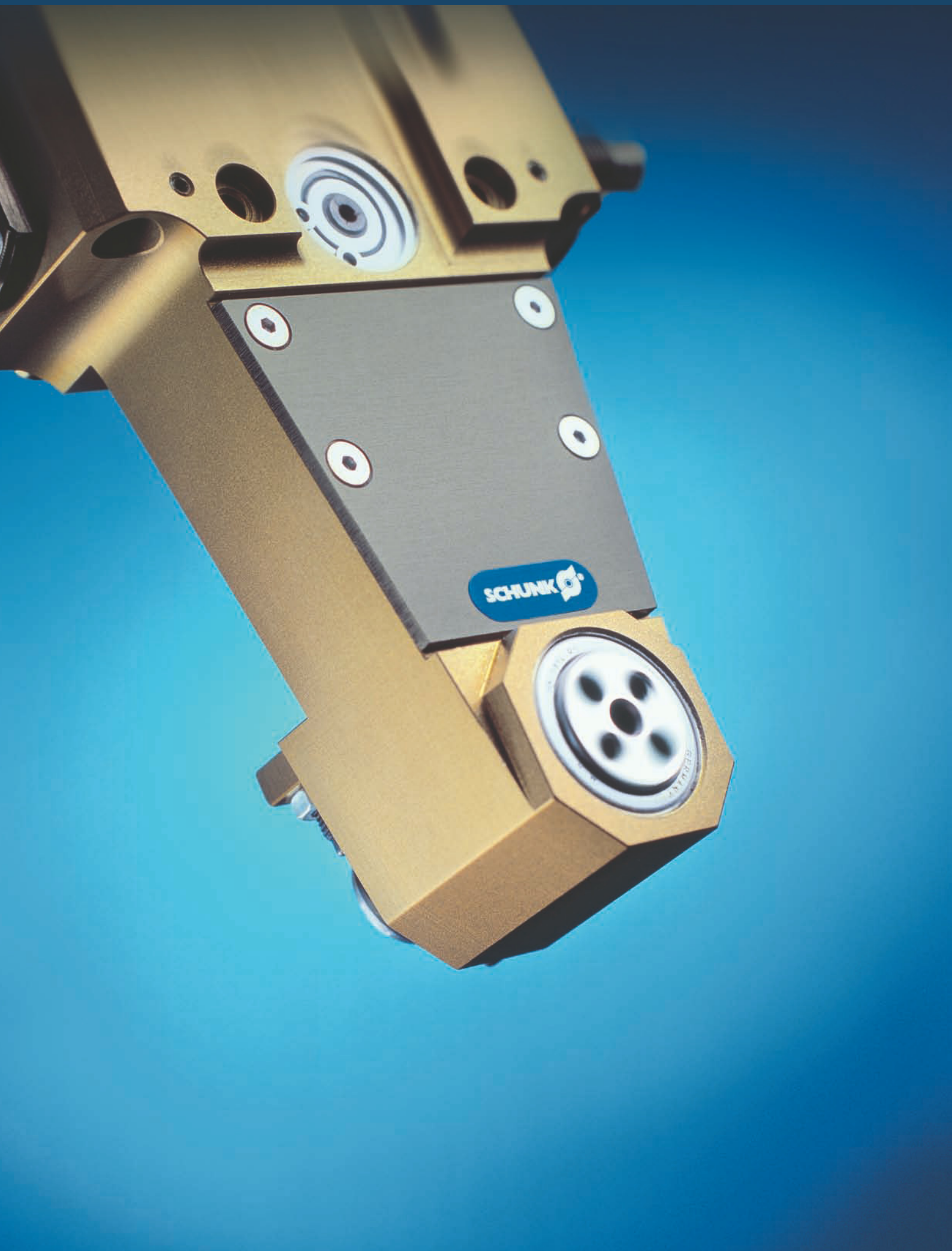
Pneumatic Rotary Modules

Rotary Finger



ROTARY FINGER

Sizes
16 .. 40

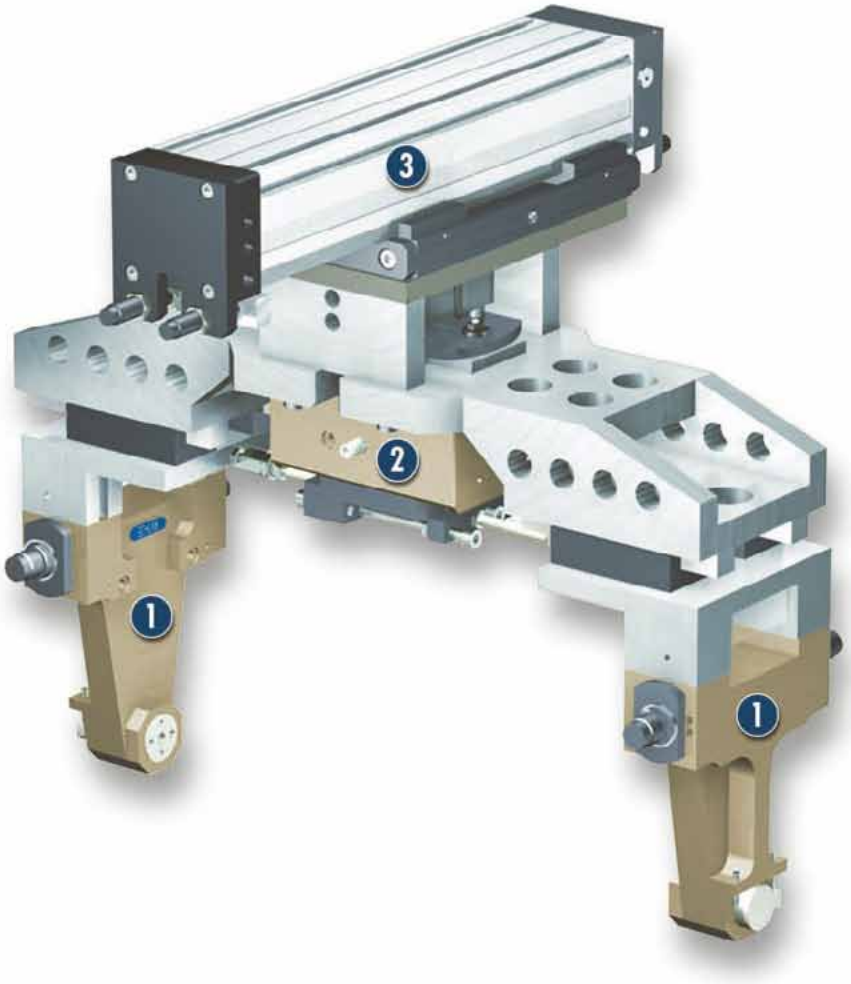
Weight
0.69 kg .. 5.0 kg

Axial force
350 N .. 3300 N

Torque
0.64 Nm .. 10 Nm

Bending moment
17 Nm .. 240 Nm

Application example



Gripping/rotating unit on a linear axis for rotating gripped cast parts during linear transport

1. GFS 32-180° Rotary Finger
2. PFH 40 2-Finger Parallel Gripper
3. SLF 01 Linear Axis

Rotary Finger

Rotary finger for turning workpieces that are held by a gripper.
Can also be used as a special rotary unit.

Area of application

For universal use

Your advantages and benefits

Integrated hydraulic end position damping
for rapid swiveling cycles

End position free from play
for high positioning accuracy

Thrust pad without drive or damping
as a low-price version of the second bearing

Information about the series

Working principle
Double-acting piston with gear transmission

Housing material
High-strength, hard-anodized aluminum alloy

Rotary flange, gears and piston
Hardened steel (16 MnCr 5)

Actuation
Pneumatic, with filtered compressed air (10 µm): Dry, lubricated or non-lubricated
Pressure medium: Required quality class of compressed air according to DIN ISO 8573-1: Quality class 4

Warranty
24 months

Scope of delivery
Guide sleeves, O-rings for direct connection, assembly and operating manual with manufacturer's declaration

Sectional diagram

1 **Drive**
pneumatic, double-acting drive piston

2 **Kinematics**
pack and pinion principle with gear transmission to the rotary flange

3 **Damping**
powerful, self-adjusting hydraulic damper for rapid swiveling cycles

4 **Rotary flange**
mounted on roller bearings, with center bore

5 **Centering and mounting possibilities**
for universal mounting of the rotary finger

Function description

The piston, subjected to compressed air on both sides, moves in a straight line. With its serrations, it turns the first gear, which transfers the rotary movement to the PTO flange by means of further gears.

Options and special information

Thanks to a pressure maintenance valve (SDV-P), the GFS can hold its position even on a loss of pressure.

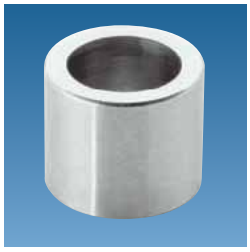
Angles of rotation

90° and 180° angles of rotation available as standard, other angles available on request.

Accessories

Accessories from SCHUNK – the suitable complement for the highest level of functionality, reliability and controlled production of all automation components.

Centering sleeves



Fittings

MMS magnetic switches

W/WK/KV/GK sensor cables

SDV-P pressure maintenance valves

V sensor distributors

ⓘ For the exact size of the required accessories, availability of this size and the designation and ID, please refer to the additional views at the end of the size in question. You will find more detailed information on our accessory range in the „Accessories“ catalog section.

General information on the series

Thrust pad

Thrust pads (-G) do not have a drive or damping.

Repeat accuracy

Repeat accuracy is defined as the spread of the limit position after 100 consecutive swiveling cycles.

Special angles of traverse

Extremely specialized angles of traverse and swivel ranges are also available on request.

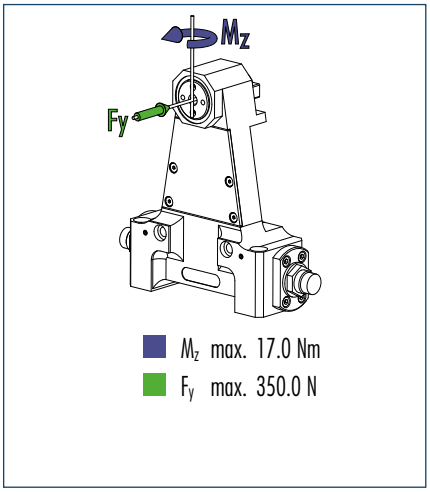
Cycle time

Cycle times are purely the times taken by the pinion/flange to turn round the nominal angle of rotation. Valve switching times, hose filling times or SPC reaction times are not included in the above times and must be taken into consideration when determining cycle times.

Layout or checking calculation

For deciding the layout or for checking calculations of rotary modules, we recommend that you use our SSE software, available on CD or from www.schunk.com.
A checking calculation of the unit you have chosen is absolutely essential, as otherwise overloading may occur.

Pinion load

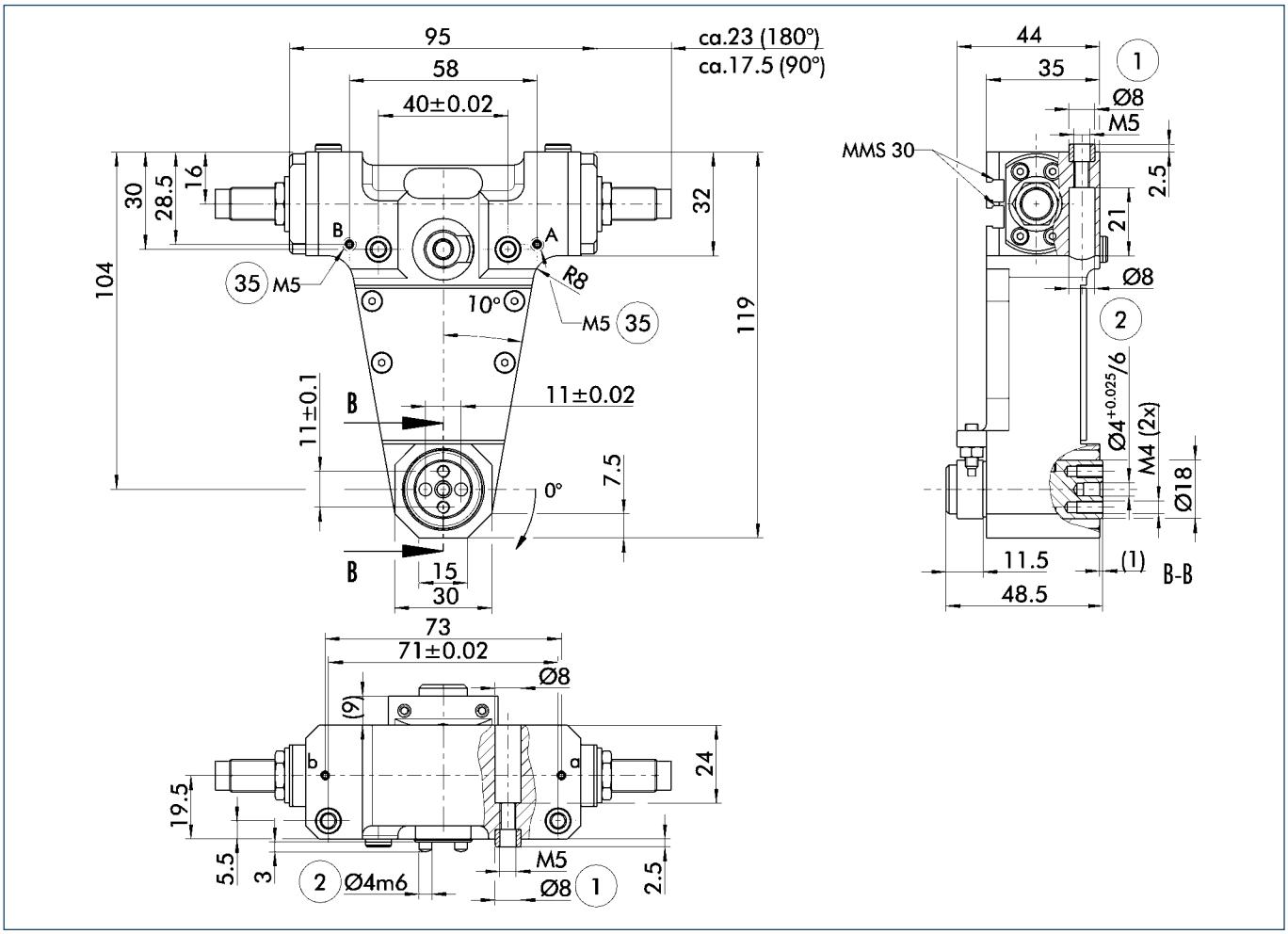


ⓘ The moment and force acting on the pinion may occur simultaneously.

Technical data

Description		GFS 16-180°	GFS 16-90°-R	GFS 16-90°-L	GFS 16-G
	ID	0355497	0355499	0355498	0355503
Torque	[Nm]	0.64	0.64	0.64	0.0
Rotating angle	[°]	180.0	90.0	90.0	
Direction of rotation			right	left	
Adjustability of end positions	[°]	5.0	5.0	5.0	
IP class		54	54	54	54
Weight	[kg]	0.69	0.69	0.69	0.55
Cycle time (1 x nominal angle of rotation) without attached load	[s]	0.3	0.3	0.3	
Fluid consumption per cycle (2 x nominal angle)	[cm^3]	4.5	2.3	2.3	
Nominal pressure	[bar]	6.0	6.0	6.0	
Minimum pressure	[bar]	3.0	3.0	3.0	
Maximum pressure	[bar]	8.0	8.0	8.0	
Diameter of connecting hose	[mm]	6.0	6.0	6.0	
Min. ambient temperature	[°C]	5.0	5.0	5.0	-10.0
Max. ambient temperature	[°C]	60.0	60.0	60.0	90.0
Repeat accuracy	[°]	0.07	0.07	0.07	

Main views



The drawing shows the rotary finger in the basic version. The pinion is in the left-hand end position and turns clockwise from this position.

ⓘ The SDV-P pressure maintenance valve can be used to hold the position upon a loss of pressure (see „Accessories“ catalog section).

A,a Main/direct connection, clockwise rotary unit
B,b Main/direct connection, anti-clockwise rotary unit
① Rotary unit connection
② Attachment connection
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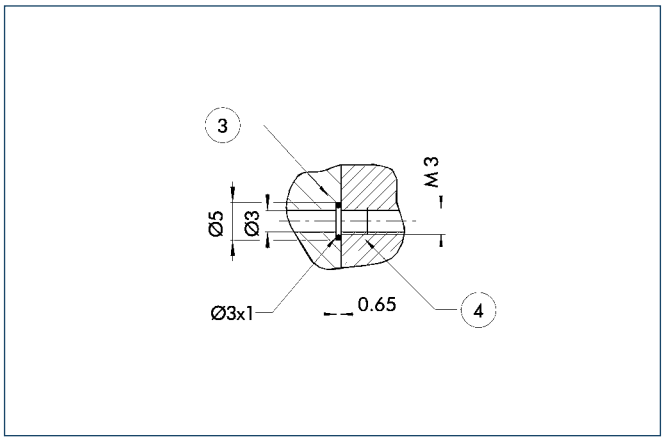
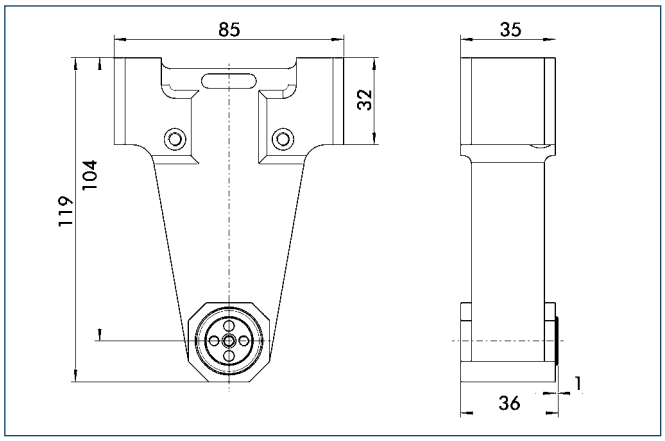
Hose-free direct connection



③ Adapter
④ Rotary unit

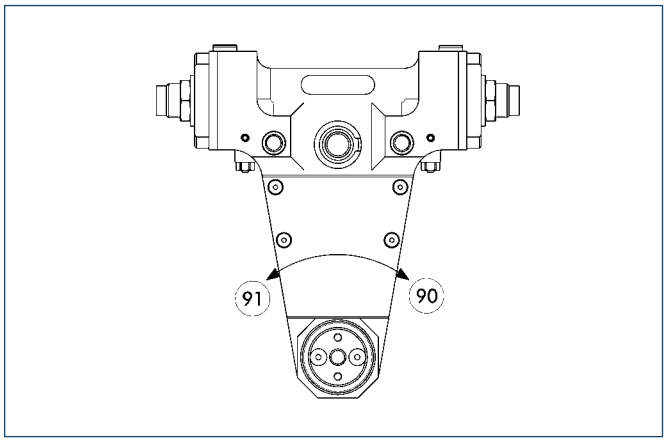
The direction connection is used for supplying compressed air without hoses, which are liable to faults. Instead, the pressure medium is conveyed through the bore-holes of the mounting plate.

Thrust pad



Thrust pads do not have a drive or damping

Direction of rotation

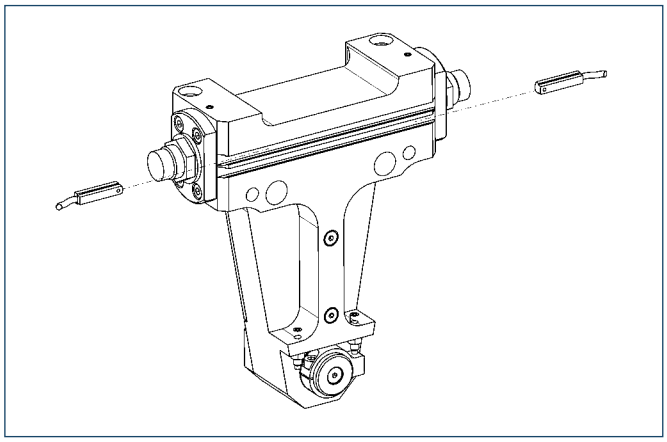


(90) Clockwise
(91) Anti-clockwise

Direction of rotation in clockwise (-R) and anti-clockwise (-L) units.

You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

Sensor system



End position monitoring:
Electronic magnetic switches, for mounting in C-slot

Description	ID	Recommended product
MMS 30-S-M12-PNP	0301571	
MMS 30-S-M8-PNP	0301471	•
MMSK 30-S-PNP	0301563	

ⓘ Two sensors (NO contacts) are required for each rotary finger.

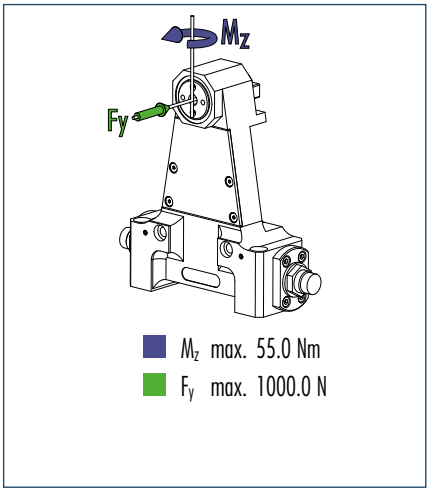
Extension cables for proximity switches/magnetic switches

Description	ID
GK 3-M8	0301622
KV 10-M12	0301596
KV 10-M8	0301496
KV 20-M12	0301597
KV 20-M8	0301497
KV 3-M12	0301595
KV 3-M8	0301495
WK 3-M8	0301594
WK 5-M8	0301502

ⓘ Please note the minimum permitted bending radii for the sensor cables, which are generally 35 mm.

You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

Pinion load

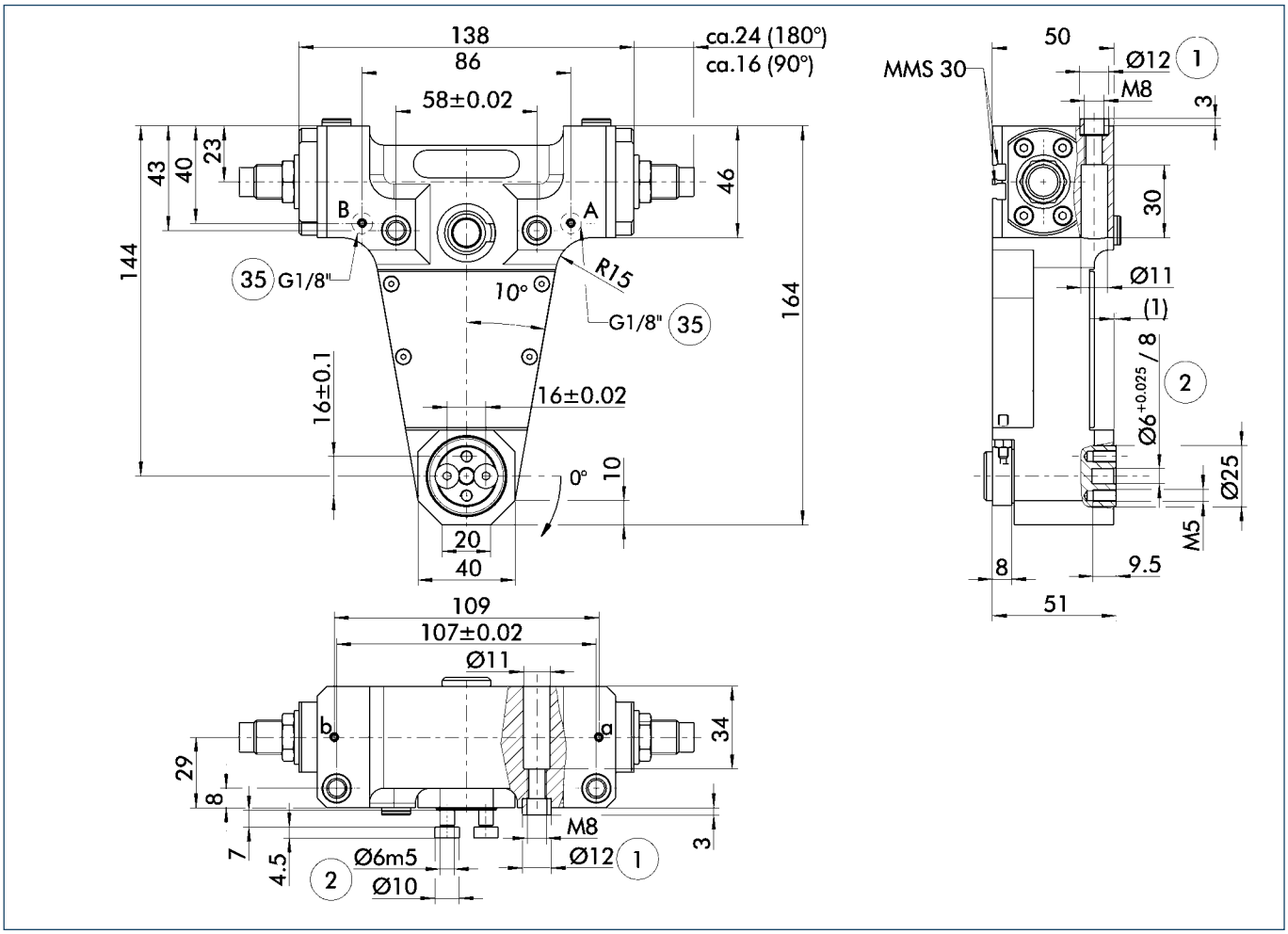


ⓘ The moment and force acting on the pinion may occur simultaneously.

Technical data

Description		GFS 25-180°	GFS 25-90°-L	GFS 25-90°-R	GFS 25-G
	ID	0355510	0355511	0355512	0355513
Torque	[Nm]	2.35	2.35	2.35	0.0
Rotating angle	[°]	180.0	90.0	90.0	
Direction of rotation			left	right	
Adjustability of end positions	[°]	5.0	5.0	5.0	
IP class		54	54	54	54
Weight	[kg]	1.6	1.6	1.6	1.25
Cycle time (1 x nominal angle of rotation) without attached load	[s]	0.3	0.3	0.3	
Fluid consumption per cycle (2 x nominal angle)	[cm^3]	15.5	7.8	7.8	
Nominal pressure	[bar]	6.0	6.0	6.0	
Minimum pressure	[bar]	3.0	3.0	3.0	
Maximum pressure	[bar]	8.0	8.0	8.0	
Diameter of connecting hose	[mm]	6.0	6.0	6.0	
Min. ambient temperature	[°C]	5.0	5.0	5.0	-10.0
Max. ambient temperature	[°C]	60.0	60.0	60.0	90.0
Repeat accuracy	[°]	0.07	0.07	0.07	

Main views

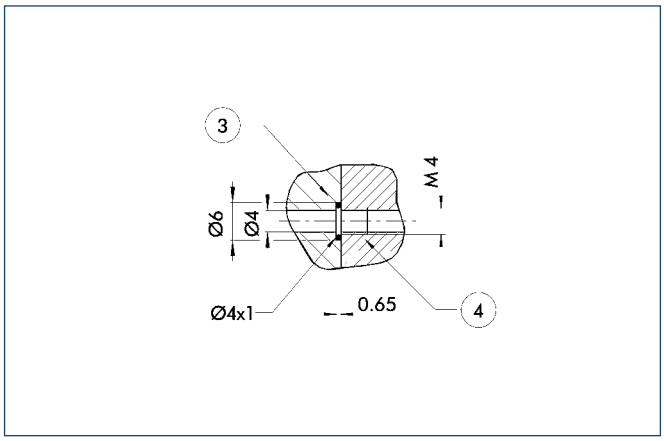


The drawing shows the rotary finger in the basic version. The pinion is in the left-hand end position and turns clockwise from this position.

ⓘ The SDV-P pressure maintenance valve can be used to hold the position upon a loss of pressure (see „Accessories“ catalog section).

A,a Main/direct connection, clockwise rotary unit
B,b Main/direct connection, anti-clockwise rotary unit
① Rotary unit connection
② Attachment connection
㉟ Back page

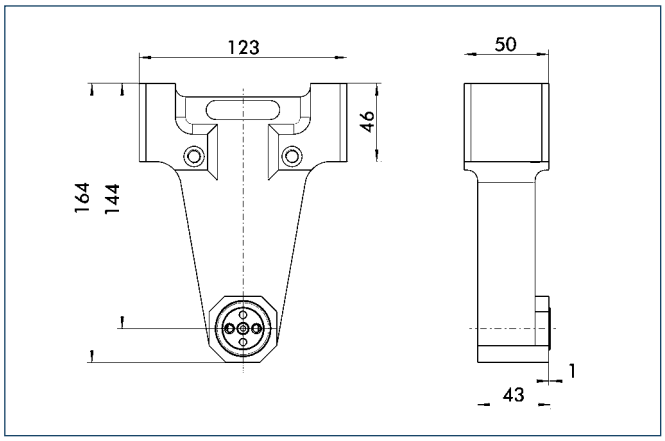
Hose-free direct connection



③ Adapter
④ Rotary unit

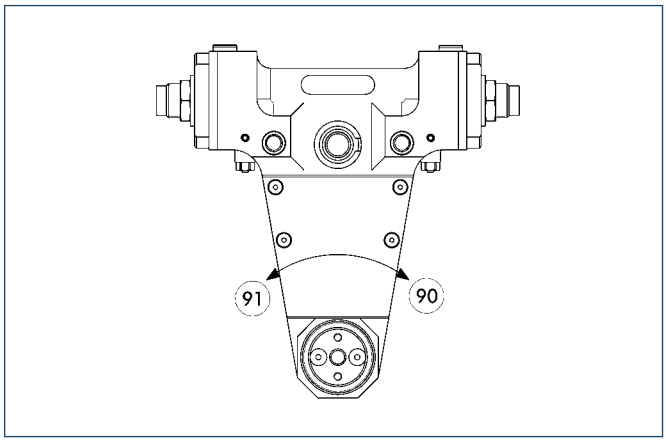
The direction connection is used for supplying compressed air without hoses, which are liable to faults. Instead, the pressure medium is conveyed through the bore-holes of the mounting plate.

Thrust pad



Thrust pads do not have a drive or damping

Direction of rotation

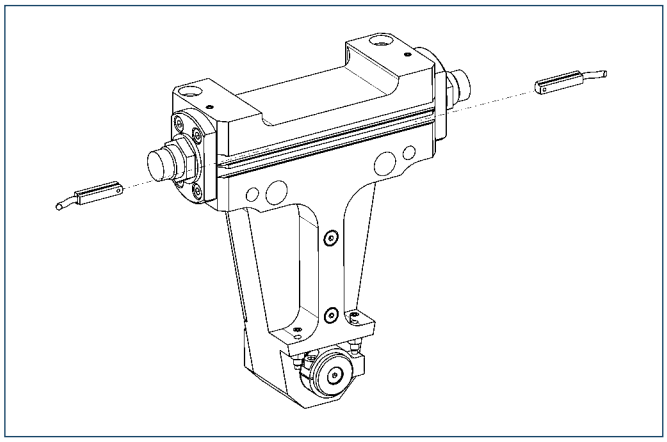


(90) Clockwise
(91) Anti-clockwise

Direction of rotation in clockwise (-R) and anti-clockwise (-L) units.

You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

Sensor system



End position monitoring:
Electronic magnetic switches, for mounting in C-slot

Description	ID	Recommended product
MMS 30-S-M12-PNP	0301571	
MMS 30-S-M8-PNP	0301471	•
MMSK 30-S-PNP	0301563	

ⓘ Two sensors (NO contacts) are required for each rotary finger.

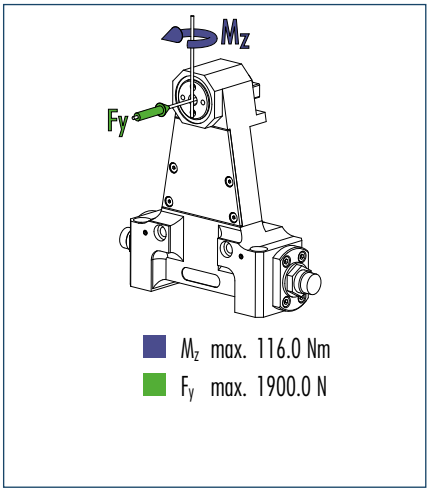
Extension cables for proximity switches/magnetic switches

Description	ID
GK 3-M8	0301622
KV 10-M12	0301596
KV 10-M8	0301496
KV 20-M12	0301597
KV 20-M8	0301497
KV 3-M12	0301595
KV 3-M8	0301495
WK 3-M8	0301594
WK 5-M8	0301502

ⓘ Please note the minimum permitted bending radii for the sensor cables, which are generally 35 mm.

