



WITTENSTEIN

motion control

From Component to System

General Catalog
2015/2016

WE LIVE
MECHATRONICS



CAD data and operating manuals

<http://wittenstein-motion-control.com/download/>

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WITTENSTEIN Group

Specialized fields united in one company



– **one** with the future

WITTENSTEIN



WITTENSTEIN

alpha



WITTENSTEIN

electronics



WITTENSTEIN

motion control



WITTENSTEIN

cyber motor

Drives, controls and positional accuracy are areas that require maximum precision. Products manufactured by WITTENSTEIN alpha GmbH are setting benchmarks worldwide in the fields of mechanical engineering and drive technology. From low backlash planetary gearheads, servo right-angle gearheads and complete drive units to the comprehensive cymex® engineering software package and expert technical consultation: WITTENSTEIN alpha GmbH has redefined the meaning of precision.

WITTENSTEIN electronics GmbH develops, manufactures and distributes **electronic and software components** for complex mechatronic drive systems and provides tailor-made support for its own innovative technology. The intelligent and efficient electronic components are characterized by outstanding power density and excellent reliability and are capable of working under extreme environmental conditions.

Integration plays an innovative role here and is a decisive factor in increasing power density and dynamics. WITTENSTEIN motion control GmbH develops **mechatronic drive systems with a high customer benefit** based on the products of the WITTENSTEIN Group. Under extreme operating conditions, electromechanical servo systems impressively demonstrate characteristics such as controllability, precision, functionality, reliability and durability.

Outstanding power density and dynamics, minimal weight and maximum reliability characterize the **servo motors** from WITTENSTEIN cyber motor GmbH. Customized motors for increased productivity and longest service life. Thanks to the development of special materials, the motors are suitable for use under extreme environmental conditions such as ultra-high vacuum, radioactive areas and in high-temperature applications.



Photo Phoenix: EADS Astrium

WITTENSTEIN – Products that know no limits. High-precision drive systems for diverse branches of industry: Drive technology · Electronics · Machine tools · Manufacturing systems · Robotics, automation, handling · Textile, printing and paper machines · Laser, glass and wood processing machines · Food and packaging machines · Pneumatics · Semiconductor industry · Linear technology · Aerospace industry · Extreme ambient conditions (such as high temperatures, ultra-high vacuums) · Oil exploration · Medical technology · Pharmaceutical industry · Motor racing · Automotive and tire industry · Optical media · Vehicle technology · Defense technology

WITTENSTEIN AG is active in **eight innovative fields of business**, each with their own subsidiaries: Servo gearheads, servo drive systems, medical technology, miniature servo units, innovative gearing technology, rotary and linear actuator systems, nanotechnology, as well as electronic and software components for drive technology.

WITTENSTEIN AG employs approximately 1,900 people worldwide and is represented by 60 subsidiaries and dealerships in more than 40 countries.



Intelligence fascinates, inspires and adds that extra dimension. Innovative medical technology manufactured by WITTENSTEIN intens GmbH, which **focuses mainly on intelligent implants** achieves all of the above. FITBONE® is currently the only fully-implantable, mechatronic intramedullary pin for bone extension worldwide that can be controlled and adjusted through the use of intelligent technology. Intelligence is crucial to every step of the development process, right up to the end product.

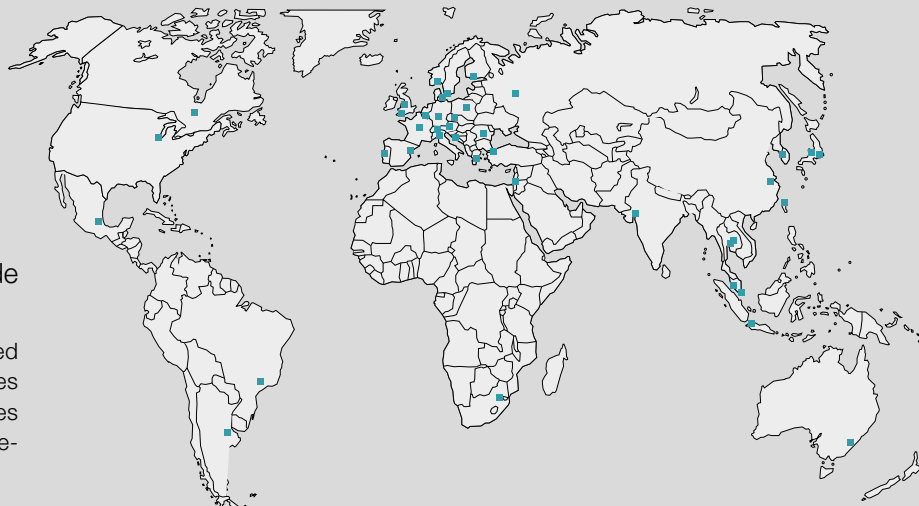
Whether in the design, manufacture, inspection or testing phase – when developing innovative gearing technology, WITTENSTEIN bastian GmbH always considers the unique requirements of the different application areas. Thus, solutions are **created that really connect**. WITTENSTEIN bastian GmbH redefines the concept of individuality on a daily basis: because the company is open to innovation and has the courage to explore unknown territory.

Maximum effect, minimum weight and efficiency plays a vital role in the aerospace industry. The powerful actuator systems manufactured by WITTENSTEIN aerospace & simulation GmbH represent both high quality and unique compactness. These highly efficient systems are used **in the Airbus A380 as well as in training aircraft and simulators**.

attocube systems is a sought after partner for high-end laboratories in science and industry worldwide and specializes in integrated system solutions for custom applications in the field of nano technology. The company develops and produces an unrivaled product family comprised of **nano positioners, distance sensors, cryostats and complete microscope systems** – all of which operate reliably and precisely at the very limit of what is physically and technically possible.

WITTENSTEIN worldwide

No matter where you need us: A comprehensive sales and service network provides quick availability and competent support worldwide.







We live mechatronics.

Our customers' challenges are our own. For this reason, mechatronics has a very creative dimension for us: The task is to integrate sensors software, gearhead, motor and electronics to the greatest possible extent in order to produce intelligent, highly efficient and controllable drive systems – even for extreme environmental conditions. In order to meet these requirements, we think ahead, laterally and in networks.

The objective is always to reduce complexity for our customers. In the final analysis, all they need to know is that we achieve optimum efficiency, safety, connectivity and innovation. This is the measurable added value that counts.





WITTENSTEIN motion control grows with the challenges. And beyond.

What will move us tomorrow? What approaches and developments will profoundly influence the industrial landscape of the future – and to what degree?

Regardless of the predictions, one thing is certain: At WITTENSTEIN motion control, we are open to new approaches, ideas and systems in order to grow with our customers and their challenges – beyond all boundaries if necessary.

This is why our system and application competency is as deep as it is wide-ranging today. Because only on the basis of this comprehensive knowledge can all forms of change bear fruit, thrive and prosper.





Our customers' requirements are as multi-faceted as life itself.

The application range of our products and systems is accordingly varied. But in comparison with other suppliers of intelligent drive systems, we at WITTENSTEIN motion control have one decisive advantage: the more complex or specific a task is, the more we are in our element.

In close collaboration with our customers, customized applications are created that meet extreme demands in the working environment, high-end drive systems for particularly difficult installation conditions, as well as system solutions that actually enable our customers to take a technological quantum leap.

This creates added value for everyone – at every level.





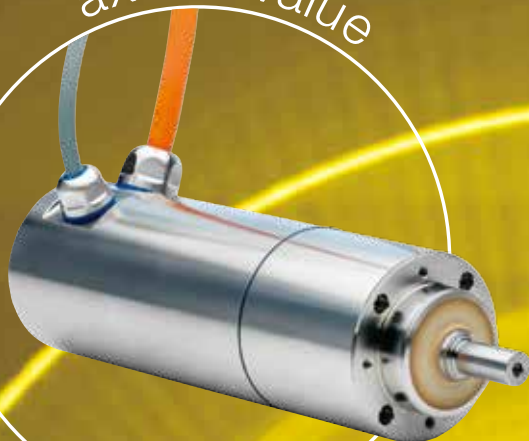
For example: motor, housing and gearhead as a high-performance power combination.

The SPM⁺ and TPM⁺ endurance system ranges demonstrate the level of customization and optimization that is possible in drive technology today: A number of gearheads can be integrated to suit the various motors. The highly compact WITTENSTEIN motion control design opens up completely new degrees of design freedom for customers.

One outstanding example of the implementation of customer-specific solutions is an application from the injection molding industry. Here, a measurable increase in performance and productivity was achieved by substituting the asynchronous and hydraulic-unit technology. The machine footprint was thereby reduced significantly and the potential for energy savings enhanced considerably.

All in all, an optimum symbiosis of different disciplines. Or as we would say: mechatronics as it should be today – for the full benefit of the customer.

axenia value



premo



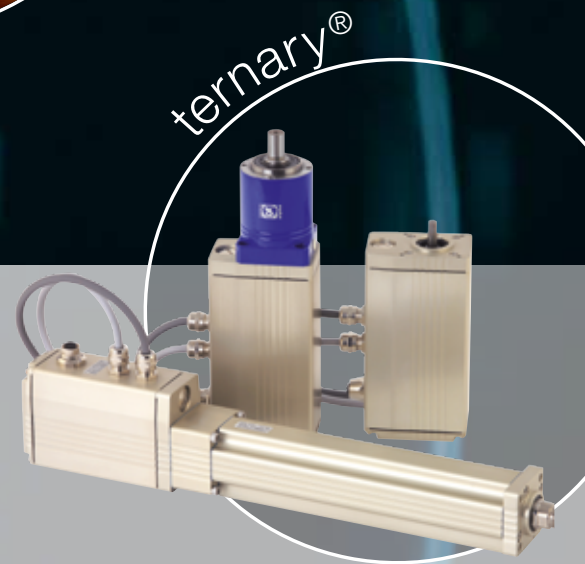
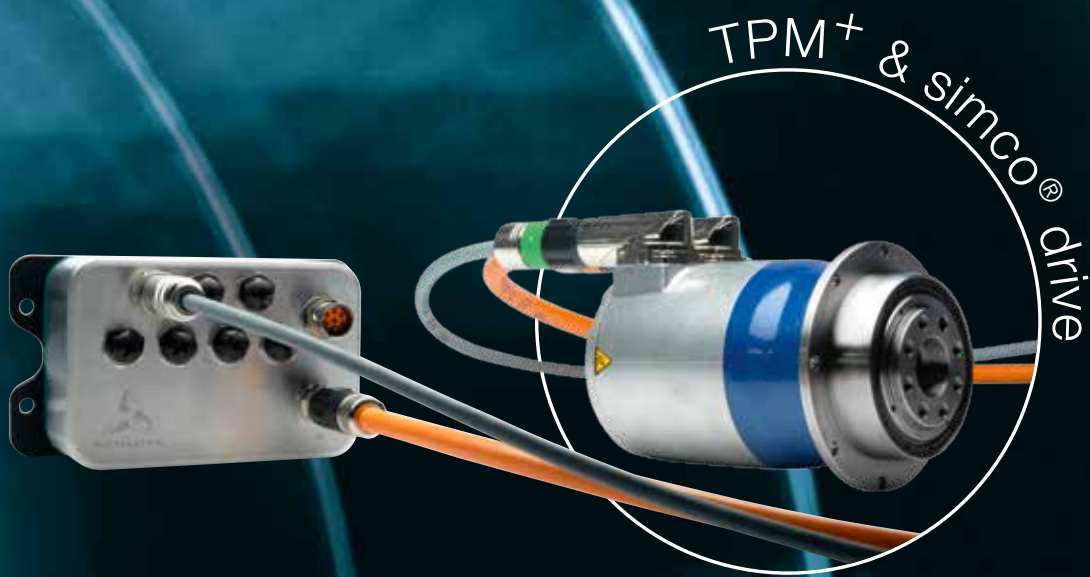
WITTENSTEIN

| motion control

Making evolution happen.

Highest demands with regard to efficiency and safety, absolute compatibility between the products and a high degree of connectivity with other manufacturers' drives – these are not utopias, but the challenges of today and of tomorrow.

At WITTENSTEIN motion control, we are fully prepared: with high-performance, highly efficient, controllable and perfectly integrated system components on the one hand – and with complete, flexible and expandable mechatronic drive systems on the other.

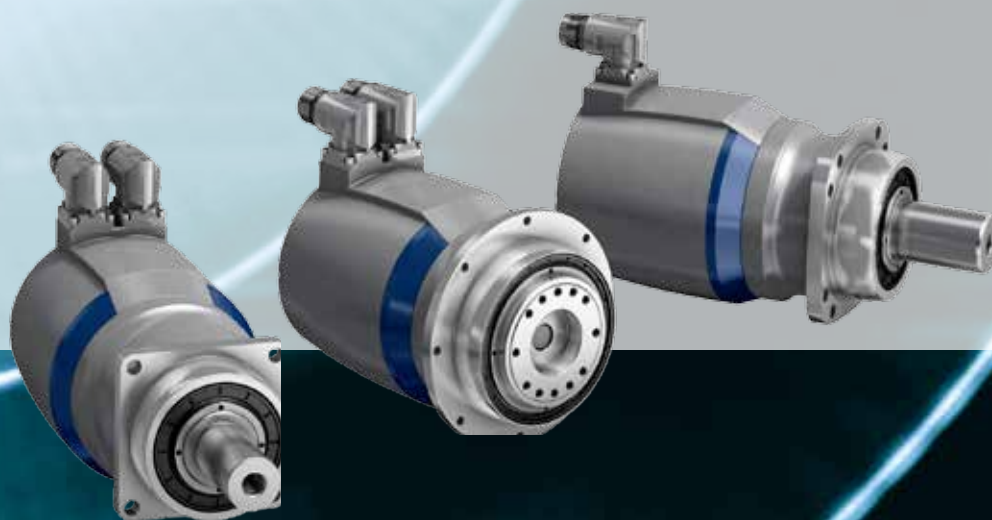


From Component to System



The background of the slide features a close-up, artistic shot of a CD or DVD. The disc's surface is highly reflective, showing concentric rings and a bright, circular highlight. A horizontal white line divides the image into two equal halves. The top half is a deep teal color, while the bottom half is a light, neutral gray. The text is positioned in the lower-left area, overlapping the gray section.

premo servo actuators



premo – the new, powerful actuator platform

Absolute precision meets perfect motion:
premo combines **precision** with **motion** – more efficient than ever.

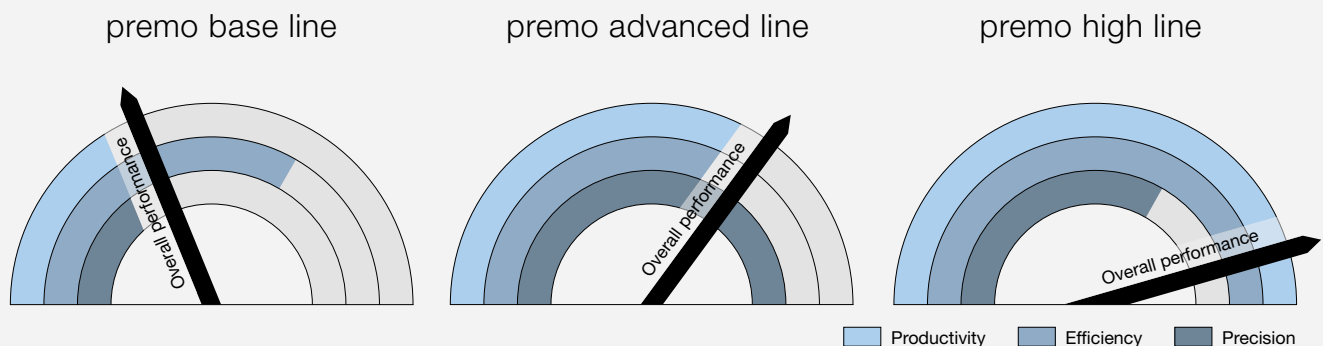
The central idea **behind the first fully scalable servo actuator platform** of WITTENSTEIN is an uncompromising flexibility from the viewpoint of the user. Motors and gearheads with application-related scalable performance characteristics can be configured modularly **to individual actuators**. The result is a modular system that is significantly more versatile and more individual with regard to performance for the most diverse applications, that meets almost all the challenges of automation, integration and industry specification. Thanks to the **modular platform concept**, premo servo actuators can also be quickly manufactured and made available for the relevant task.

The core of the motor-gearhead unit is a **torsionally rigid precision gearhead** with low backlash and excellent torque density in combination with the equally powerful, **permanent magnet servo motor**, which guarantees low

cogging and a minimal velocity ripple through the distributed winding.

Through the intelligent design principle implemented for the first time, premo not only sets **completely new standards with regard to flexibility and sustainability**, – the premo actuator generation also opens up new dimensions in terms of performance: **doubled power density with minimal increase in size**, increased productivity and optimized energy efficiency thanks to digital, single-cable technology provide for more freedom during planning, design and storage as well as lower investment costs.

All **three lines** of this innovative actuator generation are equipped with **the latest digital encoder technology** and characterized by a particularly easy-to-clean and maintenance friendly design without exposed screws.



Flexible mechanical and electrical interfaces for high scalability

premo base line – the basic class

Optimum performance for all positioning tasks

- Short cycle times through low backlash and high rigidity
- Very good positioning accuracy
- Basic configuration with smooth output shaft and resolver

premo advanced line – the dynamic class

Precision for positioning and processing tasks

- High torsional rigidity and low backlash enable high acceleration and tight control
- Basic configuration with output flange and HIPERFACE® single-turn, absolute encoder, SIL 2

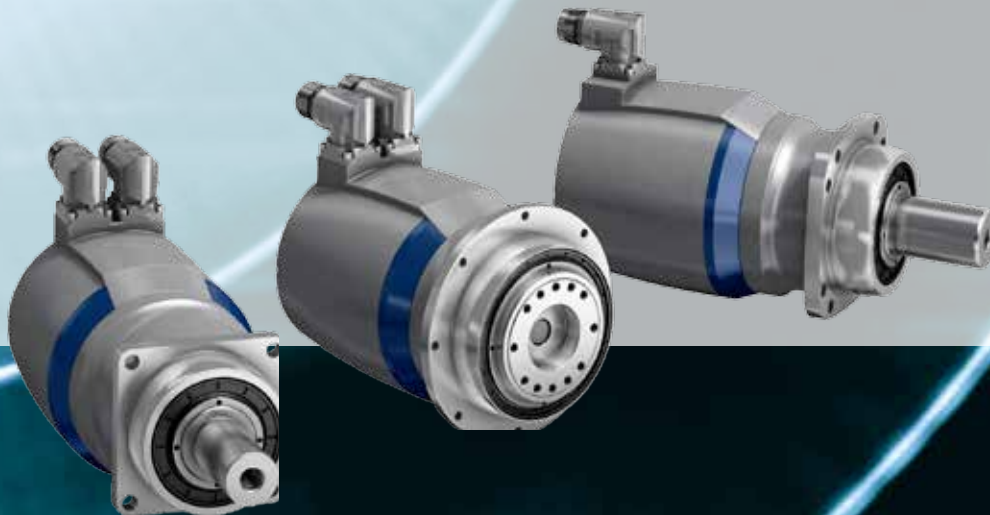
premo high line – the extra class

Versatile in almost all sectors

- Maximum power density with high torsional rigidity and radial load capacity
- Basic configuration with smooth output shaft and HIPERFACE DSL® single-turn, absolute encoder, SIL 2

Individual upgrading of all lines possible through a variety of options:

- Analog and digital feedback systems as well as safety encoder according to SIL2
- One and two-connector versions
- Permanent magnet holding brake
- Reduced backlash
- Different output designs



premo – clearly superior in performance

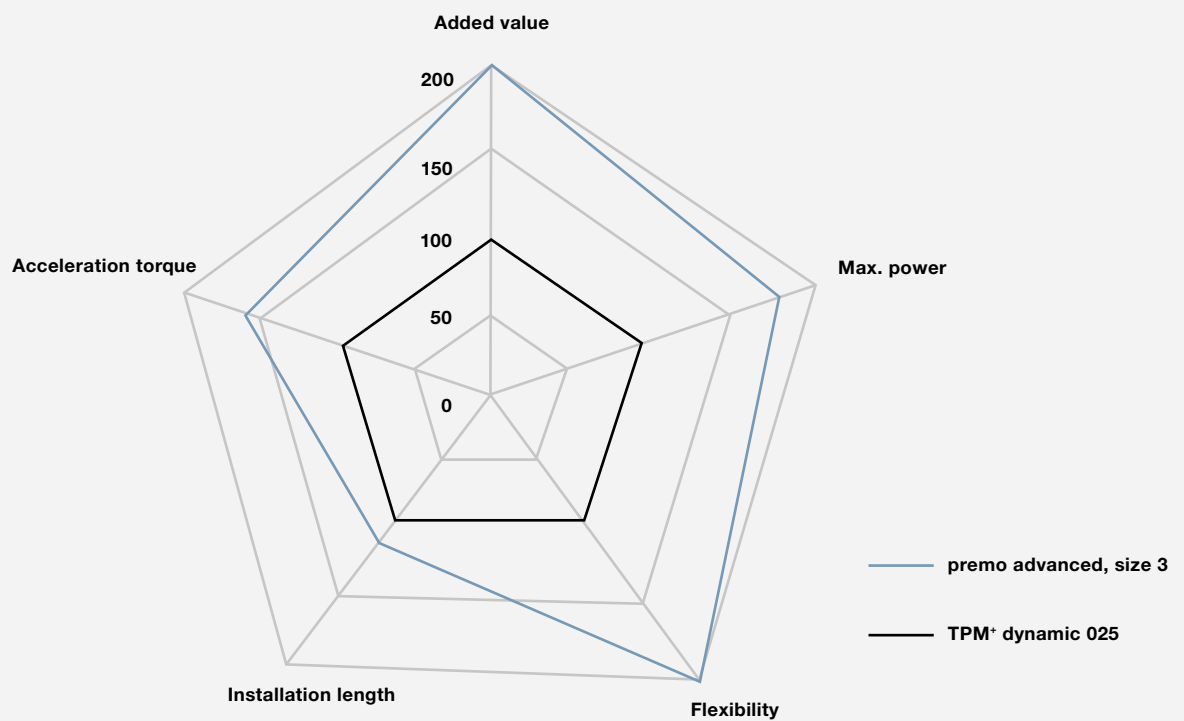
- **Higher machine performance** thanks to higher acceleration torque
- **High torque density combined with a compact design** allow for the realization of higher performance machines with significant space saving.
- **Improved connectivity to next generation controllers** from leading system providers through the use of digital feedback (EnDat 2.2, DSL, HIPERFACE DSL®, DRIVE-CLiQ) and compatability for high bus voltage up to 750 V DC
- **Reduced wiring requirement** through single-connector technology
- **Improved reliability and safety**, e.g. through the use of more powerful brakes (optional)
- **Use in washdown and food applications** through hygienic housing design with smooth surfaces
- **Reliable scheduling and reduced minimum inventory level** through shorter delivery times

premo – the new energy-efficiency class

Utilizing planetary gearheads with a wide range of gear ratios and an efficiency up to 97% combined with servo motors up to 92% efficient – the premo platform utilizes the entire experience of WITTENSTEIN motion control in the energy-efficient design of motor-gearhead actuators. The power requirement during acceleration is reduced thanks to lower inertia due to the elimination of the motor shaft coupling, as well as through a design to optimized

current saturation losses. Moreover, the digital single-cable technology for the power supply and data transmission between motor and controller requires **the use of only one** connector and connection cable. This **reduces the wiring requirement by half** and also saves weight for moving motors. This also reduces the energy consumption in the integration of premo in robots or moving machine structures. Overall, top class energy efficiency is achieved.

premo – absolute flexibility in all cases



In comparison with the proven TPM series, the new premo servo actuators exhibit significantly greater flexibility and performance potential. The mechanical interface to the machine can be designed in multiple versions. The inter-

face to the servo controller offers almost unlimited connection options through the voltage range up to 750 V DC and the wide selection of analog and digital encoders.

premo – the modular system for individual requirements

Thanks to the modularity of the intelligent premo platform, motors and gearheads with a wide range application-related performance characteristics can be **configured to individual motor-gearhead units**.

In addition, **industry specific packages** enable the adaptation of the servo actuators to the application environment. For example, applications in the food-processing, filling and packaging industries profit from the washdown option: high-pressure wash-down using cleaning and disinfection chemicals

requires particularly robust servo actuators, e.g. through a corrosion-resistant housing without edges and corners or the maximum IP protection class. For automated guided vehicle (AGV), yet another industry specific package is available, on which the Plug&Play drive unit is characterized by an extremely flat design and direct integration in the driven wheels. Industry specific packages can also be appropriately configured for further applications, such as for robotic and handling technology, for machine tools and packaging machines as well as many other requirements.

Typical fields of application and industry solutions

- Delta robot (axes 1–3, swivel axis)
- Handling portal (Z-axis, swivel/rotating axis)
- Tooling machine (rotating axes A–C, tool changer)
- Form, fill and seal machines (incl. jaw stroke, sealing jaw, blade)
- Folding carton packaging (incl. assembly/folding, filling valve)
- Plastic thermoform (tool axis)
- Intralogistics (AGV)

premo – industry-specific high performance



The short installation lengths of the premo servo actuators allow for integration in tight mounting situations of increasingly compact robots, handling machines, machine tools as well as filling and packaging lines.

Combination with the now available intermediate circuit voltage of 750 V DC results in an additional increase in performance, and therefore greater productivity with low space requirements.

Flexible gearhead interface
suitable for any application

B

All external surfaces with smooth,
hygienic design

A

Quick-fastening connector
for fast installation

A

Conical cover
without screws

A C

Reduced wiring requirement
through single-cable technology
with digital encoder

B C D

Robust bearing with
long service life

A C

Brake with
increased
holding torque

C D



Your requirement	Our solution
Resistant and easy-to-clean actuator surface	High-quality design without screw heads for optimum cleaning conditions and high value stability
High bus voltage and absolute connectivity to system providers	Enhanced performance through intermediate circuit voltage up to 750 V DC, interfaces for EnDat 2.2, HIPERFACE DSL®, DRIVE-CLiQ partially in single-cable technology for the greatest flexibility in adapting to external controllers and maximum productivity
Maximum individual freedom in design	The forward thinking modular premo design offers all available mechanical output interfaces. To aid in the case of restricted floor space on low profile machines the premo offers optimized construction designs to minimize overall length. High efficiency and single cable solutions offer savings in the drive system with maximum compatibility of position feedback for any application. And best of all, the new modular premo design offers the ability for best in class delivery of product.
Maximum machine reliability and investment protection	Intelligent, energy efficient product concept: higher reliability through the elimination of the shaft coupling, minimized electrical component size due to low current requirements allowing reduction in size of the servo drive, cabling, fusing and electrical contacts. The single cable solution offers less wiring and smaller cable tracks while higher braking torques offer faster stopping and improved reliability for vertical axes. Greater reliability thanks to the functional safety in the mechanical connection of the encoder.

A Increased productivity / higher OEE*

B Simplified machine design

C Reliability / service life

D Safety

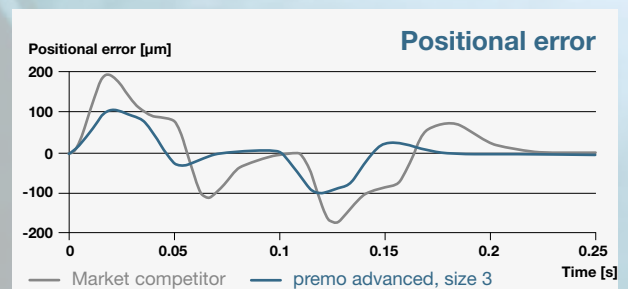
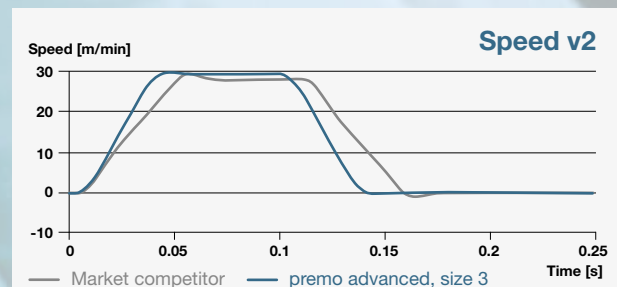
* Overall Equipment Effectiveness

Due to the high power density, the low moment of inertia, the high rigidity and the low backlash of each premo actuator, two important objectives can be achieved:

1. Increased productivity with comparable energy requirement

In order to increase productivity of a system, the most critical factor is reducing the cycle time of the most time critical movements, the so-called “bottle necks”. This is achieved through increased acceleration torques allowing for a reduction in the dynamic time components as well as through increased torsional rigidity for improved response times and tighter control loops.

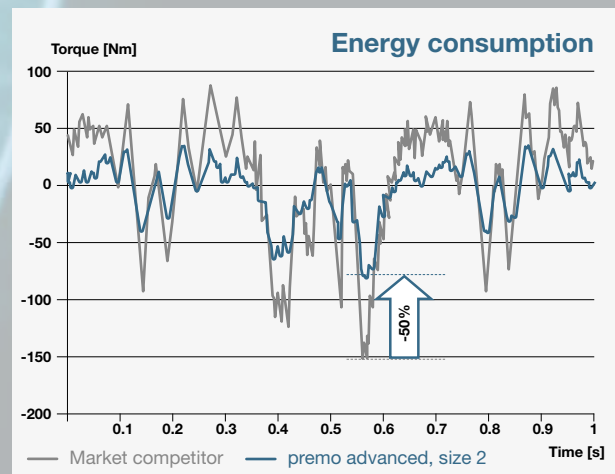
The following example of a packaging machine shows that a premo advanced line, size 3, with 20% higher acceleration torque and 30% more torsional rigidity with comparable energy requirement achieves a significant increase in productivity. The movement path of 50 mm in the time-critical axis is completed 50 ms faster, which corresponds to a production increase of 29%.



2. Reduced energy consumption with the same productivity

In using a smaller more efficient actuator with lower inertia and higher rigidity, a smaller servo controller can also be used, thus saving upfront cost as well as operating costs in the form of lower energy consumption all while achieving the same productivity.

Example: Delta robot Using a premo advanced line, size 2, the same result is achieved as with a significantly larger motor of a market competitor. The high rigidity of the actuator together with the lower moment of inertia enables the use of a smaller motor. At 6.5 A, the current consumption of the premo, size 2, is approx. 50% below that of a comparable product. This enables the selection of servo controller and supply module that are one level smaller, which involves significant savings potential in the 3-axis application.

