

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 low 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, sensor systems, service robotics and flexible robot technology.



PG
Servo-electric
2-Finger Parallel Gripper



PR
Servo-electric
Rotary Actuators



PW
Servo-electric
Pan Tilt Actuators



PSM
Servo-motors with
integrated position control



PDU
Servo-positioning Motor
with precision gears



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

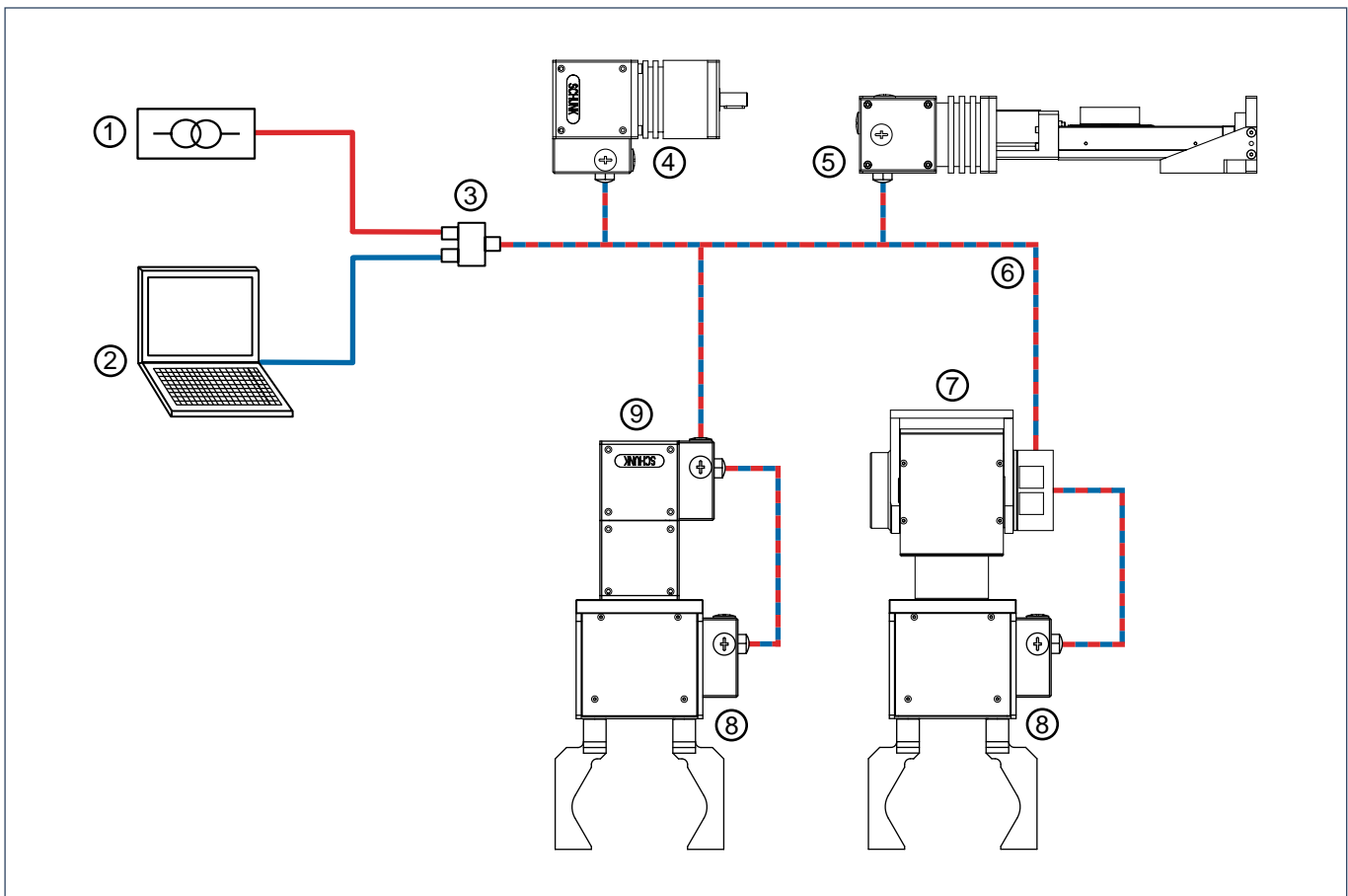
Method of actuation

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 stored in the modules, and the following 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 system or bus system.