You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

Pinion load

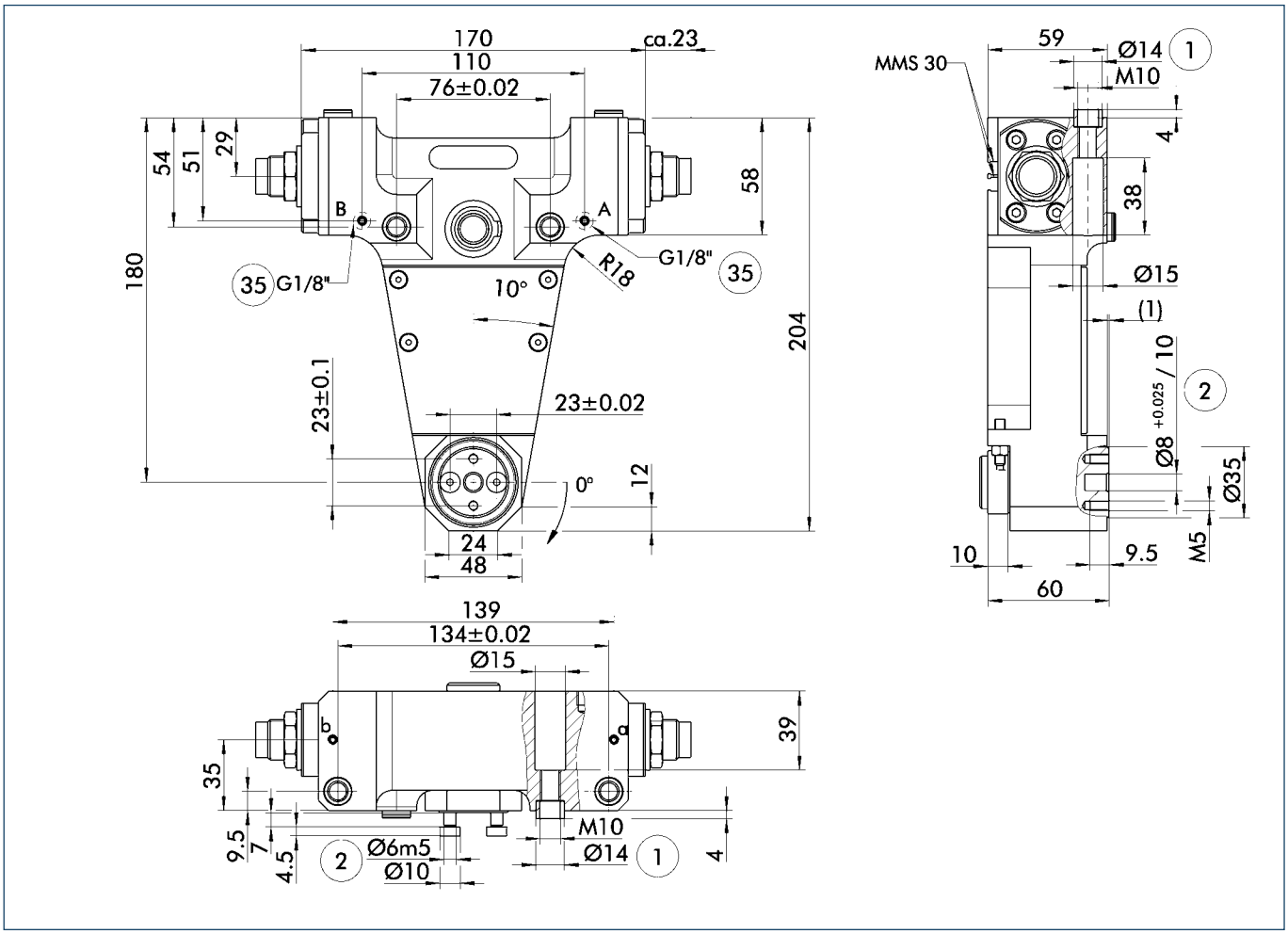


ⓘ The moment and force acting on the pinion may occur simultaneously.

Technical data

Description		GFS 32-180°	GFS 32-90°-L	GFS 32-90°-R	GFS 32-G
	ID	0355520	0355521	0355522	0355523
Torque	[Nm]	5.0	5.0	5.0	0.0
Rotating angle	[°]	180.0	90.0	90.0	
Direction of rotation			left	right	
Adjustability of end positions	[°]	5.0	5.0	5.0	
IP class		54	54	54	54
Weight	[kg]	3.0	3.0	3.0	2.4
Cycle time (1 x nominal angle of rotation) without attached load	[s]	0.4	0.4	0.4	
Fluid consumption per cycle (2 x nominal angle)	[cm^3]	31.5	16.0	16.0	
Nominal pressure	[bar]	6.0	6.0	6.0	
Minimum pressure	[bar]	3.0	3.0	3.0	
Maximum pressure	[bar]	8.0	8.0	8.0	
Diameter of connecting hose	[mm]	6.0	6.0	6.0	
Min. ambient temperature	[°C]	5.0	5.0	5.0	-10.0
Max. ambient temperature	[°C]	60.0	60.0	60.0	90.0
Repeat accuracy	[°]	0.07	0.07	0.07	

Main views

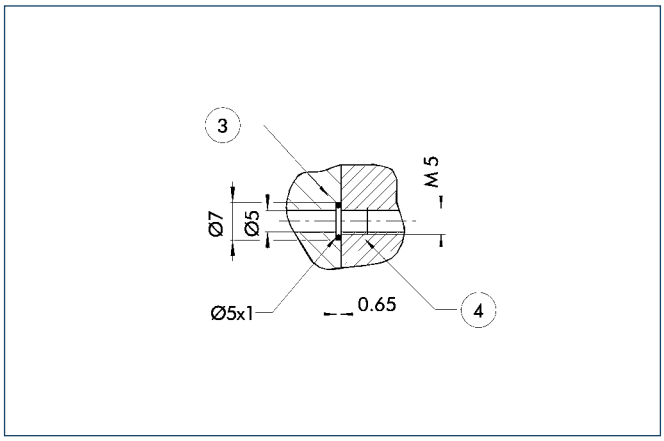


The drawing shows the rotary finger in the basic version. The pinion is in the left-hand end position and turns clockwise from this position.

ⓘ The SDV-P pressure maintenance valve can be used to hold the position upon a loss of pressure (see „Accessories“ catalog section).

A,a Main/direct connection, clockwise rotary unit
B,b Main/direct connection, anti-clockwise rotary unit
① Rotary unit connection
② Attachment connection
㉟ Back page

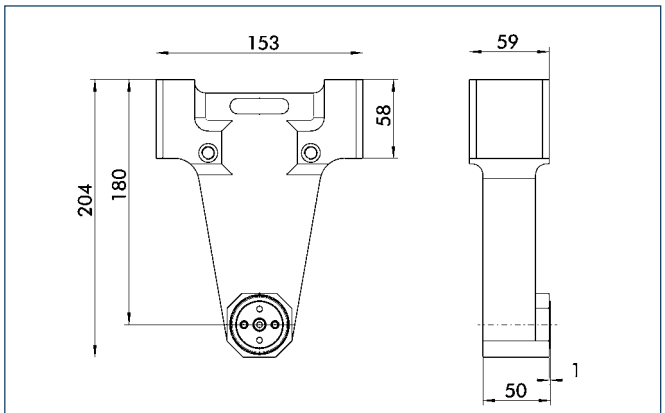
Hose-free direct connection



③ Adapter
④ Rotary unit

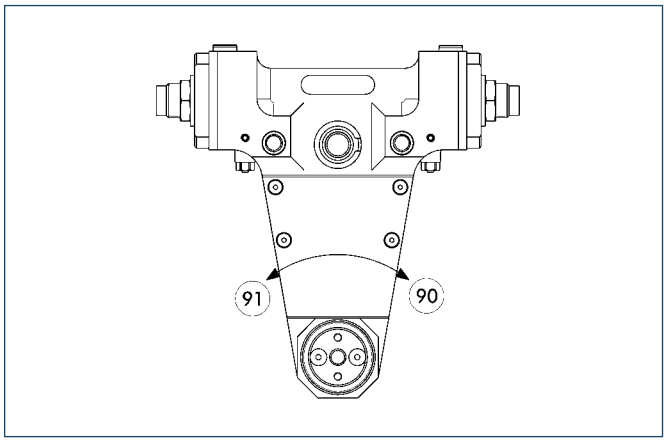
The direction connection is used for supplying compressed air without hoses, which are liable to faults. Instead, the pressure medium is conveyed through the bore-holes of the mounting plate.

Thrust pad



Thrust pads do not have a drive or damping

Direction of rotation

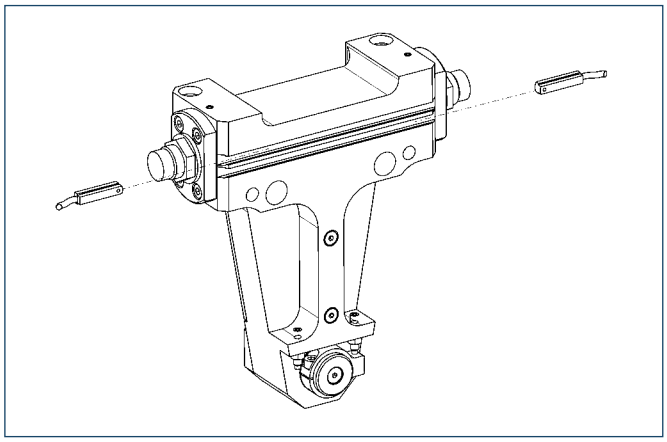


(90) Clockwise
(91) Anti-clockwise

Direction of rotation in clockwise (-R) and anti-clockwise (-L) units.

You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

Sensor system



End position monitoring:
Electronic magnetic switches, for mounting in C-slot

Description	ID	Recommended product
MMS 30-S-M12-PNP	0301571	
MMS 30-S-M8-PNP	0301471	•
MMSK 30-S-PNP	0301563	

ⓘ Two sensors (NO contacts) are required for each rotary finger.

Extension cables for proximity switches/magnetic switches

Description	ID
GK 3-M8	0301622
KV 10-M12	0301596
KV 10-M8	0301496
KV 20-M12	0301597
KV 20-M8	0301497
KV 3-M12	0301595
KV 3-M8	0301495
WK 3-M8	0301594
WK 5-M8	0301502

ⓘ Please note the minimum permitted bending radii for the sensor cables, which are generally 35 mm.

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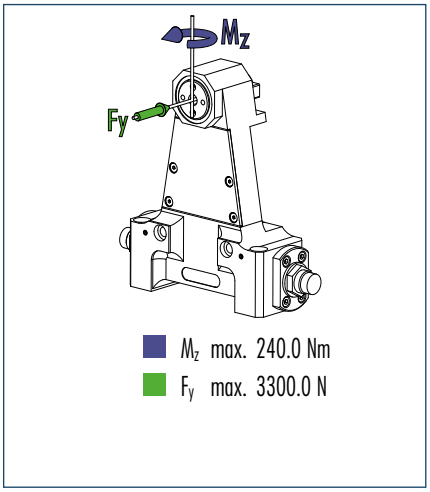
Pinion load

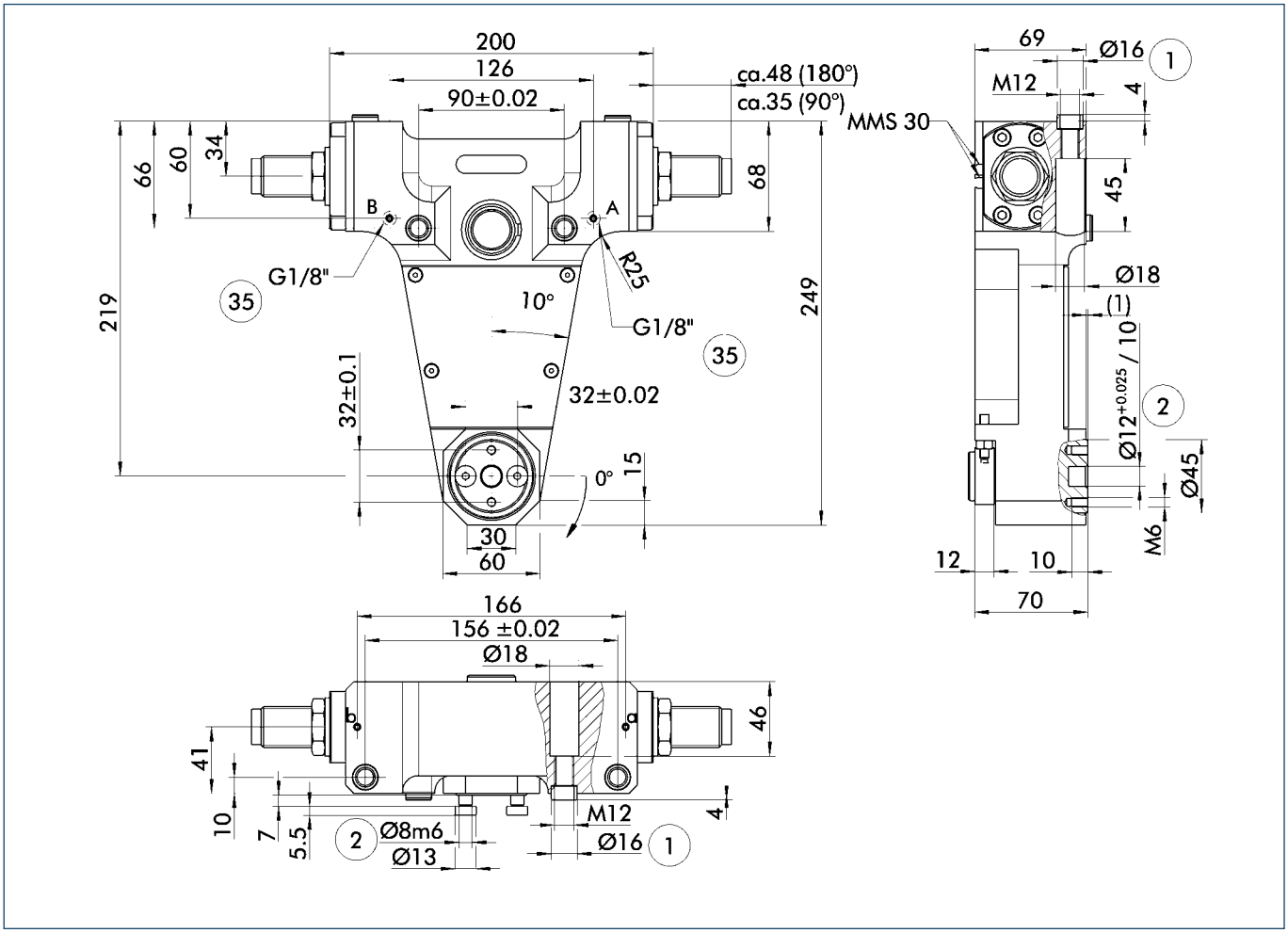


ⓘ The moment and force acting on the pinion may occur simultaneously.

Technical data

Description		GFS 40-180°	GFS 40-90°-L	GFS 40-90°-R	GFS 40-G
	ID	0355527	0355528	0355529	0355533
Torque	[Nm]	10.0	10.0	10.0	0.0
Rotating angle	[°]	180.0	90.0	90.0	
Direction of rotation			left	right	
Adjustability of end positions	[°]	5.0	5.0	5.0	
IP class		54	54	54	54
Weight	[kg]	5.0	5.0	5.0	4.0
Cycle time (1 x nominal angle of rotation) without attached load	[s]	0.4	0.4	0.4	
Fluid consumption per cycle (2 x nominal angle)	[cm^3]	63.0	32.0	32.0	
Nominal pressure	[bar]	6.0	6.0	6.0	
Minimum pressure	[bar]	3.0	3.0	3.0	
Maximum pressure	[bar]	8.0	8.0	8.0	
Diameter of connecting hose	[mm]	6.0	6.0	6.0	
Min. ambient temperature	[°C]	5.0	5.0	5.0	-10.0
Max. ambient temperature	[°C]	60.0	60.0	60.0	90.0
Repeat accuracy	[°]	0.07	0.07	0.07	

Main views



The drawing shows the rotary finger in the basic version. The pinion is in the left-hand end position and turns clockwise from this position.

ⓘ The SDV-P pressure maintenance valve can be used to hold the position upon a loss of pressure (see „Accessories“ catalog section).

A,a Main/direct connection, clockwise rotary unit
B,b Main/direct connection, anti-clockwise rotary unit
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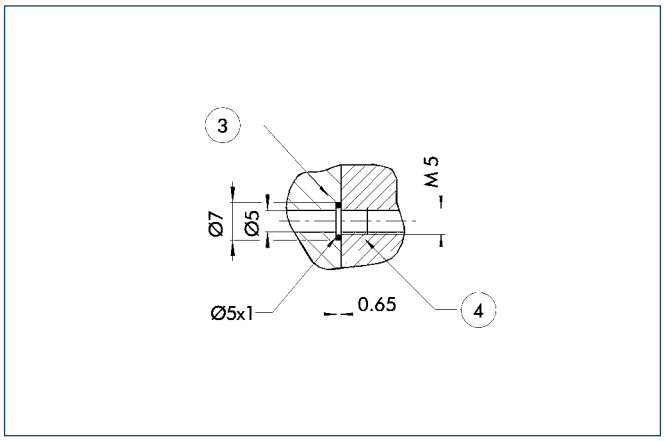
② Attachment connection
㉟ Back page

Hose-free direct connection



③ Adapter
④ Rotary unit

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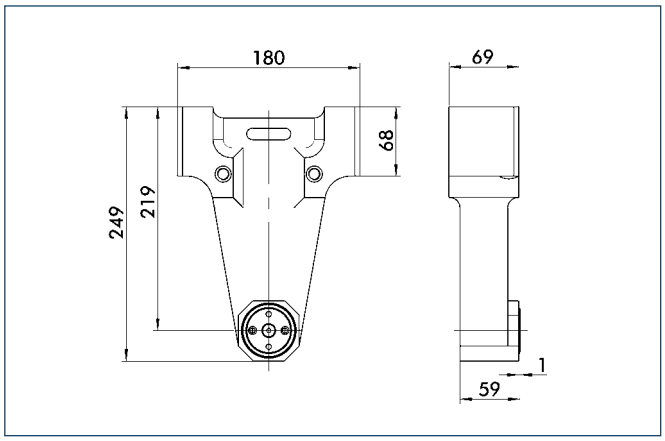
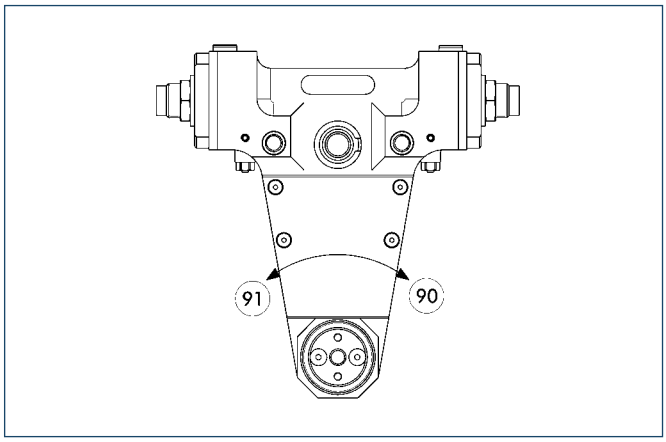
Thrust pad



Thrust pads do not have a drive or damping

Direction of rotation



(90) Clockwise
(91) Anti-clockwise

Direction of rotation in clockwise (-R) and anti-clockwise (-L) units.

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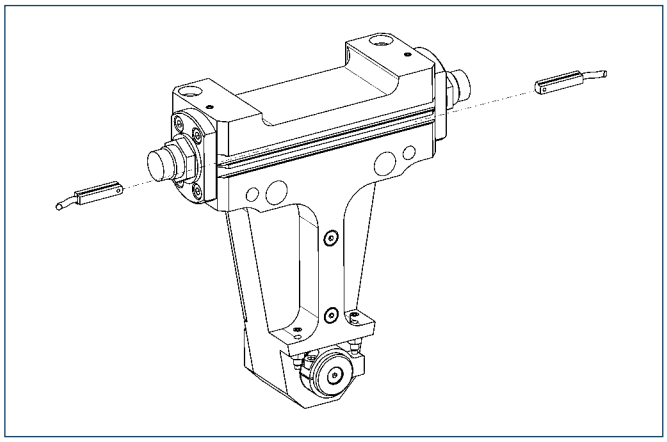
Sensor system



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Electronic magnetic switches, for mounting in C-slot

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ⓘ Two sensors (NO contacts) are required for each rotary finger.

Extension cables for proximity switches/magnetic switches

Description	ID
GK 3-M8	0301622
KV 10-M12	0301596
KV 10-M8	0301496
KV 20-M12	0301597
KV 20-M8	0301497
KV 3-M12	0301595
KV 3-M8	0301495
WK 3-M8	0301594
WK 5-M8	0301502

ⓘ Please note the minimum permitted bending radii for the sensor cables, which are generally 35 mm.

You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

Electro-pneumatic Rotary Modules

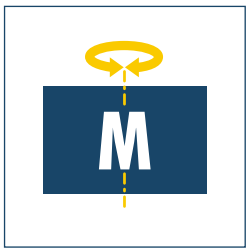
Rotary Actuators

ROTARY ACTUATORS

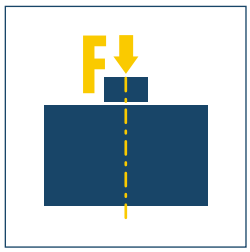
SRU-MD

Sizes
40

Weight
6 kg .. 8.05 kg



Torque
12.2 Nm .. 13 Nm



Axial force
2900 N

Bending moment
68 Nm

Application example

Automatic workloading equipment

1. Electro-pneumatic Rotary Actuator
2. AGE-XY-50 Compensation Unit
3. 3-Finger Concentric Gripper LGZ 32

Masterdrive

Flat-swivel-unit with hybrid, electro-pneumatic transmission-concept for heavy superstructure. Arbitrary intermediate position can be approached.

Area of application

Inset in applications, which require despite heavy swivel-superstructures short cycle times.

Your advantages and benefits

Drive design Masterdrive
for flexible response characteristic

Independent movement improvement
The SRU-Masterdrive evaluates the earlier swivel-motions and adapts the regulation-parameter adequate. After a few swivel-motions optimized sequence of movements will be operated.

High drive and deceleration moments
for heavy superstructures and anyhow short cycle times

Arbitrary position selectable
for flexible process sequences

Simple homing
by the adapted drive-electrionic MD-SE

Interface CAN-Bus
to versatile approach and easy integration in existing control concept

Electric rotary transmission leadthrough
for the steady reliable realization of sensor-, actuator- and bus-signals

Fluid feed-through can be used for gases, fluids and vacuum
dispensing with troublesome hoses

Information about the series

Working principle
Hybrider drive consisting of a pneumatic double piston and an electrical motor with spindle which produce a rotation over the rack-pinion-principle

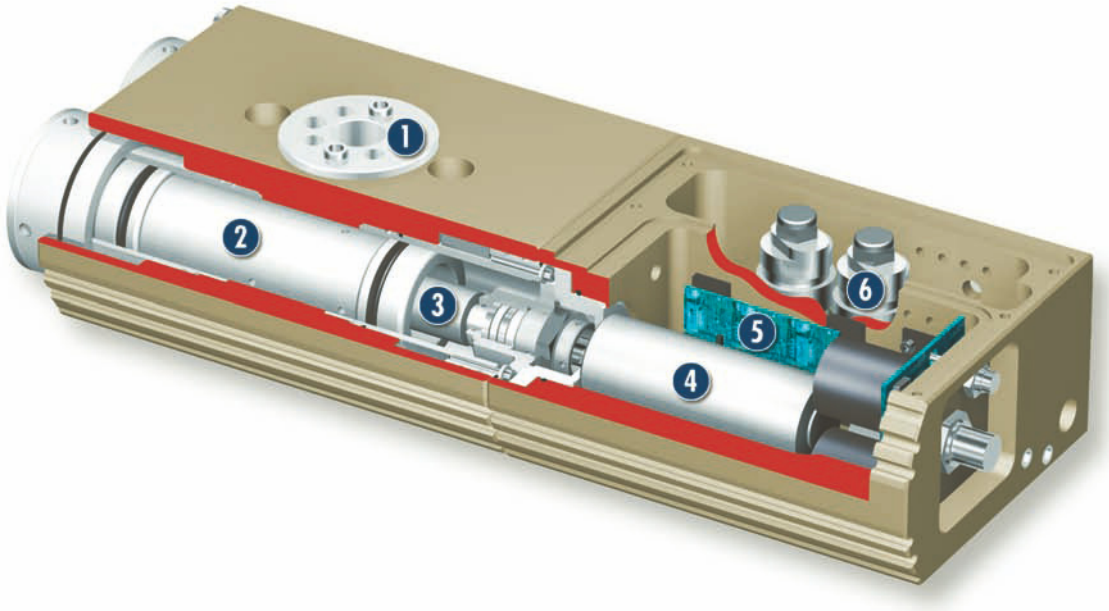
Housing material
Aluminum press-drawn section

Actuation
Pneumatic, with filtered compressed air (10 µm): Dry, lubricated or non-lubricated
Pressure medium: Required quality class of compressed air according to DIN ISO 8573-1: Quality class 4

Warranty
24 months

Scope of delivery
center sleeves, assembly instructions and instruction book with producer explanation

Sectional diagram



1 **Pinion**
stable pinion, optionally with medium-feed-through

2 **Piston with spindle nut**

3 **Spindle**

4 **Electric motor**

5 **Electronics**

6 **Microvalve**

Function description

Pneumatic and electrical drive complete each other. The pneumatic makes the high power density available, the electricity the short response times, the free positioning bar and smooth controllability. The electricity integrated into the SRU-masterdrive appoints the both drives in that way that they can insert their power in the suitable moment.
The extremely short cycle times are reached by two effects. The servo-motor of the SRU-masterdrive tightens immediately after the starting signal of the SPS, without time delay as with purely pneumatic units. Pneumatic and electrical drive combined have a higher torque that they could accelerate more strongly.

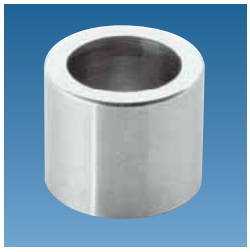
Options and special information

The SRU-Masterdrive reports upcoming maintenance work autonomous and in due time to the superior control.

Accessories

Accessories from SCHUNK – the suitable complement for the highest level of functionality, reliability and controlled production of all automation components.

Centering sleeves



ⓘ For the exact size of the required accessories, availability of this size and the designation and ID, please refer to the additional views at the end of the size in question. You will find more detailed information on our accessory range in the „Accessories“ catalog section.

General information on the series

Repeat accuracy

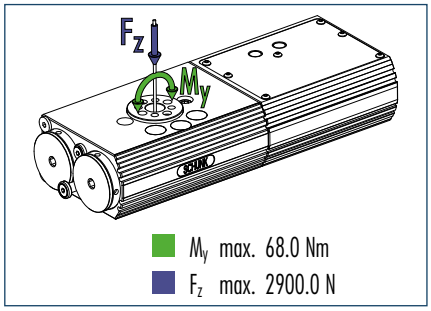
Repeat accuracy is defined as the spread of the limit position after 100 consecutive swiveling cycles.

Pinion position

The position of the pinion is always shown in the drawing in the left-hand end position. From here, the pinion rotates clockwise. The direction of rotation is indicated by the arrow.

SRU 40-MD

Pinion load

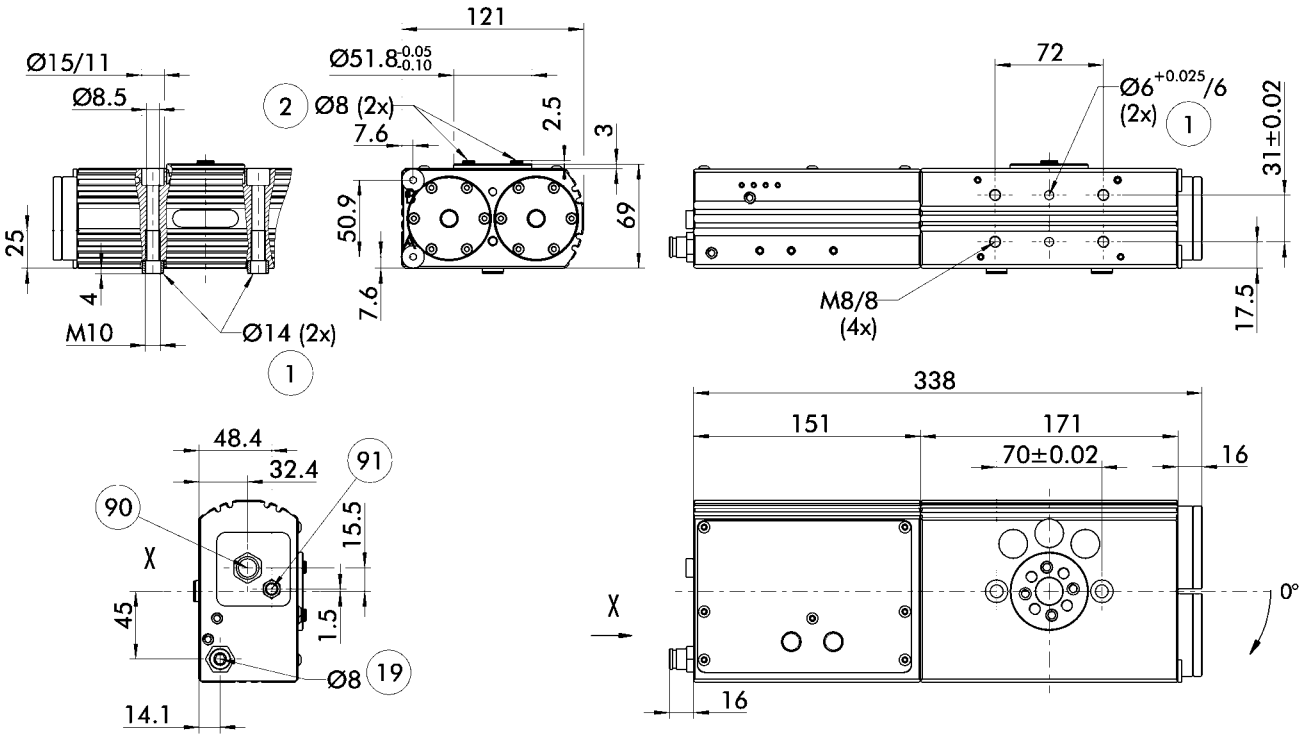


ⓘ Moments and forces may occur simultaneously. When using heavy attachments or ones with high mass moments of inertia, the speed must be restricted to ensure that the rotary movement occurs without any hitting or bouncing.

Technical data

Description		SRU 40.1-180-MD	SRU 40.1-180-8-MD	SRU 40.1-180-8-EDF M5-MD	SRU 40.1-180-8-EDF M8-MD	SRU 40.1-180-8-EDF M12-MD
	ID	0357980	0357982	0357983	0357984	0357985
Drive design		pneumatic / servo-electric	pneumatic / servo-electric	pneumatic / servo-electric	pneumatic / servo-electric	pneumatic / servo-electric
Torque	[Nm]	13	12.2	12.2	12.2	12.2
Rotating angle	[°]	180	180	180	180	180
Positioning accuracy	[°]	0.03	0.03	0.03	0.03	0.03
No. of fluid feed-throughs		8	8	8	8	
IP class		63	63	63	63	63
Weight	[kg]	6	6.7	8.05	8.05	8.05
Swiveling time with middle attached load	[s]	0.8	0.8	0.8	0.8	0.8
Nominal pressure	[bar]	6	6.7	8	8	8
Minimum pressure	[bar]	5.5	5.5	5.5	5.5	5.5
Maximum pressure	[bar]	6.5	6.5	6.5	6.5	6.5
Max. pressure in fluid feed-through	[bar]	8	8	8	8	
Diameter of connecting hose	[mm]	8	8	8	8	8
Min. ambient temperature	[° C]	5	5	5	5	5
Max. ambient temperature	[° C]	55	55	55	55	55
Max. permitted operating temperature	[° C]	85	85	85	85	85
Motortype		brush engine	brush engine	brush engine	brush engine	brush engine
Kind of tension		DC	DC	DC	DC	DC
Nominal voltage	[V]	24	24	24	24	24
Minimum voltage	[V]	23.5	23.5	23.5	23.5	23.5
Maximum voltage	[V]	24.5	24.5	24.5	24.5	24.5
Current input	[A]	4	4	4	4	4
Maximum electrical power input	[W]	100	100	100	100	100
Communications interface		CAN	CAN	CAN	CAN	CAN
Guaranteed reload number	[Mio.]	6	6	6	6	6
Number of EDF-fittings on the output end				8	8	8
Size of the EDF-connections on the output end				M5	M8	M12
Number of cores				10	10	10
Maximum voltage by EDF	[V]			24	24	24
Max. current per wire (EDF)	[A]			1	1	1
Max. current EDF complete	[A]			1	1	1

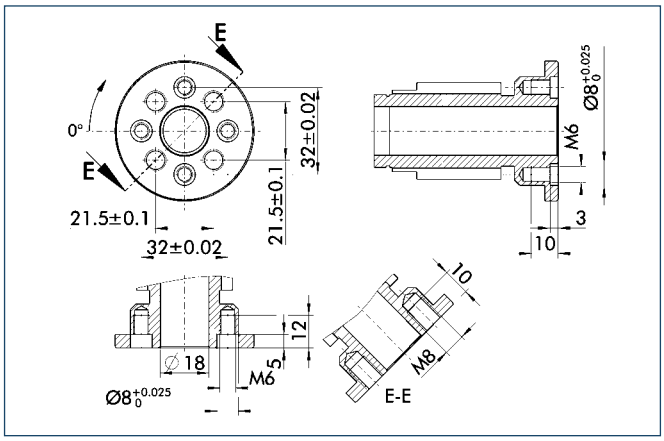
Main views for SRU without EDF



The subscription shows the SRU-MD in the most basic version, thus without feed-through. Modifications can be extracted of the adequate image beside.

