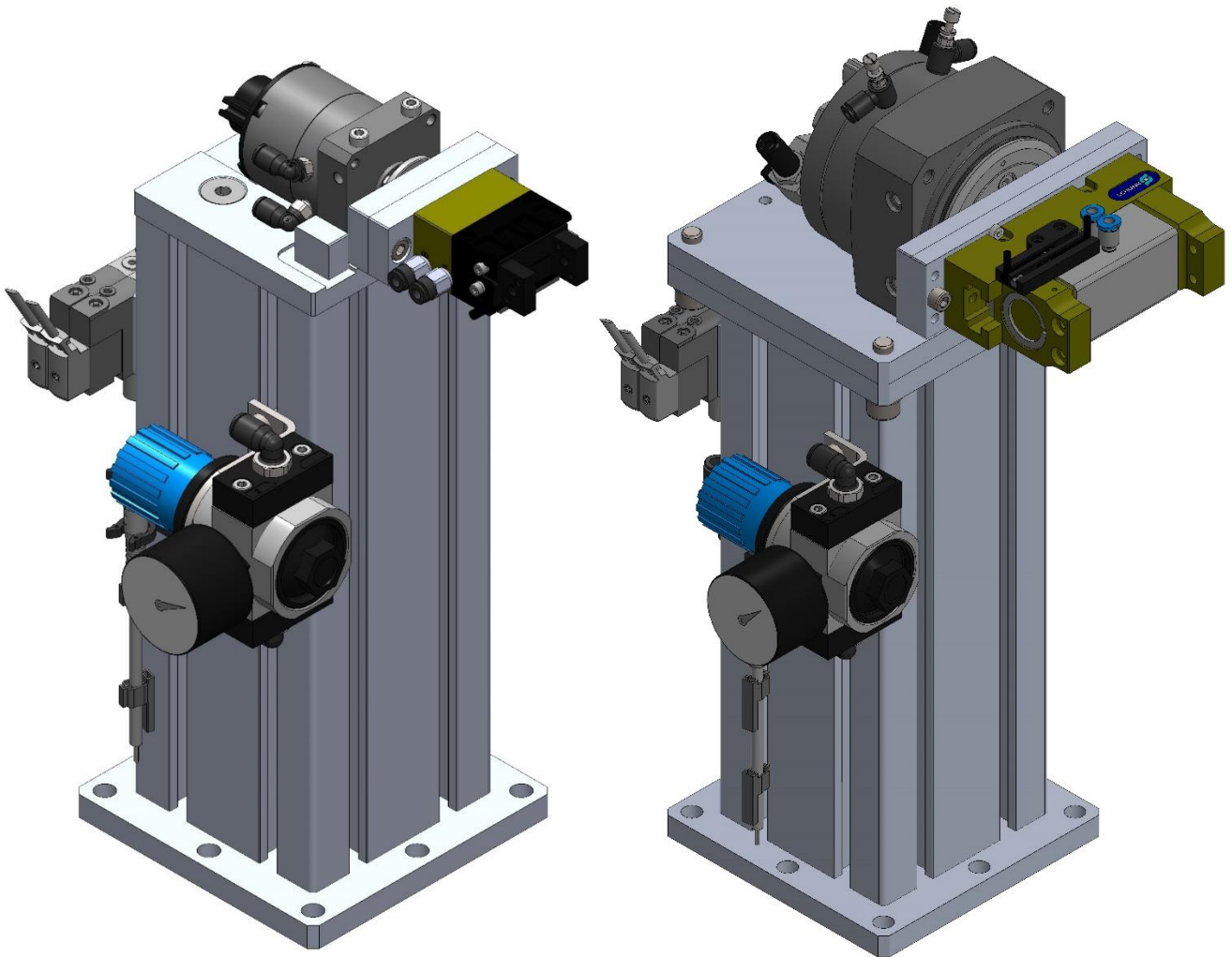


DATASHEET



External Rotator Gripper

Revision 1.0 - Edition 03/2021



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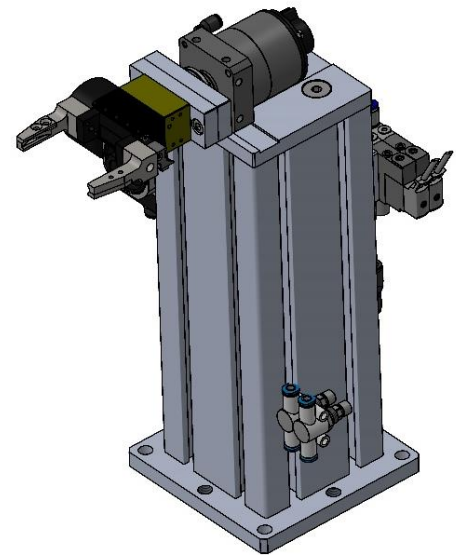
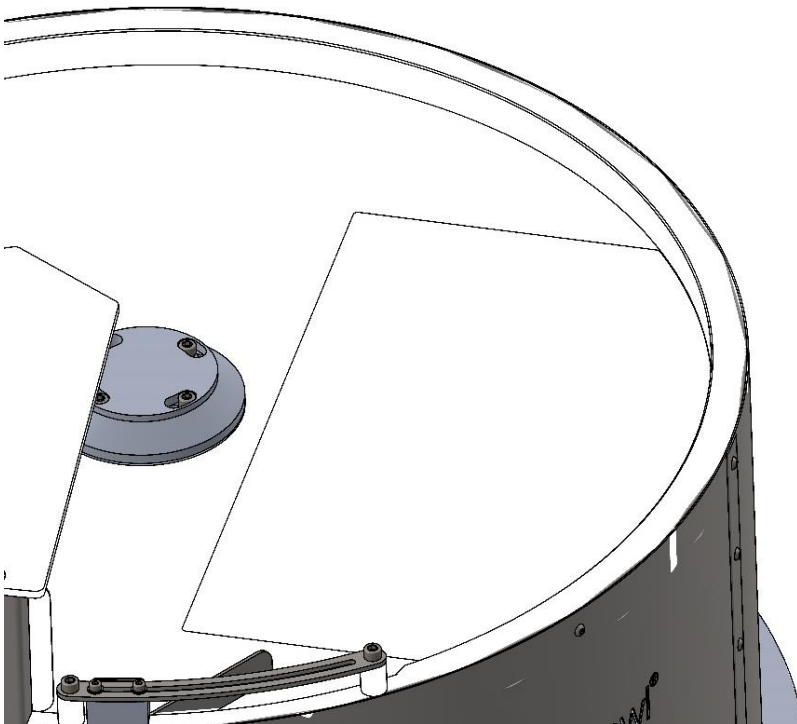
1 Application

The purpose of the external rotation system is to rotate workpieces outside the FlexiBowl that are picked up by the robot in a position that cannot be deposited directly through the robot. In this case, the actuator can be used as follows:

Picking up parts from the FlexiBowl vision area

If the workpieces are in a position where they cannot be deposited directly, the robot brings the workpiece onto the gripper of the rotary actuator

- Closing of the rotary actuator gripper is activated
- Release the workpiece from the robot's gripping system and move the robot slightly away from the actuator's rotation area
- Rotation of the rotary actuator is activated
- The workpiece is picked up using the robot's own gripping system
- The gripper of the rotary actuator opens
- The robot moves on to the deposit point



| Description | External Rotor Gripper Strong Version | External Rotor Gripper Light Version |
|----------------------|--|---|
| Suitable application | Handling of medium/heavy workpieces using mechanical gripping systems such as pneumatic or electrical grippers | Fast handling of medium/light workpieces by means of vacuum gripping systems such as suction cups |