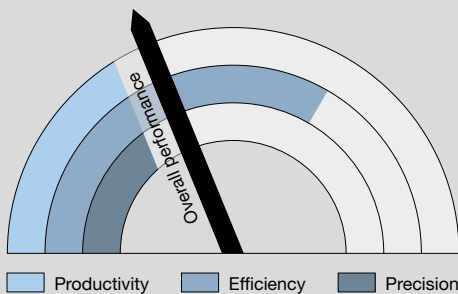


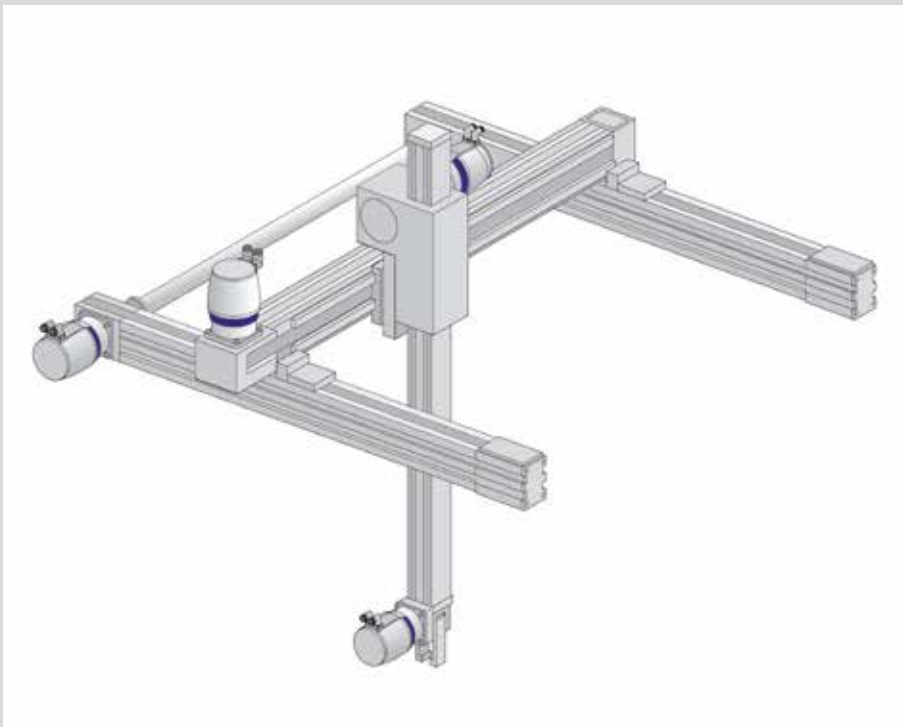
premo base line

The basic class:

- Especially suitable for positioning tasks
- Short cycle times
- Special benefits with auxiliary axes: low weight and short installation length
- Mechanical interface with output shaft
- Ideal for connecting couplings, toothed belt pulleys and pinions

- In addition to the smooth shaft version, key and involute versions are also available
- Standard electric interface with resolver
- Precision adequate for most applications
- Optionally extendable with all available encoder and connector versions





Application example

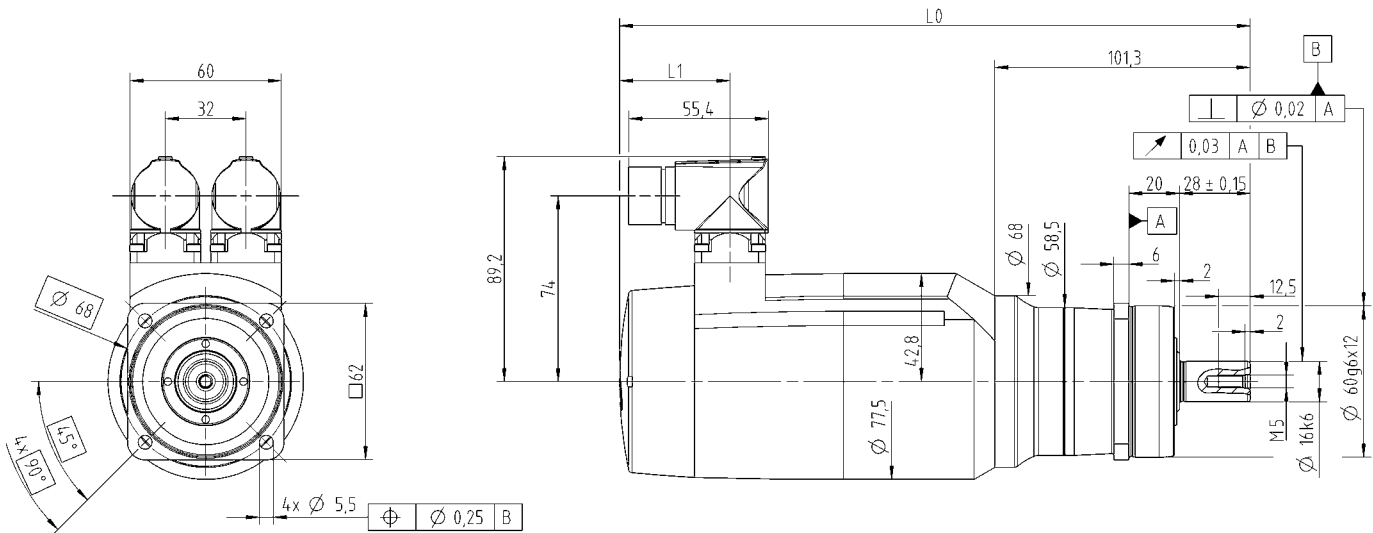
Gantry systems are useful aids if pallets, crates, trays or similar are transported from A to B – the faster, the better.

premo base line copes with this task thanks to its high power-to-weight ratio and excellent dynamics.

premo base line, size 1

Ratio	i		16	20	25	28	35	40	50	70	100
Intermediate circuit voltage	U_D	V DC	560								
Max. acceleration torque at output	T_{2B}	Nm	41.4	42	42	42	42	42	42	42	32
Static output torque	T_{20}	Nm	12	16	20	23.8	26	13.6	17	23.8	17
Brake holding torque at output (100°C)	T_{2Br}	Nm	32	40	50	56	70	32	40	56	80
Max. speed	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	375	300	240	214	171	150	120	85.7	60
Max. motor acceleration torque	T_{1Mmax}	Nm	2.84					1.4			
Max. motor acceleration current	I_{maxdyn}	A	4					2.2			
Static motor current	I_0	A	1.33					0.72			
Actuator moment of inertia (at motor shaft, without brake)	J_1	kgcm ²	0.41	0.41	0.4	0.4	0.4	0.2	0.2	0.2	0.2
Actuator moment of inertia (at motor shaft, with brake)	J_1	kgcm ²	0.48	0.47	0.47	0.47	0.47	0.22	0.22	0.22	0.22
Torsional backlash	j_t	arcmin	Standard ≤ 6 / Reduced ≤ 4								
Torsional rigidity	C_{t21}	Nm/arcmin	4.5								
Max. axial force ¹⁾	F_{2Amax}	N	2,400								
Max. radial force ¹⁾	F_{2Rmax}	N	2,800								
Max. tilting moment	M_{2Kmax}	Nm	152								
Bearing lifespan	L_h	h	> 20,000								
Weight (with resolver, without brake)	m	kg	-								
Operating noise (at $n_1 = 3000$ rpm)	L_{PA}	dB(A)	≤ 58								
Insulating material class			F								
Ambient temperature		°C	+40								
Protection class			IP 65								
Lubrication			Tribol 800/220 oil								
Mount. pos.			Any								

¹⁾ Refers to center of output shaft and flange



Without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	226.5	22.5
	HIPERFACE®, HIPERFACE DSL®	248.6	44.6
	EnDat		
	DRIVE-CLiQ	280.1	76.1
i = 40 – 100	Resolver	211.5	22.5
	HIPERFACE®, HIPERFACE DSL®	233.6	44.6
	EnDat		
	DRIVE-CLiQ	265.1	76.1

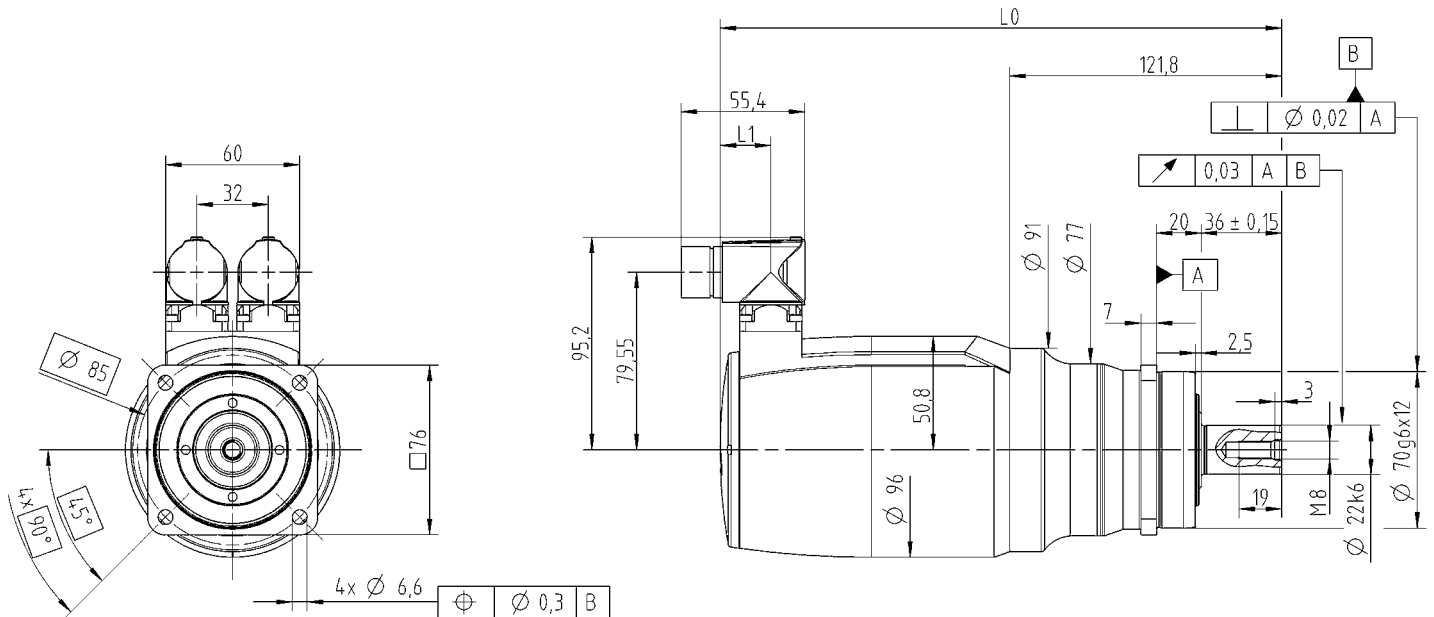
With brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	262.2	22.5
	HIPERFACE®, HIPERFACE DSL®	284.3	44.6
	EnDat		
	DRIVE-CLiQ	315.8	76.1
i = 40 – 100	Resolver	235.3	22.5
	HIPERFACE®, HIPERFACE DSL®	257.4	44.6
	EnDat		
	DRIVE-CLiQ	288.9	76.1

premo base line, size 2

Ratio	i		16	20	25	28	35	40	50	70	100
Intermediate circuit voltage	U_D	V DC	560								
Max. acceleration torque at output	T_{2B}	Nm	82.1	105	110	110	110	102	110	110	90
Static output torque	T_{20}	Nm	20.5	27.6	34.5	40	51.8	27.2	36.5	51.1	52
Brake holding torque at output (100°C)	T_{2Br}	Nm	72	90	113	126	158	80	100	140	200
Max. speed	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	269	215	188	177	153	125	110	85.7	60
Max. motor acceleration torque	T_{1Mmax}	Nm	5.53					2.76			
Max. motor acceleration current	I_{maxdyn}	A	6.5					4			
Static motor current	I_0	A	1.71					1.1			
Actuator moment of inertia (at motor shaft, without brake)	J_1	kgcm ²	0.99	0.96	0.96	0.94	0.94	0.57	0.57	0.57	0.57
Actuator moment of inertia (at motor shaft, with brake)	J_1	kgcm ²	1.2	1.17	1.17	1.15	1.15	0.59	0.59	0.59	0.59
Torsional backlash	j_t	arcmin	Standard ≤ 6 / Reduced ≤ 4								
Torsional rigidity	C_{t21}	Nm/arcmin	10								
Max. axial force ¹⁾	F_{2Amax}	N	3,350								
Max. radial force ¹⁾	F_{2Rmax}	N	4,200								
Max. tilting moment	M_{2Kmax}	Nm	236								
Bearing lifespan	L_h	h	> 20,000								
Weight (with resolver, without brake)	m	kg	-								
Operating noise (at $n_1 = 3000$ rpm)	L_{PA}	dB(A)	≤ 59								
Insulating material class			F								
Ambient temperature		°C	+40								
Protection class			IP 65								
Lubrication			Tribol 800/220 oil								
Mount. pos.			Any								

¹⁾ Refers to center of output shaft and flange



Without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	252.5	20.5
	HIPERFACE®, HIPERFACE DSL®	274.8	42.8
	EnDat		
	DRIVE-CLiQ	305	73
i = 40 – 100	Resolver	237.5	20.5
	HIPERFACE®, HIPERFACE DSL®	259.8	42.8
	EnDat		
	DRIVE-CLiQ	290	73

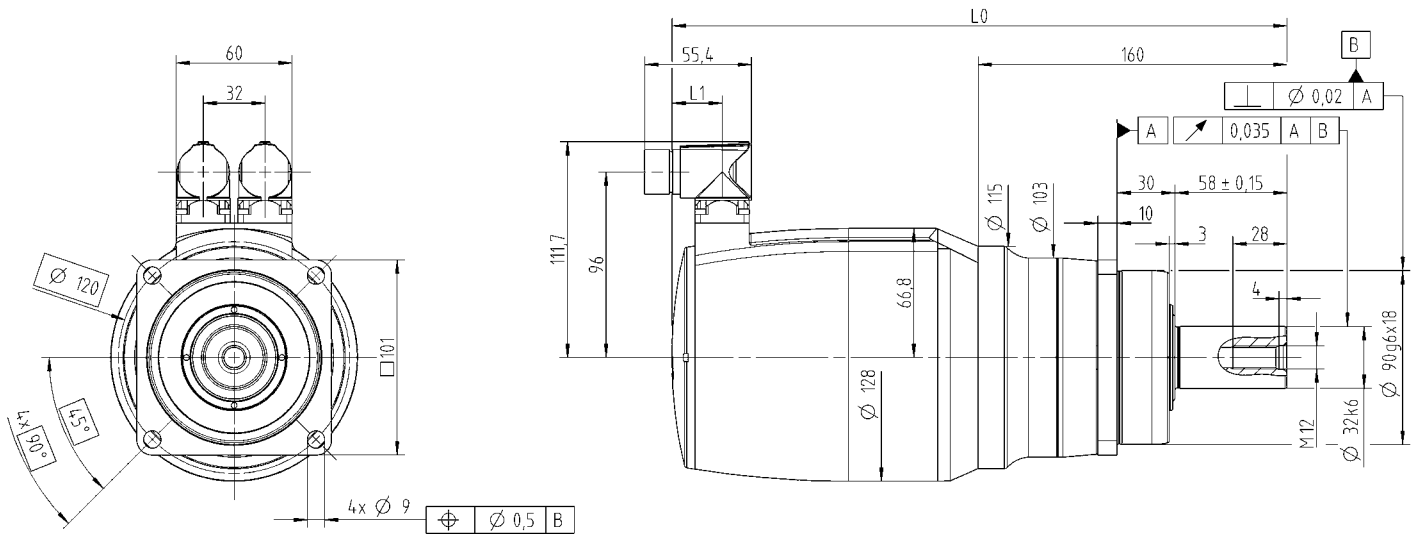
With brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	289.5	20.5
	HIPERFACE®, HIPERFACE DSL®	311.8	42.8
	EnDat		
	DRIVE-CLiQ	342	73
i = 40 – 100	Resolver	248.5	20.5
	HIPERFACE®, HIPERFACE DSL®	270.8	42.8
	EnDat		
	DRIVE-CLiQ	301	73

premo base line, size 3

Ratio	i		16	20	25	28	35	40	50	70	100
Intermediate circuit voltage	U_D	V DC	560								
Max. acceleration torque at output	T_{2B}	Nm	255	315	315	315	315	230	290	315	235
Static output torque	T_{20}	Nm	91	118	148	169	175	69	89	128	120
Brake holding torque at output (100°C)	T_{2Br}	Nm	208	260	325	364	455	180	225	315	450
Max. speed	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	313	252	218	202	170	109	87	71	59
Max. motor acceleration torque	T_{1Mmax}	Nm	16.7					6.09			
Max. motor acceleration current	I_{maxdyn}	A	19.7					7.5			
Static motor current	I_0	A	6.71					2.21			
Actuator moment of inertia (at motor shaft, without brake)	J_1	kgcm ²	4.61	4.51	4.5	4.42	4.41	1.72	1.71	1.71	1.71
Actuator moment of inertia (at motor shaft, with brake)	J_1	kgcm ²	5.71	5.61	5.6	5.52	5.51	2.59	2.59	2.59	2.58
Torsional backlash	j_t	arcmin	Standard ≤ 6 / Reduced ≤ 4								
Torsional rigidity	C_{t21}	Nm/arcmin	31								
Max. axial force ¹⁾	F_{2Amax}	N	5650								
Max. radial force ¹⁾	F_{2Rmax}	N	6,600								
Max. tilting moment	M_{2Kmax}	Nm	487								
Bearing lifespan	L_h	h	> 20,000								
Weight (with resolver, without brake)	m	kg	-								
Operating noise (at $n_1 = 3000$ rpm)	L_{PA}	dB(A)	≤ 60								
Insulating material class			F								
Ambient temperature		°C	+40								
Protection class			IP 65								
Lubrication			Tribol 800/220 oil								
Mount. pos.			Any								

¹⁾ Refers to center of output shaft and flange



Without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	318.9	26
	HIPERFACE®, HIPERFACE DSL®		
	EnDat		
	DRIVE-CLiQ		
i = 40 – 100	Resolver	294.8	26
	HIPERFACE®, HIPERFACE DSL®		
	EnDat		
	DRIVE-CLiQ		

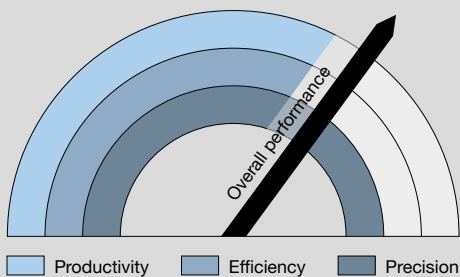
With brake

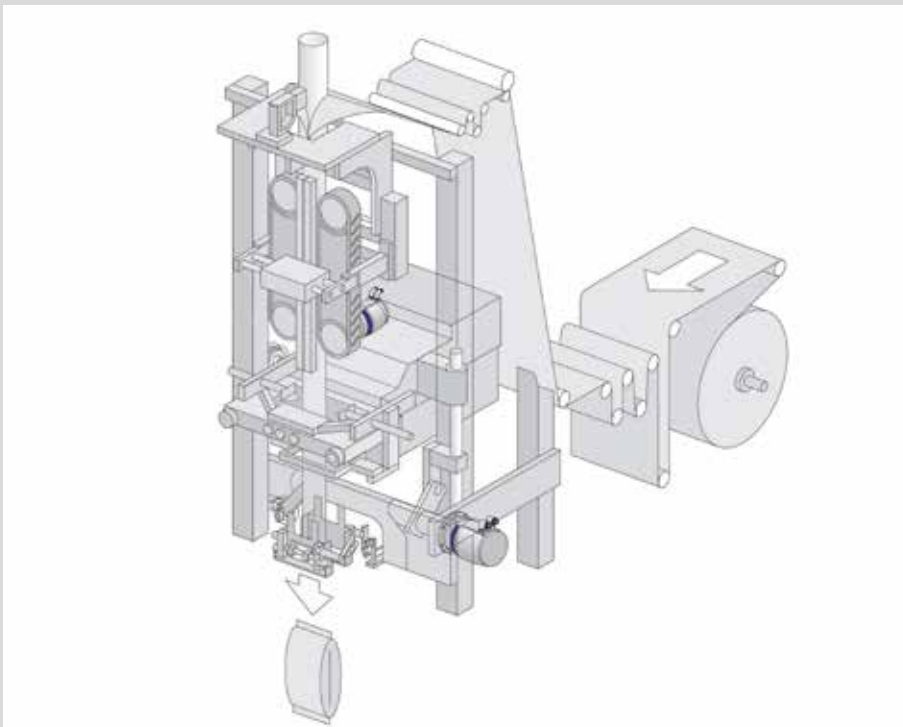
Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	359.4	26
	HIPERFACE®, HIPERFACE DSL®		
	EnDat		
	DRIVE-CLiQ		
i = 40 – 100	Resolver	318.8	26
	HIPERFACE®, HIPERFACE DSL®		
	EnDat		
	DRIVE-CLiQ		

premo advanced line

The dynamic class:

- Optimal for challenging positioning and processing tasks
- Minimal backlash and maximum torsional rigidity enable the shortest cycle times
- Excellent surface finish
- Mechanical interface with output flange
- Ideal for connecting lever arms or pinions
- Standard electric interface with absolute encoder HIPERFACE® Single-turn for high positioning accuracy
- optionally extendable with all available encoder and connector versions





Application example

Form, fill and seal machines continuously package bulk material of all types – including foods, like chips and gummy bear. A high throughput and a clean and tight sealing are especially important.

premo advanced line provides the solution with its exceptional precision and power density.

premo advanced line, size 1

Ratio	i		16	20	25	28	35	40	50	70	100
Intermediate circuit voltage	U_D	V DC	560								
Max. acceleration torque at output	T_{2B}	Nm	41	52.3	55	55	55	51	55	55	35
Static output torque	T_{20}	Nm	11.6	15.5	19.4	23.1	29.8	14.6	18.3	27.3	18
Brake holding torque at output (100°C)	T_{2Br}	Nm	32	40	50	56	70	32	40	56	80
Max. speed	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	375	300	240	214	171	150	120	85.7	60
Max. motor acceleration torque	T_{1Mmax}	Nm	2.84					1.4			
Max. motor acceleration current	I_{maxdyn}	A	4					2.2			
Static motor current	I_0	A	1.33					0.72			
Actuator moment of inertia (at motor shaft, without brake)	J_1	kgcm ²	0.41	0.41	0.4	0.4	0.4	0.2	0.2	0.2	0.2
Actuator moment of inertia (at motor shaft, with brake)	J_1	kgcm ²	0.48	0.47	0.47	0.47	0.47	0.22	0.22	0.22	0.22
Torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2								
Torsional rigidity	C_{t21}	Nm/arcmin	12	12	12	12	12	11	10	11	8
Tilting rigidity	C_{2K}	Nm/arcmin	-								
Max. axial force ¹⁾	F_{2Amax}	N	1,630								
Max. tilting moment	M_{2Kmax}	Nm	110								
Bearing lifespan	L_h	h	> 20,000								
Weight (with resolver, without brake)	m	kg	-								
Operating noise (at $n_1 = 3000$ rpm)	L_{PA}	dB(A)	≤ 58								
Insulating material class			F								
Ambient temperature		°C	+40								
Protection class			IP 65								
Lubrication			Tribol 800/220 oil								
Mount. pos.			Any								

¹⁾ Refers to center of output shaft and flange



Technical drawing of a 2000 series ball valve, showing front and side views with dimensions and tolerances.

Front View Dimensions:

- Overall width: 60
- Distance between ball centers: 32
- Flange outer diameter: $\varnothing 79$
- Flange bore diameter: $\varnothing 31.5$
- Flange thickness: 73.6
- Overall height: 89.2
- Mounting holes: 8x $\varnothing 4.5$ (positioned at 45° and $8 \times 45^\circ$)
- Mounting holes: 8x M5-7 tief
- Surface texture: $\sqrt{0.03}$ A B
- Surface texture: $\sqrt{0.02}$ A

Side View Dimensions:

- Overall length: L_0
- Distance from end to first step: 55.4
- Distance between steps: L_1
- Distance from end to second step: 4
- Distance from end to third step: 19.5
- Distance from end to fourth step: 4
- Distance from end to fifth step: 4
- Distance from end to sixth step: 4
- Distance from end to seventh step: 4
- Distance from end to eighth step: 4
- Distance from end to ninth step: 4
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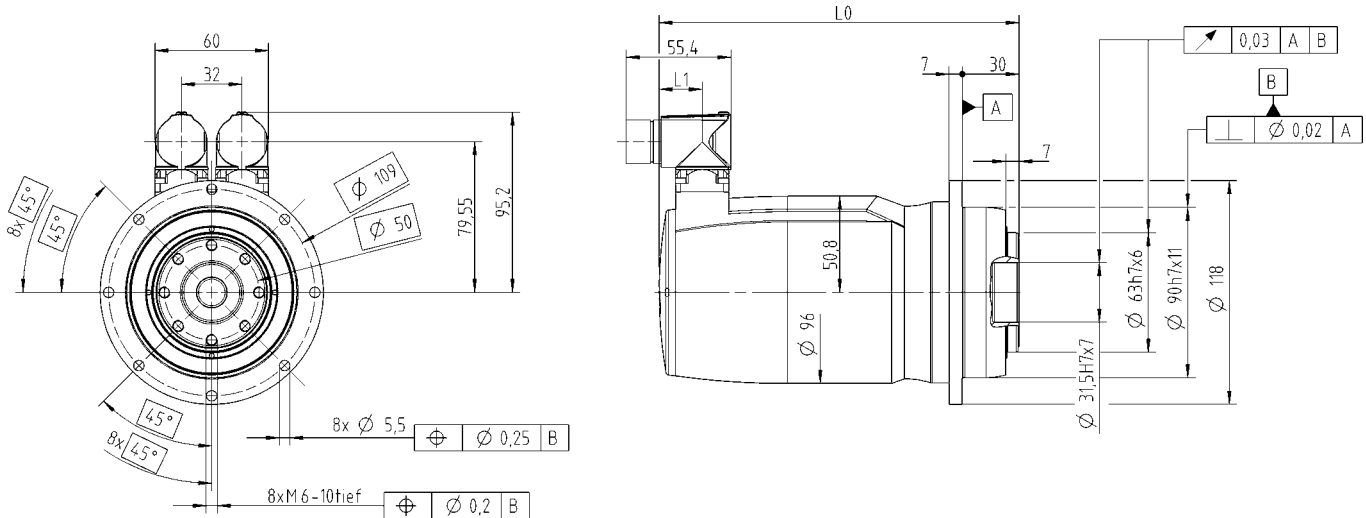
Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	164.7	22.5
	HIPERFACE®, HIPERFACE DSL®	186.8	44.6
	EnDat		
	DRIVE-CLiQ	218.3	76.1
i = 40 – 100	Resolver	149.7	22.5
	HIPERFACE®, HIPERFACE DSL®	171.8	44.6
	EnDat		
	DRIVE-CLiQ	203.3	76.1

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	200.4	22.5
	HIPERFACE®, HIPERFACE DSL®	222.5	44.6
	EnDat		
	DRIVE-CLiQ	254	76.1
i = 40 – 100	Resolver	173.5	22.5
	HIPERFACE®, HIPERFACE DSL®	195.6	44.6
	EnDat		
	DRIVE-CLiQ	227.1	76.1

premo advanced line, size 2

Ratio	i		16	20	25	28	35	40	50	70	100
Intermediate circuit voltage	U_D	V DC	560								
Max. acceleration torque at output	T_{2B}	Nm	81.3	103	130	143	143	102	129	143	105
Static output torque	T_{20}	Nm	19.7	26.1	33.9	39.3	50.1	27.2	35.3	49.4	60
Brake holding torque at output (100°C)	T_{2Br}	Nm	72	90	113	126	158	80	100	140	200
Max. speed	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	269	215	172	154	139	125	100	81	60
Max. motor acceleration torque	T_{1Mmax}	Nm	5.53					2.76			
Max. motor acceleration current	I_{maxdyn}	A	6.5					4			
Static motor current	I_0	A	1.71					1.1			
Actuator moment of inertia (at motor shaft, without brake)	J_1	kgcm ²	1	0.97	0.96	0.94	0.94	0.57	0.57	0.57	0.57
Actuator moment of inertia (at motor shaft, with brake)	J_1	kgcm ²	1.21	1.18	1.17	1.15	1.15	0.59	0.59	0.59	0.59
Torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1								
Torsional rigidity	C_{t21}	Nm/arcmin	32	32	32	31	32	30	30	28	22
Tilting rigidity	C_{2K}	Nm/arcmin	225								
Max. axial force ¹⁾	F_{2Amax}	N	2,150								
Max. tilting moment	M_{2Kmax}	Nm	270								
Bearing lifespan	L_h	h	> 20,000								
Weight (with resolver, without brake)	m	kg	-								
Operating noise (at $n_1 = 3000$ rpm)	L_{PA}	dB(A)	≤ 59								
Insulating material class			F								
Ambient temperature		°C	+40								
Protection class			IP 65								
Lubrication			Tribol 800/220 oil								
Mount. pos.			Any								

¹⁾ Refers to center of output shaft and flange



Without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	191.2	20.5
	HIPERFACE®, HIPERFACE DSL®	213.5	42.8
	EnDat		
	DRIVE-CLiQ	243.7	73
i = 40 – 100	Resolver	176.2	20.5
	HIPERFACE®, HIPERFACE DSL®	198.5	42.8
	EnDat		
	DRIVE-CLiQ	228.7	73

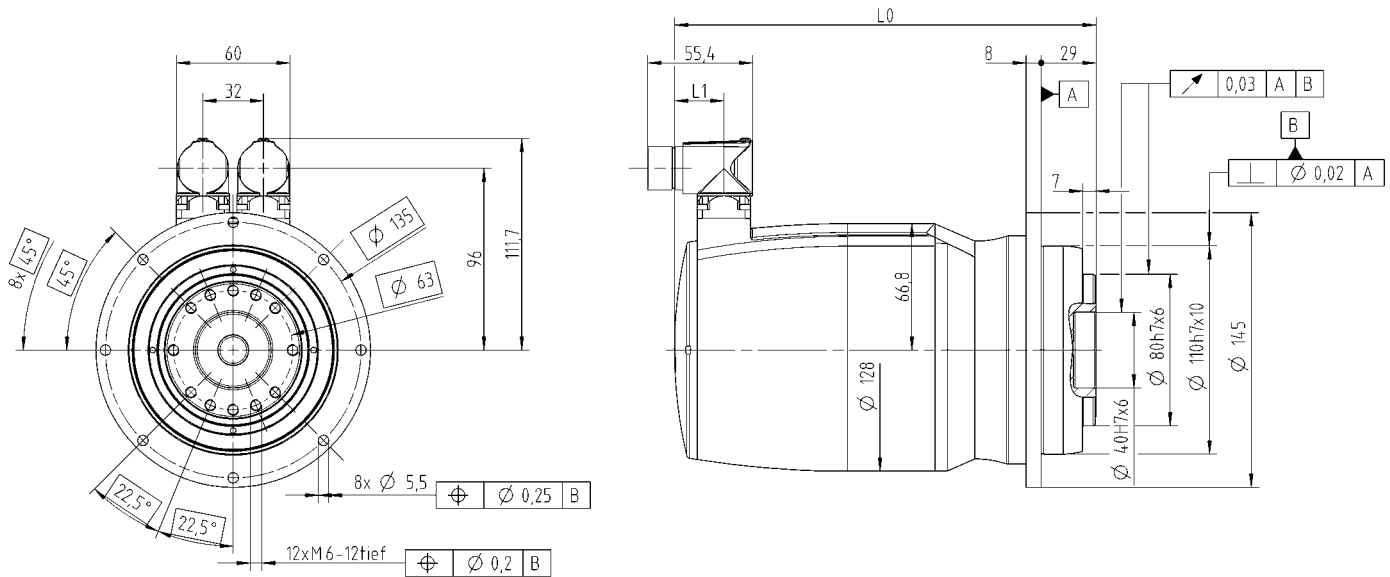
With brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	228.2	20.5
	HIPERFACE®, HIPERFACE DSL®	250.5	42.8
	EnDat		
	DRIVE-CLiQ	280.7	73
i = 40 – 100	Resolver	187.2	20.5
	HIPERFACE®, HIPERFACE DSL®	209.5	42.8
	EnDat		
	DRIVE-CLiQ	239.7	73

premo advanced line, size 3

Ratio	i		16	20	25	28	35	40	50	70	100
Intermediate circuit voltage	U_D	V DC	560								
Max. acceleration torque at output	T_{2B}	Nm	252	318	380	350	380	228	285	330	265
Static output torque	T_{20}	Nm	89.3	115	145	166	209	67.2	84	121	120
Brake holding torque at output (100°C)	T_{2Br}	Nm	208	260	325	364	455	180	225	315	450
Max. speed	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	313	250	204	195	163	109	87	69	58
Max. motor acceleration torque	T_{1Mmax}	Nm	16.7					6.09			
Max. motor acceleration current	I_{maxdyn}	A	19.7					7.5			
Static motor current	I_0	A	6.71					2.21			
Actuator moment of inertia (at motor shaft, without brake)	J_1	kgcm ²	4.65	4.54	4.52	4.43	4.42	1.72	1.72	1.71	1.71
Actuator moment of inertia (at motor shaft, with brake)	J_1	kgcm ²	5.75	5.64	5.62	5.53	5.52	2.6	2.59	2.59	2.59
Torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1								
Torsional rigidity	C_{t21}	Nm/arcmin	81	81	83	80	82	76	80	71	60
Tilting rigidity	C_{2K}	Nm/arcmin	550								
Max. axial force ¹⁾	F_{2Amax}	N	4,150								
Max. tilting moment	M_{2Kmax}	Nm	440								
Bearing lifespan	L_h	h	> 20,000								
Weight (with resolver, without brake)	m	kg	-								
Operating noise (at $n_1 = 3000$ rpm)	L_{PA}	dB(A)	≤ 58								
Insulating material class			F								
Ambient temperature		°C	+40								
Protection class			IP 65								
Lubrication			Tribol 800/220 oil								
Mount. pos.			Any								

¹⁾ Refers to center of output shaft and flange



Without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	222.9	26
	HIPERFACE®, HIPERFACE DSL®		
	EnDat		
	DRIVE-CLiQ		
i = 40 – 100	Resolver	198.8	26
	HIPERFACE®, HIPERFACE DSL®		
	EnDat		
	DRIVE-CLiQ		

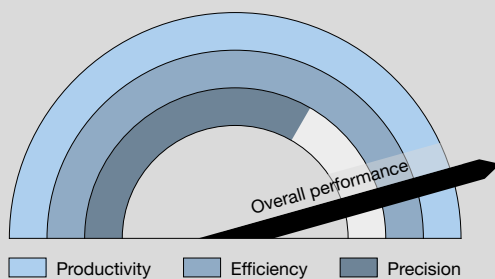
With brake

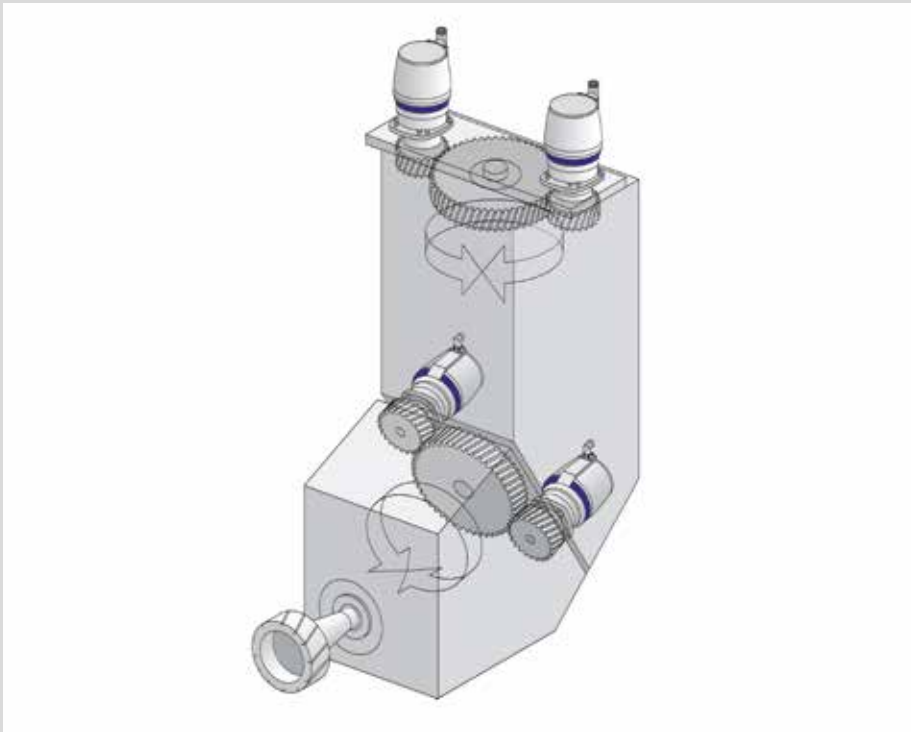
Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	263.4	26
	HIPERFACE®, HIPERFACE DSL®		
	EnDat		
	DRIVE-CLiQ		
i = 40 – 100	Resolver	222.8	26
	HIPERFACE®, HIPERFACE DSL®		
	EnDat		
	DRIVE-CLiQ		

premo high line

The extra class:

- Particularly high power density and load capacity
- Extremely low backlash, high torsional rigidity and maximum load capacity of the output bearing enable a highly compact actuator platform for enhanced machine performance
- Mechanical interface with output shaft, ideal for connecting couplings or pinions
- In addition to the smooth shaft version, an involute version is also available
- Electric interface with absolute encoder HIPERFACE DSL® single-turn incl. functional safety and single-cable connection
- Safety requirements are united with the latest connection technology
- Optionally extendable with all available encoder and connector versions





Application example

Especially in the milling head of a machining center, high disturbing forces occur due to the material processing.

