

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

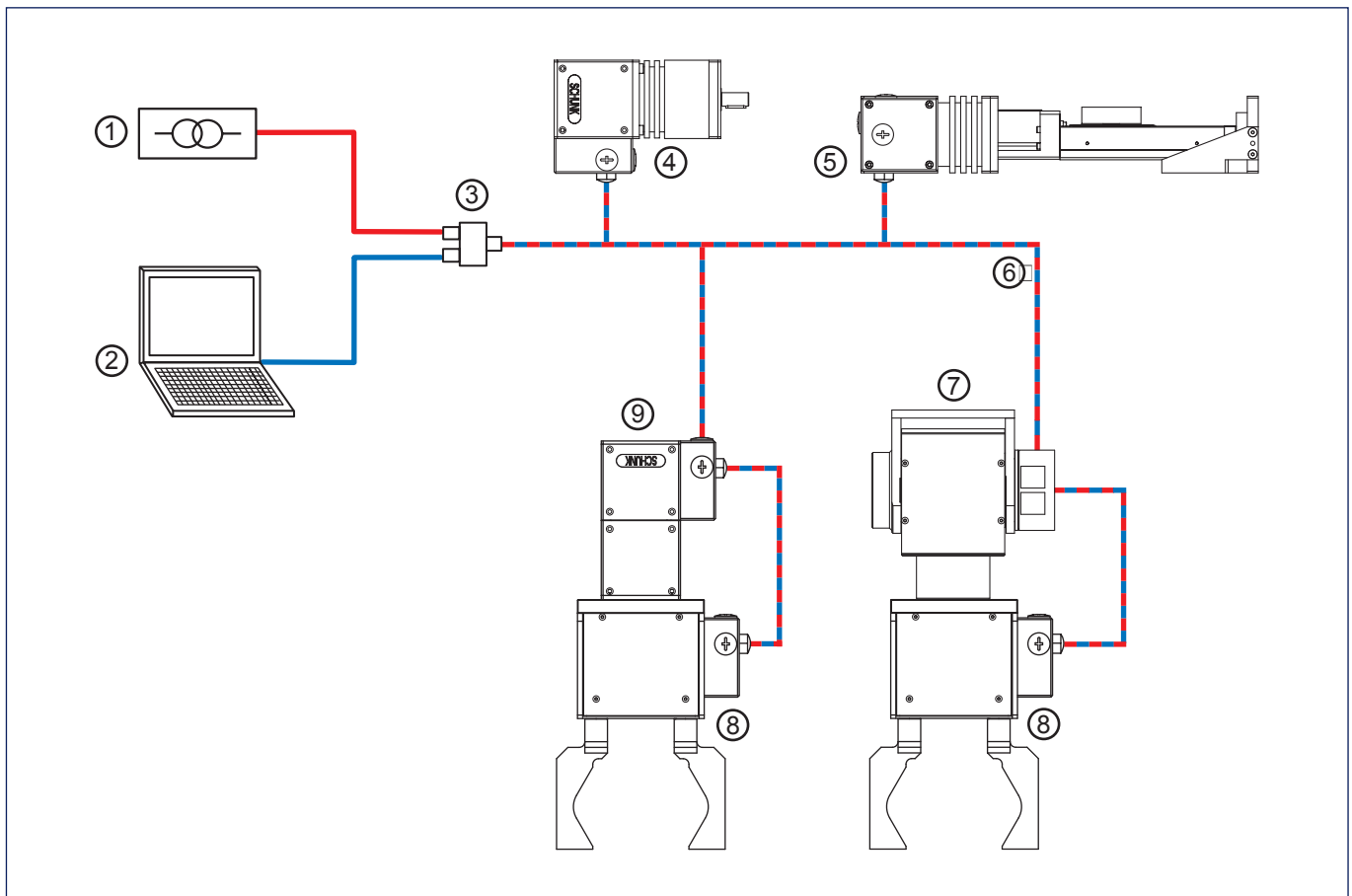
Method of actuation

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. For the communication over Bus-System the SMP - SCHUNK Motion Protocol - is used. This enables you to create industrial bus networks, and ensures easy integration in control systems.

