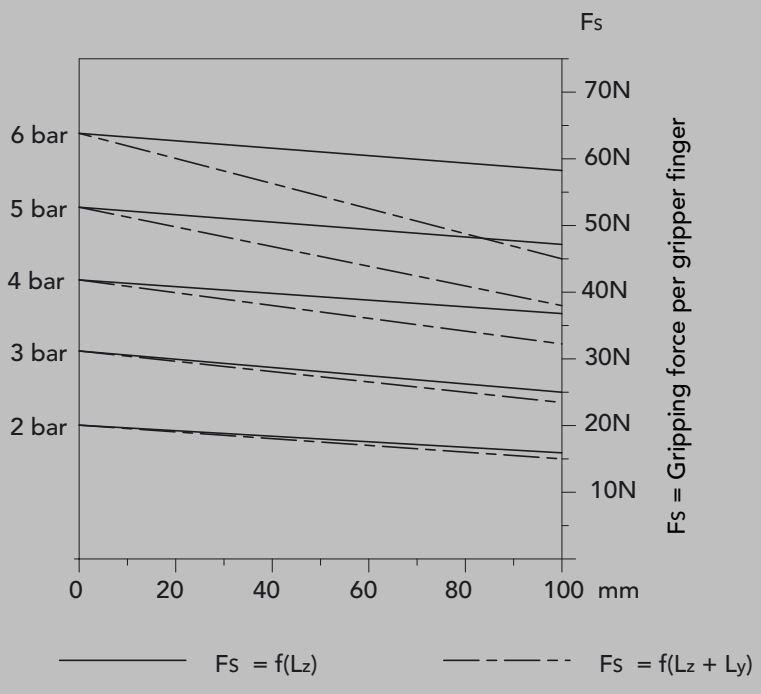
Ref. No.	
GPU-14	**56245**
GPUI-14	**56534**

UNIVERSAL PARALLEL GRIPPERS GPU-20/GPUI-20

Gripping distance = stroke		[mm]	12
Piston diameter		[mm]	20
Opening time at 5 bar	1)	[s]	0.025
Closing time at 5 bar	1)	[s]	0.03
Weight GPU/GPUI		[kg]	0.5
Mass moment of inertia J_z		[kgcm²]	2.03
Max. cycles per minute			max. 80 double stroke per minute
Operating pressure		[bar]	2–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability at 5 bar	2)	[mm]	± 0.04
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection pluggable			hose-Ø 4 mm
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			after 10 mio. cycles
Mounting position			any
Material			aluminum, steel, bronze

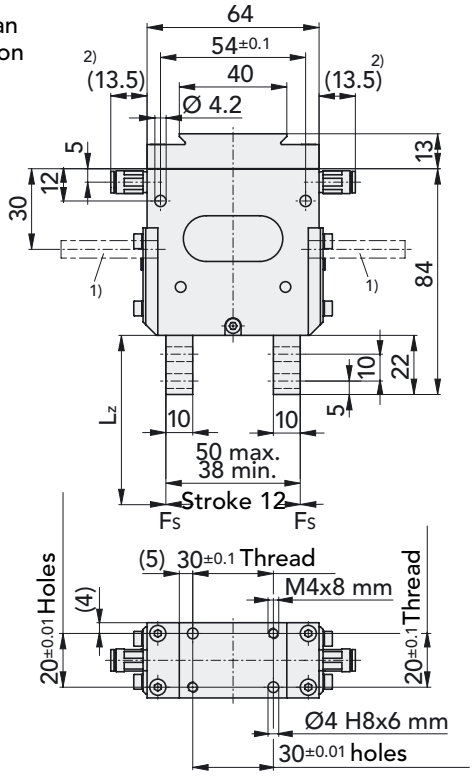
1) Measured at max. stroke (open when depressurized)
Comment: for closed when depressurized → interchange times
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

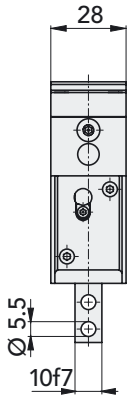
GRIPPING FORCE DIAGRAM GPU-20/GPUI-20



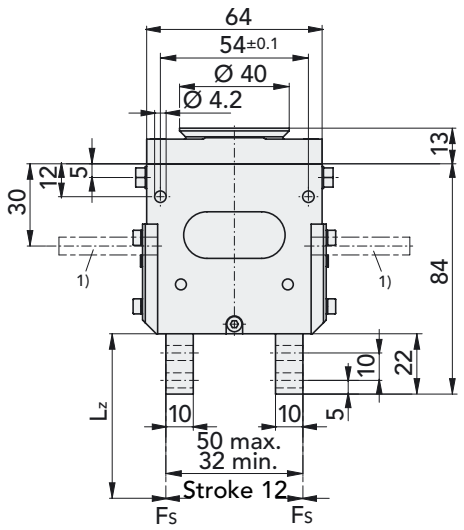
Gripping force diagram: equivalent «gripping force closed against spring» (open when depressurized).

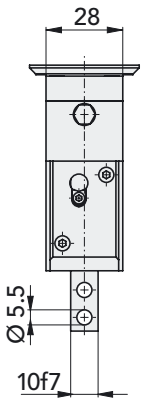
European projection



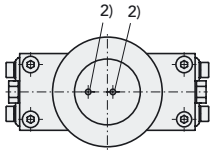


GPU-20





GPUI-20



1) Inductive proximity switches
Ø 6.5 mm installation depth 5.5 mm
2) Air supply

The gripping jaws must be designed to touch the part 0.5 mm before the closing stroke ends.

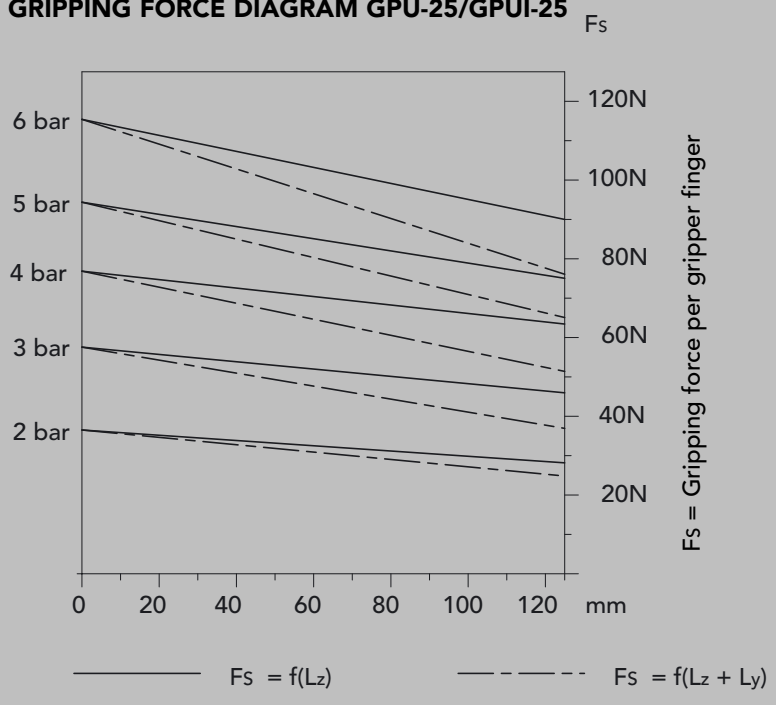
Ref. No.	
GPU-20	**56246**
GPUI-20	**56535**

