

PowerCube System

Linear Axes - System Explanation

PowerCube System

Individual modular solutions

The modules from the PowerCube series provide the basis for flexible combinations in automation. Complex systems and multi-axis robot structures with several degrees of freedom can be implemented with minimal design and programming costs. Unbeatable 32-bit technology, high precision motor current measurement and reduced heat dissipation are all combined in a minimal space in all PowerCube components. The accuracy of the motor current measurement in particular allows all components to be used in force adaptive applications, from servo-electric gripping systems, rotary actuators and pan-tilt units to motors with integrated position control through to driven linear axes.

The modular robotics concept is unique. The PowerCube modules are basic elements that can be individually combined. The cubic geometry makes the system extremely adaptable for modular solutions.

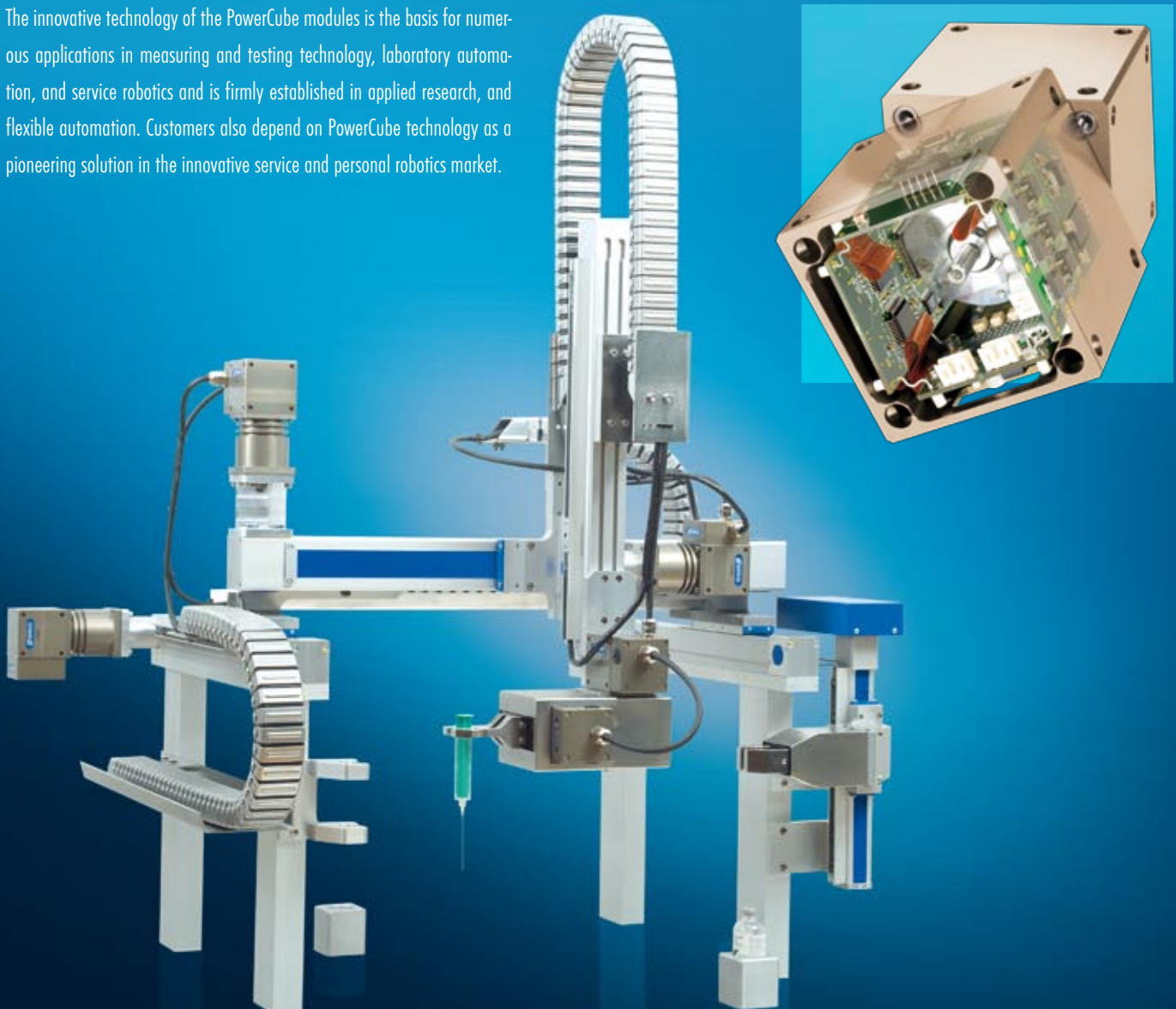
The innovative technology of the PowerCube modules is the basis for numerous applications in measuring and testing technology, laboratory automation, and service robotics and is firmly established in applied research, and flexible automation. Customers also depend on PowerCube technology as a pioneering solution in the innovative service and personal robotics market.

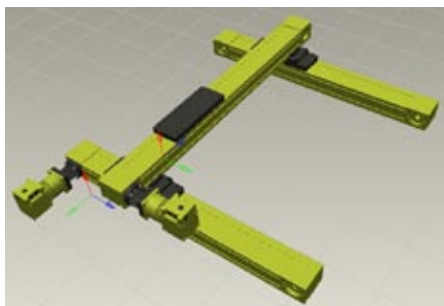
Modular intelligence

The PowerCube modules work completely independently. All PowerCube components are fitted with a standardized interface for mechatronics and control. Control, regulating and power electronics are completely integrated into the modules. The PowerCube modules can quickly be integrated into existing systems using the universal communication interfaces Profibus DP and CAN.

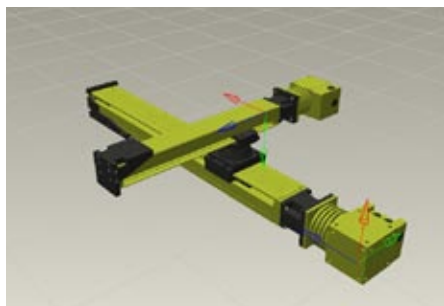
PowerCube - Mechatronic modules

- Standardized interface for mechatronics and control for quick and easy assembly without complicated design work
- Control, regulating and power electronics are completely integrated into the modules
- Integrated high-end microcontroller for high-speed data processing

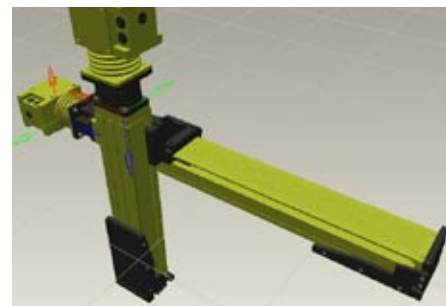




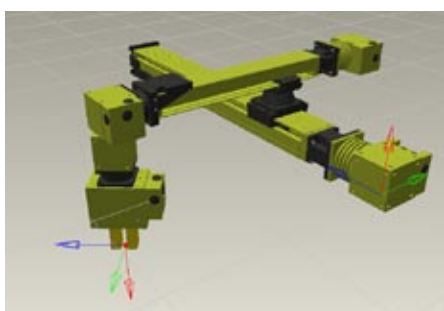
Surface gantry with toothed belt axes



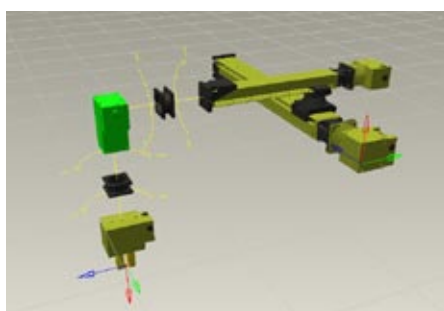
Surface gantry with spindle axes



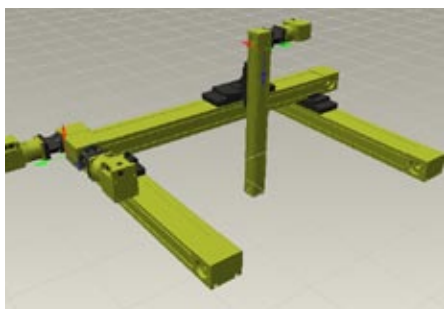
Line gantry with spindle axes



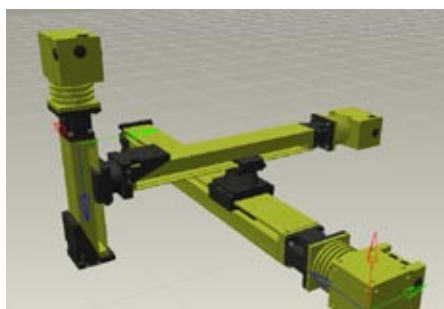
Example of an axis combination with surface gantry, rotary module, and electric gripper