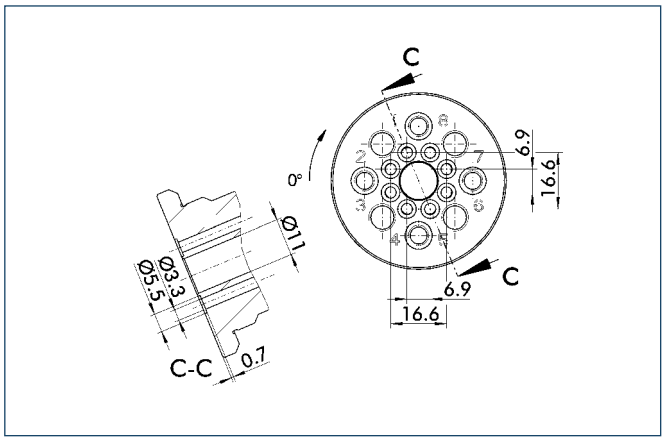
(1) Connection of rotary actuator
(2) Attachment connection
(19) Air connection
(90) Interface control unit (CAN/MD-SE)
(91) RS 232 interface (only for SCHUNK-service)

Pinion without feed-through



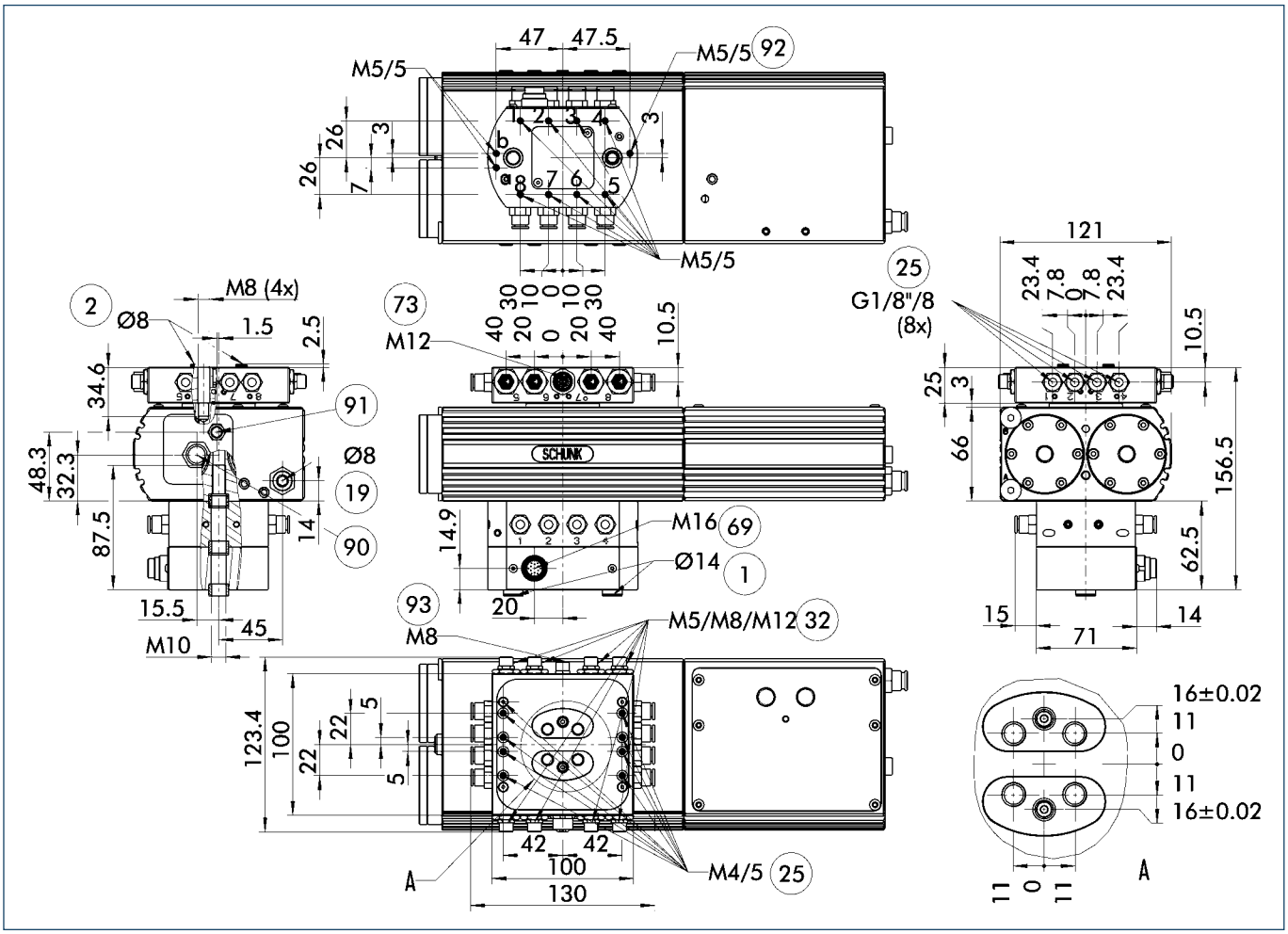
Pinion screw connection diagram for mounting the swiveling attachment. The „4x large thread for 4x screw and 2x flat fit for guide sleeve“ screw connection diagram is preferable to the „4x small thread for 2x screw and 2x dowel screw“ (in deep fit) screw connection diagram.

Pinion with feed-through



Pinion screw connection diagram for the „Fluid feed-through“ option. The preferred drilling pattern is 2x screws and 2x screws with guide sleeve (in ø 8 H7).

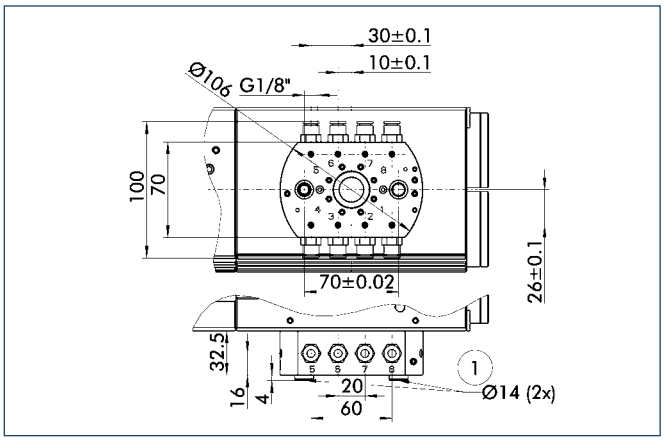
Main views for SRU with EDF



The subscription shows the SRU-MD in the version containing the medium-feed-through and the electric feed-through EDF.

① Connection of rotary actuator
② Attachment connection
⑲ Air connection
㉕ Fluid feed-through
㉜ Flange socket for NHS-connection
㊾ Connection for electric feed-through
㉝ Connection BUS-throughs
㊿ Interface control unit (CAN/MD-SE)
㉛ RS 232 interface (only for SCHUNK-service)
㉓ Change Bus-/Sensor feed-through

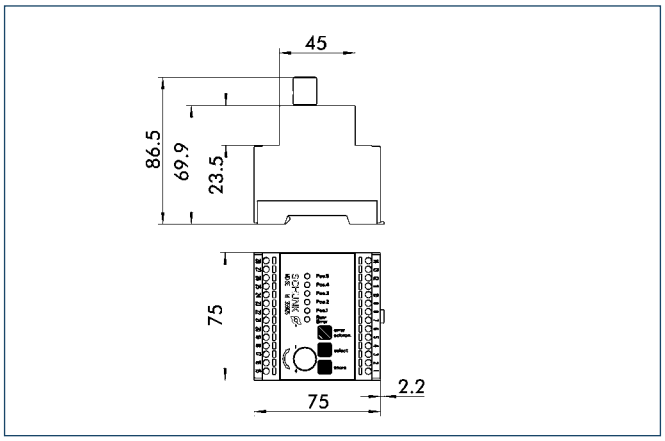
Connections for medium-throughs



① Connection of rotary actuator

Lower mounting plate for the „Fluid feed-through" option. Vacuum, gases or fluids can be conveyed. The connection may be a screw type or a direct connection.

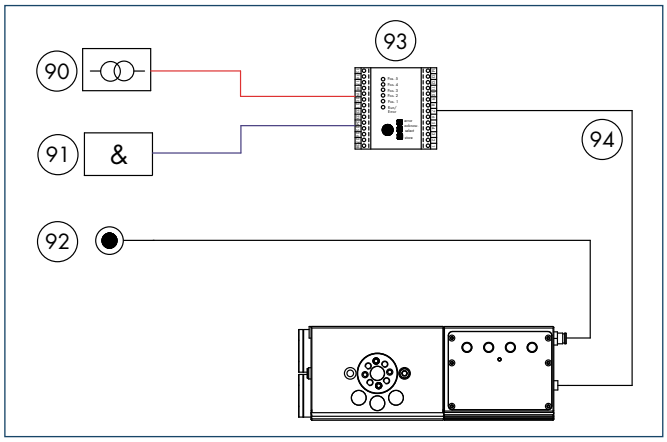
Control module



SCHUNK recommends the application of the control unit MD-SE for an easy approach of the SRU-masterdrive by digital input/output. Users with CAN-Bus experience can run the SRU-MD without control unit MD-SE too.

Description	ID
MD-SE	0359125

Connection scheme SRU-MD by MD-SE



(90) 24VDC voltage supply provided by customer
(91) Control system provided by the customer
(92) Supply of compressed air
(93) External Navigation-electronics MD-SE (ID 0359125)
(94) Interconnecting cable control unit / turning swivel unit (5 m cable are included in delivery – mounted to the turning swivel unit)

Electric Rotary Modules

Rotary Actuators

ROTARY ACTUATORS

MRD-S

Sizes
4 .. 12

Weight
1.2 kg .. 1.8 kg

Max. torque
0.4 Nm .. 1.2 Nm

Max. speed
Max. speed 600 rpm

Max. useful load
1 kg .. 3 kg

Application example

Rotary Gripping Combination with Z-stroke for the rapid handling of workpieces

1. Miniature Rotary Actuators
2. 2-Finger Parallel Gripper MPG 20 with attachment-fingers
3. Short-stroke Module with linear direct drive

Miniature Rotary Actuator

Powerful torque motor with electric and pneumatic rotary feed-through

Area of application

For all applications with exceptional requirements in terms of achievable repeatability, rotary speed, acceleration and tool life.

Your advantages and benefits

Brushless synchronous motor with permanent magnet
for maximum positioning accuracy

Integrated pneumatic and electric rotary feed-through
for modest space requirements and minimized interfering contours

Large number of pole pairs
for a powerful torque even at low speeds

Special motor geometry
for superior dynamics and acceleration

Virtually no wearing parts
for a highly reliable system with long service life

EcoDrive CS drive system
with various standard communication interfaces for easy integration and start-up (Simodrive system available on request)

SYSTEM GAS

Information about the series

Drive
3-phase, electronically commutated AC synchronous motor. The primary part (stator) is a 3-phase Cu coil, the secondary part (rotor) is an iron support with integrated permanent magnet

Measuring system
Non-contact, optical incremental measuring system with extremely high resolution and integrated reference track with reference mark

Media feed-through
4 electric (max. 60 V / 1 A)
2 pneumatic (max. 8 bar)

Bearing arrangement
Preloaded precision ball bearings, free from play, with life-time lubrication

Material
Anodized motor housing, hard-coated rotary table

Operating temperature
From 10 °C to 40 °C

Accessories
EcoDrive CS controllers from Rexroth (other manufacturers on request) Ready-made cable sets in various lengths

Scope of delivery
Centering sleeves, assembly and operating manual with manufacturer's declaration

Warranty
24 months

Function

1 **Housing**
anodized, double-sided mating flange surface with centering rings

2 **Rotary table**
with centering collar

3 **Input rotary transmission leadthrough**
(4x) electrical and (2x) pneumatic

4 **Motorplug**

5 **Connection incremental optical rotary encoder**

6 **Output rotary transmission leadthrough**
(4x) electrically pluggable and (2x) pneumatic

Function description

The unit is driven by a 3-phase brushless synchronous motor with permanent magnet. Mechanical transmission elements such as gears can be completely eliminated. The high positioning accuracy is achieved by means of an incremental, optical shaft encoder with reference mark.

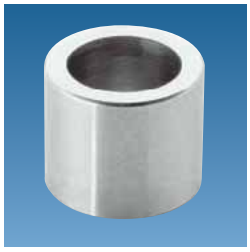
Options and special information

An electric and pneumatic rotary feed-through is integrated as special equipment.

Accessories

Accessories from SCHUNK – the suitable complement for the highest level of functionality, reliability and controlled production of all automation components.

Centering sleeves

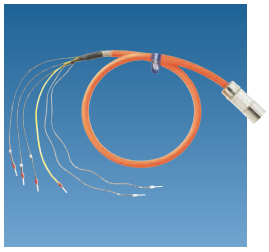


Drive controller

Cable for electric rotary feed-through

Cable for shaft encoder

Motor power cable



Interfaces

Parallel-Interface	Sercos Interface
CANopen	Profibus

Start-up software

ⓘ For the exact size of the required accessories, availability of this size and the designation and ID, please refer to the additional views at the end of the size in question. You will find more detailed information on our accessory range in the „Accessories“ catalog section.

General information on the series

Repeat accuracy

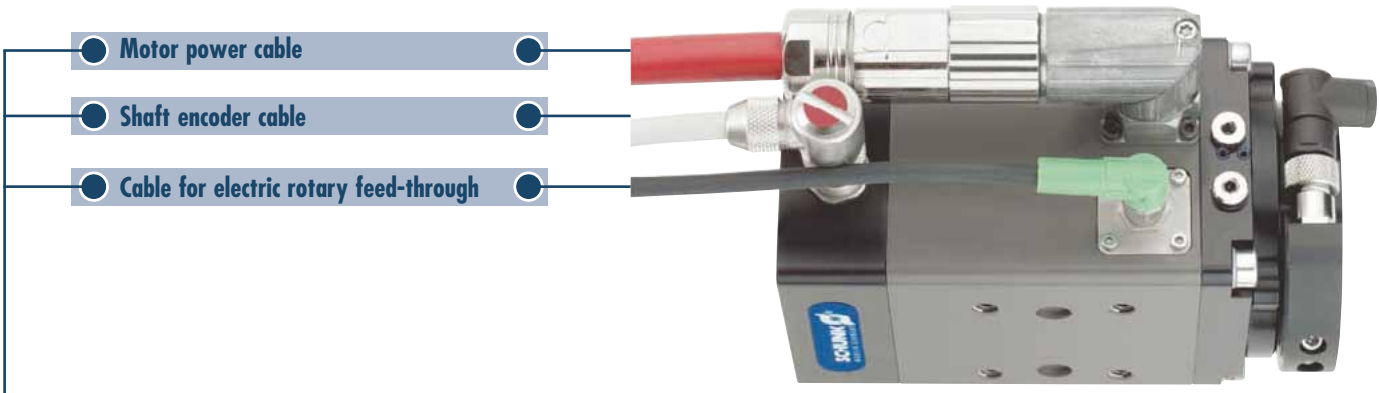
Repeat accuracy is defined as the spread of the target position after 100 consecutive positioning cycles. The target position remains unchanged during these cycles, and is always approached from the same direction.

Drive system

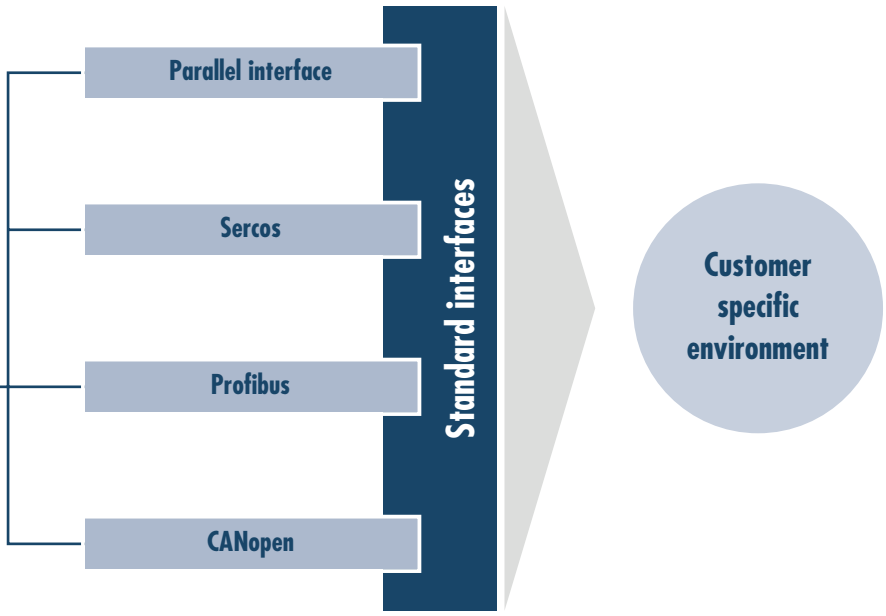
For control of the Miniature Rotary Actuator MRD the proven Rexroth components are used.

Your advantage at a glance:

- Control and adjustment electronics as well as supply unit in one housing
- Four standard communication interfaces as on option
- Comfortable parameterization with a Rexroth-Drive-Top-Software
- World-wide support of Rexroth

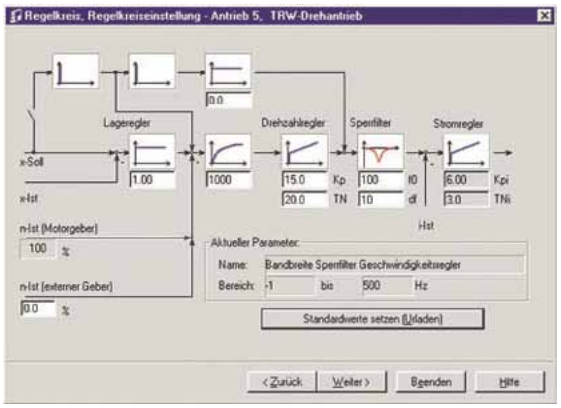


Standard Interfaces EcoDrive CS

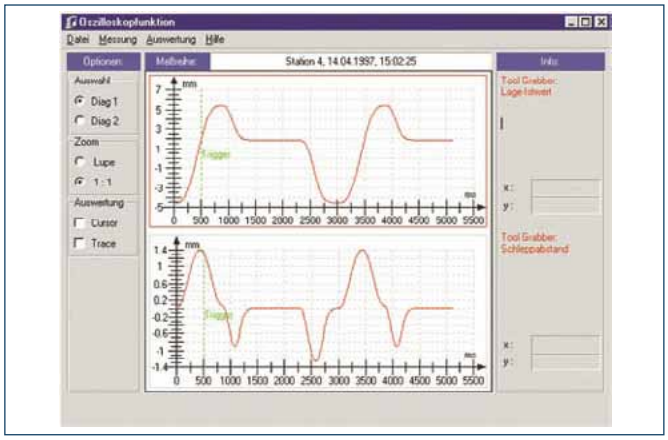


Start-up software DriveTop

The parameterized software DriveTop allows a fast and easy start-up of the actuation system EcoDrive CS from Rexroth.
Operating instructions and a basic parameter file for Miniature Swivel Units with torque motor is be supplied on a data carrier.

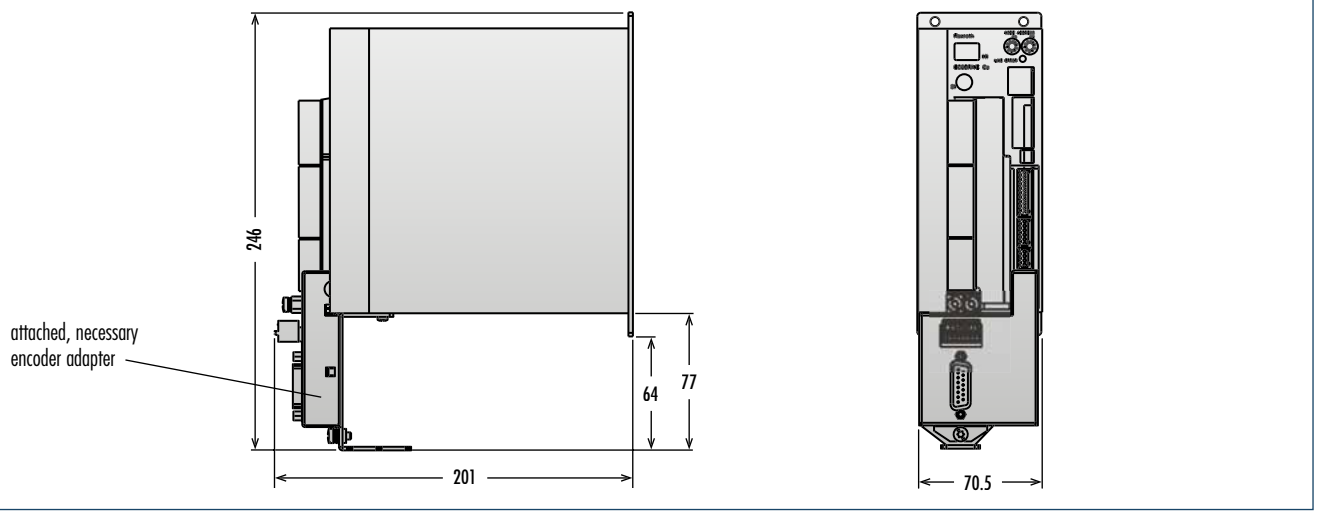


Easy optimization of the control loop adjustment since all the relevant data are visible on a window. Moreover, all parameters can be stored easily for back up in a file. The upload and download of data sets is possible via the RS-232 interface or Feldbus.



Integrated multi-channel oscilloscope for fine adjustment and signal tracing.

Actuation control unit

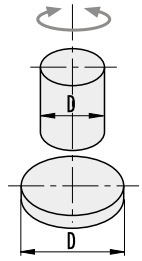


The actuation control units are offered together with the necessary cables and matching programming module as well as the suitable firmware.

Calculation of the mass moment of inertia

The geometry of customized attachments influence dynamics and seating of the MRD-module. Below and on the following page please find the most important standard formulas for calculation of the additional mass moment of inertia. If we should carry out this calculation check for you, please contact us.

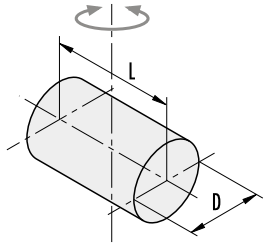
①



$$I = \frac{D^2}{8} \times m$$

Solid cylinder or flat disk, turning around the own axis

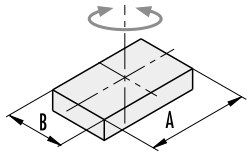
②



$$I = \left(\frac{L^2}{12} + \frac{D^2}{16}\right) \times m$$

Solid cylinder, turning around a cylinder axis vertical and centric to the axis

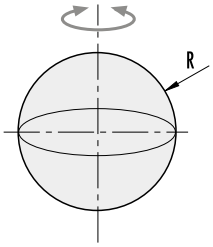
③



$$I = \frac{A^2 + B^2}{12} \times m$$

Rectangular plate of any thickness, turning around a centered axis

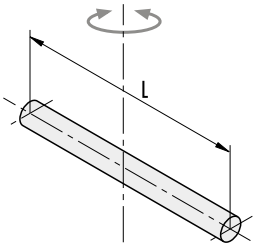
④



$$I = \frac{2 \times R^2}{5} \times m$$

Ball, turning around the own axis

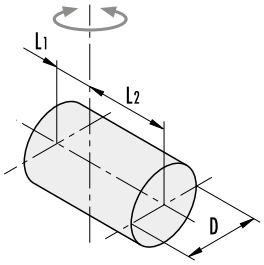
⑤



$$I = \frac{L^2}{12} \times m$$

Long and thin stick of any cross section, turning around a centered axis

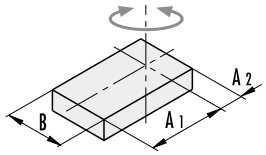
⑥



$$I = \left(\frac{L_1^2}{3} + \frac{D^2}{16}\right) \times m_1 + \left(\frac{L_2^2}{3} + \frac{D^2}{16}\right) \times m_2$$

Solid cylinder, turning around a cylinder axis vertical to an excentric axis

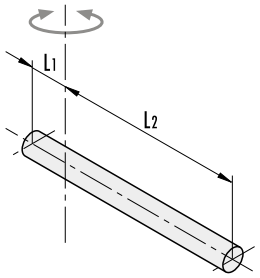
⑦



$$I = \left(\frac{4A_1^2 + B^2}{12}\right) \times m_1 + \left(\frac{4A_2^2 + B^2}{12}\right) \times m_2$$

Rectangular plate of any thickness, turning around an excentric axis

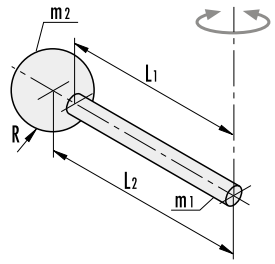
⑧



$$I = \frac{L_1^2}{3} \times m_1 + \frac{L_2^2}{3} \times m_2$$

Long and thin stick of any cross section, turning around an excentric axis

⑨



$$I = \frac{L_1^2}{3} \times m_1 + L_2^2 \times m_2 + K$$

Long and thin stick with an additional mass, turning around an excentric axis

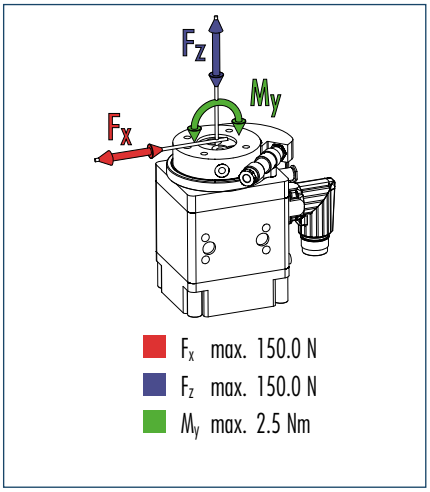
(As value K, the corresponding mass moment of inertia of the additional mass has to be used, as per example 1 to 5. The picture shows example 4)

Caption

I = Mass moment of inertia	[kgm²]
m = Mass of payload	[kg]
A, B, D, L, R = Dimensions	[m]

MRD-S 4

Shaft load



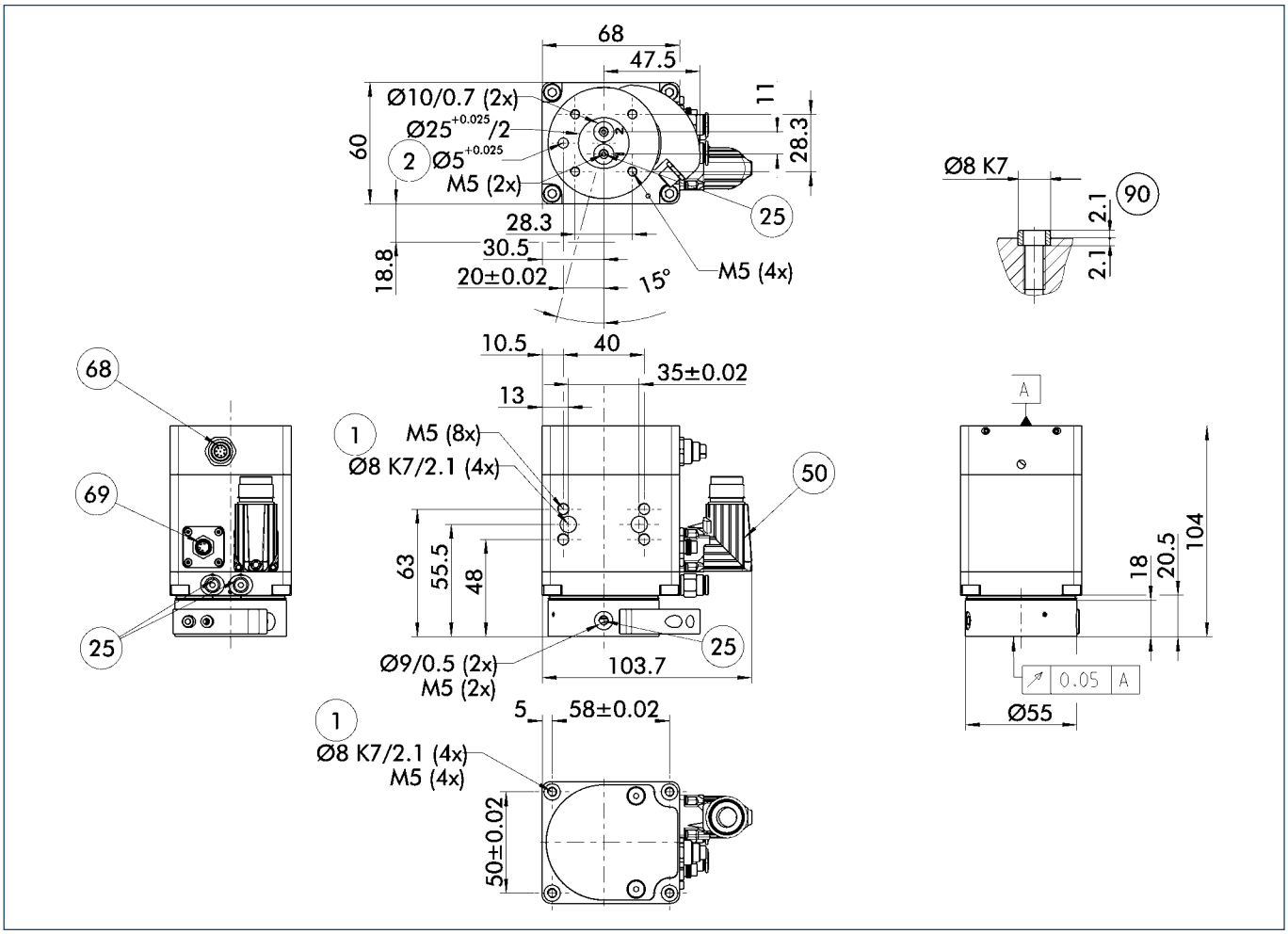
Technical data

Description		MRD-S 4 IP 40 ED with rotary transmission leadthrough	MRD-S 4 IP 40 without rotary transmission leadthrough
	ID	0331340	0331341
Mechanical operating data			
Max. torque	[Nm]	1.2	1.2
Nominal torque (with rotary feed-through)	[Nm]	0.4	0.4
Max. speed	[°/s]	600.0	600.0
Max. acceleration	[°/s²]	24000.0	24000.0
Max. additional moment of inertia	[kg mm²]	500.0	500.0
Rotor moment of inertia	[kg mm²]	84.0	84.0
Weight	[kg]	1.2	1.2
Repeat accuracy	[°]	0.001	0.001
Measuring system resolution	[arcsec]	0.038	0.038
Max. surface temperature	[°C]	70.0	70.0
Max. ambient temperature	[°C]	40.0	40.0
Electrical operating data			
Permissible power loss	[W]	54.2	54.2
Max. current	[A]	2.0	2.0
Nominal power current	[A]	0.71	0.71
Nominal voltage	[VDC]	230.0	230.0
Phase-phase resistance at 25 °C	[Ω]	70.8	70.8
Phase-phase inductance	[mH]	62.5	62.5
Tightness according to		IP 40	IP 40

Feed-through		4 electric / 2 pneumatic
Max. current	[A]	1
Maximum voltage	[V]	60
Max. operating pressure	[bar]	8

ⓘ The repeat accuracy stated here applies at constant ambient temperatures!

Main views



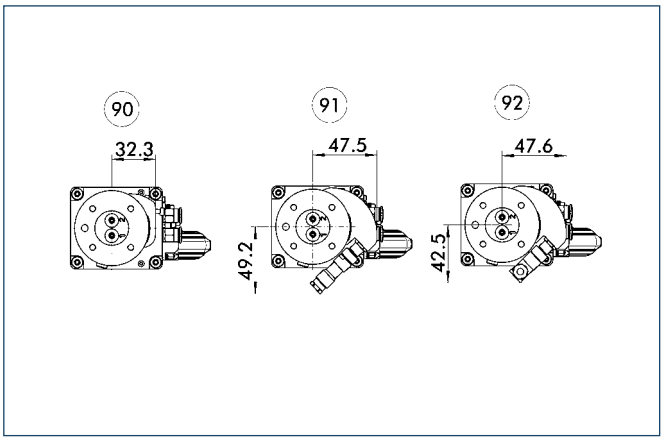
1 Connection of rotary actuator
2 Attachment connection
25 Fluid feed-through
50 Electronics connection
68 Shaft encoder connection
69 Connection for electric feed-through
90 Center sleeves bore in adapter plate

Cable sets

ⓘ The scope of delivery of the cable set includes: 1 power cable, 1 shaft encoder cable, 1 cable for connecting the electric rotary feed-through

	ID	Cable length
KSRD 5	0331330	5.0 m
KSRD 10	0331331	10.0 m
KSRD 15	0331332	15.0 m
KSRD 20	0331333	20.0 m

Plug connector



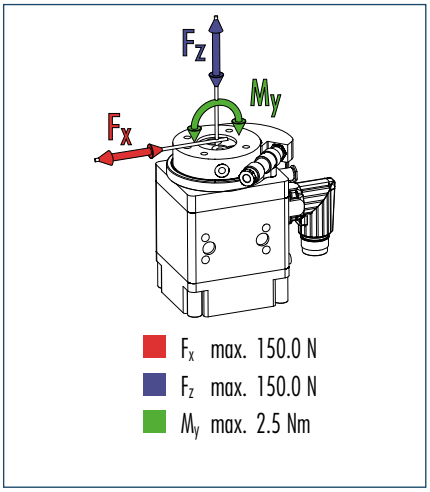
90 Version without electric through
91 Version with electric through (straight line plug)
92 Version with electric through (angle plug)

manufacturable connectors for electrical rotary feed-through

	ID
straight	9940786
angulate	9941590

MRD-S 8

Shaft load



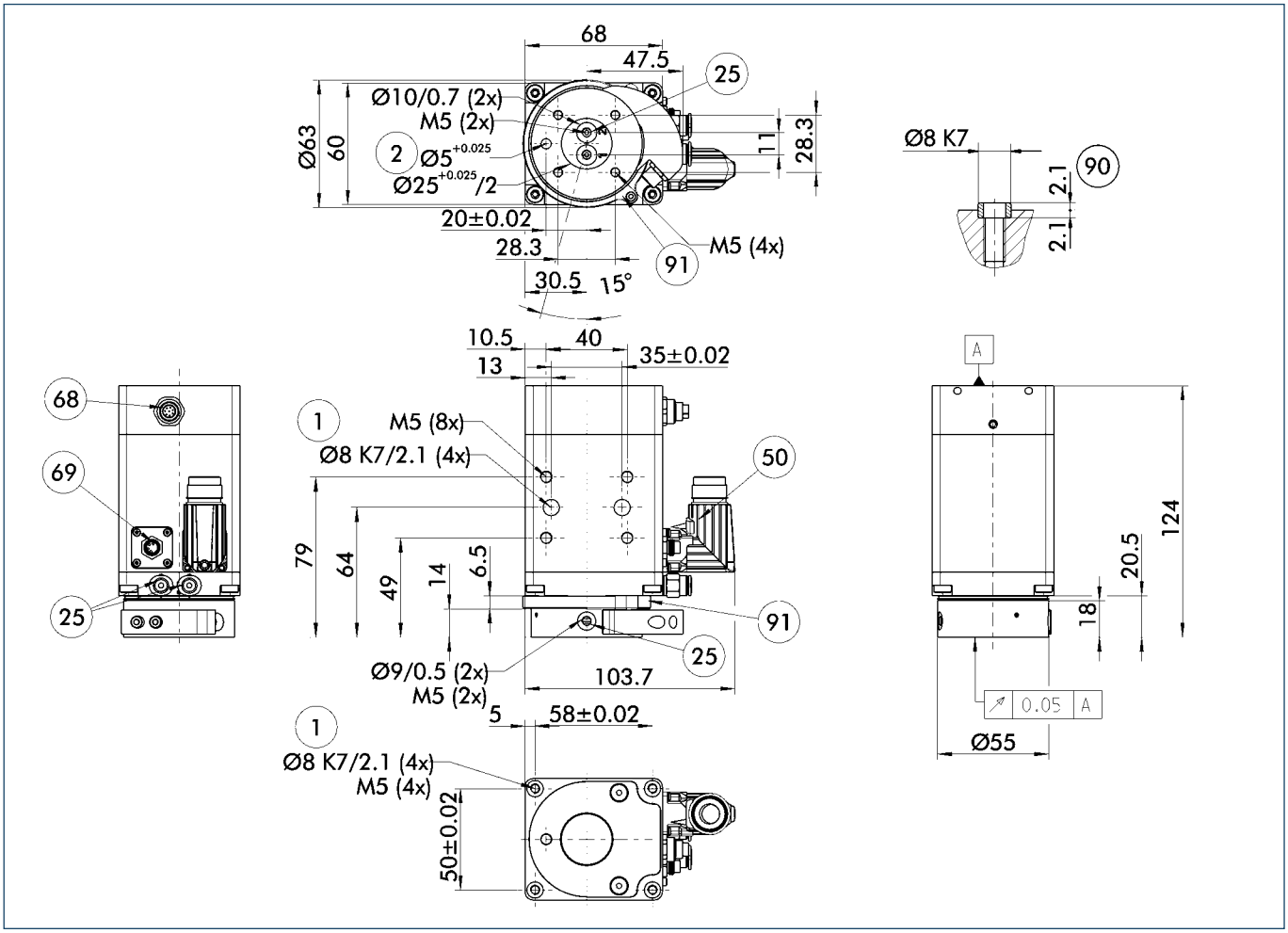
Technical data

Description		MRD-S 8 IP 40 ED	MRD-S 8 IP 40	MRD-S 8 IP 54 ED	MRD-S 8 IP 54
		with rotary transmission leadthrough	without rotary transmission leadthrough	with rotary transmission leadthrough	on request
	ID	0331350	0331351	0331352	0331353
Mechanical operating data					
Max. torque	[Nm]	2.4	2.4	2.1	2.1
Nominal torque (with rotary feed-through)	[Nm]	0.8	0.8	0.5	0.5
Max. speed	[°/s]	600.0	600.0	600.0	600.0
Max. acceleration	[°/s²]	36923.0	36923.0	36923.0	36923.0
Max. additional moment of inertia	[kg mm²]	700.0	700.0	700.0	700.0
Rotor moment of inertia	[kg mm²]	98.0	98.0	98.0	98.0
Weight	[kg]	1.5	1.5	1.5	1.5
Repeat accuracy	[°]	0.001	0.001	0.001	0.001
Measuring system resolution	[arcsec]	0.038	0.038	0.038	0.038
Max. surface temperature	[°C]	70.0	70.0	70.0	70.0
Max. ambient temperature	[°C]	40.0	40.0	40.0	40.0
Electrical operating data					
Permissible power loss	[W]	59.1	59.1	59.1	59.1
Max. current	[A]	3.8	3.8	3.8	3.8
Nominal power current	[A]	1.3	1.3	1.3	1.3
Nominal voltage	[VDC]	230.0	230.0	230.0	230.0
Phase-phase resistance at 25 °C	[Ω]	22.6	22.6	22.6	22.6
Phase-phase inductance	[mH]	27.4	27.4	27.4	27.4
Tightness according to		IP 40	IP 40	IP 54	IP 54

Feed-through		4 electric / 2 pneumatic
Max. current	[A]	1
Maximum voltage	[V]	60
Max. operating pressure	[bar]	8

ⓘ The repeat accuracy stated here applies at constant ambient temperatures!