UNIVERSAL PARALLEL GRIPPERS GPU-25/GPUI-25

Gripping distance = stroke		[mm]	20
Piston diameter		[mm]	25
Opening time at 5 bar	1)	[s]	0.05
Closing time at 5 bar	1)	[s]	0.055
Weight GPU/GPUI		[kg]	0.9
Mass moment of inertia J_z		[kgcm²]	5.56
Max. cycles per minute			max. 80 double stroke per minute
Operating pressure		[bar]	2–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability at 5 bar	2)	[mm]	± 0.05
Check on end position open/closed	3)		inductive proximity switches
Pneumatic connection pluggable			hose-Ø 4 mm
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			after 10 mio. cycles
Mounting position			any
Material			aluminum, steel, bronze

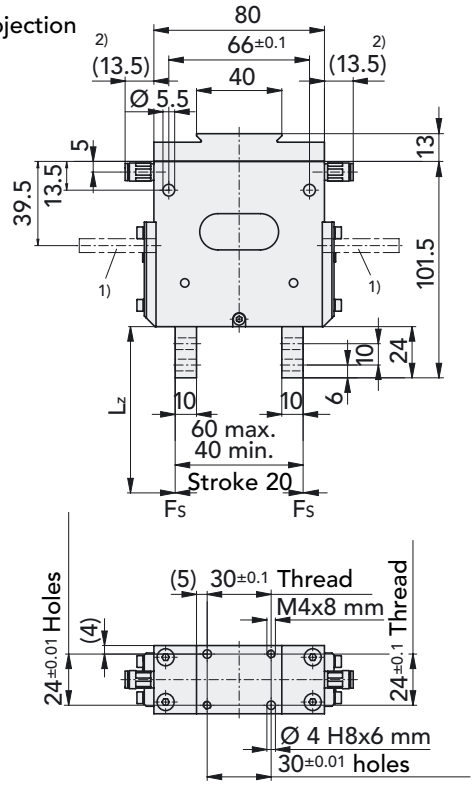
1) Measured at max. stroke (open when depressurized)
Comment: for closed when depressurized → interchange times
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302

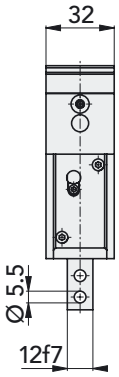
GRIPPING FORCE DIAGRAM GPU-25/GPUI-25



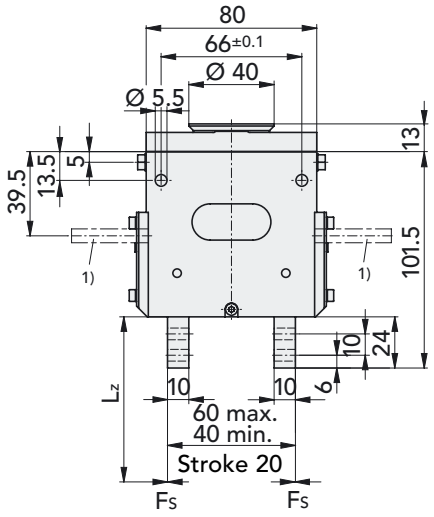
Gripping force diagram: equivalent «gripping force closed against spring» (open when depressurized).

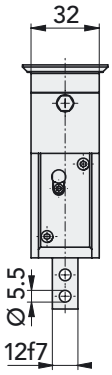
European projection



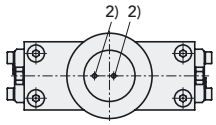


GPU-25





GPUI-25



1) Inductive proximity switches
Ø 6.5 mm installation depth 5.5 mm
2) Air supply

The gripping jaws must be designed to touch the part 0.5 mm before the closing stroke ends.

Ref. No.	
GPU-25	**56247**
GPUI-25	**56536**

LONG-STROKE GRIPPERS GPL PRODUCT DESCRIPTION

The **Long-Stroke Grippers GPL** are designed for gripping identical parts or parts with very different dimensions. Wide jaw travel is also ideal for **contour gripping.**

They have an extremely **robust, low-friction jaw guide** in which the main forces are carried by cylindrical rollers.

The pneumatic connections and proximity switches are arranged on the narrow side of the housing.

The **positions** can be polled by means of an incremental **encoder** mounted on the housing using an add-on kit. In contrast to conventional grippers, this enables any position of the fingers to be determined (option).

APPLICATIONS

Use with proximity switches;
thanks to the large stroke, interlocking gripping is possible. This enables even complicated geometries to be held.

Use with encoder;
dimensions of individual parts or specific mounting or functional dimensions can be monitored without complicated and expensive distance measuring systems.

LONG-STROKE GRIPPERS PARALLEL DOUBLE-ACTING GPL

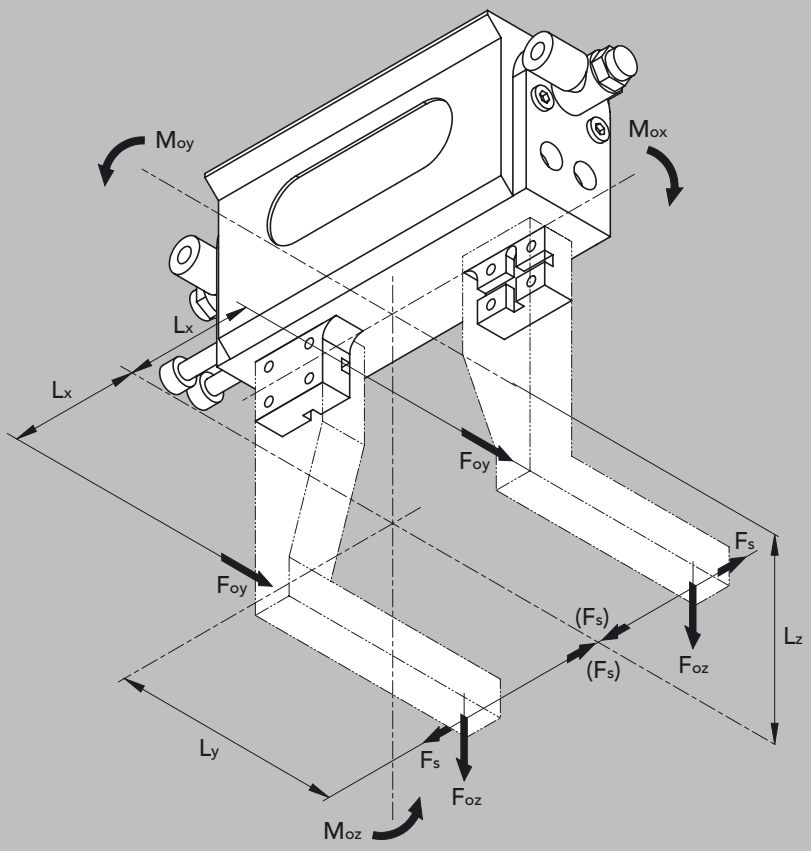
Two sizes in three or two strokes.