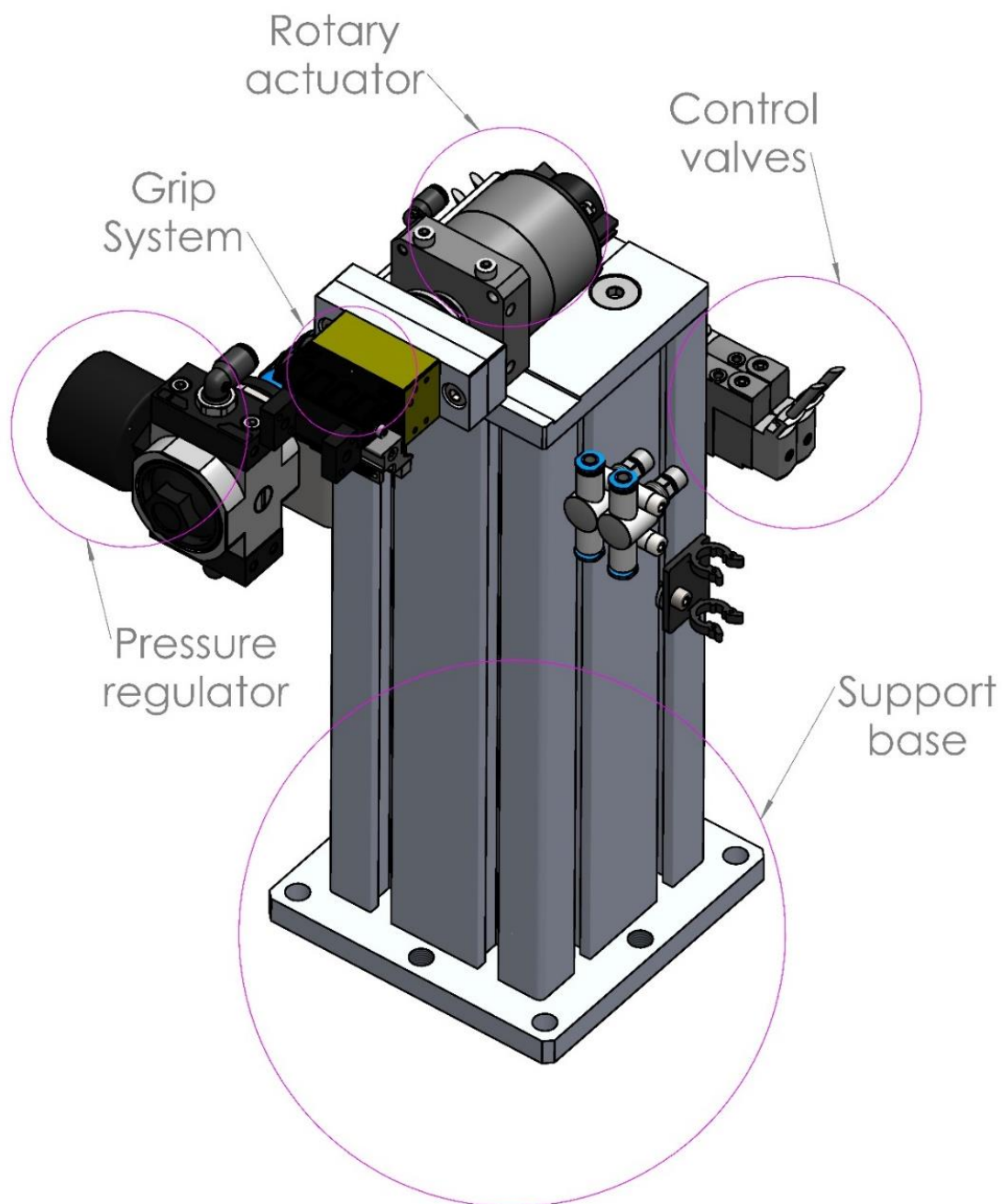


IMPORTANT: The tool mounted on the robot must be dimensionally "compatible" with the external rotation gripper. Using a mechanical gripping system (pneumatic/electric gripper) with the "Light" version can cause damage or premature wear of the rotary actuator.



2 Equipment description

- **Rotary actuator:** Generates the rotation of the gripping system.
- **Grip System:** Performs mechanical gripping of the component to be oriented.
- **Control valves:** The clockwise/anti-clockwise rotation and closing/opening of the gripper is controlled by two bistable solenoid valves.
- **Pressure regulator:** Allows adjustment of the operating pressure of the gripping system.
- **Support base:** Allows you to work at an optimum deposit level in relation to the Flexibowl system. The bottom plate has 4 anchor holes.



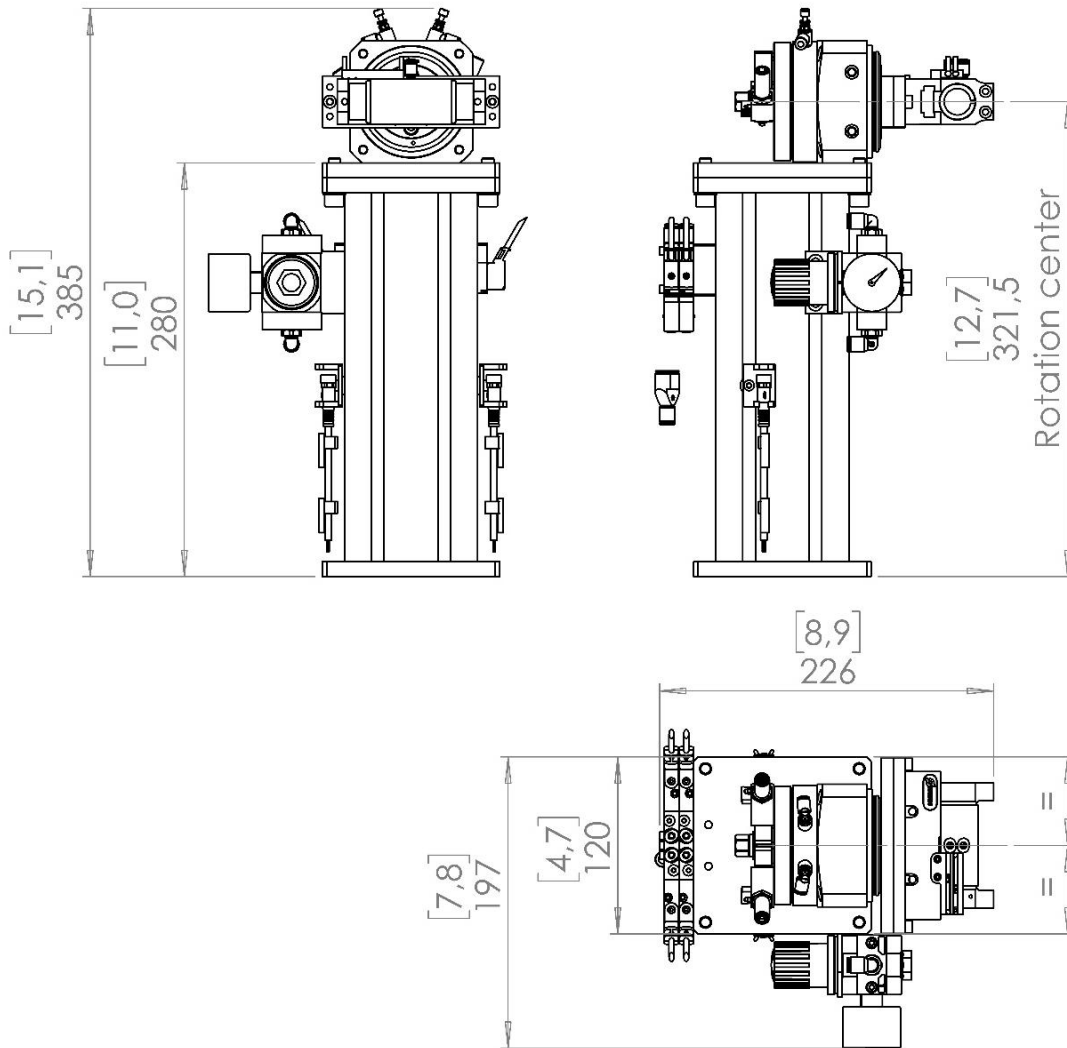
3 Data sheet

| Description | External Rottor Gripper Strong Version | External Rottor Gripper Light Version |
|------------------------|--|---------------------------------------|
| Code | GM000388 | GM000475 |
| Weight | 6Kg | 4Kg |
| Air pressure (Min/Max) | 2.5/8 bar | |
| Rotation | 0-246° | 0-200° |
| Temperature (min/Max) | -10/60°C | 0/60°C |
| Gripper stroke | 40mm | 12mm |