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

① The CD-ROM "PowerCube-Standard Software" (Id.-No. 0307700) contains: Assembly and operating manual with manufacturer's declaration, Quick-Step software, demo program and diagnostic routines, as well as various drivers.



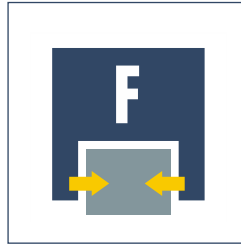
- ① 24VDC / 48VDC power supply provided by the customer
- ② Control system provided by the customer (see control versions A, B and C)
- ③ PAE 130 TB terminal block for connecting the power supply, the communication and the hybrid cable
- ④ PDU servo-motor
- ⑤ Linear axis with PLS ball-and-screw spindle drive and PSM servo-motor
- ⑥ Hybrid cable (single-cable technology) for connecting the PowerCube modules (power supply and communication)
- ⑦ PW servo-electric 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
70 mm



Workpiece weight
1 kg

Application example



Double rotary gripper module for loading and unloading of sensitive components

1 PG 70 Servo-electric 2-Finger Parallel Gripper

2 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

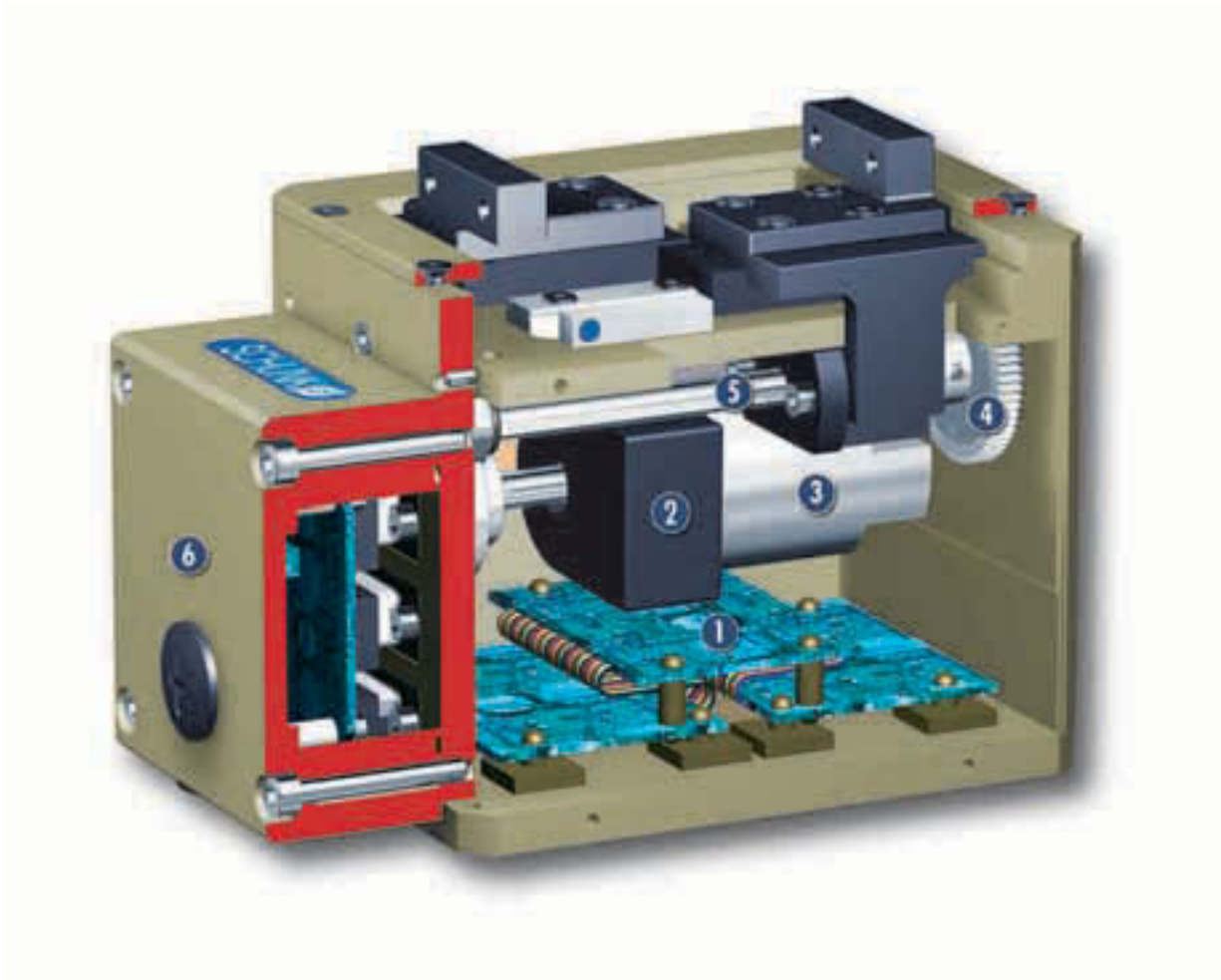
Scope of delivery

The "PowerCube Standard Software" CD-ROM contains an Assembly and Operating Manual with manufacturer's declaration, quick-step, PC CubeDemo and PC PowerCube Config software plus various driver files (see explanation of PowerCube system)

Option

- Internal encoder signal output
- External encoder signal input

Sectional diagram



- | | | |
|--|---|---|
| <p>1 Control electronics
integrated control and power electronics
for controlling the servo-motor</p> <p>2 Encoder