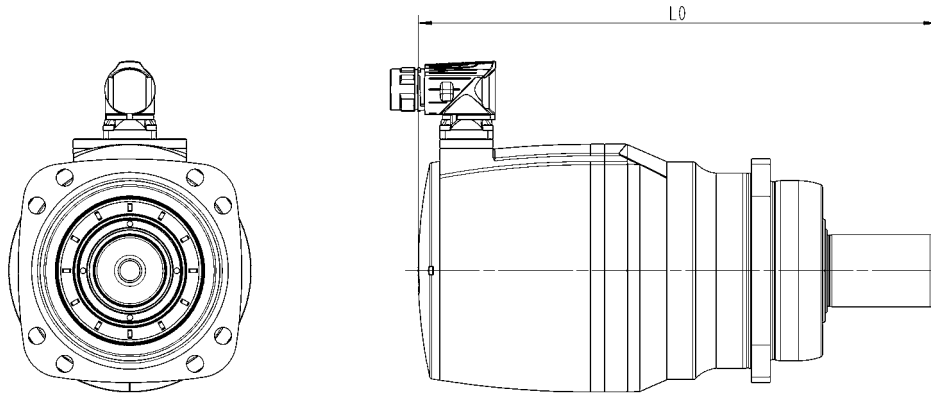
Due to the restricted installation space, actuators with the highest power density and load capacity are required here. premo high line offers the ideal solution.

premo

high line, size 1–3

Size		1	2	3
Ratio	i	16 – 100		
Intermediate circuit voltage	U _D V DC	560		
Max. acceleration torque at output	T _{2B} Nm	up to 80	up to 190	up to 455
Static output torque	T ₂₀ Nm	up to 32	up to 60	up to 215
Brake holding torque at output (100°C)	T _{2Br} Nm	up to 80	up to 158	up to 450
Max. speed	n _{2max} rpm	60 to 375		
Speed limit for T _{2B}	n _{2B} rpm	on request	on request	on request
Max. motor acceleration torque	T _{1Mmax} Nm	up to 2.84	up to 5.53	up to 16.7
Max. motor acceleration current	I _{1maxdyn} A	up to 4	up to 6.5	up to 19.7
Static motor current	I ₀ A	up to 1.33	up to 1.71	up to 6.71
Actuator moment of inertia (at motor shaft, without brake)	J ₁ kgcm ²	on request	on request	on request
Actuator moment of inertia (at motor shaft, with brake)	J ₁ kgcm ²	on request	on request	on request
Torsional backlash	j _t arcmin	up to ≤ 2		
Torsional rigidity	C ₁₂₁ Nm/arcmin	on request		
Tilting rigidity	C _{2K} Nm/arcmin	on request		
Max. axial force ¹⁾	F _{2Amax} N	on request		
Max. tilting moment	M _{2Kmax} Nm	on request		
Bearing lifespan	L _n h	on request		
Weight (with resolver, without brake)	m kg	–		
Operating noise (at n ₁ = 3000 rpm)	L _{PA} dB(A)	on request		
Insulating material class		F		
Ambient temperature	°C	+40		
Protection class		IP 65		
Lubrication		on request		
Mount. pos.		Any		

¹⁾ Refers to center of output shaft and flange



Without brake

Size		1	2	3
Ratio	Motor feedback	Length L0 in mm	Length L0 in mm	Length L0 in mm
i = 16 – 35	Resolver	210.2	243.2	301.4
	HIPERFACE®, HIPERFACE DSL®	232.3	265.5	
	EnDat			
	DRIVE-CLiQ	263.8	295.7	333.4
i = 40 – 100	Resolver	195.2	228.2	277.3
	HIPERFACE®, HIPERFACE DSL®	217.3	250.5	
	EnDat			
	DRIVE-CLiQ	248.8	280.7	309.3

premo high line is designed for very special requirements and can be adapted to the most diverse tasks with absolute flexibility. With high line, you can achieve an innovative competitive edge that is not possible with any other solution.

Benefit from our expertise and talk to us about your individual requirements. We would be pleased to give you further details on high line in a personal discussion.

With brake

Size		1	2	3
Ratio	Motor feedback	Length L0 in mm	Length L0 in mm	Length L0 in mm
i = 16 – 35	Resolver	245.9	280.2	341.9
	HIPERFACE®, HIPERFACE DSL®	268	302.5	
	EnDat			
	DRIVE-CLiQ	299.5	332.7	373.9
i = 40 – 100	Resolver	219	239.2	301.3
	HIPERFACE®, HIPERFACE DSL®	241.1	261.5	
	EnDat			
	DRIVE-CLiQ	272.6	291.7	333.3



Electrical connection:

Straight or right-angled version, alignment of outlets to gearhead flange (high line) and single-cable connection for DSL protocol.

Feedback systems

In addition to the standard version in the relevant line, optional encoder systems with the protocols EnDAT 2.1, EnDAT 2.2, HIPERFACE®, HIPERFACE DSL® and DRIVE-CLiQ are available.

Pin assignment

For easy compatibility with any number of servo controllers, we offer special pin assignments for power and signal.

Temperature sensor

Choose from PTC for temperature switch functionality or PTC1000 for a linear reading of operating temperature.

Operating voltage

Depending on the application and servo regulator, windings for 24, 48, 320 and 560 V DC are available.

Holding brake

A suitable permanent-magnet holding brake adapted to the motor power is available.

Lubrication

Select from the standard lubrication with oil or grease as well as food grade grease and oil.

Minimal backlash

In order to improve precision, the gear-head backlash can be optionally reduced.

Gearhead model

Within the relevant line, there are different versions of output and housing flange.



Options

Electrical connection:

In addition to the classic connection via two integral sockets for power and signal, a version for a single-cable connection in conjunction with HIPERFACE DSL® is available.

	Connector sizes premo 1 to 3		
	Single-cable connection	2-cable connection	
		Power	Signal
Pin assignment 1	Receptacle Intercontec M23, speedtec-ready 9-pin	Receptacle, Intercontec M23, speedtec-ready 6-pin	Receptacle, Intercontec M23, speedtec-ready 12-pin (Resolver, HIPERFACE®) 17-pin (EnDAT2.1, EnDAT 2.2) 9-pin (DRIVE-CLiQ)
Pin assignment 4	–	Receptacle Intercontec M23, speedtec-ready 9-pin	Receptacle Intercontec M23, speedtec-ready 12-pin (Resolver, HIPERFACE®) 17-pin (EnDAT 2.1, EnDAT 2.2)

The great flexibility of the new premo actuator platform is also demonstrated through the pin assignments. In addition to two standard WITTENSTEIN pin assignments, a number of compatible connections are available for various servo controller suppliers.

- Pin assignment 1: WITTENSTEIN Standard 1, temperature sensor in signal line
Resolver, HIPERFACE®, DRIVE-CLiQ
- Pin assignment 2: Siemens compatible (except DRIVE-CLiQ, temperature sensor in signal line)
Resolver, EnDAT 2.1
- Pin assignment 4: WITTENSTEIN Standard 2, temperature sensor in power line
Resolver, HIPERFACE®, EnDAT 2.1
- Pin assignment 5: Rockwell-compatible
HIPERFACE®, HIPERFACE DSL® (single-cable)
- Pin assignment 6: B&R-compatible
Resolver, EnDAT 2.1, EnDAT 2.2 (single-cable)
- Pin assignment 8: Schneider compatible
HIPERFACE®
- Pin assignment 9: Beckhoff compatible
Resolver, EnDAT 2.1, HIPERFACE DSL® (single-cable)

A wider selection of cables is available for both WITTENSTEIN standard assignments. You will find these in the chapter System expansions.

Operating voltage

Different applications and servo controllers require different intermediate circuit voltages. The data specified in the catalog relates to an intermediate circuit voltage of 560 V DC – assuming a supply voltage of 3 x 400 V AC. Moreover, the motors can be wound for the following operating voltages: **24, 48, 320 V DC**

In applications with feed modules for a regulated intermediate circuit with raised voltage level, operation up to 750 V DC is possible.

The data sheets for the specified operating voltages are available on our homepage or on request.

Lubrication

Depending on the application, the requirements regarding the lubricant in the gearhead change. The following lubricants are available for our actuators:

- Tribol 800/220 (Standard) oil lubricant
- Optimol PD1 grease lubricant
(Reduction of output torque by up to 20%)
- Foodgrade lubrication Klüber 6UH1-220 oil lubricant
(Reduction of output torque by up to 20%)
- Foodgrade lubrication Klüber UH114-115 grease lubricant
(Reduction of output torque by up to 40%)

Gearhead model

Several mechanical interface versions are available:

Model	base	advanced	high
Output	- Smooth shaft (standard) - Key (option) - Involute (option)	- Flange (standard)	- Smooth shaft (standard) - Key (option) - Involute (option)
Housing	Round through bore (standard)	Round through bore (standard)	- Round through bore (standard) - Slot through bore (option)

Options

Minimal backlash

If even greater precision is required, the relevant lines can be ordered with reduced torsional backlash or face clearance.

The following overview indicates the relevant values:

	size 1		size 2		size 3	
	Standard	Reduced	Standard	Reduced	Standard	Reduced
base line	≤ 6	≤ 4	≤ 6	≤ 4	≤ 5	≤ 3
advanced line	≤ 4	≤ 2	≤ 3	≤ 1	≤ 3	≤ 1
high line	≤ 5	≤ 3	≤ 4	≤ 2	≤ 4	≤ 2

Holding brake

A compact permanent magnet brake is fitted to secure the motor shaft when the actuator is disconnected from the power. Characteristics include no torsional backlash, no residual torque when the brake is released, unlimited duty cycles at zero speed and a constant torque at high operating temperatures.

		size 1		size 2		size 3	
Ratio		16 – 35	40 – 100	16 – 35	40 – 100	16 – 35	40 – 100
Static holding torque	Nm	2	0.8	4	2	13	4
Dynamic holding torque	Nm	1.3	0.5	3.5	1.3	8	3.5
Power supply	V DC	24	24	24	24	24	24

Feedback systems

Connectivity is the magic word. Here, WITTENSTEIN seeks to offer its customers maximum flexibility.

A large selection of encoder systems is available for positioning and speed measurement.

Resolver

- 2-pin, 1 sin/cos cycle per rotation (standard base line)

HIPERFACE® absolute encoder, safety acc. to SIL 2

- Single-turn, resolution 4096 positions per revolution, 128 sine cosine (standard advanced line)
- Multi-turn, resolution 4096 positions per revolution, 128 sine cosine, 4096 revolutions

HIPERFACE DSL® absolute encoder, safety acc. to SIL 2

- Single-turn, resolution 18/20 bits per revolution (standard high line)
- Multi-turn, resolution 18/20 bits per revolution, 4096 revolutions

EnDAT 2.1, absolute encoder

- Single-turn, resolution 8192 positions per revolution, 512 sine cosine
- Multi-turn, resolution 8192 positions per revolution, 512 sine cosine, 4096 revolutions

EnDAT 2.2, absolute encoder, safety acc. to SIL 2

- Single-turn, resolution 4096 positions per revolution
- Multi-turn, resolution 23 Bit per revolution, 4096 revolutions

DRIVE-CLiQ, absolute encoder, safety acc. to SIL 2

- Single-turn, resolution 24 bits per revolution
- Multi-turn, resolution 24 bits per revolution, 4096 revolutions

Temperature sensor

Different sensors are available to protect the motor windings from overheating.

- PTC resistor, type STM 160 according to DIN 44081/82
- PT 1000

Order code

premo

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7						
P	A	G		1	1	C	S	-	0	2	5	S	P	0	1	-	6	M	P	G	B	0	-	W	0	1						
premo			size 1 2 3						Ratio						Operating voltage 1 = 24 V 2 = 48 V 5 = 320V 6 = 560V												Pin assignment options, see opposite page					
Lines B = base A = advanced H = high			Sector package G = General			Actuator code S = Standard C = Customized R = Flange with slots (only high line)						Backlash 1 = Standard 0 = Reduced												Alignment with flange 0 = 0° 1 = 90°								
			Stator length and stator size Options, see opposite page									Output type 0 = Smooth shaft/ flange 1 = Shaft with key 2 = Involute 3 = System output 4 = Other												Electr. connection Options, see opposite page								
												Lubrication P = Oil G = Grease F = Foodstuff- compatible oil H = Foodstuff- compatible grease												Type of cooling 0 = conv. cooling								
															Gearhead model S = Standard A = HighTorque (only advanced line)												Type of brake S = Standard brake i = 40 - 100 T = Standard brake i = 16 - 35 0 = Without brake					
																											Winding code is issued by WITTENSTEIN					
																											Temperature sensor P = PTC T = PT1000					
																														Feedback system Options, see opposite page		

Electrical connection options

R	Angled integral socket, single-cable
W	Angled integral socket, 2-cable
S	Straight integral socket, single-cable connection
G	Straight integral socket, 2-cable connection
C	Cable gland, 1-cable connection
K	Cable gland, 2-cable connection

Pin assignment options

1	Temperature sensor via signal line
2	Siemens compatible (except DRIVE-CLiQ)
4	Temperature sensor in power cable
5	Rockwell-compatible
6	B&R-compatible
8	Schneider compatible
9	Beckhoff compatible

Stator length and stator size options

	Ratio 16 to 35	Ratio 40 to 100
size 1	2C	1C
size 2	2D	1D
size 3	3F	1F

Feedback system options

R	Resolver, 2-pin
E	Rockwell, single-turn
V	Rockwell, multi-turn
C	Rockwell, single-turn
P	Rockwell DSL, multi-turn
S	EnDAT 2.1 absolute encoder, single-turn
M	EnDAT 2.1 absolute encoder, multi-turn
F	EnDAT 2.2 absolute encoder, single-turn
W	EnDAT 2.2 absolute encoder, multi-turn
N	HIPERFACE® absolute encoder, single-turn
K	HIPERFACE® absolute encoder, multi-turn
A	HIPERFACE DSL® safety absolute encoder, single-turn
B	HIPERFACE DSL® safety absolute encoder, multi-turn
D	DRIVE-CLiQ

System expansions

simco® drive – More intelligent. More efficient. Safer.

The simco® drive servo amplifier controls sine-commutated servo motors and is available as a control cabinet version with protection class IP20 and a decentralized version with protection class IP65. With a voltage range of 24 and 48 V DC and a short-term peak output

of up to 1 kW, the simco® drive servo amplifier is suitable for high-precision applications, e.g. in the machine-tool, electronics or packaging industries.

Compact and space-saving solution

MotionGUI software for commissioning, diagnostics and optimization of the drive system

STO safety function acc. to SIL3

Use in control cabinet or directly on the machine, with protection class IP20 and IP65

Numerous communication interfaces

CANopen®
EtherCAT®

PROFI
NET

RS232
TCP/IP

Numerous sensor interfaces

EnDat 2.2

BiSS
INTERFACE

RESOLVER
HALLSENSOR



User interface

Software – MotionGUI

Functions

- Diagnosis via the Scope functionality
- Loading of cycle parameters via the Motion tasks
- Read-out of errors and warnings via the Errors and Warnings function
- Monitoring: read-out of the drive parameters in operation, e.g. position, temperature
- etc.

For further information, see simco® drive catalog

Technical data

Rated output current	I_N	A	2.5	10
Supply voltage (power)	U _{DC}	V _{DC}	+24 ... +48 (unregulated)	
Supply voltage (logic)	U _{log}	V _{DC}	+24 (+/- 10%)	
Peak current	I _{max}	A _{eff}	5 (for 5 s)	20 (for 5 s)
Rated power	P _N	W	125	500
Peak power	P _{max}	W	250	1000
Switching frequency	f _{PWM}	kHz	8 ... 32	
Current control resolutions		Bit	14 (effective)	
Communication			- CANopen acc. to DS402 - EtherCAT with CoE - PROFINET RT/IRT* - RS 232 - TCP/IP**	
Drive function acc. to DS 402 for CANopen / EtherCAT communication			- Profile position mode - Homing mode - Profile velocity mode - Profile torque mode - Cyclic synchronous position mode - Cyclic synchronous velocity mode	
Supported PROFIdrive application classes for PROFINET communication			- Application class 1 (PROFINET RT) - Application class 3 (PROFINET RT) - Application class 4 (PROFINET IRT)	
Sensor interfaces			- BiSS C - EnDat 2.2 - Hall sensors - Resolver	
Safety function			STO (Safe Torque off) to SIL 3	
Technology functions			Disk cam, motion tasks	
Protection class			IP20 and IP65	
Digital inputs			4, opto decoupled, freely programmable function	
Digital outputs			2, opto decoupled, freely programmable function	
Event logging with real-time clock			✓	
Brake actuation			✓	
External ballast resistor			✓	
Drive program with PLC functions			✓	
Operating temperature range	θ _A	°C	0 ... 45°C without derating	
Weight	m	kg	0.3 kg (IP20) and 0.85 kg (IP65)	

* PROFINET communication for simco drive IP65 available upon request

** Only available with PROFINET version

System expansions

alpha rack & pinion system

WITTENSTEIN alpha rack and pinion systems enable the coupling of gearhead, motor, pinion and rack in the most effective manner. More than 30 years of expertise in the fields of gearhead construction, toothing technology and the design of complete drive systems

make the alpha rack and pinion systems a well thought-out, state-of-the-art system solution. Detailed information is available at www.rack-pinion.com



Pinion versions for the system

High-performance pinion

in conjunction with premo high line



- High-precision and optimally designed toothing geometries for best possible power transmission, superior running and precision in application
- Innovative pinion/gearhead connection ensures the highest linear rigidity, maximum flexibility in pinion selection, optionally dimensioned and rigid pinions, compact drive design
- Factory assembled with marked high point
- We offer individual options for special requirements

Premium Class RTP pinion

in conjunction with premo advanced line



- High-precision and optimally designed toothing geometries for best possible power transmission, superior running and precision in application
- Adapted to the standard gearhead series with the proven TP+ output flange
- High movement speeds with low input speeds thanks to large pitch diameter
- Compact pinion/gearhead connection
- Factory assembled with marked high point

Performance and high-performance class rack



The solution for highly dynamic mid-range and precise high-end applications (with electrically clamped drives).

Your benefits:

- Significantly higher strength in the surface layer and in the core structure
- Higher permissible bending loads
- Maximum fatigue strength against vibration loads
- Maximum wear resistance

The right rack for all requirements

The correct rack is an essential component in realizing your machine concepts. WITTENSTEIN alpha offers various rack classes in order to find the right solution for your application requirements in conjunction with a matched gearhead and pinion.

Meeting your requirements without limits!

System expansions

Cables

The WITTENSTEIN range of high-performance servo actuators is completed through the appropriate connection technology: The special system cables support the high performance of the machine most effectively and therefore represent the optimal system expansion „directly from the manufacturer“.

All the cables are characterized by excellent quality and are compatible with drag chains using highly flexible lines according to DIN V DE 0295, class 6. They are also oil and flame-resistance as well as halogen, silicone and CFC-free.

Power cable for premo

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
C	A	B	-	P	O	W	-	E	-	S	T	D	0	0	1	-	D	0	1	5	0	-	S	-	L	0	5	0	0
Model			Controller manufacturer			Motor manufacturer			Length			Power connector assignment			Cable cross section														
POW = Power cable			Motor phases and brake on wire end sleeves			S = Connector, size 1 C = Connector, size 1.5 see table at bottom of next page			L0500 = 5 m L1000 = 10 m L1500 = 15 m L2000 = 20 m L2500 = 25 m L3000 = 30 m L4000 = 40 m L5000 = 50 m			Connector, size 1 R = Resolver, 2-pin E = Encoder			D0150 = 1.5 mm ² D0250 = 2.5 mm ² D0400 = 4 mm ² D0600 = 6 mm ² D1000 = 10 mm ² D1600 = 16 mm ²														
			STD000 = PE on wire end sleeve STD001 = PE on cable ring shoe etc... see top of next page									Connector, size 1.5 U = Universal for all motor feedback																	

Signal cable for premo

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
C	A	B	-	S	I	G	-	M	-	S	I	E	M	E	N	-	D	0	0	0	0	-	S	-	L	0	5	0	0
Model			Controller manufacturer			Motor manufacturer			Length			Return system			Cable cross section														
SIG = Signal cable			SIEMEN = Siemens SIMODRIVE 611 etc... see top of next page			S = Connector, size 1			L0500 = 5 m L1000 = 10 m L1500 = 15 m L2000 = 20 m L2500 = 25 m L3000 = 30 m L4000 = 40 m L5000 = 50 m			R = Resolver, 2-pin M = EnDat absolute encoder* K = HIPERFACE® absolute encoder* D = DRIVE-CLiQ			Standard for all signal cable sizes D0000														

* Multi-turn and single-turn cables are identical

Standard cable lengths: 5, 10, 15, 20, 25, 30, 40 and 50 meters.

Cables are available for the following manufacturers and servo controllers:

Pin assignment 1 (Resolver, Hiperface®, DRIVE-CLiQ)	Pin assignment 2 (EnDAT 2.1)	Pin assignment 4
B&R, Acopos	B&R, Acopos	Schneider Electric, PacDrive MC4
Schneider Electric, PacDrive MC4	Bosch Rexroth, IndraDrive	Bosch Rexroth, IndraDrive
Bosch Rexroth, IndraDrive	Control technique, UniDrive SP	Beckhoff, AX5000
Control techniques, UniDrive SP	Siemens, Sinamics S120	–
Siemens, Sinamics S120 (DRIVE-CLiQ)	–	–

Controller manufacturer

Cable for pin assignment 1 (temperature sensor in signal cable)

Manufacturer	Controller	Signal cable manufacturer	Power cable manufacturer
B&R	Acopos	BURACO	STD000
Schneider Electric	PacDrive MC4	ELAMC4	ELAMC4
Bosch Rexroth	IndraDrive	BRCIND	STD000
Control techniques	UniDrive SP	CT_SP_	STD001
Siemens	Sinamics S120	SIEMEN*	STD001

Cable for pin assignment 2 (temperature sensor in signal cable)

Manufacturer	Controller	Signal cable manufacturer	Power cable manufacturer
B&R	Acopos	BURACO	STD000
Siemens	Sinamics S120	SIEMEN	STD001
Bosch Rexroth	IndraDrive	BRCIND	STD000
Control techniques	UniDrive SP	CT_SP_	STD001

Cable for pin assignment 4 (temperature sensor in power cable)

Manufacturer	Controller	Signal cable manufacturer	Power cable manufacturer
Schneider Electric	PacDrive MC4	ELAUP4	ELAUP4
Bosch Rexroth	IndraDrive	BRC_I4	STD_P4
Beckhoff	AX5000	BHAX54	STD_P4

Other cable versions available on request

Motor manufacturer and cable cross sections

Stator	Cable cross section mm²	Power plug connection
1C	1,5	Größe 1 M23
2C	1,5	Größe 1 M23
1D	1,5	Größe 1 M23
2D	1,5	Größe 1 M23
1F	1,5	Größe 1 M23
3F	1,5	Größe 1 M23

Recommended cable cross sections according to EN 60204-1, ambient temperature 40°C, laying system C.
The selection of cable cross section depends on the motor size and stator length.

Project planning

Servo controllers

The premo actuator can be operated using many different servo controllers. The table below provides information to assist in selecting the correct options. Please observe the current consumption of the actuator during selection of the servo controller used.

Please note that not all available options are listed in the table below. Contact your local WITTENSTEIN office for assistance with other available controller options.

Manufacturer	Version/Type	Motor feedback						Temperature sensor		DC bus voltage		
		Resolver	EnDat 2.1	EnDat 2.2	HIPER-FACE®	HIPER-FACE® DSL	Drive-CLiQ	PTC	PT 1000	48 V DC	320 V DC	560 V DC
Bosch Rexroth	IndraDrive	x	x	–	x	–	–	x	x ⁵	–	x	x
Beckhoff	AX5000	x	x	x ³	x ³	x	–	x	x ⁵	–	x	x
B & R	AcoPos	x	x	x ⁴	x	–	–	x	–	–	x	x
Control techniques	UniDrive SP	x	x	x	x	–	–	x	–	–	x	x
	UniDrive M	x	x	x	x	–	–	x	x	–	x	x
Kollmorgen	Servostar 300	x	x	x	x	–	–	x	–	–	x	x
	Servostar 700	x	x	x	x	–	–	x	–	–	x	x
	AKD	x	x	x	x	–	–	x	–	–	x	x
Lenze	Global Drive 94xx	x	x	–	x	–	–	x	–	–	x	x
	TopLine 8400	x	–	–	x	–	–	x	x ⁵	–	–	–
	ECS Servosystem	x	–	–	x	–	–	x	x ⁵	–	x	x
Rockwell	Kinetix 5500	–	–	–	x ¹	x	–	–	–	–	–	–
	Kinetix 6000	–	–	–	x	–	–	x	–	–	x	x
	Kinetix 6200	–	–	–	x	–	–	x	–	–	x	x
	Kinetix 6500	–	–	–	x	–	–	x	–	–	x	x
Siemens	Sinamics S120	x	x	x ²	–	–	x	–	x ⁶	–	–	x
Schneider Electric	PacDrive MC-4	–	–	–	x	–	–	x	–	–	x	x
	PacDrive 3	–	–	–	x	–	–	x	–	–	x	x
WITTENSTEIN motion control	simco® drive	x	–	x	–	–	–	–	–	x	–	–

¹ Hiperface DSL® converter kit required

² SMC 40 options module required

³ EnDat 2.2 requires options card AX5721 / 5722

⁴ EnDat 2.2 requires options module AC126

⁵ Parametrization of temperature sensor via char. curve / parametrizable evaluation via sampling points

⁶ PT1000 only from software 4.7HF xx or software 4.8 from 2016 at the earliest

Project planning note on brakes

The holding brakes installed in the actuators are subject to various influencing factors, e.g. the oxidation of abrasion particles, the flattening of friction surfaces in the case of frequent brake action at the same position, or the wear-dependent changes to the air gap. This can result in a reduction of the available holding torques. All the holding torques indicated therefore apply for the ideal state under optimal conditions, without damaging influences.

Such influences can be countered by means of a regular brake refresh cycle. For detailed information on the recommended refresh cycles, please refer to our Instructions for Use. For critical applications, it is recommended to ensure sufficient design safeguards with regard to holding torque in order to take into account the above-mentioned uncertainty factors. Our in-house engineering department will be pleased to assist you with the application sizing.

Technical information

All information regarding premo

- Technical data sheets and dimension sheets (CAD data)
- Engineering manual
- Manuals for servo amplifier
- Commissioning instruction (Operation manual with mounting and installation instruction)

are available for you in our download centre under **www.wittenstein-motion-control.com/download/premo**

For individual solutions please contact us.

The **cymex®** engineering tool is the first choice for sizing our actuators. We will be pleased to provide assistance.

The programm is available for download free-of-charge under **www.wittenstein-cymex.com**.



TPM⁺ servo actuators



Overview of TPM⁺ product range

The TPM⁺ product range impresses! With its dynamics, torque and torsional rigidity. Combined with an extremely short overall length, high power density and superior running on a completely new level together with practical graduated performance settings that ensure greater operating efficiency in all your production applications.

Product declarations

Actuators

The TPM⁺ product range is above all dynamic and compact. Servo motors and gearheads merge seamlessly into a single versatile unit. The benefit: Maximum power density meets functional design.

Motor

Outstanding performance: Rare earth magnets, a high pole count and a high fill factor in the permanent magnet excited synchronous servo motors result in high power density with barely discernible cogging torques.

Gearhead

The planetary gearheads offer minimal backlash while achieving a high degree of torsional and tilting rigidity. The smooth-running helical teeth guarantee silent operation.

More productive. More efficient. More precise.

More productive ...

The benefits for your machines and plants: An actuator with a low moment of inertia and an extremely rigid drive train provide for the highest precision and dynamics. A decisive increase in productivity.

More efficient ...

Low torsional backlash, an output bearing with a high degree of tilting rigidity and integration of the gearhead pinion in the motor shaft result in: smaller motors, reduced energy consumption and lower investment costs.

More precise ...

Low levels of operating noise due to helical teeth and outstanding control properties ensure greater precision in your machines and plants. The result: genuinely economical products.

Further features

- | | | |
|--|--|---|
| <ul style="list-style-type: none">- Different encoder systems and permanent magnet holding brake available.- Direct attachment of drive components (pinion, belt pulley, indexing table) to standardized output flange. | <ul style="list-style-type: none">- UL version as standard.- Pre-assembled cables for selected servo controllers available.- Simple commissioning through special instructions for more than 25 servo controllers. | <ul style="list-style-type: none">- Torsional backlash reduction to less than 1 arcmin possible.- Electrical connection via time-saving bayonet couplings.- Robust output bearing eliminates the need for additional bearing point. |
|--|--|---|

TPM+ dynamic

More dynamic – Shorter – Quieter

Extra productivity: Outstanding dynamics, compact dimensions and extremely smooth running. Actuator with two-stage gearhead designed primarily for rotary applications.

TPM+ power

Stronger – Quieter – More compact

Extra power: High torque, compact dimensions. Single or two-stage motor/gearhead combination for linear and rotary applications.

TPM+ high torque

Stronger – More compact – Higher torsional rigidity

The uncompromising plus: High torsional rigidity and superior power density. Two or three-stage servo actuator for heavy-duty applications.



TPM⁺ dynamic

More dynamic. Shorter. Quieter.

Experience extraordinary dynamics through modern motor technology with high power density, a low moment of inertia and optimal torsional rigidity. Benefit from a reduced installation length: The coupling-free connection between motor and gearhead and the space-saving attachment of motor instruments make the TPM⁺ dynamic over 50 percent more compact than conventional gearhead motors. Helical-toothed precision planetary gearheads ensure low-vibration and silent operation.





Source: Hastamat Verpackungstechnik

Applications

Whether used as an axle drive on spraying robots, a swivel drive in the production of optical media and semiconductors, in packaging machines or as a drive for changeover systems in machine tools or wood processing systems, the TPM+ dynamic is ideal for all robotic and automated applications.