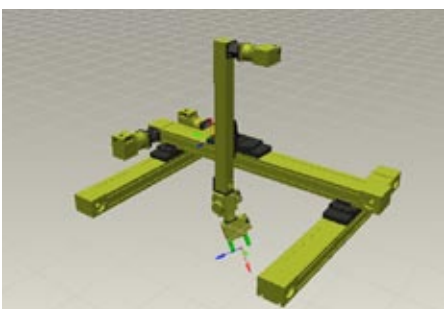
Assembly is carried out using standardized connectors



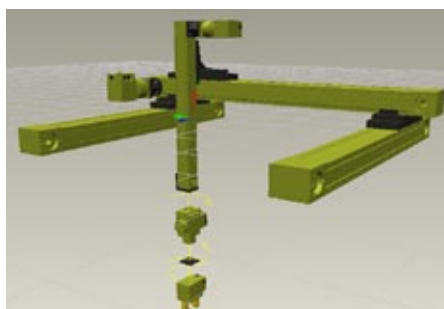
Room portal with toothed belt axes



Room portal with spindle axes

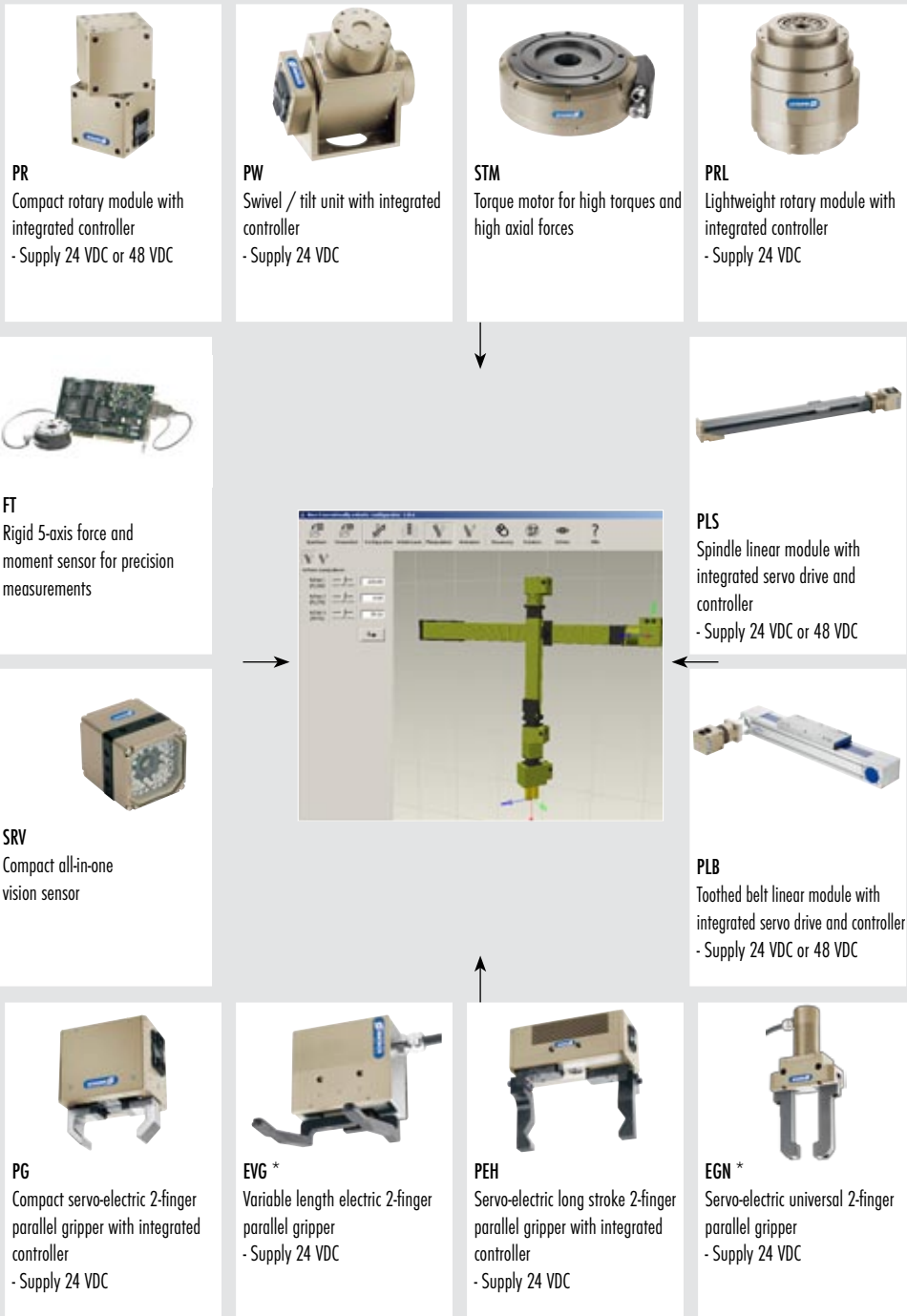


Room portal expanded with swivel/tilt module and gripper



Assembly is carried out using standardized connectors

Configuration and Design with the Mechatronic Modules



Mechatronic components

Our engineers use the configurator for mechatronic solutions developed by SCHUNK to support you in finding the right solution. The result is a handling or robot system tailored precisely to your requirements, which is ready to be installed in your machine or plant and used.

Operation with practically any controller is possible thanks to the standard Profibus and CAN interfaces.



Sizes

PLB 70 .. 110 (3 variants)
PLS 70 .. 110 (3 variants)



Weight

8 .. 94 kg
4 .. 31 kg



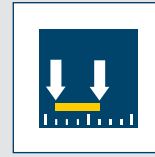
Drive / axial force

915 .. 1,830 N
180 .. 3,990 N



Range of stroke

20 .. 5,850 mm
60 .. 1,200 mm



Repeat accuracy

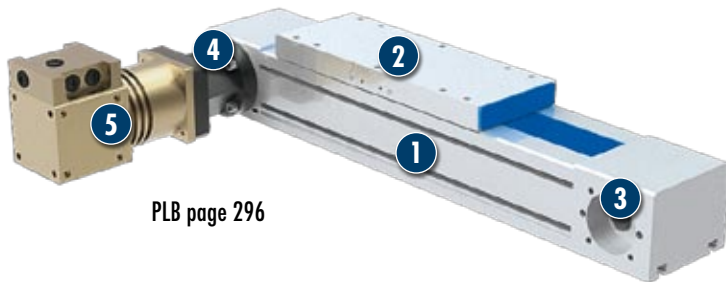
± 0.08 mm
± 0.02 mm

PLB servo linear axis with toothed belt drive

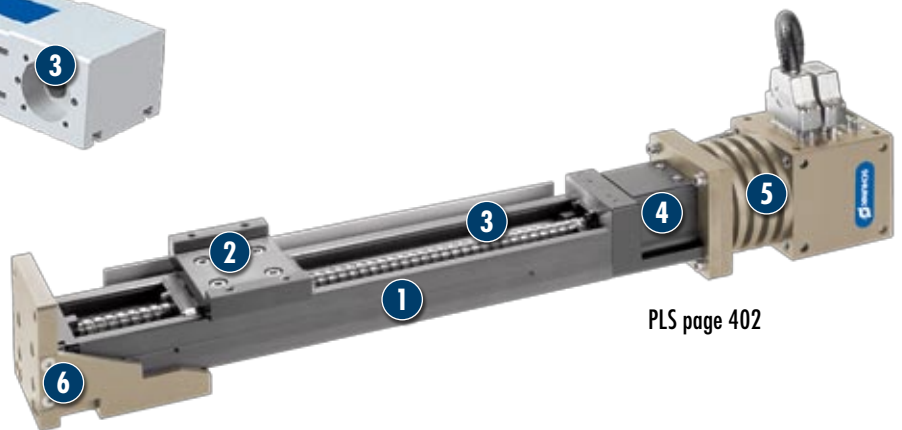
- Flexibility due to customer-specific strokes
- Lightweight construction
- Protection by cover
- Complete with servo drive and integrated controller
- Assembled, preconfigured and ready to turn on

PLS servo linear axis with recirculating ball-bearing spindle

- Maximum precision
- Maximum rigidity
- Maximum lifetime
- Complete with servo drive and integrated controller
- Assembled, preconfigured and ready to turn on



PLB page 296



PLS page 402

1 Basic profile

2 Carriage

3 Belt drive

4 Motor adaptation

5 Servo motor with integrated PDU type controller with additional Harmonic Drive® gears

1 Axis body

2 Carriage

3 Roller ball screw

4 Motor adaptation

5 Servo motor with integrated PSM type controller

6 Axis fastening bracket

PSM - Servo motor with integrated position control

The PSM servo motor with integrated position control is suitable for use as a servo drive for flexible applications for linear, rotary and CNC axes or as an axis motor for applications in measuring and testing technology. A comprehensive range of combinations with other PowerCube modules is guaranteed by the standard connecting elements and the integrated control concept. A high-resolution encoder ensures high precision. The entire control, regulating and power electronics for setting up a decentralized control system is integrated in the module. No separate motor controller in the control cabinet is required.