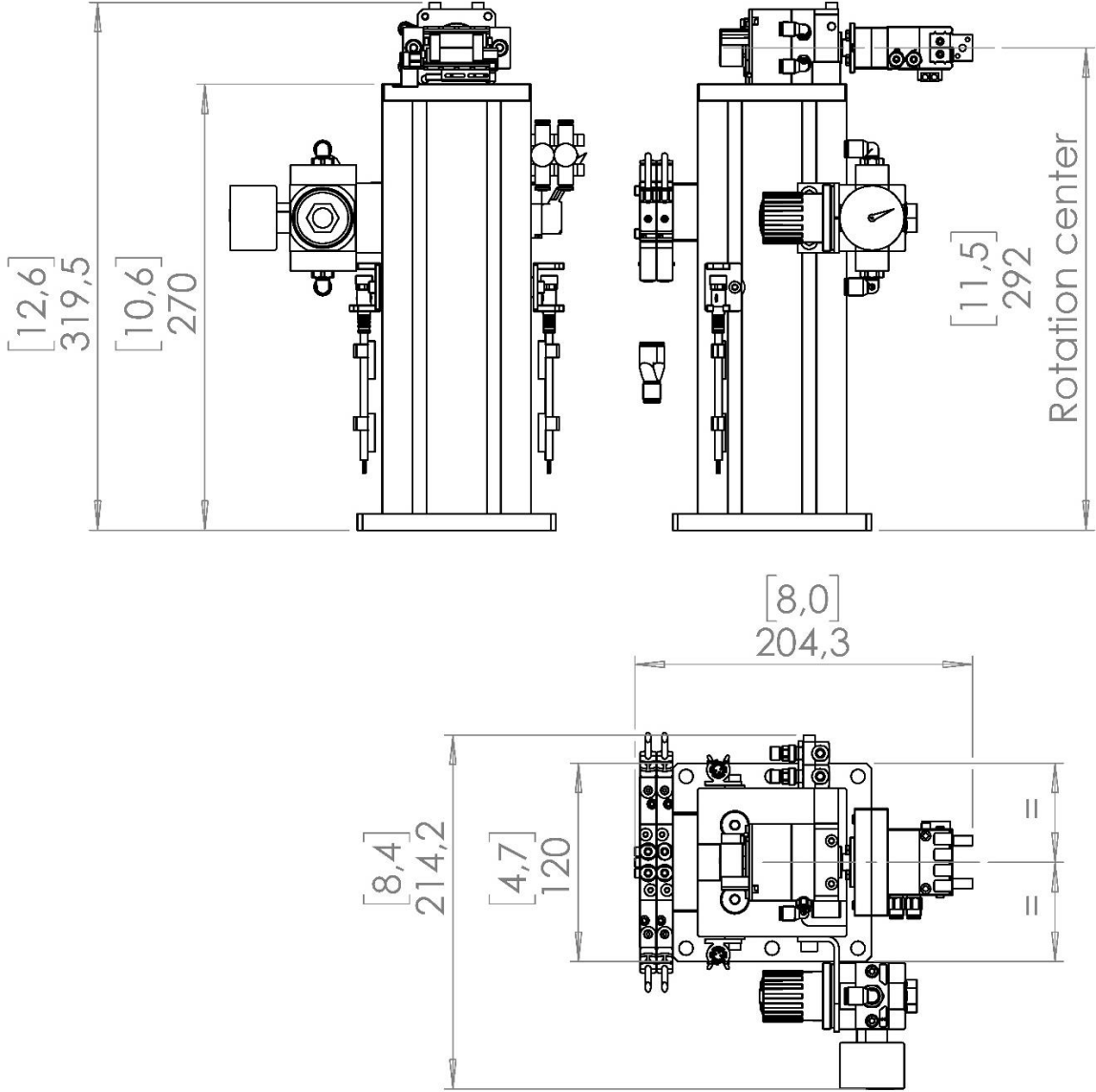


4 Dimensional drawings

4.1 Strong Version



4.2 Light Version



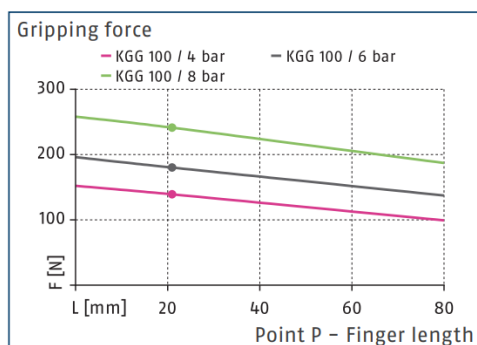
5 Technical data of the gripping system

Refer to the manufacturer's manual for dimensioning and design of the gripping handles:

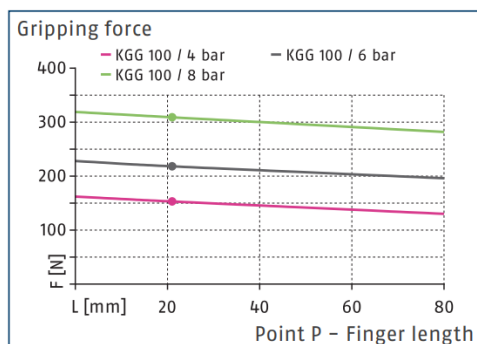
5.1 Strong Version

| Description | | KGG 100-40 |
|-----------------------------------|--------------------|-----------------|
| ID | | 0303065 |
| Stroke per jaw | [mm] | 20 |
| Closing/opening force | [N] | 175/220 |
| Weight | [kg] | 0.37 |
| Recommended workpiece weight | [kg] | 0.9 |
| Fluid consumption double stroke | [cm ³] | 22.5 |
| Min./nom./max. operating pressure | [bar] | 2.5/6/8 |
| Closing/opening time | [s] | 0.09/0.07 |
| Max. permissible finger length | [mm] | 80 |
| Max. permissible mass per finger | [kg] | 0.3 |
| Protection class IP | | 40 |
| Min./max. ambient temperature | [°C] | 5/90 |
| Repeat accuracy | [mm] | 0.02 |
| Dimensions X x Y x Z | [mm] | 100 x 31 x 49.3 |

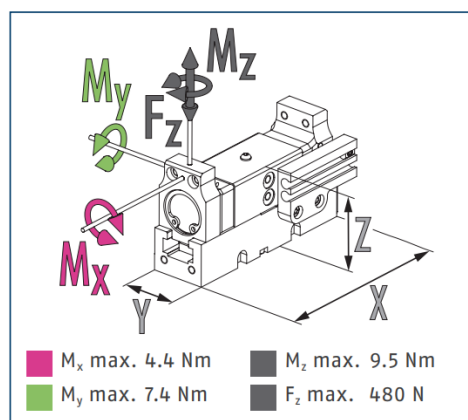
Gripping force O.D. gripping



Gripping force I.D. gripping



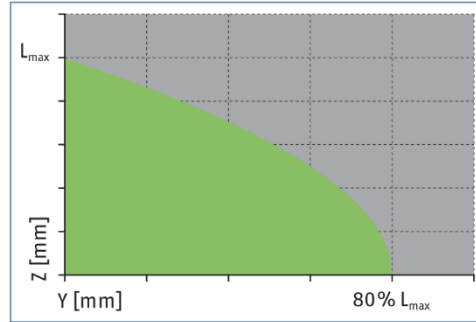
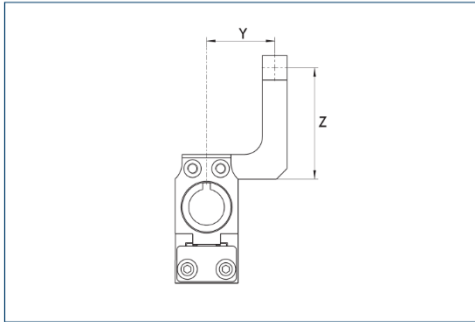
Dimensions and maximum loads



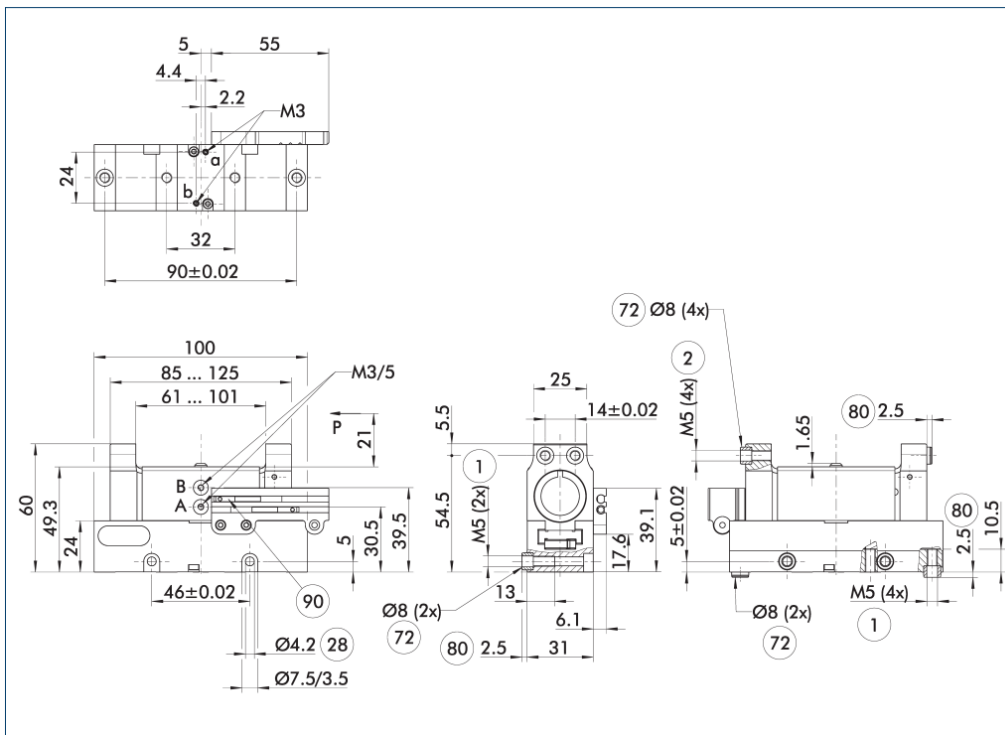
ⓘ The specified torques and forces are static values, apply for each base jaw, and may occur simultaneously. M_y may arise in addition to the moment generated by the gripping force itself.



