

Loadable. Flexible. Robust.

Universal Rotary Unit PR

Servo-electric rotary unit with angle $> 360^\circ$, precision gear and integrated electronics

Field of Application

All-purpose, ultra-flexible rotary unit in clean and slightly polluted environments as a component of positioning systems or as an axis module of light weight arms used in fields of industry or service robotics.

Advantages – Your benefit

Brushless DC servomotor for flexible use by controlled position, velocity and torque

High torque, velocity, and precision for rapid acceleration and short cycle times with high precision

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

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

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



Sizes
Quantity: 3



Weight
1.7 .. 5.6 kg



Torque
3.6 .. 88 Nm



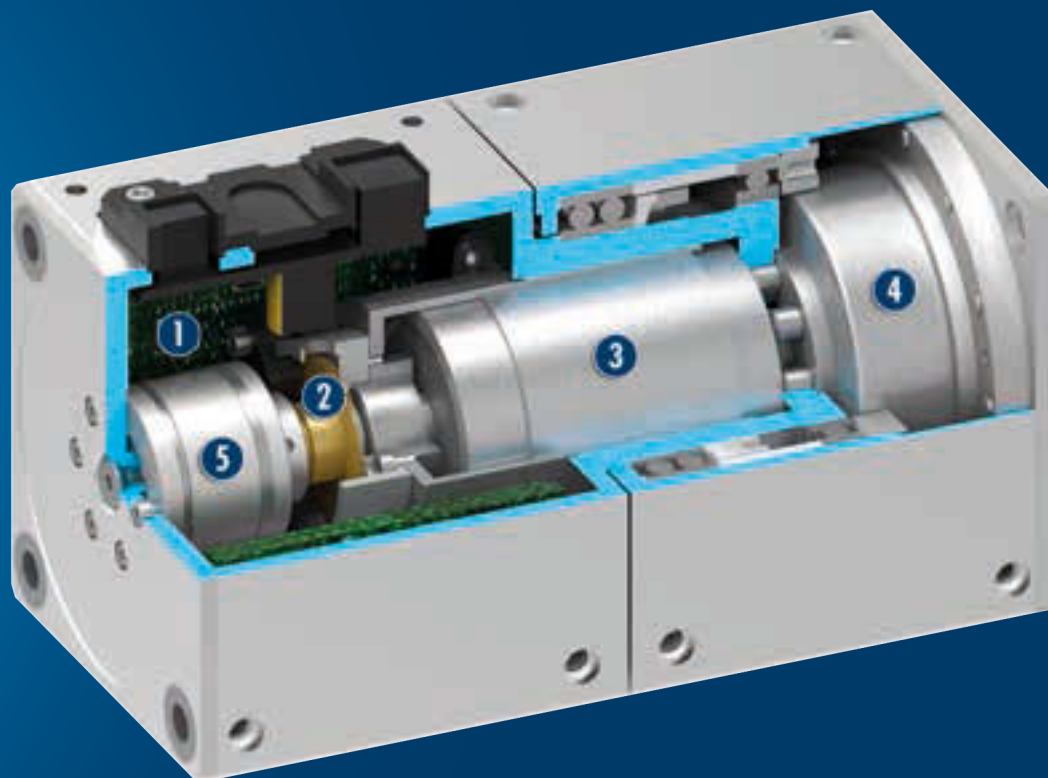
Repeat accuracy
0.03 .. 0.08°



Angle of rotation
 $> 360^\circ$

Functional Description

The rotary unit has a Harmonic Drive® precision gear, which is directly driven by a brushless DC-servo drive.



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

② **Encoder**
for position evaluation

③ **Brushless DC servomotor**
for maximum torques

④ **Harmonic Drive® gears**
for high gear ratios and rigidity

⑤ **Brake**
for a holding function on shutdown and power failure



General Notes about the Series

Housing material: aluminum alloy, coated

Actuation: servo-electric, via brushless servomotor and incremental encoder for position and speed control

Operating Principle: Harmonic Drive® gear driven directly via brushless DC servomotor

Scope of delivery: DVD with SCHUNK software and assistant for commissioning, includes assembly- and operation manual, declaration of incorporation, functional module for control via Siemens S7-300/400.

Warranty: 24 months (details, general terms and conditions and operation manuals can be downloaded at www.schunk.com)

Swiveling times: are purely the times of the module 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.

Repeat accuracy: is defined as the spread of the target position after 100 consecutive positioning cycles.

Middle attached load: intended to represent a typical load. Defined as half of the max. possible mass moment of inertia which can be swiveled without impacts or bouncing, for centric loads and vertical rotational axes.

Nominal Currents: can be available. In case of every current above the nominal current up to the maximum current, the instructions in the individual product documentation has to be considered.

Application example

Double rotary gripping module for loading and unloading different sensitive components

- ① Servo-Electric 2-Finger Parallel Gripper PG
- ② Servo-Electric rotary module PR



SCHUNK offers more ...

The following components make the PR even more productive – the perfect complement for highest functionality, flexibility and process reliability.



Connection Cap DMI



Connection Cap MMI



Power- / and Data Cable



Linear Module



Servo-Electric Drive with Gear
PDU



Servo-Electric Rotary Pan Tilt
Actuator PW



Servo-Electric 2-Finger
Parallel Gripper PEH



Connecting Element PAM

① Further information regarding the products can be found on the following product pages or at www.schunk.com. Please contact us for further information: SCHUNK technical hotline +49-7133-103-2696

Options and special Information

Integrated electronics: The electrical control of the PR is carried out by the fully integrated control and power electronics. Hence, the module does not require any additional external control units.

Easy integration: There is a varied range of interfaces available, such as Profibus-DP or CAN bus as methods of communication. This enables the assembly of industrial bus networks and ensures easy integration into existing control systems.

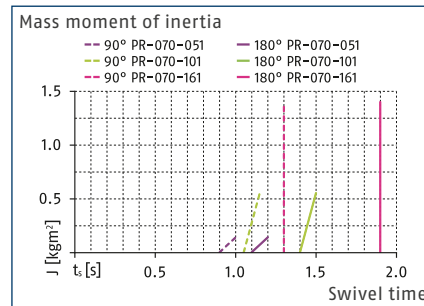
Technological Functions: Pseudo absolute encoder function, freely programmable positions and directly controllable via digital I/O or field bus with the SCHUNK Motion Protocol (SMP)

Monitoring functions: I²t monitoring, current monitoring, power failure detection, contouring error monitoring, software end position monitoring, position monitoring

IP class: The specified protection class can only be achieved in conjunction with a DMI connection cap.

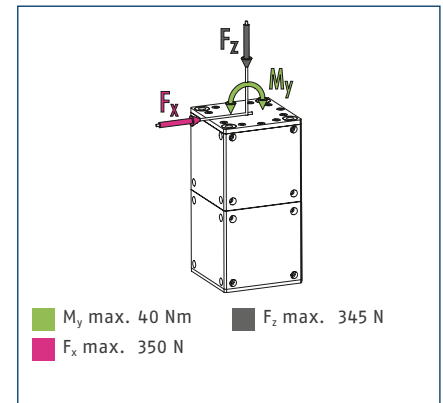


Swivel time diagram



① The diagram is only valid for applications with vertical swivel axes or horizontal swivel axes with even mass distribution and without the effects of gravity.

Forces and Moments



① Moments and forces may occur simultaneously.

Technical data

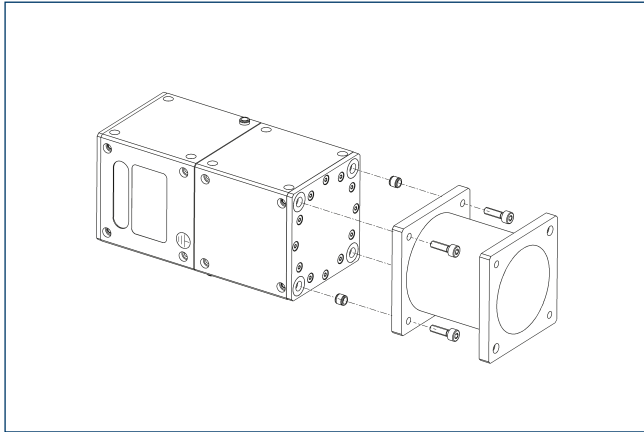
Description	Unit	PR 070-51-B	PR 070-101-B	PR 070-161-B
ID		0307304	0307302	0307300
Mechanical operating data				
Rated torque	[Nm]	3.6	7.2	10
Peak torque	[Nm]	16	34.4	51.2
max. rotational speed	[1/min]	78	40	25
max. permissible mass moment of inertia	[kgm ²]	0.14	0.55	1.4
Repeat accuracy	[°]	0.08	0.04	0.03
Transmission		51:1	101:1	161:1
General operating data				
Weight	[kg]	1.7	1.7	1.7
min. / max. ambient temperature	[°C]	5/55	5/55	5/55
IP class		40	40	40
Electrical operating data				
Nominal voltage	[V]	24	24	24
Nominal current	[A]	4.4	4.4	4.4
max. power supply	[A]	8	8	8
Control electronics				
Control electronics		integrated	integrated	integrated
Power supply	[V]	24	24	24
Encoder system		Encoder (incremental)	Encoder (incremental)	Encoder (incremental)
Interface		Profibus, CAN bus, 4/4 digital I/O, RS232	Profibus, CAN bus, 4/4 digital I/O, RS232	Profibus, CAN bus, 4/4 digital I/O, RS232

① The top torques serve as short-term drive reserves when accelerating and delaying.