Description of function

The motor shaft is powered directly by a brushless DC servo motor. The PSM servo motor is electrically actuated by the fully integrated regulating and power electronics. This means that no additional external control elements are required for the module.



PDU - Servo positioning motor with precision gears

The servo positioning motor combines high precision and high torque while simultaneously having a very compact design. The high torques are achieved by the integrated Harmonic Drive® gears with considerable reserves of acceleration and deceleration, while the high-resolution encoder guarantees high precision. The PowerCube PDU is ideally suited for linear, rotary and CNC axes or as an axis motor for applications in measuring and testing technology.

Description of function

The servo gear motor has Harmonic Drive® precision gears, which are powered directly by a brushless DC servo motor. A conventional motor shaft is used as the connection.



MSM servo motor drive

The new drives from the MSM series extend the load range of the SCHUNK modular system and achieve high dynamics and short cycle times, even for workpieces weighing more than two kilograms. The servo motors contain all components necessary for electric control. The integrated controller enables up to 100 positions to be freely defined based on time, torque or destination in the 100 travel data slots.

- No control cabinet, no complicated wiring
- Profibus-DP or CAN-Bus connection as standard
- Three sizes
- 230 V AC mains voltage



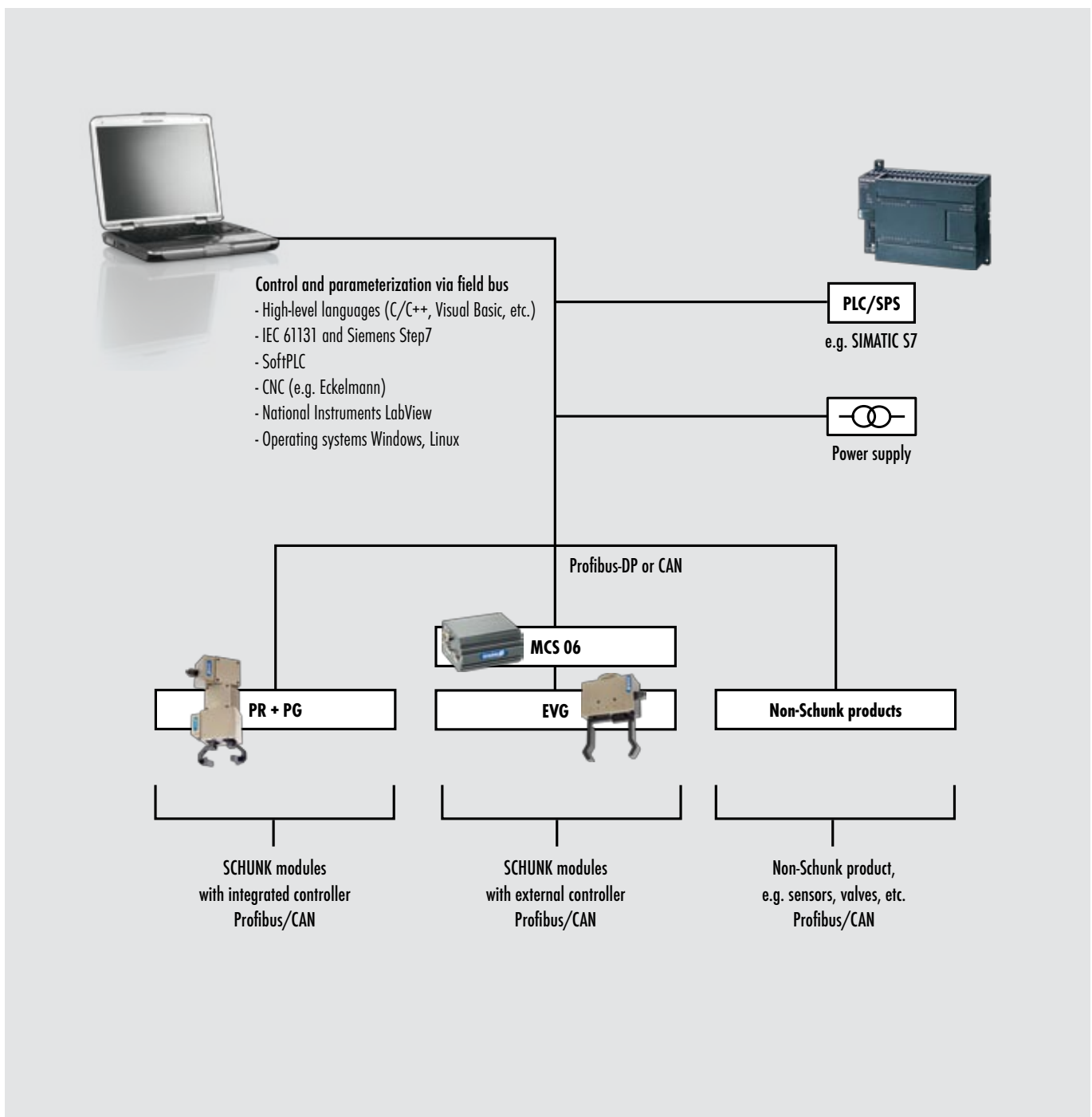
Control and parameterization

Decentralized, servo-electric technology

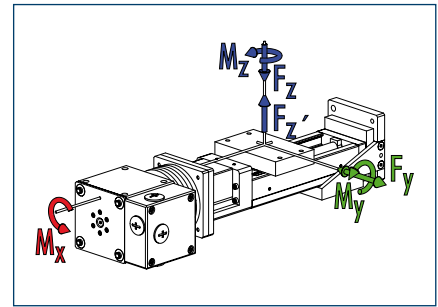
Rapid commissioning thanks to integrated servo-electric technology and sensitive control of key process parameters are the most important benefits of the SCHUNK mechatronic range. The mechatronic components are based on the close linking of mechanical, electronic, and IT sub-systems. All modules can be integrated easily and with no problems into existing control concepts. Because all modules are autonomous overall systems, assembly and commissioning costs are low.

Benefit from mechatronics

- Total costs for mechatronics are lower than the cost of providing and maintaining a compressed air system
- Significant increase in flexibility
- Exact adaptation to specified requirements
- Control of all parameters
- Measuring options for movement and holding currents without additional sensors
- Direct processing in machine controller or on external computer (control by Internet and remote maintenance)



Forces and moments



PLS 070		
■	F_z max. [N]	2840
■	F_z' max. [N]	2840
■	F_y max. [N]	2840
■	M_x max. [Nm]	428
■	M_y max. [Nm]	166
■	M_z max. [Nm]	166

① Note that use under extreme ambient conditions (e.g. coolant range, with casting or abrasive dust) can significantly reduce the lifetime of these units and we cannot accept any liability for this. However, in many cases we have the perfect solution. Please contact us for assistance.

