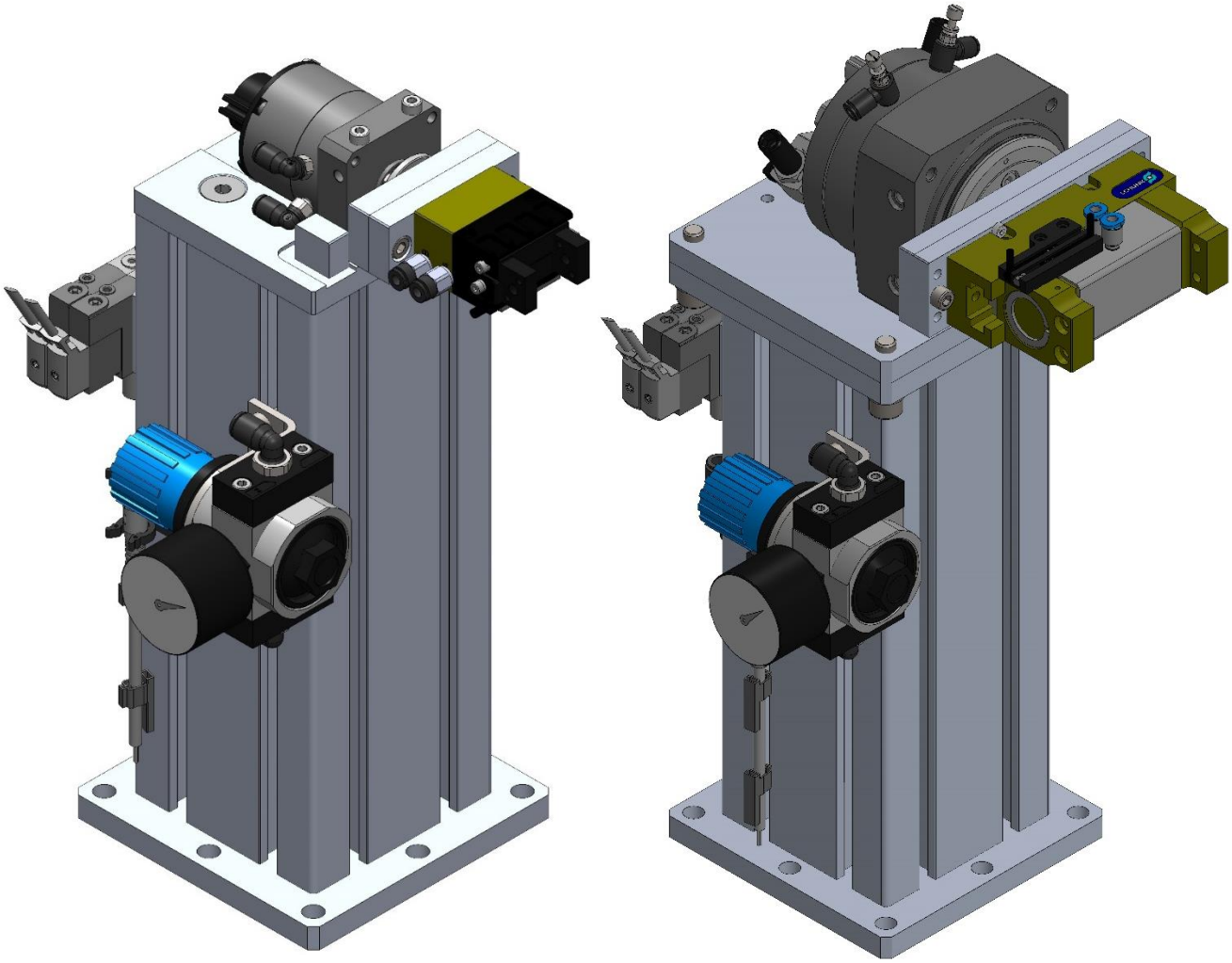
DATASHEET



External Rotator Gripper

Revision 1.0 - Edition 03/2021

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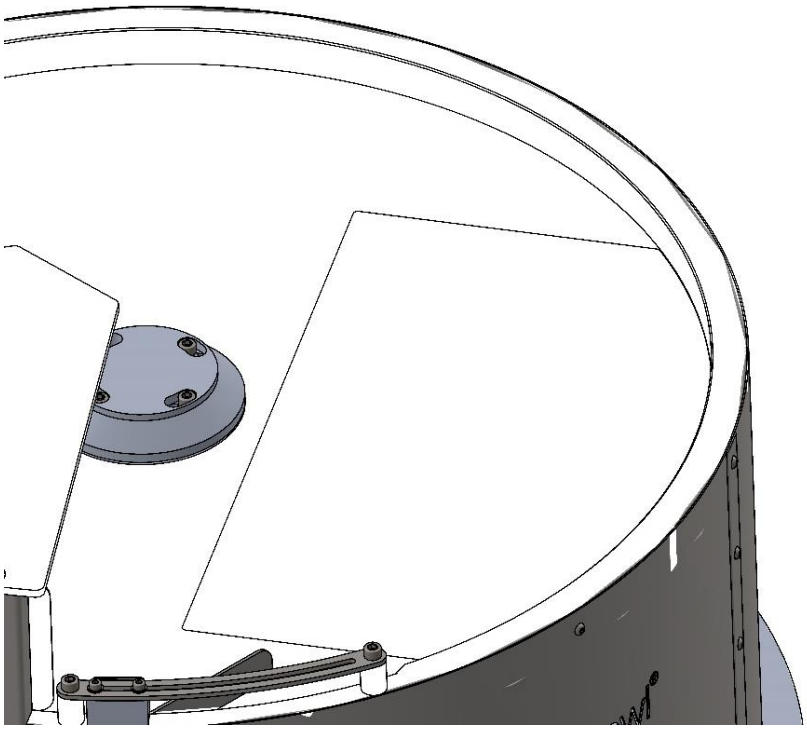
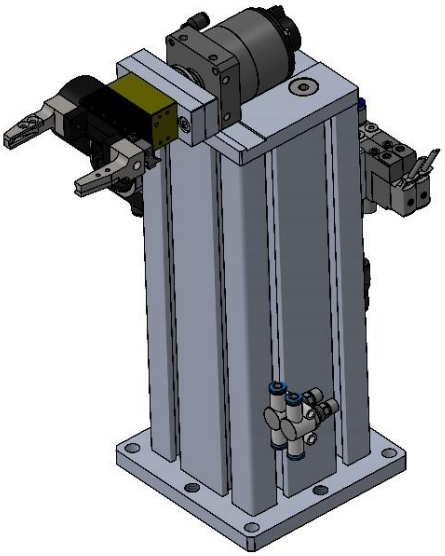
Table of contents