PR 70

Electrical | Rotary Units | Universal Rotary Unit

Connecting element – straight

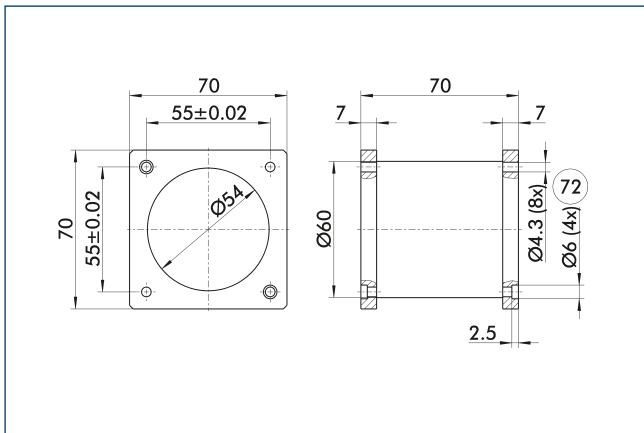


Straight standard element for connection of PowerCube modules with repeat accuracy

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

① Special lengths on request

PAM 101 – straight

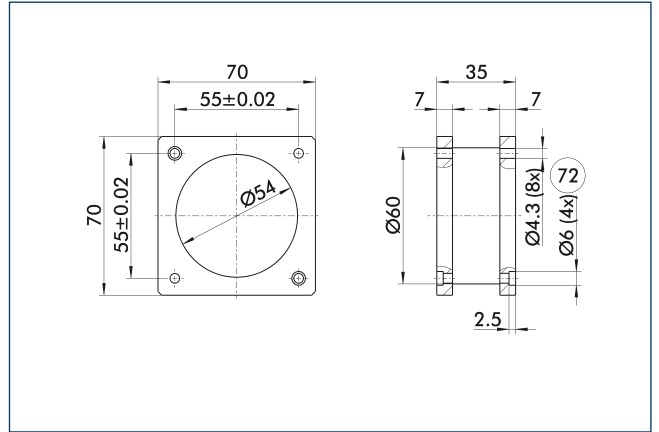


⑦2 Fitting for centering sleeve

Suitable for PowerCube unit size 70

Description	ID	Dimensions
Connecting element		
PAM 101	0307801	70x70/70/70x70 mm

PAM 100 – straight

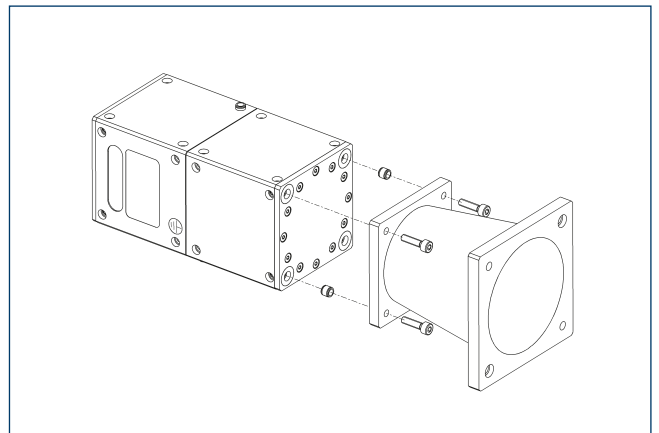


⑦2 Fitting for centering sleeve

Suitable for PowerCube unit size 70

Description	ID	Dimensions
Connecting element		
PAM 100	0307800	70x70/35/70x70 mm

Connecting element – conical

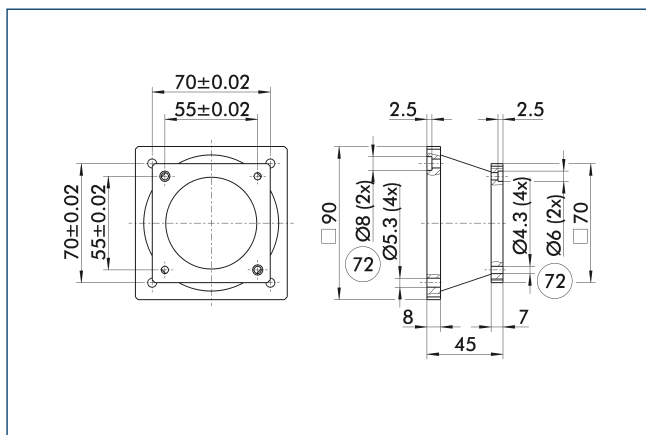


Conical standard element for connection of PowerCube modules with repeat accuracy

Description	ID	Dimensions
Connecting element		
PAM 110	0307810	
PAM 111	0307811	

① Special lengths on request

PAM 110 – conical

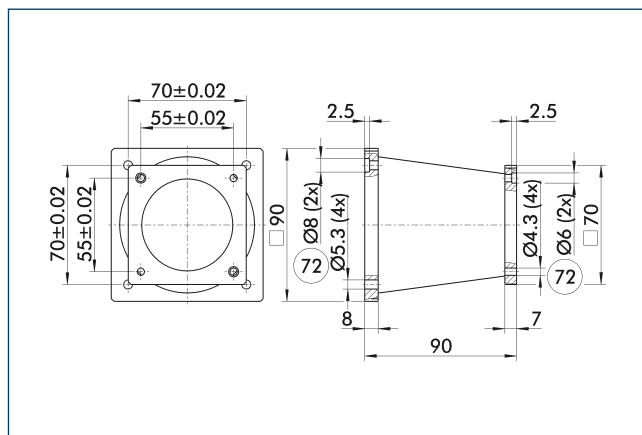


72 Fitting for centering sleeve

Suitable for PowerCube unit sizes 70/90

Description	ID
Connecting element	
PAM 110	0307810

PAM 111 – conical

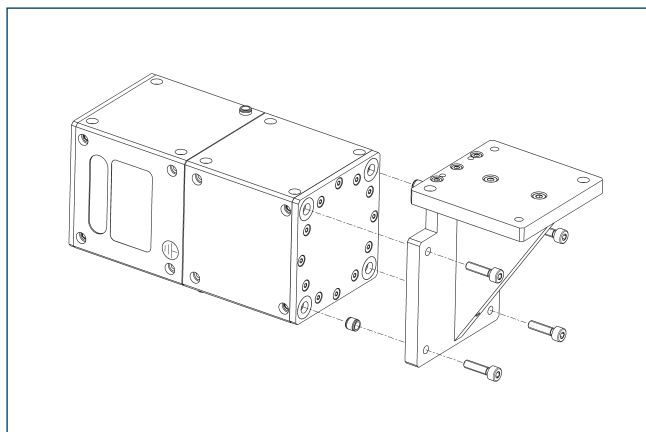


72 Fitting for centering sleeve

Suitable for PowerCube unit sizes 70/90

Description	ID
Connecting element	
PAM 111	0307811

Connecting element – angle

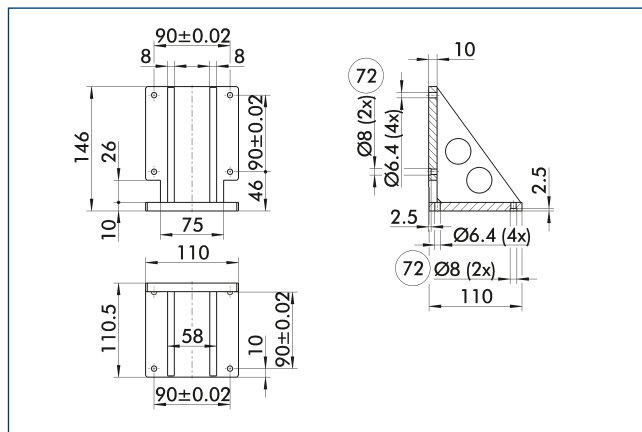


Angular standard element for connection of PowerCube modules with repeat accuracy