Size	Installation length in mm	Acceleration torque in Nm	Max. power in kW
004	from 113	up to 40	up to 1.0
010	from 142	up to 100	up to 1.5
025	from 153	up to 300	up to 4.7
050	from 187	up to 650	up to 10.2
110	from 268	up to 1300	up to 14.2

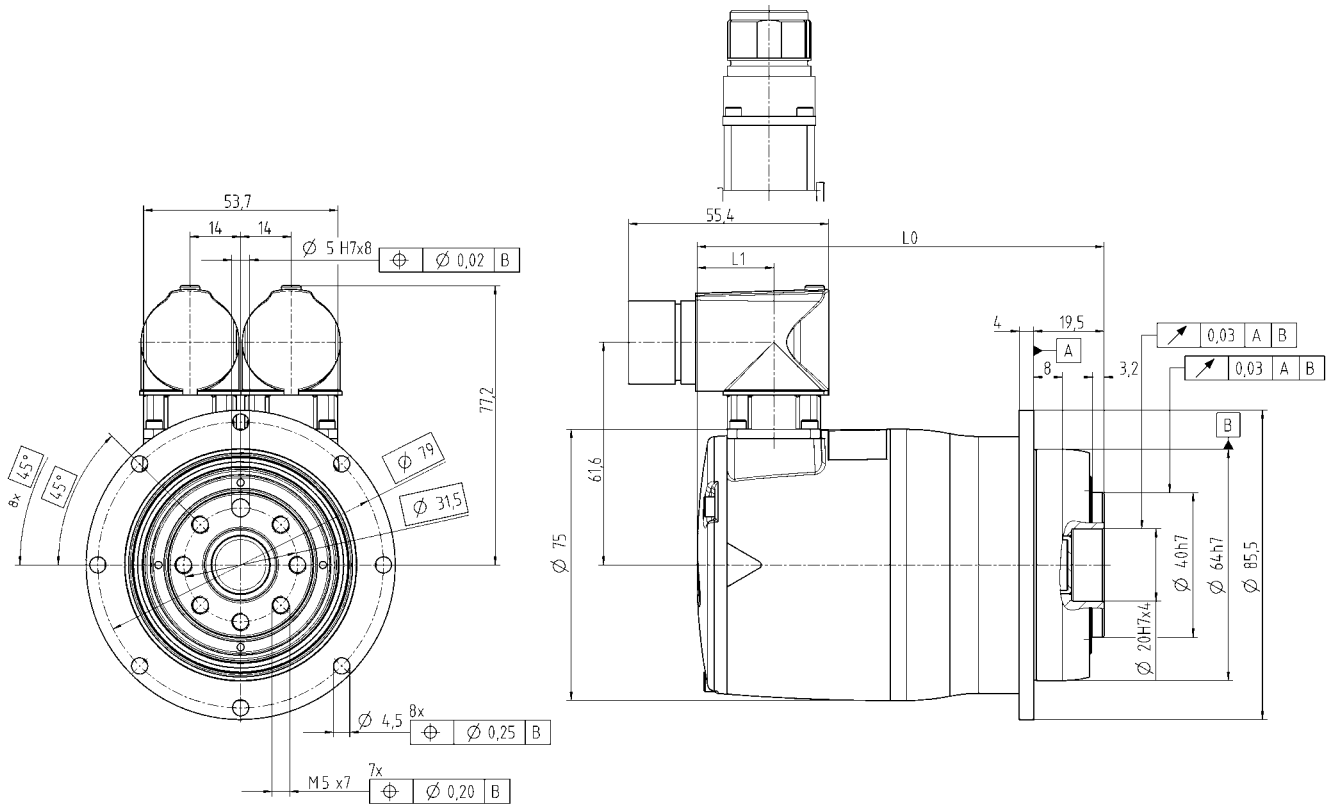
TPM⁺ dynamic 004

Ratio	i		16		21		31		61		64		91	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	30		32		40		32		32		32	
Static output torque	T ₂₀	Nm	8		11		17		15		15		15	
Brake holding torque at output, 100°C	T _{2BR}	Nm	18		23		34		67 ¹⁾		70 ¹⁾		100 ¹⁾	
Max. speed	n _{2max}	rpm	375		286		194		98		94		66	
Speed limit for T _{2B}	n _{2B}	rpm	313		262		189		98		94		66	
Max. motor acceleration torque	T _{Mmax}	Nm	2.0		2.0		2.0		1.0		1.0		1.0	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	5.5	3.2	5.5	3.2	5.5	3.2	4.2	2.4	4.2	2.4	4.2	2.4
Static motor current	I ₀	A _{eff}	1.9	1.1	1.9	1.1	1.9	1.1	1.4	0.8	1.4	0.8	1.4	0.8
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²•10 ⁻⁴	0.21		0.20		0.20		0.12		0.11		0.12	
Torsional backlash	j _t	arcmin	Standard ≤ 4 / Reduced ≤ 2											
Torsional rigidity	C _t	Nm/arcmin	–		10		9		9		–		7	
Tilting rigidity	C _K	Nm/arcmin	–											
Max. axial force	F _{Amax}	N	1630											
Max. tilting moment (distance from point of rotation to output flange 57.6 mm)	M _{Kmax}	Nm	110											
Weight (with resolver, without brake)	m	kg	2.2						2.0					
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 58											
Max. permitted housing temperature		°C	+90											
Ambient temperature		°C	0 to +40											
Protection class			IP65											
Mount. pos.			Any											
Lubrication			Synthetic oil, lubricated for life											
Insulating material class			F											
Paint			Metallic blue 250 and natural cast aluminum											

Tolerances T, I and n: Maximal +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	128	22
	Hiperface	153	47
	EnDat	157	51
i = 61/64/91	Resolver	113	22
	Hiperface	138	47
	EnDat	142	51

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	165	22
	Hiperface	190	47
	EnDat	194	51
i = 61/64/91	Resolver	150	22
	Hiperface	175	47
	EnDat	179	51

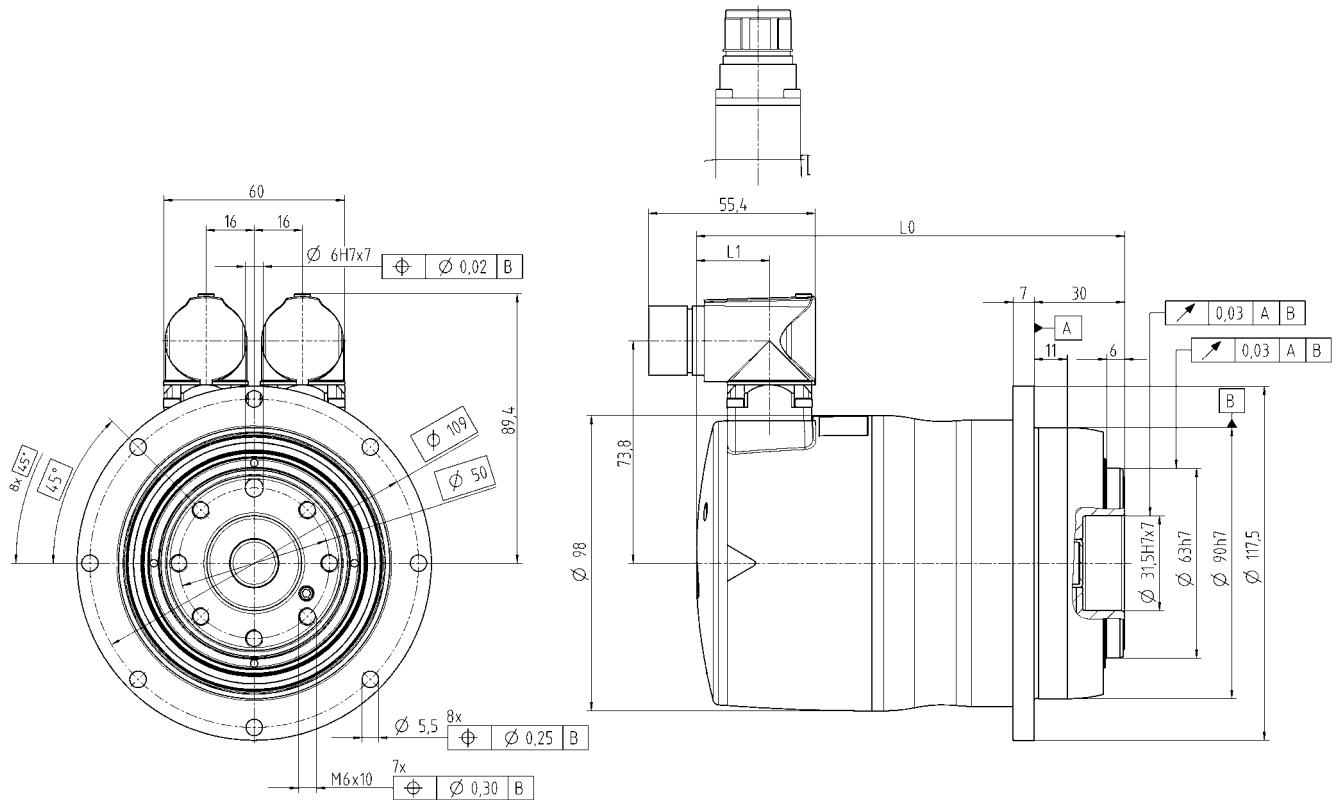
TPM⁺ dynamic 010

Ratio	i		16		21		31		61		64		91	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	57		75		100		80		80		80	
Static output torque	T ₂₀	Nm	13		18		27		29		28		35	
Brake holding torque at output, 100°C	T _{2BR}	Nm	18		23		34		67		70		100 ¹⁾	
Max. speed	n _{2max}	rpm	375		286		194		98		94		66	
Speed limit for T _{2B}	n _{2B}	rpm	256		195		132		81		78		54	
Max. motor acceleration torque	T _{Mmax}	Nm	3.8		3.8		3.8		1.9		1.9		1.9	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	9.0	5.2	9.0	5.2	9.0	5.2	5.2	3.0	5.2	3.0	5.2	3.0
Static motor current	I ₀	A _{eff}	2.3	1.3	2.3	1.3	2.3	1.3	1.6	0.9	1.6	0.9	1.6	0.9
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²*10 ⁻⁴	0.32		0.32		0.32		0.17		0.17		0.17	
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1											
Torsional rigidity	C _t	Nm/arcmin	–		26		24		24		–		21	
Tilting rigidity	C _K	Nm/arcmin	225											
Max. axial force	F _{Amax}	N	2150											
Max. tilting moment (distance from point of rotation to output flange 82.7 mm)	M _{Kmax}	Nm	270											
Weight (with resolver, without brake)	m	kg	4.8						4.3					
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 62											
Max. permitted housing temperature		°C	+90											
Ambient temperature		°C	0 to +40											
Protection class			IP65											
Mount. pos.			Any											
Lubrication			Synthetic oil, lubricated for life											
Insulating material class			F											
Paint			Metallic blue 250 and natural cast aluminum											

Tolerances T, I and n: Max. +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	157	24
	Hiperface	178	45
	EnDat	182	49
i = 61/64/91	Resolver	142	24
	Hiperface	163	45
	EnDat	167	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	178	24
	Hiperface	199	45
	EnDat	202	49
i = 61/64/91	Resolver	163	24
	Hiperface	184	45
	EnDat	187	49

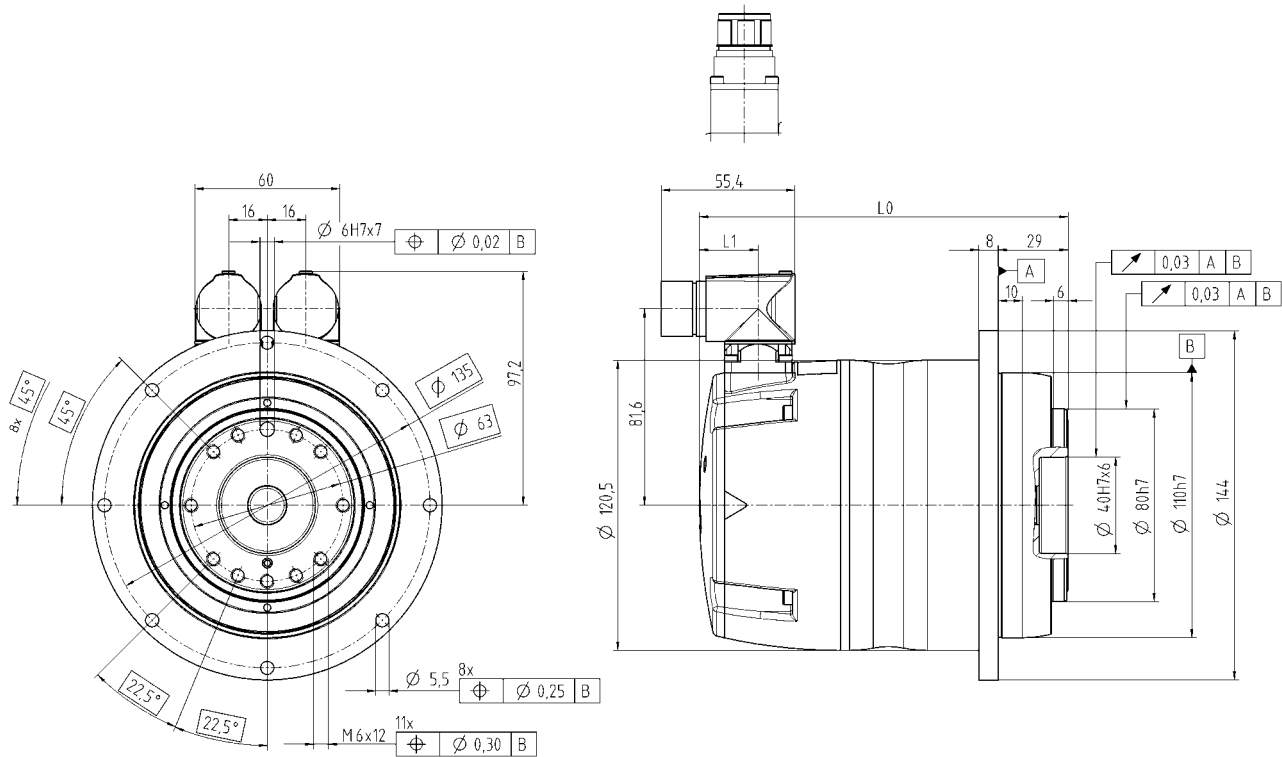
TPM⁺ dynamic 025

Ratio	i		16		21		31		61		64		91	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	182		239		300		250		250		250	
Static output torque	T ₂₀	Nm	74		97		146		87		83		100	
Brake holding torque at output, 100°C	T _{2BR}	Nm	72		94		140		274 ¹⁾		288 ¹⁾		410 ¹⁾	
Max. speed	n _{2max}	rpm	375		286		194		98		94		66	
Speed limit for T _{2B}	n _{2B}	rpm	244		185		125		59		56		39	
Max. motor acceleration torque	T _{Mmax}	Nm	12.1		12.1		12.1		4.4		4.4		4.4	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	29.4	17.0	29.4	17.0	29.4	17.0	10.4	6.0	10.4	6.0	10.4	6.0
Static motor current	I ₀	A _{eff}	9.9	5.7	9.9	5.7	9.9	5.7	3.3	1.9	3.3	1.9	3.3	1.9
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² *10 ⁻⁴	2.16		2.16		2.17		0.77		0.76		0.76	
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1											
Torsional rigidity	C _t	Nm/arcmin	–		70		54		61		–		55	
Tilting rigidity	C _K	Nm/arcmin	550											
Max. axial force	F _{Amax}	N	4150											
Max. tilting moment (distance from point of rotation to output flange 94.5 mm)	M _{Kmax}	Nm	440											
Weight (with resolver, without brake)	m	kg	8.5						7.1					
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 64											
Max. permitted housing temperature		°C	+90											
Ambient temperature		°C	0 to +40											
Protection class			IP65											
Mount. pos.			Any											
Lubrication			Synthetic oil, lubricated for life											
Insulating material class			F											
Paint			Metallic blue 250 and natural cast aluminum											

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	183	24
	Hiperface	204	45
	EnDat	208	49
i = 61/64/91	Resolver	153	24
	Hiperface	174	45
	EnDat	178	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	202	24
	Hiperface	223	45
	EnDat	227	49
i = 61/64/91	Resolver	172	24
	Hiperface	193	45
	EnDat	197	49

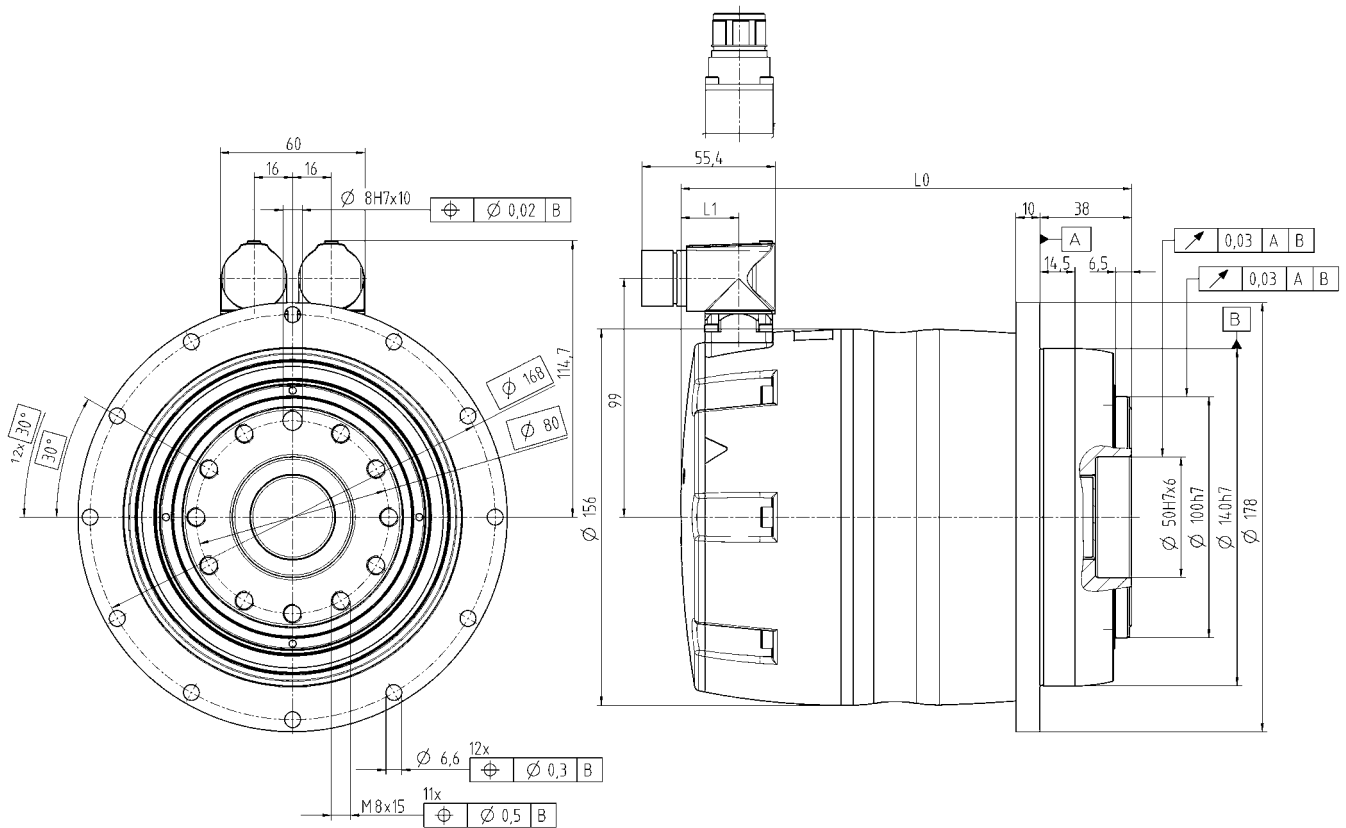
TPM⁺ dynamic 050

Ratio	i		16		21		31		61		64		91	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	435		500		650		447		469		500	
Static output torque	T ₂₀	Nm	185		220		370		173		166		220	
Brake holding torque at output, 100°C	T _{2BR}	Nm	208		273		403		793 ¹⁾		832 ¹⁾		1183 ¹⁾	
Max. speed	n _{2max}	rpm	312		238		161		82		78		55	
Speed limit for T _{2B}	n _{2B}	rpm	225		171		116		59		56		39	
Max. motor acceleration torque	T _{Mmax}	Nm	28.9		28.9		28.9		7.8		7.8		7.8	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	70.0	40.0	70.0	40.0	70.0	40.0	21.0	12.0	21.0	12.0	21.0	12.0
Static motor current	I ₀	A _{eff}	23.7	13.7	23.7	13.7	23.7	13.7	6.6	3.8	6.6	3.8	6.6	3.8
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²*10 ⁻⁴	9.07		9.07		8.94		2.51		2.49		2.49	
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1											
Torsional rigidity	C _t	Nm/arcmin	–		145		130		123		–		100	
Tilting rigidity	C _K	Nm/arcmin	560											
Max. axial force	F _{Amax}	N	6130											
Max. tilting moment (distance from point of rotation to output flange 81.2 mm)	M _{Kmax}	Nm	1335											
Weight (with resolver, without brake)	m	kg	18.5						14.7					
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 65											
Max. permitted housing temperature		°C	+90											
Ambient temperature		°C	0 to +40											
Protection class			IP65											
Mount. pos.			Any											
Lubrication			Synthetic oil, lubricated for life											
Insulating material class			F											
Paint			Metallic blue 250 and natural cast aluminum											

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	232	24
	Hiperface	253	45
	EnDat	257	49
i = 61/64/91	Resolver	187	24
	Hiperface	208	45
	EnDat	212	49

with brake

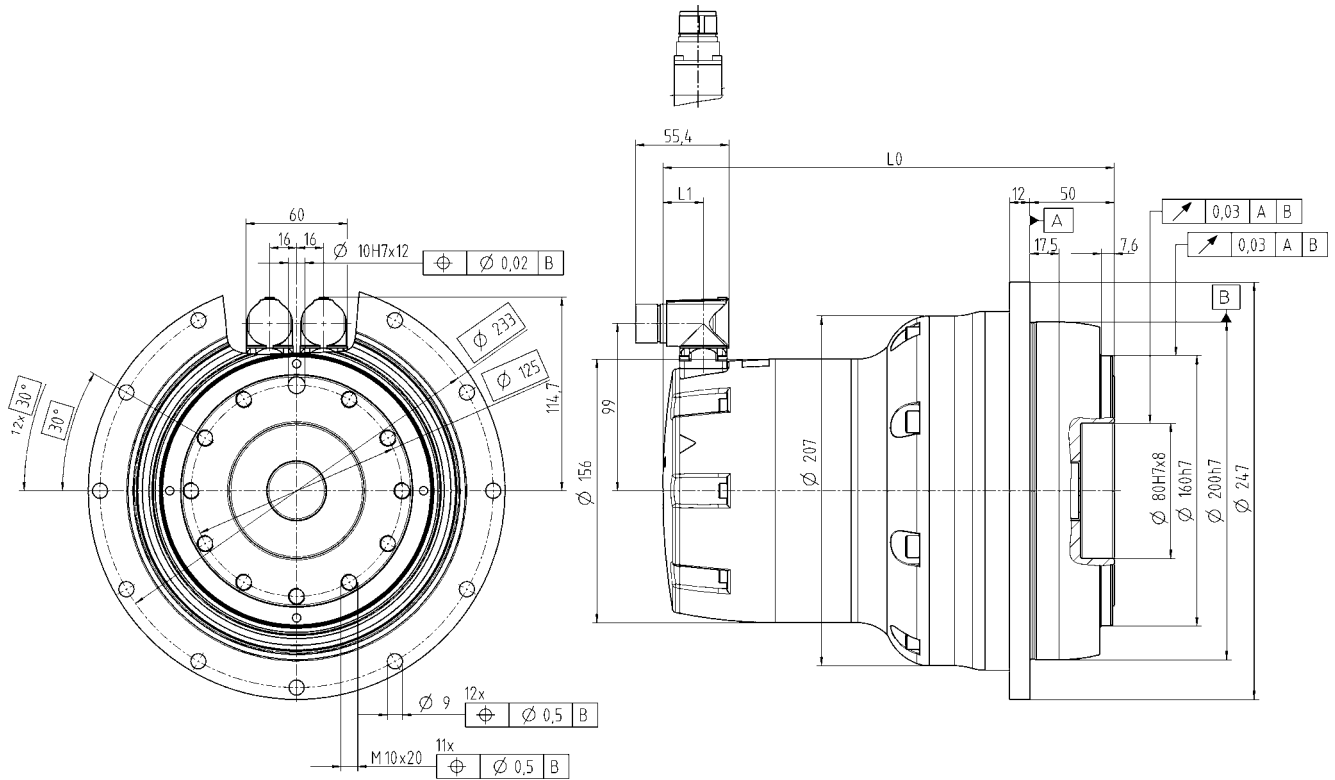
Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	256	24
	Hiperface	278	45
	EnDat	281	49
i = 61/64/91	Resolver	211	24
	Hiperface	233	45
	EnDat	236	49

TPM⁺ dynamic 110

Ratio	i		16		21		31		61		64		91	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	660		867		1279		1300		1300		1300	
Static output torque	T ₂₀	Nm	208		278		419		700		700		700	
Brake holding torque at output, 100°C	T _{2BR}	Nm	208		273		403		793		832		1183	
Max. speed	n _{2max}	rpm	231	312	176	238	119	161	82		78		55	
Speed limit for T _{2B}	n _{2B}	rpm	118	206	90	157	61	106	59		56		39	
Max. motor acceleration torque	T _{Mmax}	Nm	43.9		43.9		43.9		28.9		28.9		28.9	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	70.0		70.0		70.0		70.0	40.0	70.0	40.0	70.0	40.0
Static motor current	I ₀	A _{eff}	16.7		16.7		16.7		23.7	13.7	23.7	13.7	23.7	13.7
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² *10 ⁻⁴	13.14		13.14		12.84		8.89		8.83		8.83	
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1											
Torsional rigidity	C _t	Nm/arcmin	–		465		440		415		–		360	
Tilting rigidity	C _K	Nm/arcmin	1452											
Max. axial force	F _{Amax}	N	10050											
Max. tilting moment (distance from point of rotation to output flange 106.8 mm)	M _{Kmax}	Nm	3280											
Weight (with resolver, without brake)	m	kg	37.1						35.9					
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 72											
Max. permitted housing temperature		°C	+90											
Ambient temperature		°C	0 to +40											
Protection class			IP65											
Mount. pos.			Any											
Lubrication			Synthetic oil, lubricated for life											
Insulating material class			F											
Paint			Metallic blue 250 and natural cast aluminum											

Tolerances T, I and n: Maximum +/- 10%.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	283	24
	Hiperface	304	45
	EnDat	308	49
i = 61/64/91	Resolver	268	24
	Hiperface	289	45
	EnDat	293	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	307	24
	Hiperface	328	45
	EnDat	332	49
i = 61/64/91	Resolver	292	24
	Hiperface	313	45
	EnDat	317	49

TPM⁺ high torque

Stronger. More compact. Higher torsional rigidity.

This servo actuator brings you further advancement: with 50% more torque and improved performance. Even better power transmission due to the more rigid drive train enables higher acceleration and shorter cycle times. Effectiveness from which you benefit. An additional planet in the gearbox significantly increases the torsional rigidity of the particularly short and light actuator. The coupling-free integration of motor and gearhead and the efficient attachment of motor instruments is the formula for success.





Applications

Thanks to the TPM⁺ high torque, processing machines and swivel axes become significantly more productive. The high torsional rigidity and the ample torque reserve in the case of disturbing forces ensure extremely stable drive control. The reliable servo actuator therefore guarantees dynamics and precision for your (heavy-duty) tasks.

Size	Installation length in mm	Acceleration torque in Nm	Max. power in kW
010	from 183	up to 230	up to 4.5
025	from 219	up to 530	up to 9.8
050	from 279	up to 950	up to 15.6
110	from 328	up to 3100	up to 49.9

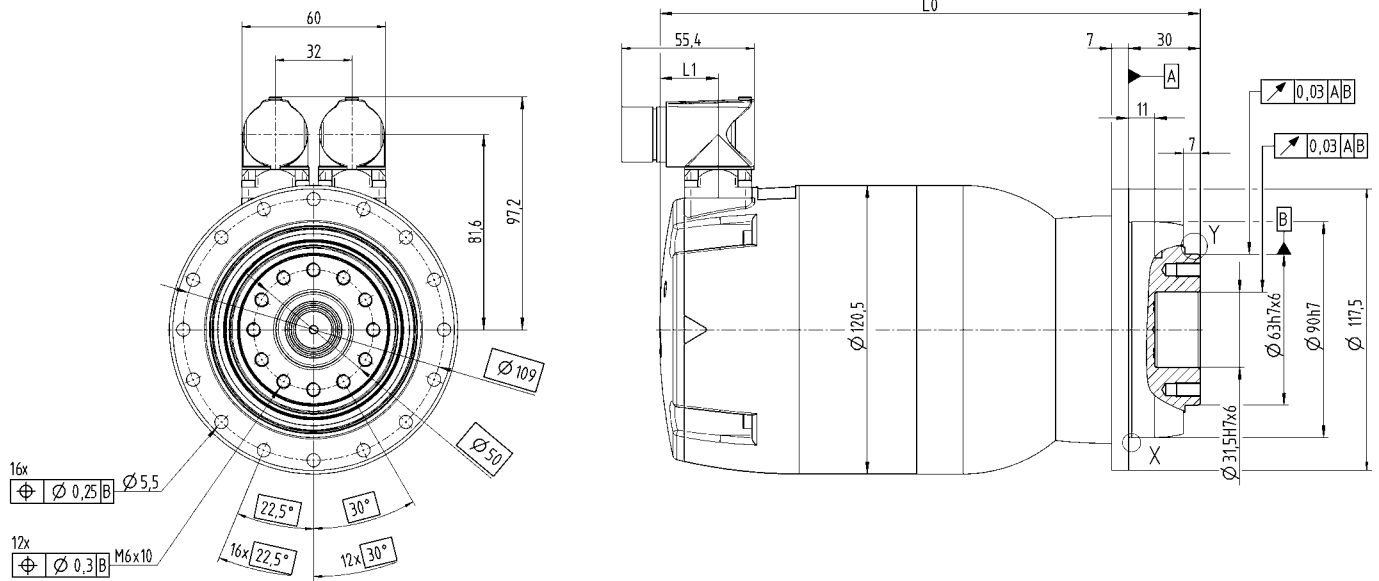
TPM⁺ high torque 010

Ratio	i		22		27.5		38.5		55		88		110		154		220	
Intermediate circuit voltage	U _D	V DC	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	230															
Static output torque	T ₂₀	Nm	79		99		139		110		180		180		180		180	
Brake holding torque at output, 100°C	T _{2BR}	Nm	99		124		173		248 ¹⁾		396 ¹⁾		495 ¹⁾		277 ¹⁾		396 ¹⁾	
Max. speed	n _{2max}	rpm	220		176		126		88		55		44		31		22	
Speed limit for T _{2B}	n _{2B}	rpm	187		163		126		88		55		44		31		22	
Max. motor acceleration torque	T _{Mmax}	Nm	12		12		12		12		12		12		4.4		4.4	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	17	29.4	17	29.4	17	29.4	17	29.4	17	29.4	17	29.4	6	10.4	6	10.4
Static motor current	I ₀	A _{eff}	5	8.6	5	8.6	5	8.6	5	8.6	5	8.6	5	8.6	1.9	3.3	1.9	3.3
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² ·10 ⁻⁴	2.06		2.03		2.01		1.99		2.01		2		0.68		0.67	
Torsional backlash	j _t	arcmin	≤ 1															
Torsional rigidity	C _t	Nm/arcmin	43						42									
Tilting rigidity	C _K	Nm/arcmin	225															
Max. axial force	F _{Amax}	N	2150															
Max. tilting torque (distance from point of rotation to output flange 82.7 mm)	M _{Kmax}	Nm	400															
Weight (with resolver, without brake)	m	kg	7.6									8.0				6.5		
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 60															
Max. permitted housing temperature		°C	90															
Ambient temperature		°C	0 to +40															
Protection class			IP65															
Mount. pos.			Any															
Lubrication			Synthetic oil, lubricated for life															
Insulating material class			F															
Paint			Metallic blue 250 and natural cast aluminum															

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 22/27.5/38.5/55	Resolver	207	24
	Hiperface	228	45
	EnDat	232	49
i = 88/110	Resolver	213	24
	Hiperface	234	45
	EnDat	238	49
i = 154/220	Resolver	183	24
	Hiperface	204	45
	EnDat	208	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 22/27.5/38.5/55	Resolver	226	24
	Hiperface	247	45
	EnDat	251	49
i = 88/110	Resolver	232	24
	Hiperface	253	45
	EnDat	257	49
i = 154/220	Resolver	202	24
	Hiperface	223	45
	EnDat	227	49

TPM⁺ high torque 025

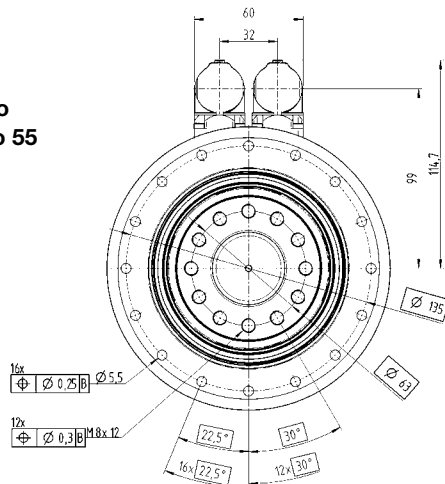
Ratio	i		22		27.5		38.5		55		66		88		110		154		220	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	530		530		530		530		480		480		480		480		480	
Static output torque	T ₂₀	Nm	232		291		375		375		260		260		260		260		260	
Brake holding torque at output, 100°C	T _{2BR}	Nm	286		358		500		715 ¹⁾		297		396		495 ¹⁾		693 ¹⁾		990 ¹⁾	
Max. speed	n _{2max}	rpm	220		176		126		88		73		55		44		31		22	
Speed limit for T _{2B}	n _{2B}	rpm	177		155		122		88		70		55		44		31		22	
Max. motor acceleration torque	T _{Mmax}	Nm	28.9		28.9		28.9		28.9		12		12		12		12		12	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	70	40	70	40	70	40	70	40	29.4	17	29.4	17	29.4	17	29.4	17	29.4	17
Static motor current	I ₀	A _{eff}	22.7	13.1	22.7	13.1	22.7	13.1	22.7	13.1	10.0	5.8	10.0	5.8	10.0	5.8	10.0	5.8	10.0	5.8
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² ·10 ⁻⁴	9.01		8.83		8.74		8.69		2.03		1.96		1.93		1.91		1.89	
Torsional backlash	j _t	arcmin	≤ 1																	
Torsional rigidity	C _t	Nm/arcmin	105		105		105		100		95		95		95		95		95	
Tilting rigidity	C _K	Nm/arcmin	550																	
Max. axial force	F _{Amax}	N	4150																	
Max. tilting torque (distance from point of rotation to output flange 94.5 mm)	M _{Kmax}	Nm	550																	
Weight (with resolver, without brake)	m	kg	14.8									10								
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 62																	
Max. permitted housing temperature		°C	90																	
Ambient temperature		°C	0 to +40																	
Protection class			IP65																	
Mount. pos.			Any																	
Lubrication			Synthetic oil, lubricated for life																	
Insulating material class			F																	
Paint			Metallic blue 250 and natural cast aluminum																	

Tolerances T, I and n: Maximum +/- 10%.