Maximum permitted finger projection



■ Permitted range ■ Inadmissible range
 L_{max} is equivalent to the maximum permitted finger length, see the technical data table.

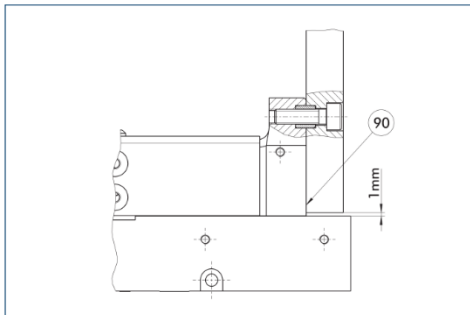


The drawing shows the gripper in the basic version with closed jaws, without dimensional consideration of the options described below.

① The SDV-P pressure maintenance valve can be used as a gripping force maintenance device (see catalog section on accessories).

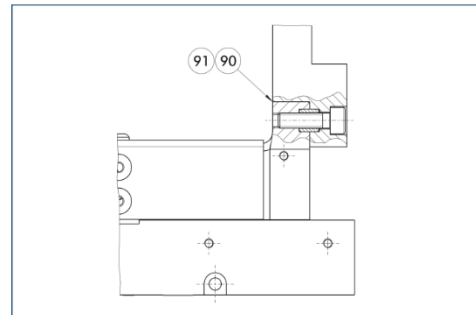
- A, a Main / direct connection, gripper opening
- B, b Main / direct connection, gripper closing
- ① Gripper connection
- ② Finger connection
- ②8 Through-hole
- 72 Fit for centering sleeves
- 80 Depth of the centering sleeve hole in the counter part
- 90 Sensor MMS 22..

Jaw design 0.D. gripping



⑨0 Support of the top jaws at the base jaw

Jaw design I.D. gripping



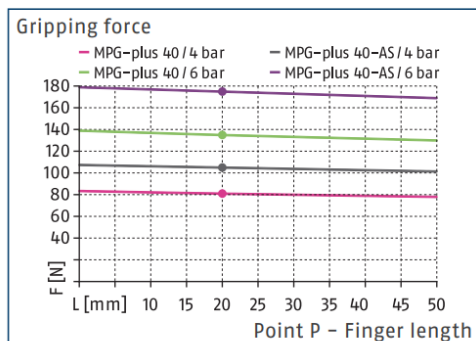
⑨0 Support of the top jaws at the base jaw ⑨1 For dimensions of steps at the top jaw see drawings of finger blanks



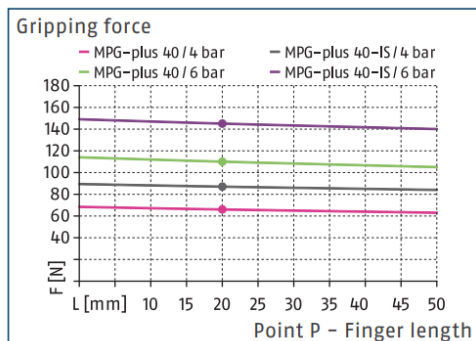
5.2 Light Version

| Description | | MPG-plus 40 |
|-----------------------------------|--------------------|--------------|
| ID | | 0305521 |
| Stroke per jaw | [mm] | 6 |
| Closing/opening force | [N] | 135/110 |
| Min. spring force | [N] | |
| Weight | [kg] | 0.18 |
| Recommended workpiece weight | [kg] | 0.7 |
| Fluid consumption double stroke | [cm ³] | 4.1 |
| Min./nom./max. operating pressure | [bar] | 2/6/8 |
| Closing/opening time | [s] | 0.04/0.04 |
| Closing/opening time with spring | [s] | |
| Max. permissible finger length | [mm] | 50 |
| Max. permissible mass per finger | [kg] | 0.08 |
| IP protection class | | 30 |
| Min./max. ambient temperature | [°C] | 5/90 |
| Repeat accuracy | [mm] | 0.02 |
| Dimensions X x Y x Z | [mm] | 40 x 26 x 39 |

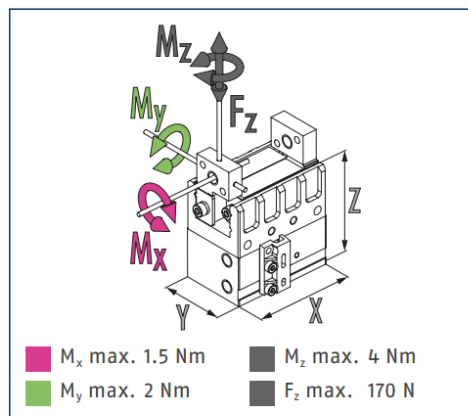
Gripping force O.D. gripping



Gripping force I.D. gripping



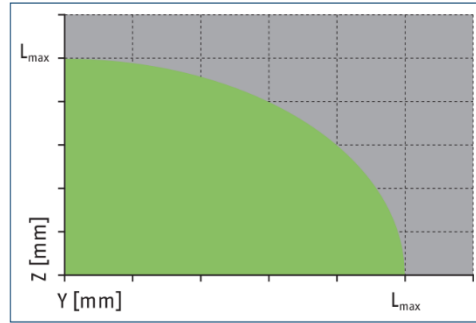
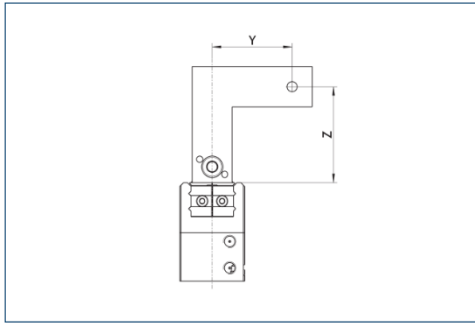
Dimensions and maximum loads



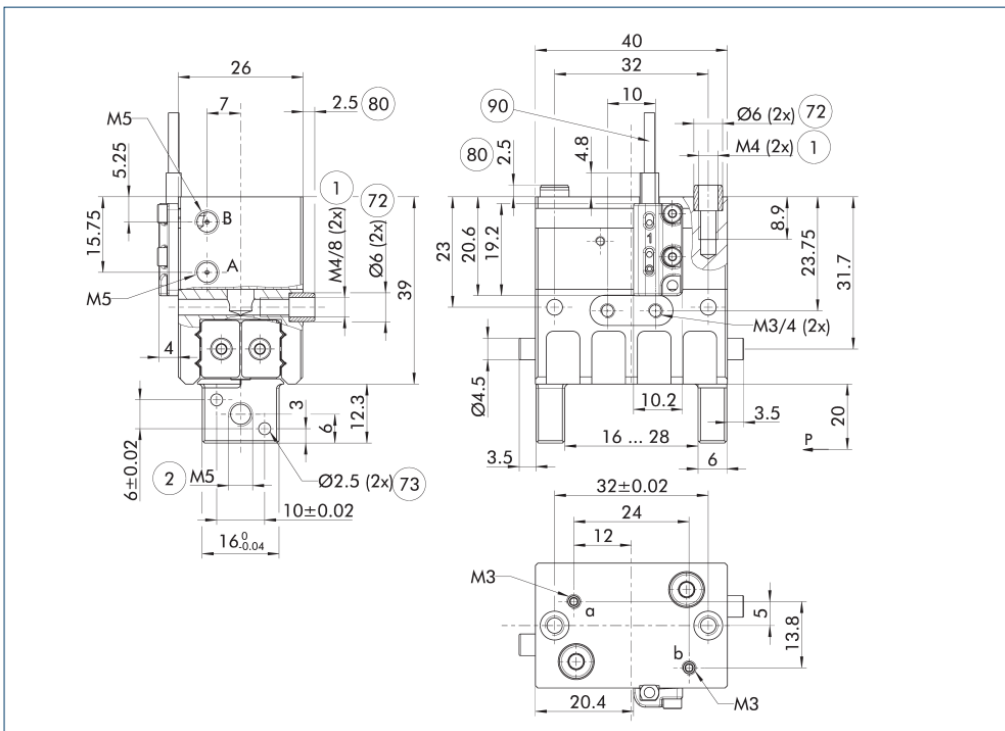
ⓘ The indicated moments and forces are statical values, apply for each base jaw and should not appear simultaneously. Loads may additionally occur to the moment produced by the gripping force itself.