SCOPE OF DELIVERY
With clamping device for proximity switches and two exhaust throttles.

SUITABLE ACCESSORIES

Special accessories	from page 130
Accessories	from page 302
Quick-Set®	from page 338

DEFINITION OF LOAD



		GPL-...-1	GPL-...-2
$F_{S\ perm.}$	[N]	see gripping force diagram	
$F_{oy\ perm.}$	[N]	7.5	15
$F_{oz\ perm.}$	[N]	70	120
$L_{x\ perm.}$	[mm]	55	75
$L_{y\ perm.}$	[mm]	90	160
$L_{z\ perm.}$	[mm]	120	200
$(L_x + L_y)_{perm.}$	[mm]	90	160
$(L_y + L_z)_{perm.}$	[mm]	120	200
$(L_z + L_x)_{perm.}$	[mm]	120	200
$M_{ox\ perm.} = (F_{oy} \cdot L_z) + (F_{oz} \cdot L_y)$	[Nmm]	7000	22000
$M_{oy\ perm.} = (F_S \cdot L_z) + (F_{oz} \cdot L_x)$	[Nmm]	9000	37000
$M_{oz\ perm.} = (F_S \cdot L_y) + (F_{oy} \cdot L_x)$	[Nmm]	4000	23000

F_S: Gripping force per gripper finger [N]
F_{oy}, F_{oz}: Static forces [N]
L_x, L_y, L_z: Distances of force application [mm]
M_{ox}, M_{oy}, M_{oz}: Static load moments [Nmm]

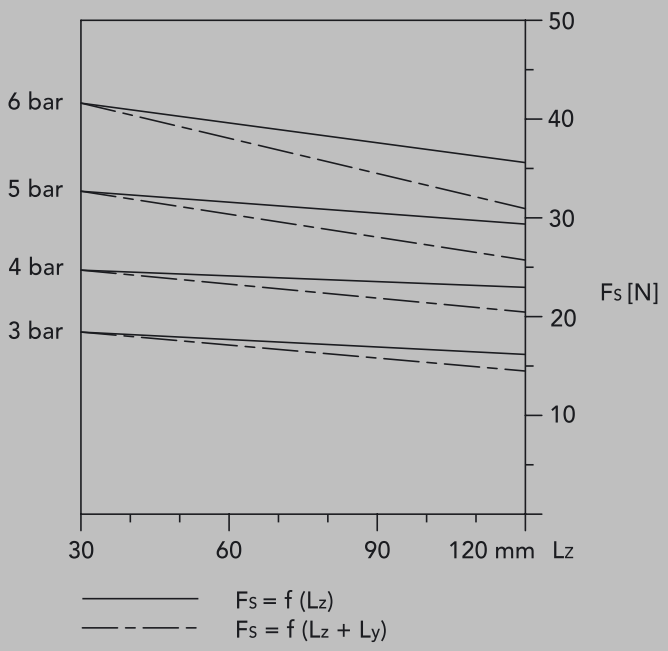
When M_{ox}, M_{oy}, M_{oz} act simultaneously, each may attain its permitted maximum.

LONG-STROKE GRIPPERS PARALLEL DOUBLE-ACTING GPL — SIZE 1

			GPL-30-1	GPL-40-1
Gripping distance = stroke		[mm]	2–30	12–40
Opening time at 3/6 bar	1)	[s]	0.18/0.1	0.22/0.12
Closing time at 3/6 bar	1)	[s]	0.18/0.1	0.22/0.12
Weight GPL		[kg]	0.44	0.46
Mass moment of inertia J_z		[kgcm^2]	3.5	4.4
Operating pressure		[bar]	3–6	
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C	
Repeatability	2)	[mm]	± 0.03	
Pneumatic connection			M5, with plug Ø 4 mm	
Speed regulation			adjustable exhaust throttles	
Check on end position open/closed	3)		inductive proximity switches	
Opt. displacement measuring system	4)		incremental rotary position encoder	
Ambient: Temperature		[°C]	10–50	
Rel. humidity			< 95% (without condensation)	
Air purity			normal workshop atmosphere	
Warranty			2 years from the date of delivery	
Maintenance			none needed	
Mounting position			any	
Material			aluminum, steel, plastic	

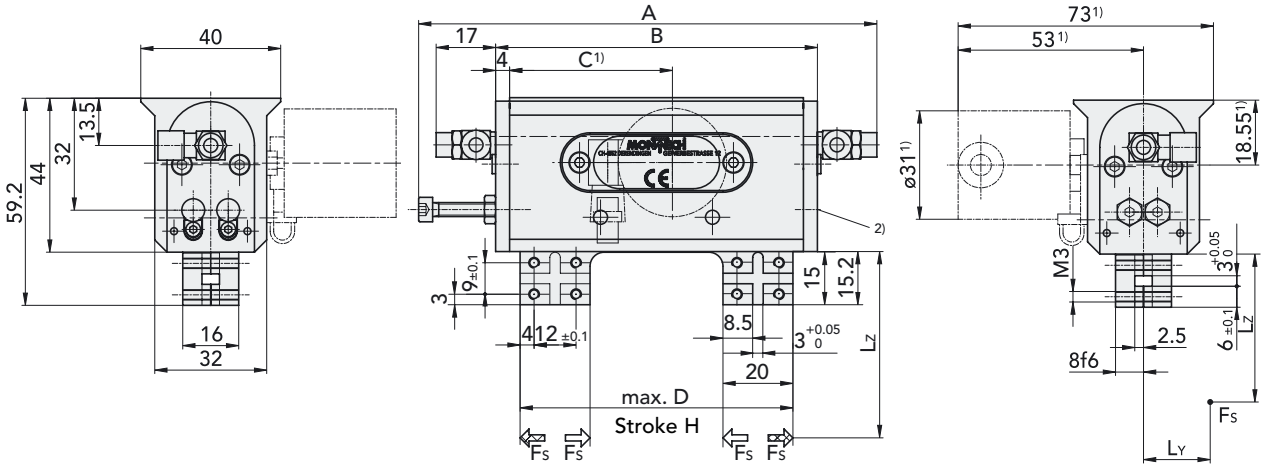
1) Measured at max. travel
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302
4) See special accessories from page 130