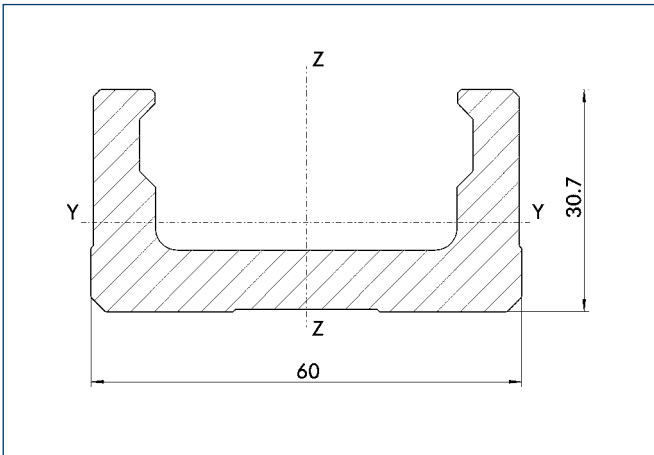
Size 070

Technical data

Designation	PLS 070	
Rated feeding force	[N]	180
Peak feeding force	[N]	550
Output resolution	[inc/mm]	333
Repeat accuracy	[mm]	± 0.02
Max. speed	[mm/s]	500
Power consumption, typ.	[VA]	24 VDC, 3 A
Power consumption, max.	[VA]	24 VDC, 15 A
Tightness	[IP]	10
Controller	Integrated - SMP	

Type	ID no.	Guide	Stroke	Weight
			[mm]	[kg]
PLS 070 0050	0378371	KR3306 A 150L	50	3.5
PLS 070 0100	0378372	KR3306 A 200L	100	3.8
PLS 070 0200	0378373	KR3306 A 300L	200	4.4
PLS 070 0300	0378374	KR3306 A 400L	300	5.0
PLS 070 0400	0378375	KR3306 A 500L	400	5.7
PLS 070 0500	0378376	KR3306 A 600L	500	6.3

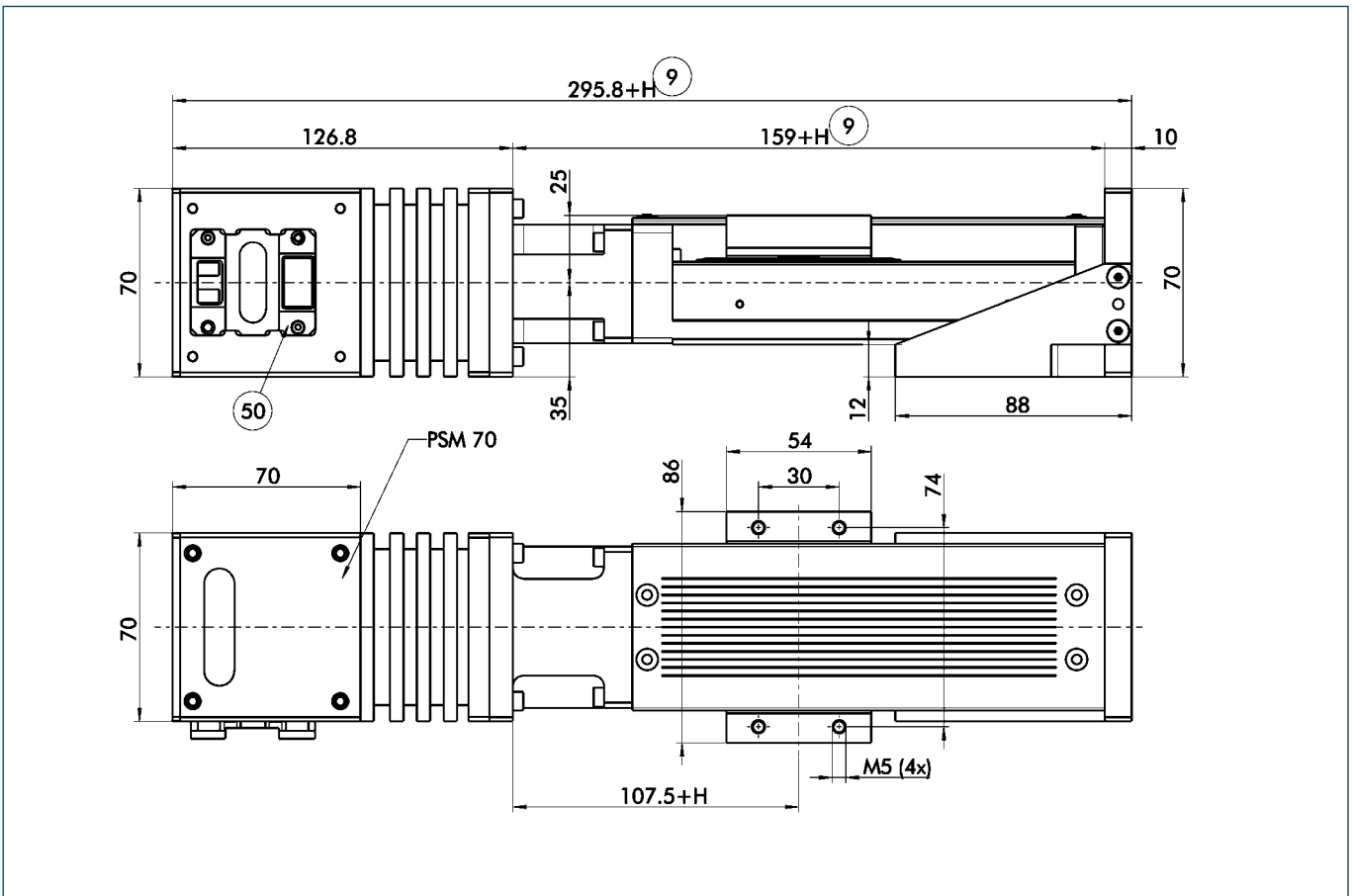
Planar moments of inertia



PLS 070

I_z max.	[mm ⁴]	6.2×10^4
I_y max.	[mm ⁴]	3.8×10^4

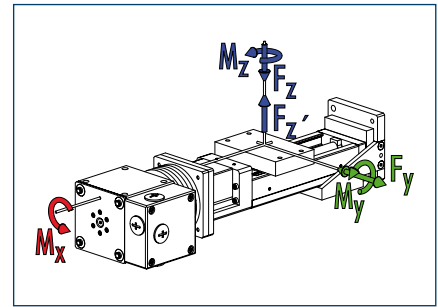
Dimensions









The drawing shows the basic axis design with PSM drive motors.

- ⑨ Useful stroke
- ⑤⑩ Electronic connection

Forces and moments



PLS 090		
	F_z max. [N]	3140
	F_z' max. [N]	3140
	F_y max. [N]	3140
	M_x max. [Nm]	1400
	M_y max. [Nm]	547
	M_z max. [Nm]	547

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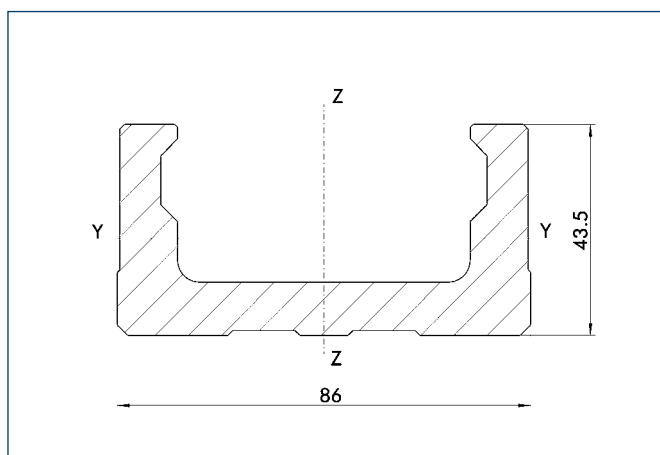
Size 090

Technical data

Designation		PLS 090
Rated feeding force	[N]	333
Peak feeding force	[N]	950
Output resolution	[inc/mm]	200
Repeat accuracy	[mm]	± 0.02
Max. speed	[mm/s]	715
Power consumption, typ.	[VA]	24 VDC, 6 A
Power consumption, max.	[VA]	24 VDC, 30 A
Tightness	[IP]	10
Controller		Integrated - SMP

Type	ID no.	Guide	Stroke	Weight
			[mm]	[kg]
PLS 090 0200	0378381	KR4610 A 340L	200	10.7
PLS 090 0300	0378382	KR4610 A 440L	300	12.0
PLS 090 0400	0378383	KR4610 A 540L	400	13.3
PLS 090 0500	0378384	KR4610 A 640L	500	14.6
PLS 090 0600	0378385	KR4610 A 740L	600	15.8
PLS 090 0800	0378386	KR4610 A 940L	800	18.3