Maximum permitted finger projection



■ Permitted range ■ Inadmissible range
 L^{max} is equivalent to the maximum permitted finger length, see the technical data table.



The drawing shows the basic version of the gripper with open jaws, without dimensional consideration of the options described below.

① The SDV-P pressure maintenance valve can also be used for I.D. or O.D. gripping alternatively or in addition to the spring-loaded, mechanical gripping force maintenance device (see catalog section on accessories).

- A, a Main / direct connection, gripper opening
- B, b Main / direct connection, gripper closing
- ① Gripper connection
- ② Finger connection
- 72 Fit for centering sleeves
- 73 Fit for centering pins
- 80 Depth of the centering sleeve hole in the counter part
- 90 MMS 22...-PI2... sensor



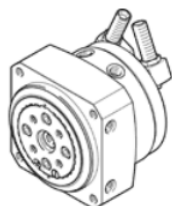
6 Technical data of the rotary actuator

Refer to the manufacturer's manual for dimensioning and design of the gripping handles:

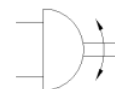
6.1 Strong Version

DSM-25-270-P1-HD-A-B

Part number: 1369118



FESTO



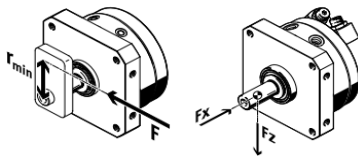
Data sheet

| Feature | Value |
|---|---|
| Size | 25 |
| Cushioning angle | 7.5 deg |
| Rotation angle adjustment range | 0 ... 246 deg |
| Swivel angle | 0 ... 246 deg |
| Cushioning | P1: Flexible cushioning rings/plates with stop at both ends |
| Assembly position | Any |
| Fine adjustment | -6 deg |
| Mode of operation | double-acting |
| Design structure | Rotary vane |
| Position detection | For proximity sensor |
| Operating pressure | 2 ... 10 bar |
| Max. swivel frequency at 6 bar | 1.5 Hz |
| Operating medium | Compressed air in accordance with ISO8573-1:2010 [7:-:] |
| Corrosion resistance classification CRC | 0 - No corrosion stress |
| Ambient temperature | -10 ... 60 °C |
| Max. axial force | 350 N |
| Max. radial force | 450 N |
| Theoretical torque at 6 bar | 5 Nm |
| Permissible mass moment of inertia | 0.045 kgm ² |
| Product weight | 1,015 g |
| Mounting type | with internal (female) thread |
| Pneumatic connection | M5 |
| Materials note | Free of copper and PTFE Conforms to RoHS |
| Material of drive shaft | Steel |
| Material seals | Nickel plated |
| Material seals | TPE-U(PU) |
| Material housing | Wrought Aluminium alloy |



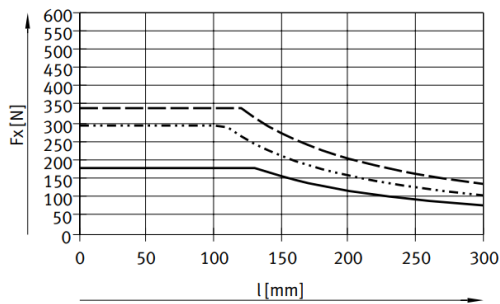
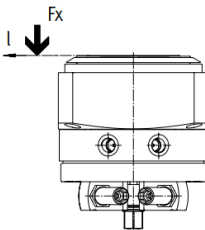
| Forces and torques | | 12 | 16 | 25 | 32 | 40 | 63 |
|---|---------------------|------|------|-----------|------|------|-------|
| Torque at 6 bar | | | | | | | |
| DSM-... | [Nm] | 1.25 | 2.5 | 5 | 10 | 20 | 40 |
| DSM-T-... | [Nm] | 2.5 | 5 | 10 | 20 | 40 | 80 |
| DSM-...-HD | [Nm] | 1.25 | 2.5 | 5 | 10 | 20 | 40 |
| Torque per bar | | | | | | | |
| DSM-... | [Nm] | 0.2 | 0.41 | 0.83 | 1.66 | 3.33 | 6.66 |
| DSM-T-... | [Nm] | 0.4 | 0.82 | 1.66 | 3.33 | 6.66 | 13.33 |
| Min. perm. stop radius r | [mm] | 15 | 17 | 21 | 28 | 40 | 50 |
| Max. perm. stop force F | [N] | 90 | 160 | 320 | 480 | 650 | 1050 |
| Max. perm. dyn. axial force F_x on drive shaft ¹⁾ | | | | | | | |
| DSM-... / DSM-T-... | [N] | 18 | 30 | 50 | 75 | 120 | 500 |
| DSM-...-HD | [N] | 180 | 290 | 350 | 450 | 950 | 1300 |
| Max. perm. dyn. radial force F_z on drive shaft ¹⁾ | | | | | | | |
| DSM-... / DSM-T-... | [N] | 45 | 75 | 120 | 200 | 350 | 500 |
| DSM-...-HD | [N] | 200 | 300 | 450 | 550 | 1200 | 1600 |
| Max. permissible mass moment of inertia | | | | | | | |
| DSM-...-P | [kgm ²] | | | → Page 33 | | | |
| DSM-...-P1 | [kgm ²] | | | → Page 34 | | | |
| DSM-...-CC | [kgm ²] | | | → Page 35 | | | |

1) The axis of rotation and the centre of the drive shaft are the point of reference for the forces



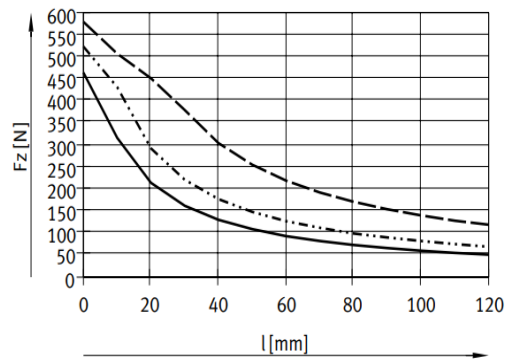
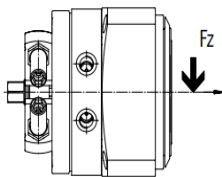
Permissible dynamic load for DSM-...-HD

Permissible axial force F_x as a function of distance l



- DSM-12-...-HD
- · - · - DSM-16-...-HD
- - - DSM-25-...-HD

Permissible radial force F_z as a function of distance l

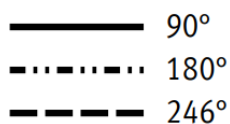
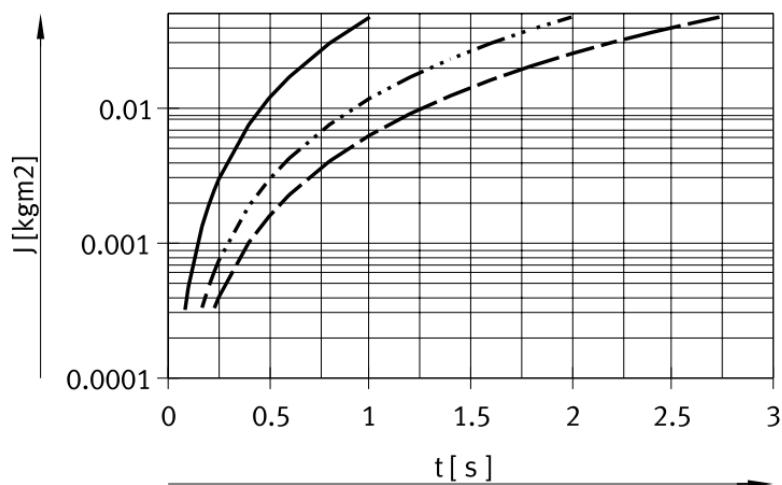


- DSM-12-...-HD
- · - · - DSM-16-...-HD
- - - DSM-25-...-HD



Mass moment of inertia J as a function of swivel time t With adjustable, elastic cushioning components (P1)

DSM-25-270-P1



- Moment of inertia of rotation about the axis of the rotating actuator:
- Gripper + mounting brackets
- $J=0.0015 \text{ Kgm}^2$. (This value will increase depending on the technical characteristics of the gripping handles and the component being manipulated)



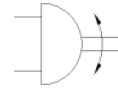
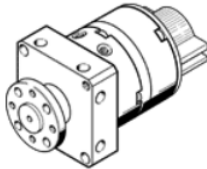
6.2 Light Version