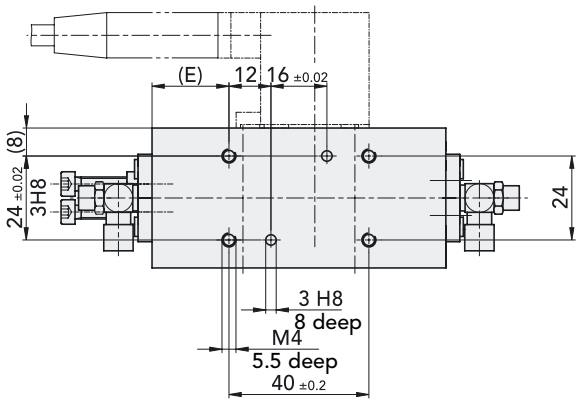
GRIPPING FORCE DIAGRAM



F_S = Gripping force per gripper finger

European projection





1) With encoder (special accessories)
2) Inductive proximity switches Ø 6.5 mm, installation depth 5.5 mm

	H	A	B	C	D	E
GPL-30-1	30	131	92	46.55	78	22
GPL-40-1	40	141	102	51.55	88	27

Ref. No.

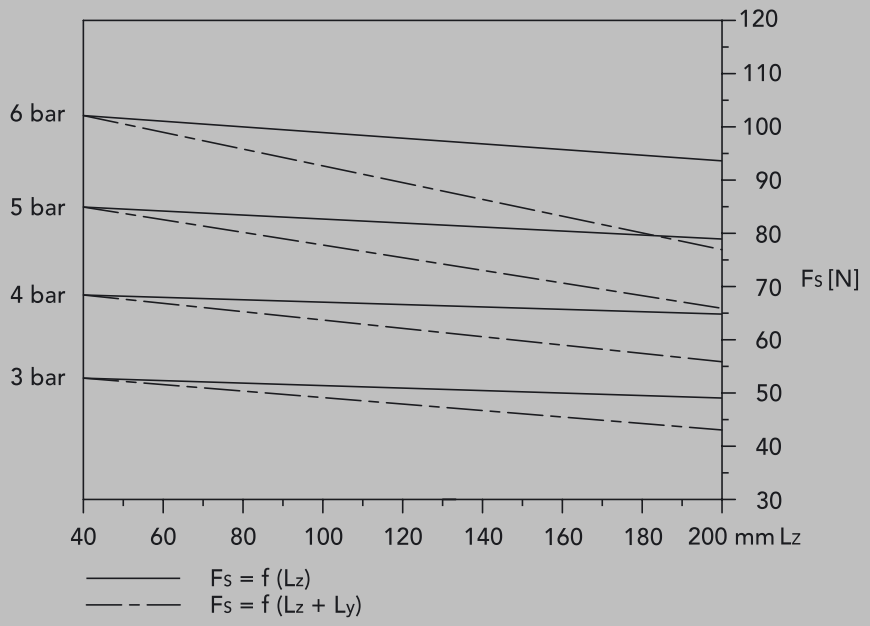
GPL-30-1	**47759**
GPL-40-1	**47776**

LONG-STROKE GRIPPERS PARALLEL DOUBLE-ACTING GPL — SIZE 2

			GPL-45-2	GPL-60-2	GPL-75-2
Gripping distance = stroke		[mm]	11–45	26–60	41–75
Opening time at 3/6 bar	1)	[s]	0.44/0.28	0.6/0.32	0.76/0.36
Closing time at 3/6 bar	1)	[s]	0.44/0.28	0.6/0.32	0.76/0.36
Weight GPL		[kg]	1.04	1.12	1.26
Mass moment of inertia J_z		[kgcm^2]	16.4	21.5	29.1
Operating pressure		[bar]	3–6		
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C		
Repeatability	2)	[mm]	± 0.04		
Pneumatic connection			M5, with plug Ø 4 mm		
Speed regulation			adjustable exhaust throttles		
Check on end position open/closed	3)		inductive proximity switches		
Opt. displacement measuring system	4)		incremental rotary position encoder		
Ambient: Temperature		[°C]	10–50		
Rel. humidity			< 95% (without condensation)		
Air purity			normal workshop atmosphere		
Warranty			2 years from the date of delivery		
Maintenance			none needed		
Mounting position			any		
Material			aluminum, steel, plastic		

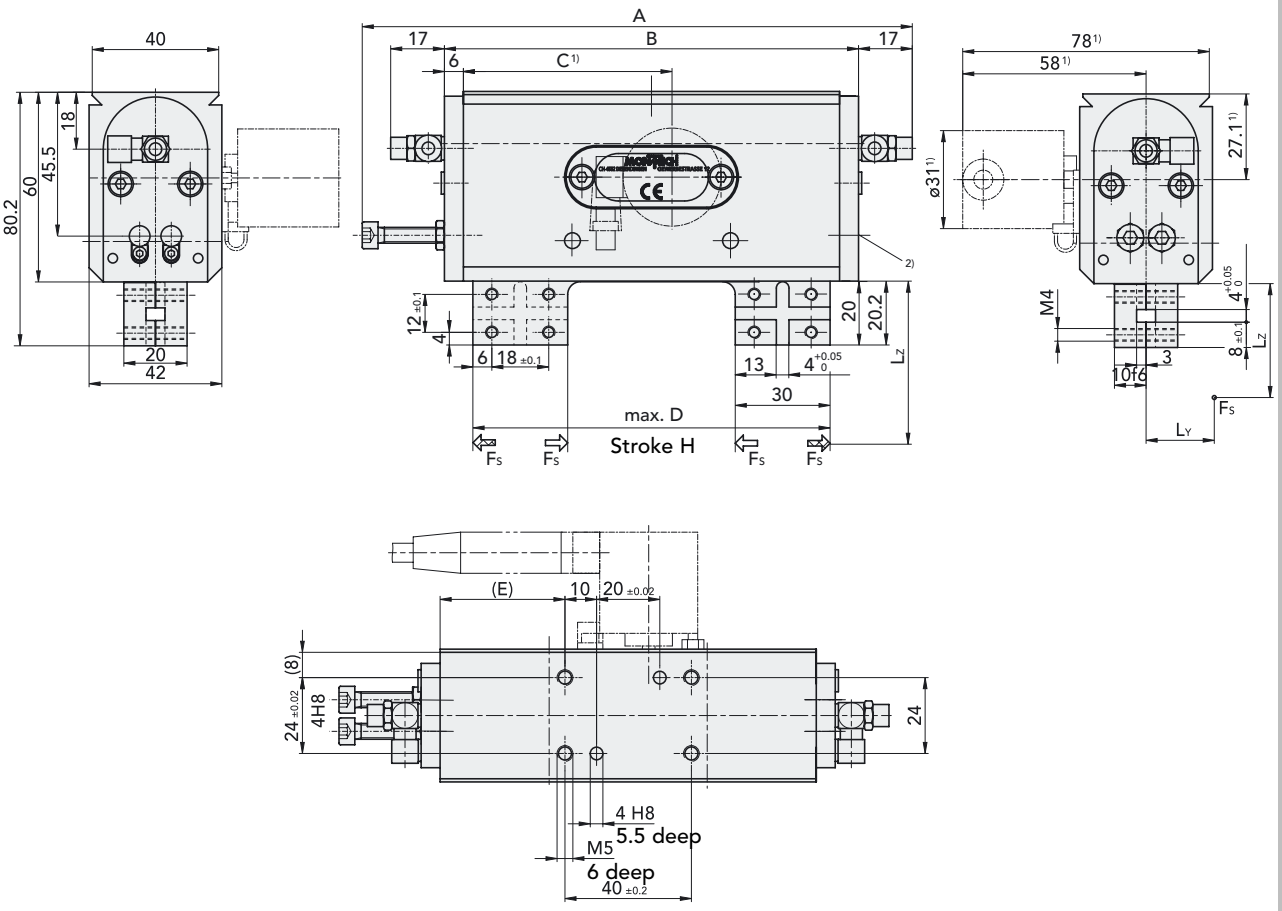
1) Measured at max. travel
2) Scatter of the gripper end position after 100 successive strokes under constant conditions
3) See accessories page 302
4) See special accessories from page 130