Main views



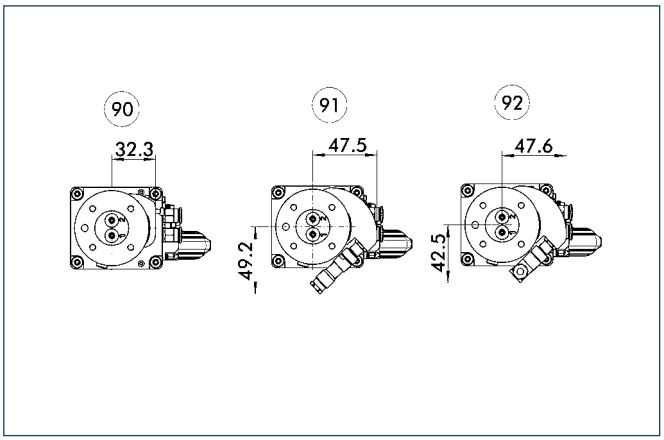
① Connection of rotary actuator
② Attachment connection
㉕ Fluid feed-through
㊿ Electronics connection
㊽ Shaft encoder connection
㊾ Connection for electric feed-through
㊿ Center sleeves bore in adapter plate
㊶ Only by sealed version

Cable sets

ⓘ The scope of delivery of the cable set includes: 1 power cable, 1 shaft encoder cable, 1 cable for connecting the electric rotary feed-through

	ID	Cable length
KSRD 5	0331330	5.0 m
KSRD 10	0331331	10.0 m
KSRD 15	0331332	15.0 m
KSRD 20	0331333	20.0 m

Plug connector



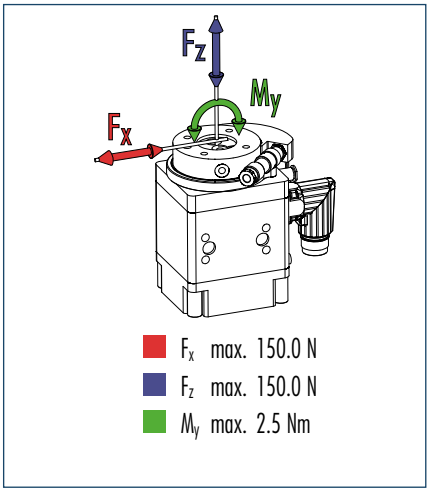
㊿ Version without electric through
㊶ Version with electric through (straight line plug)
㊷ Version with electric through (angle plug)

manufacturable connectors for electrical rotary feed-through

	ID
straight	9940786
angulate	9941590

MRD-S 12

Shaft load



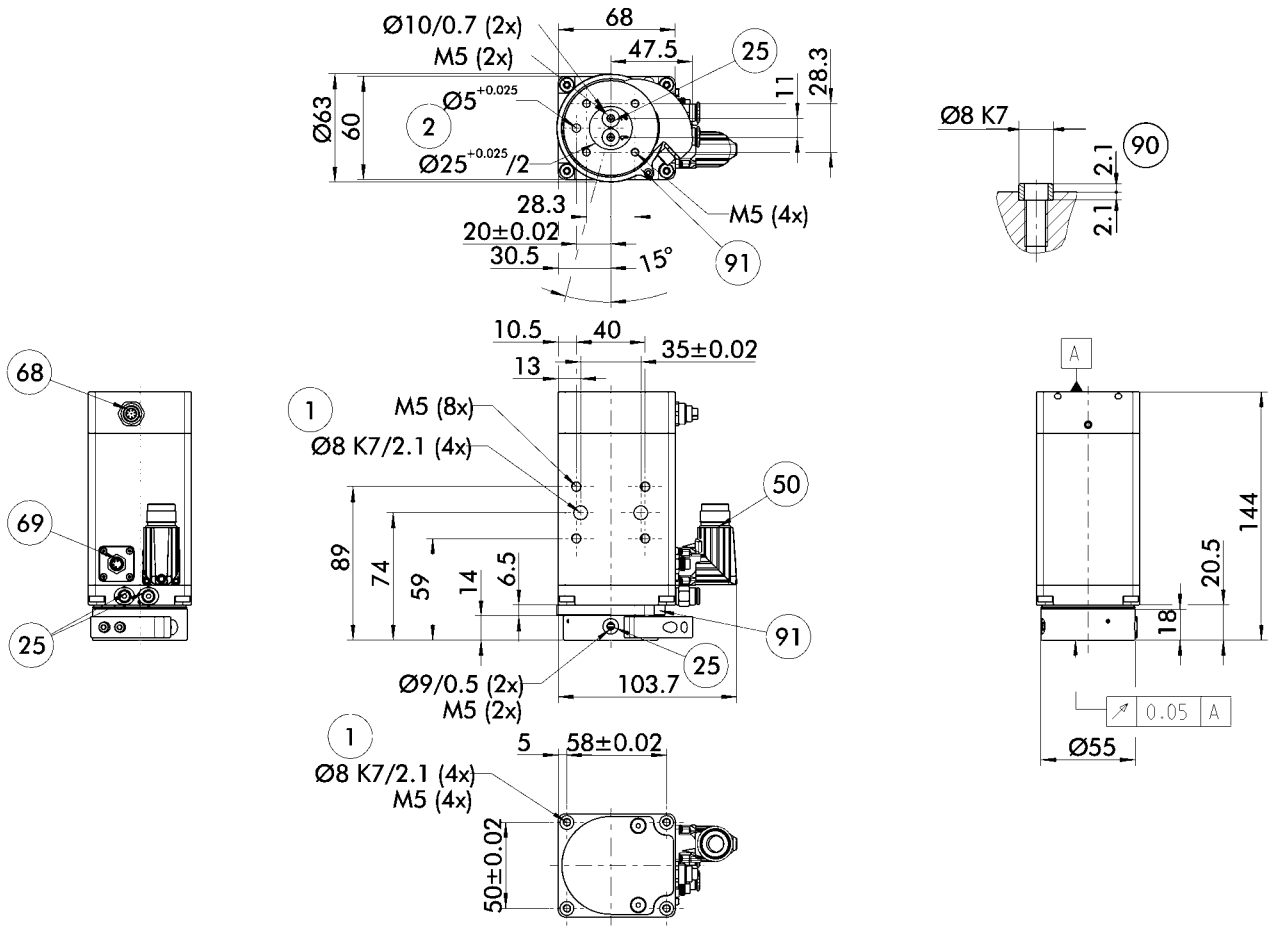
Technical data

Description		MRD-S 12 IP 40 ED	MRD-S 12 IP 40	MRD-S 12 IP 54 ED	MRD-S 12 IP 54
		with rotary transmission leadthrough	without rotary transmission leadthrough	with rotary transmission leadthrough	on request
	ID	0331360	0331361	0331362	0331363
Mechanical operating data					
Max. torque	[Nm]	3.6	3.6	3.3	3.3
Nominal torque (with rotary feed-through)	[Nm]	1.2	1.2	0.9	0.9
Max. speed	[°/s]	600.0	600.0	600.0	600.0
Max. acceleration	[°/s²]	45000.0	45000.0	45000.0	45000.0
Max. additional moment of inertia	[kg mm²]	900.0	900.0	900.0	900.0
Rotor moment of inertia	[kg mm²]	113.0	113.0	113.0	113.0
Weight	[kg]	1.8	1.8	1.8	1.8
Repeat accuracy	[°]	0.001	0.001	0.001	0.001
Measuring system resolution	[arcsec]	0.038	0.038	0.038	0.038
Max. surface temperature	[°C]	70.0	70.0	70.0	70.0
Max. ambient temperature	[°C]	40.0	40.0	40.0	40.0
Electrical operating data					
Permissible power loss	[W]	65.0	65.0	65.0	65.0
Max. current	[A]	5.1	5.1	5.1	5.1
Nominal power current	[A]	1.6	1.6	1.6	1.6
Nominal voltage	[VDC]	230.0	230.0	230.0	230.0
Phase-phase resistance at 25 °C	[Ω]	16.9	16.9	16.9	16.9
Phase-phase inductance	[mH]	16.0	16.0	16.0	16.0
Tightness according to		IP 40	IP 40	IP 54	IP 54

Feed-through		4 electric / 2 pneumatic
Max. current	[A]	1
Maximum voltage	[V]	60
Max. operating pressure	[bar]	8

ⓘ The repeat accuracy stated here applies at constant ambient temperatures!

Main views



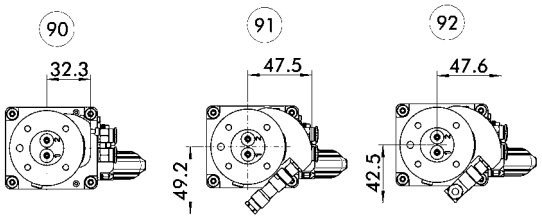
(1) Connection of rotary actuator
(2) Attachment connection
(25) Fluid feed-through
(50) Electronics connection
(68) Shaft encoder connection
(69) Connection for electric feed-through
(90) Center sleeves bore in adapter plate
(91) Only by sealed version

Cable sets

ⓘ The scope of delivery of the cable set includes: 1 power cable, 1 shaft encoder cable, 1 cable for connecting the electric rotary feed-through

	ID	Cable length
KSRD 5	0331330	5.0 m
KSRD 10	0331331	10.0 m
KSRD 15	0331332	15.0 m
KSRD 20	0331333	20.0 m

Plug connector



(90) Version without electric through
(91) Version with electric through (straight line plug)
(92) Version with electric through (angle plug)

manufacturable connectors for electrical rotary feed-through

	ID
straight	9940786
angulate	9941590

Modular Robotics

The modules of the PowerCube series provide the basis for flexible combinatorics in automation. Complex systems and multiple-axis robot structures with several degrees of freedom can be achieved with minimum time and expenditure spent on design and programming.

Your advantages and benefits

Modular

- Standardized interfaces for mechatronics and control for rapid and simple assembly without complicated designs
- Cube geometry with diverse possibilities for creating individual solutions from the modular system

Integrated

- The control and power electronics are fully integrated in the modules for minimal space requirements and interfering contours
- Single-cable technology combines data transmission and the power supply for minimal assembly and start-up costs

Intelligent

- Integrated high-end microcontroller for rapid data processing
- Decentralized control system for digital signal processing
- Universal communication interfaces for rapid incorporation in existing servo-controlled concepts

Module overview

The innovative technology of the PowerCube modules already forms the basis of numerous applications in the fields of measuring and testing systems, laboratory automation, service robotics and flexible robot technology.

PG
Servo-electric
2-Finger Parallel Gripper

PR
Servo-electric
Rotary Actuators

PW
Servo-electric
Rotary Pan Tilt Actuators

PSM
Servo-motors with
integrated position control

PDU
Servo-positioning motor
with precision gears

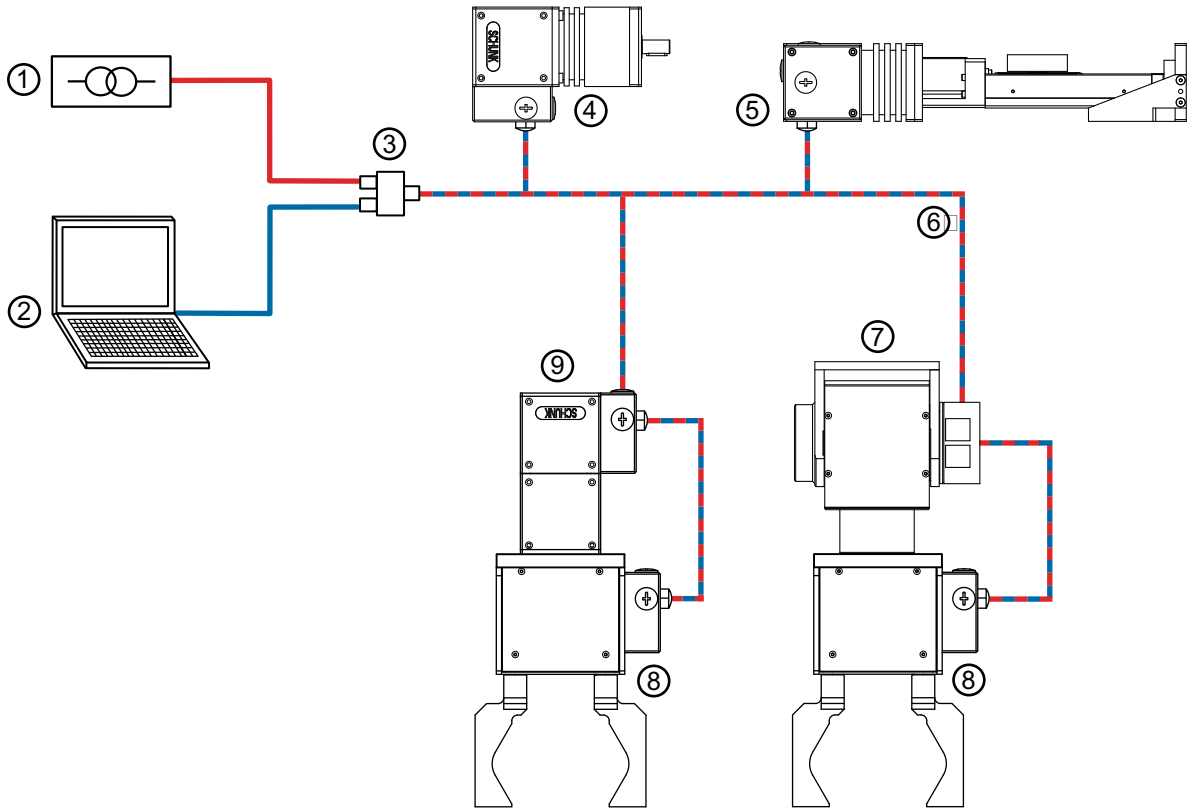
PLS
Servo-electric
Linear Axes with
ball-and-screw spindle drive

Method of actuation

The PowerCube modules work completely independently. The master control system is only required for generating the sequential program and sending it step by step to the connected modules. Therefore, only the current sequential command is ever stored in the modules, and the subsequent command is stored in the buffer. The current, rotational speed and positioning are controlled in the module itself. Likewise, functions such as temperature and limit monitoring are performed in the module itself. Real-time capability is not absolutely essential for the master control or bus system.

Control version	A	B			C
Hardware	Control with SPC (S7)	Control with PC			Control with PC
Interface	Profibus DP	CAN bus / RS-232			CANopen
Software	PowerCube standard software (gsd file, programming examples)	Windows operating system PowerCube standard software	LINUX operating system on request	Development platforms (LabView, Diadem) on request	on request (e.g. Eckelmann CNC 55)

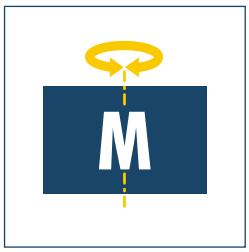
ⓘ Included with the "PowerCube Standard Software" CD-ROM (ID 0307700): Assembly and operating manual with manufacturer's declaration, quick-step software, demo and diagnostic program plus various driver files.



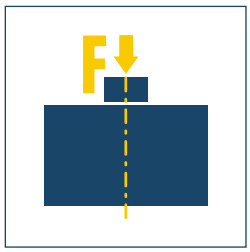
1. 24 VDC / 48 VDC power supply provided by the customer
2. Control system provided by the customer (see control versions A, B and C)
3. PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
4. PDU servo-motor
5. Linear axis with PLS ball-and-screw spindle drive and PSM servo-motor
6. Hybrid cable (single-cable technology) for connecting the PowerCube modules (voltage supply and communication)
7. PW Servo-electric Rotary Pan Tilt Actuator
8. PG Servo-electric 2-Finger Parallel Gripper
9. PR Servo-electric Rotary Actuator

Sizes
70 .. 110

Weight
1.7 kg .. 5.6 kg



Torque
7.5 Nm .. 142 Nm



Axial force
345 N .. 895 N

Bending moment
100 Nm .. 460 Nm

Application example

Double rotary gripping module for loading and unloading sensitive components

1 **PG 70 Servo-electric 2-Finger Parallel Gripper**

2 **PR 70 Servo-electric Rotary Actuator**

Universal Rotary Actuator

Servo-electric rotary actuator with > 360° rotating angle

Area of application

For universal use in clean to slightly dirty environments as handling or positioning system components; for workpiece or sensor positioning in measuring and testing applications; as extension axes and axes for industrial and service robots and in machining centers.

Your advantages and benefits

Brushless DC servo-motor as drive
for high versatility thanks to the controlled position, speed and torque

High torques and speeds
for rapid acceleration and short cycle times

Fully integrated control and power electronics
for creating a decentralized control system

Versatile actuation options
for simple integration in existing servo-controlled concepts via Profibus DP, CAN bus or RS-232

Standard connecting elements and uniform control concept
for extensive combinatorics with other PowerCube modules (see explanation of the PowerCube system)

Single-cable technology for data transmission and voltage supply (plug & play)
for low assembly and start-up costs

Fraunhofer IPA TESTED® DEVICE Greifersystem / Schwenkeinheit Report No. SC 0508-332

POWERCUBE™

Information about the series

Working principle
with Harmonic Drive® gear driven by a brushless DC servo-motor

Housing material
Aluminum alloy, hard-anodized

Actuation
Servo-electric, with brushless servo-motor and incremental encoder for position and speed control

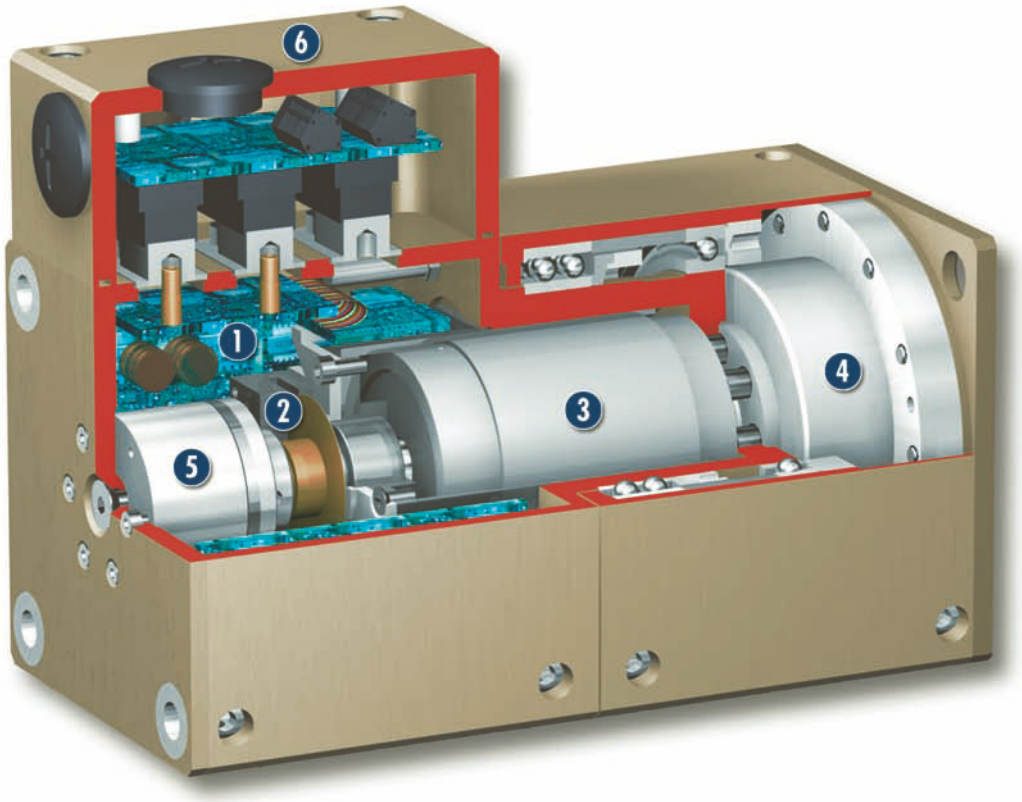
Warranty
24 months

Scope of delivery
"PowerCube Standard Software" CD-ROM, containing assembly and operating manual with manufacturer's declaration, quick-step software, demo and diagnostic programs and various driver files (see explanation of PowerCube system).

Optional extras
- Magnetic brake
- Input for external encoder signal
- Outdoor modification

Other information
- Unit suitable for use in clean rooms (ISO Class 3)
- 4 digital EIA 24 VDC
- Differential encoder signal output (RS-422)

Sectional diagram



1 **Control electronics**
integrated control and power electronics

2 **Encoder**
for position evaluation

3 **Motor**
for maximum torques

4 **Harmonic Drive® gear**

5 **Brake**
for holding function when unit is stationary and on power failure

6 **Damp-proof cap**
link to the customer's system

Function description

The rotary actuator is equipped with a Harmonic Drive® precision gear, which is driven directly by a brushless DC servo-motor.

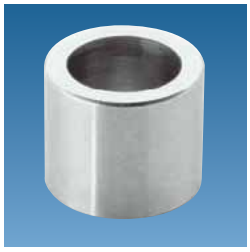
Electrical actuation

The PR rotary actuator is electrically actuated by the fully integrated control and power electronics. In this way, the module does not require any additional external control units.
A varied range of interfaces, such as Profibus DP, CAN-Bus or RS-232 are available as methods of communication. This enables you to create industrial bus networks, and ensures easy integration in control systems. You can make use of our hybrid cables for conveying the supply voltage and for communication.
If you wish to create combined systems (e.g. a rotary gripping module), various other modules from our PowerCube series are at your disposal.

Accessories

Accessories from SCHUNK – the suitable complement for the highest level of functionality, reliability and controlled production of all automation components.

Centering sleeves

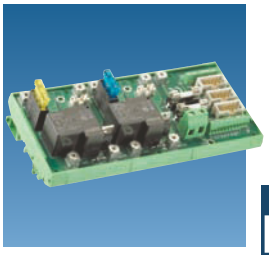


Interfaces

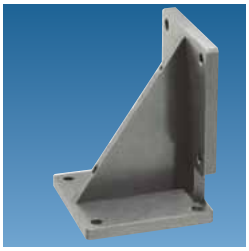
CAN-Bus	RS-232
	Profibus-DP

Hybrid cable

Electrical accessories PAE terminal block



PAM standard connecting elements



ⓘ For the exact size of the required accessories, availability of this size and the designation and ID, please refer to the additional views at the end of the size in question. You will find more detailed information on our accessory range in the „Accessories“ catalog section.

General information on the series

Repeat accuracy

Repeat accuracy is defined as the spread of the limit position after 100 consecutive swiveling cycles.

Position of output cube

The position of the output cube is always shown in the drawing in the zero position. From here, it can be rotated clockwise and anti-clockwise in the “radius of action with end position switch” – software end positions (basic position on delivery). If the basic parameters are changed (software end positions are deactivated), the output cube can be swiveled until the memory for the position value in the control electronics overflows.

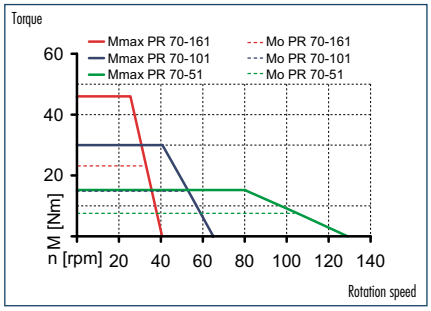
Swiveling time

Swiveling times are purely the times of the output cube to rotate from rest position to rest position. Relay switching times or SPC reaction times are not included in the above times and must be taken into consideration when determining cycle times. Load-dependent rest periods may have to be included in the cycle time.

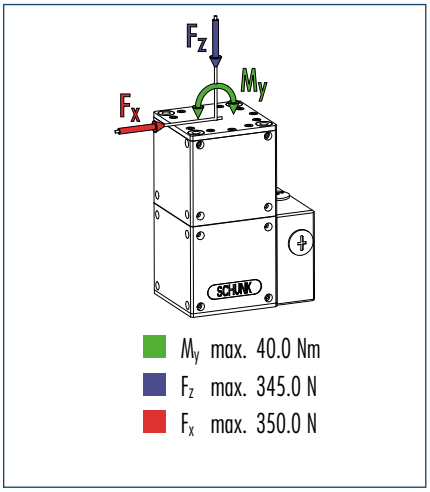
Mean attached load

The mean attached load should constitute a typical load. It is defined as the half of the max. possible moment of inertia that can be rotated without bouncing or hitting, with a centric load and a vertical rotating axis.

Torque characteristic



Moment load



ⓘ Moments and forces may occur simultaneously.

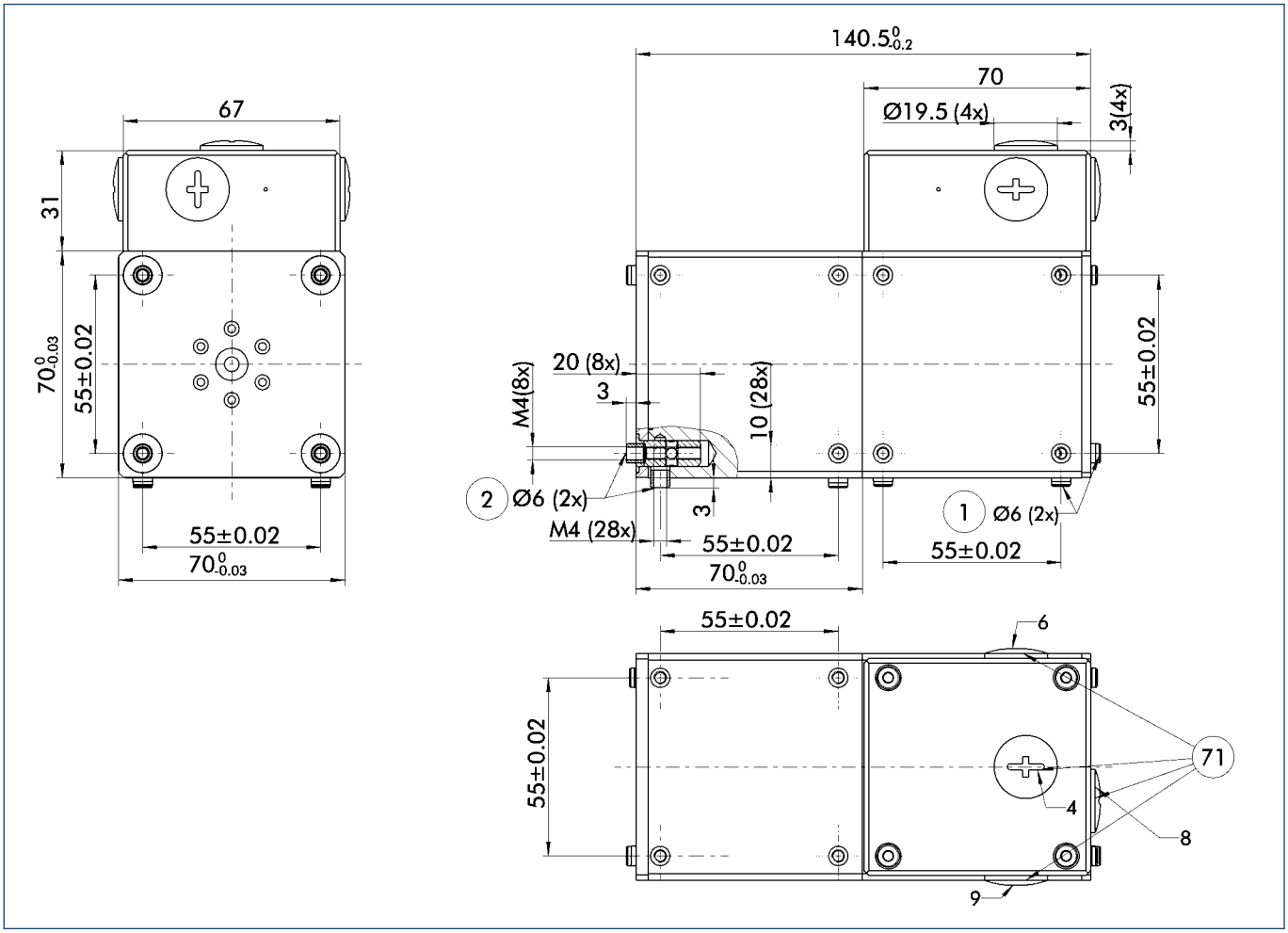
Technical data

Description		PR 70-161	PR 70-101	PR 70-51
	ID	0306503	0306513	0306523
Version with brake		PR 70-161-B	PR 70-101-B	PR 70-51-B
	ID	0306508	0306518	0306528
Mechanical operating data				
Nominal torque	[Nm]	23.0	15.0	7.5
Peak torque	[Nm]	46.0	30.0	15.0
Rotating angle (>)	[°]	360.0	360.0	360.0
Radius of action with end position switch (±)	[°]	160.0	160.0	160.0
IP class		64	64	64
Weight	[kg]	1.7	1.7	1.7
Swiveling time (90°) with mean attached load	[s]	0.85	0.65	0.45
Min. ambient temperature	[°C]	5.0	5.0	5.0
Max. ambient temperature	[°C]	55.0	55.0	55.0
Repeat accuracy*	[°]	0.02	0.03	0.04
Max. angular velocity	[°/s]	150.0	240.0	470.0
Max. acceleration	[°/s²]	600.0	960.0	1880.0
Gear ratio		161:1	101:1	51:1
Electrical operating data				
Nominal voltage	[VDC]	24.0	24.0	24.0
Nominal power current	[A]	4.0	4.0	4.0
Max. current	[A]	8.0	8.0	8.0
Resolution	[arcsec]	4.0	6.0	13.0
Control electronics				
Integrated electronics		Yes	Yes	Yes
Voltage supply	[VDC]	24.0	24.0	24.0
Nominal power current	[A]	0.5	0.5	0.5
Sensor system		Encoder	Encoder	Encoder
Interfaces		RS-232; Profibus-DP; CAN-Bus	RS-232; Profibus-DP; CAN-Bus	RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

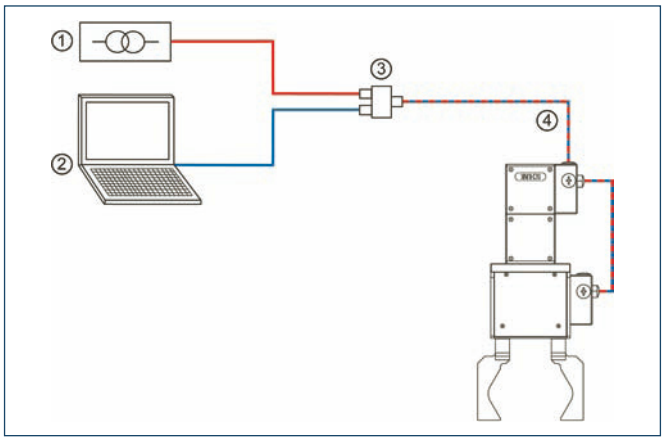
Main views



The drawing shows the rotary actuator with damp-proof cap in the basic version with closed jaws, the dimensions do not include the options described below.