DSM-10-240-P-A-FF-FW

Part number: 185947

with flanged shaft, fixed stop and position sensing

FESTO



Data sheet

| Feature | Value |
|------------------------------------|---|
| Size | 10 |
| Cushioning angle | 0 deg |
| Rotation angle adjustment range | 0 ... 200 deg |
| Swivel angle | 0 ... 200 deg |
| Assembly position | Any |
| Fine adjustment | -5 deg |
| Mode of operation | double-acting |
| Design structure | Rotary vane |
| Position detection | For proximity sensor |
| Operating pressure | 2.5 ... 8 bar |
| Max. swivel frequency at 6 bar | 2 Hz |
| Operating medium | Compressed air in accordance with ISO8573-1:2010 [7:4:4] |
| Note on operating and pilot medium | Lubricated operation possible (subsequently required for further operation) |
| Ambient temperature | 0 ... 60 °C |
| Theoretical torque at 6 bar | 0.85 Nm |
| Permissible mass moment of inertia | 0.0026 kgm ² |
| Product weight | 265 g |
| Mounting type | with internal (female) thread |
| Pneumatic connection | M3 |
| Materials note | Free of copper and PTFE Conforms to RoHS |
| Material of drive shaft | High alloy steel, non-corrosive |
| Material seals | TPE-U(PIU) |
| Material housing | Aluminium Anodised |

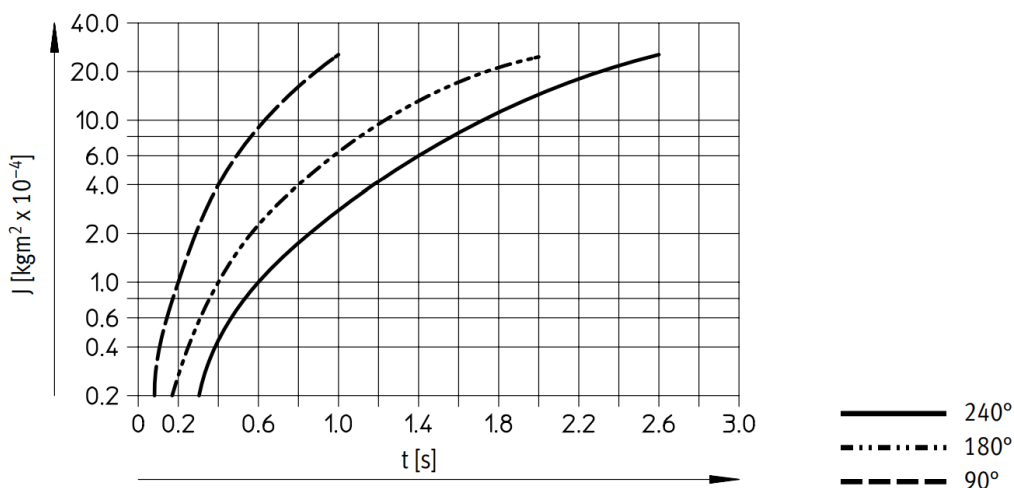


| Forces and torques | | 6 | 8 | 10 |
|--|---------------------|---------|--------|--------|
| Torque at 6 bar | | | | |
| DSM-... | [Nm] | 0.15 | 0.35 | 0.85 |
| DSM-F... | [Nm] | 0.3 | 0.7 | 1.7 |
| Max. permissible axial force on drive shaft ¹⁾ | [N] | 10 | | |
| Max. permissible radial force on drive shaft ¹⁾ | [N] | 15 | 20 | 30 |
| Max. perm. mass moment of inertia on drive shaft ²⁾ | [kgm ²] | 0.00065 | 0.0013 | 0.0026 |

1) The axis of rotation and the centre of the drive shaft are the point of reference for the forces

Mass moment of inertia J as a function of swivel time t

DSM-10



- Moment of inertia of rotation about the axis of the rotating actuator:
- Gripper + mounting brackets
- $J = 1.51 \times 10^{-4} \text{ Kg}m^2$. (This value will increase depending on the technical characteristics of the gripping handles and the component being manipulated)

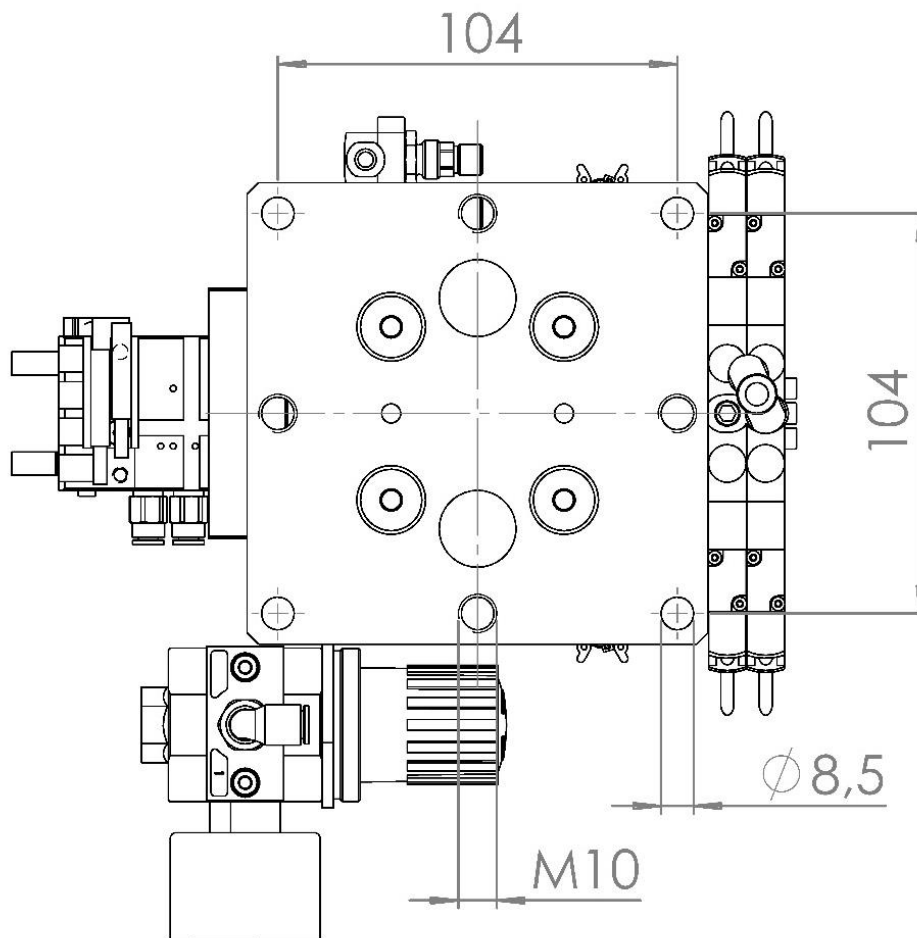


7 Installation

7.1 Fixing

Both versions are equipped with the same ground anchorage plate.