GRIPPING FORCE DIAGRAM



F_S = Gripping force per gripper finger

European projection



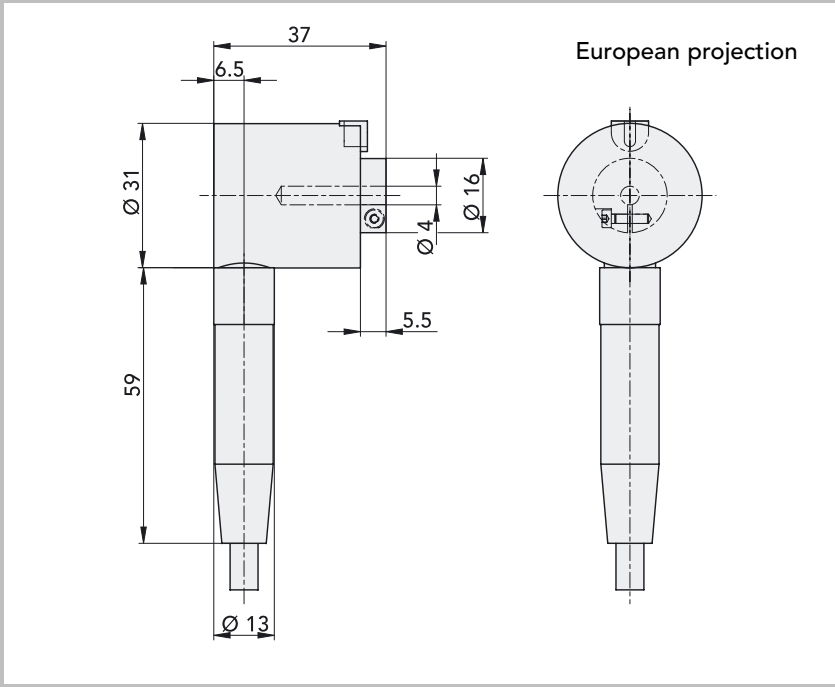
1) With encoder (special accessories)
2) Inductive proximity switches Ø 6.5 mm, installation depth 5.5 mm

	H	A	B	C	D	E
GPL-45-2	45	174	131	66	113	39.5
GPL-60-2	60	189	146	73.5	128	47
GPL-75-2	75	204	161	81	143	54.5

Ref. No.	
GPL-45-2	**47736**
GPL-60-2	**47783**
GPL-75-2	**48168**

SPECIAL ACCESSORIES FOR GPL

INCREMENTAL ROTARY POSITION ENCODER

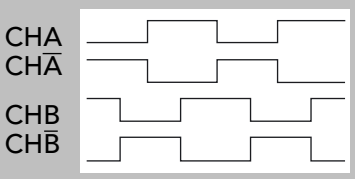


Resolution

500 pulses per revolution, i.e.
with GPL-1 0.114 mm/pulse
with GPL-2 0.163 mm/pulse

Output signal

2 square-wave signals electrically offset 90° within inversion



Signal CHB lagging behind signal CHA when gripper closing

Connection assignment

Destination	Pin number in plug	Cable colour 506686	Cable colour 508126
0 V	1	white	white
+ Vs	2	braun	braun
CHA	3	green	green
CHB	4	yellow	yellow
CHN inverted [1]	5	grey	–
CHN [1]	6	pink	pink
CHB inverted	7	blue	–
CHA inverted	8	red	–

	506686	508126
Operating voltage + Vs	5 V DC ±10%	10–30 V DC
Current consumption	typ. 60 mA	typ. 60 mA
Output circuit	antivalent, EIA-Standard RS 422	push-pull, short-circuit protection
Protection class	IP64	IP64

1) The reference signal CHN is not evaluated for GPL applications.

INCREMENTAL ROTARY POSITION ENCODER

for Parallel Grippers-Longstroke GPL -1/GPL-2 with hollow shaft and device plug, pluggable

Version 5 volt	**506686**
Version 24 volt	**508126**

ROTARY POSITION ENCODER ADD-ON KIT

for attachement of the incremental rotary position encoders (506686, 508126) of the gripper case GPL

to GPL-1 (size 1)	**49004**
to GPL-2 (size 2)	**49005**

CABLE TO ROTARY POSITION ENCODER

to fit rotary position encoder, version 5 volt (506686), 8-conductor, assembled at one end

Length	10 m	**507512**

to fit rotary position encoder, version 24 volt (508126), 5-conductor, assembled at one end

Length	10 m	**508129**

UNIVERSAL ANGULAR GRIPPERS GWU/GWUI PRODUCT DESCRIPTION

The **Universal Angular Grippers GWU-20/GWUI-20** are designed for **external gripping.** The pneumatic cylinder is **double-acting.** The special shape of the jaw actuating bracket generates high gripping forces without self-locking when the gripper is in the closed position.

The inductive proximity switches needed to scan the end positions and the compressed-air supply are arranged on the two narrow sides. This enables several grippers to be mounted side by side without limiting the accessibility to the proximity switches or compressed air supply.

With **jaws that open 180°,** the GW gripper may reduce the number of movements required to grip a part. The maximum opening angle saves a handling movement in many cases.