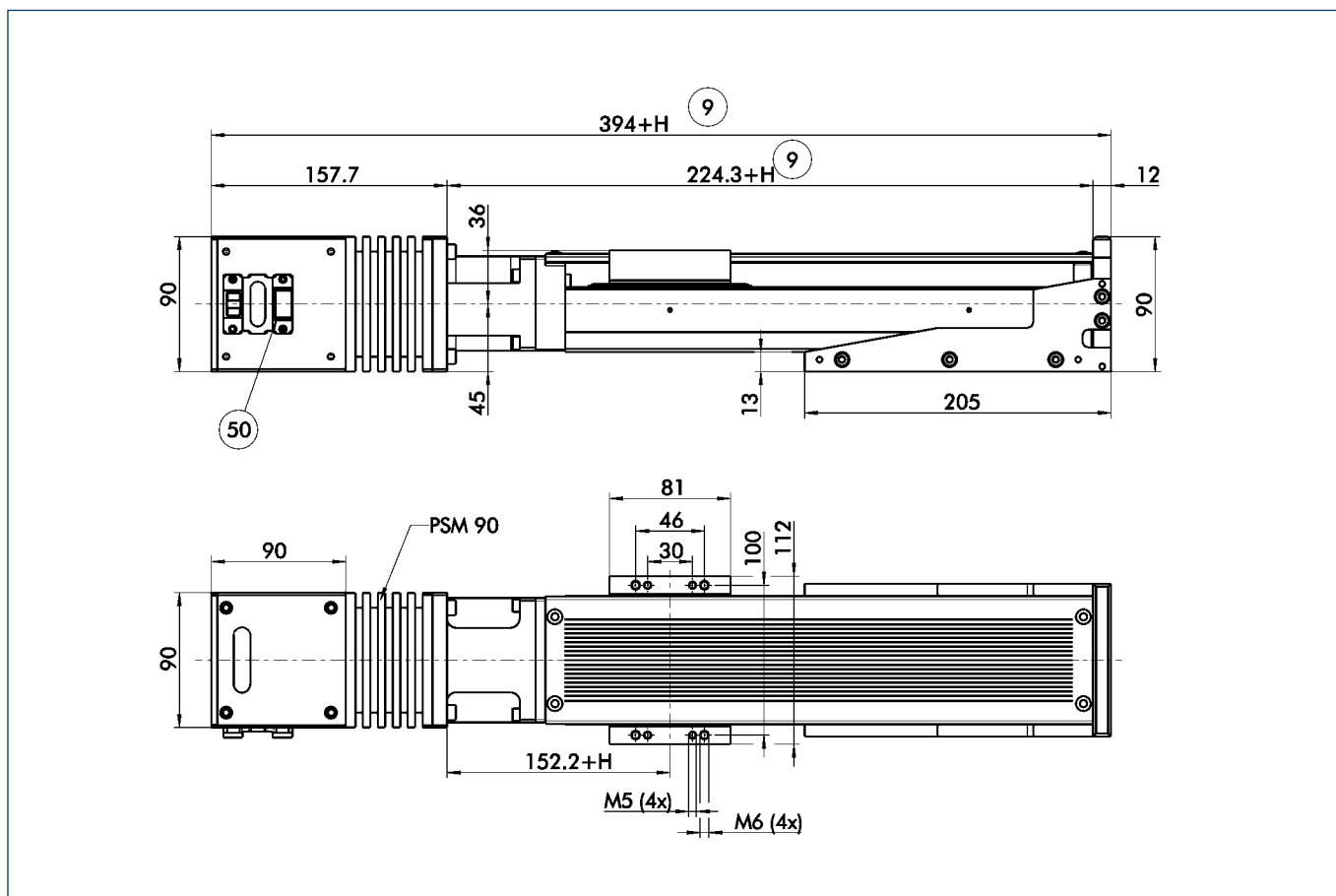
Planar moments of inertia



PLS 090

I_z max.	[mm ⁴]	6.2×10^4
I_y max.	[mm ⁴]	3.8×10^4

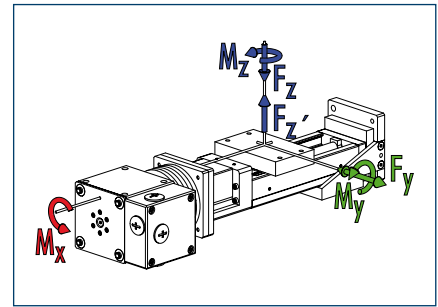
Dimensions









The drawing shows the basic axis design with PSM drive motors.

- ⑨ Useful stroke
- ⑤⑩ Electronic connection

Forces and moments



PLS 110		
	F_z max. [N]	3620
	F_z' max. [N]	3620
	F_y max. [N]	3620
	M_x max. [Nm]	2280
	M_y max. [Nm]	870
	M_z max. [Nm]	870

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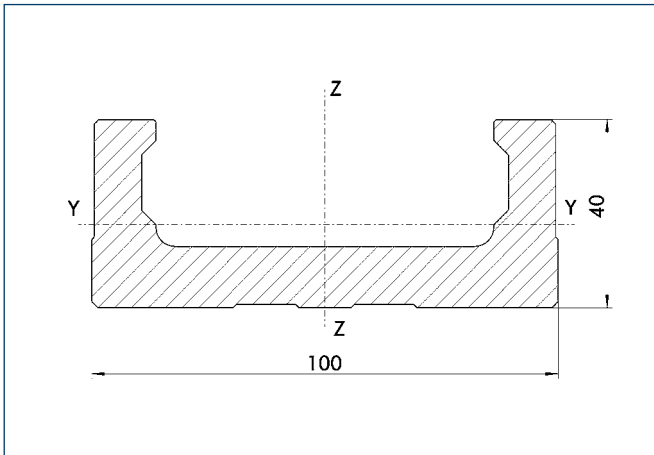
Size 110

Technical data

Designation		PLS 110
Rated feeding force	[N]	315
Peak feeding force	[N]	1200
Output resolution	[inc/mm]	100
Repeat accuracy	[mm]	± 0.05
Max. speed	[mm/s]	1500
Power consumption, typ.	[VA]	48 VDC, 6 A
Power consumption, max.	[VA]	48 VDC, 30 A
Tightness	[IP]	10
Controller		Integrated - SMP

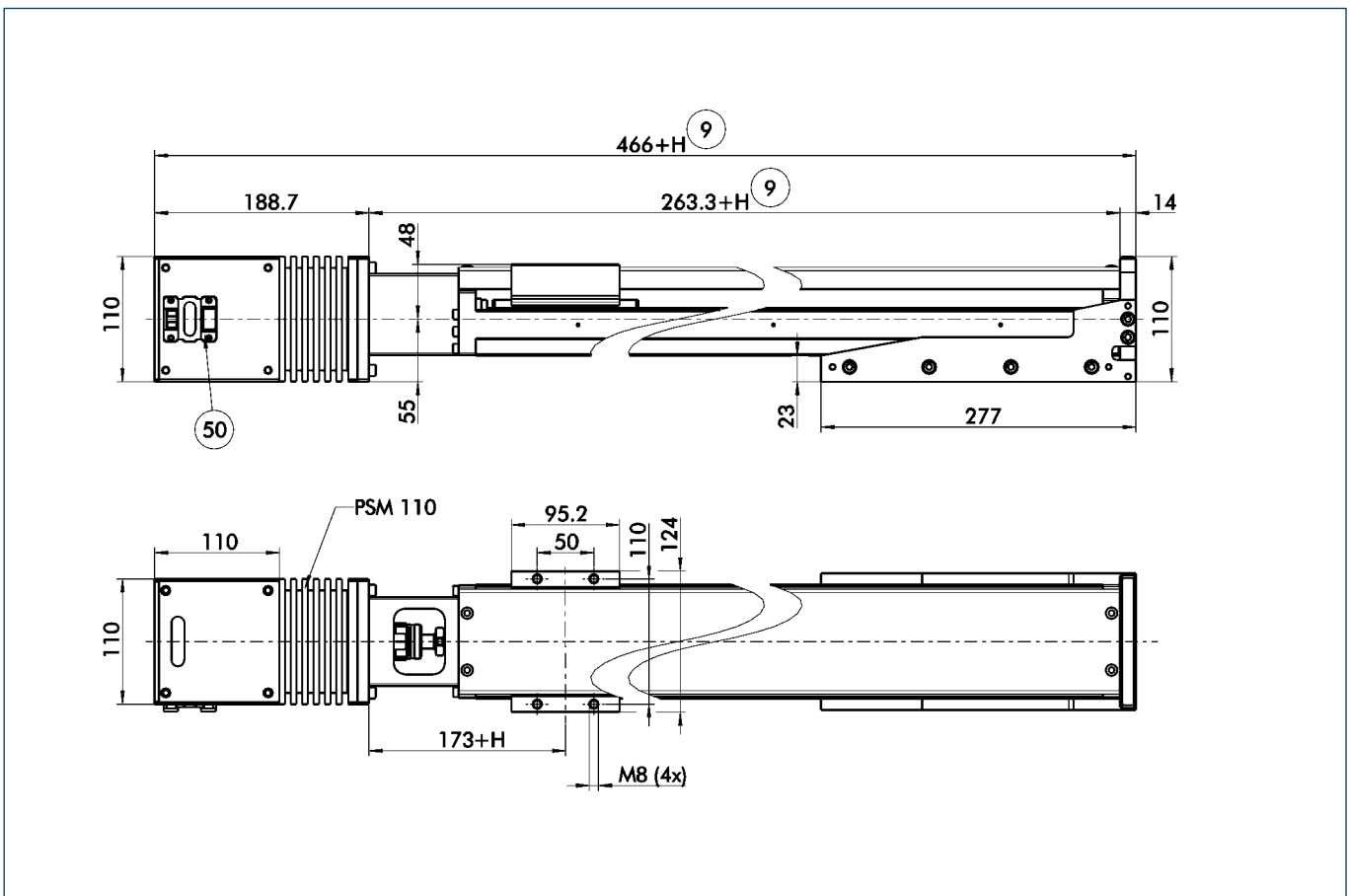
Type	ID no.	Guide	Stroke	Weight
			[mm]	[kg]
PLS 110 0800	0378391	KR5520 A 980L	800	23.9
PLS 110 0900	0378392	KR5520 A 1080L	900	25.7
PLS 110 1000	0378393	KR5520 A 1180L	1000	28.4
PLS 110 1100	0378394	KR5520 A 1280L	1100	29.1
PLS 110 1200	0378395	KR5520 A 1380L	1200	30.9