Description	ID
Connecting element	
PAM 120	0307820

① Special lengths on request

PAM 120 – angle

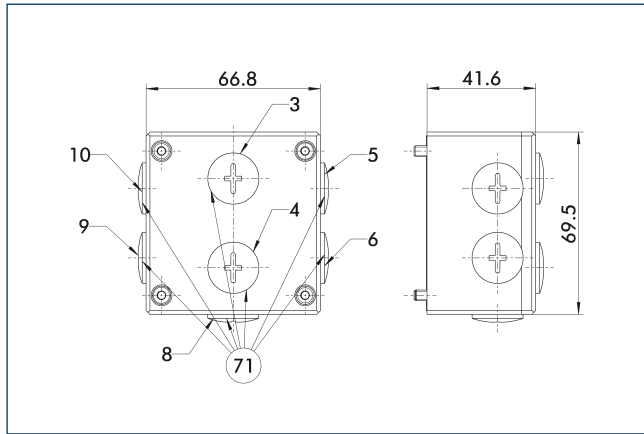


72 Fitting for centering sleeve

Suitable for PowerCube unit size 70

Description	ID
Connecting element	
PAM 120	0307820

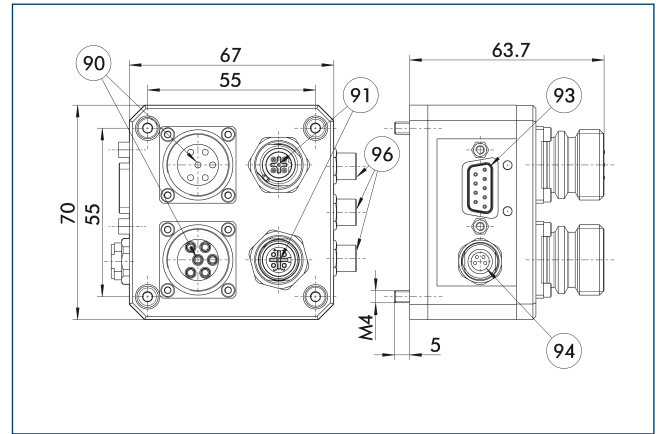
Connection cap DMI



71 M16x1.5 for cable guide penetrating screw connection

Description	ID
Connection caps	
DMI 070-V05-B	0307732

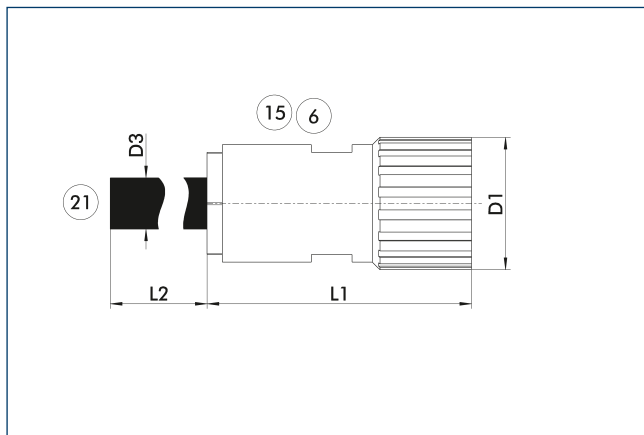
Connection cap MMI



90 Connection power supply (logic / load)
 91 Connection fieldbus M12
 93 Parametrized interface RS232
 94 Connection power supply service box (SSB)
 96 Connection external end switch

Description	ID
Connection caps	
MMI 070-V05-E-CN	0307500
MMI 070-V05-D-CN	0307501
MMI 070-V05-E-PB	0307502
MMI 070-V05-D-PB	0307503

Power cable for SCHUNK MMI

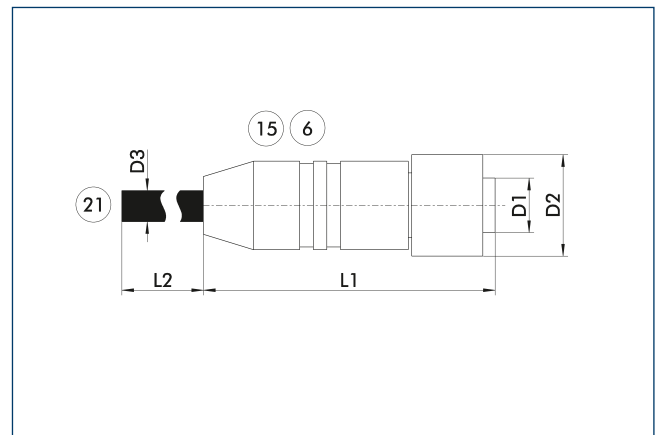


6 Connection module side
 15 Socket
 21 Connection controller side

Description	ID	L ₂	D ₁
Power cable for SCHUNK MMI			
KA GGN2304-LK-00150-H	0349874	1.5 m	M23
KA GGN2304-LK-00300-H	0349875	3 m	M23
KA GGN2304-LK-00500-H	0349876	5 m	M23
KA GGN2304-LK-01000-H	0349877	10 m	M23
KA GLN2304-LK-00150-H	0349870	1.5 m	M23
KA GLN2304-LK-00300-H	0349871	3 m	M23
KA GLN2304-LK-00500-H	0349872	0.5 m	M23
KA GLN2304-LK-01000-H	0349873	1 m	M23

ⓘ Please observe the bending radius (7.5 times the cable diameter).

CAN-Bus cable

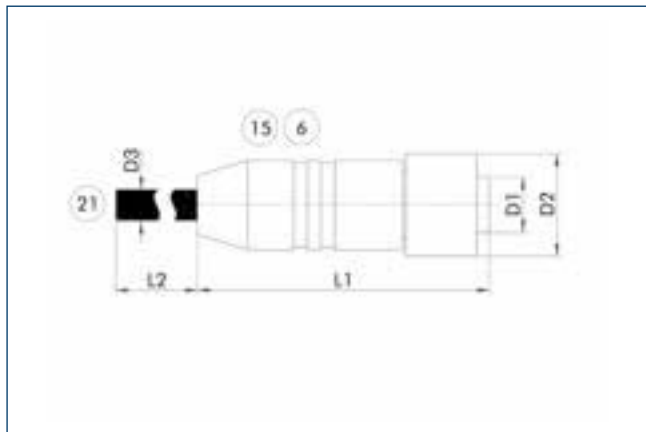


6 Connection module side
 15 Socket
 21 Connection controller side

Description	ID	L ₂	D ₁
CAN-bus cable			
KA GGN1204-CN-00150-A	0349770	1.5 m	M12
KA GGN1204-CN-00300-A	0349771	3 m	M12
KA GGN1204-CN-00500-A	0349772	5 m	M12
KA GGN1204-CN-01000-A	0349773	10 m	M12

ⓘ Please observe the bending radius (7.5 times the cable diameter).

Profibus cable

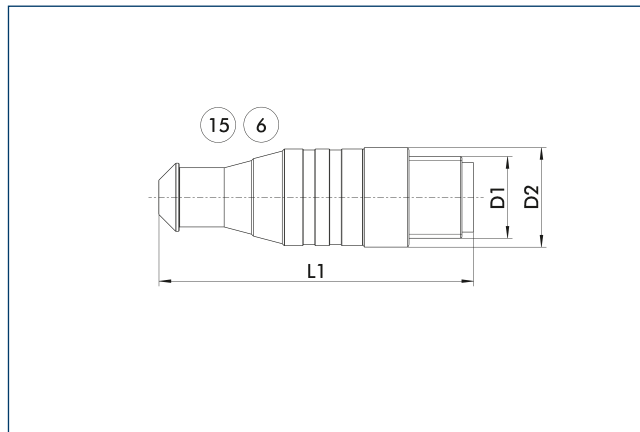


- ⑥ Connection module side
- ②① Connection controller side
- ⑮ Socket

Description	ID	L ₂	D ₁
Profibus cable			
KA GGN1204-PB-00150-A	0349750	1.5 m	M12
KA GGN1204-PB-00300-A	0349751	3 m	M12
KA GGN1204-PB-00500-A	0349752	5 m	M12
KA GGN1204-PB-01000-A	0349753	10 m	M12

① Please observe the bending radius (7.5 times the cable diameter).

Terminators



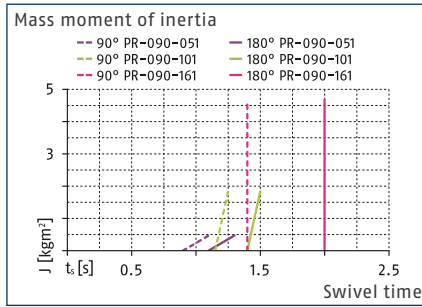
- ⑥ Connection module side
- ⑮ Socket

Description	ID	D ₁
Terminators		
ST SG1204-CN-A-A	0349660	M12
ST SG1204-PB-A-A	0349650	M12

① A suitable terminator must be mounted on the last module in the CAN or Profibus line.

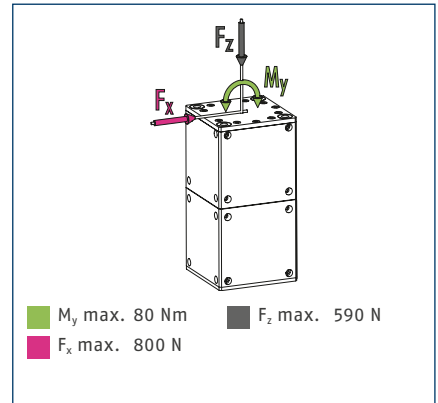


Swivel time diagram



① The diagram is only valid for applications with vertical swivel axes or horizontal swivel axes with even mass distribution and without the effects of gravity.