Control version	A	B	
Hardware	Control with PLC (S7)	Control with PC	
Interface	Profibus DP	CAN bus / RS-232	
Software	MC-Demo Operating Software with Online documentation, gsd-file, programming examples	Windows (from Windows 98) operating system PowerCube standard software (gsd file, programming examples) on request	LINUX operating system Development platforms (LabView, Diadem) on request

① Included with the "Mechatronik DVD" (ID 9949633): Assembly and Operating Manual with manufacturer's declaration, MCDemo software and description and gsd-file for S7 use.



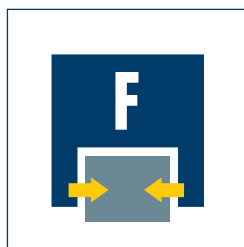
- ① 24VDC / 48VDC power supply provided by the customer
- ② Control system provided by the customer (see control versions A, B and C)
- ③ PAE 130 TB terminal block for connecting the voltage supply, the communication and the hybrid cable (Option for easy connection)
- ④ PDU servo-motor
- ⑤ Linear axis 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). Not recommended for the use in Profibus applications
- ⑦ PW Servo-electric Rotary Pan Tilt Actuator
- ⑧ PG Servo-electric 2-Finger Parallel Gripper
- ⑨ PR Servo-electric Rotary Actuator



Size
70



Weight
1.4 kg



Gripping force
up to 200 N



Stroke per finger
35 mm



Workpiece weight
1 kg

Application example



Double rotary gripper module for loading
and unloading of sensitive components

PG 70 Servo-electric
2-Finger Parallel Gripper

PR 70 Servo-electric
Rotary Actuator

Universal Gripper

Servo-electric 2-finger parallel gripper with highly precise gripping force control and long stroke

Area of application

Universal, ultra-flexible gripper for great part variety and sensitive components in clean working environments

Your advantages and benefits

Gripping force control in the range of 30 - 200 N
for the delicate gripping of sensitive workpieces

Long stroke of 70 mm
for flexible workpiece handling

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 servo-controlled concept
for extensive combinatorics with other PowerCube modules (see explanation of the PowerCube system)

Single-cable technology for data transmission and power supply
for low assembly and start-up costs