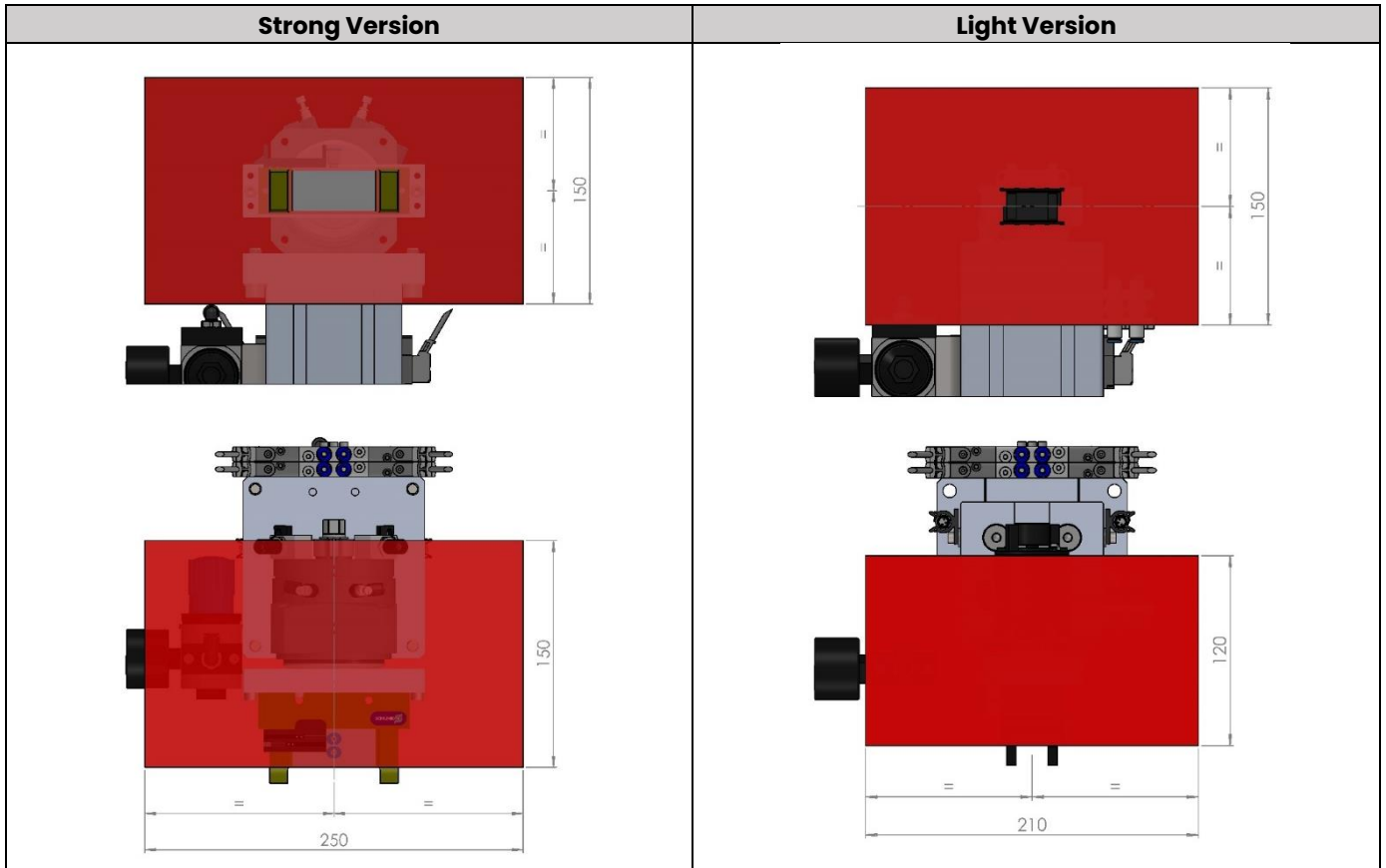
- Fixing: No. 4 holes for M8 screw
- Levelling of the support surface: No. 4 holes M10



7.2 Operation spaces



IMPORTANT: Leave room for the gripper's wiring.



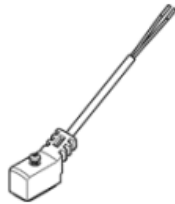
7.3 Electrical connections

Each external rotation gripper is supplied with 4 cables for sensor management and 4 cables for pilot valve management.

Please refer to the manufacturer’s manual for the technical features of the connecting cables:

NEBV-Z4WA2L-R-E-5-N-LE2-S1
Part number: 8047680

FESTO



Data sheet

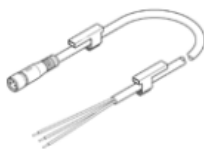
| Feature | Value |
|--|---|
| Signal status display | Yellow LED |
| Additional functions | Reduction of holding current Protective circuit |
| Cable identification | Without inscription label holder |
| Connection frequency | 50 |
| Product weight | 90 g |
| Electrical connection 1, function | Field device side |
| Electrical connection 1, design | Angular |
| Electrical connection 1, connection type | Plug socket |
| Electrical connection 1, cable outlet | Angled |
| Electrical connection 1, connection technology | Connection pattern ZC, metric screw |
| Electrical connection 1, number of pins/wires | 2 |
| Electrical connection 1, occupied pins/wires | 2 |
| Electrical connection 1, type of mounting | On solenoid valve with M2 central screw |
| Electrical connection 2, function | Controller side |
| Electrical connection 2, connection type | Cable |
| Electrical connection 2, connection technology | Open end |
| Electrical connection 2, number of pins/wires | 2 |
| Electrical connection 2, occupied pins/wires | 2 |
| Operating voltage range DC | 20.4 ... 26.4 V |
| Nominal operating voltage DC | 24 V |
| Surge strength | 2.4 kV |
| Polarity protected | Bipolar |
| Protective earth connection | Not available |
| Cable length | 5 m |
| Cable attribute | Suitable for chain link trunking |
| Test conditions of cable | Test conditions on request |
| Bending radius, flexible cable installation | ≥ 29 mm |
| Cable diameter | 2.9 mm |
| Cable diameter tolerance | ± 0,1 mm |
| Cable structure | 2x0,14 |
| Nominal conductor cross-section | 0.14 mm ² |
| Protection class | IP65 |
| Note on degree of protection | in assembled condition |
| Ambient temperature | -10 ... 50 °C |
| CE mark (see declaration of conformity) | to EU directive for EMC in accordance with EU RoHS directive |
| Materials note | Conforms to RoHS |
| Degree of contamination | 3 |
| Corrosion resistance classification CRC | 3 - High corrosion stress |
| Material cable sheath | TPE-U(PUR) |
| Cable sheath colour | Grey |
| Material housing | TPE-U(PLU) |
| Housing colour | Black |
| Material screws | Stainless steel |
| Material electrical contact | Copper alloy, tinned |
| Material insulation | PP |



NEBU-M8G3-K-5-LE3

Part number: 541334
 ★ Core product range

for proximity sensors, position transmitter, pressure switch, flow sensors, visual and inductive sensors.



Data sheet

| Feature | Value |
|--|---|
| Conforms to standard | Core colours and connection numbers to EN 60947-5-2 EN 61076-2-104 |
| Cable identification | with 2x label holders |
| Product weight | 123 g |
| Electrical connection 1, function | Field device side |
| Electrical connection 1, design | Round |
| Electrical connection 1, connection type | Plug socket |
| Electrical connection 1, cable outlet | Straight |
| Electrical connection 1, connection technology | M8x1, A-coded to EN 61076-2-104 |
| Electrical connection 1, number of pins/wires | 3 |
| Electrical connection 1, occupied pins/wires | 3 |
| Electrical connection 1, type of mounting | Screw lock |
| Electrical connection 2, function | Controller side |
| Electrical connection 2, connection type | Cable |
| Electrical connection 2, connection technology | Open end |
| Electrical connection 2, number of pins/wires | 3 |
| Electrical connection 2, occupied pins/wires | 3 |
| Operating voltage range DC | 0 ... 60 V |
| Operating voltage range AC | 0 ... 60 V |
| Acceptable current load at 40°C | 3 A |
| Surge strength | 1.5 kV |
| Cable length | 5 m |
| Cable attribute | Standard |
| Test conditions of cable | Bending strength according to Festo standard Test conditions on request Chain link trunking: 5 million cycles, bending radius 75 mm |
| Bending radius, fixed cable installation | 12 mm |
| Bending radius, flexible cable installation | 39 mm |
| Cable diameter | 3.8 mm |
| Cable diameter tolerance | ± 0,1 mm |
| Cable structure | 3x0,25 |
| Nominal conductor cross-section | 0.25 mm ² |
| Protection class | IP65 IP68 IP69K |
| Note on degree of protection | in assembled condition |
| Special characteristics | Oil resistant |
| Ambient temperature | -25 ... 70 °C |
| Ambient temperature with flexible cable installation | -5 ... 70 °C |
| CE mark (see declaration of conformity) | to EU directive low-voltage devices in accordance with EU RoHS directive |
| Materials note | Free of copper and PTFE Conforms to RoHS |

| Feature | Value |
|---|---|
| | Halogen-free Free of phosphoric acid ester |
| Degree of contamination | 3 |
| Corrosion resistance classification CRC | 2 - Moderate corrosion stress |
| Material cable sheath | TPE-U(PUR) |
| Cable sheath colour | Grey |
| Material housing | TPE-U(PUR) |
| Housing colour | Black |
| Material screw-type lock | Nickel-plated brass |
| Material seals | NBR |
| Material electrical contact | Gold-plated copper alloy |
| Material insulation | PP |