Forces and Moments



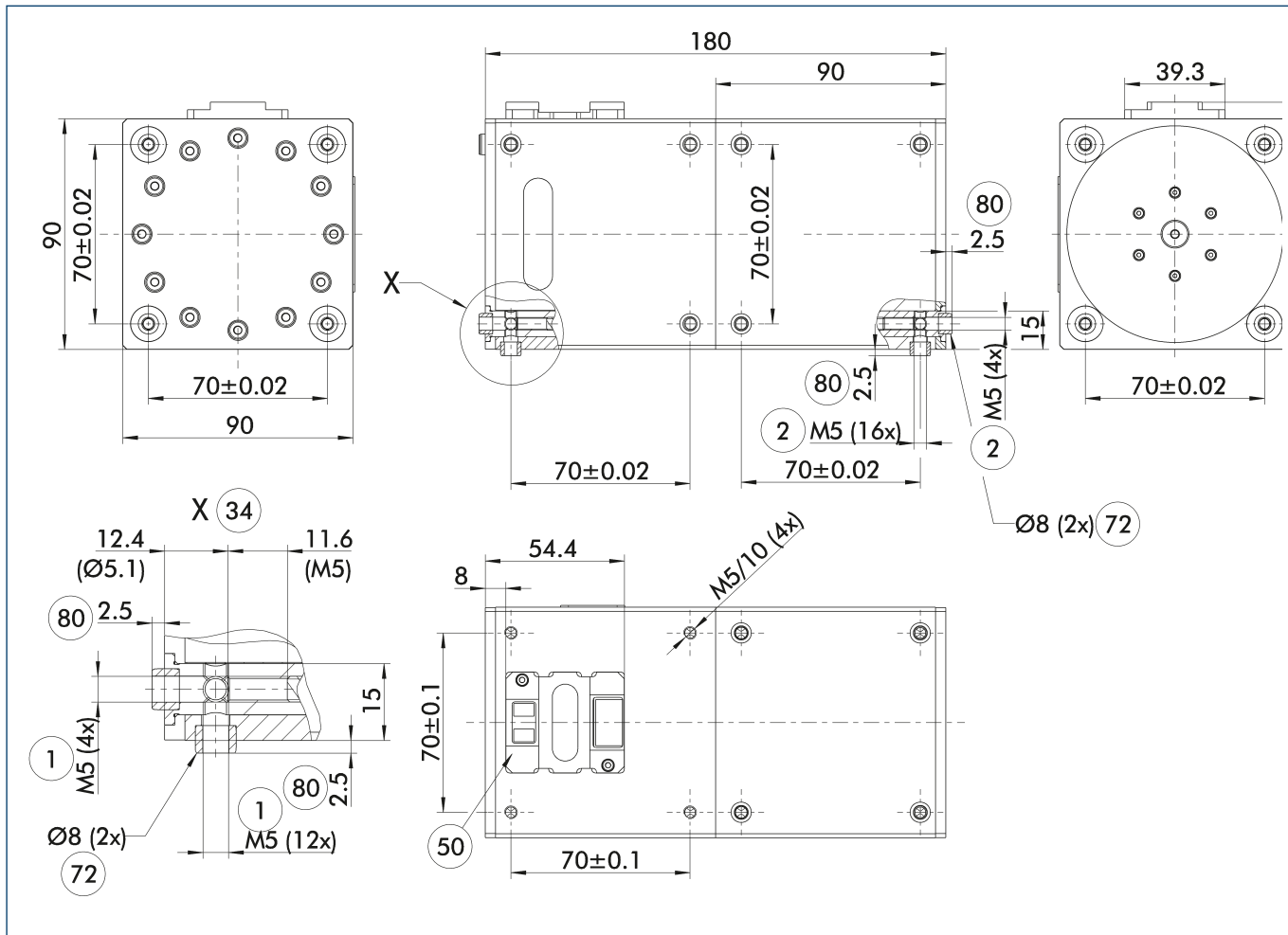
① Moments and forces may occur simultaneously.

Technical data

Description	Unit	PR 090-51-B	PR 090-101-B	PR 090-161-B
ID		0307314	0307312	0307310
Mechanical operating data				
Rated torque	[Nm]	12.8	28.8	44.8
Peak torque	[Nm]	20.8	43.2	58.4
max. rotational speed	[1/min]	78	40	25
max. permissible mass moment of inertia	[kgm ²]	0.47	1.84	4.67
Repeat accuracy	[°]	0.08	0.04	0.03
Transmission		51:1	101:1	161:1
General operating data				
Weight	[kg]	3.4	3.4	3.4
min. / max. ambient temperature	[°C]	5/55	5/55	5/55
IP class		40	40	40
Electrical operating data				
Nominal voltage	[V]	24	24	24
Nominal current	[A]	10	10	10
max. power supply	[A]	20	20	20
Control electronics				
Control electronics		integrated	integrated	integrated
Power supply	[V]	24	24	24
Encoder system		Encoder (incremental)	Encoder (incremental)	Encoder (incremental)
Interface		Profibus, CAN bus, 4/4 digital I/O, RS232	Profibus, CAN bus, 4/4 digital I/O, RS232	Profibus, CAN bus, 4/4 digital I/O, RS232

① The top torques serve as short-term drive reserves when accelerating and delaying.

Main view



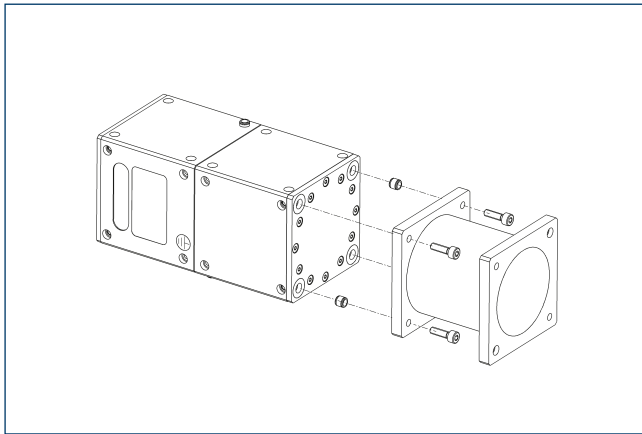
The drawing shows the basic design of the module without the connection cap without dimensional consideration of the options described below.

- ① Rotary actuator connection
- ② Attachment connection
- ③ On both connection faces
- ⑤0 Electronics connection
- ⑦2 Fitting for centering sleeve
- ⑧0 Depth of the centering sleeve hole in the mating part

PR 90

Electrical | Rotary Units | Universal Rotary Unit

Connecting element – straight

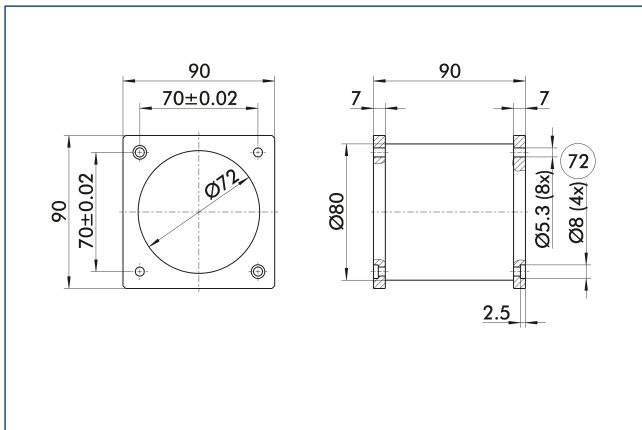


Straight standard element for connection of PowerCube modules with repeat accuracy