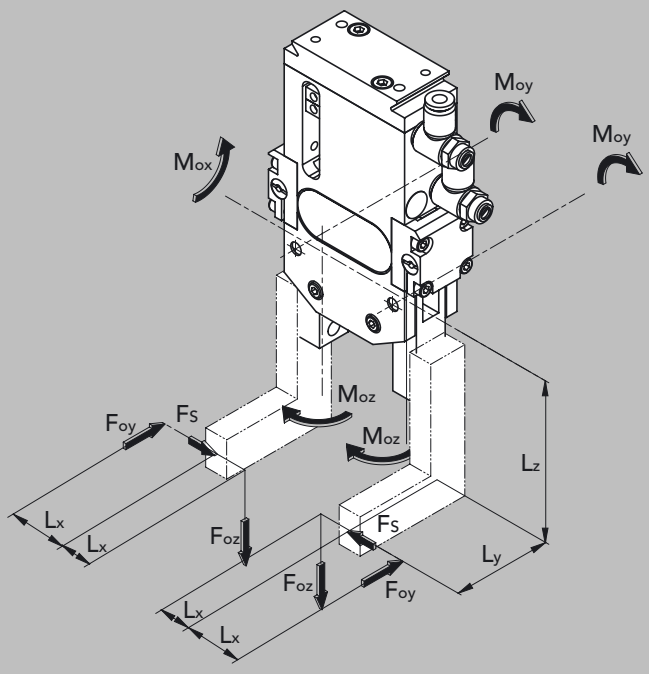
SCOPE OF DELIVERY

With clamping device for proximity switches two exhaust throttles.
I versions without exhaust throttles.

SUITABLE ACCESSORIES

Accessories from page 302
Quick-Set® from page 338

DEFINITION OF LOAD



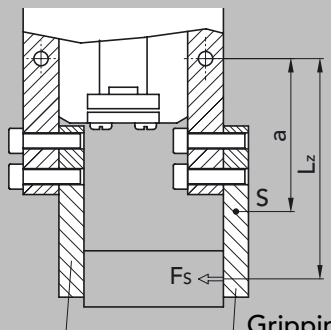
		GWU/GWUI-16	GWU/GWUI-20
Fs	[N]	see gripping force diagram	
Foz	[N]	±250	±400
Mox perm. = (Foy · Lz) + (Foz · Ly)	[Nmm]	800	2000
Moy perm. = (Foz · Lx)	[Nmm]	4000	6000
Moz perm. = (Fs · Ly) + (Foy · Lx)	[Nmm]	1000	3000

Fs: Gripping force per gripper finger [N]
Foy, Foz: Static forces [N]
Lx, Ly, Lz: Distances of force application [mm]
Mox, Moy, Moz: Static load moments [Nmm]

When Mox, Moy, Moz act simultaneously, each may attain its permitted maximum.

If the action of Foz on the gripper jaw is displaced by Lx the closing force Fs is affected as follows:

$$F_{s\,eff} = F_s \pm F_{oz} \frac{L_x}{L_z}$$



DIMENSIONS OF FINGER MOUNTING

S: Center of gravity of gripping finger
a: Distance between fulcrum and center of gravity
Lz: Distance between fulcrum and clamping point
Fs: Clamping force per gripping finger

Gripping finger mounting on the inside of the gripper jaw

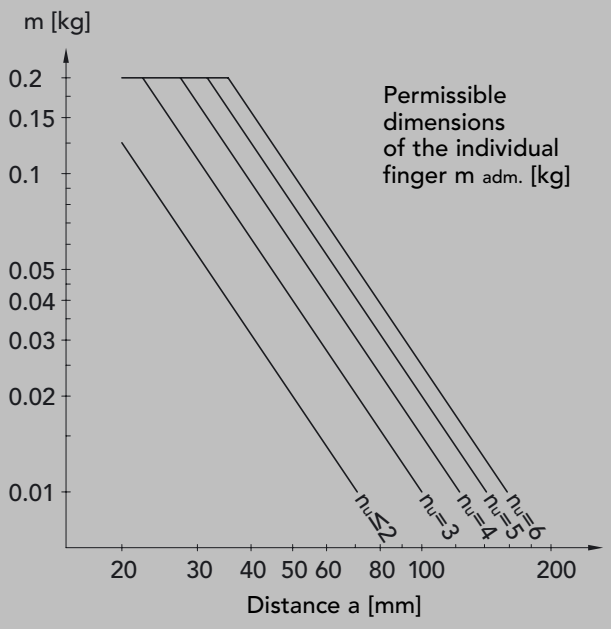
Gripping finger mounting on the outside of the gripper jaw

UNIVERSAL ANGULAR GRIPPERS GWU-16/GWUI-16

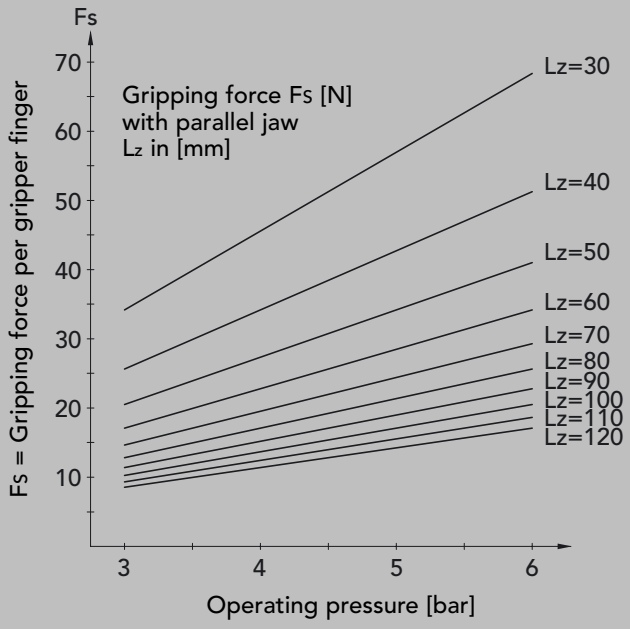
Opening angle infinitely adjustable		[°]	0–180
Piston diameter		[mm]	16
Weight GWU/GWUI		[kg]	0.27
Mass moment of inertia J_z (closed)		[kgcm²]	0.56
Max. cycles per minute			max. 80 double stroke per minute
Operating pressure		[bar]	3–6
Operating medium			air, oiled or unoiled, filtered to 5 μm, dew point < 6°C
Repeatability at 5 bar	1)	[mm]	±0.05
Check on end position open/closed	2)		inductive proximity switch
Pneumatic connection			adjustable exhaust throttles M5, with plug Ø 4 mm
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			after 10 mio. cycles
Mounting position			any
Material			aluminum, steel, bronze

1) At L_z = 33 [mm] → End of jaw. Scatter of the gripper end position after 100 successive strokes under constant conditions
2) See accessories page 302