POWER  **CUBE**

General information on the series

Working principle

Ball screw drive

Housing material

Aluminum alloy, hard-anodized

Base jaw material

Aluminum alloy, hard-anodized

Actuation

Servo-electric, by brushless DC servo-motor

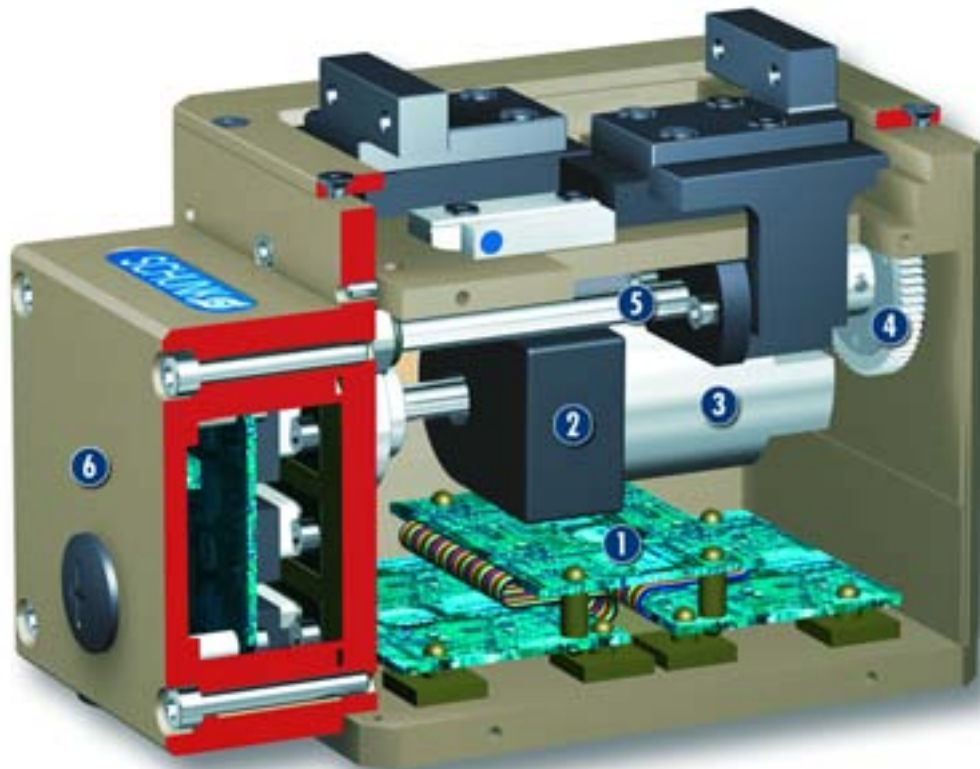
Warranty

24 months

Scope of delivery

Guide centering sleeves and "Mechatronik DVD" (contains an Assembly and Operating Manual with manufacturer's declaration and MC-Demo software with description)

Sectional diagram



Control electronics

integrated control and power electronics for controlling the servo-motor

Encoder

for gripper positioning and position evaluation

Drive

brushless DC servo-motor

Gear mechanism

transfers power from the servo-motor to the drive spindle

Spindle

transforms the rotational movement into the linear movement of the base jaw

Humidity protection cap

link to the customer's system

Function description

The brushless servo-motor drives the ball screw by means of the gear mechanism. The rotational movement is transformed into the linear movement of the base jaw by base jaws mounted on the spindles.

Electrical actuation

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

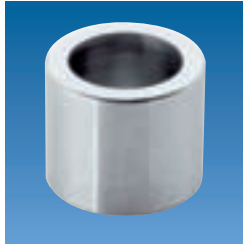
A varied range of interfaces, such as Profibus-DP, CAN-Bus or RS-232 are available as methods of communication. For the communication over Bus-System the SMP - SCHUNK Motion Protocol - is used. This enables you to create industrial bus networks, and ensures easy integration in control systems.

If you wish to create combined systems (e.g. a rotary gripper module), various other modules from the Mechatronik-Portfolio are at your disposal.

Accessories

Accessories from SCHUNK – the suitable supplement for maximum functionality, reliability and performance of all automation modules.

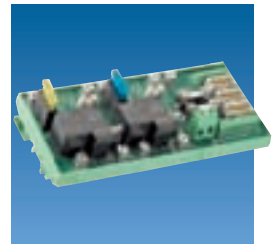
Centering sleeves



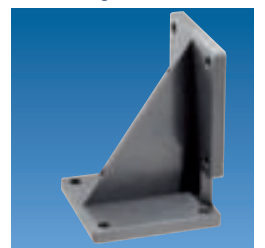
Hybrid cable



Electrical accessories PAE terminal block



PAM standard connecting elements



- ① 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

Gripping force

is the arithmetic total of the gripping force applied to each base jaw at distance P (see illustration), measured from the upper edge of the gripper.

Finger length

is measured from the upper edge of the gripper housing in the direction of the main axis.

Repeat accuracy

is defined as the spread of the limit position after 100 consecutive strokes.

Workpiece weight

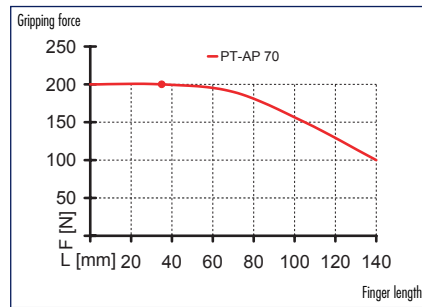
The recommended workpiece weight is calculated for a force-type connection with a coefficient of friction of 0.1 and a safety factor of 2 against slippage of the workpiece on acceleration due to gravity g. Considerably heavier workpiece weights are permitted with form-fit gripping.