for gripper positioning and position evaluation</p> | <p>3 Drive
brushless DC servo-motor</p> <p>4 Gear mechanism
transfers power from the servo-motor
to the drive spindle</p> | <p>5 Spindle
transforms the rotational movement
into the linear movement of the base jaw</p> <p>6 Connector housing
link to the customer's system</p> |
|--|---|---|

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. This enables you to create industrial bus networks, and ensures easy integration in control systems. You can make use of our hybrid cables for transporting the supply voltage and for communication.

If you wish to create combined systems (e.g. a rotary gripper 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.

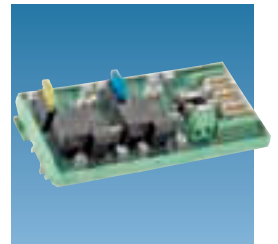
Centering sleeves



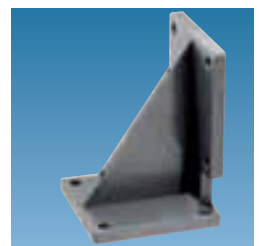
Hybrid cable



PAE 130 Terminal Block



Standard connecting elements PAM



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 specific size. You can 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

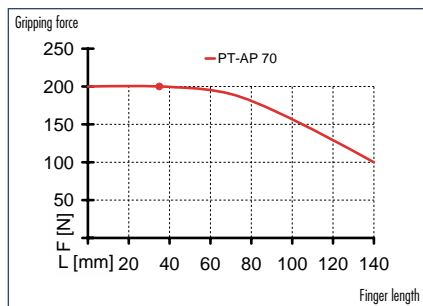
The recommended workpiece weight is calculated for a friction grip with a coefficient of friction of 0.1 and a safety factor of 2 against slippage of the workpiece on acceleration due to gravity g. Considerably heavier workpiece weights are permitted with form-fit clamping.

Closing and opening times

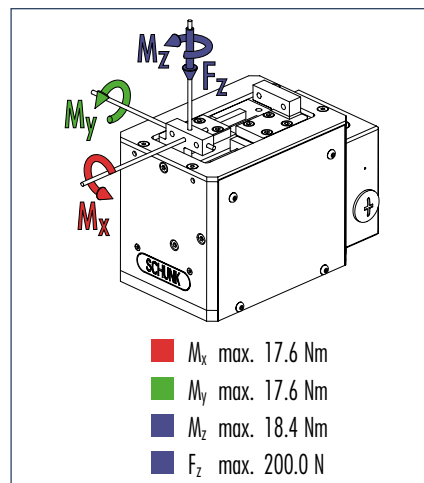
Closing and opening times are purely the times that the base jaws or fingers are in motion. Valve switching times, hose filling times or PLC reaction times are not included in the above times and must be taken into consideration when determining cycle times.