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

① Special lengths on request

PAM 103 – straight

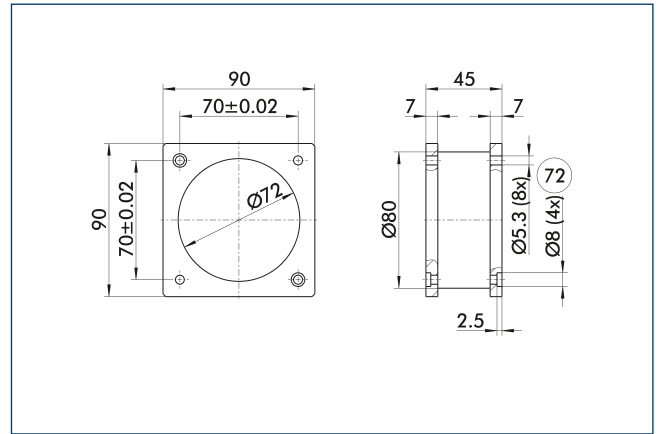


⑦2 Fitting for centering sleeve

Suitable for PowerCube unit size 90

Description	ID	Dimensions
Connecting element		
PAM 103	0307803	90x90/90/90x90 mm

PAM 100 – straight

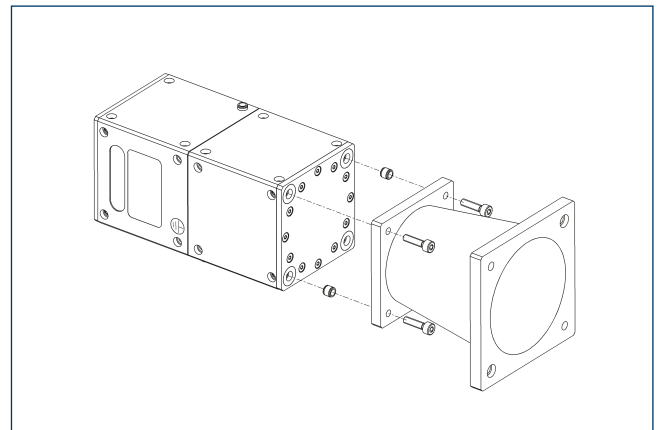


⑦2 Fitting for centering sleeve

Suitable for PowerCube unit size 90

Description	ID	Dimensions
Connecting element		
PAM 102	0307802	90x90/45/90x90 mm

Connecting element – conical

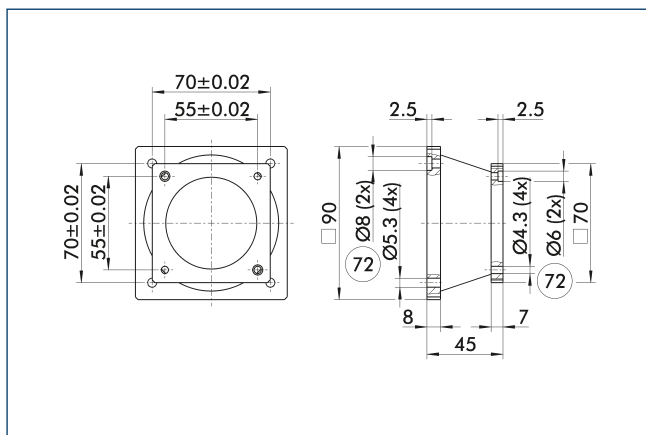


Conical standard element for connection of PowerCube modules with repeat accuracy

Description	ID	Dimensions
Connecting element		
PAM 110	0307810	
PAM 111	0307811	
PAM 112	0307812	
PAM 113	0307813	

① Special lengths on request

PAM 110 – conical

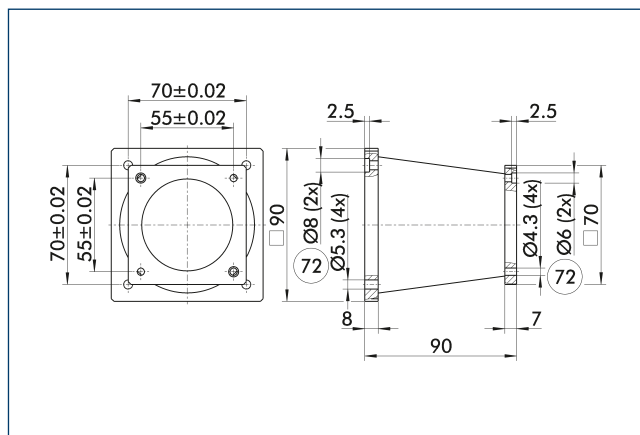


72 Fitting for centering sleeve

Suitable for PowerCube unit sizes 70/90

Description	ID
Connecting element	
PAM 110	0307810

PAM 111 – conical

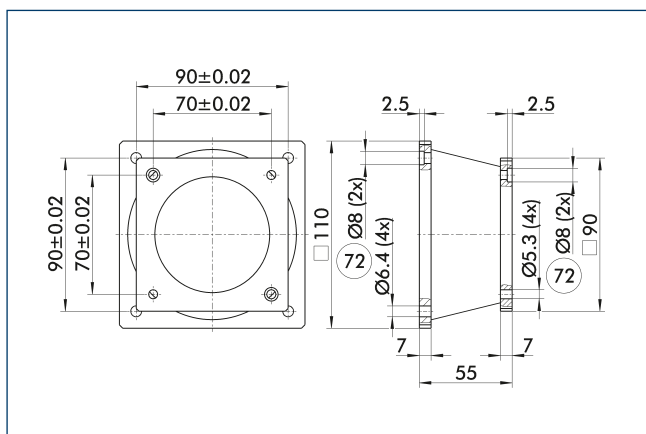


72 Fitting for centering sleeve

Suitable for PowerCube unit sizes 70/90

Description	ID
Connecting element	
PAM 111	0307811

PAM 112 – conical

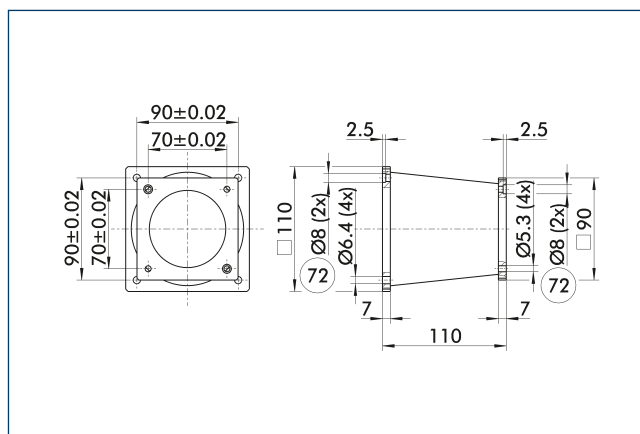


72 Fitting for centering sleeve

Suitable for PowerCube unit sizes 90/110

Description	ID
Connecting element	
PAM 112	0307812

PAM 113 – conical

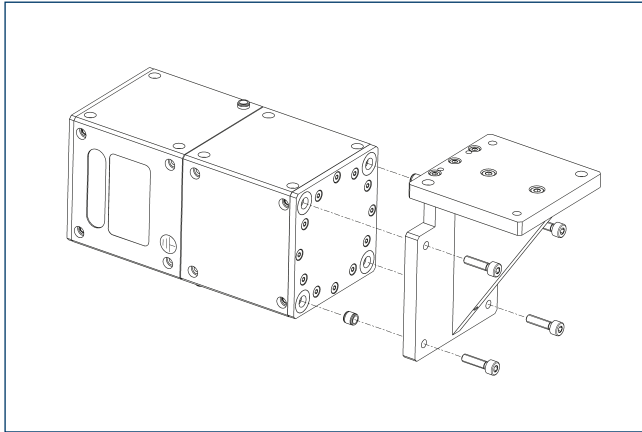


72 Fitting for centering sleeve

Suitable for PowerCube unit sizes 90/110

Description	ID
Connecting element	
PAM 113	0307813

Connecting element – angle

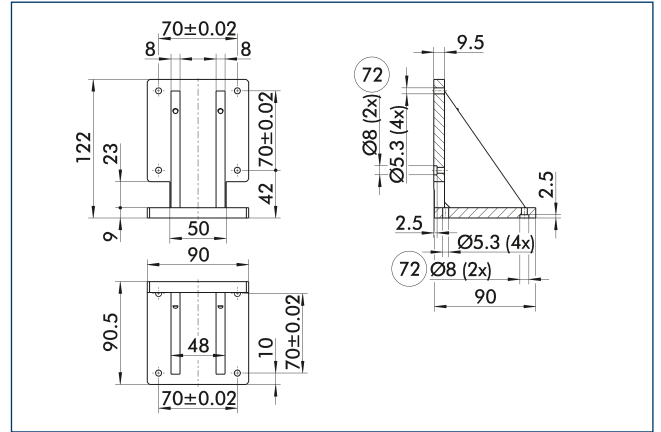


Angular standard element for connection of PowerCube modules with repeat accuracy

Description	ID
Connecting element	
PAM 121	0307821

① Special lengths on request

PAM 121 – Winkel

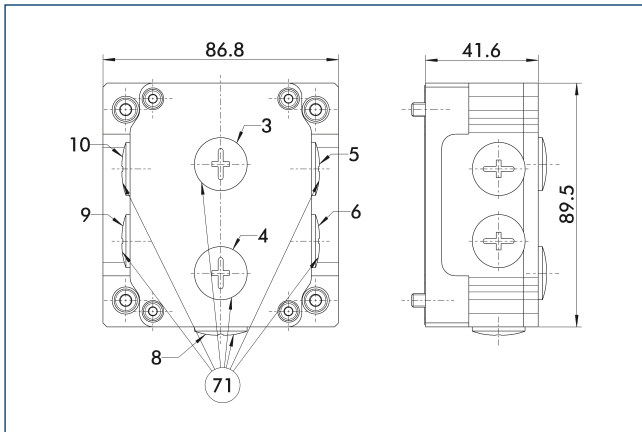


⑦2 Fitting for centering sleeve

Suitable for PowerCube unit size 90

Description	ID
Connecting element	
PAM 121	0307821

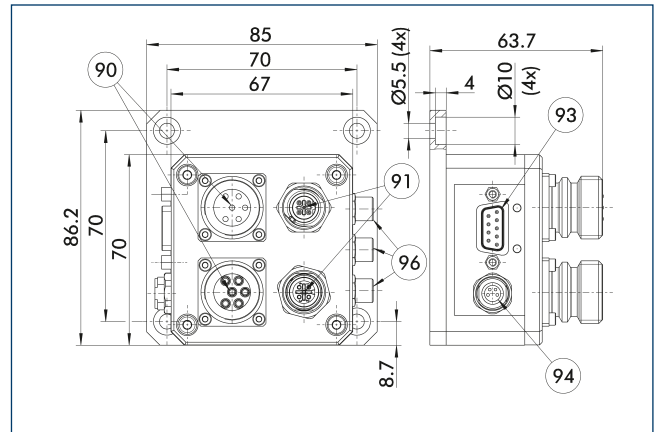
Connection cap DMI



⑦1 M16x1.5 for cable guide penetrating screw connection

Description	ID
Connection caps	
DMI 090-V05-B	0307733

Connection cap MMI



⑨0 Connection power supply (logic / load)