Closing and opening times

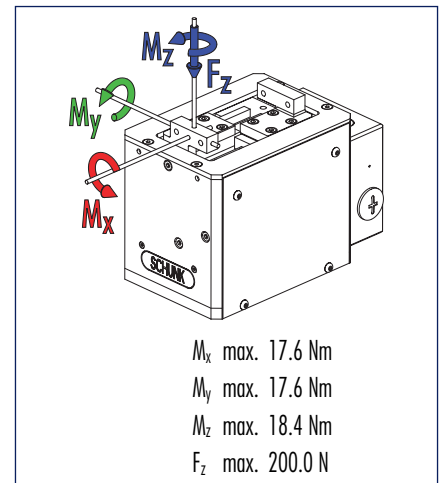
Closing and opening times are purely the times that the base jaws or fingers are in motion. Control or PLC reaction times are not included in the above times and must be taken into consideration when determining cycle times.



Gripping force, I.D. gripping



Finger load

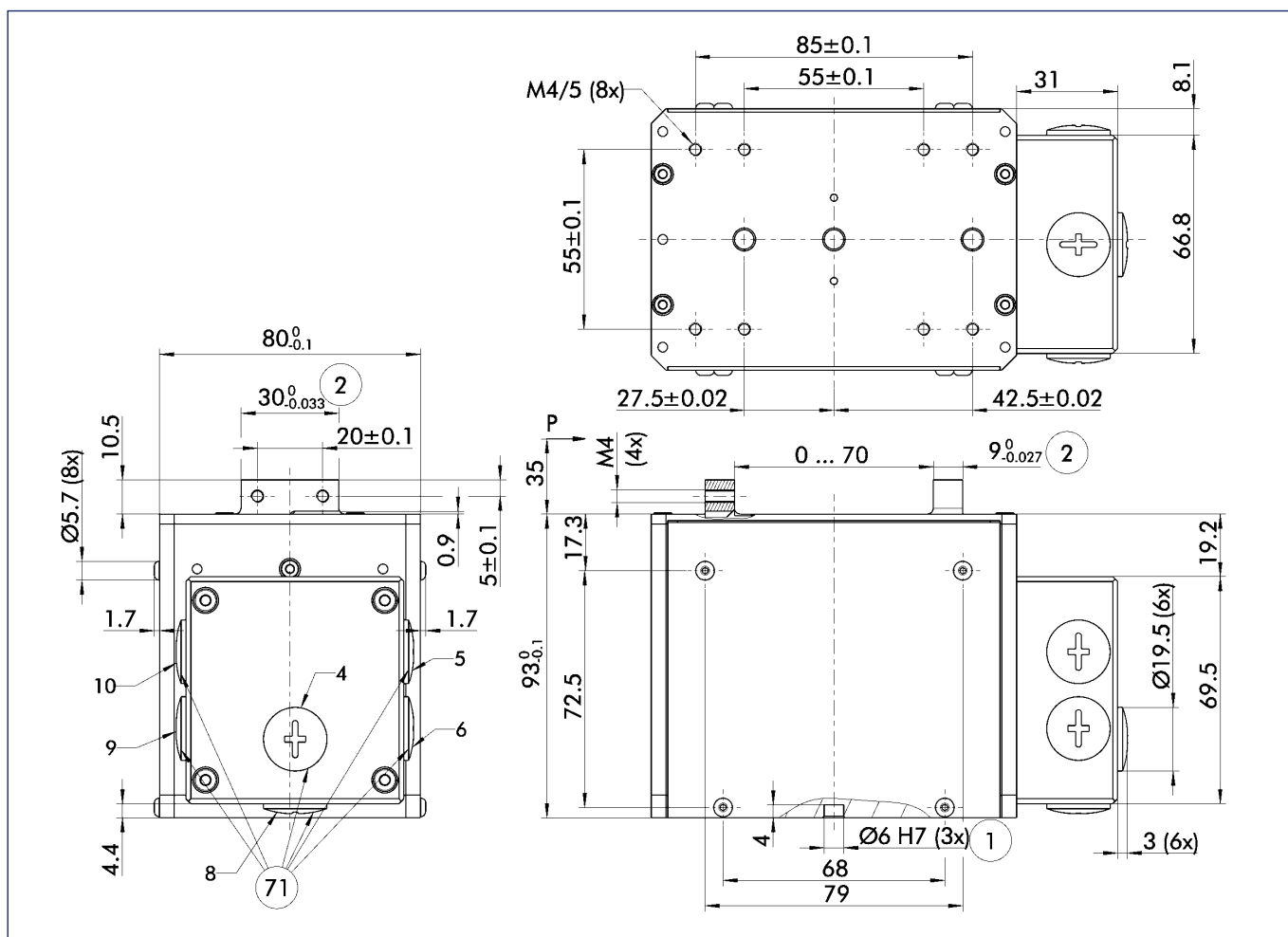


① Moments and forces apply per base jaw and may occur simultaneously. M_y may arise in addition to the moment generated by the gripping force itself. If the max. permitted finger weight is exceeded, it is imperative to throttle the air pressure so that the jaw movement occurs without any hitting or bouncing. Service life may be reduced.

Technical data

Description		PG 70
Mechanical gripper operating data	ID	0306090
Stroke per finger	[mm]	35.0
Constant gripping force (100 % continuous duty)	[N]	200.0