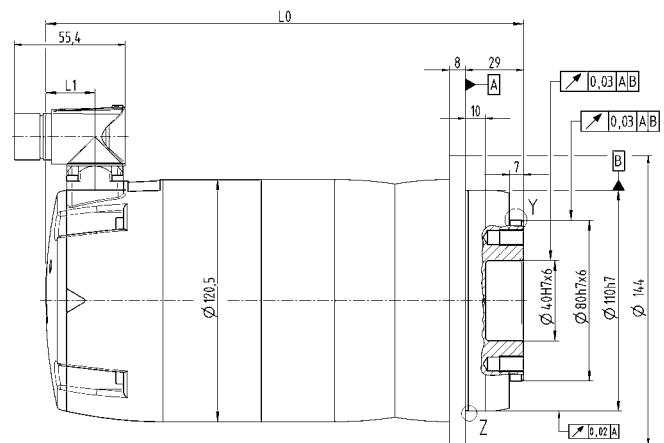
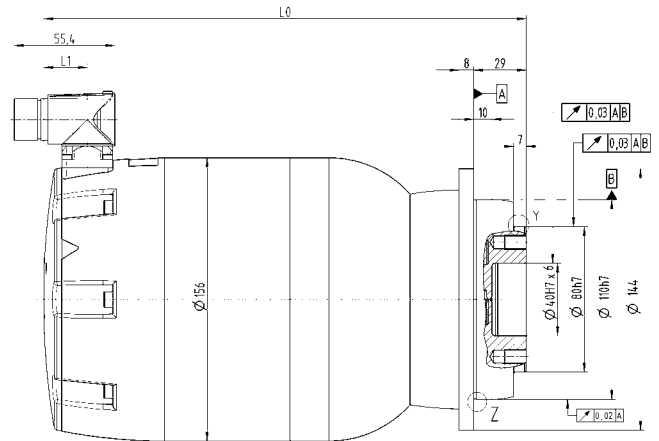
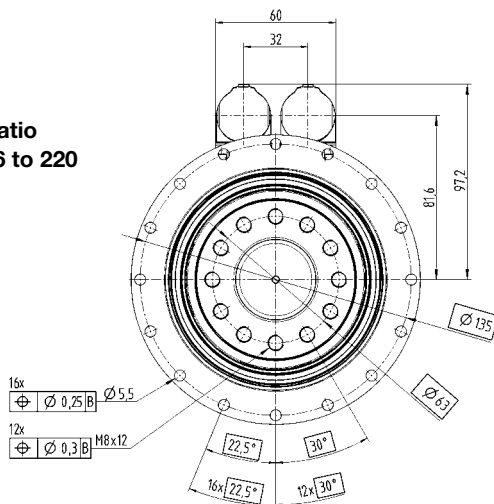
¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.

**Ratio
22 to 55**



**Ratio
66 to 220**



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 22/27.5/38.5/55	Resolver	242	24
	Hiperface	263	45
	EnDat	267	49
i = 66/88/110/154/220	Resolver	219	24
	Hiperface	240	45
	EnDat	244	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 22/27.5/38.5/55	Resolver	266	24
	Hiperface	287	45
	EnDat	291	49
i = 66/88/110/154/220	Resolver	238	24
	Hiperface	259	45
	EnDat	263	49

TPM⁺ high torque 050

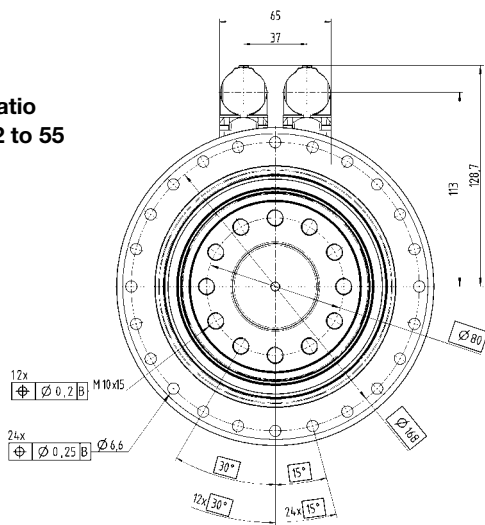
Ratio	i		22	27.5	38.5	55	66	88	110	154	220
Intermediate circuit voltage	U _D	V DC	560								
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	950								
Static output torque	T ₂₀	Nm	406	513	650	675	675	675	675	675	675
Brake holding torque at output, 100°C	T _{2BR}	Nm	506	632	886	1265 ¹⁾	858	1144 ¹⁾	1430 ¹⁾	2002 ¹⁾	2375 ¹⁾
Max. speed	n _{2max}	rpm	205	164	117	82	73	55	44	31	22
Speed limit for T _{2B}	n _{2B}	rpm	156	136	108	82	69	55	44	31	22
Max. motor acceleration torque	T _{Mmax}	Nm	56.6	56.6	56.6	56.6	28.9	28.9	28.9	28.9	28.9
Max. motor acceleration current	I _{maxdyn}	A _{eff}	63.5	63.5	63.5	63.5	40	40	40	40	40
Static motor current	I ₀	A _{eff}	17.9	17.9	17.9	17.9	12.6	12.6	12.6	12.6	12.6
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²·10 ⁻⁴	23.8	23.35	22.99	22.81	9.23	9.04	8.84	8.74	8.69
Torsional backlash	j _t	arcmin	≤ 1								
Torsional rigidity	C _t	Nm/arcmin	220	220	220	220	205	205	205	205	205
Tilting rigidity	C _K	Nm/arcmin	560								
Max. axial force	F _{Amax}	N	6130								
Max. tilting torque (distance from point of rotation to output flange 81.2 mm)	M _{Kmax}	Nm	1335								
Weight (with resolver, without brake)	m	kg	25.3				21.8				
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 64								
Max. permitted housing temperature		°C	90								
Ambient temperature		°C	0 to +40								
Protection class			IP65								
Mount. pos.			Any								
Lubrication			Synthetic oil, lubricated for life								
Insulating material class			F								
Paint			Metallic blue 250 and natural cast aluminum								

Tolerances T, I and n: Maximum +/- 10%.

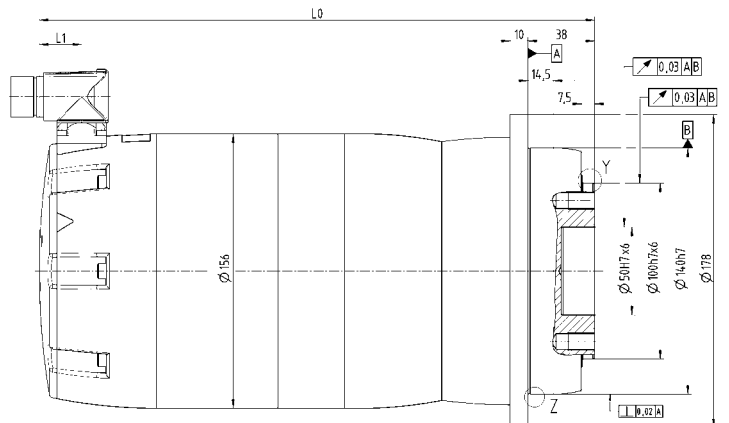
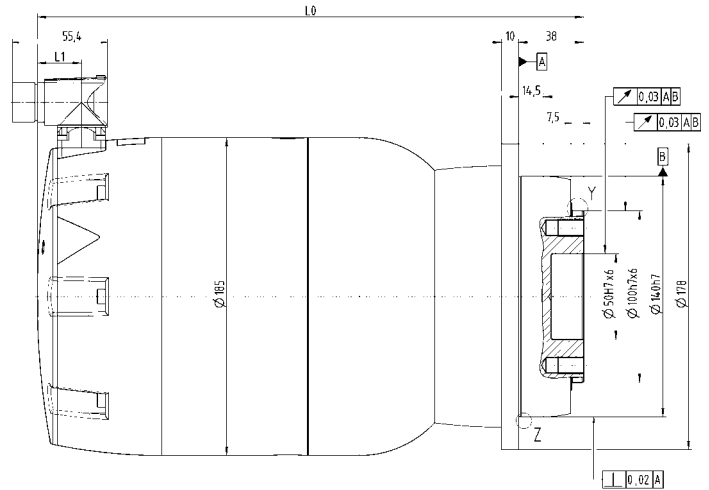
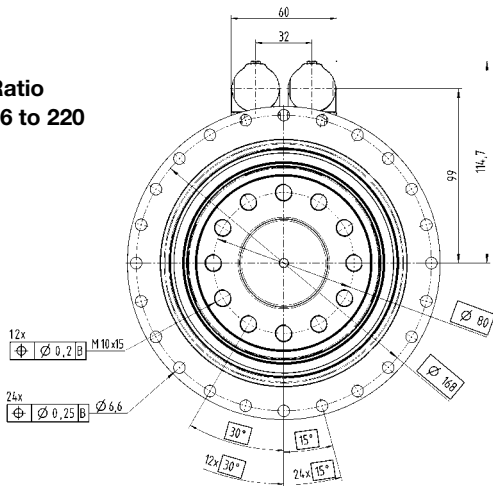
¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.

**Ratio
22 to 55**



**Ratio
66 to 220**



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 22/27.5/38.5/55	Resolver	279	26
	Hiperface	304	50
	EnDat	304	50
i = 66/88/110/154/220	Resolver	292	24
	Hiperface	313	45
	EnDat	317	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 22/27.5/38.5/55	Resolver	319	26
	Hiperface	344	50
	EnDat	344	50
i = 66/88/110/154/220	Resolver	316	24
	Hiperface	337	45
	EnDat	341	49

TPM⁺

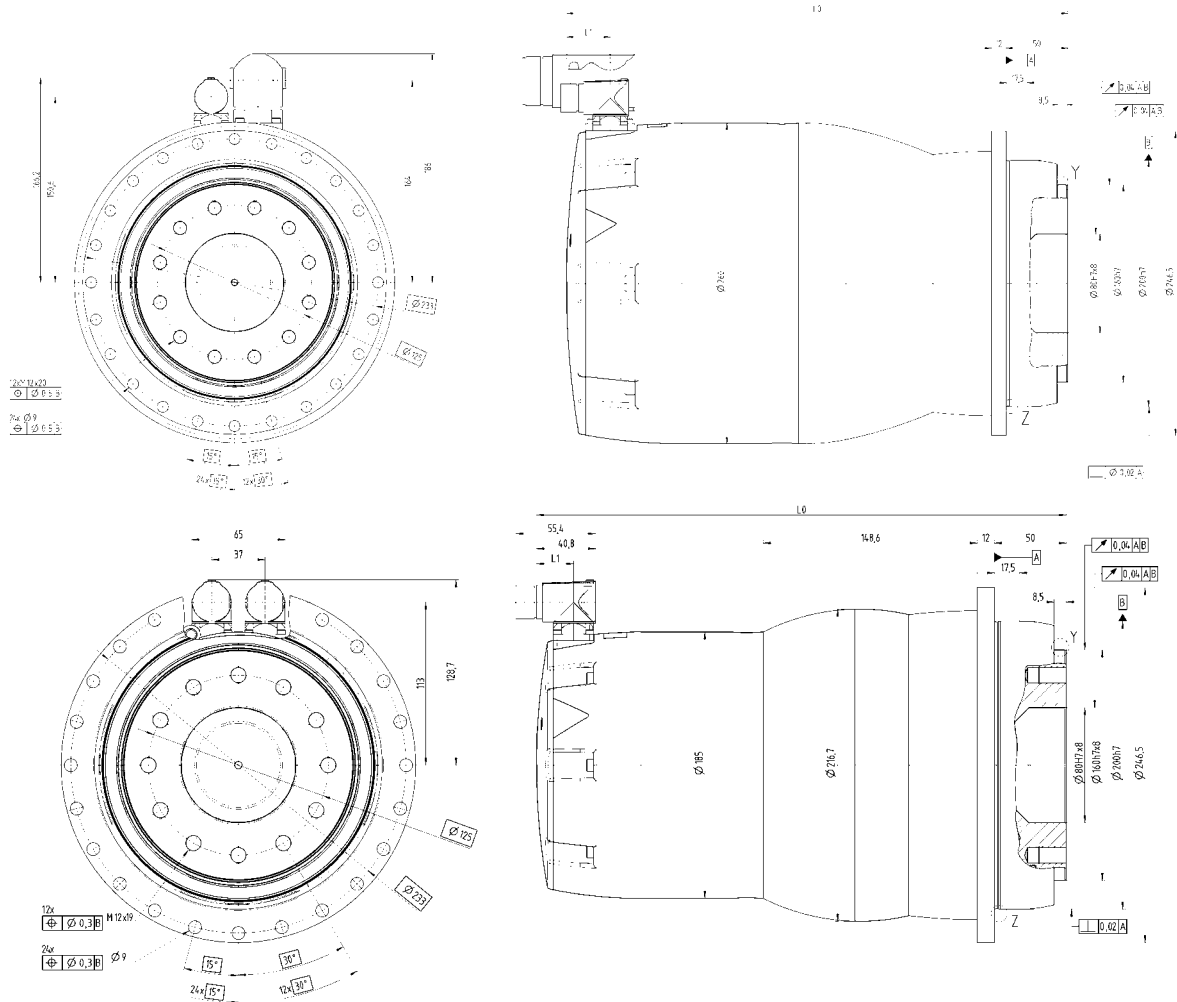
high torque 110

Ratio	i		22	27.5	38.5	55	66	88	110	154	220
Intermediate circuit voltage	U _D	V DC	560								
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	3100	3100	3100	2000	2600	2600	2600	2600	2600
Static output torque	T ₂₀	Nm	1368	1600	1650	1400	1600	1750	1750	1750	1750
Brake holding torque at output, 100°C	T _{2BR}	Nm	1584	1980	2772	3960 ¹⁾	4752 ¹⁾	6336 ¹⁾	2530	3542 ¹⁾	5060 ¹⁾
Max. speed	n _{2max}	rpm	189	151	108	75	63	47	41	29	20
Speed limit for T _{2B}	n _{2B}	rpm	154	135	106	75	63	47	38	29	20
Max. motor acceleration torque	T _{Mmax}	Nm	164.5	164.5	164.5	164.5	88	88	56.6	56.6	56.6
Max. motor acceleration current	I _{maxdyn}	A _{eff}	160	160	160	160	100	100	63.5	63.5	63.5
Static motor current	I ₀	A _{eff}	53.7	53.7	53.7	53.7	40.9	40.9	20.5	20.5	20.5
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² ·10 ⁻⁴	220.4	218.9	217.6	216.9	111.8	108.2	2.9	22.5	22.3
Torsional backlash	j _t	arcmin	≤ 1								
Torsional rigidity	C _t	Nm/arcmin	730	725	715	670	650	650	650	650	650
Tilting rigidity	C _K	Nm/arcmin	1452								
Max. axial force	F _{Amax}	N	10050								
Max. tilting torque (distance from point of rotation to output flange 106.8 mm)	M _{Kmax}	Nm	3280								
Weight (with resolver, without brake)	m	kg	76.8				63.8		45.5		
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 66								
Max. permitted housing temperature		°C	90								
Ambient temperature		°C	0 to +40								
Protection class			IP65								
Mount. pos.			Any								
Lubrication			Synthetic oil, lubricated for life								
Insulating material class			F								
Paint			Metallic blue 250 and natural cast aluminum								

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 22/27.5/38.5/55	Resolver	417	36
	Hiperface	441	60
	EnDat	441	60
i = 66/88	Resolver	357	36
	Hiperface	381	60
	EnDat	381	60
i = 110/154/220	Resolver	328	26
	Hiperface	353	50
	EnDat	353	50

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 22/27.5/38.5/55	Resolver	467	36
	Hiperface	491	60
	EnDat	491	60
i = 66/88	Resolver	407	36
	Hiperface	431	60
	EnDat	431	60
i = 110/154/220	Resolver	368	26
	Hiperface	393	50
	EnDat	393	50

TPM+ power

Stronger. More compact. Quieter.

Generate more power: More torque, high capability. A perfect combination of motors and efficient planetary gearheads makes light work of even the most difficult motion applications. 40 percent more compact due to coupling-free connection of motor and gearhead and efficient attachment of motor instruments. Shorter installation length for greater flexibility when mounting. Helical-toothed precision planetary gearheads for extremely quiet and low-vibration operation reduce operating noise to very low levels.





Source: Schmale Maschinenbau GmbH

Applications

The compact TPM+ power drive unit easily copes with highly dynamic linear applications with rack and pinions or spindles as well as in rotary movements with high masses and disturbing forces.

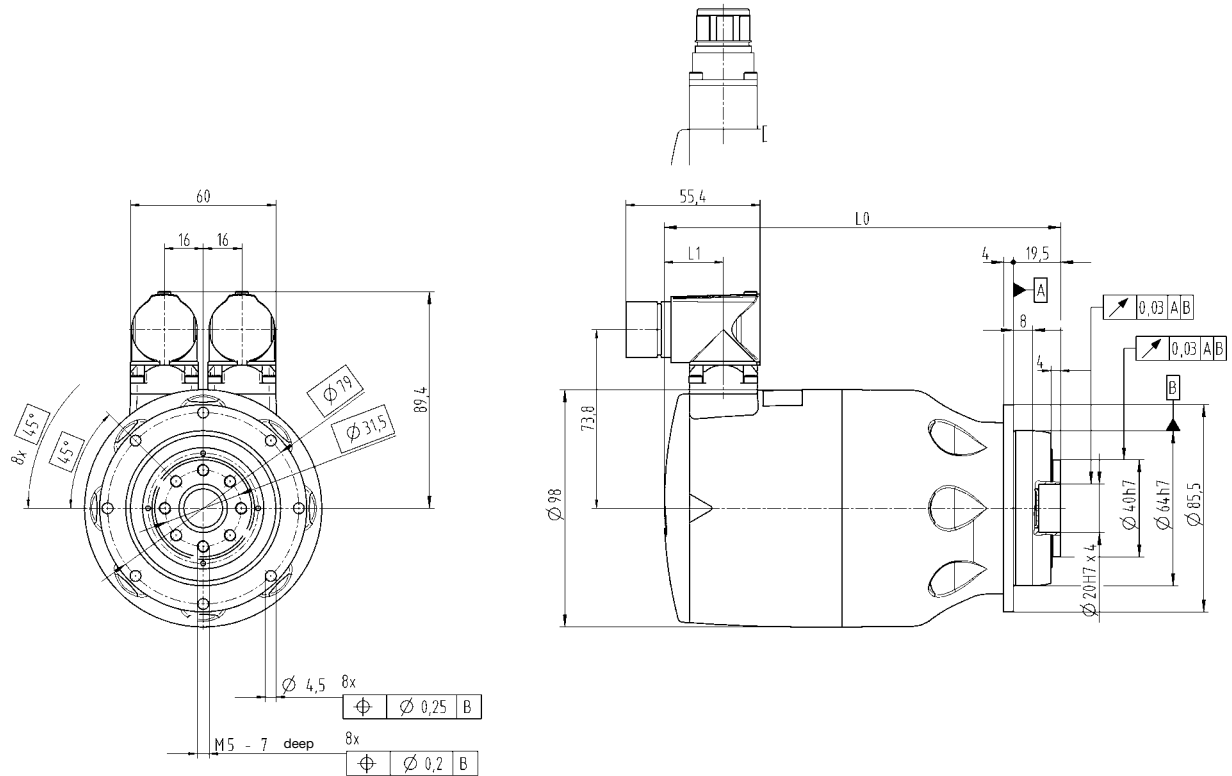
Size	Installation length in mm	Acceleration torque in Nm	Max. power in kW
004	from 149	up to 50	up to 1.4
010	from 175	up to 130	up to 4.7
025	from 197	up to 380	up to 10.6
050	from 236	up to 750	up to 16.5
110	from 307	up to 1600	up to 32.0

TPM⁺ power 004 1-stage

Ratio	i		4		5		7		10	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	15		18		26		26	
Static output torque	T ₂₀	Nm	4		6		8		12	
Brake holding torque at output, 100°C	T _{2BR}	Nm	4		6		8		11	
Max. speed	n _{2max}	rpm	1500		1200		857		600	
Speed limit for T _{2B}	n _{2B}	rpm	1040		830		590		460	
Max. motor acceleration torque	T _{Mmax}	Nm	3.8		3.8		3.8		3.8	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	9.0	5.2	9.0	5.2	9.0	5.2	9.0	5.2
Static motor current	I ₀	A _{eff}	2.7	1.6	2.7	1.6	2.7	1.6	2.7	1.6
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²·10 ⁻⁴	0.39		0.36		0.33		0.31	
Torsional backlash	j _t	arcmin	Standard ≤ 4 / Reduced ≤ 2							
Torsional rigidity	C _t	Nm/arcmin	12		12		11		8	
Tilting rigidity	C _K	Nm/arcmin	–							
Max. axial force	F _{Amax}	N	1630							
Max. tilting moment (distance from point of rotation to output flange 57.6 mm)	M _{Kmax}	Nm	110							
Weight (with resolver, without brake)	m	kg	3.6							
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 58							
Max. permitted housing temperature		°C	+90							
Ambient temperature		°C	0 to +40							
Protection class			IP65							
Mount. pos.			Any							
Lubrication			Synthetic oil, lubricated for life							
Insulating material class			F							
Paint			Metallic blue 250 and natural cast aluminum							

Tolerances T, I and n: Maximum +/- 10%.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	164	24
	Hiperface	185	45
	EnDat	189	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	184	24
	Hiperface	205	45
	EnDat	209	49

TPM⁺

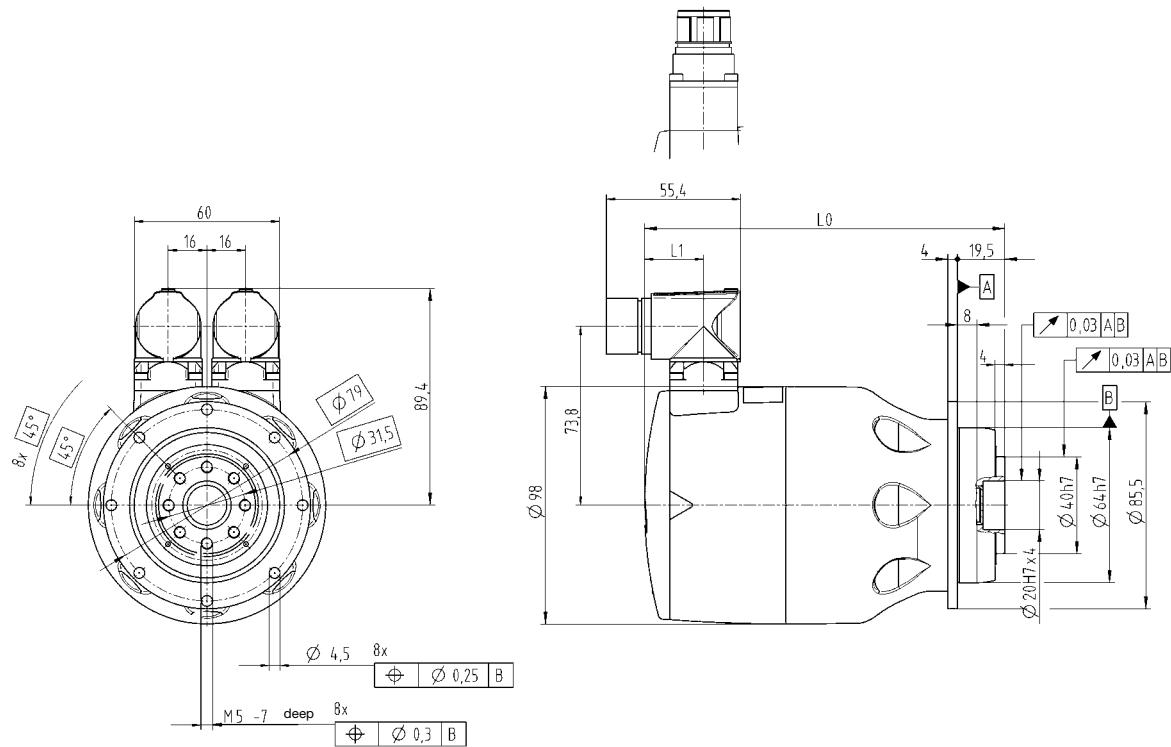
power 004 2-stage

Ratio	i		16		20		25		28		35		40		50		70		100			
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560		
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	50		50		50		50		50		50		50		50		35			
Static output torque	T ₂₀	Nm	18		23		28		32		40		24		30		40		18			
Brake holding torque at output, 100°C	T _{2BR}	Nm	18		22		28		31		38		44		55 ¹⁾		77 ¹⁾		110 ¹⁾			
Max. speed	n _{2max}	rpm	375		300		240		214		171		150		120		86		60			
Speed limit for T _{2B}	n _{2B}	rpm	260		230		200		185		158		144		120		86		60			
Max. motor acceleration torque	T _{Mmax}	Nm	3.8										1.9									
Max. motor acceleration current	I _{maxdyn}	A _{eff}	9.0	5.2	9.0	5.2	9.0	5.2	9.0	5.2	9.0	5.2	5.2	3.0	5.2	3.0	5.2	3.0	5.2	3.0		
Static motor current	I ₀	A _{eff}	2.7	1.6	2.7	1.6	2.7	1.6	2.7	1.6	2.7	1.6	1.7	1.0	1.7	1.0	1.7	1.0	1.7	1.0		
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² ·10 ⁻⁴	0.32		0.31		0.31		0.31		0.31		0.16		0.16		0.16		0.16			
Torsional backlash	j _t	arcmin	Standard ≤ 4 / Reduced ≤ 2																			
Torsional rigidity	C _t	Nm/arcmin	12		12		12		12		12		11		12		11		8			
Tilting rigidity	C _K	Nm/arcmin	–																			
Max. axial force	F _{Amax}	N	1630																			
Max. tilting torque (distance from point of rotation to output flange 57.6 mm)	M _{Kmax}	Nm	110																			
Weight (with resolver, without brake)	m	kg	3.7										3.3									
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 58																			
Max. permitted housing temperature		°C	+90																			
Ambient temperature		°C	0 to +40																			
Protection class			IP65																			
Mount. pos.			Any																			
Lubrication			Synthetic oil, lubricated for life																			
Insulating material class			F																			
Paint			Metallic blue 250 and natural cast aluminum																			

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/20/25/28/35	Resolver	164	24
	Hiperface	185	45
	EnDat	189	49
i = 40/50/70/100	Resolver	149	24
	Hiperface	170	45
	EnDat	174	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/20/25/28/35	Resolver	184	24
	Hiperface	205	45
	EnDat	209	49
i = 40/50/70/100	Resolver	169	24
	Hiperface	190	45
	EnDat	194	49

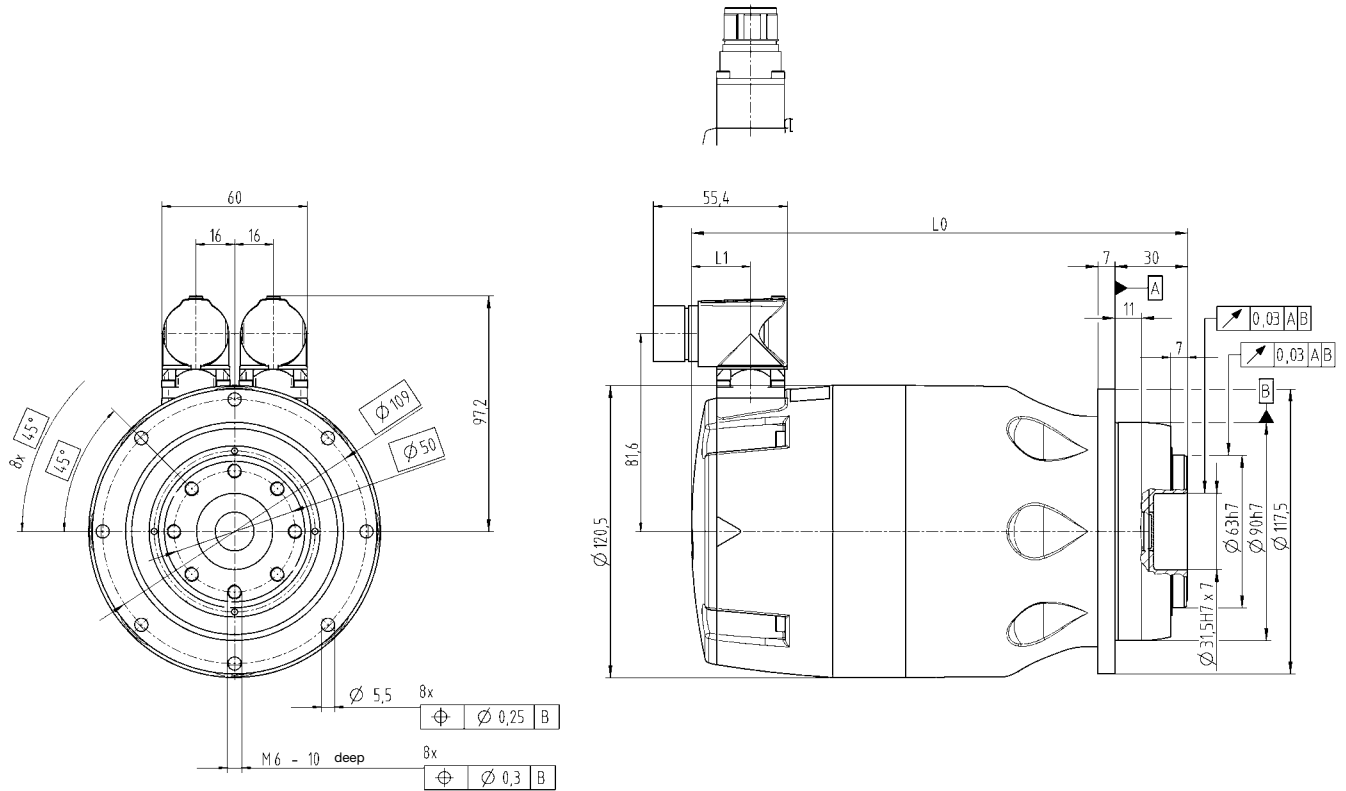
TPM⁺

power 010 1-stage

Ratio	i		4		5		7		10	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	44		56		80		85	
Static output torque	T ₂₀	Nm	14		18		27		40	
Brake holding torque at output, 100°C	T _{2BR}	Nm	18		22		32		45	
Max. speed	n _{2max}	rpm	1500		1200		857		600	
Speed limit for T _{2B}	n _{2B}	rpm	980		780		560		440	
Max. motor acceleration torque	T _{Mmax}	Nm	12.1		12.1		12.1		12.1	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	29.4	17.0	29.4	17.0	29.4	17.0	29.4	17.0
Static motor current	I ₀	A _{eff}	9.4	5.4	9.4	5.4	9.4	5.4	9.4	5.4
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²·10 ⁻⁴	2.38		2.22		2.08		2.00	
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1							
Torsional rigidity	C _t	Nm/arcmin	32		33		30		23	
Tilting rigidity	C _K	Nm/arcmin	225							
Max. axial force	F _{Amax}	N	2150							
Max. tilting moment (distance from point of rotation to output flange 82.7 mm)	M _{Kmax}	Nm	270							
Weight (with resolver, without brake)	m	kg	7.2							
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 60							
Max. permitted housing temperature		°C	+90							
Ambient temperature		°C	0 to +40							
Protection class			IP65							
Mount. pos.			Any							
Lubrication			Synthetic oil, lubricated for life							
Insulating material class			F							
Paint			Metallic blue 250 and natural cast aluminum							

Tolerances T, I and n: Maximum +/- 10%.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	205	24
	Hiperface	226	45
	EnDat	230	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	224	24
	Hiperface	245	45
	EnDat	249	49

TPM⁺

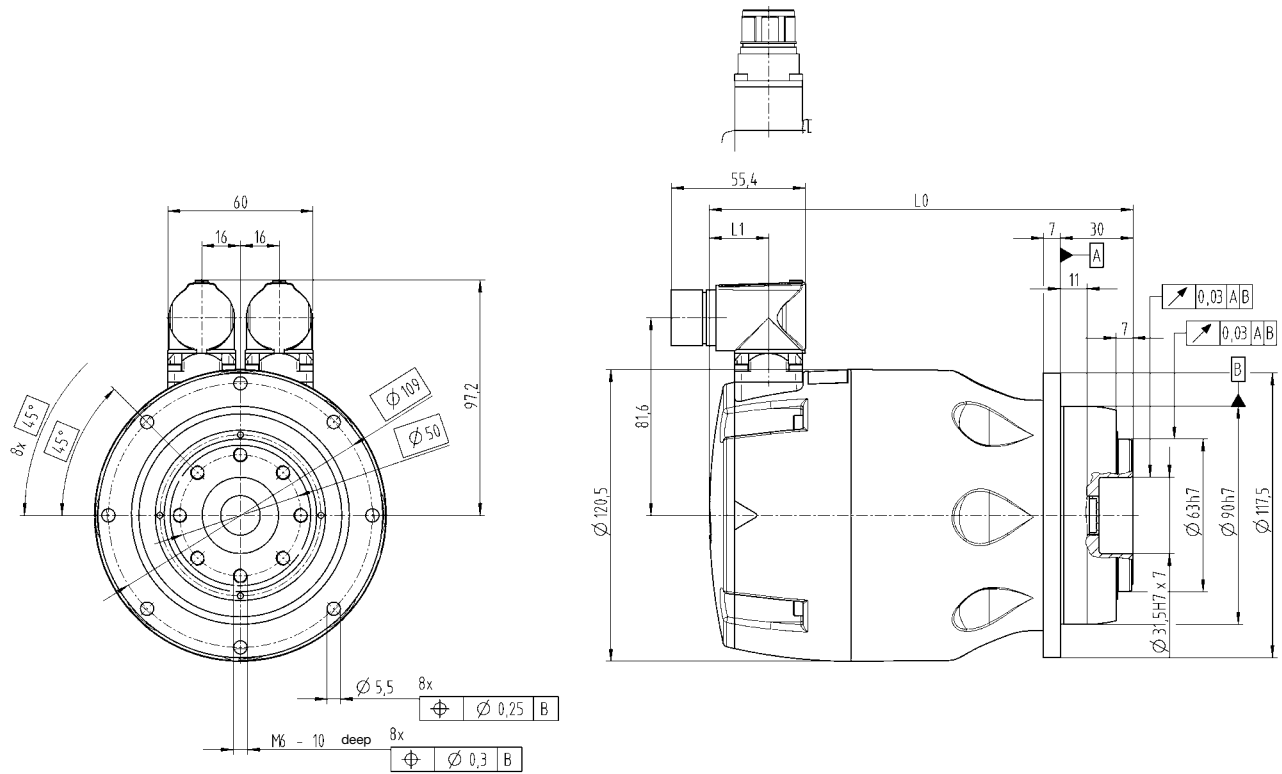
power 010 2-stage

Ratio	i		16		20		25		28		35		40		50		70		100	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	130		130		130		130		130		130		130		130		100	
Static output torque	T ₂₀	Nm	66		84		90		90		90		48		62		86		60	
Brake holding torque at output, 100°C	T _{2BR}	Nm	72		90		112		126		158 ¹⁾		180 ¹⁾		225 ¹⁾		250 ¹⁾		180 ¹⁾	
Max. speed	n _{2max}	rpm	375		300		240		214		171		150		120		86		60	
Speed limit for T _{2B}	n _{2B}	rpm	280		240		200		185		158		100		88		70		55	
Max. motor acceleration torque	T _{Mmax}	Nm	12.1		12.1		12.1		12.1		12.1		4.4		4.4		4.4		4.4	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	29.4	17.0	29.4	17.0	29.4	17.0	29.4	17.0	29.4	17.0	10.4	6.0	10.4	6.0	10.4	6.0	10.4	6.0
Static motor current	I ₀	A _{eff}	9.4	5.4	9.4	5.4	9.4	5.4	9.4	5.4	9.4	5.4	3.2	1.9	3.2	1.9	3.2	1.9	3.2	1.9
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² ·10 ⁻⁴	2.02		1.99		1.98		1.96		1.96		0.72		0.72		0.72		0.72	
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1																	
Torsional rigidity	C _t	Nm/arcmin	32		32		32		31		32		30		30		28		22	
Tilting rigidity	C _K	Nm/arcmin	225																	
Max. axial force	F _{Amax}	N	2150																	
Max. tilting torque (distance from point of rotation to output flange 82.7 mm)	M _{Kmax}	Nm	270																	
Weight (with resolver, without brake)	m	kg	7.4										6.0							
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 62																	
Max. permitted housing temperature		°C	+90																	
Ambient temperature		°C	0 to +40																	
Protection class			IP65																	
Mount. pos.			Any																	
Lubrication			Synthetic oil, lubricated for life																	
Insulating material class			F																	
Paint			Metallic blue 250 and natural cast aluminum																	

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/20/25/28/35	Resolver	205	24
	Hiperface	226	45
	EnDat	230	49
i = 40/50/70/100	Resolver	175	24
	Hiperface	196	45
	EnDat	200	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/20/25/28/35	Resolver	224	24
	Hiperface	245	45
	EnDat	249	49
i = 40/50/70/100	Resolver	194	24
	Hiperface	215	45
	EnDat	219	49

TPM⁺

power 025 1-stage

Ratio	i		4		5		7		10	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	112		141		199		200	
Static output torque	T ₂₀	Nm	43		55		78		113	
Brake holding torque at output, 100°C	T _{2BR}	Nm	52		65		91		130	
Max. speed	n _{2max}	rpm	1500		1200		857		600	
Speed limit for T _{2B}	n _{2B}	rpm	900		720		520		420	
Max. motor acceleration torque	T _{Mmax}	Nm	28.9		28.9		28.9		28.9	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	70	40	70	40	70	40	70	40
Static motor current	I ₀	A _{eff}	23.7	13.7	23.7	13.7	23.7	13.7	23.7	13.7
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²·10 ⁻⁴	9.98		9.50		9.07		8.84	
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1							
Torsional rigidity	C _t	Nm/arcmin	80		86		76		62	
Tilting rigidity	C _K	Nm/arcmin	550							
Max. axial force	F _{Amax}	N	4150							
Max. tilting moment (distance from point of rotation to output flange 94.5 mm)	M _{Kmax}	Nm	440							
Weight (with resolver, without brake)	m	kg	14.0							
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 64							
Max. permitted housing temperature		°C	+90							
Ambient temperature		°C	0 to +40							
Protection class			IP65							
Mount. pos.			Any							
Lubrication			Synthetic oil, lubricated for life							
Insulating material class			F							
Paint			Metallic blue 250 and natural cast aluminum							

Tolerances T, I and n: Maximum +/- 10%.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Technical drawing of a 100mm diameter hydraulic cylinder with a 100mm stroke. The drawing includes a front view, a side view, and a cross-sectional view. The front view shows a circular cylinder with a central port and eight mounting holes. The side view shows the cylinder's profile with a 100mm stroke and a 100mm diameter. The cross-sectional view shows the internal components, including the piston rod, piston, and seals. Dimensions are given in millimeters. Surface texture symbols are present on the cylinder body and the piston rod.