⑨1 Connection fieldbus M12

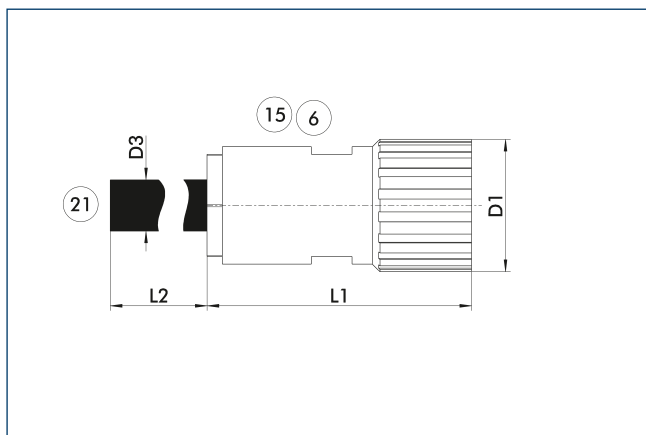
⑨3 Parametrized interface RS232

⑨4 Connection power supply service box (SSB)

⑨6 Connection external end switch

Description	ID
Connection caps	
MMI 090-V05-D-CN	0307505
MMI 090-V05-D-PB	0307507
MMI 090-V05-E-CN	0307504
MMI 090-V05-E-PB	0307506

Power cable for SCHUNK MMI

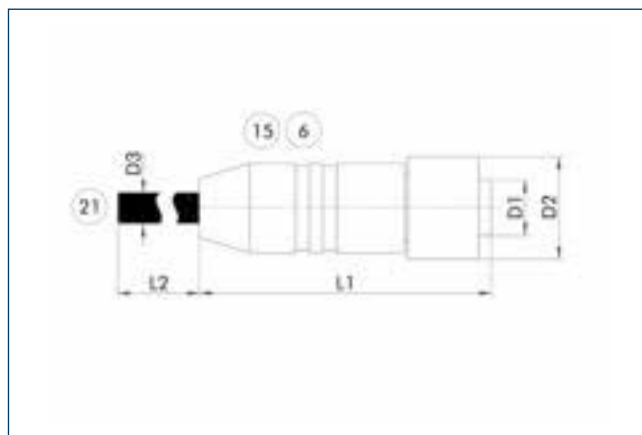


⑥ Connection module side ⑳ Connection controller side
 ⑮ Socket

Description	ID	L ₂	D ₁
Power cable for SCHUNK MMI			
KA GGN2304-LK-00150-H	0349874	1.5 m	M23
KA GGN2304-LK-00300-H	0349875	3 m	M23
KA GGN2304-LK-00500-H	0349876	5 m	M23
KA GGN2304-LK-01000-H	0349877	10 m	M23
KA GLN2304-LK-00150-H	0349870	1.5 m	M23
KA GLN2304-LK-00300-H	0349871	3 m	M23
KA GLN2304-LK-00500-H	0349872	0.5 m	M23
KA GLN2304-LK-01000-H	0349873	1 m	M23

① Please observe the bending radius (7.5 times the cable diameter).

CAN-Bus cable

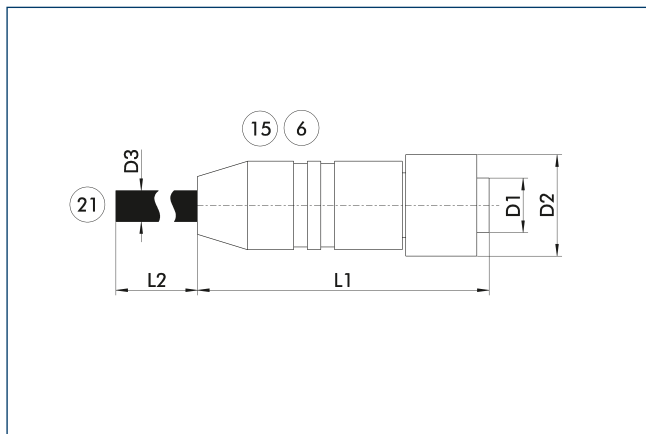


⑥ Connection module side ⑳ Connection controller side
 ⑮ Socket

Description	ID	L ₂	D ₁
CAN-bus cable			
KA GGN1204-CN-00150-A	0349770	1.5 m	M12
KA GGN1204-CN-00300-A	0349771	3 m	M12
KA GGN1204-CN-00500-A	0349772	5 m	M12
KA GGN1204-CN-01000-A	0349773	10 m	M12

① Please observe the bending radius (7.5 times the cable diameter).

Profibus cable

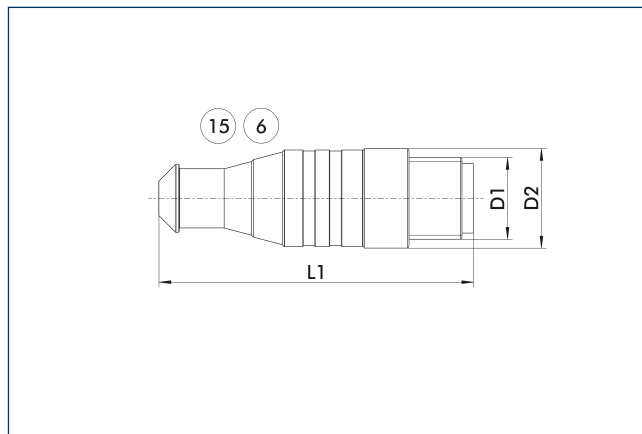


⑥ Connection module side ⑳ Connection controller side
 ⑮ Socket

Description	ID	L ₂	D ₁
Profibus cable			
KA GGN1204-PB-00150-A	0349750	1.5 m	M12
KA GGN1204-PB-00300-A	0349751	3 m	M12
KA GGN1204-PB-00500-A	0349752	5 m	M12
KA GGN1204-PB-01000-A	0349753	10 m	M12

① Please observe the bending radius (7.5 times the cable diameter).

Terminators



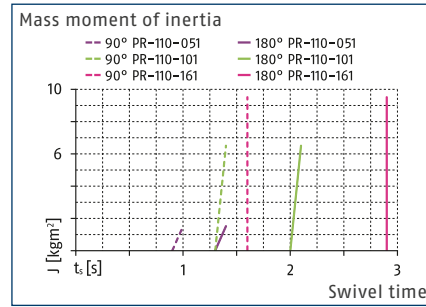
⑥ Connection module side ⑮ Socket

Description	ID	D ₁
Terminators		
ST SG1204-CN-A-A	0349660	M12
ST SG1204-PB-A-A	0349650	M12

① A suitable terminator must be mounted on the last module in the CAN or Profibus line.

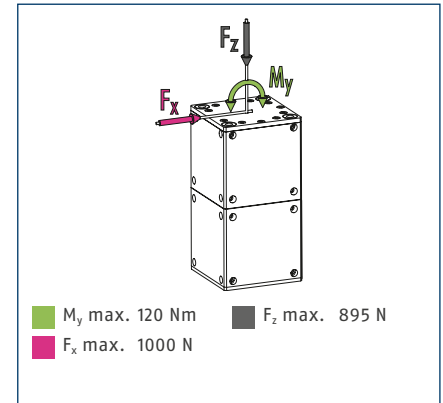


Swivel time diagram



① The diagram is only valid for applications with vertical swivel axes or horizontal swivel axes with even mass distribution and without the effects of gravity.

Forces and Moments



① Moments and forces may occur simultaneously.