① Connection of rotary actuator
② Attachment connection
71 M16x1.5 for cable gland

Actuation



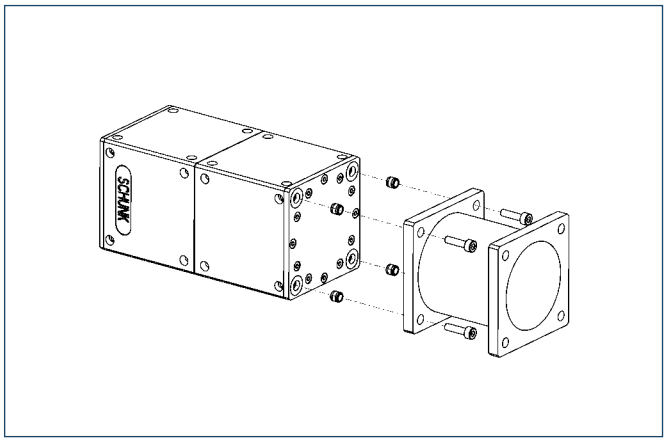
① 24 VDC voltage supply provided by customer
② Control (SPC, etc.) provided by customer
③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
④ Hybrid cable for connecting the PowerCube modules

Interconnecting cable

Description	ID	Length
PowerCube Hybrid cable, coiled	0307753	0.3 m
PowerCube Hybrid cable, coiled	0307754	0.46 m
PowerCube Hybrid cable, straight (per meter)	9941120	

You can find further cables in the “Accessories” catalog section.

Mechanical accessories

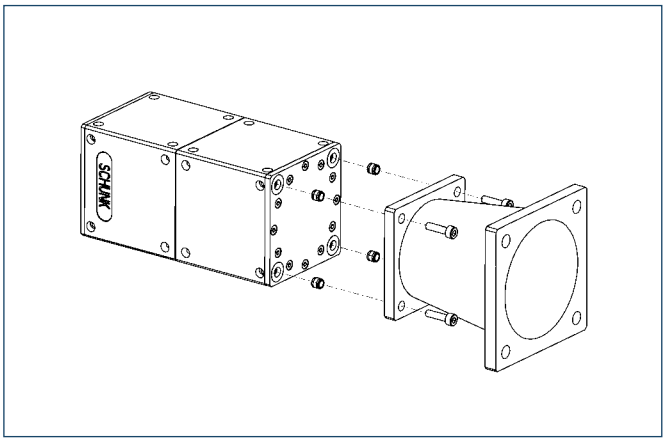


Straight connecting element

Straight standard element for connecting size 70 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 100	**0307800**	70x70/35/70x70 mm
PAM 101	**0307801**	70x70/70/70x70 mm

Special lengths on request

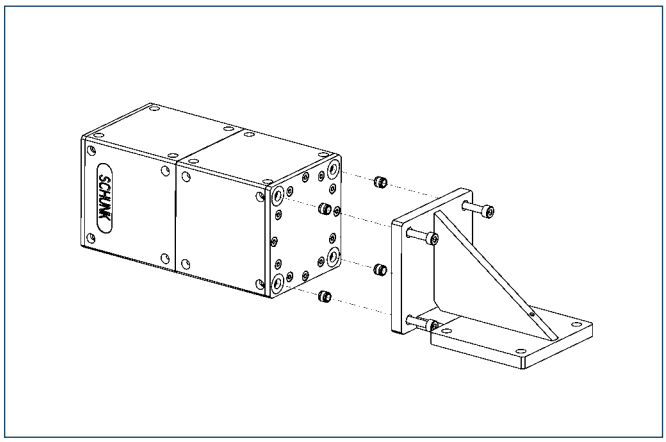


Conical connecting element

Conical standard element for connecting size 70 and 90 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 110	**0307810**	90x90/45/70x70 mm
PAM 111	**0307811**	90x90/90/70x70 mm

Special lengths on request



Right-angle connecting element

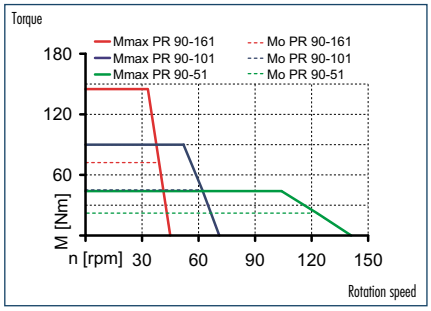
Right-angle standard element for connecting size 70 PowerCube modules with complete repeat accuracy

Description	ID
PAM 120	**0307820**

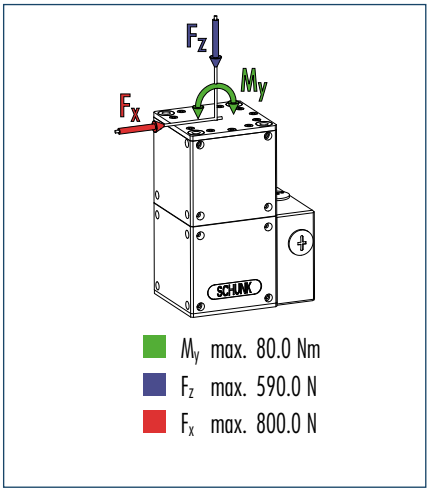
You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

PR 90

Torque characteristic



Moment load



ⓘ Moments and forces may occur simultaneously.

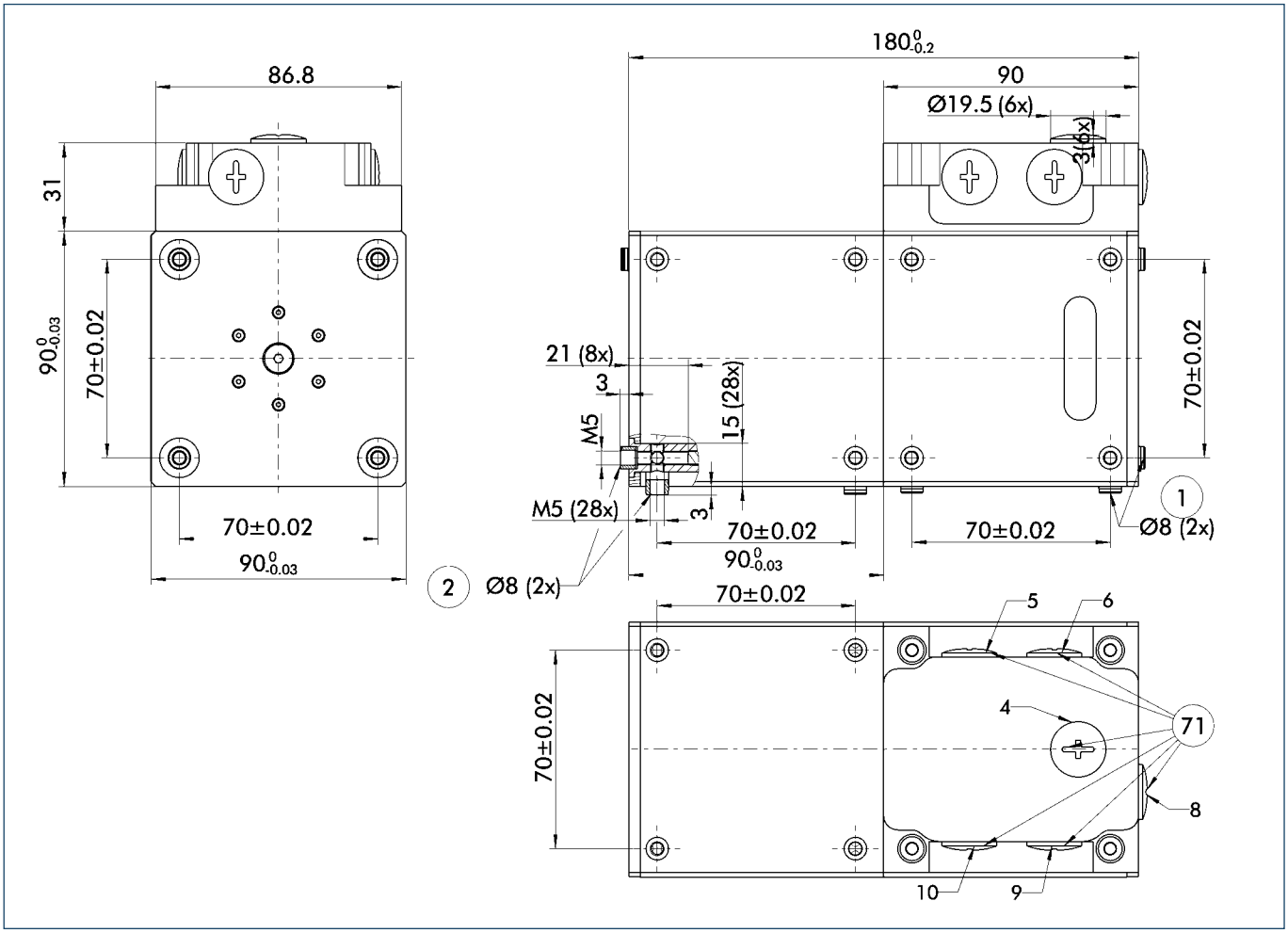
Technical data

Description		PR 90-161	PR 90-101	PR 90-51
	ID	0306533	0306543	0306553
Version with brake		PR 90-161-B	PR 90-101-B	PR 90-51-B
	ID	0306538	0306548	0306558
Mechanical operating data				
Nominal torque	[Nm]	72.0	45.0	22.0
Peak torque	[Nm]	145.0	90.0	45.0
Rotating angle (>)	[°]	360.0	360.0	360.0
Radius of action with end position switch (±)	[°]	160.0	160.0	160.0
IP class		64	64	64
Weight	[kg]	3.4	3.4	3.4
Swiveling time (90°) with mean attached load	[s]	0.85	0.65	0.45
Min. ambient temperature	[°C]	5.0	5.0	5.0
Max. ambient temperature	[°C]	55.0	55.0	55.0
Repeat accuracy*	[°]	0.02	0.03	0.04
Max. angular velocity	[°/s]	150.0	240.0	470.0
Max. acceleration	[°/s²]	600.0	960.0	1880.0
Gear ratio		161:1	101:1	51:1
Electrical operating data				
Nominal voltage	[VDC]	24.0	24.0	24.0
Nominal power current	[A]	4.0	4.0	4.0
Max. current	[A]	12.0	12.0	12.0
Resolution	[arcsec]	4.0	6.0	13.0
Control electronics				
Integrated electronics		Yes	Yes	Yes
Voltage supply	[VDC]	24.0	24.0	24.0
Nominal power current	[A]	0.5	0.5	0.5
Sensor system		Encoder	Encoder	Encoder
Interfaces		RS-232; Profibus-DP; CAN-Bus	RS-232; Profibus-DP; CAN-Bus	RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

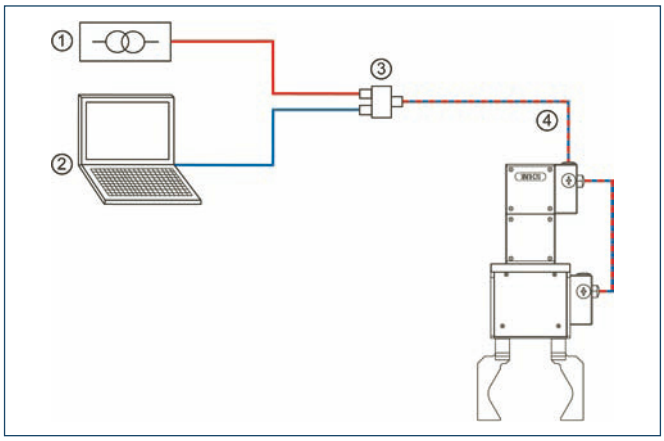
Main views



The drawing shows the rotary actuator with damp-proof cap in the basic version with closed jaws, the dimensions do not include the options described below.

① Connection of rotary actuator
② Attachment connection
71 M16x1.5 for cable gland

Actuation



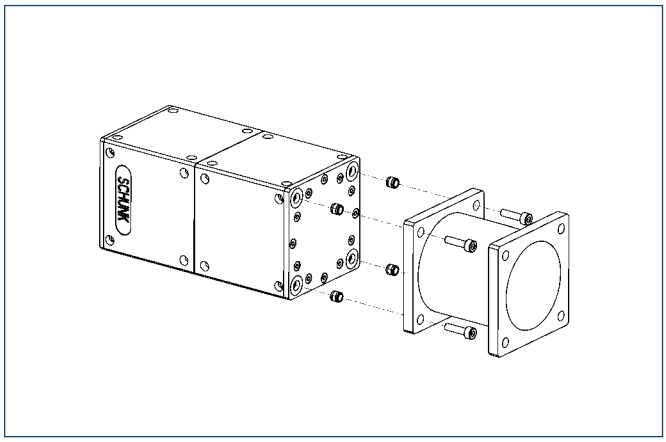
① 24 VDC voltage supply provided by customer
② Control (SPC, etc.) provided by customer
③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
④ Hybrid cable for connecting the PowerCube modules

Interconnecting cable

Description	ID	Length
PowerCube Hybrid cable, coiled	0307753	0.3 m
PowerCube Hybrid cable, coiled	0307754	0.46 m
PowerCube Hybrid cable, straight (per meter)	9941120	

You can find further cables in the “Accessories” catalog section.

Mechanical accessories

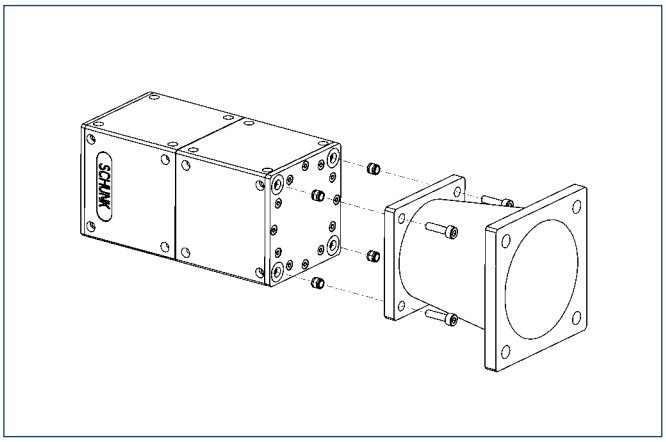


Straight connecting element

Straight standard element for connecting size 90 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 102	**0307802**	90x90/45/90x90 mm
PAM 103	**0307803**	90x90/90/90x90 mm

Special lengths on request

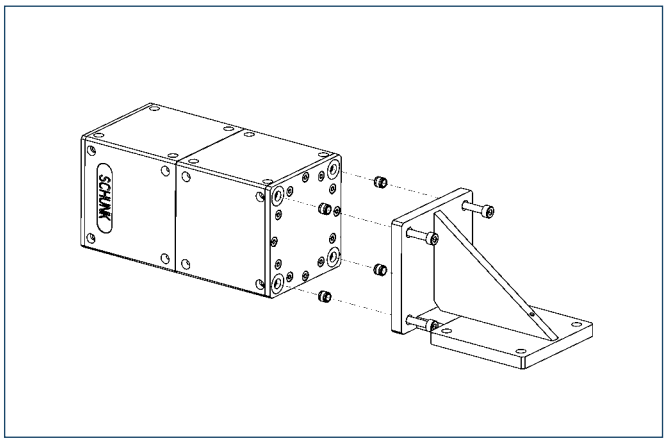


Conical connecting element

Conical standard element for connecting size 70, 90 and 110 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 110	**0307810**	90x90/45/70x70 mm
PAM 111	**0307811**	90x90/90/70x70 mm
PAM 112	**0307812**	110x110/55/90x90 mm
PAM 113	**0307813**	110x110/110/90x90 mm

Special lengths on request



Right-angle connecting element

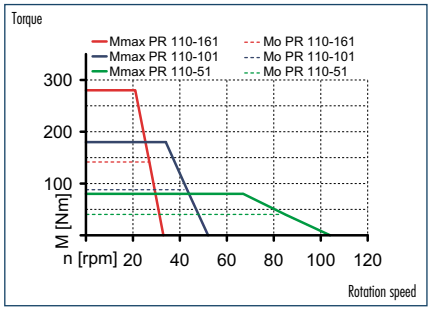
Right-angle standard element for connecting size 90 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 121	**0307821**	90°/90.5x122

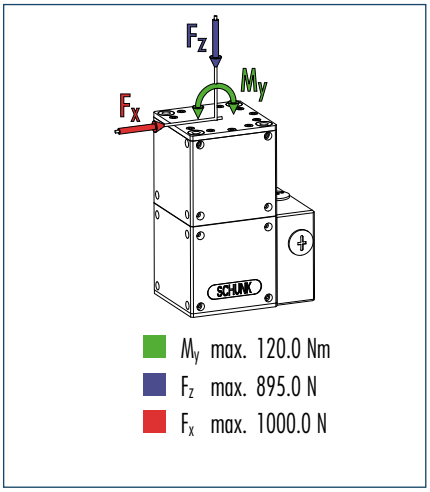
You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

PR 110

Torque characteristic



Moment load



ⓘ Moments and forces may occur simultaneously.

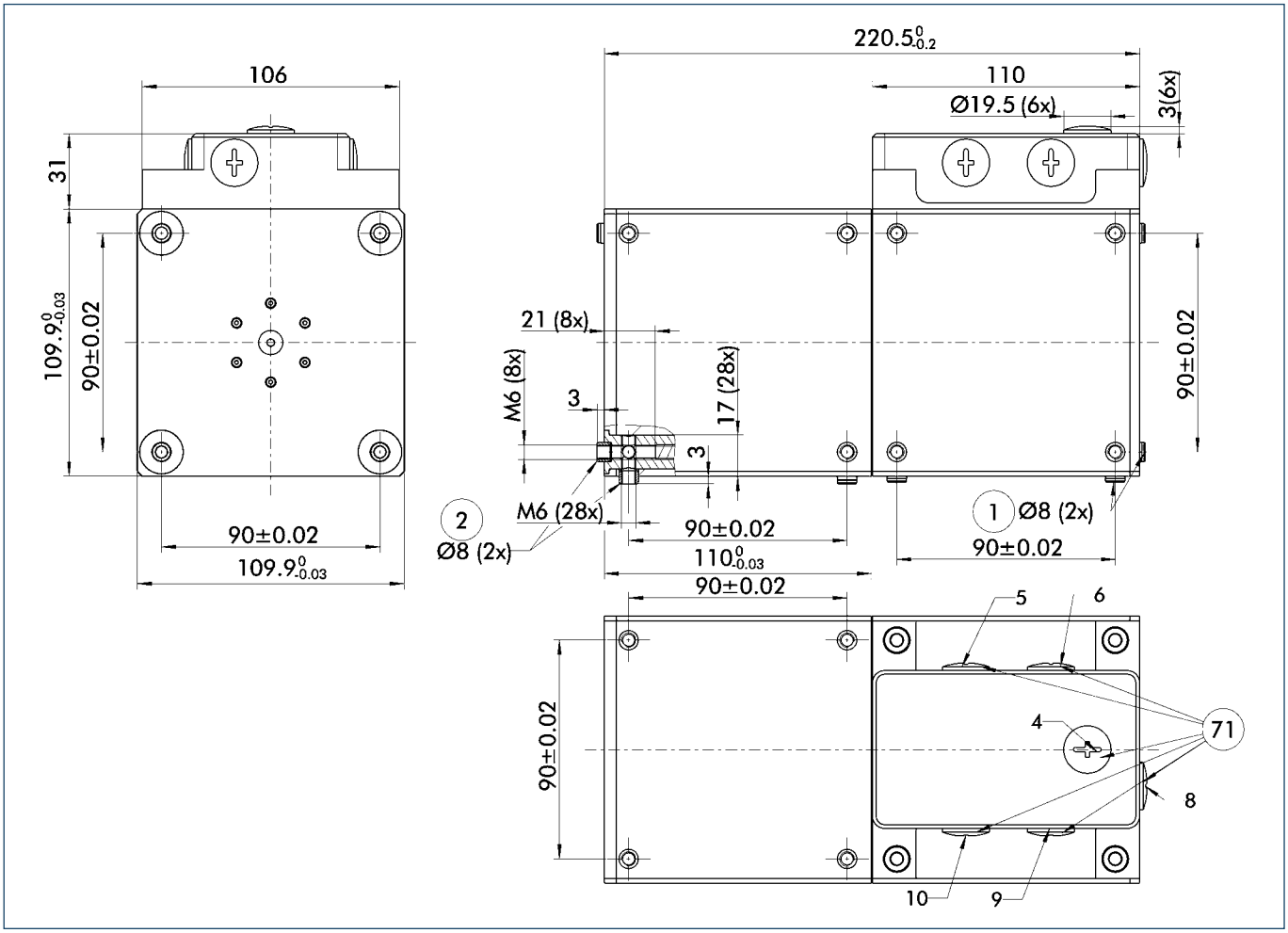
Technical data

Description		PR 110-161	PR 110-101	PR 110-51
	ID	0306563	0306573	0306583
Version with brake		PR 110-161-B	PR 110-101-B	PR 110-51-B
	ID	0306568	0306578	0306588
Mechanical operating data				
Nominal torque	[Nm]	142.0	89.0	40.0
Peak torque	[Nm]	280.0	180.0	80.0
Rotating angle (>)	[°]	360.0	360.0	360.0
Radius of action with end position switch (±)	[°]	160.0	160.0	160.0
IP class		64	64	64
Weight	[kg]	5.6	5.6	5.6
Swiveling time (90°) with mean attached load	[s]	0.85	0.65	0.45
Min. ambient temperature	[°C]	5.0	5.0	5.0
Max. ambient temperature	[°C]	55.0	55.0	55.0
Repeat accuracy*	[°]	0.02	0.03	0.04
Max. angular velocity	[°/s]	150.0	240.0	470.0
Max. acceleration	[°/s²]	600.0	960.0	1880.0
Gear ratio		161:1	101:1	51:1
Electrical operating data				
Nominal voltage	[VDC]	48.0	48.0	48.0
Nominal power current	[A]	4.0	4.0	4.0
Max. current	[A]	12.0	12.0	12.0
Resolution	[arcsec]	4.0	6.0	13.0
Control electronics				
Integrated electronics		Yes	Yes	Yes
Voltage supply	[VDC]	24.0	24.0	24.0
Nominal power current	[A]	0.5	0.5	0.5
Sensor system		Encoder	Encoder	Encoder
Interfaces		RS-232; Profibus-DP; CAN-Bus	RS-232; Profibus-DP; CAN-Bus	RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

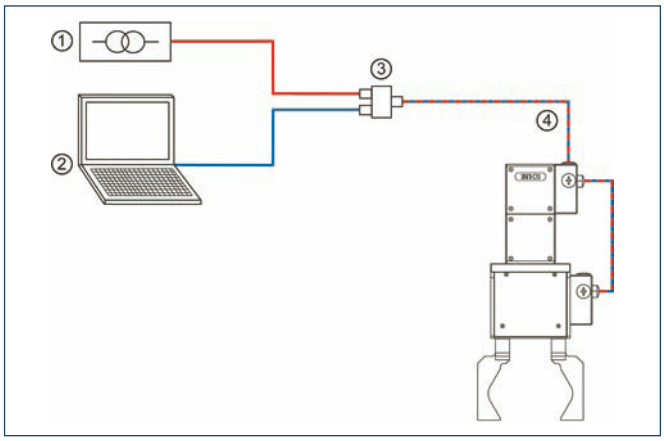
Main views



The drawing shows the rotary actuator with damp-proof cap in the basic version with closed jaws, the dimensions do not include the options described below.

① Connection of rotary actuator
② Attachment connection
71 M16x1.5 for cable gland

Actuation



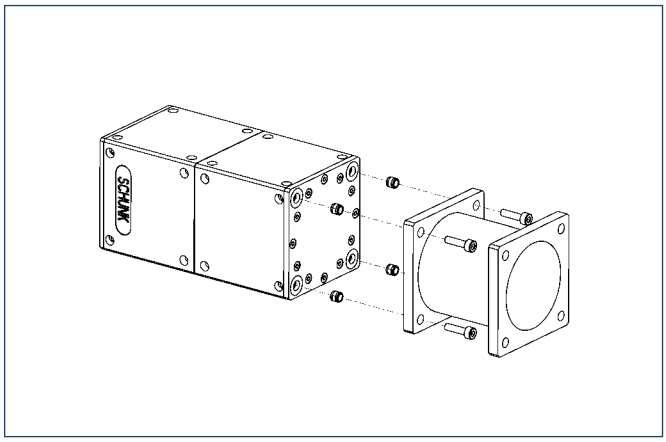
① 24 VDC voltage supply provided by customer
② Control (SPC, etc.) provided by customer
③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
④ Hybrid cable for connecting the PowerCube modules

Interconnecting cable

Description	ID	Length
PowerCube Hybrid cable, coiled	0307753	0.3 m
PowerCube Hybrid cable, coiled	0307754	0.46 m
PowerCube Hybrid cable, straight (per meter)	9941120	

You can find further cables in the “Accessories” catalog section.

Mechanical accessories

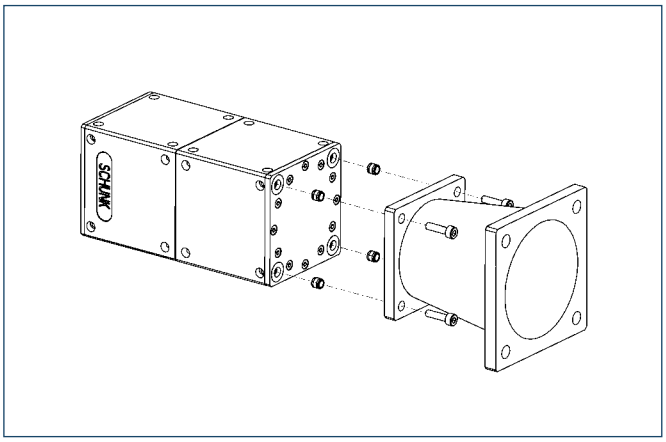


Straight connecting element

Straight standard element for connecting size 110 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 104	**0307804**	110x110/55/110x110 mm
PAM 105	**0307805**	110x110/110/110x110 mm

Special lengths on request

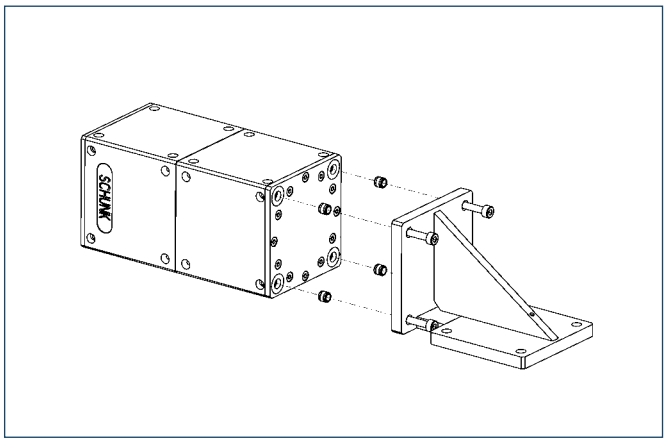


Conical connecting element

Conical standard element for connecting size 90 and 110 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 112	**0307812**	110x110/55/90x90 mm
PAM 113	**0307813**	110x110/110/90x90 mm

Special lengths on request



Right-angle connecting element

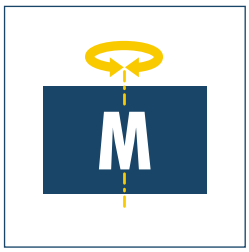
Right-angle standard element for connecting size 110 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 122	**0307822**	90°/110.5x146

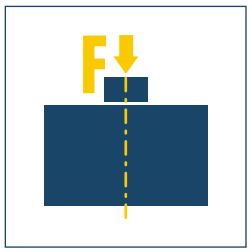
You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

Sizes
60 .. 120

Weight
1.0 kg .. 3.6 kg



Torque
4.5 Nm .. 216 Nm



Axial force
120 N .. 800 N

Bending moment
20 Nm .. 320 Nm

Application example

Mobile platform with autonomous loading and unloading possibility for workpiece transportation

1 **3-Finger Electric Gripping Hand**

2 **LWA 3 Light-weight Arm consists of 7 PRL modules**

Universal Rotary Actuator

Servo-electric rotary actuator with > 360° rotating angle

Area of application

For universal use in clean to slightly dirty environments as handling or positioning system components; for workpiece or sensor positioning in measuring and testing applications; as extension axes and axes for industrial and service robots and in machining centers.

Your advantages and benefits

Hollow shaft for media feed-through
for minimizing interfering contours and break of cable

High torques at smallest space requirements
for short cycles

Absolute position encoder
without additional set-up

Magnetic brake
for save hold in case of power outage

Fully integrated control and power electronics
for creating a decentralized control system

Versatile actuation options
for simple integration in existing servo-controlled concepts via Profibus DP, CAN bus or RS-232

Standard connecting elements and uniform control concept
for extensive combinatorics with other PowerCube modules (see explanation of the PowerCube system)

Single-cable technology for data transmission and power supply (plug & play)
for low assembly and start-up costs

POWERCUBE™

General information on the series

Working principle
with Harmonic Drive® gear driven by a brushless DC servo-motor

Housing material
Aluminum alloy, hard-anodized

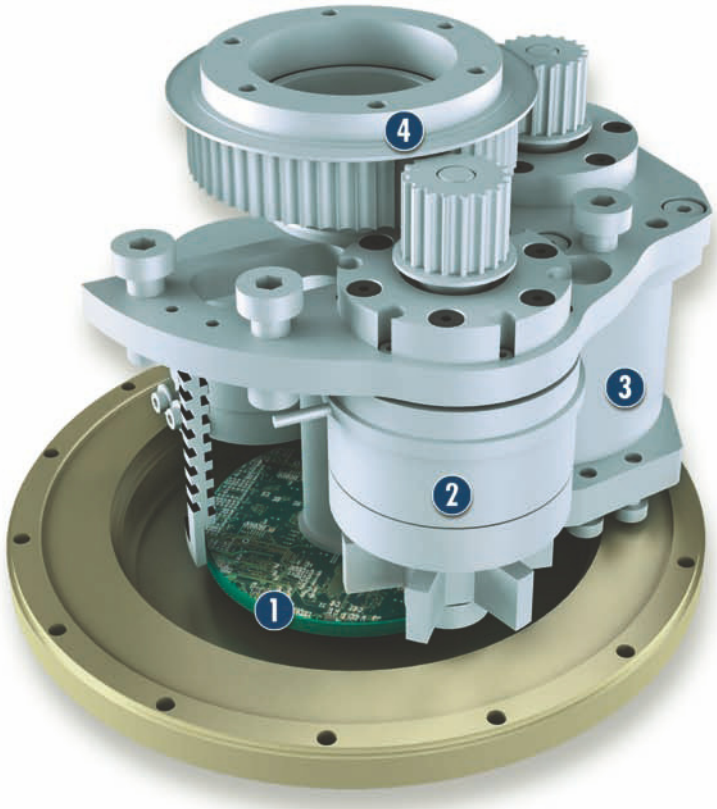
Actuation
servo-electric, with brushless servo-motor and incremental encoder for position and speed control

Warranty
24 months

Scope of delivery
"PowerCube Standard Software" CD-ROM, containing assembly and operating manual with manufacturer's declaration, quick-step software, demo and diagnostic program and various driver files (see explanation of PowerCube system).

Other information
· 2 digital EIA 24 VDC

Sectional diagram



1 Complete performance and control electronics

2 Integrated brake

3 Brushless servo-motor

4 Harmonic Drive® gear

Function description

The rotary actuator is equipped with a Harmonic Drive® precision gear, which is driven directly by a brushless DC servo-motor.

Electrical actuation

The PRL rotary actuator is electrically actuated by the fully integrated control and power electronics. In this way, the module does not require any additional external control units.

A varied range of interfaces, such as Profibus DP, CAN-Bus or RS-232 are available as methods of communication. This enables you to create industrial bus networks, and ensures easy integration in control systems. You can make use of our hybrid cables for conveying the supply voltage and for communication.

If you wish to create combined systems (e.g. a rotary gripping module), various other modules from our PowerCube series are at your disposal.

Accessories

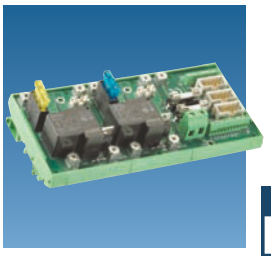
Accessories from SCHUNK – the suitable complement for the highest level of functionality, reliability and controlled production of all automation components.

Interfaces

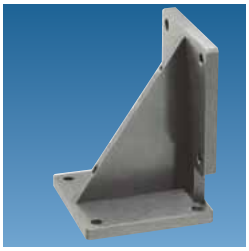
CAN-Bus	RS-232
	Profibus-DP

Hybrid cable

Electrical accessories PAE terminal block



PAM standard connecting elements



ⓘ For the exact size of the required accessories, availability of this size and the designation and ID, please refer to the additional views at the end of the size in question. You will find more detailed information on our accessory range in the „Accessories“ catalog section.

General information on the series

Repeat accuracy

Repeat accuracy is defined as the spread of the limit position after 100 consecutive swiveling cycles.

Position of drive

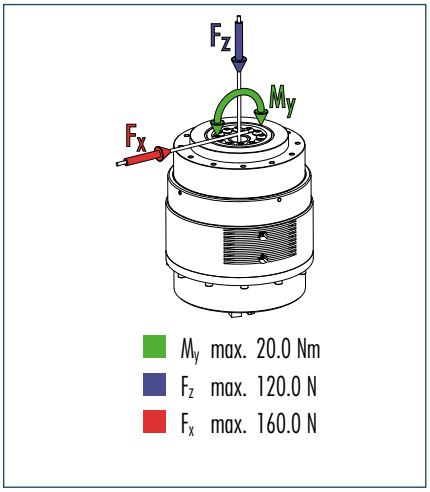
The position of the motor shaft is always shown in the drawing in the zero position (0°). From here, it can be rotated clockwise and anti-clockwise.
The turning range may exceed 360° several times, depending on the type of application. After switch on the module reports its position as an absolute value (last position before switch off).