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	242	24
	Hiperface	263	45
	EnDat	267	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	266	24
	Hiperface	287	45
	EnDat	291	49

TPM⁺

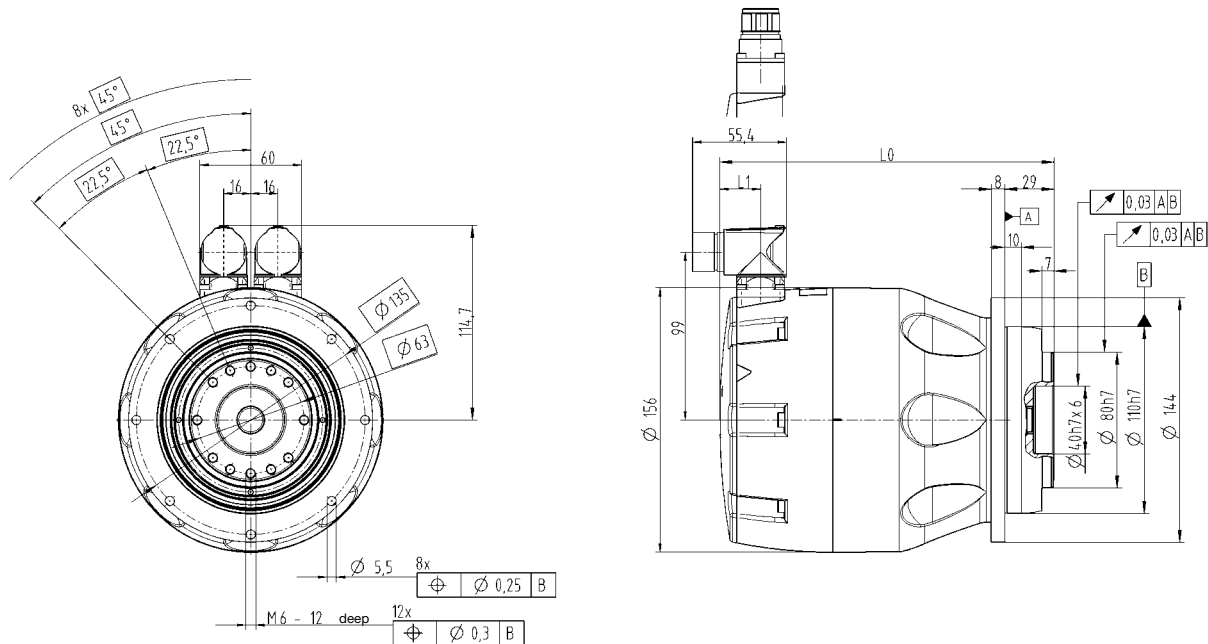
power 025 2-stage

Ratio	i		16		20		25		28		35		40		50		70		100	
Intermediate circuit voltage	U _D	V DC	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	350		350		380		350		380		305		380		330		265	
Static output torque	T ₂₀	Nm	181		210		200		210		220		113		142		200		120	
Brake holding torque at output, 100°C	T _{2BR}	Nm	208		260		325		364 ¹⁾		455 ¹⁾		520 ¹⁾		625 ¹⁾		625 ¹⁾		600 ¹⁾	
Max. speed	n _{2max}	rpm	375		300		240		214		171		150		120		86		60	
Speed limit for T _{2B}	n _{2B}	rpm	260		220		185		170		140		90		70		65		50	
Max. motor acceleration torque	T _{Mmax}	Nm	28.9		28.9		28.9		28.9		28.9		7.8		7.8		7.8		7.8	
Max. motor acceleration current	I _{maxdyn}	A _{eff}	70	40	70	40	70	40	70	40	70	40	21.0	12.0	21.0	12.0	21.0	12.0	21.0	12.0
Static motor current	I ₀	A _{eff}	23.7	13.7	23.7	13.7	23.7	13.7	23.7	13.7	23.7	13.7	6.9	4.0	6.9	4.0	6.9	4.0	6.9	4.0
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² ·10 ⁻⁴	8.94		8.83		8.81		8.72		8.71		2.48		2.48		2.48		2.47	
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1																	
Torsional rigidity	C _t	Nm/arcmin	81		81		83		80		82		76		80		71		60	
Tilting rigidity	C _K	Nm/arcmin	550																	
Max. axial force	F _{Amax}	N	4150																	
Max. tilting moment (distance from point of rotation to output flange 94.5 mm)	M _{Kmax}	Nm	440																	
Weight (with resolver, without brake)	m	kg	14.5										10.3							
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 64																	
Max. permitted housing temperature		°C	+90																	
Ambient temperature		°C	0 to +40																	
Protection class			IP65																	
Mount. pos.			Any																	
Lubrication			Synthetic oil, lubricated for life																	
Insulating material class			F																	
Paint			Metallic blue 250 and natural cast aluminum																	

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/20/25/28/35	Resolver	242	24
	Hiperface	263	45
	EnDat	267	49
i = 40/50/70/100	Resolver	197	24
	Hiperface	218	45
	EnDat	222	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/20/25/28/35	Resolver	266	24
	Hiperface	287	45
	EnDat	291	49
i = 40/50/70/100	Resolver	221	24
	Hiperface	242	45
	EnDat	246	49

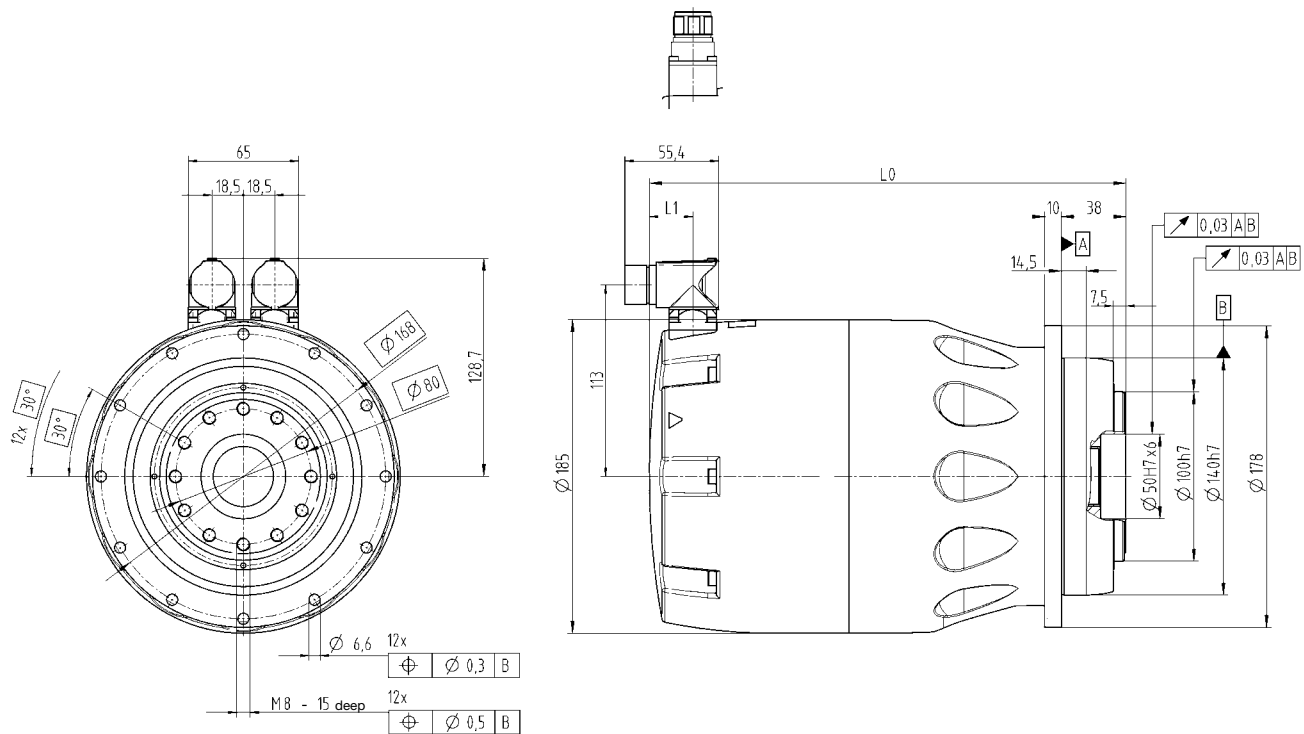
TPM⁺

power 050 1-stage

Ratio	i		4	5	7	10
Intermediate circuit voltage	U _D	V DC	560	560	560	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	221	278	340	350
Static output torque	T ₂₀	Nm	72	91	130	188
Brake holding torque at output, 100°C	T _{2BR}	Nm	92	115	161	230
Max. speed	n _{2max}	rpm	1250	1000	714	500
Speed limit for T _{2B}	n _{2B}	rpm	780	620	450	370
Max. motor acceleration torque	T _{Mmax}	Nm	56.6			
Max. motor acceleration current	I _{maxdyn}	A _{eff}	63.5			
Static motor current	I ₀	A _{eff}	19			
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² ·10 ⁻⁴	26.4	24.8	23.3	22.5
Torsional backlash	j _l	arcmin	Standard ≤ 3 / Reduced ≤ 1			
Torsional rigidity	C _t	Nm/arcmin	190	187	159	123
Tilting rigidity	C _K	Nm/arcmin	560			
Max. axial force	F _{Amax}	N	6130			
Max. tilting moment (distance from point of rotation to output flange 81.2 mm)	M _{Kmax}	Nm	1335			
Weight (with resolver, without brake)	m	kg	23.6			
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 66			
Max. permitted housing temperature		°C	+90			
Ambient temperature		°C	0 to +40			
Protection class			IP65			
Mount. pos.			Any			
Lubrication			Synthetic oil, lubricated for life			
Insulating material class			F			
Paint			Metallic blue 250 and natural cast aluminum			

Tolerances T, I and n: Maximum +/- 10%.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	281	26
	Hiperface	306	50
	EnDat	306	50

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	321	26
	Hiperface	346	50
	EnDat	346	50

TPM⁺

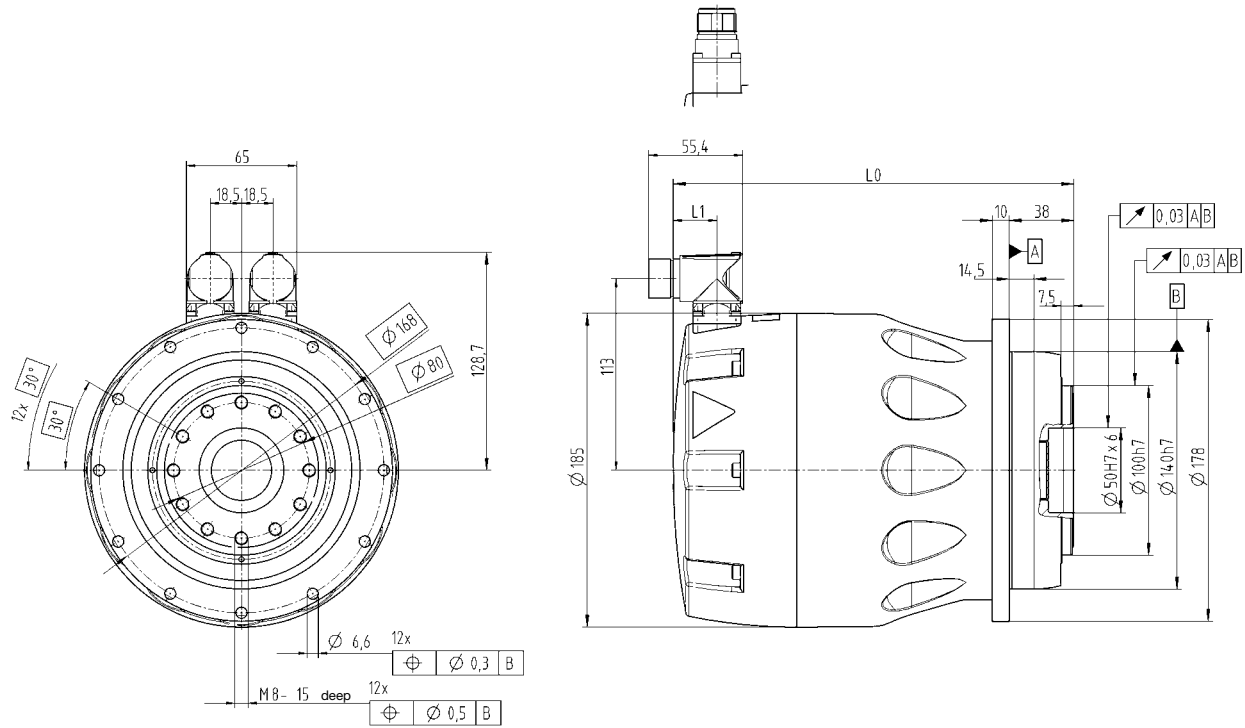
power 050 2-stage

Ratio	i		16	20	25	28	35	40	50	70	100
Intermediate circuit voltage	U _D	V DC	560	560	560	560	560	560	560	560	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	750	750	750	750	750	607	750	700	540
Static output torque	T ₂₀	Nm	293	371	400	400	400	199	250	354	240
Brake holding torque at output, 100°C	T _{2BR}	Nm	368	460	575	644	805 ¹⁾	920 ¹⁾	1150 ¹⁾	1250 ¹⁾	1100 ¹⁾
Max. speed	n _{2max}	rpm	312	250	200	179	143	125	100	71	50
Speed limit for T _{2B}	n _{2B}	rpm	210	180	155	145	125	90	80	65	50
Max. motor acceleration torque	T _{Mmax}	Nm	56.6					15.6			
Max. motor acceleration current	I _{maxdyn}	A _{eff}	63.5					33			
Static motor current	I ₀	A _{eff}	19					7.5			
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²·10 ⁻⁴	23.1	22.6	22.6	22.2	22.2	6.3	6.3	6.3	6.3
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1								
Torsional rigidity	C _t	Nm/arcmin	180	185	180	180	175	175	175	145	115
Tilting rigidity	C _K	Nm/arcmin	560								
Max. axial force	F _{Amax}	N	6130								
Max. tilting torque (distance from point of rotation to output flange 81.2 mm)	M _{Kmax}	Nm	1335								
Weight (with resolver, without brake)	m	kg	25.1					19.4			
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 65								
Max. permitted housing temperature		°C	+90								
Ambient temperature		°C	0 to +40								
Protection class			IP65								
Mount. pos.			Any								
Lubrication			Synthetic oil, lubricated for life								
Insulating material class			F								
Paint			Metallic blue 250 and natural cast aluminum								

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/20/25/28/35	Resolver	281	26
	Hiperface	306	50
	EnDat	306	50
i = 40/50/70/100	Resolver	236	26
	Hiperface	261	50
	EnDat	261	50

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/20/25/28/35	Resolver	321	26
	Hiperface	346	50
	EnDat	346	50
i = 40/50/70/100	Resolver	276	26
	Hiperface	301	50
	EnDat	301	50

TPM⁺

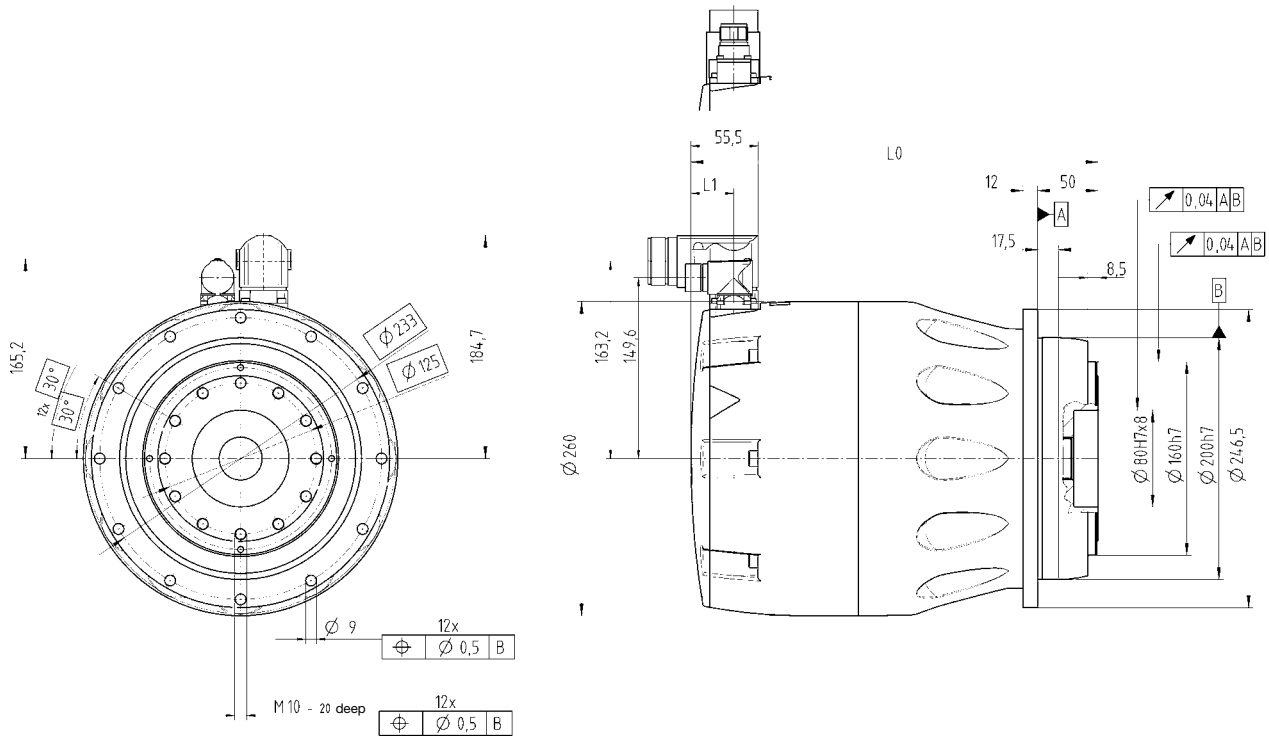
power 110 1-stage

Ratio	i		4	5	7	10
Intermediate circuit voltage	U _D	V DC	560	560	560	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	340	428	603	555
Static output torque	T ₂₀	Nm	136	172	246	356
Brake holding torque at output, 100°C	T _{2BR}	Nm	288	360	504	720 ¹⁾
Max. speed	n _{2max}	rpm	1050	840	643	450
Speed limit for T _{2B}	n _{2B}	rpm	950	750	540	450
Max. motor acceleration torque	T _{Mmax}	Nm	88			
Max. motor acceleration current	I _{maxdyn}	A _{eff}	100			
Static motor current	I ₀	A _{eff}	38.6			
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² ·10 ⁻⁴	142	132	123	118
Torsional backlash	j _l	arcmin	Standard ≤ 3 / Reduced ≤ 1			
Torsional rigidity	C _t	Nm/arcmin	610	610	550	445
Tilting rigidity	C _K	Nm/arcmin	1452			
Max. axial force	F _{Amax}	N	10050			
Max. tilting moment (distance from point of rotation to output flange 106.8 mm)	M _{Kmax}	Nm	3280			
Weight (with resolver, without brake)	m	kg	58.8			
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 70			
Max. permitted housing temperature		°C	+90			
Ambient temperature		°C	0 to +40			
Protection class			IP65			
Mount. pos.			Any			
Lubrication			Synthetic oil, lubricated for life			
Insulating material class			F			
Paint			Metallic blue 250 and natural cast aluminum			

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1.5

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	337	36
	Hiperface	361	60
	EnDat	361	60

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 4/5/7/10	Resolver	387	36
	Hiperface	411	60
	EnDat	411	60

TPM⁺

power 110 2-stage

Ratio	i		16	20	25	28	35	40	50	70	100
Intermediate circuit voltage	U _D	V DC	560	560	560	560	560	560	560	560	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T _{2B}	Nm	1375	1600	1600	1600	1600	1600	1600	1600	1400
Static output torque	T ₂₀	Nm	558	705	886	999	1250	794	997	900	800
Brake holding torque at output, 100°C	T _{2BR}	Nm	1152	1440	1800 ¹⁾	2016 ¹⁾	2520 ¹⁾	2750 ¹⁾	2750 ¹⁾	1750 ¹⁾	2500 ¹⁾
Max. speed	n _{2max}	rpm	281	225	180	161	129	112	90	64	45
Speed limit for T _{2B}	n _{2B}	rpm	230	190	170	160	135	95	85	65	50
Max. motor acceleration torque	T _{Mmax}	Nm	88					44.2			
Max. motor acceleration current	I _{maxdyn}	A _{eff}	100					50			
Static motor current	I ₀	A _{eff}	38.6					21.9			
Moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²·10 ⁻⁴	117	117	116	115	115	60	60	60	60
Torsional backlash	j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1								
Torsional rigidity	C _t	Nm/arcmin	585	580	570	560	560	520	525	480	395
Tilting rigidity	C _K	Nm/arcmin	1452								
Max. axial force	F _{Amax}	N	10050								
Max. tilting moment (distance from point of rotation to output flange 106.8 mm)	M _{Kmax}	Nm	3280								
Weight (with resolver, without brake)	m	kg	59.6					52.3			
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	≤ 72								
Max. permitted housing temperature		°C	+90								
Ambient temperature		°C	0 to +40								
Protection class			IP65								
Mount. pos.			Any								
Lubrication			Synthetic oil, lubricated for life								
Insulating material class			F								
Paint			Metallic blue 250 and natural cast aluminum								

Tolerances T, I and n: Maximum +/- 10%.

¹⁾ greater than T_{2B} of the gearhead. In case of an emergency stop, can be used approx. 1000 times while the motor is rotating.

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter “Project planning”.



Servo actuator options

Increased corrosion protection

All actuators of the “TPM+” product range are optionally available with increased corrosion protection.

Versions

1. Chemically nickel-plated gearbox housing.
2. Stainless steel output flange and shaft nut.
3. Small external screws made from stainless steel.
4. Additional U-seals on the external screws.
5. Important: No index bore in output flange.
6. Base (chemically nickel plated) for integral socket with laser-marking of identification plate.
7. Versions are generally equipped with straight integral socket only.
8. The TPM+ is completely painted with a highly resistant, two-component material on epoxy resin basis.

Colors: - Ultramarine blue silk matt (RAL 5002)
- Papyrus white silk matt (RAL 9018)

Fields of application

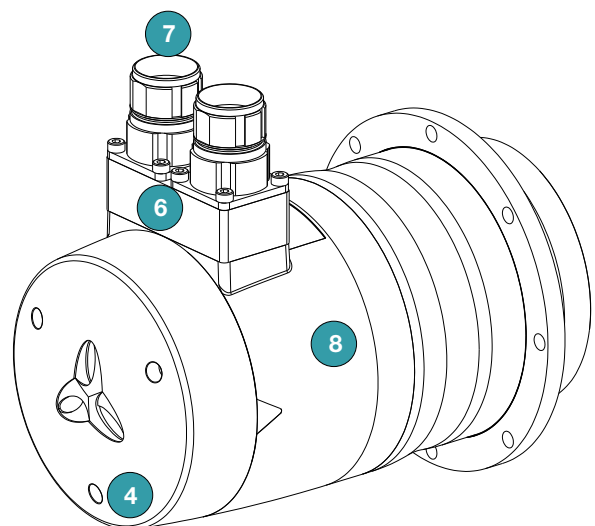
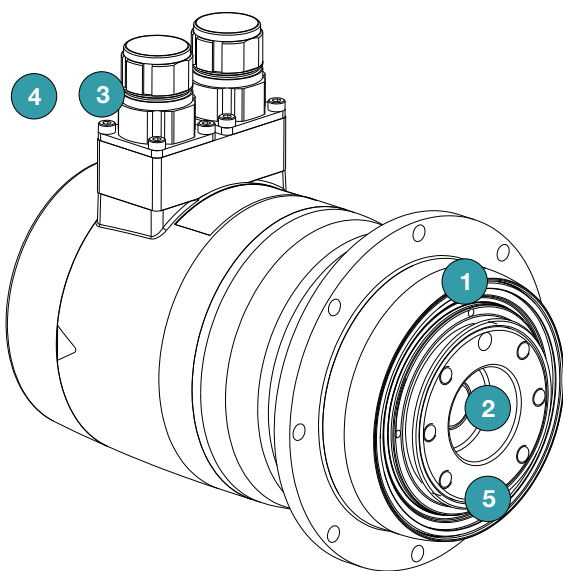
- Outdoor use in barriers, conveyors etc.
- Packaging machines, outside of the food sector.
- Textile machines.
- Pharmaceutical plants, outside of the medication sector.

Resistance

- To water and moisture.
- Restricted due to cleaning agents, especially under extended exposure period. Successful tests with Oxofam VF5L (Johnson Diversey) and Ultraclean VK3 (Johnson Diversey).
- Further cleaning agents can be qualified on request.

Protection class

Against spray water: IP66



Options

Holding brake

A compact permanent magnet brake is fitted to secure the motor shaft when the actuator is disconnected from the power.

Characteristics include no torsional backlash, no residual torque when the brake is released, unlimited duty cycles at zero speed and a constant torque at high operating temperatures.

Size dynamic		004 and 010	025	050 and 110
Holding torque at 100°C	Nm	1.1	4.5	13
Power supply	V DC	24 +6% / -10%		
Current	A	0.42	0.42	0.71

Size power		004	010	025	050	110
Holding torque at 100°C	Nm	1.1	4.5	13	23	72
Power supply	V DC	24 +6% / -10%				
Current	A	0.42	0.42	0.51	1	1.2

Size high Torque		10		25		50		110	
Ratios		22 - 110	154 - 220	22 - 55	66 - 220	22 - 55	66 - 220	22 - 88	110 - 220
Holding torque	Nm	4.5	1.8	13	4.5	23	13	72	23
Power supply	V DC	24 +6% / -10%							
Current	A	0.42	0.42	0.71	0.42	1	0.71	1.2	1

In the case of high ratios, the holding torque is reduced by the manufacturer, if necessary, in order to prevent damage to the gearbox. The exact holding torques at the output can be found in the relevant data tables for the actuators, e.g. TPM* power 110 2-stage.

Please refer to our project planning note on page 67.

Temperature sensors

Different sensors are available to protect the motor coil from overheating.

Standard: PTC resistor, type STM 160 according to DIN 44081/82
PTC resistor, type KTY 84-130

Encoder systems

A selection of encoder systems is available for positioning and speed measurement.

- Standard:
- Resolver, 2-pole, 1 sin/cos cycle per rotation
- Optional:
- Single-turn, EnDat 2.1 with 1 V_{SS}, 512 S/R
 - Multi-turn, EnDat 2.1 with 1 V_{SS}, 512 S/R, 4096 R
 - Hiperface, single-turn, 128 S/R
 - Hiperface, multi-turn, 128 S/R, 4096 R
 - TTL incremental encoder with hall signals and rectangular incremental signals 2048 S/R
 - On request:
 - DRIVECLiQ
 - EnDat 2.2
 - Hiperface DSL

Cables

For selected servo controllers (see page 64), pre-assembled cables are available in pin assignments 1 and 4 (see page 57/58), in lengths of 5, 10, 15, 20, 25, 30, 40 and 50 meters.

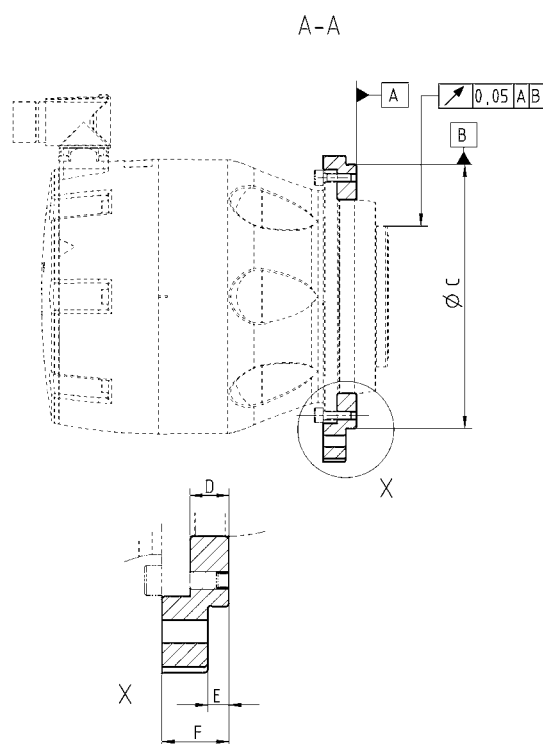
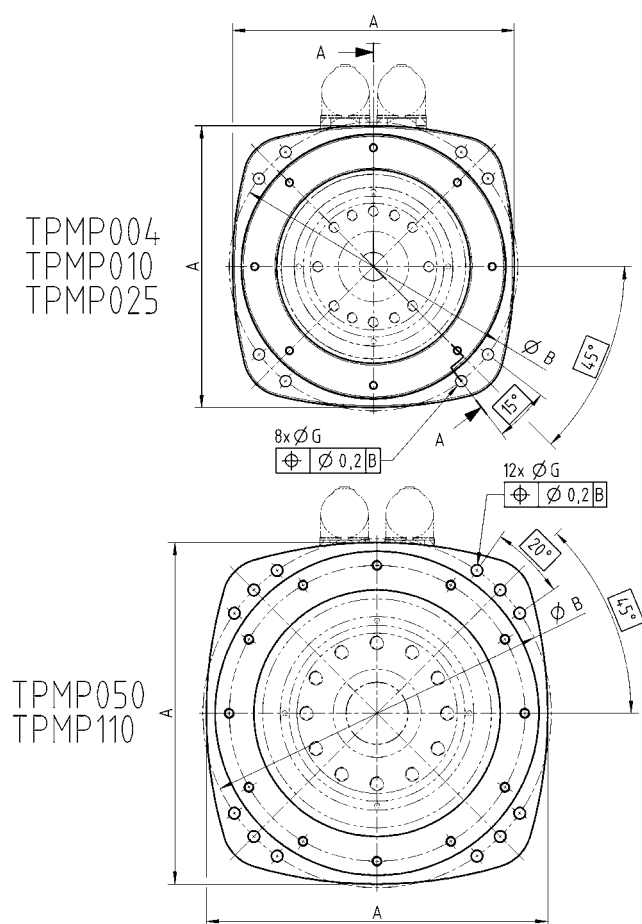
The cables are of the highest quality:

- Compatible with drag chains using highly flexible lines as specified in DIN VDE 0295, Cl. 6
- Oil and flame-resistant
- Free from halogen, silicone and CFCs

Options

Adapter flange for the TPM+ power

In certain installation situations, the flange bores must be accessed from the rear, for example. For this purpose, an adapter flange with a large hole circle is available for the TPM+ power. The flange is already fitted to the actuator on delivery.