Technical data

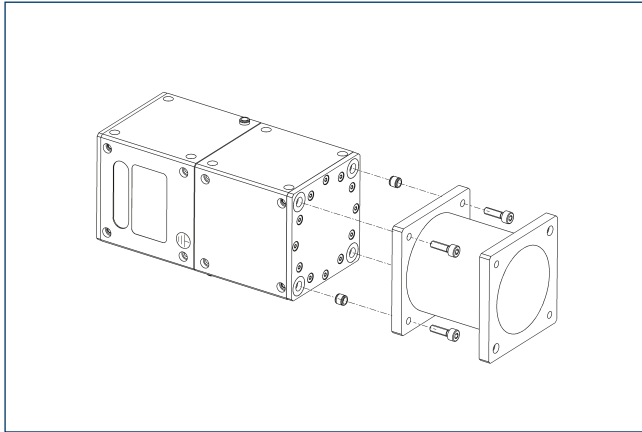
Description	Unit	PR 110-51-B	PR 110-101-B	PR 110-161-B
ID		0307324	0307322	0307320
Mechanical operating data				
Rated torque	[Nm]	22.4	40.8	88
Peak torque	[Nm]	61.6	120	184
max. rotational speed	[1/min]	78	40	25
Max. permissible mass moment of inertia	[kgm ²]	1.5	6.5	9.5
Repeat accuracy	[°]	0.08	0.04	0.03
Transmission		51:1	101:1	161:1
General operating data				
Weight	[kg]	5.6	5.6	5.6
min. / max. ambient temperature	[°C]	5/55	5/55	5/55
IP class		40	40	40
Electrical operating data				
Nominal voltage	[V]	24	24	24
Nominal current	[A]	10	10	10
max. power supply	[A]	20	20	20
Control electronics				
Control electronics		integrated	integrated	integrated
Power supply	[V]	24	24	24
Encoder system		Encoder (incremental)	Encoder (incremental)	Encoder (incremental)
Interface		Profibus, CAN bus, 4/4 digital I/O, RS232	Profibus, CAN bus, 4/4 digital I/O, RS232	Profibus, CAN bus, 4/4 digital I/O, RS232

① The top torques serve as short-term drive reserves when accelerating and delaying.

PR 110

Electrical | Rotary Units | Universal Rotary Unit

Connecting element – straight

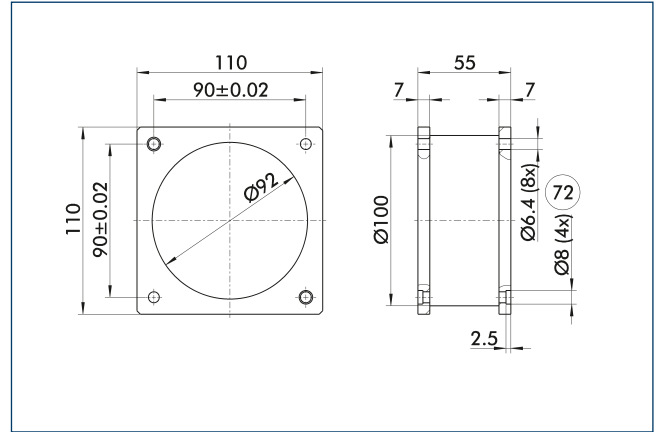


Straight standard element for connection of PowerCube modules with repeat accuracy

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

① Special lengths on request

PAM 104 – straight

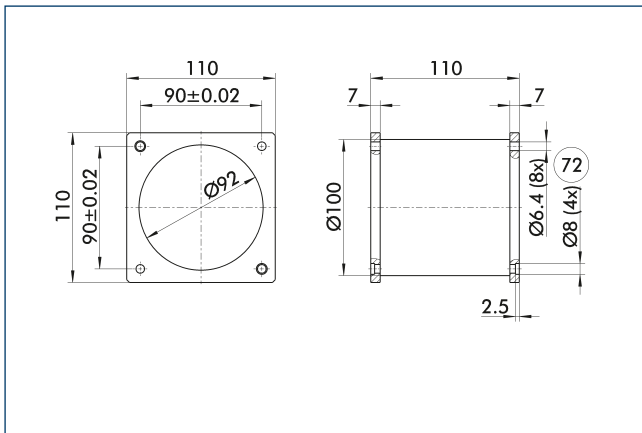


⑦2 Fitting for centering sleeve

Suitable for PowerCube unit size 110

Description	ID	Dimensions
Connecting element		
PAM 104	0307804	110x110/55/110x110 mm

PAM 105 – straight

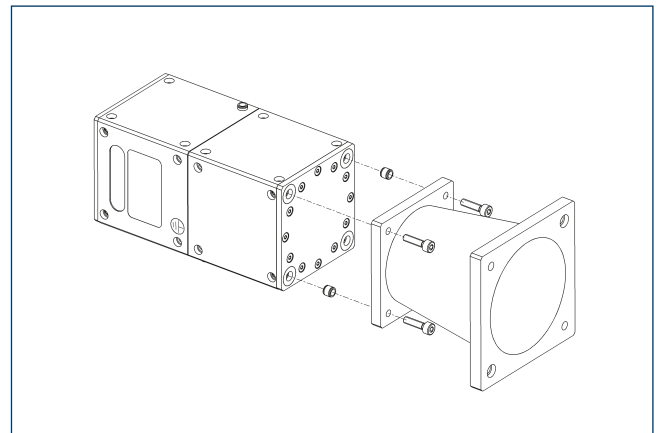


⑦2 Fitting for centering sleeve

Suitable for PowerCube unit size 110

Description	ID	Dimensions
Connecting element		
PAM 105	0307805	110x110/110/110x110 mm

Connecting element – conical

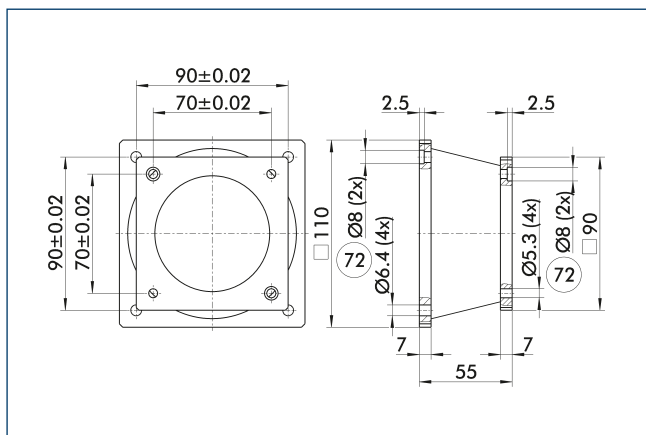


Conical standard element for connection of PowerCube modules with repeat accuracy

Description	ID	Dimensions
Connecting element		
PAM 112	0307812	
PAM 113	0307813	

① Special lengths on request

PAM 112 – conical



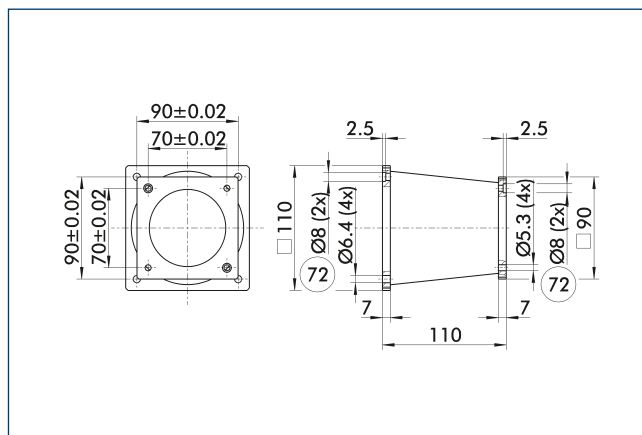
72 Fitting for centering sleeve

Suitable for PowerCube unit sizes 90/110

Description	ID
Connecting element	
PAM 112	0307812

① Special lengths on request

PAM 113 – conical



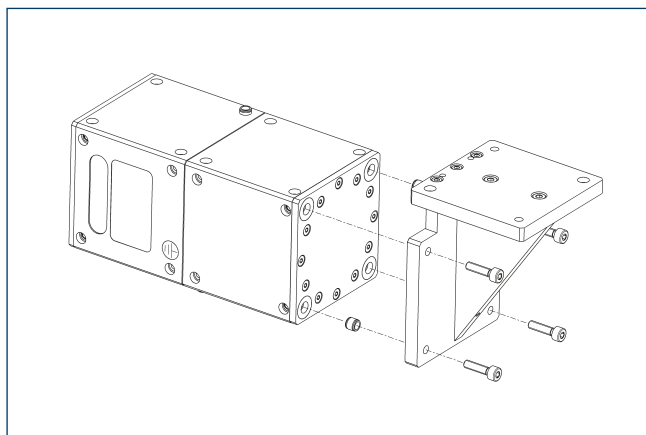
72 Fitting for centering sleeve

Suitable for PowerCube unit sizes 90/110

Description	ID
Connecting element	
PAM 113	0307813

① Special lengths on request

Connecting element – angle

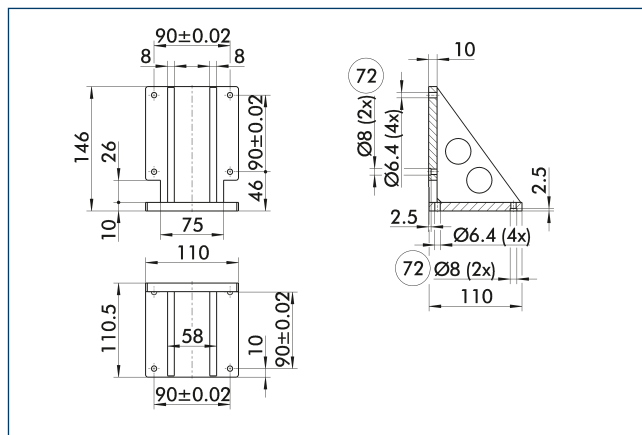


Angular standard element for connection of PowerCube modules with repeat accuracy