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



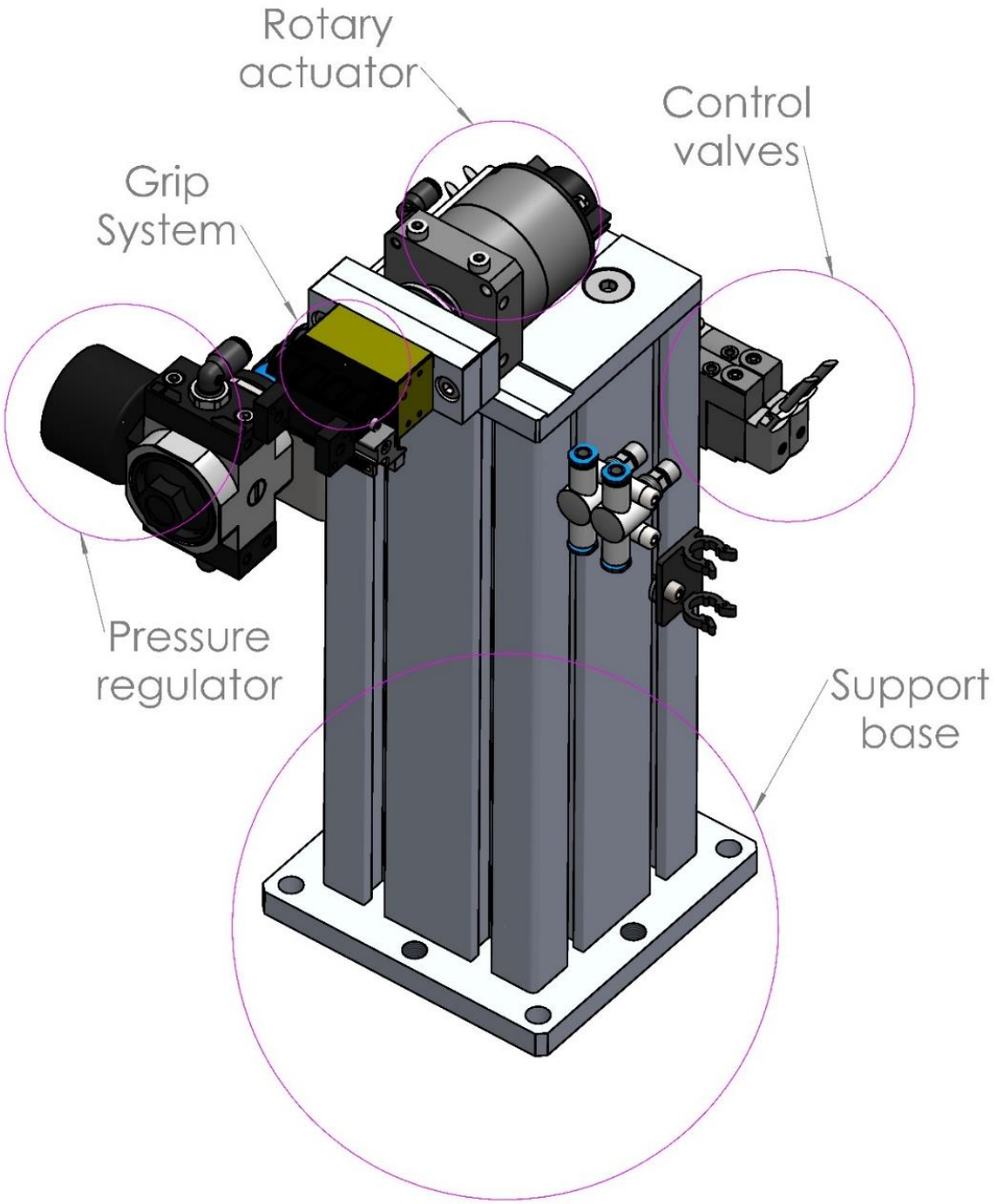


Description	External Rottor Gripper Strong Version	External Rottor Gripper Light Version
Suitable application	Handling of medium/heavy workpieces using mechanical gripping systems such as pneumatic or electrical grippers	Fast handling of medium/light workpieces by means of vacuum gripping systems such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