Swiveling time

Swiveling times are purely the times of the output cube to rotate from rest position to rest position. Relay switching times or SPC reaction times are not included in the above times and must be taken into consideration when determining cycle times. Load-dependent rest periods may have to be included in the cycle time.

PRL 60

Moment load



ⓘ Moments and forces may occur simultaneously.

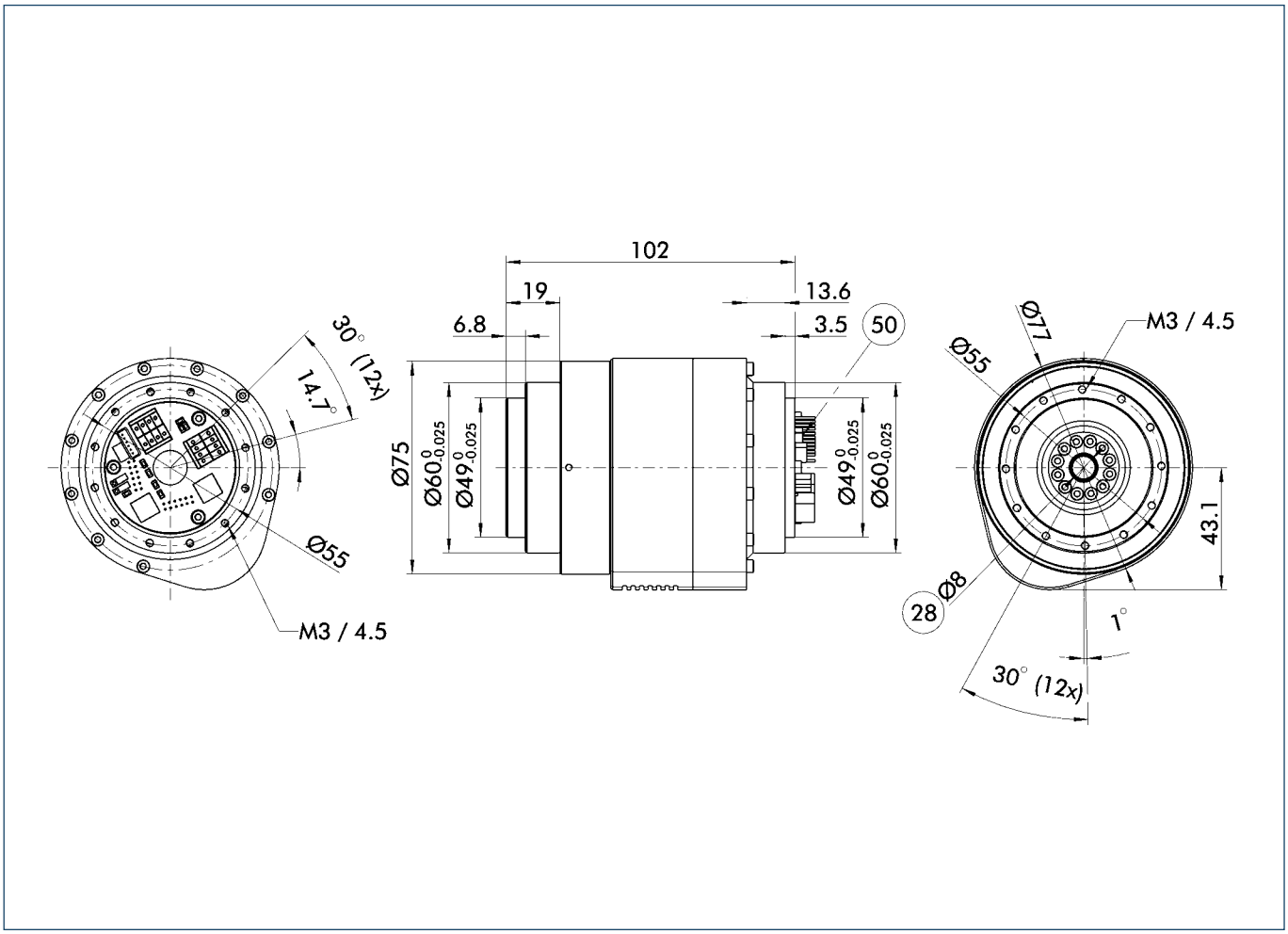
Technical data

Description		PRL 60-300
	ID	0306910
Mechanical operating data		
Nominal torque	[Nm]	4.5
Peak torque	[Nm]	9.6
Rotating angle (>)	[°]	360.0
IP class		65
Weight	[kg]	1.0
Swiveling time (90°) with mean attached load	[s]	2.55
Min. ambient temperature	[°C]	5.0
Max. ambient temperature	[°C]	55.0
Repeat accuracy*	[°]	0.02
Max. angular velocity	[°/s]	50.0
Max. acceleration	[°/s²]	200.0
Gear ratio		300:1
Electrical operating data		
Nominal voltage	[VDC]	24.0
Nominal power current	[A]	2.0
Max. current	[A]	4.0
Resolution	[arcsec]	2.0
Control electronics		
Integrated electronics		Yes
Voltage supply	[VDC]	24.0
Nominal power current	[A]	0.5
Sensor system		
Interfaces		RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

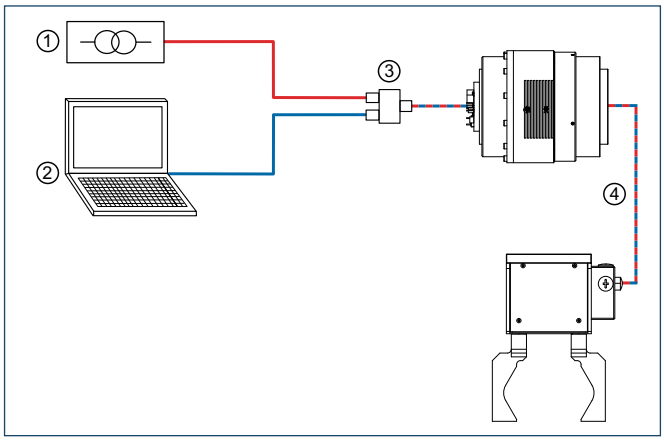
Main views



The drawing shows the rotary actuator with damp-proof cap in the basic version with closed jaws, the dimensions do not include the options described below.

(28) Through-bore
(50) Electronics connection

Actuation



(1) 24 VDC voltage supply provided by customer
(2) Control (SPC, etc.) provided by customer
(3) PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
(4) Hybrid cable for connecting the PowerCube modules

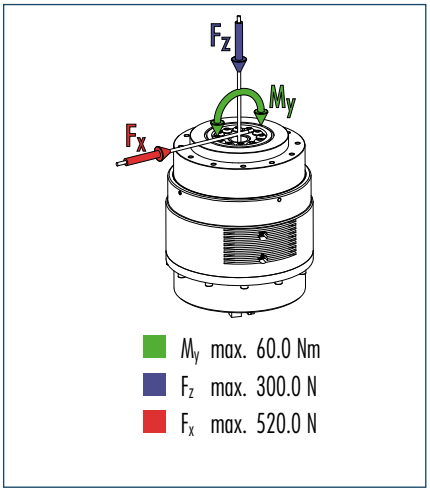
Interconnecting cable

Description	ID
Terminal block PAE 130 TB	0307725
PowerCube Communication cable	0307759
PowerCube Hybrid cable, straight (per meter)	9941120

You can find further cables in the "Accessories" catalog section.

PRL 80

Moment load



ⓘ Moments and forces may occur simultaneously.

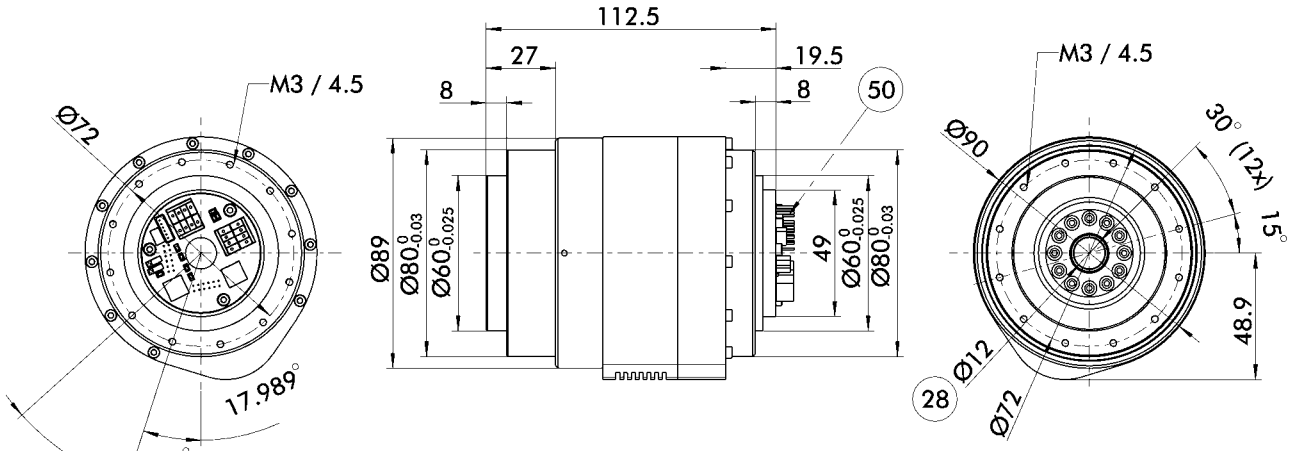
Technical data

Description		PRL 80-552
	ID	0306915
Mechanical operating data		
Nominal torque	[Nm]	20.7
Peak torque	[Nm]	41.4
Rotating angle (>)	[°]	360.0
IP class		65
Weight	[kg]	1.2
Swiveling time (90°) with mean attached load	[s]	4.25
Min. ambient temperature	[°C]	5.0
Max. ambient temperature	[°C]	55.0
Repeat accuracy*	[°]	0.02
Max. angular velocity	[°/s]	25.0
Max. acceleration	[°/s²]	100.0
Gear ratio		552:1
Electrical operating data		
Nominal voltage	[VDC]	24.0
Nominal power current	[A]	3.0
Max. current	[A]	6.0
Resolution	[arcsec]	1.0
Control electronics		
Integrated electronics		Yes
Voltage supply	[VDC]	24.0
Nominal power current	[A]	0.5
Sensor system		
Interfaces		RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

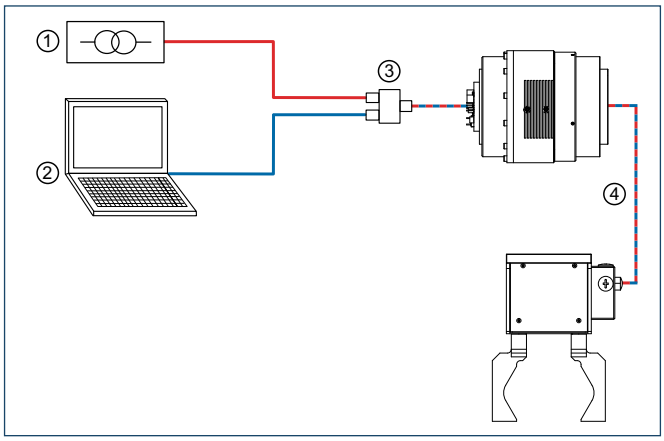
Main views



The drawing shows the rotary actuator with damp-proof cap in the basic version with closed jaws, the dimensions do not include the options described below.

(28) Through-bore
(50) Electronics connection

Actuation



(1) 24 VDC voltage supply provided by customer
(2) Control (SPC, etc.) provided by customer
(3) PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
(4) Hybrid cable for connecting the PowerCube modules

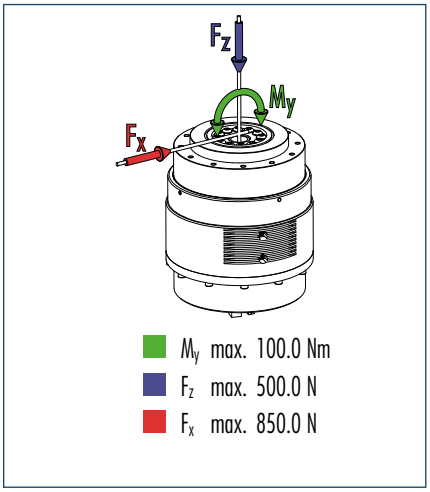
Interconnecting cable

Description	ID
Terminal block PAE 130 TB	0307725
PowerCube Communication cable	0307759
PowerCube Hybrid cable, straight (per meter)	9941120

You can find further cables in the "Accessories" catalog section.

PRL 100

Moment load



ⓘ Moments and forces may occur simultaneously.

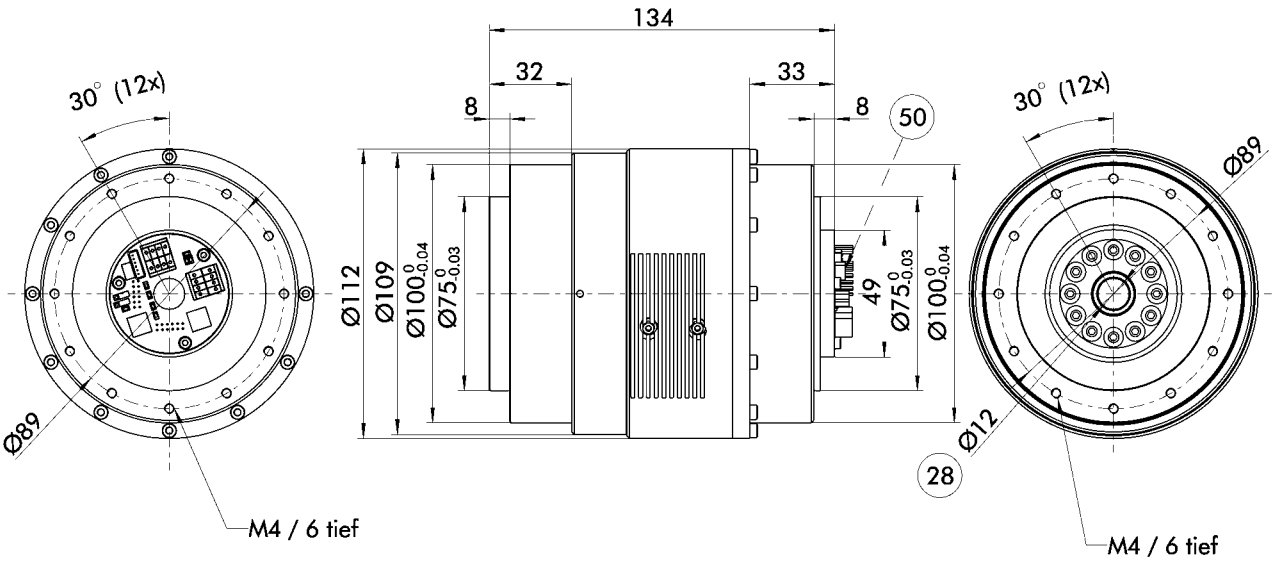
Technical data

Description		PRL 100-625
	ID	0306920
Mechanical operating data		
Nominal torque	[Nm]	81.5
Peak torque	[Nm]	176.0
Rotating angle (>)	[°]	360.0
IP class		65
Weight	[kg]	2.0
Swiveling time (90°) with mean attached load	[s]	4.25
Min. ambient temperature	[°C]	5.0
Max. ambient temperature	[°C]	55.0
Repeat accuracy*	[°]	0.02
Max. angular velocity	[°/s]	24.0
Max. acceleration	[°/s²]	96.0
Gear ratio		625:1
Electrical operating data		
Nominal voltage	[VDC]	24.0
Nominal power current	[A]	4.0
Max. current	[A]	8.0
Resolution	[arcsec]	1.0
Control electronics		
Integrated electronics		Yes
Voltage supply	[VDC]	24.0
Nominal power current	[A]	0.5
Sensor system		
Interfaces		RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

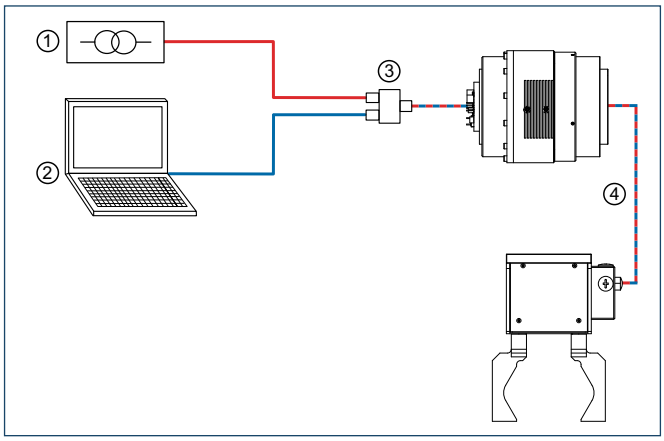
Main views



The drawing shows the rotary actuator with damp-proof cap in the basic version with closed jaws, the dimensions do not include the options described below.

(28) Through-bore
(50) Electronics connection

Actuation



(1) 24 VDC voltage supply provided by customer
(2) Control (SPC, etc.) provided by customer
(3) PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
(4) Hybrid cable for connecting the PowerCube modules

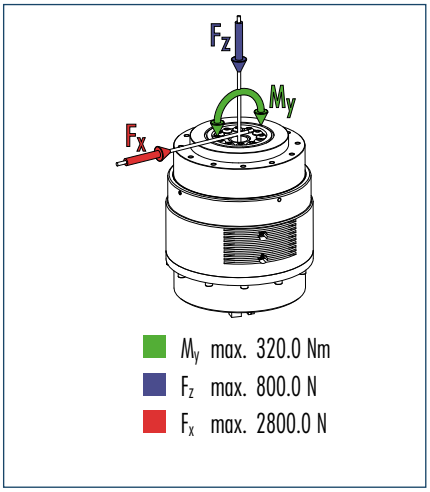
Interconnecting cable

Description	ID
Terminal block PAE 130 TB	0307725
PowerCube Communication cable	0307759
PowerCube Hybrid cable, straight (per meter)	9941120

You can find further cables in the "Accessories" catalog section.

PRL 120

Moment load



ⓘ Moments and forces may occur simultaneously.

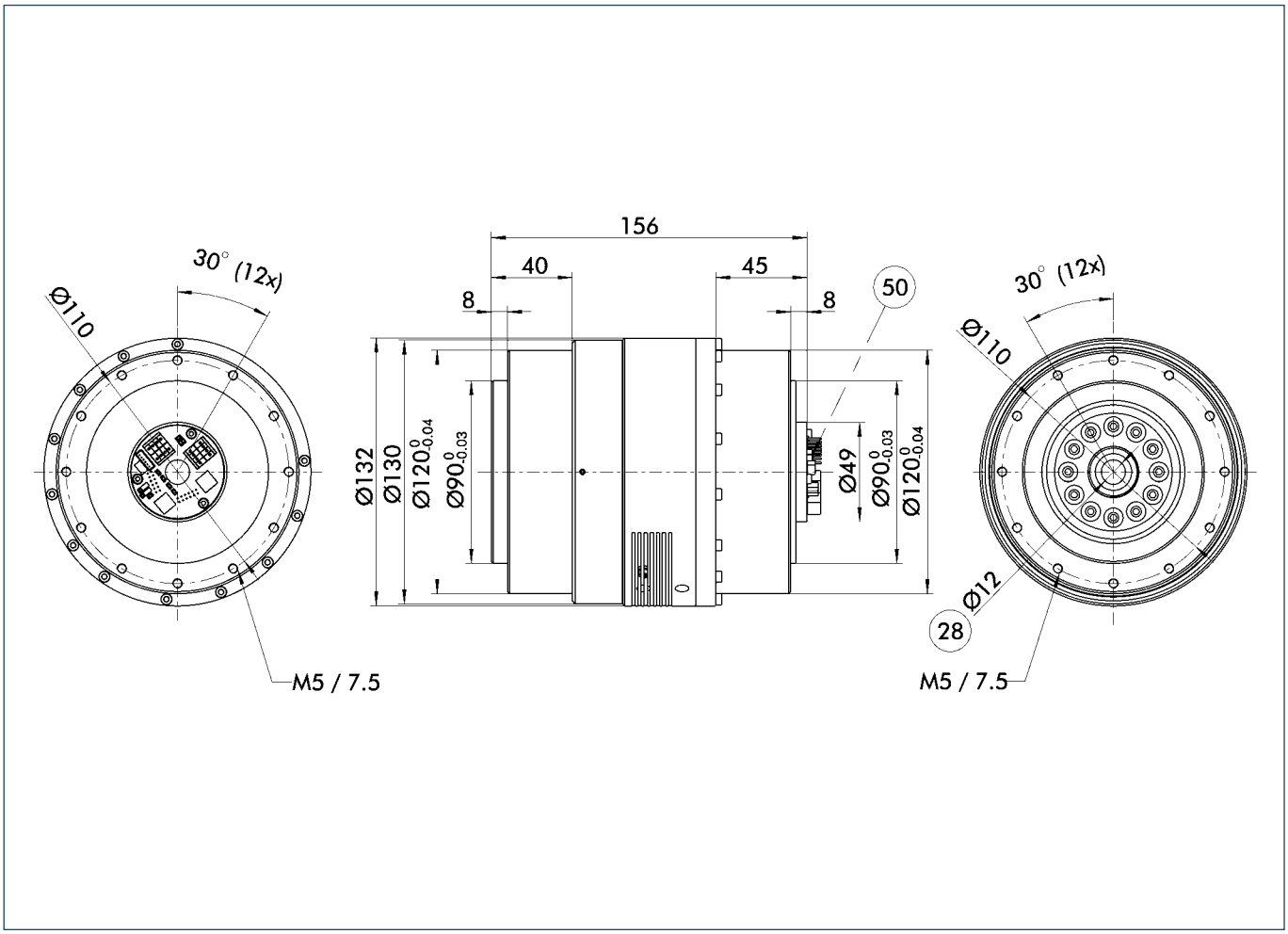
Technical data

Description		PRL 120-596
	ID	0306925
Mechanical operating data		
Nominal torque	[Nm]	216.0
Peak torque	[Nm]	372.0
Rotating angle (>)	[°]	360.0
IP class		65
Weight	[kg]	3.6
Swiveling time (90°) with mean attached load	[s]	4.25
Min. ambient temperature	[°C]	5.0
Max. ambient temperature	[°C]	55.0
Repeat accuracy*	[°]	0.02
Max. angular velocity	[°/s]	25.0
Max. acceleration	[°/s²]	100.0
Gear ratio		596:1
Electrical operating data		
Nominal voltage	[VDC]	24.0
Nominal power current	[A]	5.0
Max. current	[A]	10.0
Resolution	[arcsec]	1.0
Control electronics		
Integrated electronics		Yes
Voltage supply	[VDC]	24.0
Nominal power current	[A]	0.5
Sensor system		
Interfaces		RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

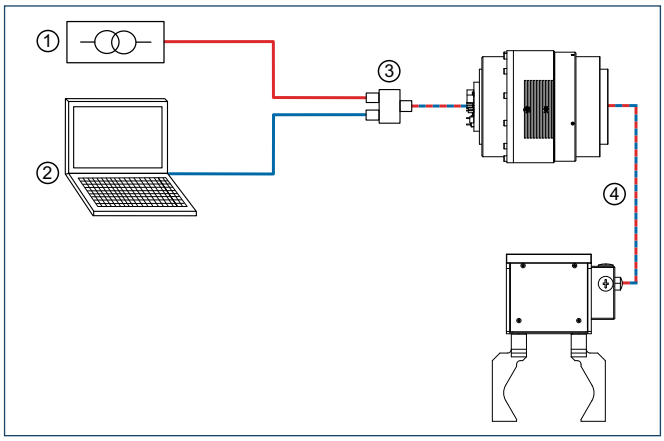
Main views



The drawing shows the rotary actuator with damp-proof cap in the basic version with closed jaws, the dimensions do not include the options described below.

(28) Through-bore
(50) Electronics connection

Actuation



(1) 24 VDC voltage supply provided by customer
(2) Control (SPC, etc.) provided by customer
(3) PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
(4) Hybrid cable for connecting the PowerCube modules

Interconnecting cable

Description	ID
Terminal block PAE 130 TB	0307725
PowerCube Communication cable	0307759
PowerCube Hybrid cable, straight (per meter)	9941120

You can find further cables in the "Accessories" catalog section.

PW

Sizes
70 .. 90

Weight
1.8 kg .. 3.4 kg

Torque
Axis 1: 12 Nm .. 23 Nm
Axis 2: 2 Nm .. 12 Nm

Axial force
80 N .. 200 N

Bending moment
8 Nm .. 12 Nm

Application example

7-DOF light-weight arm and gripping hand for applications in research and development and in service robotics

1. SGH Servo-electric Gripping Hand
2. PW 70 Rotary Tilt Unit
3. LWA 2 Light-weight Arm

Pan Tilt Actuator

Servo-electric pan tilt actuator with two rotating axes for precise positioning

Area of application

Pan tilt actuator for cameras, laser scanners and other sensors for positioning during measuring and testing operations. Pan-tilt module and extension axes for service or standard robots and handling tasks in clean room environment

Your advantages and benefits

Two independently moving axes integrated in a single housing
for complete flexibility in the rotating movement, despite the compact design

High torques and speeds
for rapid acceleration and short cycle times

Fully integrated control and power electronics
for creating a decentralized control system

Versatile actuation options
for simple integration in existing servo-controlled concepts via Profibus DP, CAN bus or RS-232

Standard connecting elements and uniform control concept
for extensive combinatorics with other PowerCube modules (see explanation of the PowerCube system)

Single-cable technology for data transmission and voltage supply (plug & play)
for low assembly and start-up costs

POWERCUBE™

Information about the series

Working principle
with Harmonic Drive® gear driven by a brushless DC servo-motor

Housing material
Aluminum alloy, hard-anodized

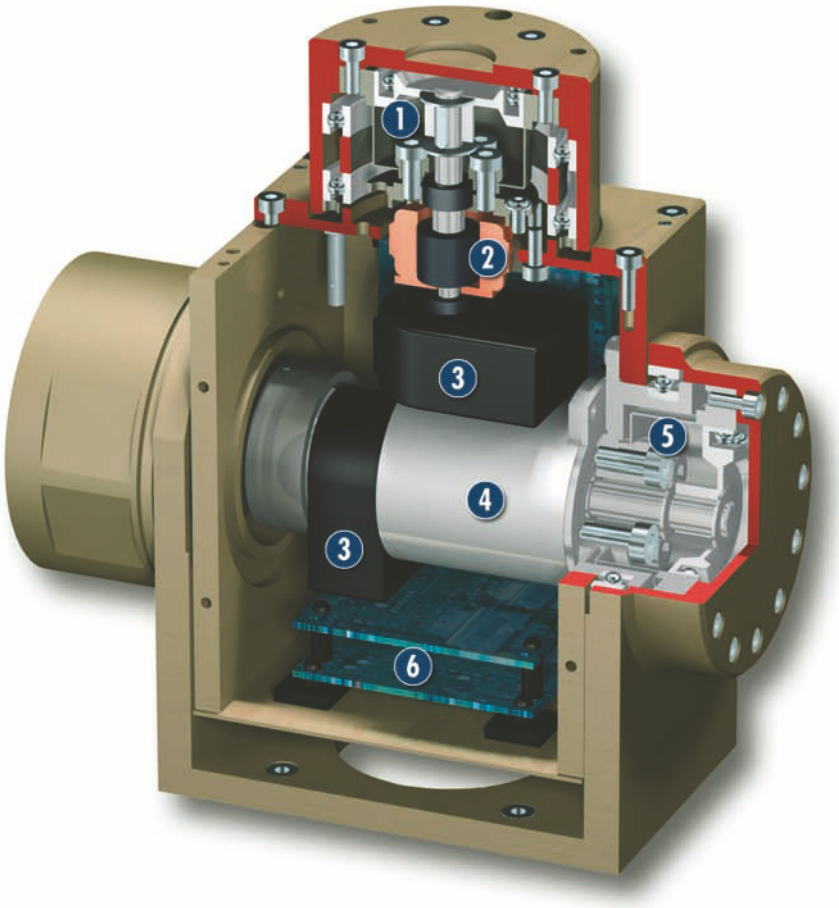
Actuation
servo-electric, with two brushless DC servo-motors and two incremental encoders for position and speed control

Warranty
24 months

Scope of delivery
"PowerCube Standard Software" CD-ROM, containing assembly and operating manual with manufacturer's declaration, quick-step software, demo and diagnostic programs and various driver files (see explanation of PowerCube system).

Further possible uses
Module suitable for use in clean room environment

Sectional diagram



1 **Axis 2**
for endless rotations

2 **Servo-motor axis 2**

3 **Encoder**
for position evaluation

4 **Servo-motor axis 1**
for maximum torques

5 **Axis 1**
for rotations up to +/– 120°

6 **Control electronics**
integrated control and power electronics

Function description

The pan tilt actuator accommodates two self-contained servo axes in an extremely compact housing. Both axes are actuated and moved by the separately integrated control electronics completely independent from one another.
Each axis features a Harmonic Drive® precision gear, which is driven directly by a brushless DC servo-motor.

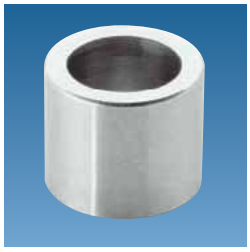
Electrical actuation

The PW pan tilt actuator is electrically actuated by the fully integrated control and power electronics. In this way, the module does not require any additional external control units.
A varied range of interfaces, such as Profibus DP, CAN-Bus or RS-232 are available as methods of communication. This enables you to create industrial bus networks, and ensures easy integration in control systems. You can make use of our hybrid cables for conveying the supply voltage and for communication.
If you wish to create combined systems (e.g. a rotary gripping module), various other modules from our PowerCube series are at your disposal.

Accessories

Accessories from SCHUNK – the suitable complement for the highest level of functionality, reliability and controlled production of all automation components.

Centering sleeves

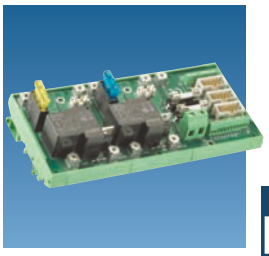


Interfaces

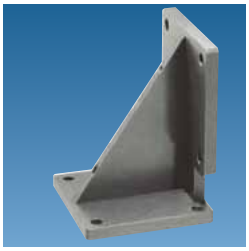
CAN-Bus	RS-232
Profibus-DP	

Hybrid cable

Electrical accessories PAE terminal block



PAM standard connecting elements



ⓘ For the exact size of the required accessories, availability of this size and the designation and ID, please refer to the additional views at the end of the size in question. You will find more detailed information on our accessory range in the „Accessories“ catalog section.

General information on the series

Repeat accuracy

Repeat accuracy is defined as the spread of the limit position after 100 consecutive swiveling cycles.

Axis positions

The position of the axes is always shown in the drawing in the zero position (0°). From here, it can be rotated clockwise and anti-clockwise in the “radius of action with end position switch“ – software end positions (basic position on delivery). If the basic parameters are changed (software end positions are deactivated), axis 2 of the module can be swiveled until the memory for the position value in the control electronics overflows.

Swiveling time

Swiveling times are purely the rotation times of the axes. Relay switching times or SPC reaction times are not included in the above times and must be taken into consideration when determining cycle times. Load-dependent rest periods may have to be included in the cycle time.

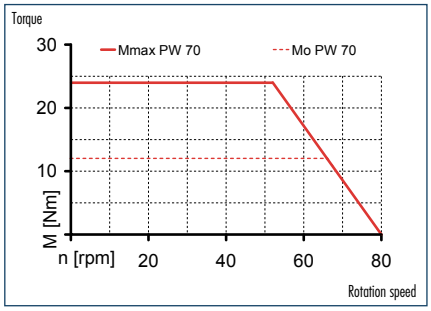
Mean attached load

The mean attached load should constitute a typical load. It is defined as the half of the max. possible moment of inertia that can be swiveled without bouncing or hitting, with a centric load and a vertical rotating axis.

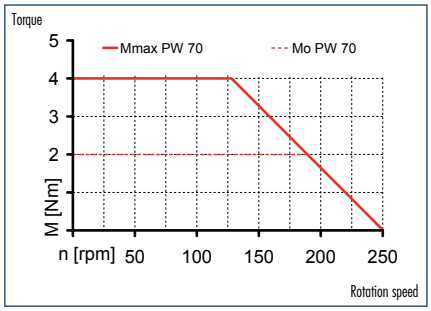
PW 70

Electrical · Rotary Actuators · Pan Tilt Actuator

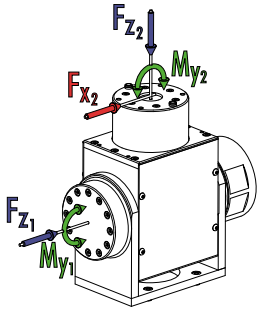
Torque characteristic axis 1



Torque characteristic axis 2



Forces and moments



		Axis 1	Axis 2
M_y	max.	8.0 Nm	8.0 Nm
F_z	max.	80.0 N	80.0 N
F_x	max.		120.0 N

ⓘ Moments and forces may occur simultaneously.