Planar moments of inertia



PLS 110		
I_z max.	[mm ⁴]	6.2×10^4
I_y max.	[mm ⁴]	3.8×10^4

Dimensions



The drawing shows the basic axis design with PSM drive motors.

- ⑨ Useful stroke
- ⑵ Electronic connection



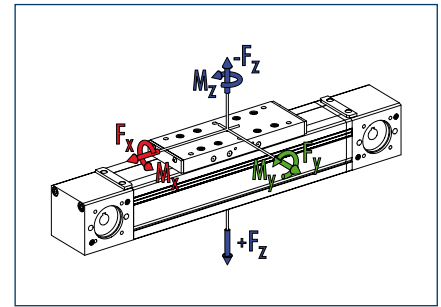
Size 070

Technical data

Designation		PLB 070
Rated feeding force	[N]	250
Peak feeding force	[N]	500
Output resolution	[inc/mm]	583
Repeat accuracy	[mm]	± 0.08
Max. speed	[mm/s]	225
Power consumption, typ.	[VA]	24 VDC, 3 A
Power consumption, max.	[VA]	24 VDC, 15 A
Tightness	[IP]	54
Controller		Integrated - SMP

Type	ID no.	Guide	Stroke [mm]	Weight [kg]
PLB 070 0200	0378301	B70-C-ZSS-32AT5	200	8,1
PLB 070 0500	0378302	B70-C-ZSS-32AT5	500	9,3
PLB 070 1000	0378303	B70-C-ZSS-32AT5	1000	11,2
PLB 070 1500	0378304	B70-C-ZSS-32AT5	1500	13,1
PLB 070 2000	0378305	B70-C-ZSS-32AT5	2000	15,0
PLB 070 3000	0378306	B70-C-ZSS-32AT5	3000	18,8

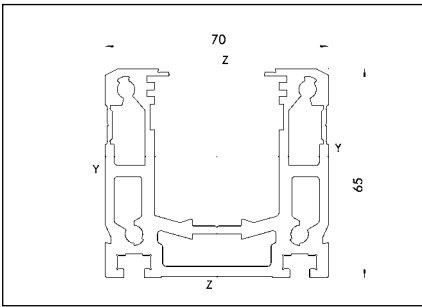
Moment load



PLB 070		
■	F_x max.* [N]	1100
■	F_y max. [N]	600
■	F_z max. [N]	1800
■	M_x max. [Nm]	60
■	M_y max. [Nm]	180 (230)
■	M_z max. [Nm]	120 (150)

- ⓘ Moments and forces may occur simultaneously.
 Values in brackets relate to the long slide.
 * Maximum value = Depends on speed