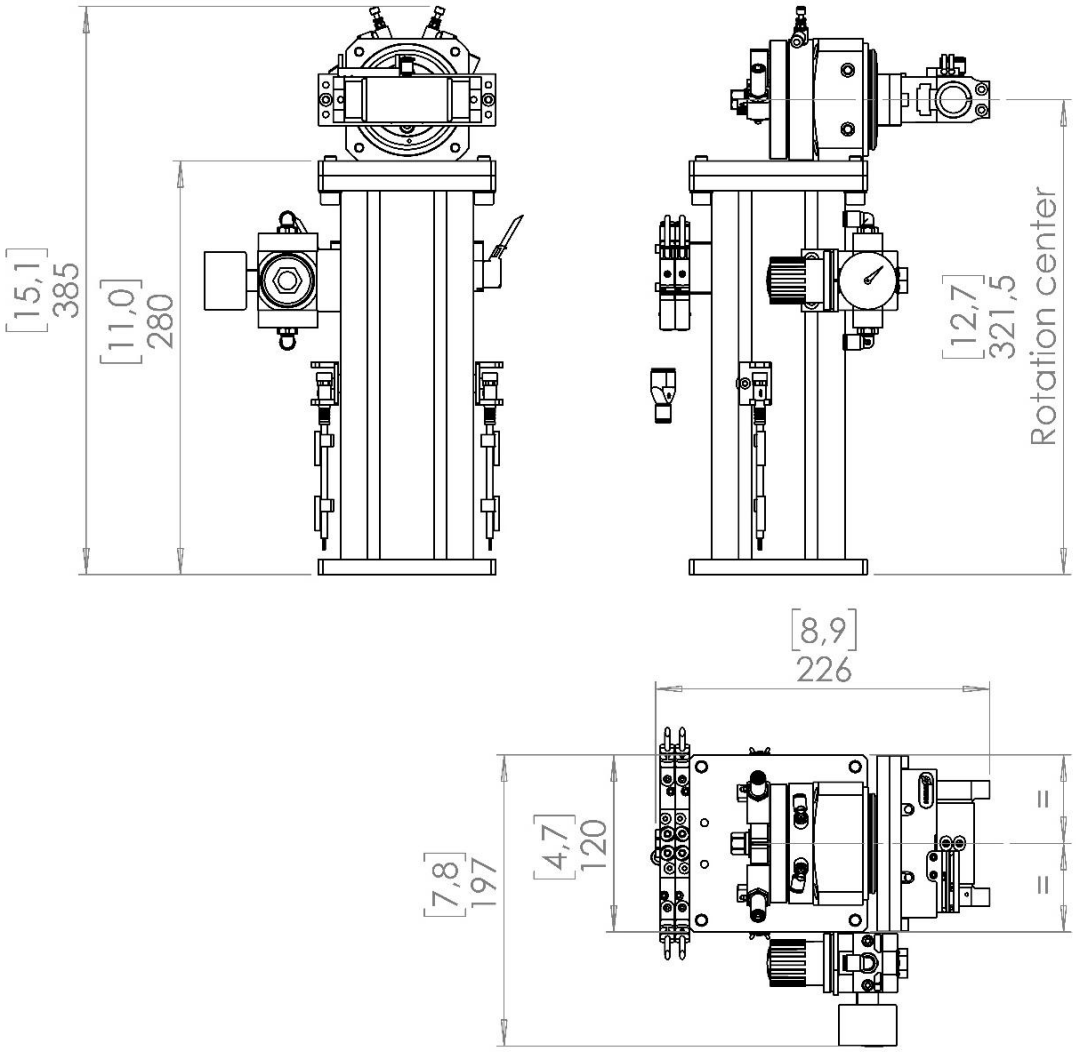


3 Data sheet

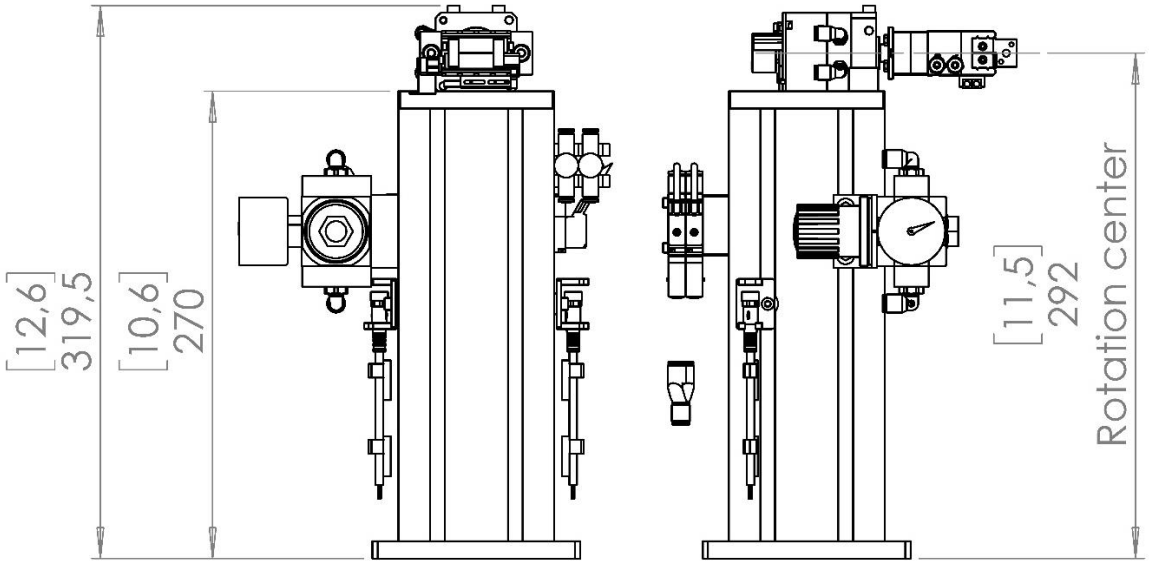
Description	External Rottor Gripper Strong Version	External Rottor Gripper Light Version
Code	GM000388	GM000475
Weight	6Kg	4Kg
Air pressure (Min/Max)		2.5/8 bar
Rotation	0-246°	0-200°
Temperature (min/Max)	-10/60°C	0/60°C
Gripper stroke	40mm	12mm

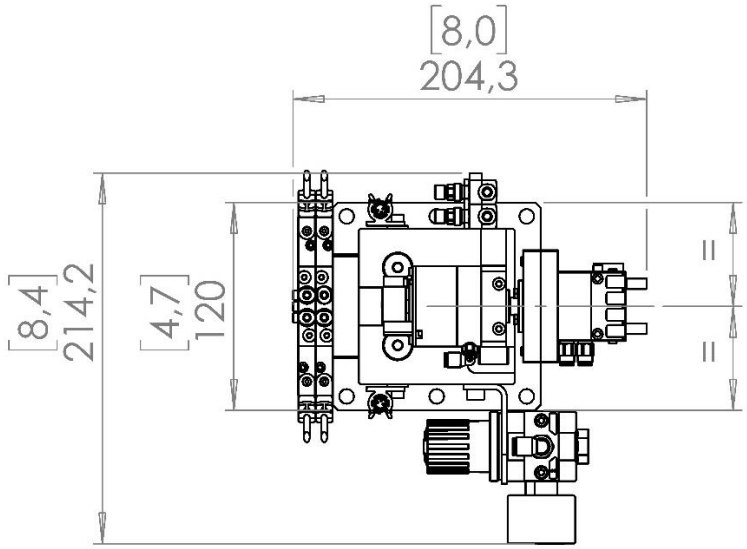
4 Dimensional drawings

4.1 Strong Version



4.2 Light Version





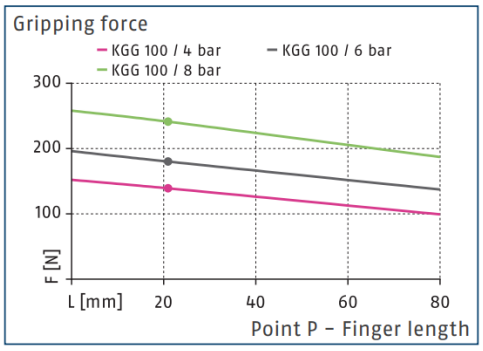
5 Technical data of the gripping system

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

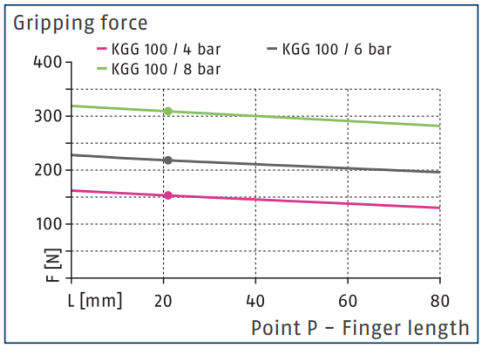
5.1 Strong Version

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	[cm³]	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