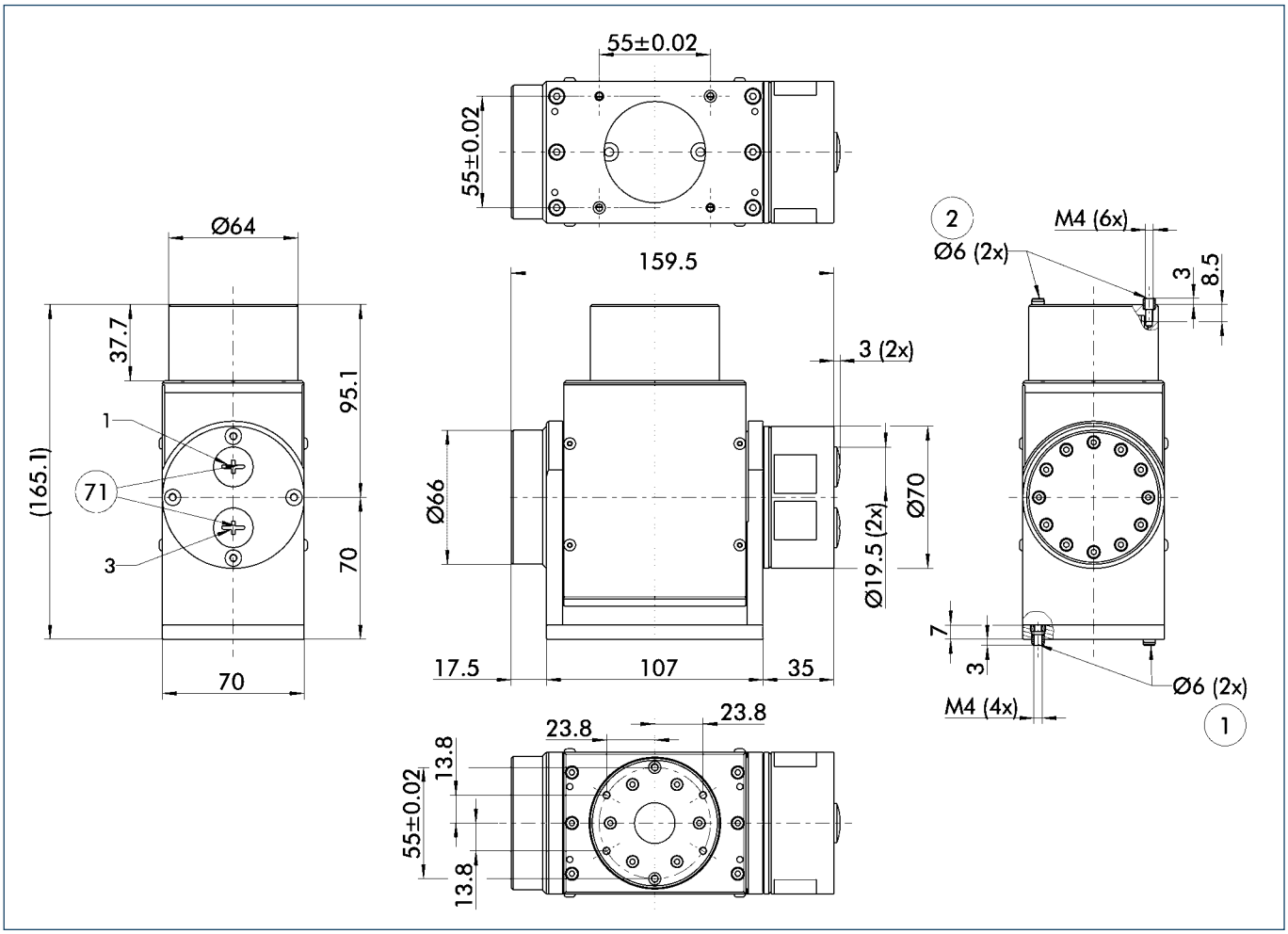
Technical data

Description			PW 70	
	ID		0306603	
IP class			54	
Weight	[kg]		1.8	
Min. ambient temperature	[°C]		5.0	
Max. ambient temperature	[°C]		55.0	
Mechanical operating data		**Axis 1**		**Axis 2**
Nominal torque	[Nm]	12.0		2.0
Peak torque	[Nm]	24.0		4.0
Angle of rotation (1:±/2:>)	[°]	120.0		360.0
Swiveling time (90°) with mean attached load	[s]	0.65		0.5
Repeat accuracy*	[°]	0.04		0.04
Max. angular velocity	[°/s]	240.0		360.0
Max. acceleration	[°/s²]	960.0		1440.0
Gear ratio		121:1		101:1
Magnetic brake		Yes		No
Resolution	[arcsec]	5.0		6.0
Electrical operating data				
Nominal voltage	[VDC]	24.0		24.0
Nominal power current	[A]	4.0		4.0
Max. current	[A]	8.0		
Control electronics				
Integrated electronics			Yes	
Voltage supply	[VDC]		24.0	
Nominal power current	[A]		0.5	
Sensor system			Encoder	
Interface			RS-232; Profibus-DP; CAN-Bus	

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

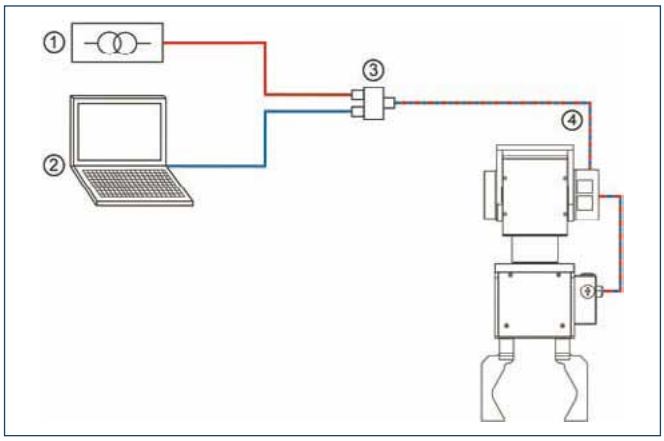
Main views



The drawing shows the rotary actuator with damp-proof cap in the basic version, the dimensions do not include the options described below.

① Connection of actuator
② Attachment connection
71 M16x1.5 for cable gland

Actuation



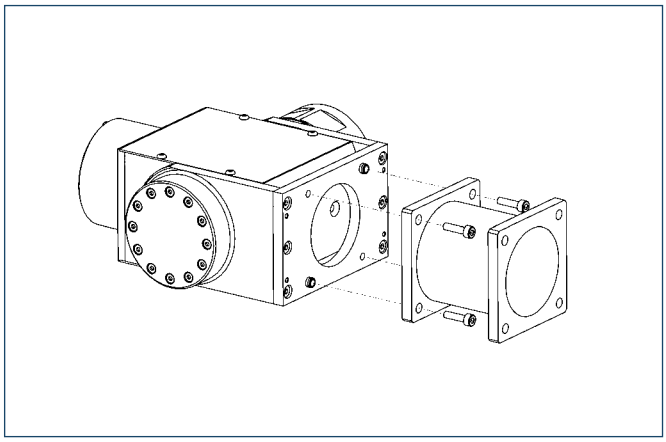
① 24 VDC voltage supply provided by customer
② Control (SPC, etc.) provided by customer
③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
④ Hybrid cable for connecting the PowerCube modules

Electrical accessories

Description	ID	Length
PowerCube Hybrid cable, coiled	0307753	0.3 m
PowerCube Hybrid cable, coiled	0307754	0.46 m
PowerCube Hybrid cable, straight (per meter)	9941120	
Terminal block PAE 130 TB	0307725	

You can find further cables in the „Accessories“ catalog section.

Mechanical accessories

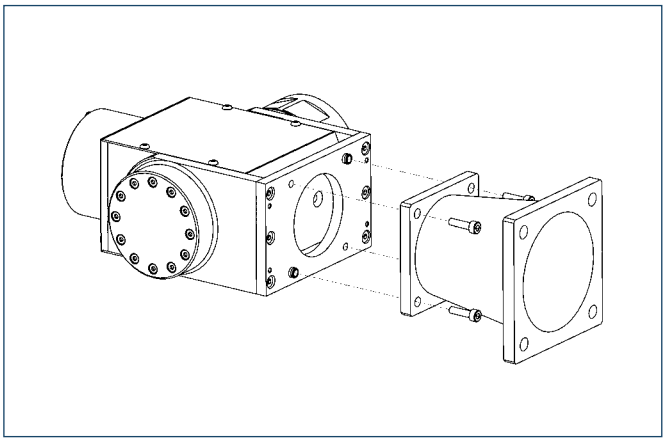


Straight connecting element

Straight standard element for connecting size 70 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 100	**0307800**	70x70/35/70x70 mm
PAM 101	**0307801**	70x70/70/70x70 mm

Special lengths on request

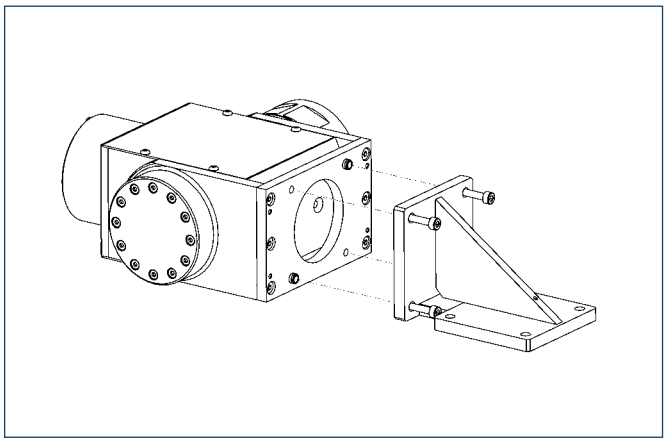


Conical connecting element

Conical standard element for connecting size 70 and 90 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 110	**0307810**	90x90/45/70x70 mm
PAM 111	**0307811**	90x90/90/70x70 mm

Special lengths on request



Right-angle connecting element

Right-angle standard element for connecting size 70 PowerCube modules with complete repeat accuracy

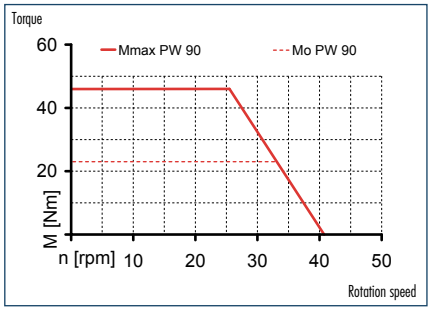
Description	ID	Dimensions
PAM 120	**0307820**	90°/70.5x98

You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

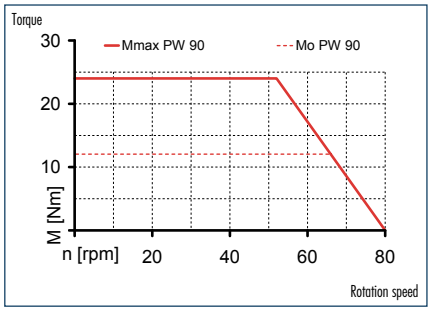
PW 90

Electrical · Rotary Actuators · Pan Tilt Actuator

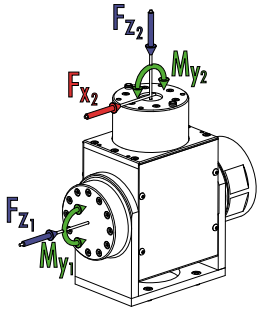
Torque characteristic axis 1



Torque characteristic axis 2



Forces and moments



	Axis 1	Axis 2
M_y max.	12.0 Nm	12.0 Nm
F_z max.	200.0 N	200.0 N
F_x max.		250.0 N

ⓘ Moments and forces may occur simultaneously.

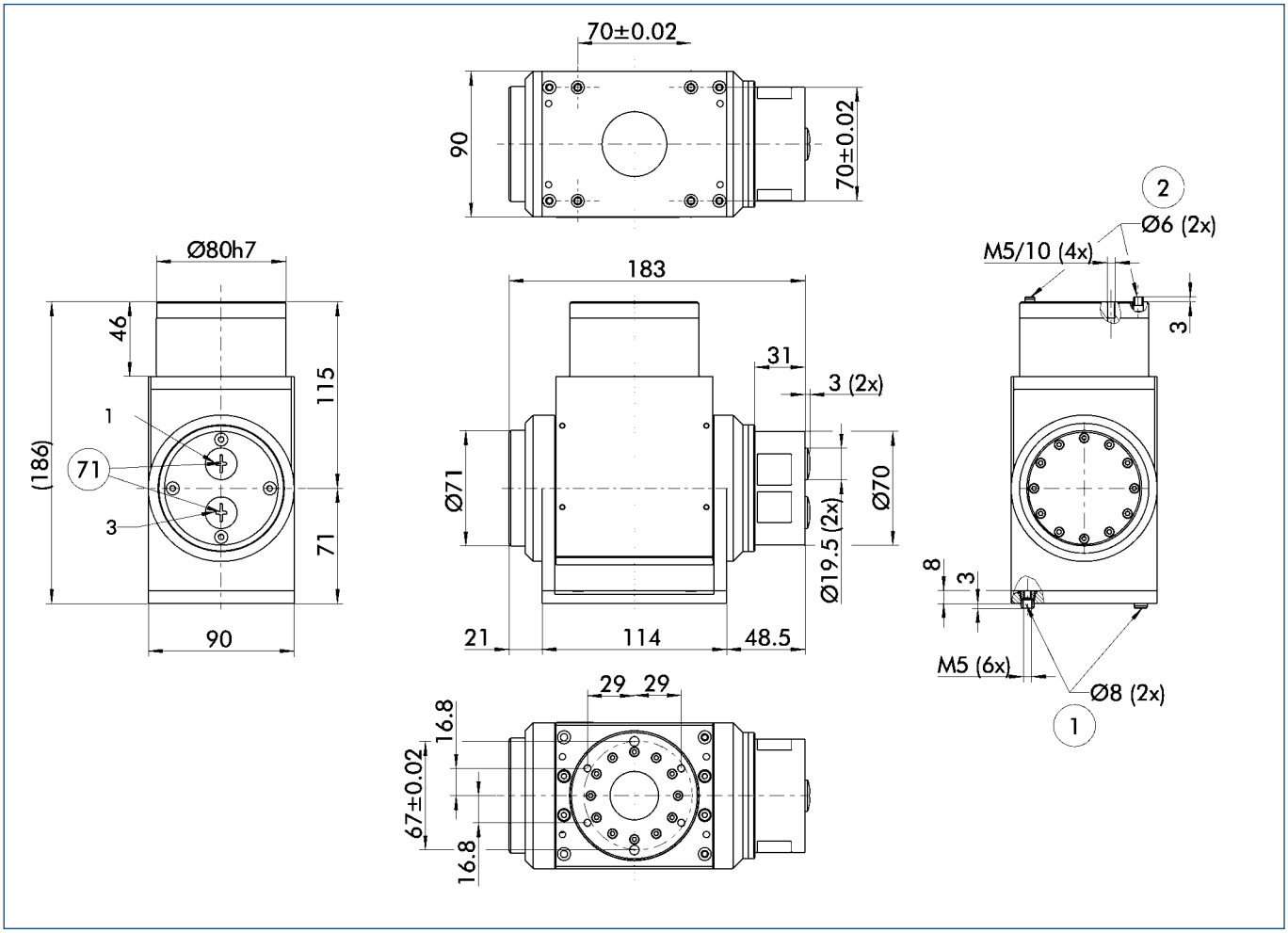
Technical data

Description			PW 90	
	ID		0306613	
IP class			54	
Weight	[kg]		3.4	
Min. ambient temperature	[°C]		5.0	
Max. ambient temperature	[°C]		55.0	
Mechanical operating data		**Axis 1**		**Axis 2**
Nominal torque	[Nm]	23.0		12.0
Peak torque	[Nm]	46.0		24.0
Angle of rotation (1:±/2:>)	[°]	120.0		360.0
Swiveling time (90°) with mean attached load	[s]	0.85		0.65
Repeat accuracy*	[°]	0.04		0.04
Max. angular velocity	[°/s]	150.0		240.0
Max. acceleration	[°/s²]	600.0		960.0
Gear ratio		161:1		121:1
Magnetic brake		Yes		No
Resolution	[arcsec]	4.0		5.0
Electrical operating data				
Nominal voltage	[VDC]		24.0	
Nominal power current	[A]		4.0	
Max. current	[A]		8.0	
Control electronics				
Integrated electronics			Yes	
Voltage supply	[VDC]		24.0	
Nominal power current	[A]		0.5	
Sensor system			Encoder	
Interface			RS-232; Profibus-DP; CAN-Bus	

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

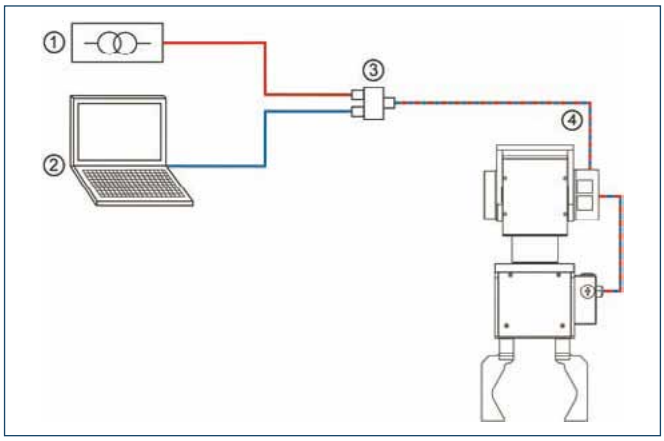
Main views



The drawing shows the rotary actuator with damp-proof cap in the basic version, the dimensions do not include the options described below.

① Connection of actuator
② Attachment connection
71 M16x1.5 for cable gland

Actuation



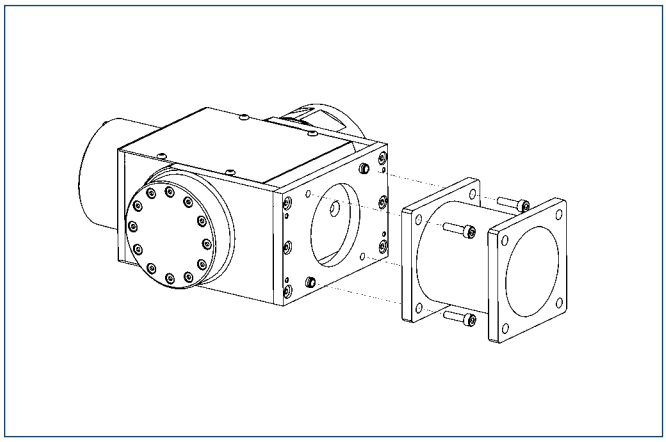
① 24 VDC voltage supply provided by customer
② Control (SPC, etc.) provided by customer
③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
④ Hybrid cable for connecting the PowerCube modules

Electrical accessories

Description	ID	Length
PowerCube Hybrid cable, coiled	0307753	0.3 m
PowerCube Hybrid cable, coiled	0307754	0.46 m
PowerCube Hybrid cable, straight (per meter)	9941120	
Terminal block PAE 130 TB	0307725	

You can find further cables in the „Accessories“ catalog section.

Mechanical accessories

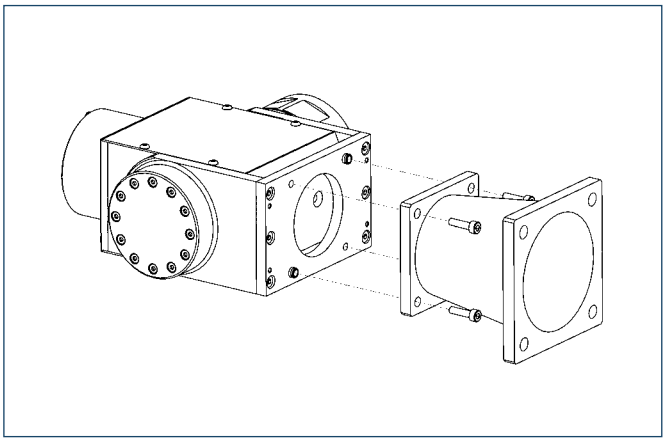


Straight connecting element

Straight standard element for connecting size 90 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 102	**0307802**	90x90/45/90x90 mm
PAM 103	**0307803**	90x90/90/90x90 mm

Special lengths on request

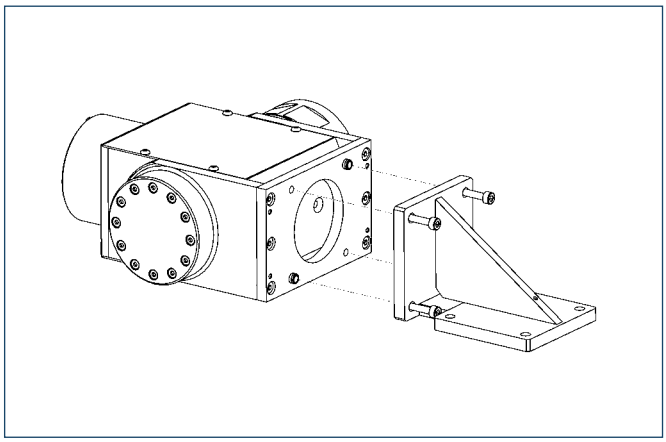


Conical connecting element

Conical standard element for connecting size 70, 90 and 110 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 110	**0307810**	90x90/45/70x70 mm
PAM 111	**0307811**	90x90/90/70x70 mm
PAM 112	**0307812**	110x110/55/90x90 mm
PAM 113	**0307813**	110x110/110/90x90 mm

Special lengths on request



Right-angle connecting element

Right-angle standard element for connecting size 90 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 121	**0307821**	90°/90.5x122

You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

Electric Rotary Modules

DRIVES

Modular Robotics

The modules of the PowerCube series provide the basis for flexible combinatorics in automation. Complex systems and multiple-axis robot structures with several degrees of freedom can be achieved with minimum time and expenditure spent on design and programming.

Your advantages and benefits

Modular

- Standardized interfaces for mechatronics and control for rapid and simple assembly without complicated designs
- Cube geometry with diverse possibilities for creating individual solutions from the modular system

Integrated

- The control and power electronics are fully integrated in the modules for minimal space requirements and interfering contours
- Single-cable technology combines data transmission and the power supply for minimal assembly and start-up costs

Intelligent

- Integrated high-end microcontroller for rapid data processing
- Decentralized control system for digital signal processing
- Universal communication interfaces for rapid incorporation in existing servo-controlled concepts

Module overview

The innovative technology of the PowerCube modules already forms the basis of numerous applications in the fields of measuring and testing systems, laboratory automation, service robotics and flexible robot technology.

PG
Servo-electric
2-Finger Parallel Gripper

PR
Servo-electric
Rotary Actuators

PW
Servo-electric
Rotary Pan Tilt Actuators

PSM
Servo-motors with
integrated position control

PDU
Servo-positioning motor
with precision gears

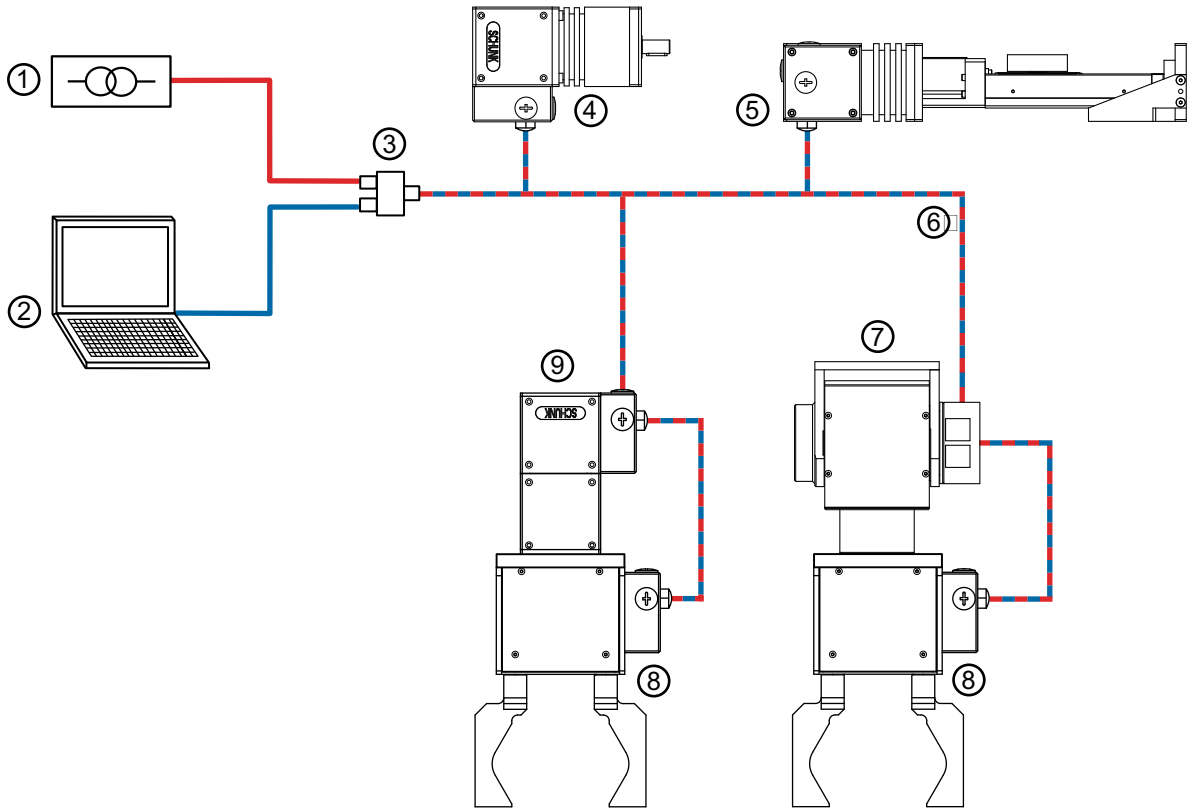
PLS
Servo-electric
Linear Axes with
ball-and-screw spindle drive

Method of actuation

The PowerCube modules work completely independently. The master control system is only required for generating the sequential program and sending it step by step to the connected modules. Therefore, only the current sequential command is ever stored in the modules, and the subsequent command is stored in the buffer. The current, rotational speed and positioning are controlled in the module itself. Likewise, functions such as temperature and limit monitoring are performed in the module itself. Real-time capability is not absolutely essential for the master control or bus system.

Control version	A	B			C
Hardware	Control with SPC (S7)	Control with PC			Control with PC
Interface	Profibus DP	CAN bus / RS-232			CANopen
Software	PowerCube standard software (gsd file, programming examples)	Windows operating system PowerCube standard software	LINUX operating system on request	Development platforms (LabView, Diadem) on request	on request (e.g. Eckelmann CNC 55)

ⓘ Included with the "PowerCube Standard Software" CD-ROM (ID 0307700): Assembly and operating manual with Manufacturer's Declaration, quick-step software, demo and diagnostic program plus various driver files.



① 24 VDC / 48 VDC power supply provided by the customer
② Control system provided by the customer (see control versions A, B and C)
③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
④ PDU servo-motor
⑤ Linear axis with PLS ball-and-screw spindle drive and PSM servo-motor
⑥ Hybrid cable (single-cable technology) for connecting the PowerCube modules (voltage supply and communication)
⑦ PW Servo-electric Rotary Pan Tilt Actuator
⑧ PG Servo-electric 2-Finger Parallel Gripper
⑨ PR Servo-electric Rotary Actuator

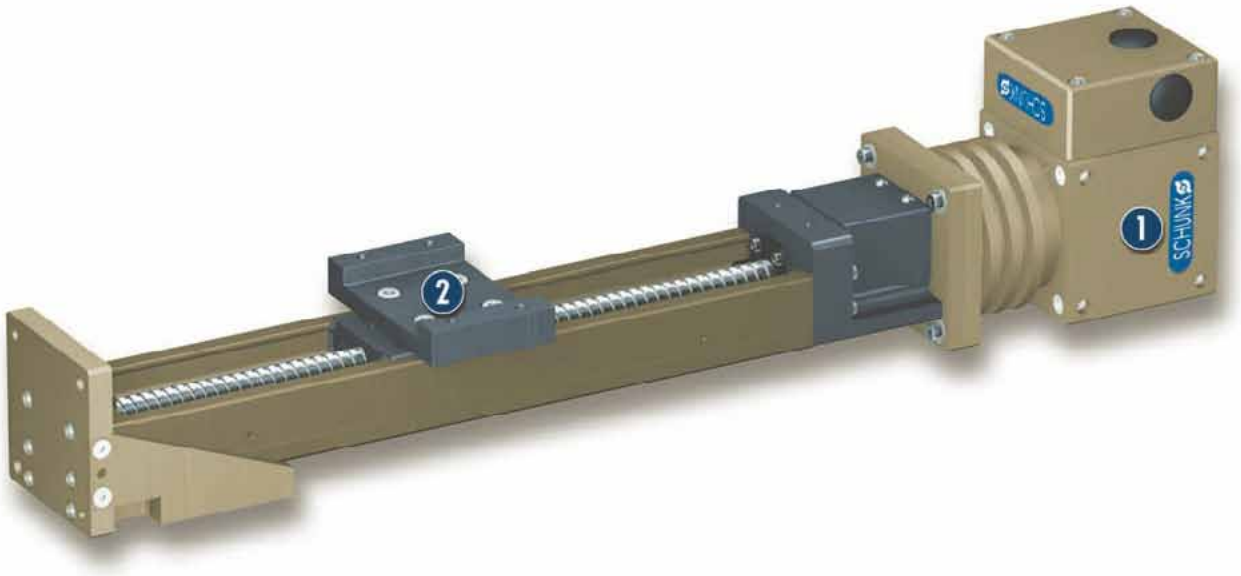
Sizes
70 .. 110

Weight
1.1 kg .. 3.9 kg

Nominal torque
0.19 Nm .. 1.0 Nm

Repeat accuracy
0.5°

Application example



Sturdy spindle axis with high positioning accuracy, driven by PSM motor

1 Servo-motor with integrated position control PSM 70

2 Linear Axis with PLS 70 ball-and-screw spindle drive

Servo-motor

Servo-motor with integrated position control

Area of application

Servo-drive for linear, rotary or CNC axes;
axis motor for applications in the field of measuring and testing

Your advantages and benefits

Servo-motor with large positioning range
for flexibility in use

High-resolution encoder
for high precision

Fully integrated control and power electronics
for the creation of a decentralized control system, no separate motor controller required in the control cabinet

Versatile actuation options
for simple integration in existing servo-controlled concepts via Profibus DP, CAN bus or RS-232

Standard connecting elements and uniform control concept
for extensive combinatorics with other PowerCube modules (see explanation of the PowerCube system)

Single-cable technology for data transmission and voltage supply (plug & play)
for low assembly and start-up costs

POWERCUBE

Information about the series

Working principle
with motor shaft driven by a brushless DC servo-motor

Housing material
Aluminum alloy, hard-anodized

Actuation
Servo-electric, with brushless servo-motor and incremental encoder for position and speed control

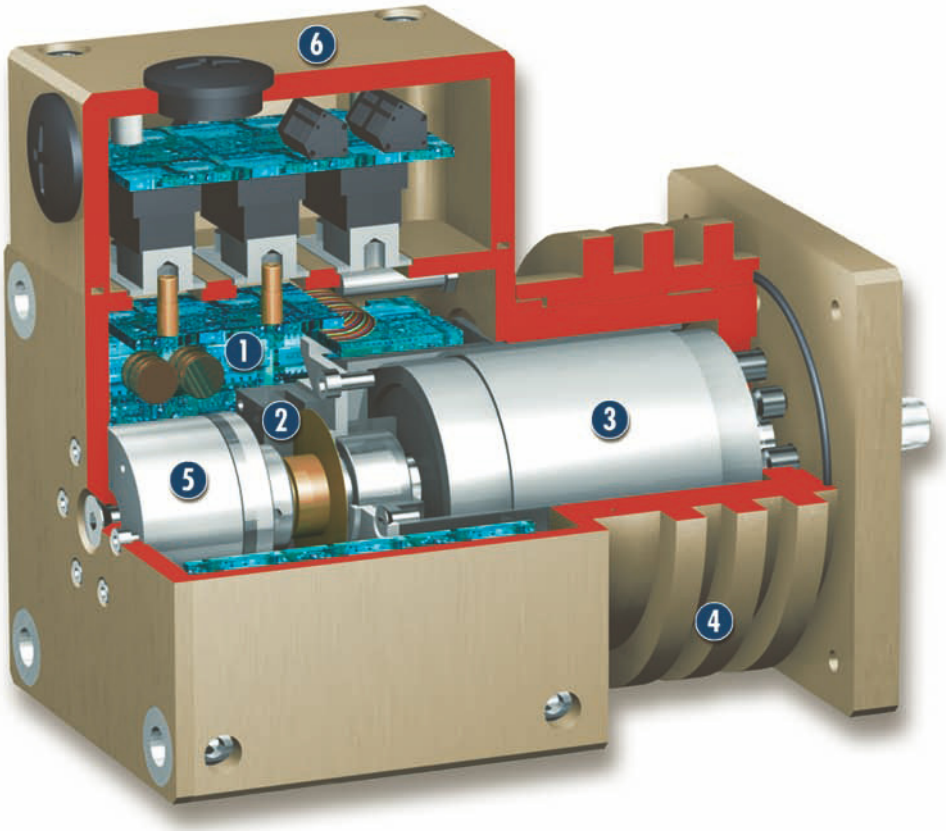
Warranty
24 months

Scope of delivery
"PowerCube Standard Software" CD-ROM, containing assembly and operating manual with manufacturer's declaration, quick-step software, demo and diagnostic programs and various driver files (see explanation of PowerCube system)

Optional extras
· Magnetic brake
· Input for external encoder signal
· Outdoor modification

Other information
· Unit suitable for use in clean room environment
· 4 digital EIA 24 VDC
· Differential encoder signal output (RS-422)

Sectional diagram



1 **Control electronics**
Integrated control and power electronics

2 **Encoder**
for position evaluation

3 **Motor**
for maximum torques

4 **Heat sink**

5 **Brake**
for holding function when unit is stationary and on power failure

6 **Damp-proof cap**
link to the customer's system

Function description

The motor shaft is driven directly by a brushless DC servo-motor.

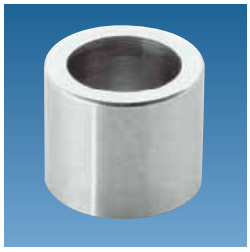
Electrical actuation

The PSM servo-motor is electrically actuated by the fully integrated control and power electronics. In this way, the module does not require any additional external control units.
A varied range of interfaces, such as Profibus DP, CAN-Bus or RS-232 are available as methods of communication. This enables you to create industrial bus networks, and ensures easy integration in control systems. You can make use of our hybrid cables for conveying the supply voltage and for communication.
If you wish to create combined systems (e.g. linear unit with servo-motor and rotary gripping module), various other modules from our PowerCube series are at your disposal.

Accessories

Accessories from SCHUNK – the suitable complement for the highest level of functionality, reliability and controlled production of all automation components.