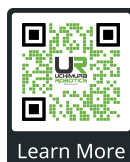
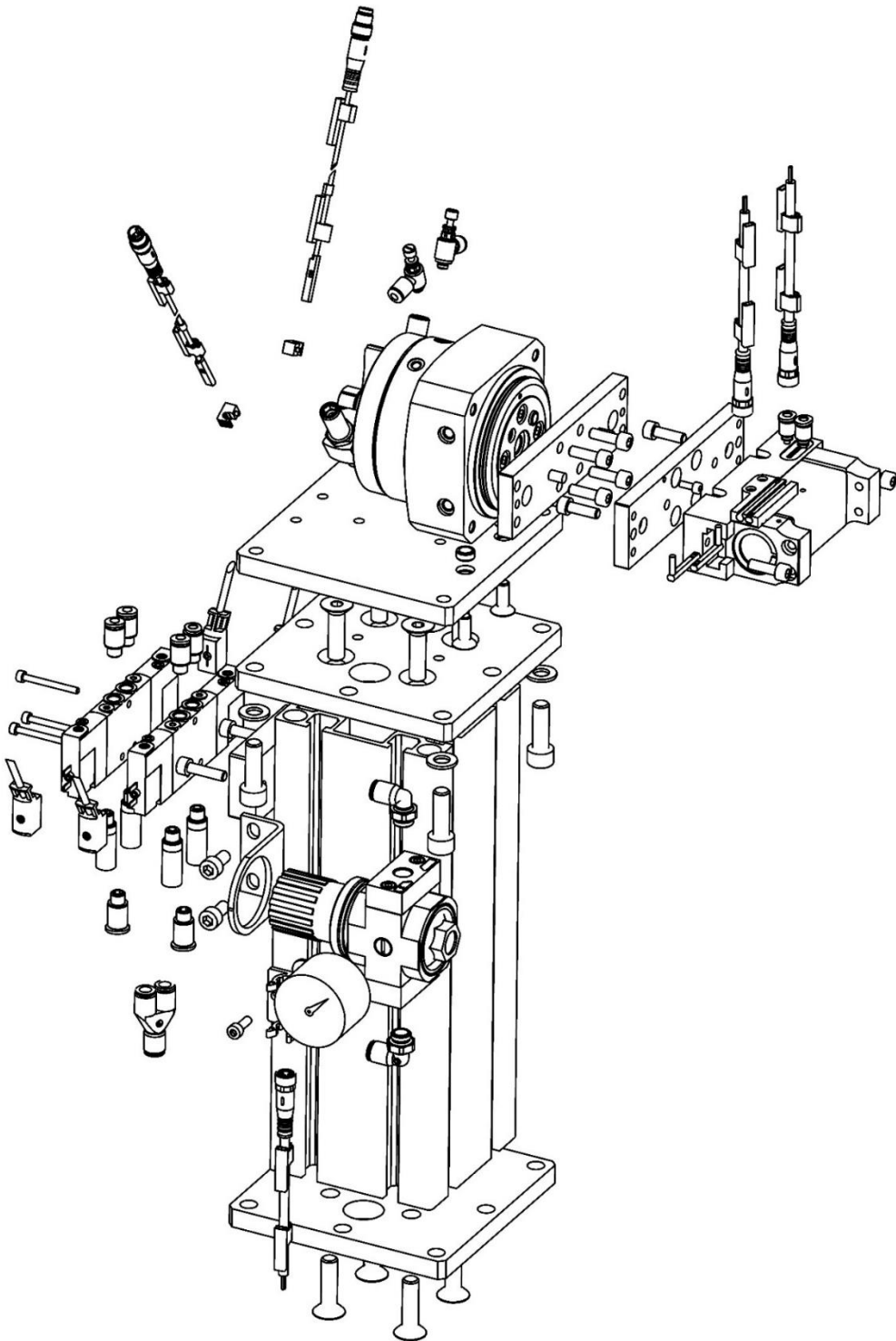
8 Exploded view and list of spare parts

8.1 Strong Version

| Code | Description | Qty | Manufacturer | Spare part |
|----------|---|-----|--------------|------------|
| CM000235 | 161418 UC-M7 Silencer | 4 | Festo | RM |
| CE000155 | 0301042 MMS 22-S-M8-PNP-SA Sensor | 2 | Schunk | RR |
| CM000811 | 196925 CPE10-MIBH-5J-M7 5/2 Bistable solenoid valve | 2 | Festo | RR |
| CM000804 | 162590 LR-1/8-D-O-MINI Pressure regulator | 1 | Festo | RM |
| CE000128 | 551375 SMT-10M-PS-24V-E-0.3-L-M8D Limit switch sensor | 2 | Festo | RR |

| Key | |
|-----|-----------------------|
| RM | Spare part |
| RR | Critical spare part |
| RC | Consumable spare part |



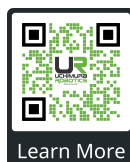
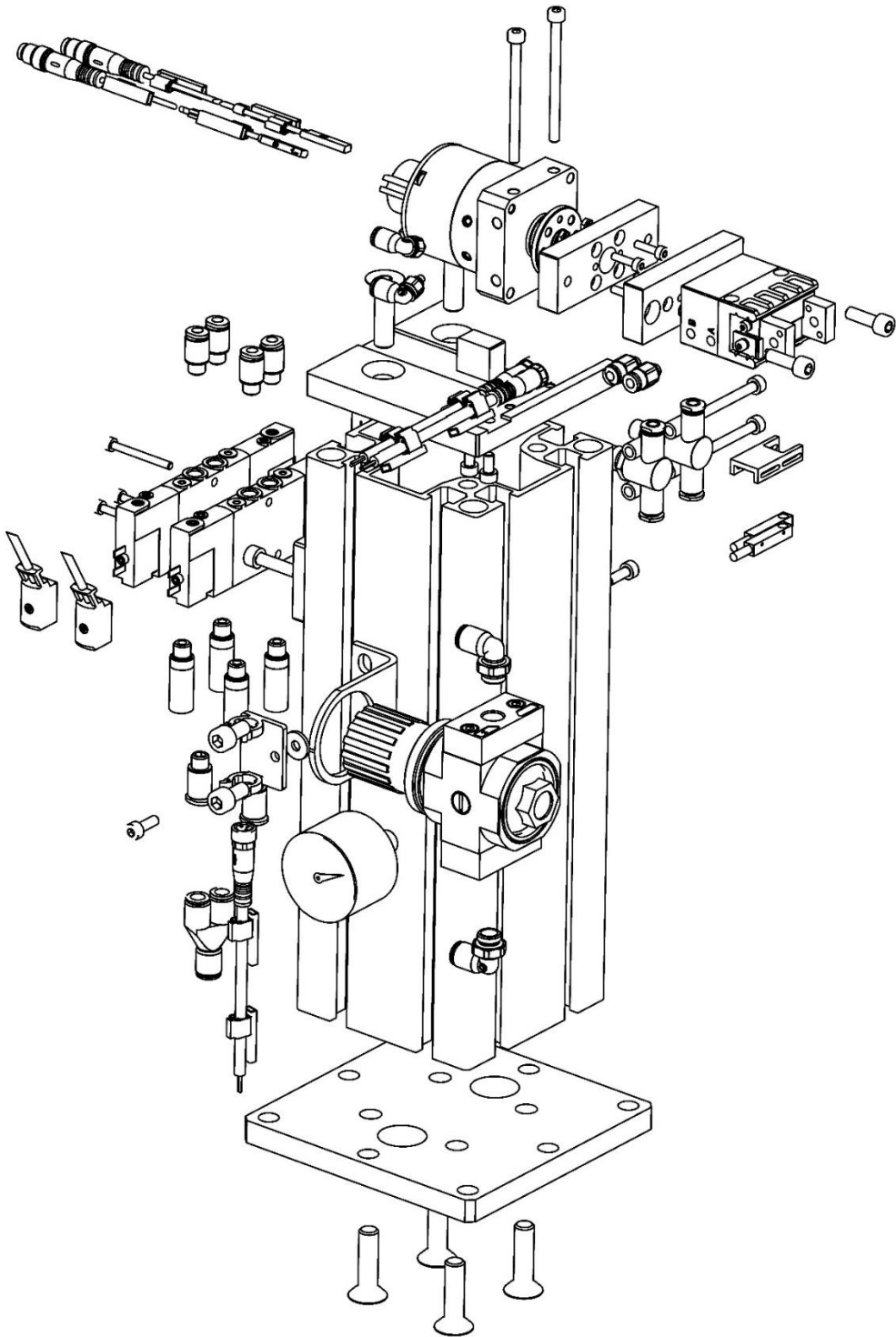


8.2 Light Version

| Code | Description | Qty | Manufacturer | Spare part |
|----------|---|-----|--------------|------------|
| CM000235 | 161418 UC-M7 Silencer | 4 | Festo | RM |
| CM000811 | 196925 CPE10-MIBH-5J-M7 5/2 Bistable solenoid valve | 2 | Festo | RR |
| CE000128 | 551375 SMT-10M-PS-24V-E-0.3-L-M8D Limit switch sensor | 2 | Festo | RR |
| CM000804 | 162590 LR-1/8-D-O-MINI Pressure regulator | 1 | Festo | RM |
| CE000028 | 0301469 IN 5-S-M8 Sensor | 2 | Schunk | RR |

| Key | |
|-----|-----------------------|
| RM | Spare part |
| RR | Critical spare part |
| RC | Consumable spare part |







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