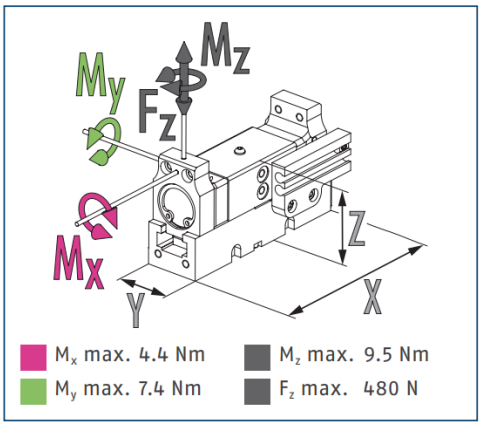
Gripping force O.D. gripping



Gripping force I.D. gripping

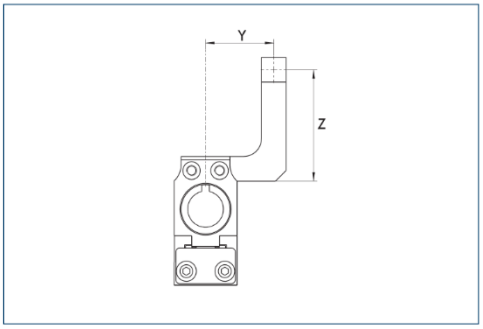


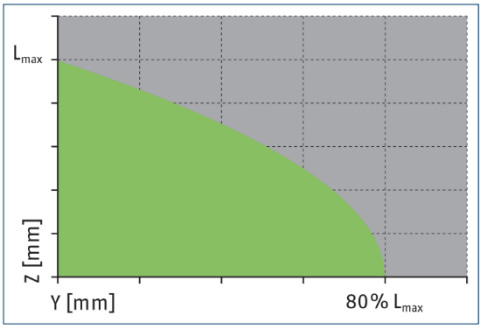
Dimensions and maximum loads



ⓘ 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.

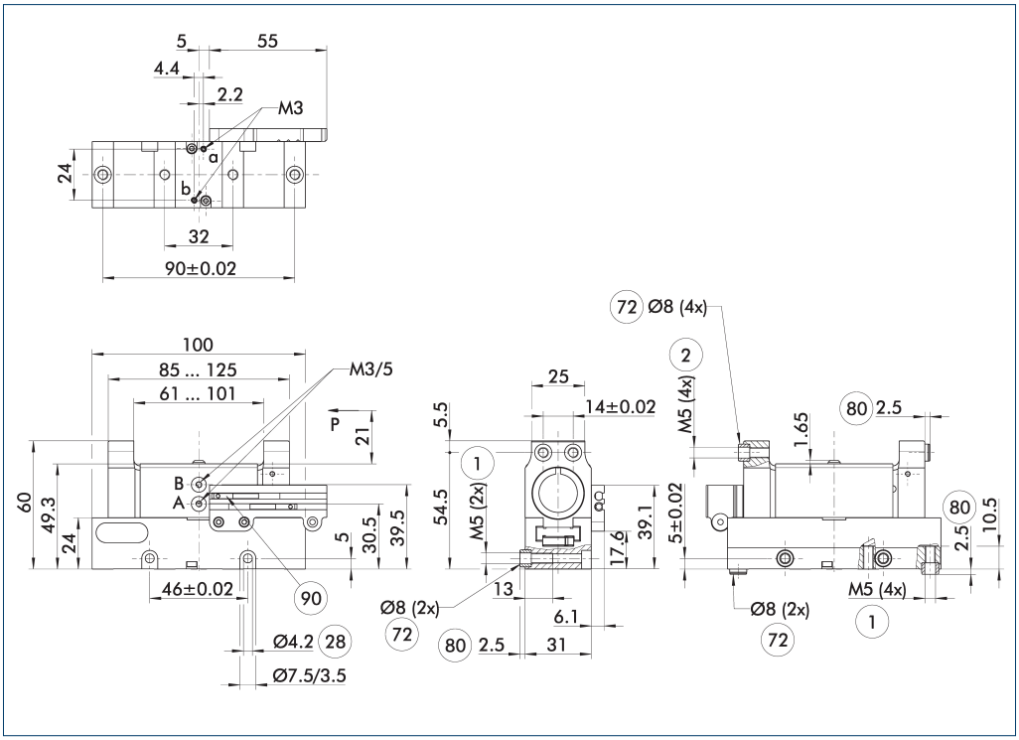
Maximum permitted finger projection





Permitted range Inadmissible range

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

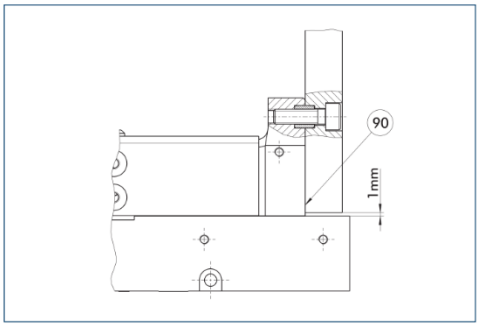


The drawing shows the gripper in the basic version with closed jaws, without dimensional consideration of the options described below.

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

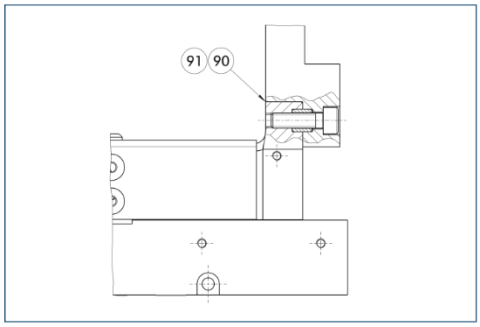
A, a Main / direct connection, gripper opening
B, b Main / direct connection, gripper closing
(1) Gripper connection
(2) Finger connection
(28) Through-hole
(72) Fit for centering sleeves
(80) Depth of the centering sleeve hole in the counter part
(90) Sensor MMS 22..

Jaw design O.D. gripping



(90) Support of the top jaws at the base jaw

Jaw design I.D. gripping

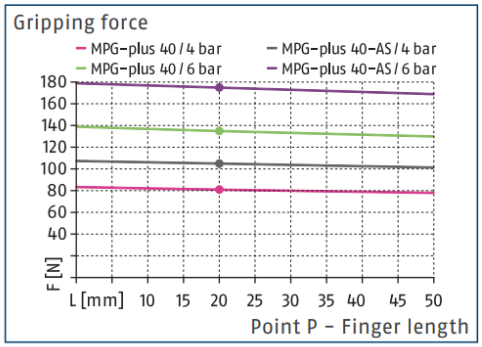


(90) Support of the top jaws at the base jaw
(91) For dimensions of steps at the top jaw see drawings of finger blanks

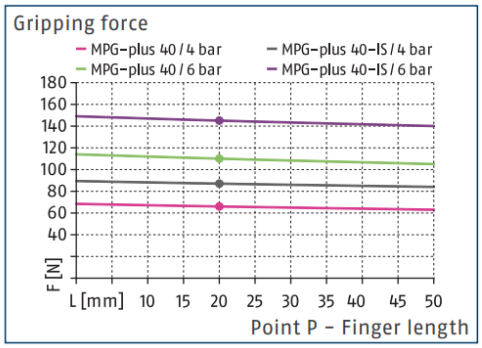
5.2 Light Version

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	[cm³]	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