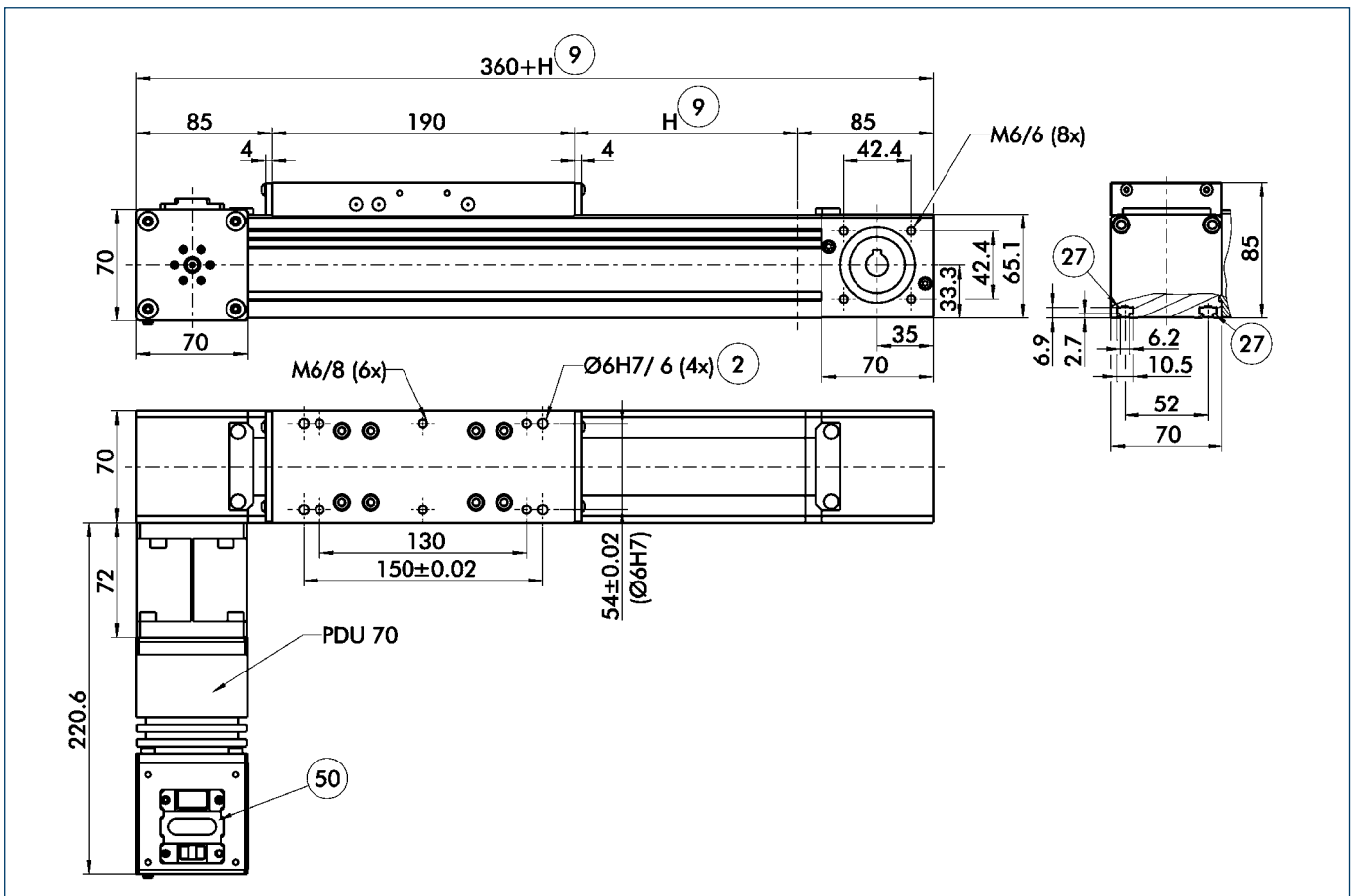
Planar moments of inertia



Profile B 70

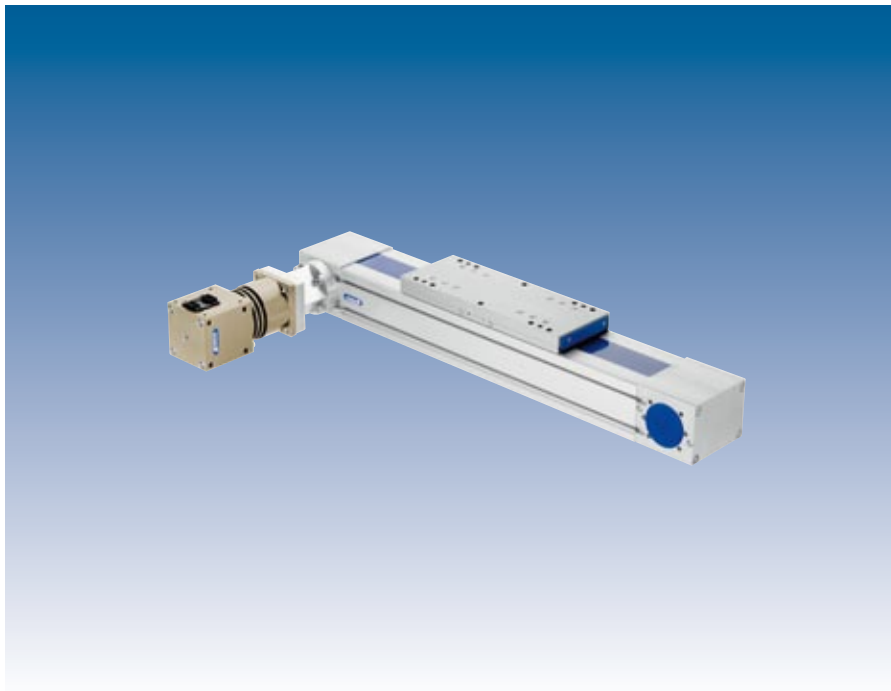
Specific mass	[kg/m]	3.69
Surface dimension	[mm ²]	1369
Planar moment of inertia ly	[mm ⁴]	563059
Planar moment of inertia lz	[mm ⁴]	852507
Load torque Wy	[mm ³]	14743
Load torque Wz	[mm ³]	24335

Dimensions



The drawing shows the basic axis design with PDU drive motor.

- ② Connection of the assembly
- ⑨ Useful stroke
- ⑳ Mounting groove for T-nuts
- ⑤⑩ Electronic connection



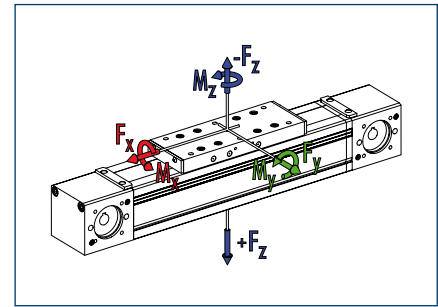
Size 090

Technical data

Designation		PLB 090
Rated feeding force	[N]	550
Peak feeding force	[N]	1100
Output resolution	[inc/mm]	425
Repeat accuracy	[mm]	± 0.08
Max. speed	[mm/s]	310
Power consumption, typ.	[VA]	24 VDC, 6 A
Power consumption, max.	[VA]	24 VDC, 30 A
Tightness	[IP]	54
Controller		Integrated - SMP

Type	ID no.	Guide	Stroke [mm]	Weight [kg]
PLB 090 0300	0378311	B120-ZSS-50ATL10	300	28,8
PLB 090 0500	0378312	B120-ZSS-50ATL10	500	32,2
PLB 090 1000	0378313	B120-ZSS-50ATL10	1000	4037
PLB 090 1500	0378314	B120-ZSS-50ATL10	1500	49,2
PLB 090 2000	0378315	B120-ZSS-50ATL10	2000	57,7
PLB 090 3000	0378316	B120-ZSS-50ATL10	3000	74,7

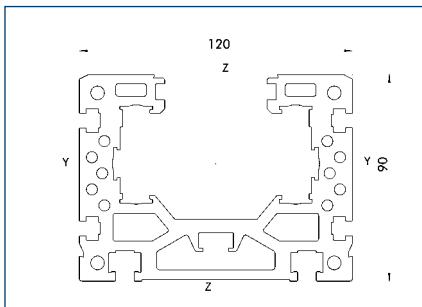
Moment load



PLB 090		
■	F_x max.* [N]	4000
■	F_y max. [N]	3000
■	F_z max. [N]	8000
■	M_x max. [Nm]	400
■	M_y max. [Nm]	800 (1200)
■	M_z max. [Nm]	600 (800)

ⓘ Moments and forces may occur simultaneously.
 Values in brackets relate to the long slide.
 * Maximum value = Depends on speed