Centering sleeves

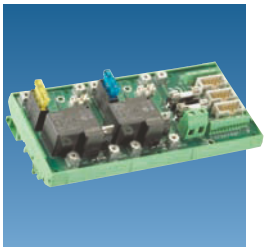


Interfaces

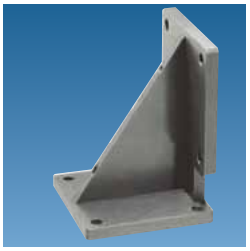
CAN-Bus	RS-232
Profibus-DP	

Hybrid cable

Electrical accessories PAE terminal block



PAM standard connecting elements



ⓘ For the exact size of the required accessories, availability of this size and the designation and ID, please refer to the additional views at the end of the size in question. You will find more detailed information on our accessory range in the „Accessories“ catalog section.

General information on the series

Repeat accuracy

Centering sleeves repeat accuracy is defined as the spread of the limit position after 100 consecutive motion cycles.

Position of motor shaft

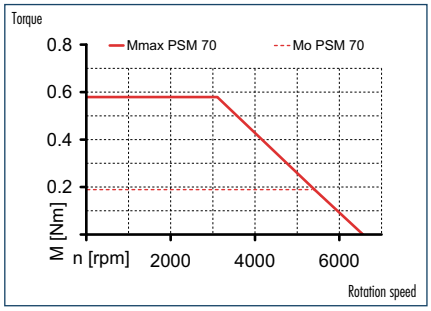
The position of the motor shaft is always shown in the drawing in the zero position (0°). From here, the motor shaft can be rotated clockwise and anti-clockwise until the memory for the position value in the control electronics overflows.

Swiveling time

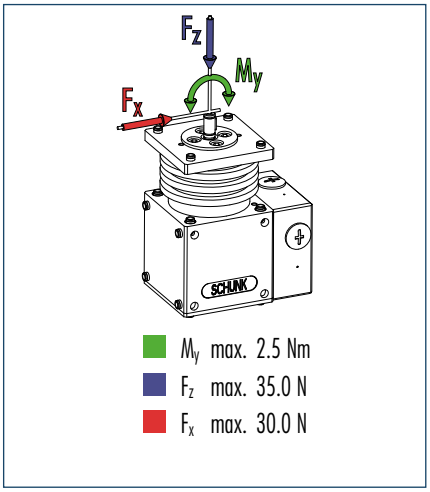
Swiveling times are purely rotation times. Relay switching times or SPC reaction times are not included in the above times and must be taken into consideration when determining cycle times. Load-dependent rest periods may have to be included in the cycle time.

PSM 70

Torque characteristic



Forces and moments



ⓘ Moments and forces may occur simultaneously.

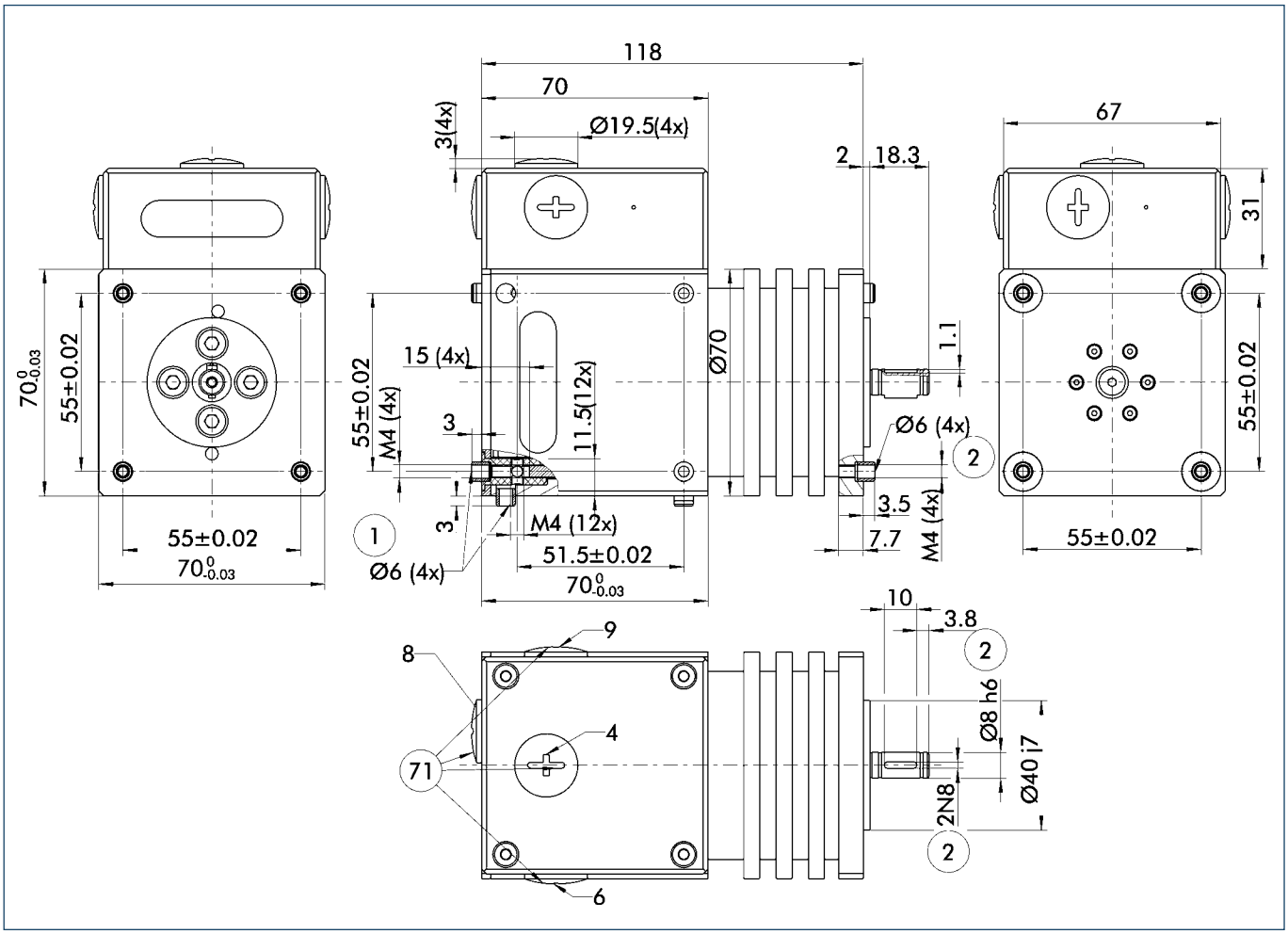
Technical data

Description		PSM 70
	ID	0306653
Version with brake		PSM 70-B
	ID	0306658
Mechanical operating data		
Nominal torque	[Nm]	0.19
Peak torque	[Nm]	0.58
Angle de rotation	[°]	360.0
IP class		64
Weight	[kg]	2.4
Min. ambient temperature	[°C]	5.0
Max. ambient temperature	[°C]	55.0
Repeat accuracy*	[°]	0.6
Max. angular velocity	[°/s]	24000.0
Max. acceleration	[°/s²]	96000.0
Electrical operating data		
Nominal voltage	[VDC]	24.0
Nominal power current	[A]	4.0
Max. current	[A]	8.0
Resolution	["]	648.0
Control electronics		
Integrated control electronics		Yes
Voltage supply	[VDC]	24.0
Nominal power current	[A]	0.5
Sensor system		Encoder
Interface		RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

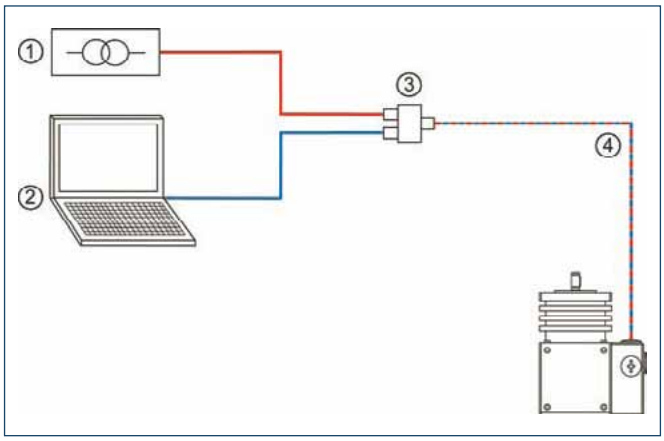
Main views



The drawing shows the servo-motor with damp-proof cap in the basic version, it does not include the options described below.

① Connection of rotary actuator
② Attachment connection
71 M16x1.5 for cable gland

Actuation



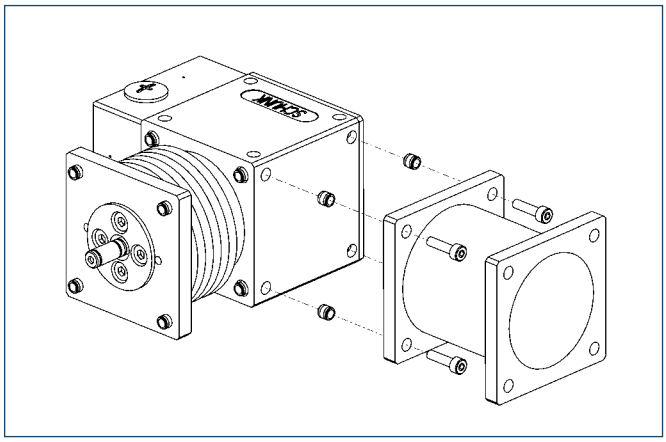
① Voltage supply provided by customer
② Control (SPC, etc.) provided by customer
③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
④ Hybrid cable for connecting the PowerCube modules

Electrical accessories

Description	ID	Length
PowerCube Hybrid cable, coiled	0307753	0.3 m
PowerCube Hybrid cable, coiled	0307754	0.46 m
PowerCube Hybrid cable, straight (per meter)	9941120	
Terminal block PAE 130 TB	0307725	

You can find further cables in the „Accessories“ catalog section.

Mechanical accessories

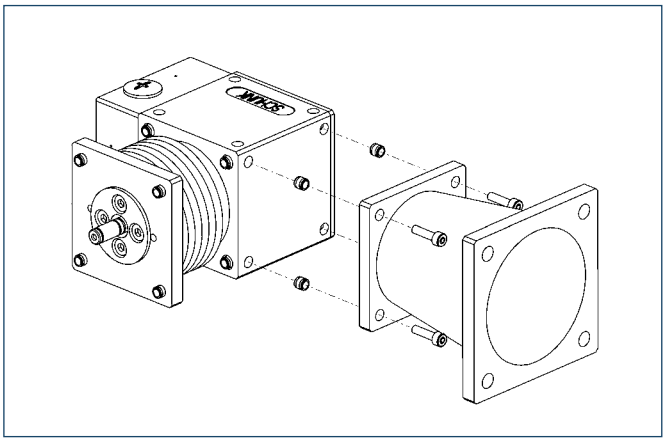


Straight connecting element

Straight standard element for connecting size 70 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 100	**0307800**	70x70/35/70x70 mm
PAM 101	**0307801**	70x70/70/70x70 mm

Special lengths on request

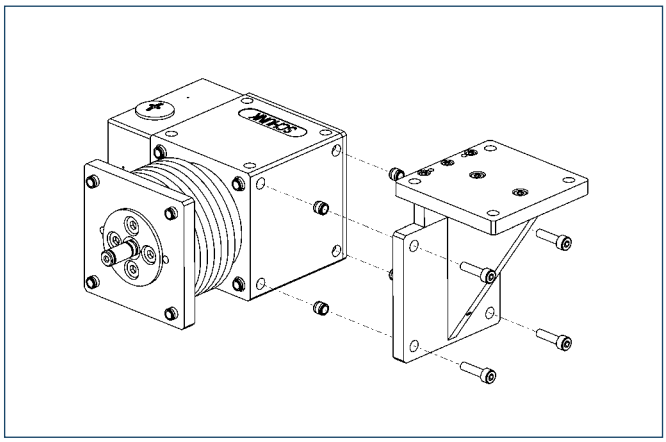


Conical connecting element

Conical standard element for connecting size 70 and 90 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 110	**0307810**	90x90/45/70x70 mm
PAM 111	**0307811**	90x90/90/70x70 mm

Special lengths on request



Right-angle connecting element

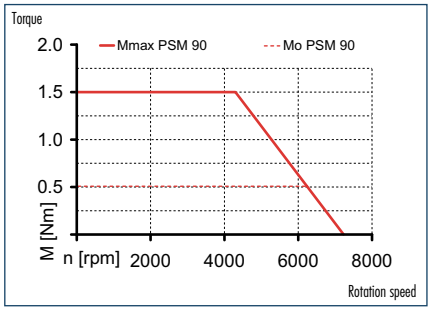
Right-angle standard element for connecting size 70 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 121	**0307821**	90°/90.5x122

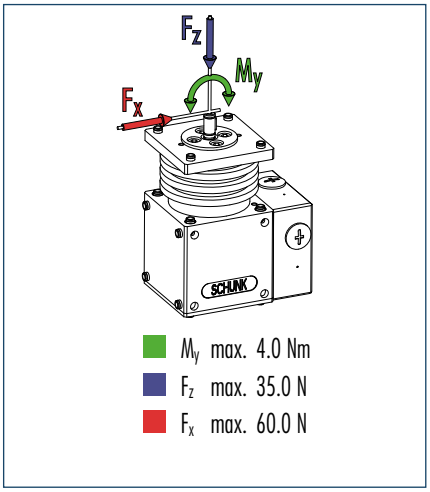
You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

PSM 90

Torque characteristic



Forces and moments



ⓘ Moments and forces may occur simultaneously.

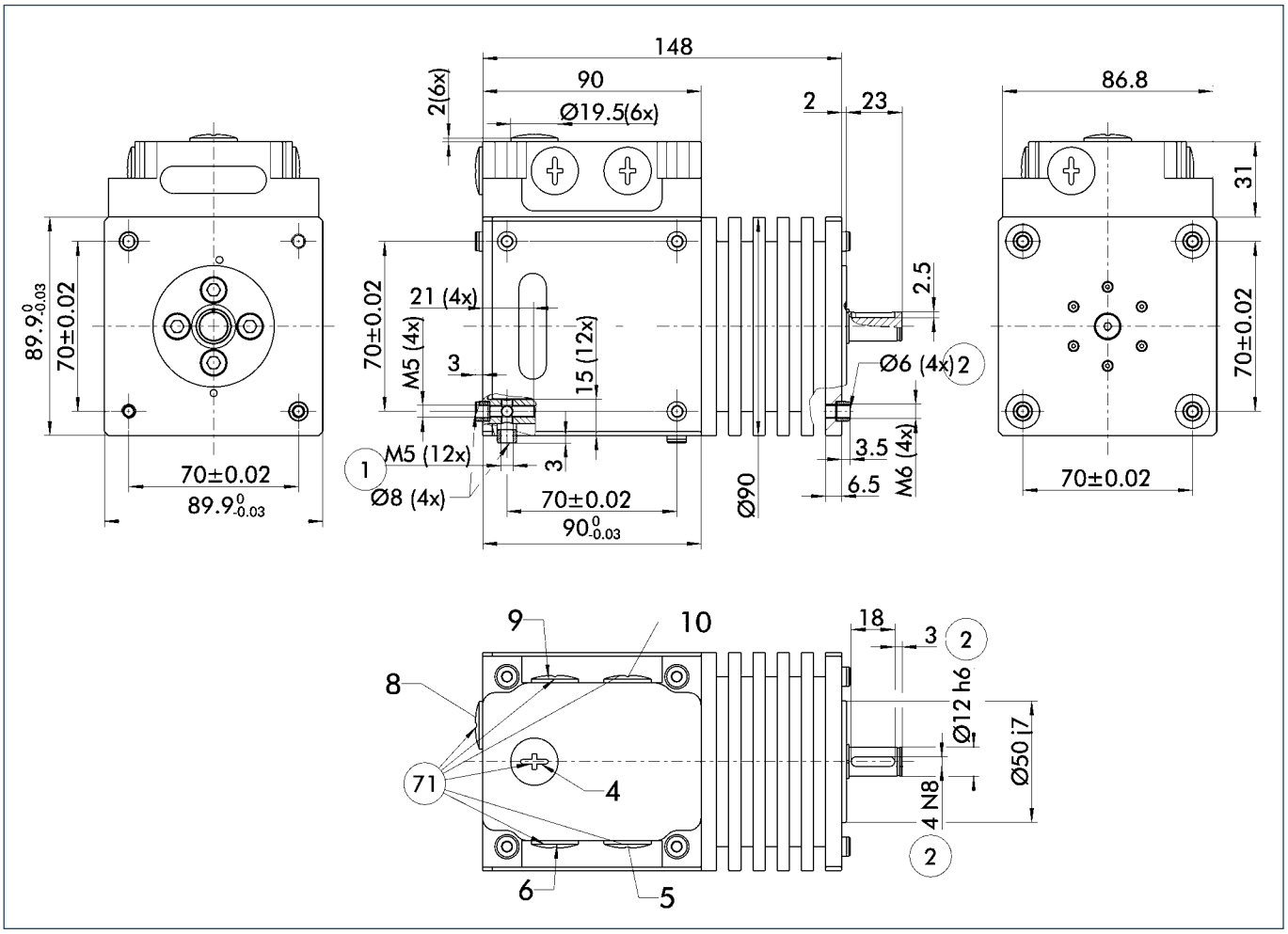
Technical data

Description		PSM 90
	ID	0306663
Version with brake		PSM 90-B
	ID	0306668
Mechanical operating data		
Nominal torque	[Nm]	0.51
Peak torque	[Nm]	1.5
Angle de rotation	[°]	360.0
IP class		64
Weight	[kg]	2.4
Min. ambient temperature	[°C]	5.0
Max. ambient temperature	[°C]	55.0
Repeat accuracy*	[°]	0.6
Max. angular velocity	[°/s]	24000.0
Max. acceleration	[°/s²]	96000.0
Electrical operating data		
Nominal voltage	[VDC]	24.0
Nominal power current	[A]	4.0
Max. current	[A]	12.0
Resolution	[“]	648.0
Control electronics		
Integrated control electronics		Yes
Voltage supply	[VDC]	24.0
Nominal power current	[A]	0.5
Sensor system		Encoder
Interface		RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

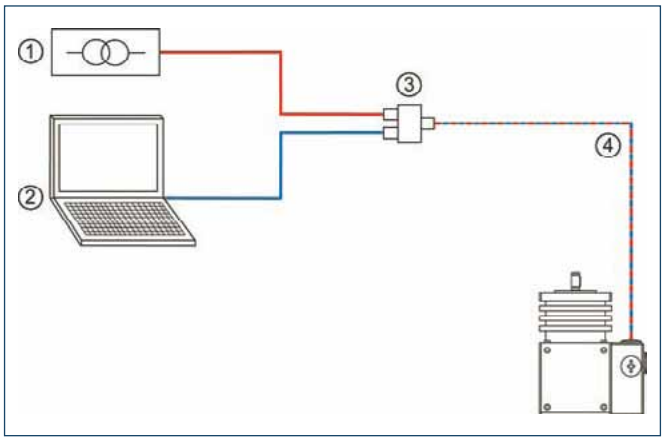
Main views



The drawing shows the servo-motor with damp-proof cap in the basic version, it does not include the options described below.

① Linear unit connection
② Attachment connection
71 M16x1.5 for cable gland

Actuation



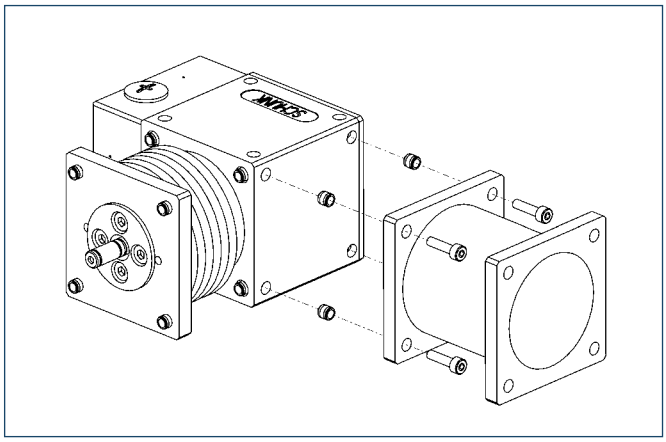
① Voltage supply provided by customer
② Control (SPC, etc.) provided by customer
③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
④ Hybrid cable for connecting the PowerCube modules

Electrical accessories

Description	ID	Length
PowerCube Hybrid cable, coiled	0307753	0.3 m
PowerCube Hybrid cable, coiled	0307754	0.46 m
PowerCube Hybrid cable, straight (per meter)	9941120	
Terminal block PAE 130 TB	0307725	

You can find further cables in the „Accessories“ catalog section.

Mechanical accessories

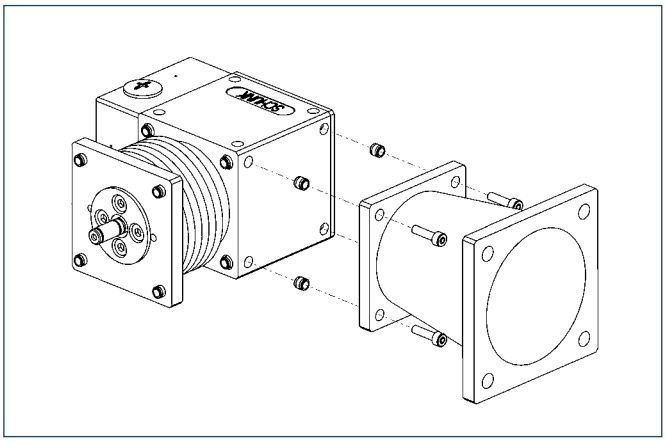


Straight connecting element

Straight standard element for connecting size 90 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 102	**0307802**	90x90/45/90x90 mm
PAM 103	**0307803**	90x90/90/90x90 mm

Special lengths on request

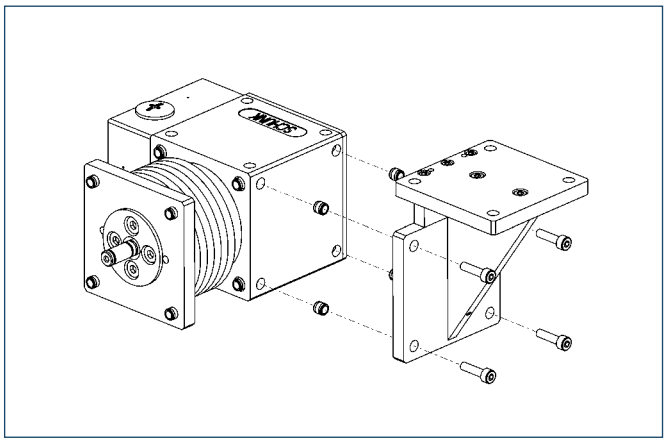


Conical connecting element

Conical standard element for connecting size 70, 90 and 110 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 110	**0307810**	90x90/45/70x70 mm
PAM 111	**0307811**	90x90/90/70x70 mm
PAM 112	**0307812**	110x110/55/90x90 mm
PAM 113	**0307813**	110x110/110/90x90 mm

Special lengths on request



Right-angle connecting element

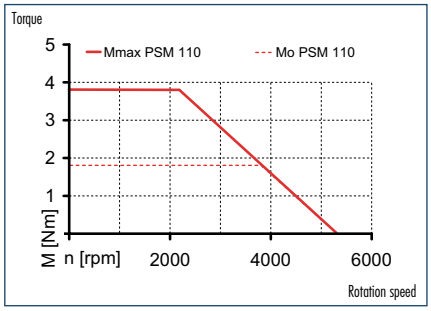
Right-angle standard element for connecting size 90 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 121	**0307821**	90°/90.5x122

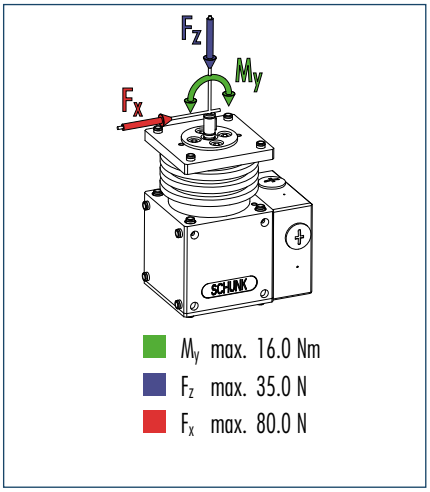
You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.

PSM 110

Torque characteristic



Forces and moments



ⓘ Moments and forces may occur simultaneously.

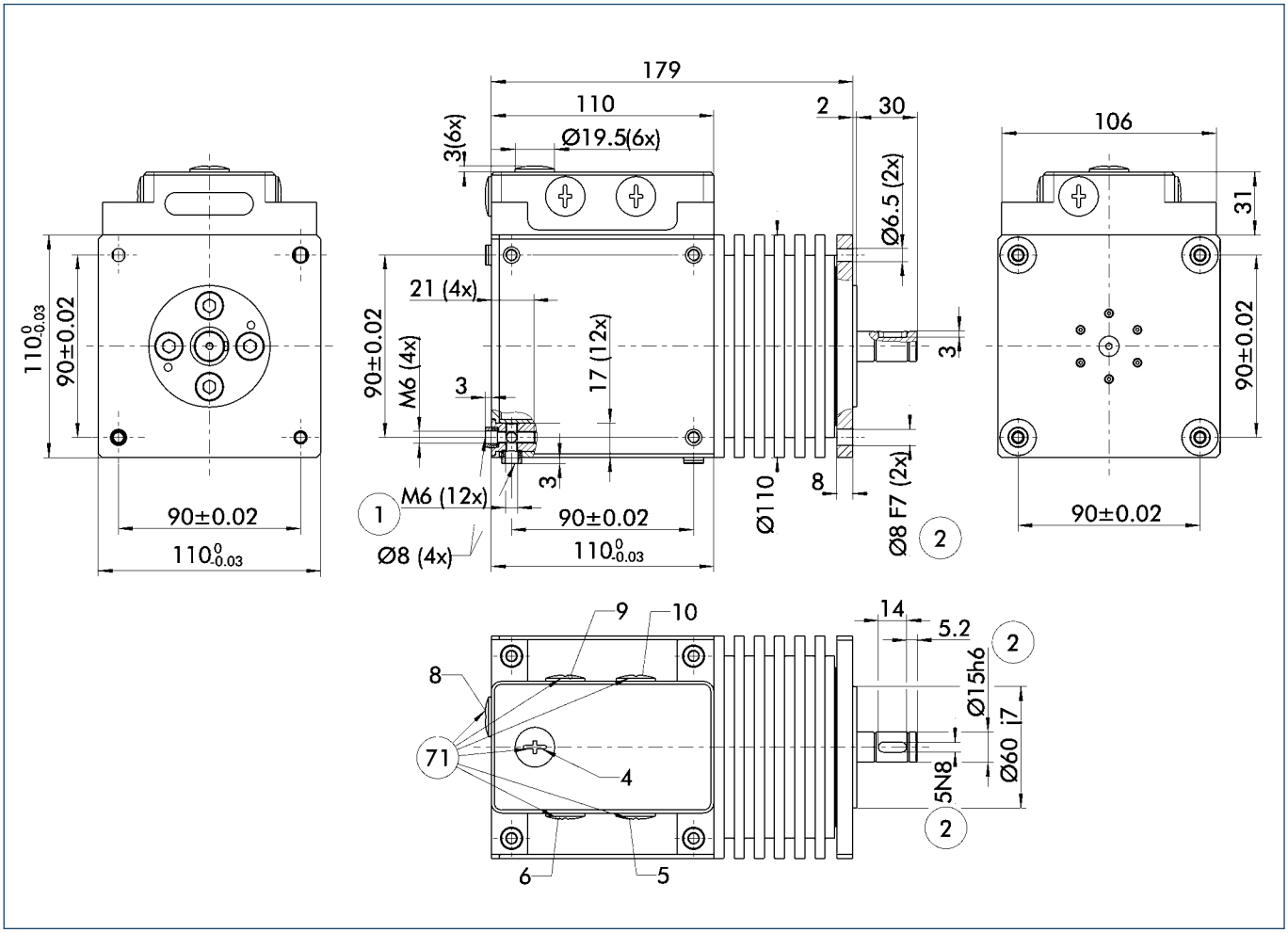
Technical data

Description		PSM 110
	ID	0306673
Version with brake		PSM 110-B
	ID	0306678
Mechanical operating data		
Nominal torque	[Nm]	1.8
Peak torque	[Nm]	3.8
Angle de rotation	[°]	360.0
IP class		64
Weight	[kg]	3.9
Min. ambient temperature	[°C]	5.0
Max. ambient temperature	[°C]	55.0
Repeat accuracy*	[°]	0.6
Max. angular velocity	[°/s]	24000.0
Max. acceleration	[°/s²]	96000.0
Electrical operating data		
Nominal voltage	[VDC]	48.0
Nominal power current	[A]	4.0
Max. current	[A]	12.0
Resolution	["]	648.0
Control electronics		
Integrated control electronics		Yes
Voltage supply	[VDC]	24.0
Nominal power current	[A]	0.5
Sensor system		Encoder
Interface		RS-232; Profibus-DP; CAN-Bus

ⓘ The peak torques act as a temporary drive reserve on acceleration and braking.

* Higher accuracy on request

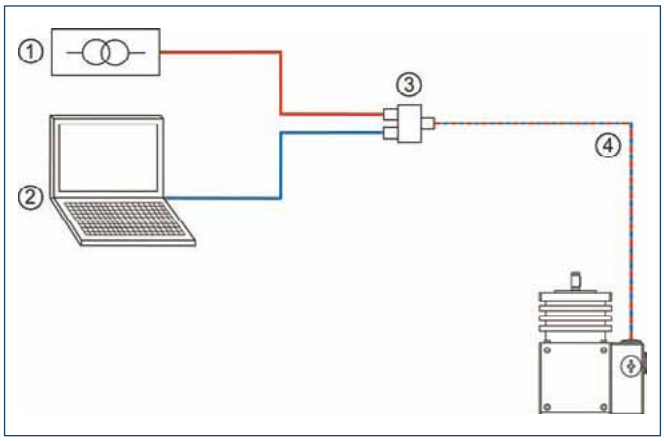
Main views



The drawing shows the servo-motor with damp-proof cap in the basic version, it does not include the options described below.

① Connection of rotary actuator
② Attachment connection
71 M16x1.5 for cable gland

Actuation



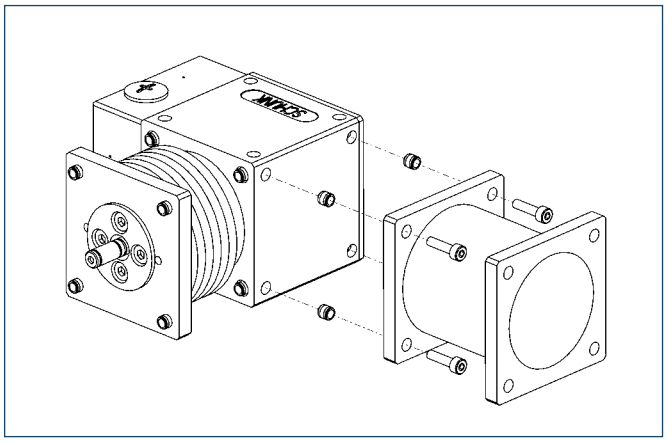
① Voltage supply provided by customer
② Control (SPC, etc.) provided by customer
③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable
④ Hybrid cable for connecting the PowerCube modules

Electrical accessories

Description	ID	Length
PowerCube Hybrid cable, coiled	0307753	0.3 m
PowerCube Hybrid cable, coiled	0307754	0.46 m
PowerCube Hybrid cable, straight (per meter)	9941120	
Terminal block PAE 130 TB	0307725	

You can find further cables in the „Accessories“ catalog section.

Mechanical accessories

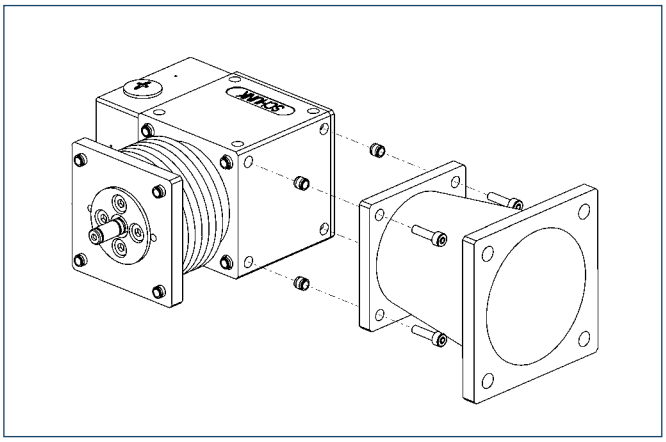


Straight connecting element

Straight standard element for connecting size 110 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 104	**0307804**	110x110/55/110x110 mm
PAM 105	**0307805**	110x110/110/110x110 mm

Special lengths on request

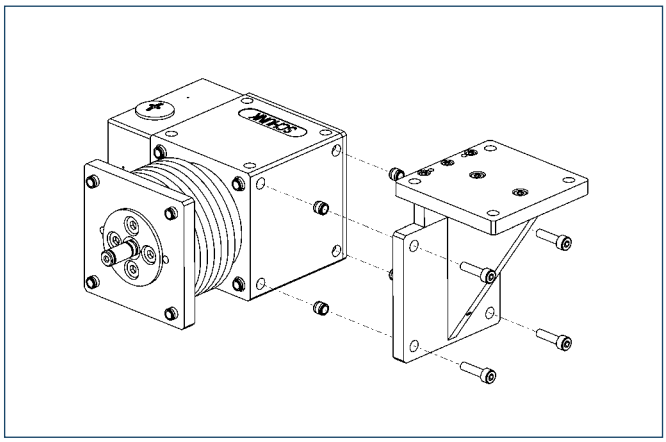


Conical connecting element

Conical standard element for connecting size 90 and 110 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 112	**0307812**	110x110/55/90x90 mm
PAM 113	**0307813**	110x110/110/90x90 mm

Special lengths on request



Right-angle connecting element

Right-angle standard element for connecting size 110 PowerCube modules with complete repeat accuracy

Description	ID	Dimensions
PAM 122	**0307822**	90°/110.5x146

You can find more detailed information and individual parts of the above-mentioned accessories in the „Accessories“ catalog section.