Gripping force, I.D. gripping



Finger load

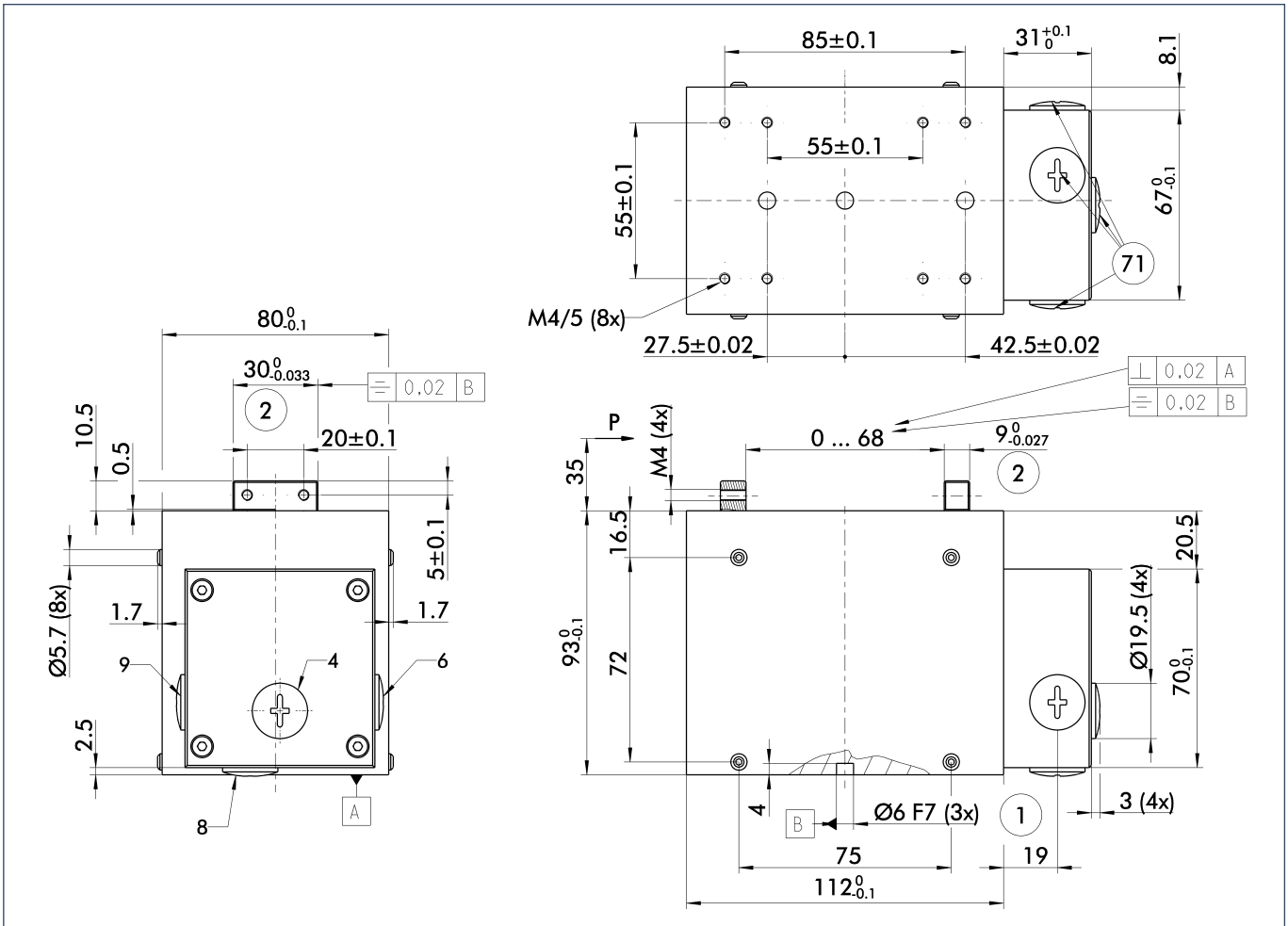


① Moments and forces apply per base jaw and may occur simultaneously. M_y may arise in addition to the moment generated by the gripping force itself. If the max. permitted finger weight is exceeded, it is imperative to reduce the speed so that the jaw movement occurs without any hitting or bouncing.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

Technical data

Designation		PG 70
Mechanical gripper operating data	ID	0306087
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 rating		20
Min. ambient temperature	[°C]	5.0
Max. ambient temperature	[°C]	55.0
Repeat accuracy	[mm]	0.05
Positioning accuracy	[mm]	on request
Max. speed	[mm/s]	82.0
Max. acceleration	[mm/s ²]	328.0
Electrical operating data for gripper		
Terminal voltage	[V]	24.0
Nominal current	[A]	2.2
Maximum current	[A]	on request
Resolution	[mm]	0.25
Controller operating data		
Integrated electronics		Yes
Voltage supply	[VDC]	24.0
Nominal current	[A]	0.5
Sensor system		Encoder
Interface		RS-232; Profibus-DP; CAN-Bus