Max. gripping force	[N]	200.0
Min. gripping force	[N]	30.0
Weight	[kg]	1.4
Recommended workpiece weight	[kg]	1.0
Closing time	[s]	1.1
Opening time	[s]	1.1
Max. permitted finger length	[mm]	140.0
IP class		20
Min. ambient temperature	[°C]	5.0
Max. ambient temperature	[°C]	55.0
Repeat accuracy	[mm]	0.05
Positioning accuracy	[mm]	on request
Max. velocity	[mm/s]	82.0
Max. acceleration	[mm/s ²]	328.0
Electrical operating data for gripper		
Terminal voltage	[V]	24.0
Nominal power current	[A]	1.8
Maximum current	[A]	6.5
Resolution	[µm]	1.0
Controller operating data		
Integrated electronics		Yes
Voltage supply	[VDC]	24.0
Nominal power current	[A]	0.5
Sensor system		Encoder
Interface		I/O, RS 232, CAN-Bus, Profibus DP

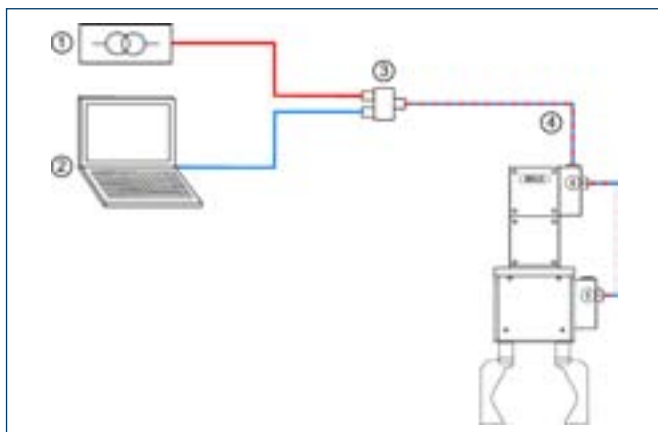
Main views



The drawing shows the gripper in the basic version with closed jaws, the dimensions do not include the options described below.