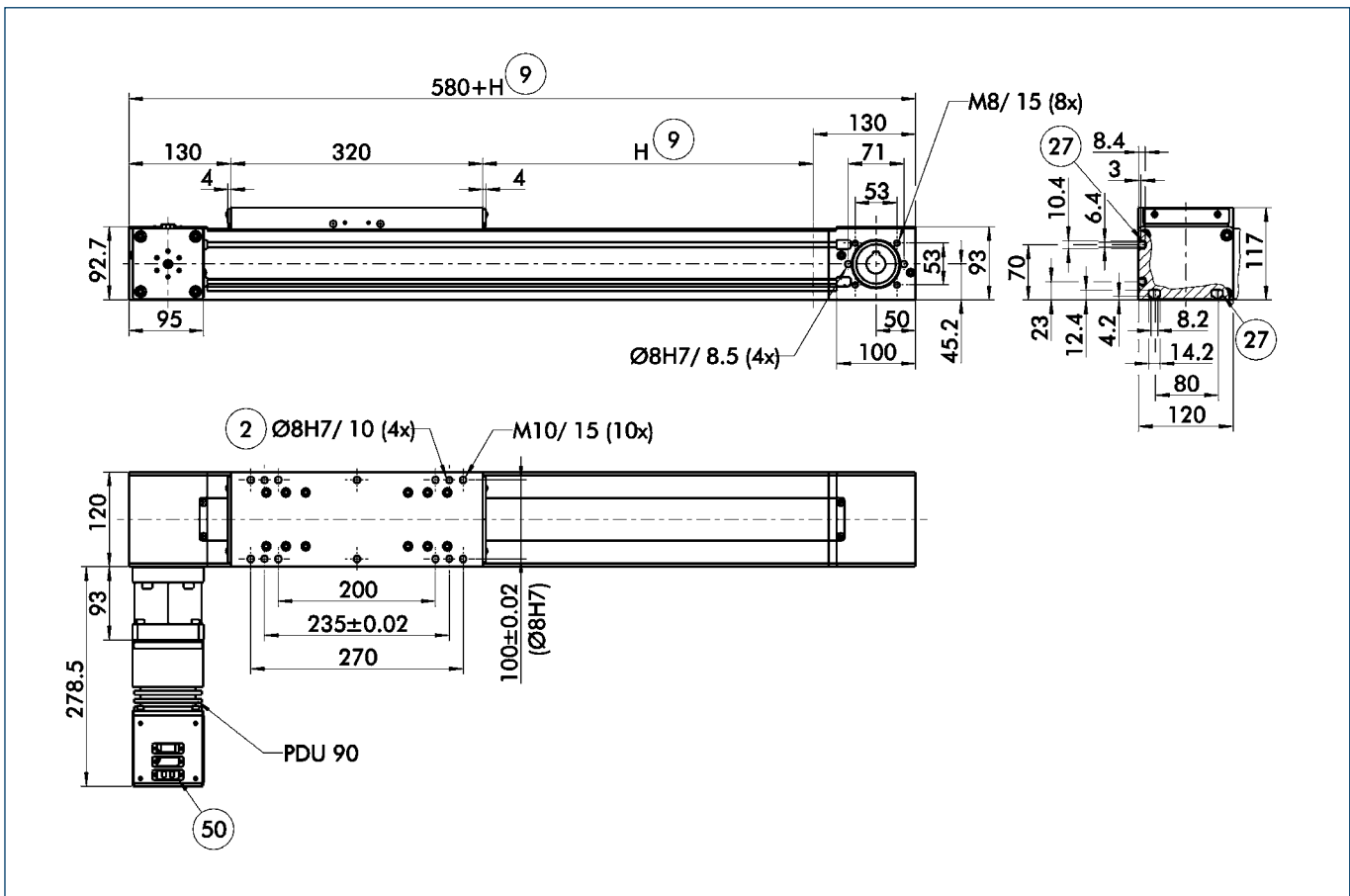
Planar moments of inertia



Profile B 120

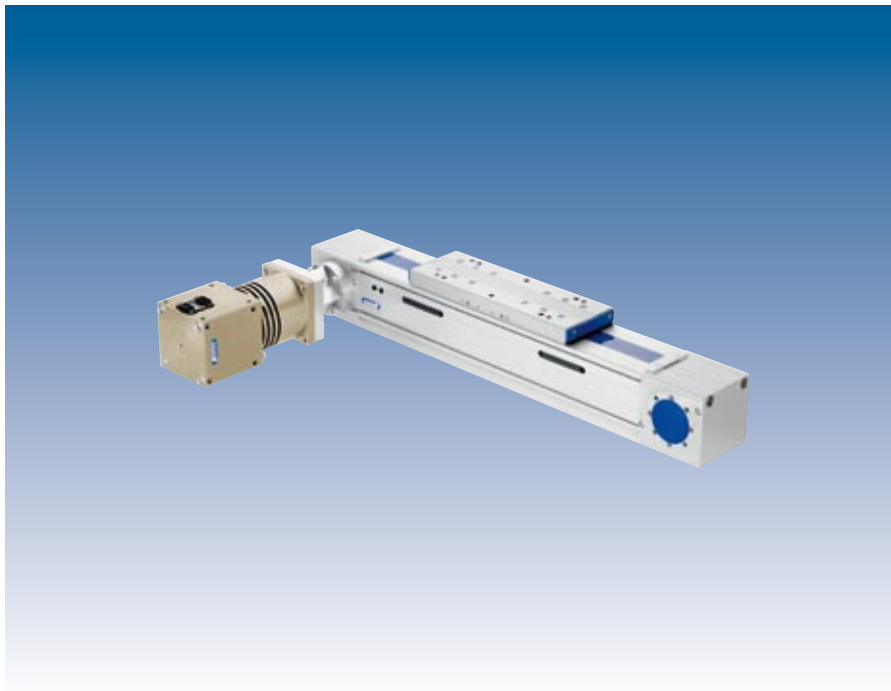
Specific mass	[kg/m]	10.40
Surface dimension	[mm ²]	3869
Planar moment of inertia ly	[mm ⁴]	3083392
Planar moment of inertia lz	[mm ⁴]	7109291
Load torque Wy	[mm ³]	62408
Load torque Wz	[mm ³]	118397

Dimensions



The drawing shows the basic axis design with PDU drive motor.

- ② Connection of the assembly
- ⑨ Useful stroke
- ⑳ Mounting groove for T-nuts
- ⑤① Electronic connection



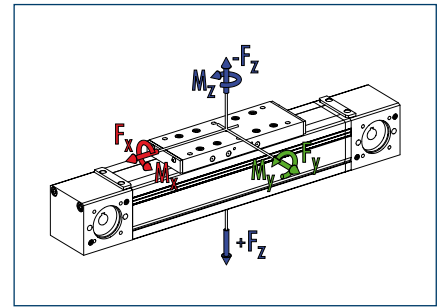
Size 110

Technical data

Designation		PLB 110
Rated feeding force	[N]	790
Peak feeding force	[N]	1590
Output resolution	[inc/mm]	340
Repeat accuracy	[mm]	± 0.08
Max. speed	[mm/s]	390
Power consumption, typ.	[VA]	48 VDC, 6 A
Power consumption, max.	[VA]	48 VDC, 30 A
Tightness	[IP]	54
Controller		Integrated - SMP

Type	ID no.	Guide	Stroke	Weight
			[mm]	[kg]
PLB 110 0300	0378321	B110-ZSS-50ATL10	300	36,5
PLB 110 0500	0378322	B110-ZSS-50ATL10	500	40,7
PLB 110 1000	0378323	B110-ZSS-50ATL10	1000	51,2
PLB 110 1500	0378324	B110-ZSS-50ATL10	1500	61,7
PLB 110 2000	0378325	B110-ZSS-50ATL10	2000	72,2
PLB 110 3000	0378326	B110-ZSS-50ATL10	3000	93,2

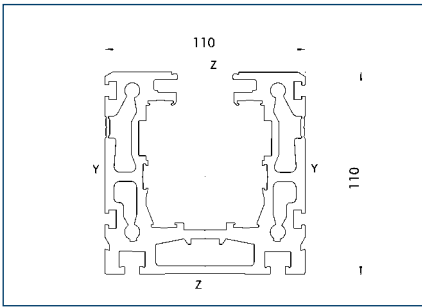
Moment load



		PLB 110
■	F_x max.* [N]	4000
■	F_y max. [N]	3000
■	F_z max. [N]	8000
■	M_x max. [Nm]	400
■	M_y max. [Nm]	1200 (1500)
■	M_z max. [Nm]	600 (800)

ⓘ Moments and forces may occur simultaneously.
 Values in brackets relate to the long slide.
 * Maximum value = Depends on speed

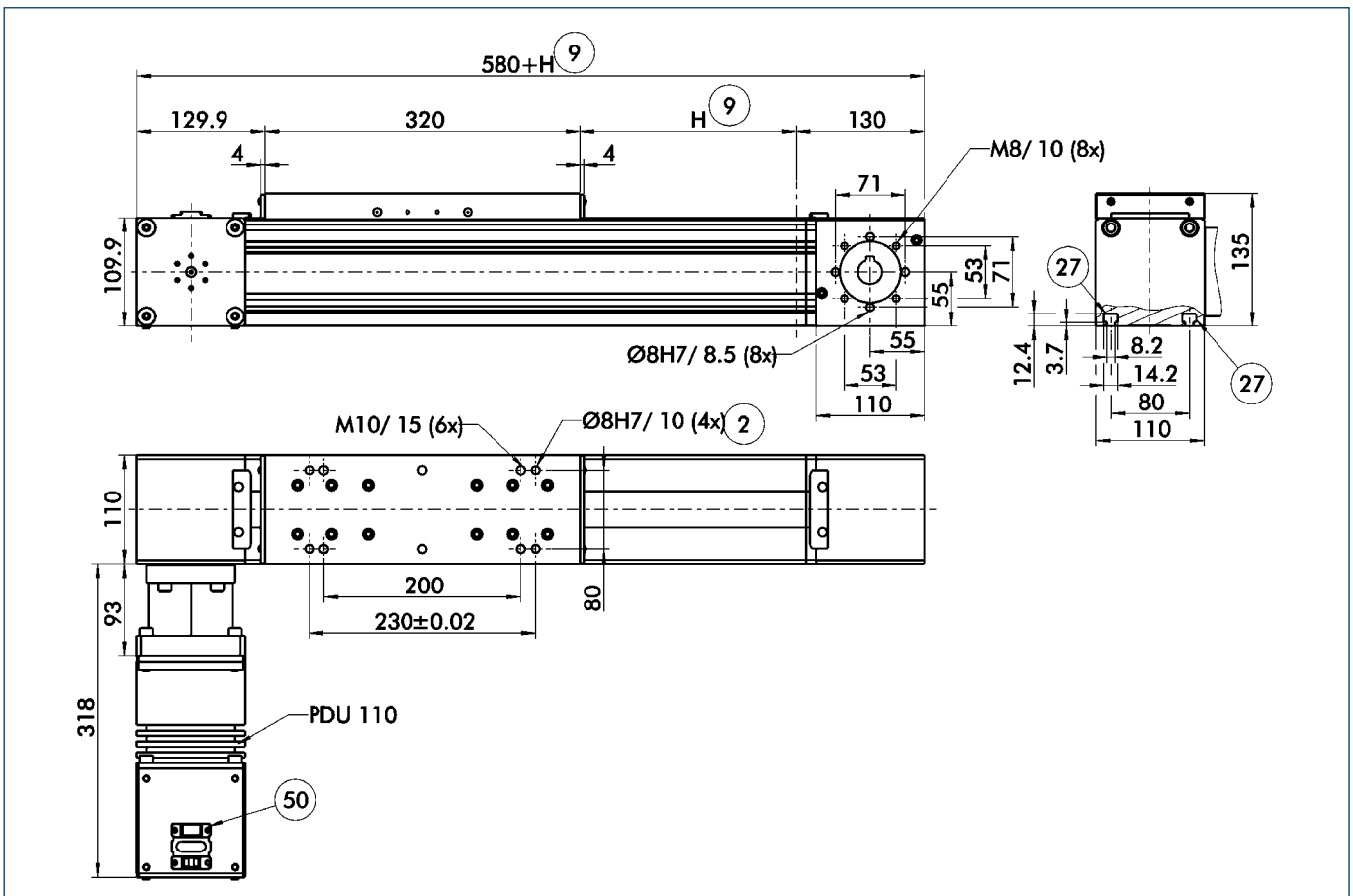
Planar moments of inertia



Profile B 110

Specific mass	[kg/m]	11.11
Surface dimension	[mm ²]	4117
Planar moment of inertia ly	[mm ⁴]	5362210
Planar moment of inertia lz	[mm ⁴]	6162957
Load torque Wy	[mm ³]	88229
Load torque Wz	[mm ³]	111826

Dimensions



The drawing shows the basic axis design with PDU drive motor.

- ② Connection of the assembly
- ⑨ Useful stroke
- ⑳ Mounting groove for T-nuts
- ⑤① Electronic connection