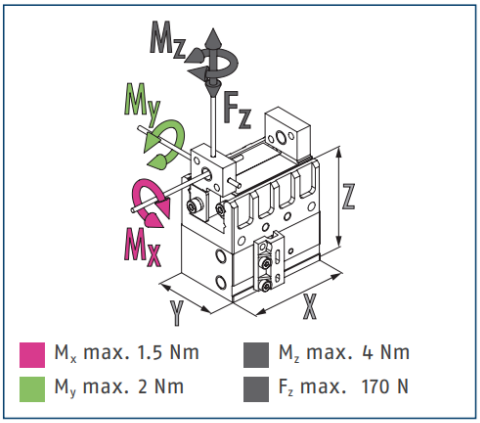
Gripping force O.D. gripping



Gripping force I.D. gripping

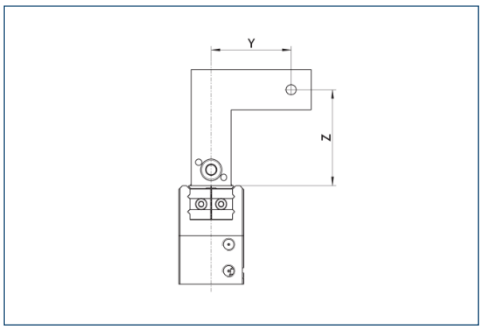


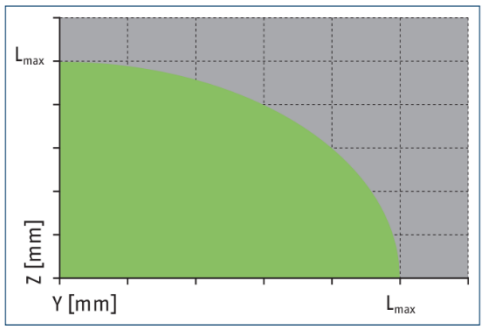
Dimensions and maximum loads



ⓘ 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.

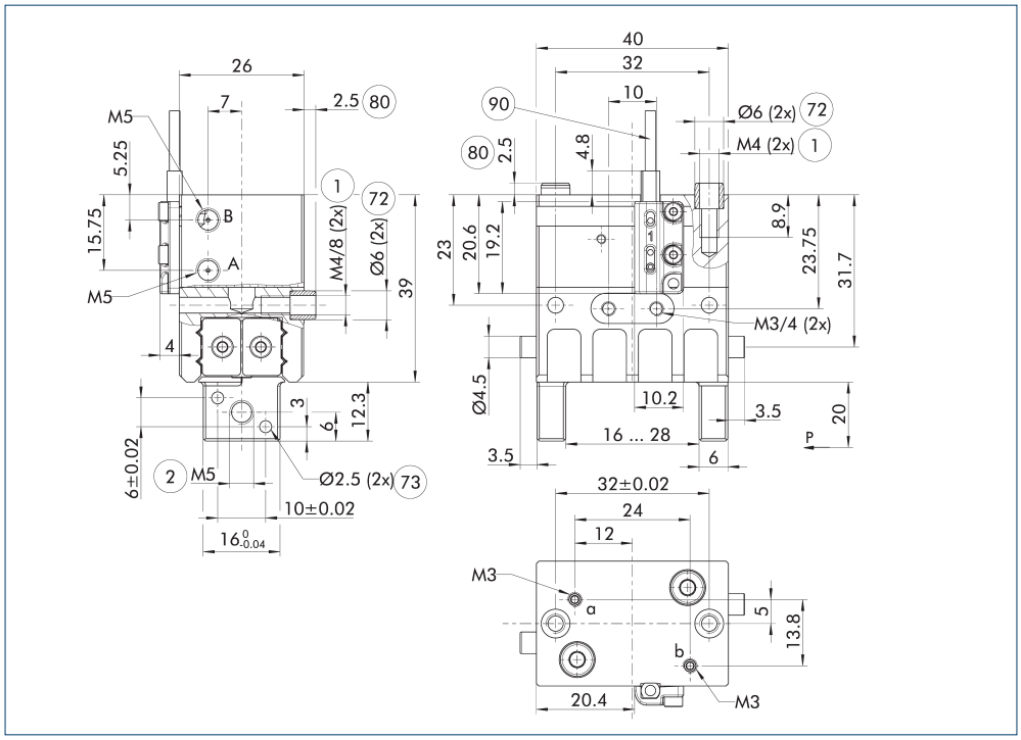
Maximum permitted finger projection





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.

ⓘ 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

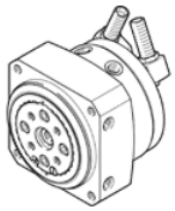
6 Technical data of the rotary actuator

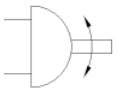
Refer to the manufacturer's manual for dimensioning and design of the gripping handles:

6.1 Strong Version

DSM-25-270-P1-HD-A-B
Part number: 1369118

FESTO



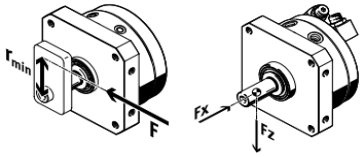


Data sheet

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 kgm2
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 Nickel plated
Material seals	TPE-U(PU)
Material housing	Wrought Aluminium alloy

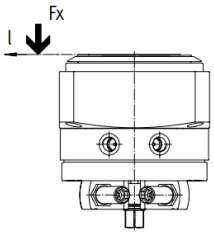
Forces and torques Size		12	16	25	32	40	63
Torque at 6 bar							
DSM-...	[Nm]	1.25	2.5	5	10	20	40
DSM-T-...	[Nm]	2.5	5	10	20	40	80
DSM-...-HD	[Nm]	1.25	2.5	5	10	20	40
Torque per bar							
DSM-...	[Nm]	0.2	0.41	0.83	1.66	3.33	6.66
DSM-T-...	[Nm]	0.4	0.82	1.66	3.33	6.66	13.33
Min. perm. stop radius r	[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	[kgm²]	➔ Page 33					
DSM-...-P1	[kgm²]	➔ Page 34					
DSM-...-CC	[kgm²]	➔ Page 35					

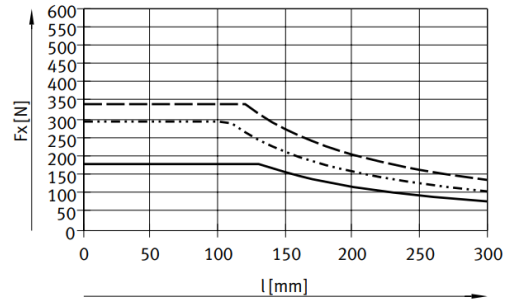
1) The axis of rotation and the centre of the drive shaft are the point of reference for the forces