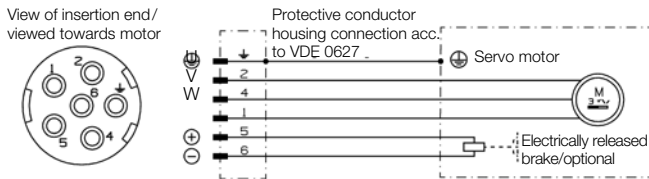


	TPM+ power 004	TPM+ power 010	TPM+ power 025	TPM+ power 050	TPM+ power 110
A	105	130	160	194	268
B	105	133	164	198	273
C	92 h7	120 h7	150 h7	184 h7	252 h7
D	8	10	11	14	16
E	5	5	6	7	8
F	12	17	19	24	28
G	4.5	5.5	5.5	6.5	9

Pin assignment 1

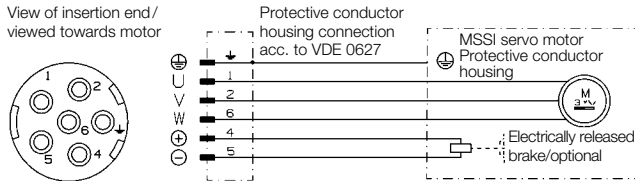
Version with resolver, size 1

Integral power socket: speedtec, BED size 1, Intercontec 6-pin, pin contact $\varnothing$ 2 mm



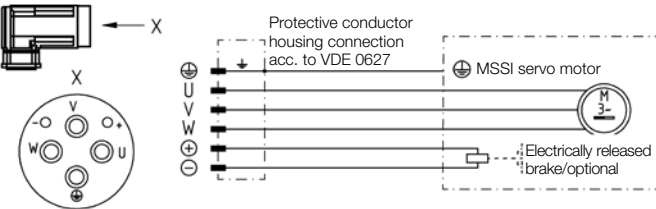
Version with optical sensor, size 1

Integral power socket: speedtec, BED size 1, Intercontec 6-pin, pin contact $\varnothing$ 2 mm



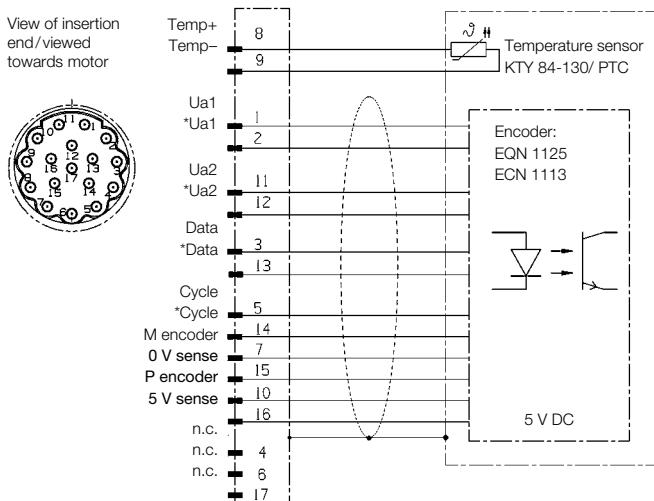
Version with resolver or optical sensor, size 1.5

Integral power socket: speedtec, CED size 1.5, Intercontec 6-pin, pin contact 4 x $\varnothing$ 3.6 mm and 2 x $\varnothing$ 2 mm



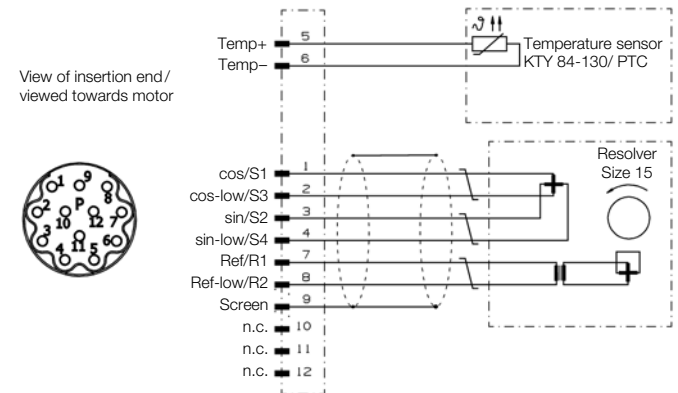
Options "S" and "M"

Integral signal socket: speedtec, AED size 1, Intercontec 17-pin, E-part, pin contact $\varnothing$ 1 mm, housing code 0°



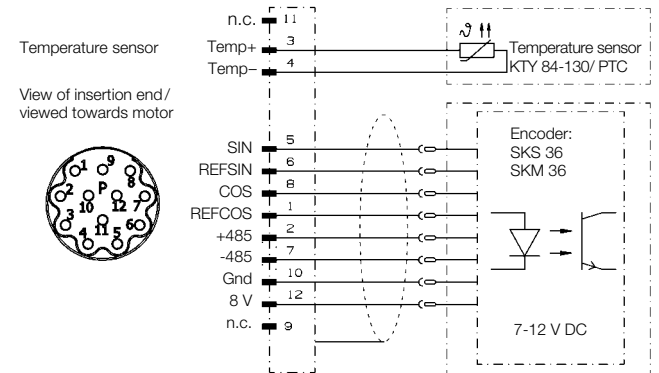
Option "R"

Integral signal socket: speedtec, AED size 1, Intercontec 12-pin, P-part, pin contact $\varnothing$ 1 mm, housing code 0°



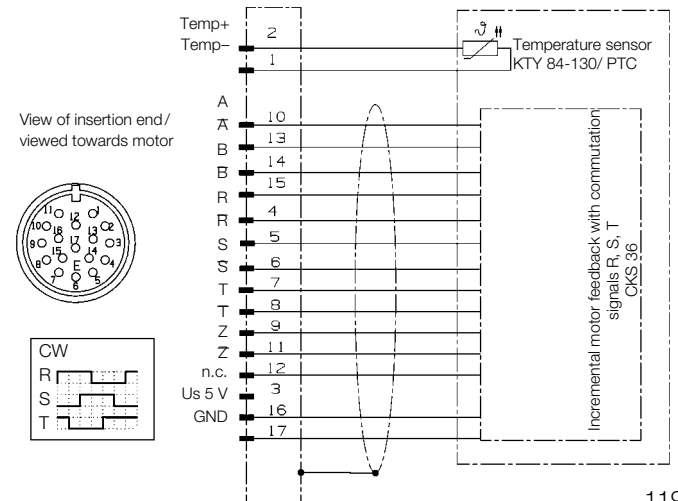
Options "N" and "K"

Integral signal socket: speedtec, AED size 1, Intercontec 12-pin, P-part, pin contact $\varnothing$ 1 mm, housing code 0°



Option "T"

Integral signal socket: speedtec, AED size 1, Intercontec 17-pin, E-part, pin contact $\varnothing$ 1 mm, housing code 0°

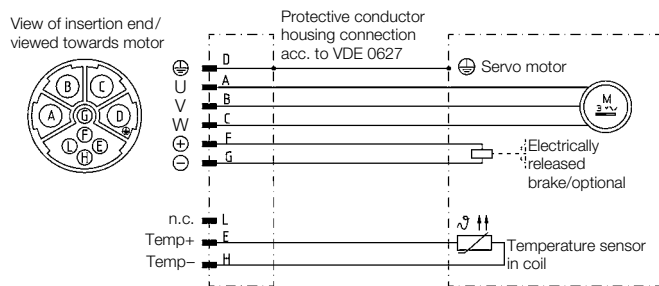


Options

Pin assignment 4

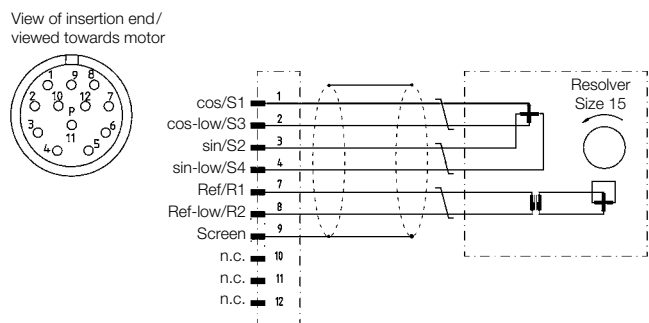
Version with resolver and optical sensor, size 1

Integral power socket: speedtec, BED size 1, Intercontec 9-pin, pin contact 4 x ø 2 mm + 5 x ø 1 mm



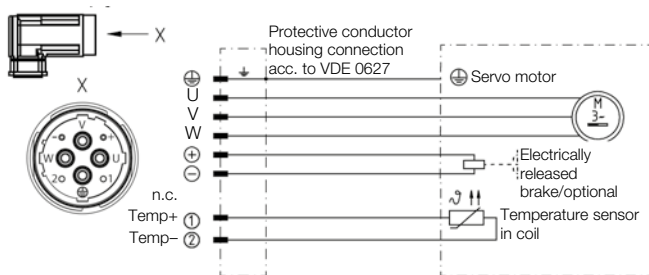
Option "R"

Integral signal socket: speedtec, AED size 1, Intercontec 12-pin, P-part, pin contact ø 1 mm, housing code 0°



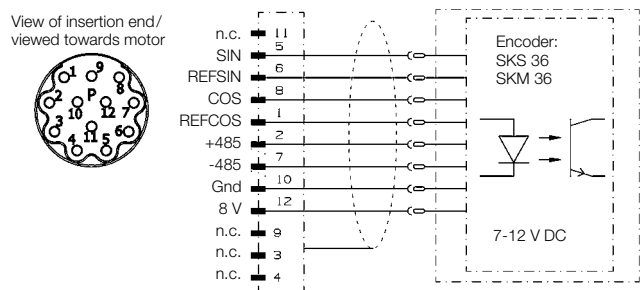
Version with resolver and optical sensor, size 1.5

Integral power socket: speedtec, CED size 1.5, Intercontec 8-pin, pin contact 4 x ø 2 mm + 4 x ø 1 mm



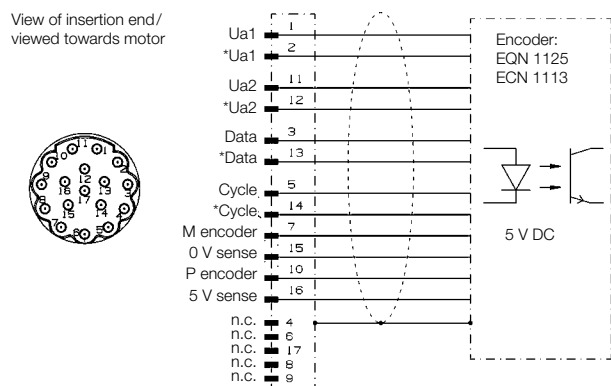
Options "N" and "K"

Integral signal socket: speedtec, AED size 1, Intercontec 12-pin, P-part, pin contact ø 1 mm, housing code 0°



Options "S" and "M"

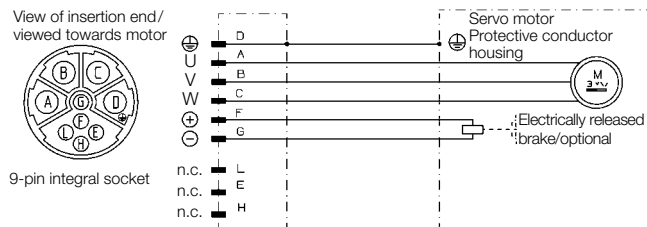
Integral signal socket: speedtec, AED size 1, Intercontec 17-pin, E-part, pin contact ø 1 mm, housing code 0°



Pin assignment 5 only for TPM⁺ dynamic (Rockwell-compatible)

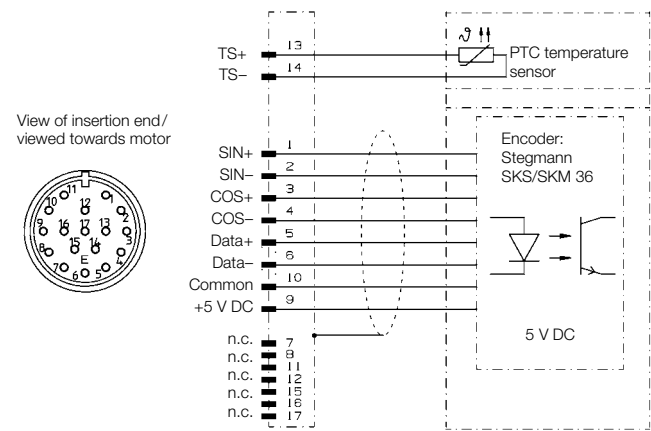
Version with optical sensor

Integral power socket: speedtec, BED size 1, Intercontec 9-pin, pin contact 4 x ø 2 mm + 5 x ø 1 mm



Options “E” and “V”

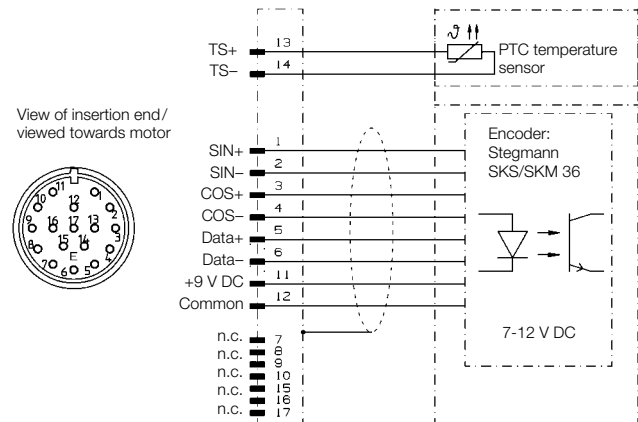
Integral signal socket: speedtec, AED size 1, Intercontec 17-pin, E-part, pin contact ø 1 mm, housing code 0°



On TPM⁺ dynamic sizes 004, 010 and 025 with 320 V intermediate circuit voltage.

Options “E” and “V”

Integral signal socket: speedtec, AED size 1, Intercontec 17-pin, E-part, pin contact ø 1 mm, housing code 0°



On TPM⁺ dynamic with 560 V intermediate circuit voltage.

Order code

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
T	P	M		0	1	0	S	-	0	9	1	R	-	6	P	B	1	-	0	6	4	A	-	W	1	-	0	0	0

Actuator type

TPM

Size

004
010
025
050
110

Ratio

Version

_ = dynamic
P = power
A = high torque

Backlash

1 = Standard
0 = Reduced

Brake

B = with brake
O = without brake

Temperature sensor

P = PTC
K = KTY

Pin assignment

1 = Standard, temperature sensor via signal cable
4 = Temperature sensor via power cable
5 = Rockwell-compatible
6 = B&R-compatible
8 = Elau PacDrive3-compatible
B = Bosch Rexroth-compatible

Electr. connection

W = Angled integral socket, speedtec®
G = Straight integral socket, speedtec®
E = Angled integral socket, itec®

Intermediate circuit voltage

5 = 320 V
6 = 560 V

Version

S = Standard, oil lubrication
F = Food-grade oil lubrication
G = Grease lubrication
H = Food-grade grease lubrication
X = Special model

Motor size & stator length

not selectable, determined automatically depending on the ratio (see next page: assignment matrix)

Return system

R = Resolver, 2-pin
S = EnDat 2.1 absolute encoder, single turn
M = EnDat 2.1 absolute encoder, multi-turn
N = Hiperface absolute encoder, single-turn
K = Hiperface absolute encoder, multi-turn
T = 5V-TTL incremental encoder with hall signal
E = Absolute encoder, single turn, Rockwell-compatible
V = Absolute encoder, multiturn, Rockwell-compatible
D = DRIVECLiQ absolute encoder, single turn, SIEMENS compatible (on request)

Motor / gearbox assignment matrix

Ratio	BG 004		BG 010			BG 025			BG 050			BG 110		
	dynamic	power	dynamic	power	high torque	dynamic	power	high torque	dynamic	power	high torque	dynamic	power	high torque
4	x	64B	x	94C	x	x	130D	x	x	155D	x	x	220D	x
5	x	64B	x	94C	x	x	130D	x	x	155D	x	x	220D	x
7	x	64B	x	94C	x	x	130D	x	x	155D	x	x	220D	x
10	x	64B	x	94C	x	x	130D	x	x	155D	x	x	220D	x
16	53B	64B	64B	94C	x	94C	130D	x	130D	155D	x	130E	220D	x
20	x	64B	x	94C	x	x	130D	x	x	155D	x	x	220D	x
21	53B	x	64B	x	x	94C	x	x	130D	x	x	130E	x	x
22	x	x	x	x	94C	x	x	130D	x	x	155D	x	x	220H
25	x	64B	x	94C	x	x	130D	x	x	155D	x	x	220D	x
27.5	x	x	x	x	94C	x	x	130D	x	x	155D	x	x	220H
28	x	64B	x	94C	x	x	130D	x	x	155D	x	x	220D	x
31	53B	x	64B	x	x	94C	x	x	130D	x	x	130E	x	x
35	x	64B	x	94C	x	x	130D	x	x	155D	x	x	220D	x
38.5	x	x	x	x	94C	x	x	130D	x	x	155D	x	x	220H
40	x	64A	x	94A	x	x	130A	x	x	155A	x	x	220B	x
50	x	64A	x	94A	x	x	130A	x	x	155A	x	x	220B	x
55	x	x	x	x	94C	x	x	130D	x	x	155D	x	x	220H
61	53A	x	64A	x	x	94A	x	x	130A	x	x	130D	x	x
64	53A	x	64A	x	x	94A	x	x	130A	x	x	130D	x	x
66	x	x	x	x	x	x	x	94C	x	x	130D	x	x	220D
70	x	64A	x	94A	x	x	130A	x	x	155A	x	x	220B	x
88	x	x	x	x	94C	x	x	94C	x	x	130D	x	x	220D
91	53A	x	64A	x	x	94A	x	x	130A	x	x	130D	x	x
100	x	64A	x	94A	x	x	130A	x	x	155A	x	x	220B	x
110	x	x	x	x	94C	x	x	94C	x	x	130D	x	x	155D
154	x	x	x	x	94A	x	x	94C	x	x	130D	x	x	155D
220	x	x	x	x	94A	x	x	94C	x	x	130D	x	x	155D

x = no standard combination

Order code

Power cables for product range TPM+

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
C	A	B	-	P	O	W	-	E	-	S	T	D	0	0	1	-	D	0	1	5	0	-	S	-	L	0	5	0	0

Cable harness

Cables for TPM+

Product range

Model

POW = Power cable

Controller manufacturer

Motor phases and brake on wire end sleeves

STD000 = PE on wire end sleeve
STD001 = PE on cable ring shoe
etc... see top of next page

Length

L0500 = 5 m
L1000 = 10 m
L1500 = 15 m
L2000 = 20 m
L2500 = 25 m
L3000 = 30 m
L4000 = 40 m
L5000 = 50 m

Motor manufacturer

S = Connector size 1
C = Connector size 1.5
see table at bottom of next page

Power connector assignment

Connector size 1

R = Resolver, 2-pole

E = Encoder (EnDat, Hiperface, incremental, TTL)

Connector size 1.5

U = Universal for all motor feedback

Cable cross section

D0150 = 1.5 mm²
D0250 = 2.5 mm²
D0400 = 4 mm²
D0600 = 6 mm²
D1000 = 10 mm²
D1600 = 16 mm²

Signal cables for product range TPM+

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
C	A	B	-	S	I	G	-	M	-	S	I	E	M	E	N	-	D	0	0	0	0	-	S	-	L	0	5	0	0

Cable harness

Cables for TPM+

Product range

Model

SIG = Signal cable

Controller manufacturer

SIEMEN = Siemens SIMODRIVE 611
etc... see top of next page

Length

L0500 = 5 m
L1000 = 10 m
L1500 = 15 m
L2000 = 20 m
L2500 = 25 m
L3000 = 30 m
L4000 = 40 m
L5000 = 50 m

Motor manufacturer

S = Connector size 1

Return system

R = Resolver, 2-pole

I = Incremental encoder, optical

M = EnDat absolute encoder*

K = Hiperface absolute encoder*

T = incremental encoder with hall signal

Cable cross section

Standard for all signal
cable sizes D0000

* Multiturn and singleturn cables are identical

Controller manufacturer

Cable for pin assignment 1 (temperature sensor in signal cable)

Manufacturer	Controller	Signal cable manufacturer	Power cable manufacturer
B&R	Acopos	BURACO	STD000
ELAU	PacDrive MC4	ELAMC4	ELAMC4
Bosch Rexroth	IndraDrive	BRCIND	STD000
Control techniques	UniDrive SP	CT_SP_	STD001
Siemens	Sinamics S120	SIEMEN*	STD001
	SimoDrive 611	SIEMEN	STD001
	Masterdrive MC	SIEMEN	STD001

* not available for DRIVECLiQ

Cable for pin assignment 4 (temperature sensor in power cable)

Manufacturer	Controller	Signal cable manufacturer	Power cable manufacturer
ELAU	PacDrive MC4	ELAUP4	ELAUP4
Bosch Rexroth	IndraDrive	BRC_I4	STD_P4
Beckhoff	AX5000	BHAX54	STD_P4

Other cable versions available on request

Motor manufacturer and cable cross sections

Stator	Cable cross section mm ²	Power plug connection
053A	1.5	Size 1 M23
053B	1.5	Size 1 M23
064A	1.5	Size 1 M23
064B	1.5	Size 1 M23
094A	1.5	Size 1 M23
094C	1.5	Size 1 M23
130A	1.5	Size 1 M23
130D	2.5	Size 1 M23
130E	2.5	Size 1 M23
155A	1.5	Size 1 M23
155D	2.5	Size 1 M23
220B	4	Size 1.5 M40
220D	10	Size 1.5 M40
220H	16	Size 1.5 M40

Recommended cable cross sections according to EN 60204-1, ambient temperature 40°C, laying system C.

The selection of cable cross section depends on the motor size and stator length.

Project planning

Servo controllers

TPM⁺ actuators can be operated using many different servo controllers. The table below contains a selection of servo controllers already tested with the TPM⁺. It also provides information to assist in selecting the correct options. You can request a set of quick start instructions containing all the most important information for parametrizing the servo controller. Please observe the current consumption of the actuator during selection of the servo controller used.

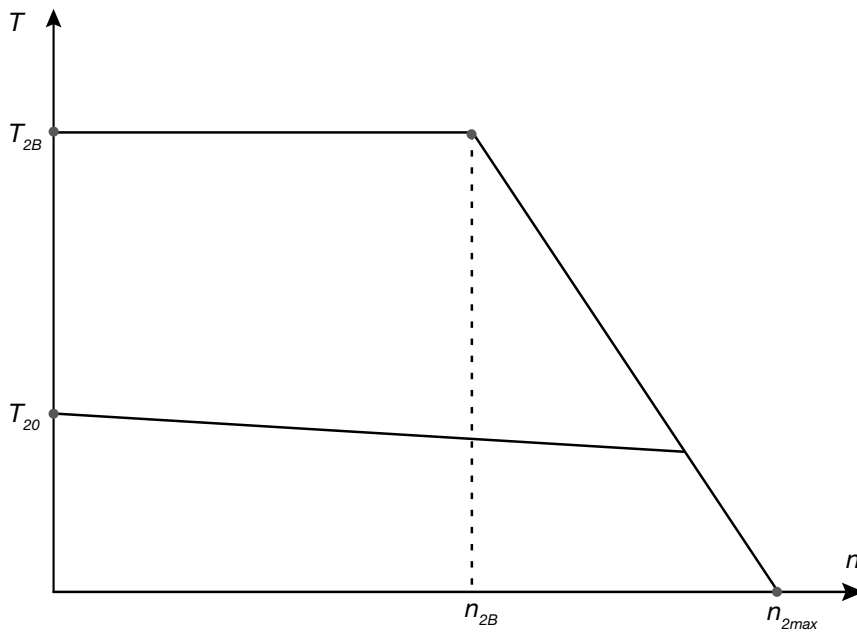
Manufacturer	Version/Type	Motor feedback				Temperature sensor		DC bus voltage		
		Resolver	EnDat	Hiperface	TTL encoder	PTC	KTY	48 V DC	320 V DC	560 V DC
Bosch Rexroth	IndraDrive	x	x	x	–	x	x	–	x	x
Beckhoff	AX5000	x	x	x	–	x	x	–	x	x
B & R	AcoPos	x	x	x ¹	–	x	x	–	x ²	x
Control techniques	UniDrive SP	x	x	x	x	x	–	–	–	x
Kollmorgen	Servostar 300	x	x	x	x	x	–	–	x	x
	Servostar 700	x	x	x	x	x	–	–	x	x
	AKD	x	x	x	–	x	–	–	x	x
ESR Pollmeier	TrioDrive D/xS	x	x	x	–	x	x	–	x	–
	MidiDrive D/xS	x	x	x	–	x	x	–	–	x
Parker	Compax 3	x	x	x	x	x	–	–	x	x
KEB	Combivert F5-Servo	x	x	x	–	x	–	–	x	x
	Combivert F5-A Servo	x	–	–	–	x	–	–	x	x
Lenze	Global Drive 93xxx	x	–	x	–	x	x	–	–	x
	Global Drive 94xx	x	x	x	–	x	x	–	x	x
	ECS Servosystem	x	–	x	–	x	–	–	x	x
NUM	MDLU 3	–	–	x	–	x	–	–	–	x
Rockwell	Ultra 3000	–	–	x	–	x	–	–	x	x
	Kinetix 6000	–	–	x	–	x	–	–	x	x
	Kinetix 6200	–	–	x	–	x	–	–	x	x
	Kinetix 6500	–	–	x	–	x	–	–	x	x
Siemens	SimoDrive 611U	x	x	–	–	–	x	–	–	x
	SimoDrive 611D	–	x	–	–	–	x	–	–	x
	Masterdrive MC	x	x	–	–	x	x	–	–	x
	Sinamics S120	x	x	–	–	–	x	–	–	x
Schneider Electric	PacDrive MC-4	–	–	x	–	x	–	–	x	x
	PacDrive 3	–	–	x	–	x	–	–	x	x
WITTENSTEIN motion control	simco	x	x	–	–	–	x	x ³	–	–

¹ No programming of the electronic identification plate possible

² up to 3.6 A_{eff} rated current

³ up to 10 A_{eff} rated current

Technical data



Symbol	Designation	Unit
T_{2dyn}	Dynamic load torque	Nm
T_{2Pr}	Process load torque	Nm
T_{2b}	Total load torque at gearhead output	Nm
T_{1b}	Total load torque at motor	Nm
T_{Mmax}	Maximum acceleration torque of motor	Nm
T_{2B}	Maximum permissible acceleration torque at gearhead output	Nm
T_{20}	Permanent static torque at gearhead output	Nm
M_{2k}	Tilting torque at gearhead output	Nm
$M_{2k, max}$	Maximum permissible tilting torque at gearhead output	Nm
J_L	Mass moment of inertia of external load	kgm ²
J_1	Mass moment of inertia of drive (motor side)	kgm ²
i	Gearhead ratio	–
η	Gearhead efficiency (1-stage 0.97 / 2-stage 0.94)	–
α	Acceleration of external load	rad/s ²
n_{2B}	Speed limit* for T_{2B}	rpm
n_{2max}	Maximum permitted output speed	rpm

* The maximum acceleration torque available at the gearhead output decreases if speed limit n_{2B} is exceeded.

Project planning

Acceleration and tilting torque design instructions

To fully utilize gearhead actuators from the TPM+ product range, please check the maximum permissible acceleration torques with reference to the following points:

Calculate the maximum acceleration torque required at the gearhead output:

$$T_{2dyn} = \alpha * J_L$$

Identify additional process loads and calculate the total load torque at the gearhead output:

$$T_{2b} = T_{2dyn} + T_{2Pr}$$

Then calculate the total load torque required at the motor:

$$T_{1b} = (\alpha * J_L + T_{2Pr}) * \frac{1}{\eta * i} + \alpha * i * J_1$$

To fully utilize the gearhead actuator during acceleration, the following conditions must be adhered to:

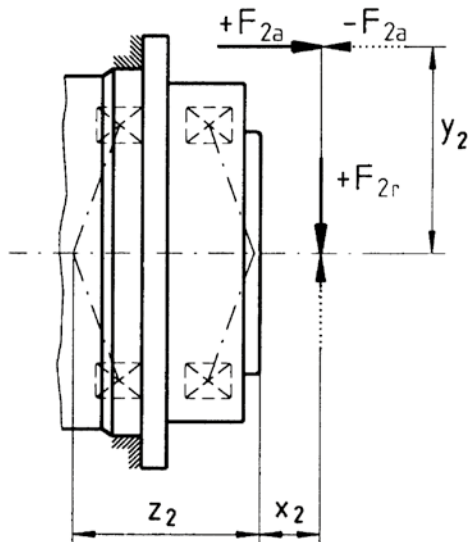
Condition for the total load torque at the gearhead output:

$$T_{2b} \leq T_{2B}$$

Condition for the total load torque at the motor:

$$T_{1b} \leq T_{1max}$$

In addition, the tilting torque produced from prevalent radial and axial forces must be determined and compared with the permissible value:



$$M_{2k} = \frac{F_{2a} * y_2 + F_{2r} * (x_2 + z_2)}{1000}$$

$$M_{2k} \leq M_{2K max}$$

Please refer to the table below for values corresponding to z_2 :

TPM* dynamic	004	010	025	050	110
Z_2 [mm]	57.6	82.7	94.5	81.2	106.8

TPM* high torque		010	025	050	110
Z_2 [mm]		82.7	94.5	81.2	106.8

TPM* power	004	010	025	050	110
Z_2 [mm]	57.6	82.7	94.5	81.2	106.8

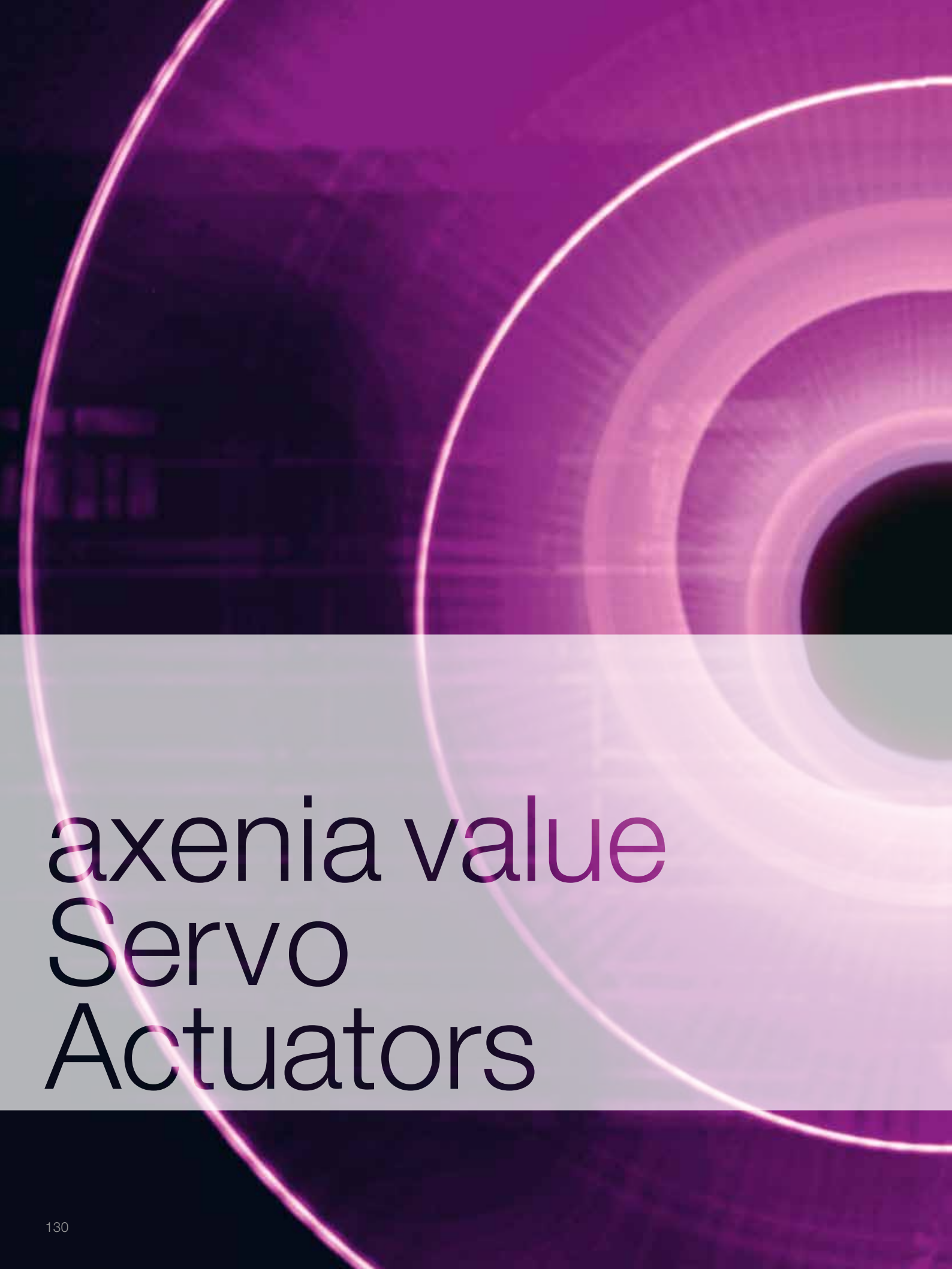
TPM* endurance		010		050	
Z_2 [mm]		82.7		81.2	

If you require a more complex design, in particular the thermal characteristics of our drives, we recommend analyzing the drive train using our design software cymex®.