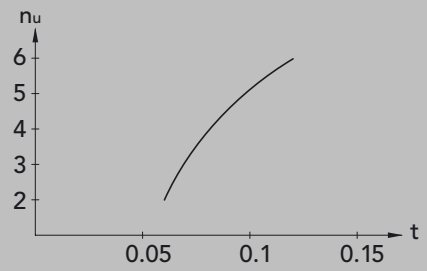
PERM. FINGER DIMENSIONS GWU-16/GWUI-16



GRIPPING FORCE DIAGRAM GWU-16/GWUI-16

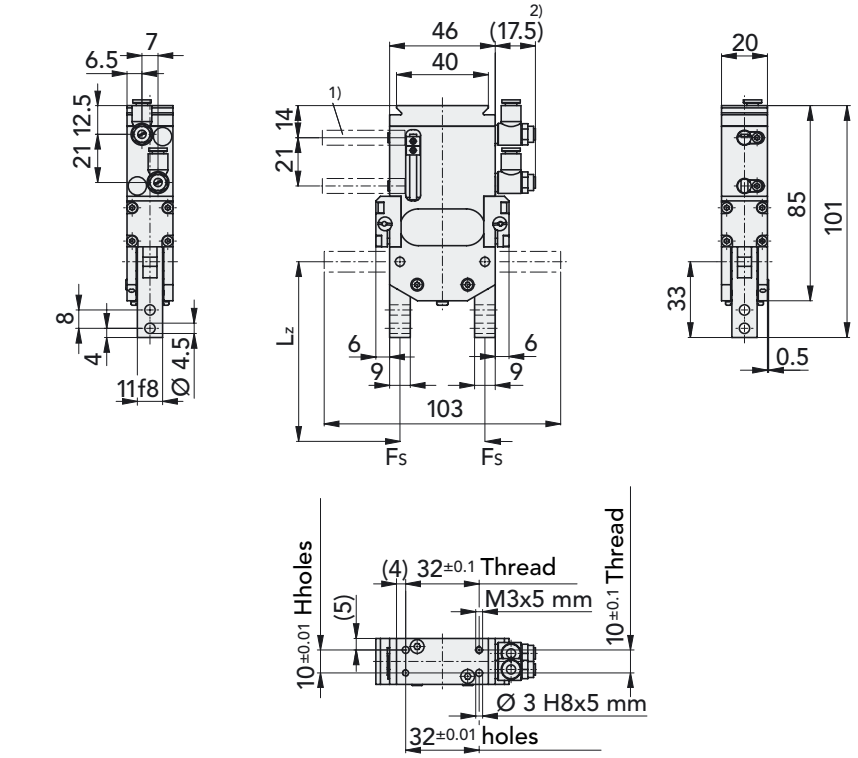


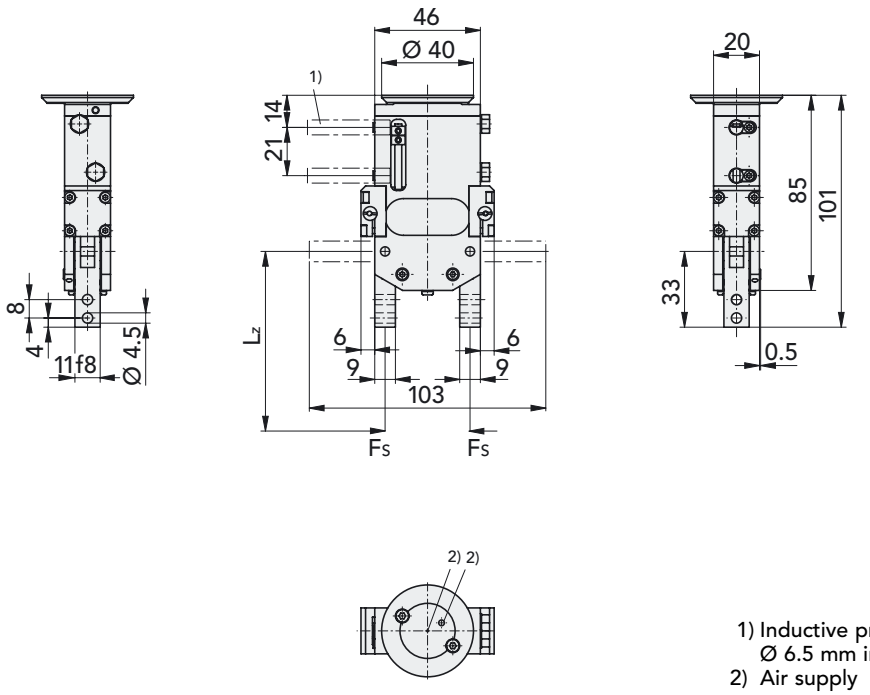
CLOSING AND OPENING TIME GWU-16/GWUI-16



nu: Number of closing revolutions of the exhaust throttle
t: Closing and opening time [s] (90° per jaw, p = 5 bar)

European projection





1) Inductive proximity switches
Ø 6.5 mm installation depth 6.7 mm
2) Air supply

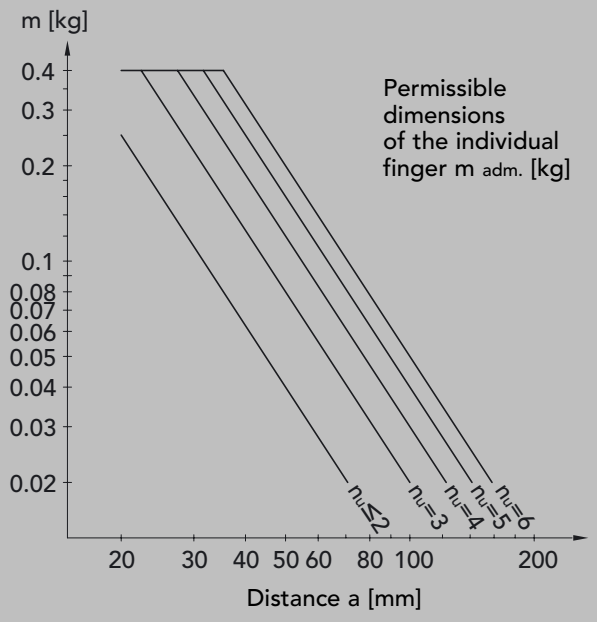
Ref. No.	
GWU-16	**56266**
GWUI-16	**56567**