Permissible dynamic load for DSM-...-HD

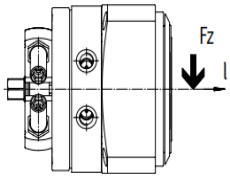
Permissible axial force F_x as a function of distance l

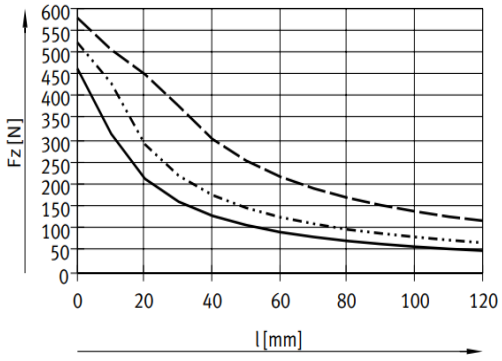




DSM-12-...-HD
DSM-16-...-HD
DSM-25-...-HD

Permissible radial force F_z as a function of distance l

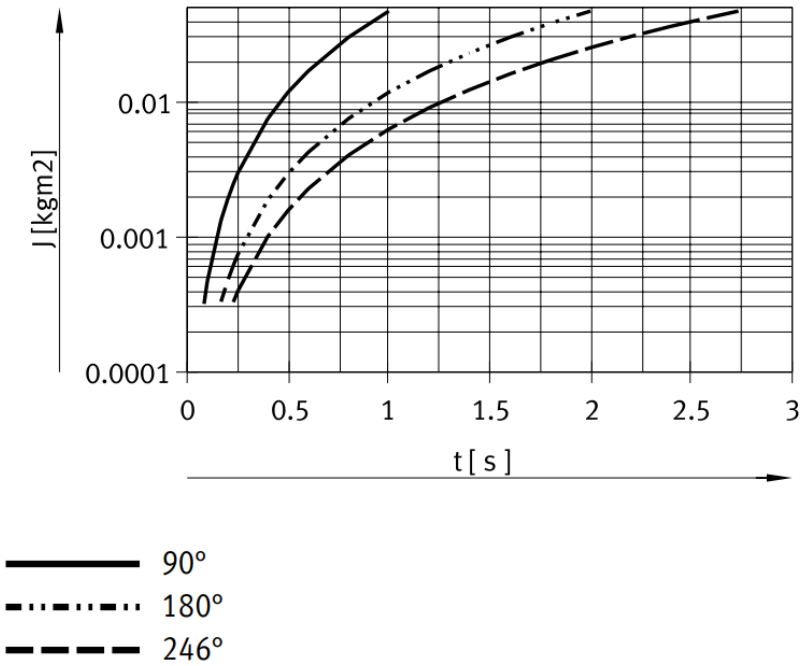




DSM-12-...-HD
DSM-16-...-HD
DSM-25-...-HD

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

DSM-25-270-P1



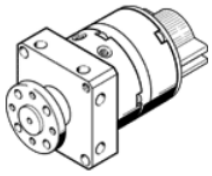
- Moment of inertia of rotation about the axis of the rotating actuator:
- Gripper + mounting brackets
- J=0.0015 Kgm2. (This value will increase depending on the technical characteristics of the gripping handles and the component being manipulated)

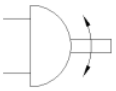
6.2 Light Version

DSM-10-240-P-A-FF-FW
Part number: 185947

FESTO

with flanged shaft, fixed stop and position sensing





Data sheet

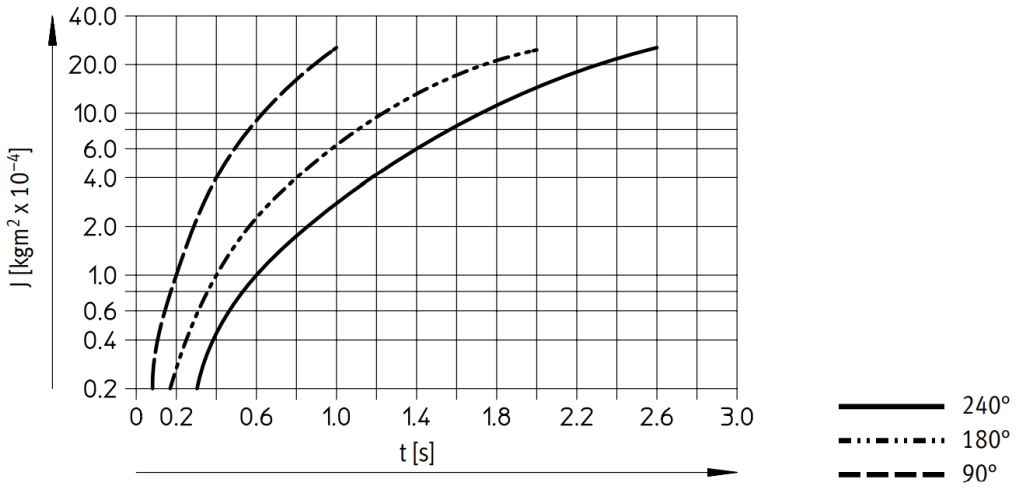
Feature	Value
Size	10
Cushioning angle	0 deg
Rotation angle adjustment range	0 ... 200 deg
Swivel angle	0 ... 200 deg
Assembly position	Any
Fine adjustment	-5 deg
Mode of operation	double-acting
Design structure	Rotary vane
Position detection	For proximity sensor
Operating pressure	2.5 ... 8 bar
Max. 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 kgm2
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(PU)
Material housing	Aluminium Anodised

Forces and torques				
Size		6	8	10
Torque at 6 bar				
DSM-...	[Nm]	0.15	0.35	0.85
DSM-T-...	[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]	[kgm²]	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