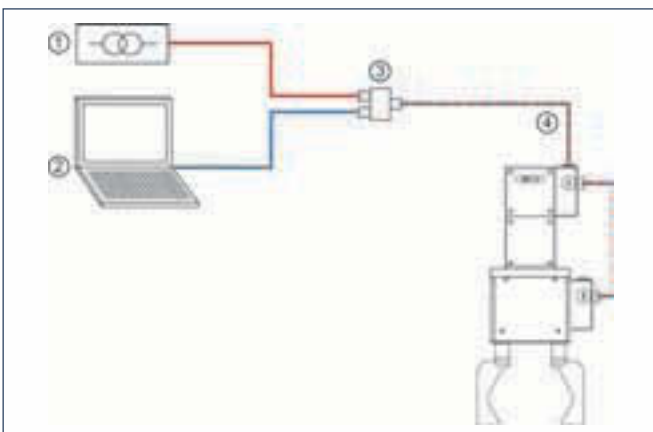
Main views



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
- ⑦ M16x1.5 for cable connection

Actuation

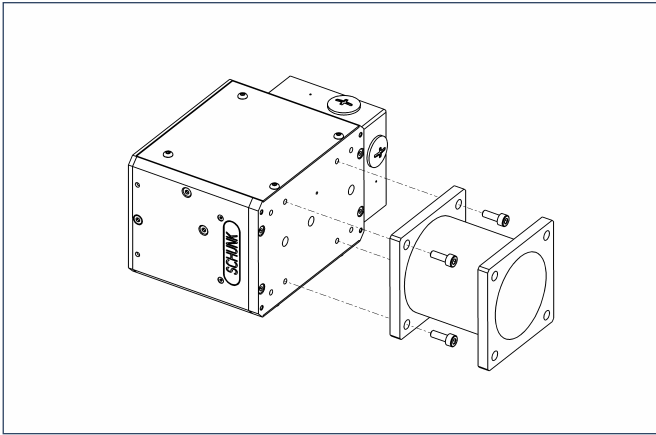


- ① 24 VDC power supply provided by the customer
- ② Control (PLC or similar) provided by the customer
- ③ PAE 130 TB terminal block (ID No. 0307725) for connecting the power supply, the communication and the hybrid cable
- ④ Hybrid cable for connecting the PowerCube modules

Connecting cable

Designation	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	

Mechanical accessories

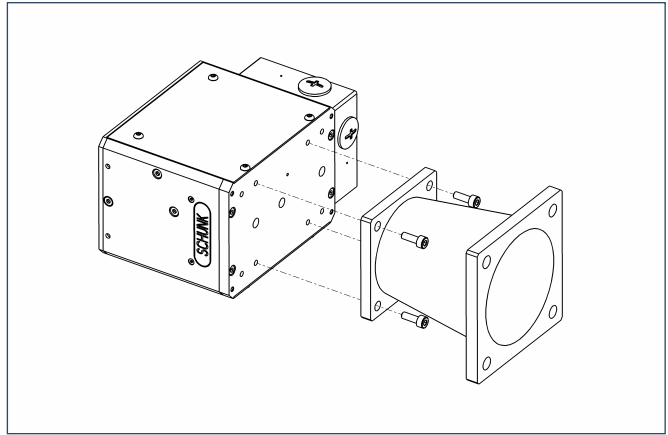


Straight connecting elements

Designation	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

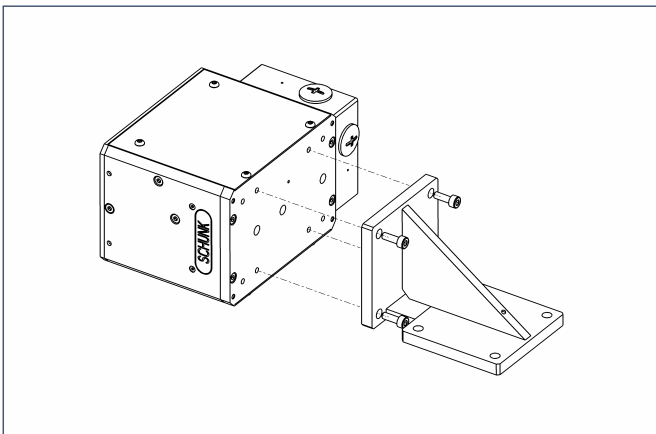


Conical connecting elements

Designation	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

Designation	ID
PAM 120	0307820

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.