Description	ID
Connecting element	
PAM 122	0307822

① Special lengths on request

PAM 122 – angle

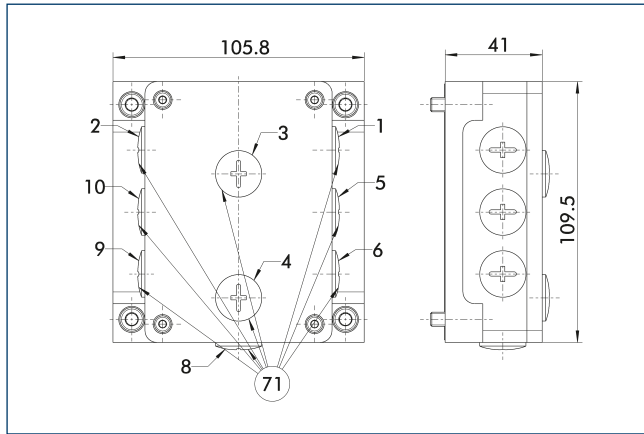


72 Fitting for centering sleeve

Suitable for PowerCube unit size 110

Description	ID
Connecting element	
PAM 122	0307822

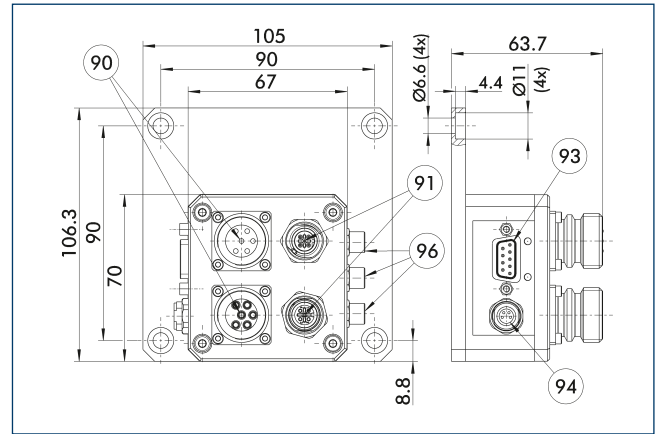
Connection cap DMI



71 M16x1.5 for cable guide penetrating screw connection

Description	ID
Connection caps	
DMI 100-V05-B	0307734

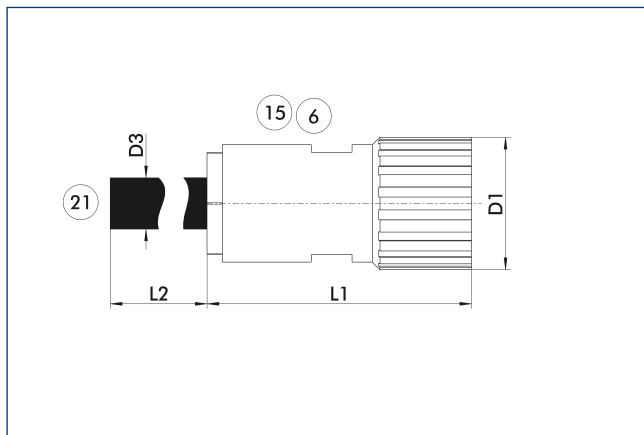
Connection cap MMI



90 Connection power supply (logic / load)
 91 Connection fieldbus M12
 93 Parametrized interface RS232
 94 Connection power supply service box (SSB)
 96 Connection external end switch

Description	ID
Connection caps	
MMI 110-V05-E-CN	0307508
MMI 110-V05-D-CN	0307509
MMI 110-V05-E-PB	0307510
MMI 110-V05-D-PB	0307511

Power cable for SCHUNK MMI

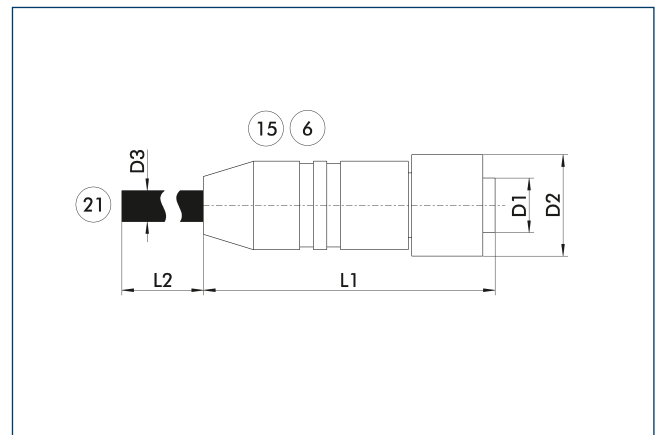


6 Connection module side
 15 Socket
 21 Connection controller side

Description	ID	L ₂	D ₁
Power cable for SCHUNK MMI			
KA GGN2304-LK-00150-H	0349874	1.5 m	M23
KA GGN2304-LK-00300-H	0349875	3 m	M23
KA GGN2304-LK-00500-H	0349876	5 m	M23
KA GGN2304-LK-01000-H	0349877	10 m	M23
KA GLN2304-LK-00150-H	0349870	1.5 m	M23
KA GLN2304-LK-00300-H	0349871	3 m	M23
KA GLN2304-LK-00500-H	0349872	5 m	M23
KA GLN2304-LK-01000-H	0349873	1 m	M23

ⓘ Please observe the bending radius (7.5 times the cable diameter).

CAN-Bus cable

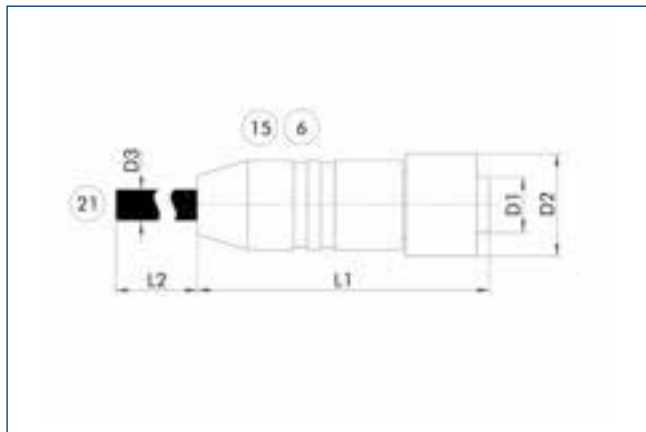


6 Connection module side
 15 Socket
 21 Connection controller side

Description	ID	L ₂	D ₁
CAN-bus cable			
KA GGN1204-CN-00150-A	0349770	1.5 m	M12
KA GGN1204-CN-00300-A	0349771	3 m	M12
KA GGN1204-CN-00500-A	0349772	5 m	M12
KA GGN1204-CN-01000-A	0349773	10 m	M12

ⓘ Please observe the bending radius (7.5 times the cable diameter).

Profibus cable

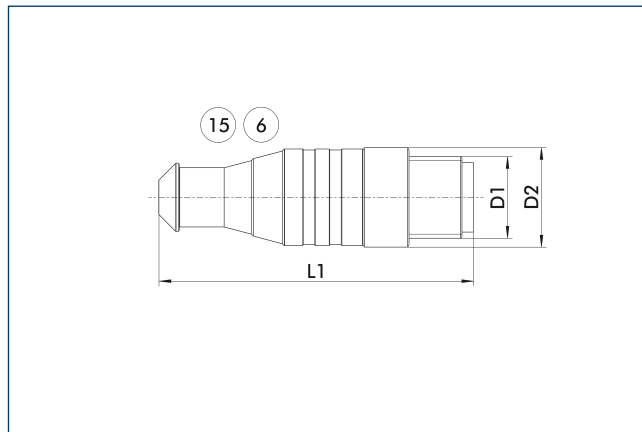


- ⑥ Connection module side
- ②① Connection controller side
- ⑮ Socket

Description	ID	L ₂	D ₁
Profibus cable			
KA GGN1204-PB-00150-A	0349750	1.5 m	M12
KA GGN1204-PB-00300-A	0349751	3 m	M12
KA GGN1204-PB-00500-A	0349752	5 m	M12
KA GGN1204-PB-01000-A	0349753	10 m	M12

① Please observe the bending radius (7.5 times the cable diameter).

Terminators



- ⑥ Connection module side
- ⑮ Socket

Description	ID	
Terminators		
ST SG1204-CN-A-A	0349660	
ST SG1204-PB-A-A	0349650	

① A suitable terminator must be mounted on the last module in the CAN or Profibus line.