UNIVERSAL ANGULAR GRIPPERS GWU-20/GWUI-20

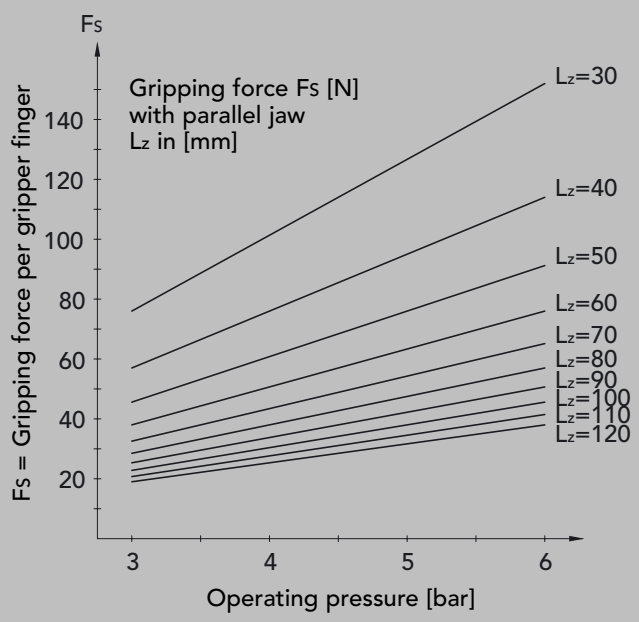
Opening angle infinitely adjustable		[°]	0–180
Piston diameter		[mm]	20
Weight GWU/GWUI		[kg]	0.43
Mass moment of inertia J_z (closed)		[kgcm²]	1.34
Max. cycles per minute			max. 80 double stroke per minute
Operating pressure		[bar]	3–6
Operating medium			air, oiled or unoiled, filtered to 5 µm, dew point < 6°C
Repeatability at 5 bar	1)	[mm]	±0.05
Check on end position open/closed	2)		inductive proximity switch
Pneumatic connection			adjustable exhaust throttles M5, with plug Ø 4 mm
Ambient: Temperature		[°C]	10–50
Rel. humidity			< 95% (without condensation)
Air purity			normal workshop atmosphere
Warranty			2 years from the date of delivery
Maintenance			after 10 mio. cycles
Mounting position			any
Material			aluminum, steel, bronze

1) At L_z = 38 [mm] → End of jaw. Scatter of the gripper end position after 100 successive strokes under constant conditions
2) See accessories page 302

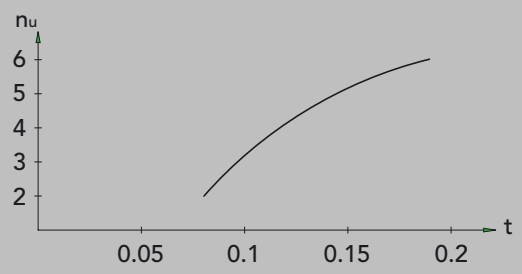
PERM. FINGER DIMENSIONS GWU-20/GWUI-20



GRIPPING FORCE DIAGRAM GWU-20/GWUI-20



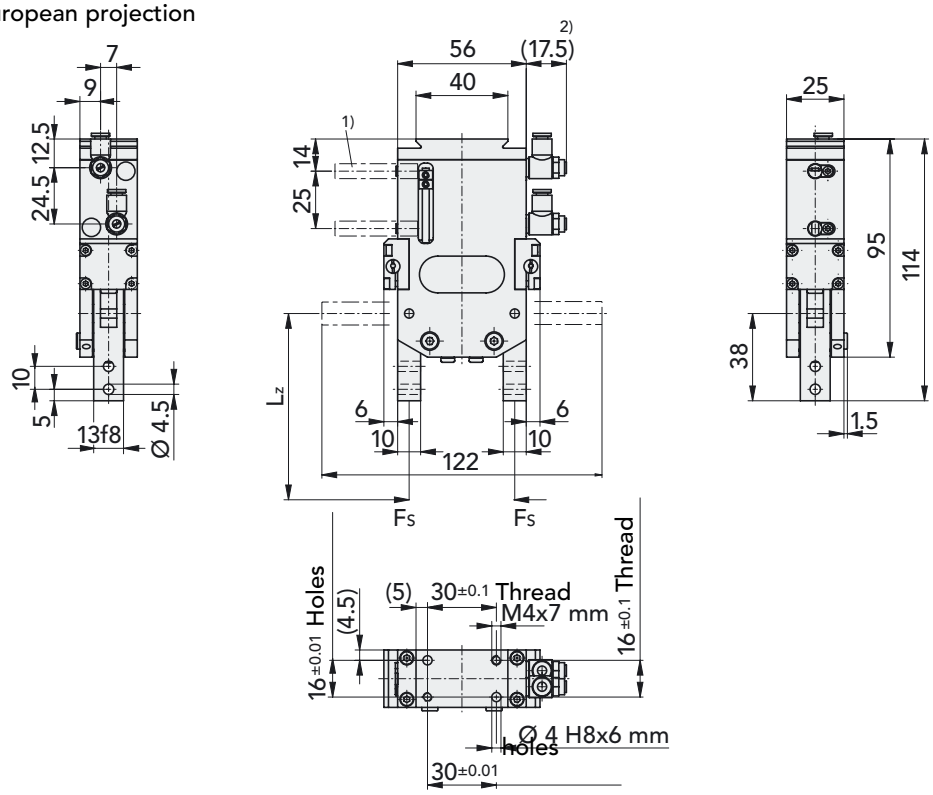
CLOSING AND OPENING TIME GWU-20/GWUI-20



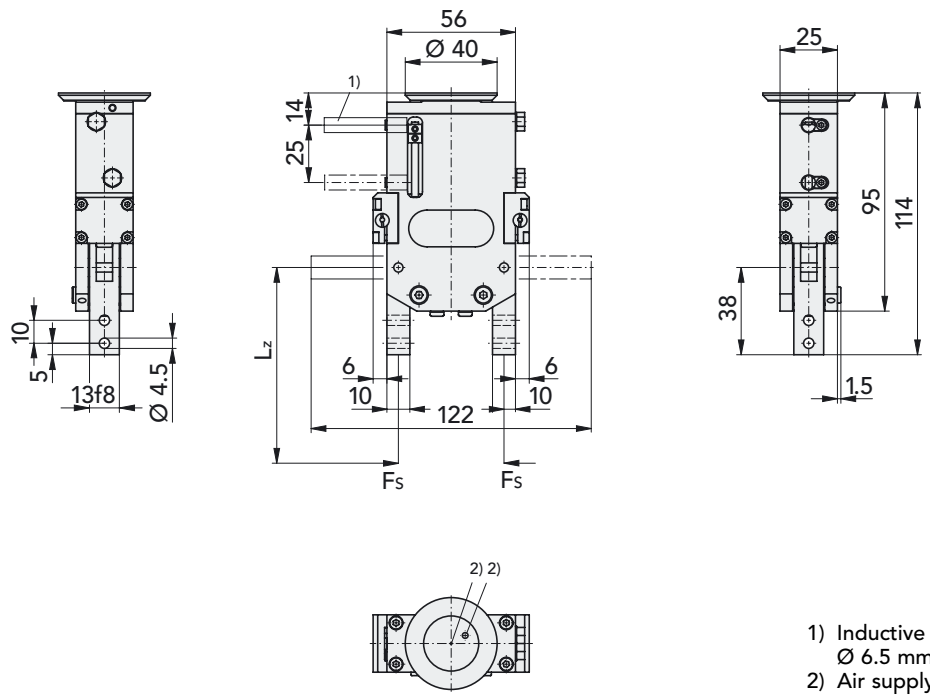
nu: Number of closing revolutions of the exhaust throttle
t: Closing and opening time [s] (90° per jaw, p = 5 bar)

European projection

GWU-20



GWUI-20



1) Inductive proximity switches
Ø 6.5 mm installation depth 8.7 mm
2) Air supply

Ref. No.	
GWU-20	**56270**
GWUI-20	**56596**