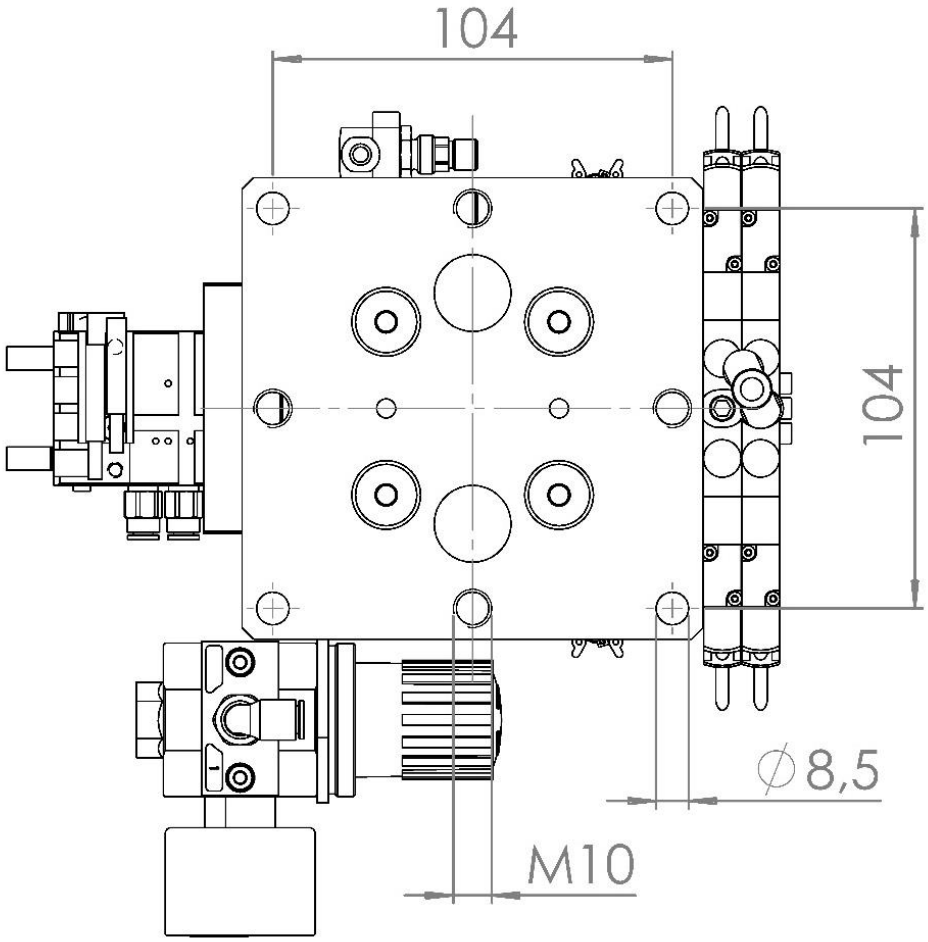
- Moment of inertia of rotation about the axis of the rotating actuator:
- Gripper + mounting brackets
- J = 1.51 x 10-4 Kgm2. (This value will increase depending on the technical characteristics of the gripping handles and the component being manipulated)

7 Installation

7.1 Fixing

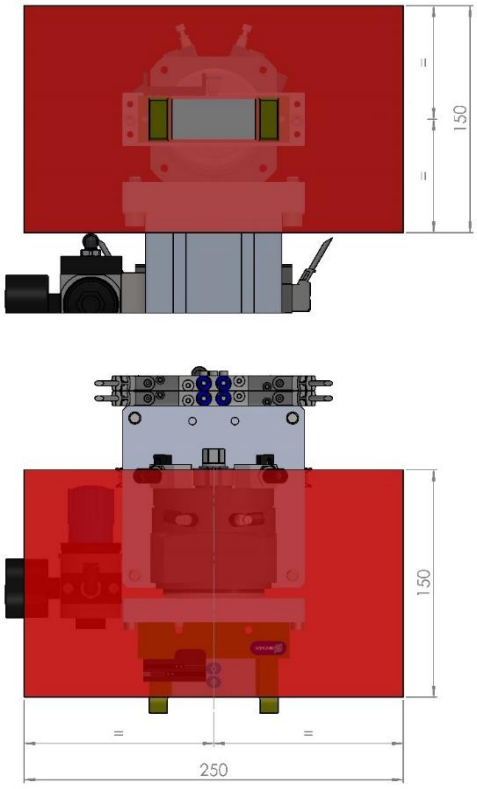
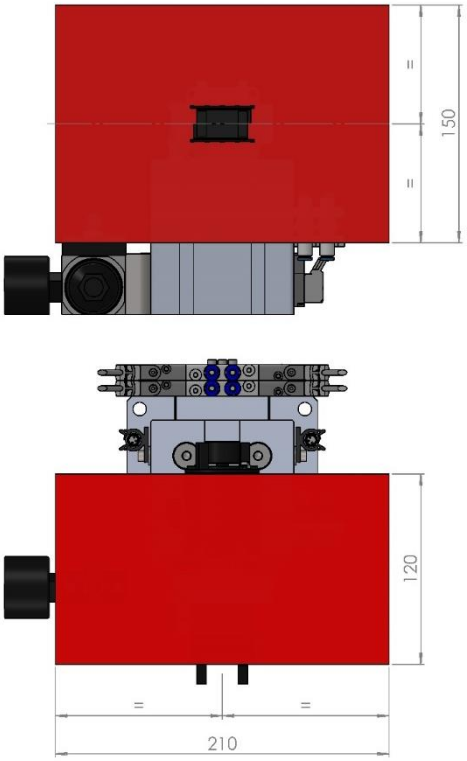
Both versions are equipped with the same ground anchorage plate.

- 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.

Strong Version	Light Version
	

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

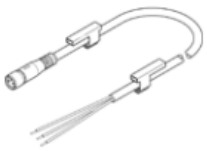
Feature	Value
Signal status display	Yellow LED
Additional functions	Reduction of holding current Protective circuit
Cable identification	Without inscription label holder
Connection frequency	50
Product weight	90 g
Electrical connection 1, function	Field device side
Electrical connection 1, design	Angular
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 mm2
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(PU)
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.

FESTO



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 mm2
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