- ① Gripper connection
- ② Finger connection
- ⑦1 M16x1.5 for cable gland

Actuation



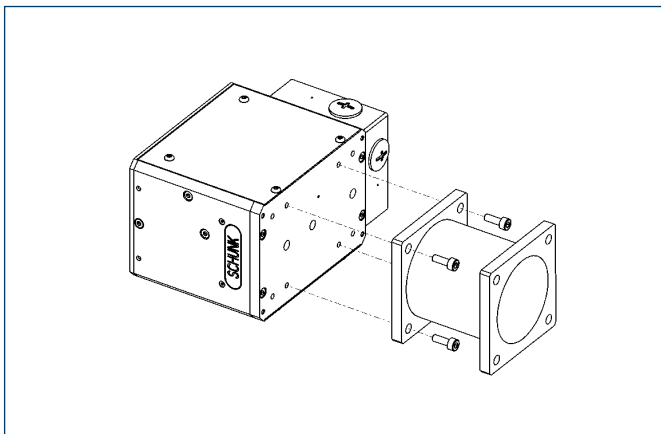
- ① 24 VDC power supply provided by the customer
- ② Control (PLC or similar) provided by the customer
- ③ PAE 130 TB terminal block (ID No. 0307725) for connecting the power supply, the communication and the hybrid cable
- ④ Hybrid cable for connecting the PowerCube modules

Interconnecting cable

Description	ID	Length
PowerCube Hybrid cable, coiled	0307753	0.3 m
PowerCube Hybrid cable, coiled	0307754	0.5 m
PowerCube Hybrid cable, straight (per meter)	9941120	

- i** The 'Hybrid cable' is recommended for the use in CAN-Bus- or RS232-systems.
For Profibus applications we recommend to use a separate standardized Profibus cable for the communication.
You can find further cables in the „Accessories“ catalog section.

Mechanical accessories

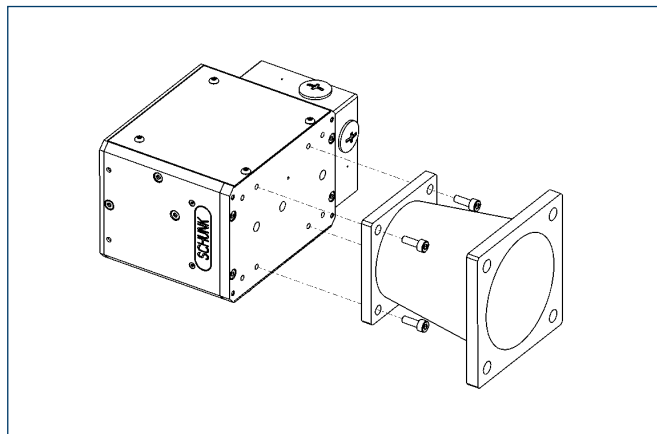


Straight connecting elements

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

Special lengths on request

Straight standard element for connecting size 70 PowerCube modules

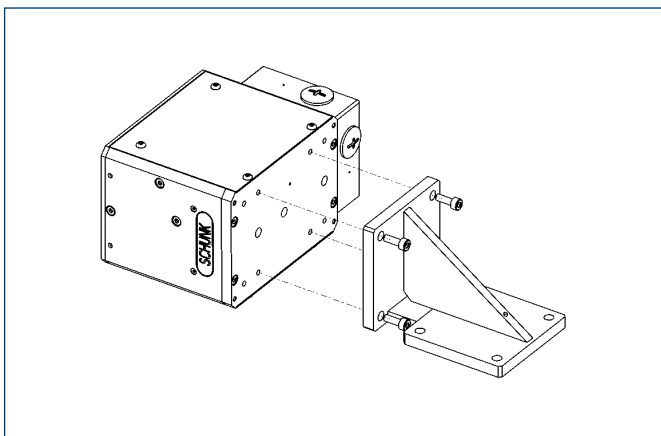


Conical connecting elements

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

Special lengths on request

Conical standard element for connecting size 70 and 90 PowerCube modules



Right-angle connecting elements

Description	ID	Dimensions
PAM 120	0307820	90°/70.5x98

Special lengths on request

Right-angle standard element for connecting size 70 PowerCube modules



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