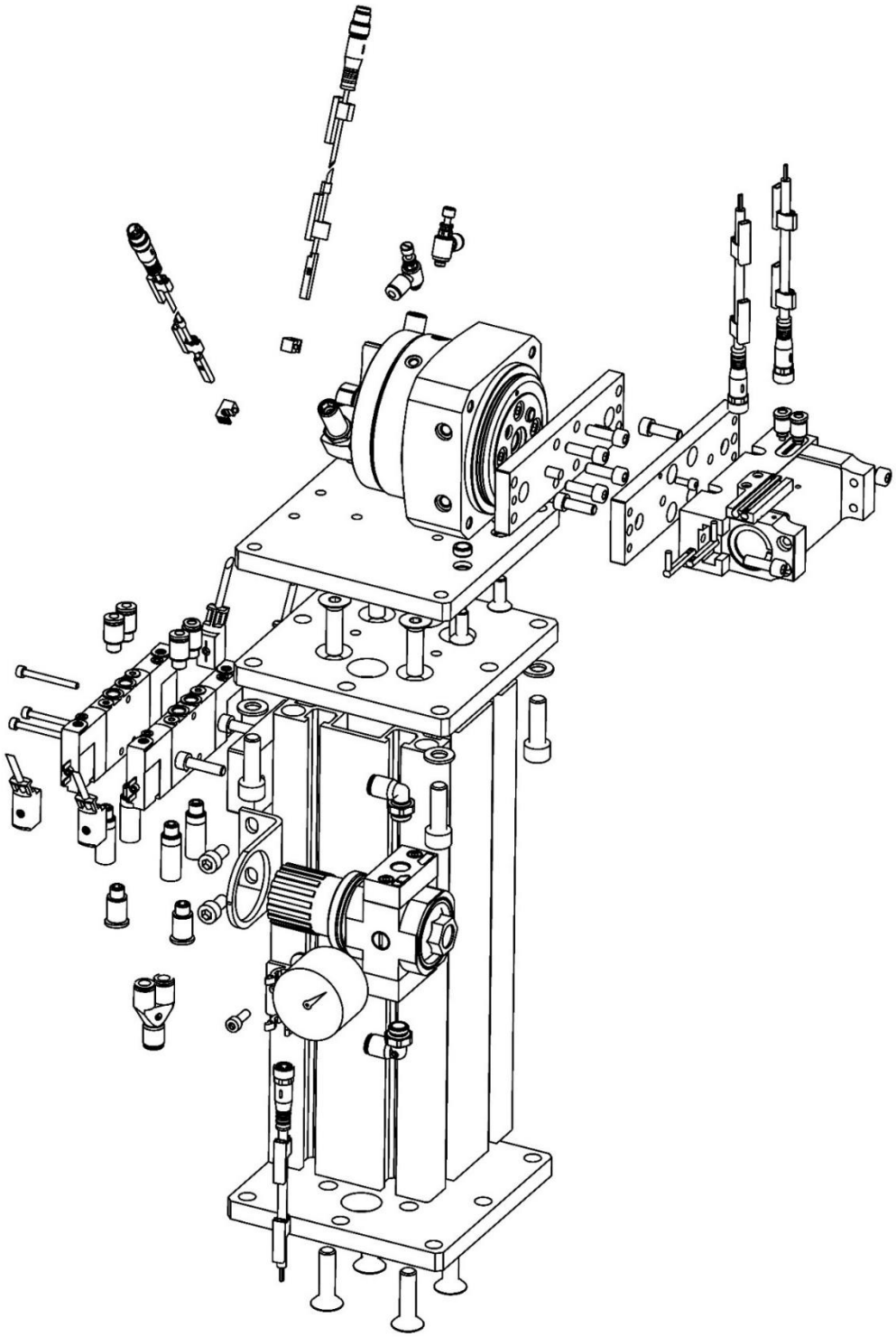
Feature	Value
	Halogen-free Free of phosphoric acid ester
Degree of contamination	3
Corrosion resistance classification CRC	2 - Moderate corrosion stress
Material cable sheath	TPE-U(PUR)
Cable sheath colour	Grey
Material housing	TPE-U(PUR)
Housing colour	Black
Material screw-type lock	Nickel-plated brass
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-M1BH-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

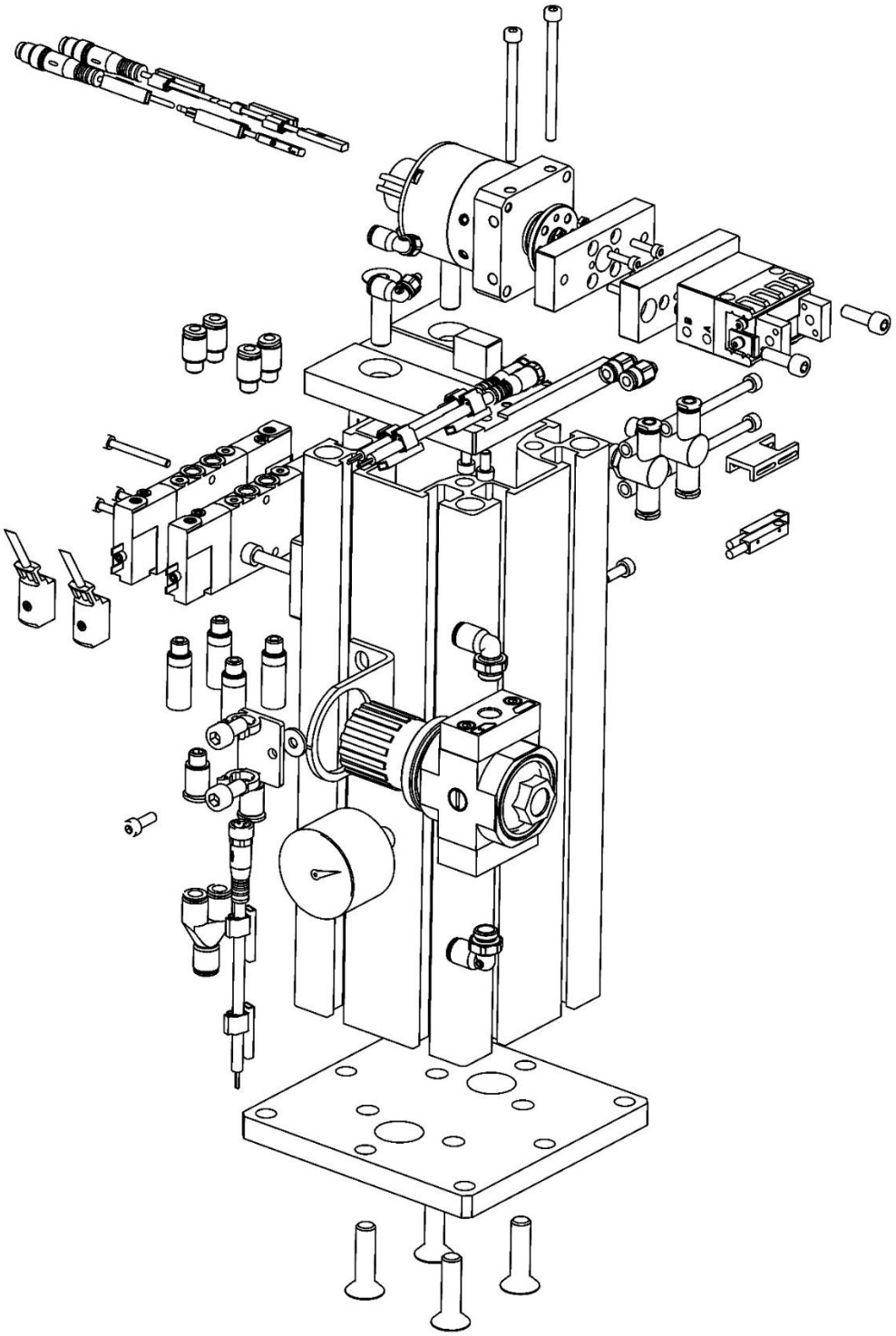
Key	
RM	Spare part
RR	Critical spare part
RC	Consumable spare part



8.2 Light Version

Code	Description	Qty	Manufacturer	Spare part
CM000235	161418 UC-M7 Silencer	4	Festo	RM
CM000811	196925 CPE10-M1BH-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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