Project planning note on brakes

The holding brakes installed in the actuators are subject to various influencing factors, e.g. the oxidation of abrasion particles, the flattening of friction surfaces in the case of frequent brake action at the same position, or the wear-dependent changes to the air gap. This can result in a reduction of the available holding torques. All the holding torques indicated therefore apply for the ideal state under optimal conditions, without damaging influences.

Such influences can be countered by means of a regular brake refresh cycle. For detailed information on the recommended refresh cycles, please refer to our Instructions for Use. For critical applications, it is recommended to ensure sufficient design safeguards with regard to holding torque in order to take into account the above-mentioned uncertainty factors. Our in-house engineering department will be pleased to assist you with the application sizing.



axenia value Servo Actuators



Overview - axenia value

The compact axenia servo actuator was specially developed and produced for challenging applications. It is made from highly resistant stainless steel and is therefore durably resistant against numerous aggressive media such as cleaning agents and disinfectants. Furthermore, it provides a highly precise and dynamic connection between motor and gearhead.

Your technical benefits

- Hygienic design: Cavity-free design
- Long service life through use of CIP-compatible materials
- Integrated, optimized actuator sealing concept
- Resistant against aggressive cleaning agents and disinfectants
- Foodstuff-compatible lubrication
- Powerful motor performance
- Low gearhead torsional backlash

Your benefits

- Simple and hygienic cleaning
- Smaller machines possible
- No complicated encapsulation
- Fewer wearing parts in the machine
- Low drive failure probability
- Low maintenance and repair costs

Fields of application

Suitable for any field of application where hygiene is the highest priority, aggressive cleaning agents are used and precise drives are required.

Particularly in the following industries, the stainless steel servo actuator shows its strengths:

- Food industry
- Pharmaceutical industry
- Textile industry
- Medical industry
- Packaging industry



axenia value

More resistant - More compact - More compatible

At a glance:

- Three sizes
- Max. acceleration torque up to 200 Nm
- Ratios: 16 to 100
- Large selection of encoder systems
- With or without brake
- Protection class IP69K (at 30 bar)



axenia value 060

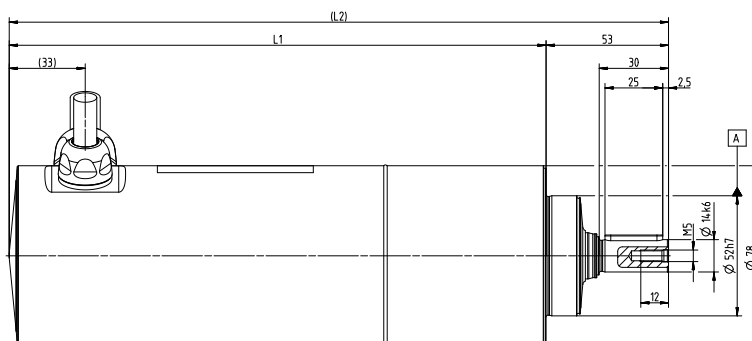
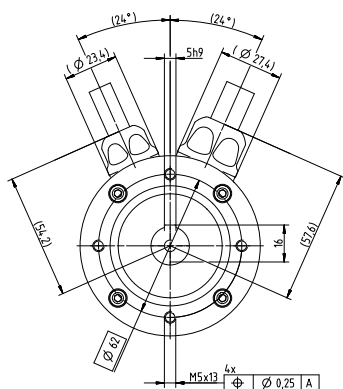
Technical data

Ratio	i	16	20	25	50	70	100
Intermediate circuit voltage	V DC	560					
Max. acceleration torque at output	Nm	21	26	32	30	32	29
Static output torque	Nm	7.5	9.4	11.8	8.2	11.5	15
Brake holding torque at output (100°C)	Nm	17.6	22	27.5	55 (1)	77 (1)	–
Max. speed	rpm	375	300	240	120	86	60
Max. motor acceleration torque	Nm	1.4			0.7		
Max. motor acceleration current	A	2.3			1.7		
Actuator mass moment of inertia at MS	kgcm²	0.35			0.28		
Backlash	arcmin	≤ 15					
Torsional rigidity	Nm/arcmin	2.3					2
Max. axial force	N	1000					
Max. radial force (relative to shaft center at 100 rpm)	N	1600					
Bearing lifespan	h	20000					
Weight (with resolver, without brake)	kg	6					
Operating noise (at n1 = 3000 rpm)	dB(A)	≤ 60					
Max. perm. motor surface temperature	°C	135					
Max. perm. gearhead surface temperature	°C	90					
Insulating material class		F					
Ambient temperature	°C	0 to +40					
Protection class		IP69K (2)					
Lubrication		Lubricated for life H1					
Mount. pos.		Any (3)					

(1) greater than T2B of the gearhead. In an emergency, can be used approx. 1000 times while the motor is rotating.

(2) at 30 bar, based on DIN40050-9.

(3) preferably horizontal mounting position with cable outlet facing downwards.





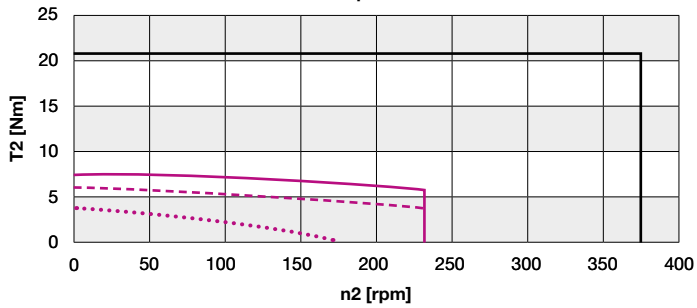
WITTENSTEIN

motion control

Char. curves

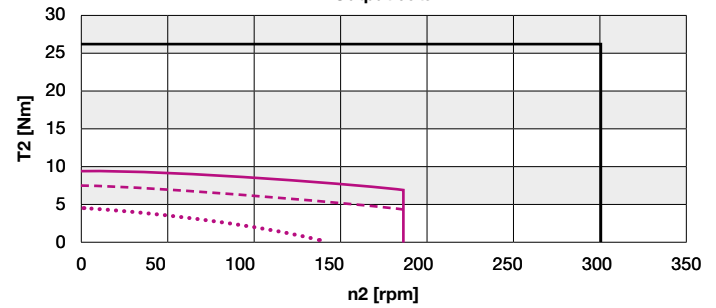
AXV 060_-016_-6__1-053B-K_-000

Output data



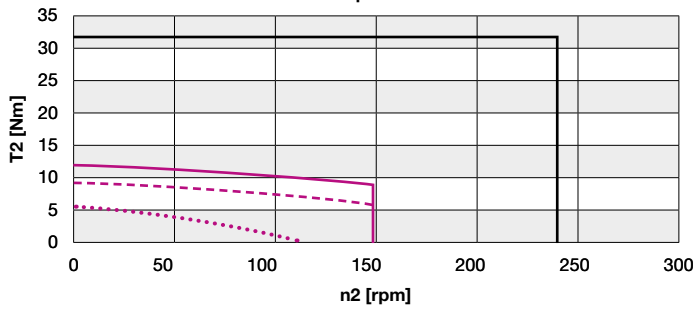
AXV 060_-020_-6__1-053B-K_-000

Output data



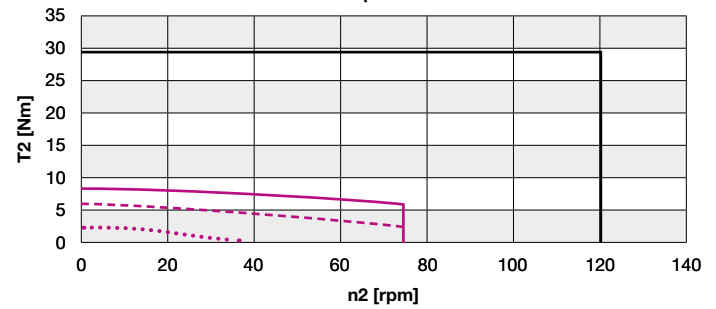
AXV 060_-025_-6__1-053B-K_-000

Output data



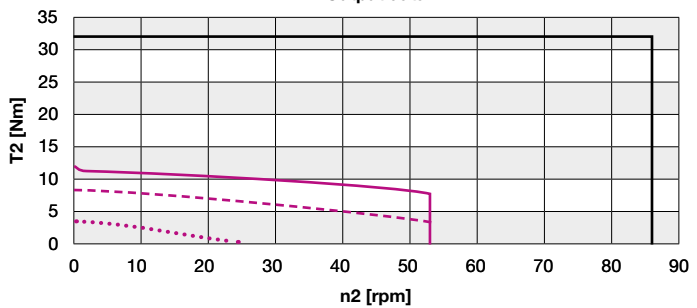
AXV 060_-050_-6__1-053A-K_-000

Output data



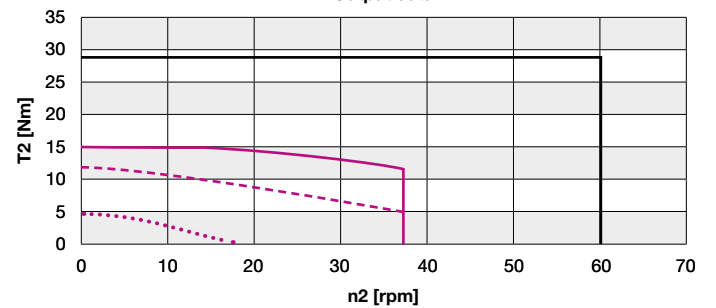
AXV 060_-070_-6__1-053A-K_-000

Output data



AXV 060_-100_-6__1-053A-K_-000

Output data



- Short-term maximum torque
- Permanent torque curve S1
- - - Permanent torque curve S1
- 50K over ambient temperature at surface
- Permanent torque curve S1
- 30K over ambient temperature at surface

Ratio	Length L1 [mm]	Length L2 [mm]
Dual-stage (16, 20, 25, 50, 70, 100)	229	282

axenia value 080

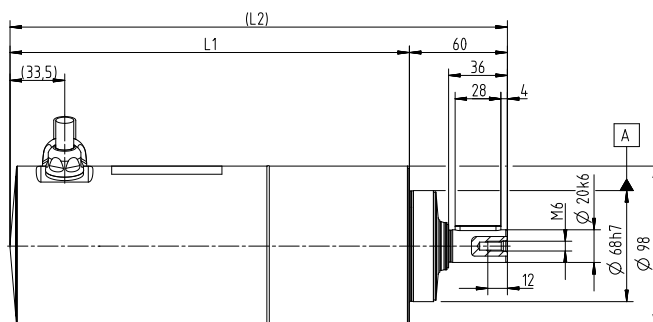
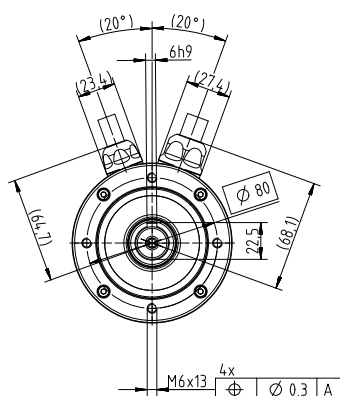
Technical data

Ratio	i	16	20	25	50	70	100
Intermediate circuit voltage	V DC	560					
Max. acceleration torque at output	Nm	50	62	78	48	67	72
Static output torque	Nm	21	26.2	32.8	15	21	30
Brake holding torque at output (100°C)	Nm	18	17.6	27.5	55	77	110 (1)
Max. speed	rpm	375	300	240	120	86	60
Max. motor acceleration torque	Nm	3.4			1.24		
Max. motor acceleration current	A	4.4			1.77		
Actuator mass moment of inertia at MS	kgcm²	0.98			0.7		
Backlash	arcmin	≤ 15					
Torsional rigidity	Nm/arcmin	7.5					5.5
Max. axial force	N	1500					
Max. radial force (relative to shaft center at 100 rpm)	N	2500					
Bearing lifespan	h	20000					
Weight (with resolver, without brake)	kg	11.5					
Operating noise (at n1 = 3000 rpm)	dB(A)	≤ 63					
Max. perm. motor surface temperature	°C	135					
Max. perm. gearhead surface temperature	°C	90					
Insulating material class		F					
Ambient temperature	°C	0 to +40					
Protection class		IP69K (2)					
Lubrication		Lubricated for life H1					
Mount. pos.		Any (3)					

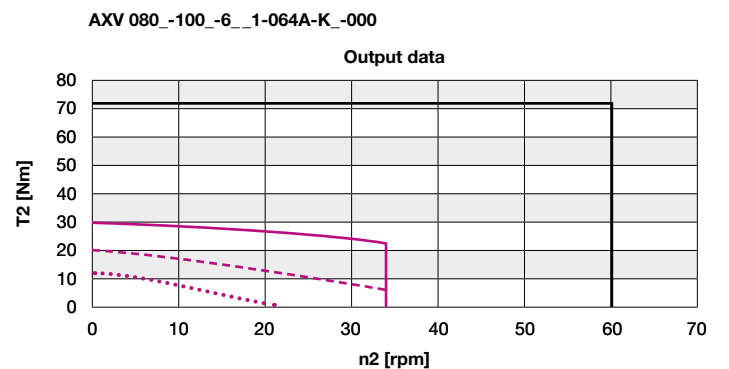
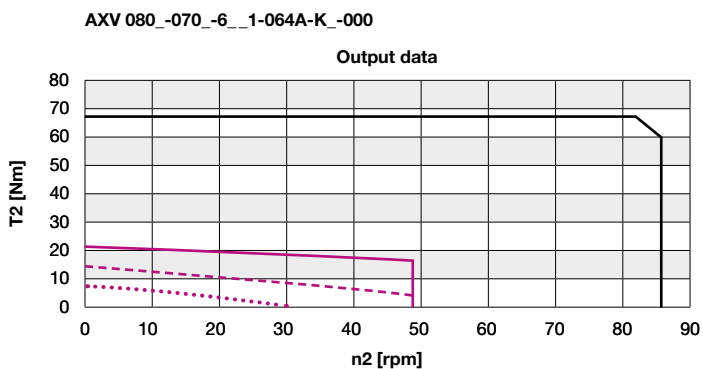
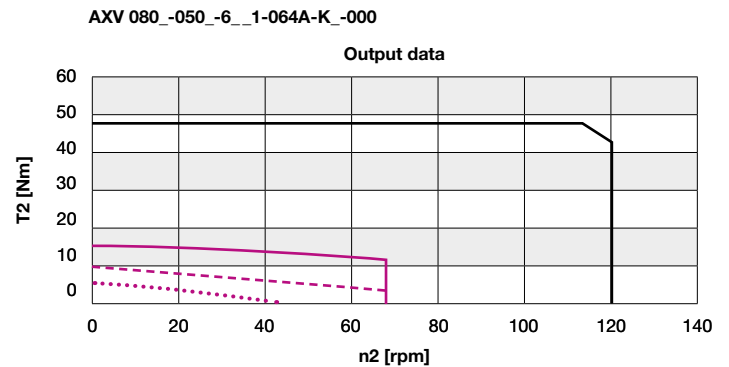
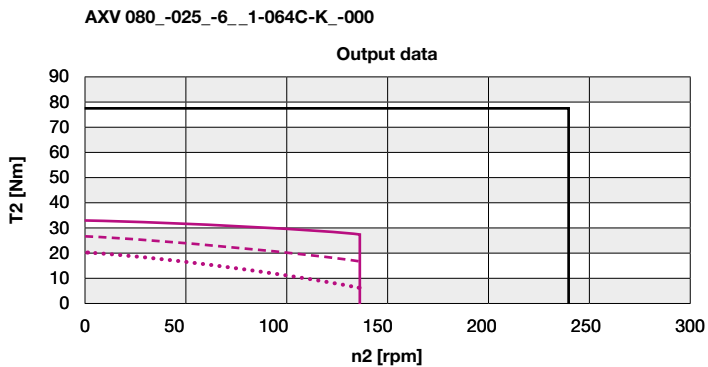
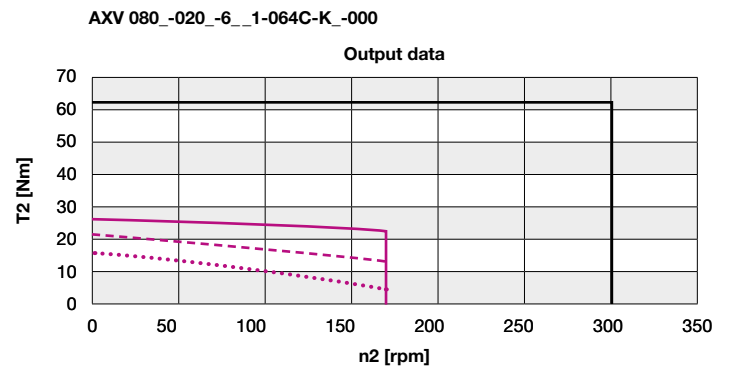
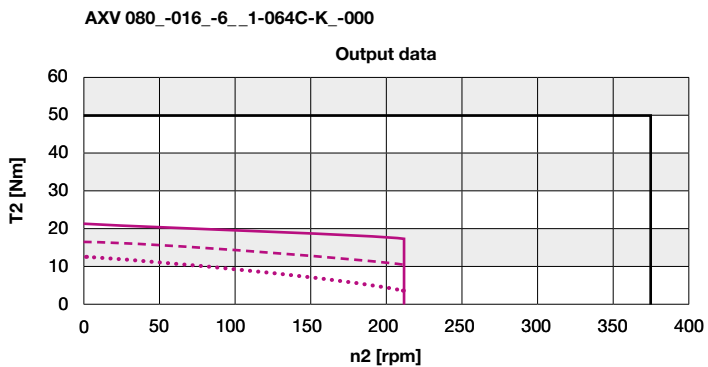
(2) at 30 bar, based on DIN40050-9.

(3) preferably horizontal mounting po

(7) $\mathcal{F} \vdash \varphi$ iff $\mathcal{F} \models \varphi$.



Char. curves



- Short-term maximum torque
- Permanent torque curve S1
- - - Permanent torque curve S1
- 50K over ambient temperature at surface
- Permanent torque curve S1
- 30K over ambient temperature at surface

Ratio	Length L1 [mm]	Length L2 [mm]
Dual-stage (16, 20, 25, 50, 70, 100)	244.5	304.5

axenia value 115

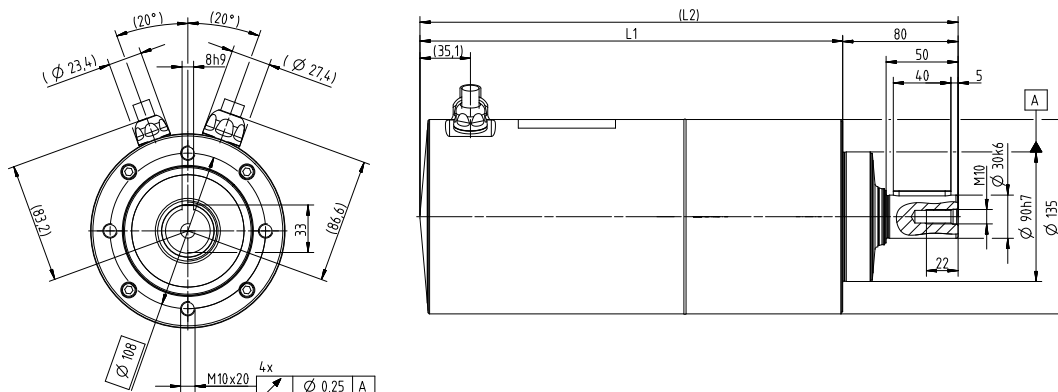
Technical data

Ratio	i	16	20	25	50	70	100
Intermediate circuit voltage	V DC	560					
Max. acceleration torque at output	Nm	145	181	200	152	200	180
Static output torque	Nm	57	71	88	42	58	83
Brake holding torque at output (100°C)	Nm	72	90	113	225 (1)	315 (1)	450 (1)
Max. speed	rpm	300	240	192	96	69	48
Max. motor acceleration torque	Nm	9.55			3.53		
Max. motor acceleration current	A	12.9			4.8		
Actuator mass moment of inertia at MS	kgcm²	3.73			2.51		
Backlash	arcmin	≤ 15					
Torsional rigidity	Nm/arcmin	24					22
Max. axial force	N	3000					
Max. radial force (relative to shaft center at 100 rpm)	N	4250					
Bearing lifespan	h	20000					
Weight (with resolver, without brake)	kg	21					
Operating noise (at n1 = 3000 rpm)	dB(A)	≤ 68					
Max. perm. motor surface temperature	°C	135					
Max. perm. gearhead surface temperature	°C	90					
Insulating material class		F					
Ambient temperature	°C	0 to +40					
Protection class		IP69K (2)					
Lubrication		Lubricated for life H1					
Mount. pos.		Any (3)					

(1) greater than T2B of the gearhead. In an emergency, can be used approx. 1000 times while the motor is rotating.

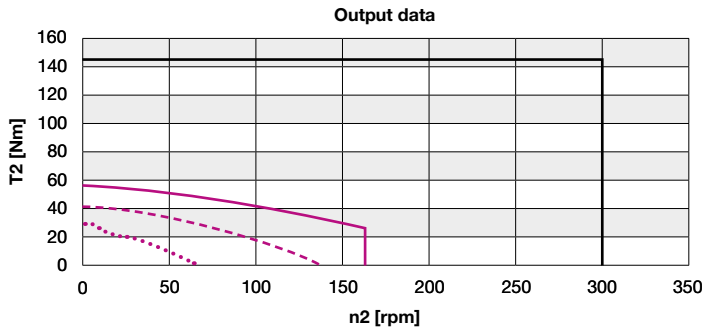
(2) at 30 bar, based on DIN40050-9.

(3) preferably horizontal mounting position with cable outlet facing downwards.

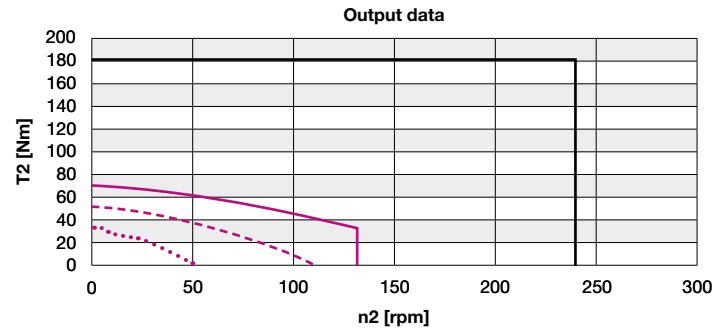


Char. curves

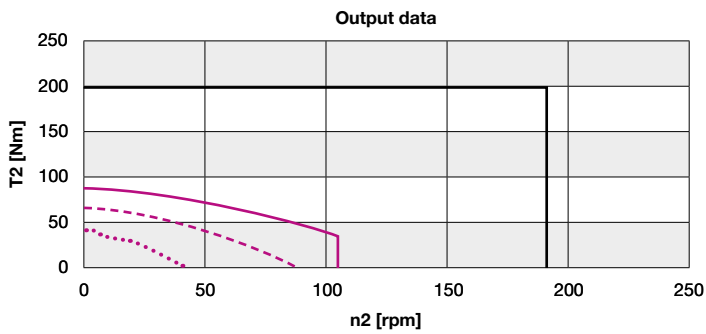
AXV 115_-016_-6__1-094C-K_-000



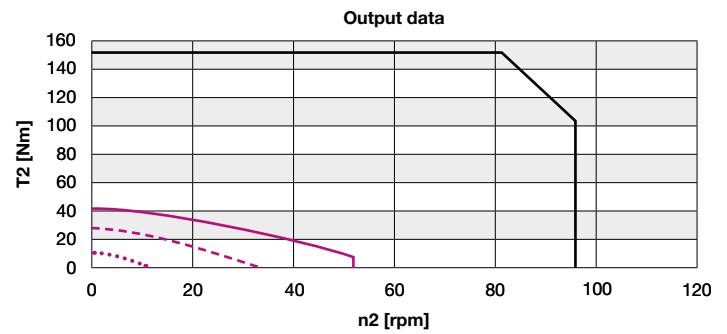
AXV 115_-020_-6__1-094C-K_-000



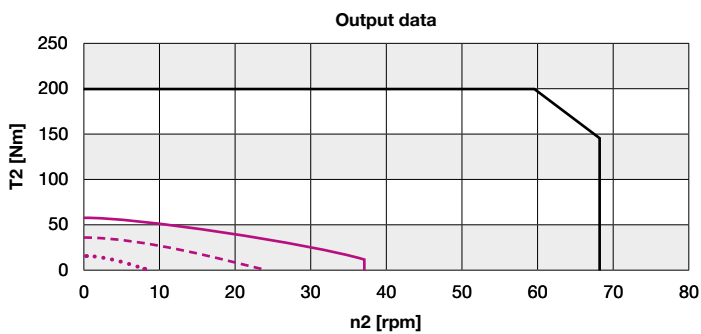
AXV 115_-025_-6__1-094C-K_-000



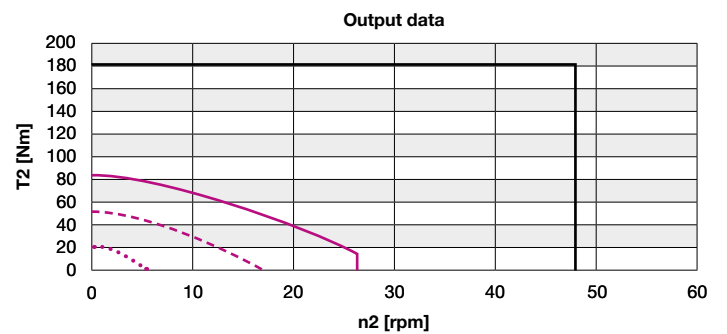
AXV 115_-050_-6__1-094A-K_-000



AXV 115_-070_-6__1-094A-K_-000



AXV 115_-100_-6__1-094A-K_-000



— Short-term maximum torque
 — Permanent torque curve S1
 - - - Permanent torque curve S1
 50K over ambient temperature
 at surface
 Permanent torque curve S1
 30K over ambient temperature
 at surface

Ratio	Length L1 [mm]	Length L2 [mm]
Dual-stage (16, 20, 25, 50, 70, 100)	293.6	373.6

Options

Design (lubrication)

All gearheads are lubricated for life with a foodstuff-compatible synthetic grease (hydrocarbon oil, aluminum complex soap, type UH1 14-151, Klüber) or with a mineral oil-based lithium soap grease (type Longtime PD 1, Castrol).

Feedback systems

A selection of encoder systems is available for positioning and speed measurement.

Standard:

- Resolver, 2-pin, 1 sin/cos cycle per rotation

Optional:

- Single-turn, EnDat 2.1 with 1V_{SS}, 512 S/R
- Multi-turn, EnDat 2.1 with 1V_{SS}, 512 S/R, 4096 R
- Hiperface, single-turn, 128 S/R
- Hiperface, multi-turn, 128 S/R, 4096 R
- TTL incremental encoder with hall signals and rectangular incremental signals 2048 S/R
- other encoder types available on request

Operating voltage

The technical data on pages 6, 8, and 10 are based on an intermediate circuit voltage of 560 V DC. Other voltages are available on request.

Temperature sensors

Different sensors are available to protect the motor coil from overheating.

Standard:

- PTC resistor, type STM 160 according to DIN 44081/82
- KTY resistor, type KTY 84-130

Holding brake

A compact permanent magnet brake is fitted to secure the motor shaft when the actuator is disconnected from the power. Characteristics include no torsional backlash, no residual torque when the brake is released, unlimited duty cycles at zero speed and a constant torque at high operating temperatures.

Size		060 and 080	115
Holding torque at 100°C	Nm	1.1	4.5
Power supply	V DC	24 +6% / -10%	
Current	A	0.42	0.42

Please refer to our project planning note on page 14.

Backlash

The standard backlash of the gearheads is ≤ 15 arcmin.

Motor size

The motor sizes are defined in accordance with the selected ratios.

Size	060	080	115
Ratio: 16, 20, 25	053B	064C	094C
Ratio: 50, 70, 100	053A	064A	094A

Cables

The actuators are equipped with a cable as standard (1 meter length, clean cut end). The cable can optionally be ordered in 3, 5, 10, 15, 20, 25 and 30 meter lengths. The termination of the cables on the controller side can be implemented to customer requirements.

Please refer to our Instructions for Use for further information on cables and their color assignments.

axenia value mounting kit

A special mounting kit is available for all sizes. This comprises:

- O-rings for the output shaft, inner and outer shoulder of the gearhead housing
- Stainless steel screws and washers for housing and output shaft

Article codes:

Size 060: 20058221

Size 080: 20058222

Size 115: 20058220

Order code

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0																						
A X V			-	0 8 0			H	-	0 1 6			R	-	6	P	B	1	-	0 6 4			C	-	K	1	-	0 0 0																								
Actuator type 3 characters: AXV = axenia value				Subtype _ = space				Size 3 characters: value: 060, 080, 115				Ratio 3 characters: 016 to 100				Return system R = Resolver, 2-pole I = Incremental encoder, optical S = EnDat absolute encoder, single turn M = EnDat absolute encoder, multi-turn N = Hiperface absolute encoder, single-turn K = Hiperface absolute encoder, multi-turn T = Incremental encoder with hall signal				Operating voltage 6 = 560 V				Brake B = with brake O = without brake				Temperature sensor P = PTC K = KTY				Stator length A = 15 mm B = 30 mm C = 45 mm				Electr. connection K = Cable gland				Special model 3 characters, consecutive				Pin/cable assignment 1 = Temperature sensor in signal cable 4 = Temperature sensor in power cable				Motor size 53 mm 64 mm 94 mm			

Project planning

Project planning note on brakes

The holding brakes installed in the actuators are subject to various influencing factors, e.g. the oxidation of abrasion particles, the flattening of friction surfaces in the case of frequent brake action at the same position, or the wear-dependent changes to the air gap. This can result in a reduction of the available holding torques.

All the holding torques indicated therefore apply for the ideal state under optimal conditions, without damaging influences. Such influences can be countered by means of a regular brake refresh cycle. For detailed information on the recommended refresh cycles, please refer to our Instructions for Use.

For critical applications, it is recommended to ensure sufficient design safeguards with regard to holding torque in order to take into account the above-mentioned uncertainty factors. Our in-house engineering department will be pleased to assist you with the application sizing.

Material information

The axenia value actuator is made from the following stainless steel materials:

- Gearhead output shaft: 1.4418
- Motor/gearhead housing, cover: 1.4404
- The surfaces are electropolished, surface roughness < Ra 0.8 (µm)
- Cable gland: 1.4404

The seals in the actuator are designed as follows:

- Gearhead output: PTFE
- Cover sealing ring: PUR
- O-ring between motor and gearhead: Fluoroprene
- Cable gland seal: TPU

Protection class information

The actuator complies with protection class IP69K.
IP69K: Dustproof and water resistant at high pressure / steam jet cleaning (max. 30 bar)

All of the axenia value actuator materials which come into contact with the environment are highly resistant against a wide variety of aggressive CIP cleaning agents.

Servo controllers

The axenia actuator can be operated using a wide selection of different servo controllers. The table below contains a selection of servo controllers already tested with the axenia. and provides information to assist in selecting the correct options. You can request a set of quick start instructions containing all the most important information for parametrizing the servo controller. Please take the current consumption of the actuator during selection of the servo controller used.

Manufacturer	Version/Type	Motor feedback				Temperature sensor		DC bus voltage		
		Resolver	EnDat	Hiperface	TTL encoder	PTC	KTY	48 V DC	320 V DC	560 V DC
Bosch Rexroth	IndraDrive	x	x	x	–	x	x	–	x	x
Beckhoff	AX5000	x	x	x	–	x	x	–	x	x
B & R	AcoPos	x	x	x ¹	–	x	x	–	x ²	x
Control techniques	UniDrive SP	x	x	x	x	x	–	–	–	x
Kollmorgen	Servostar 300	x	x	x	x	x	–	–	x	x
	Servostar 700	x	x	x	x	x	–	–	x	x
	AKD	x	x	x	–	x	–	–	x	x
ESR Pollmeier	TrioDrive D/xS	x	x	x	–	x	x	–	x	–
	MidiDrive D/xS	x	x	x	–	x	x	–	–	x
Parker	Compax 3	x	x	x	x	x	–	–	x	x
KEB	Combivert F5-Servo	x	x	x	–	x	–	–	x	x
	Combivert F5-A Servo	x	–	–	–	x	–	–	x	x
Lenze	Global Drive 93xxx	x	–	x	–	x	x	–	–	x
	Global Drive 94xx	x	x	x	–	x	x	–	x	x
	ECS Servosystem	x	–	x	–	x	–	–	x	x
NUM	MDLU 3	–	–	x	–	x	–	–	–	x
Rockwell	Ultra 3000	–	–	x	–	x	–	–	x	x
	Kinetix 6000	–	–	x	–	x	–	–	x	x
	Kinetix 6200	–	–	x	–	x	–	–	x	x
	Kinetix 6500	–	–	x	–	x	–	–	x	x
Siemens	SimoDrive 611U	x	x	–	–	–	x	–	–	x
	SimoDrive 611D	–	x	–	–	–	x	–	–	x
	Masterdrive MC	x	x	–	–	x	x	–	–	x
	Sinamics S120	x	x	–	–	–	x	–	–	x
Schneider Electric	PacDrive MC-4	–	–	x	–	x	–	–	x	x
	PacDrive 3	–	–	x	–	x	–	–	x	x
WITTENSTEIN motion control	simco	x	x	–	–	–	x	x ³	–	–

¹ No programming of the electronic nameplate possible

² up to 3.6 A_{eff} rated current

³ up to 10 A_{eff} rated current

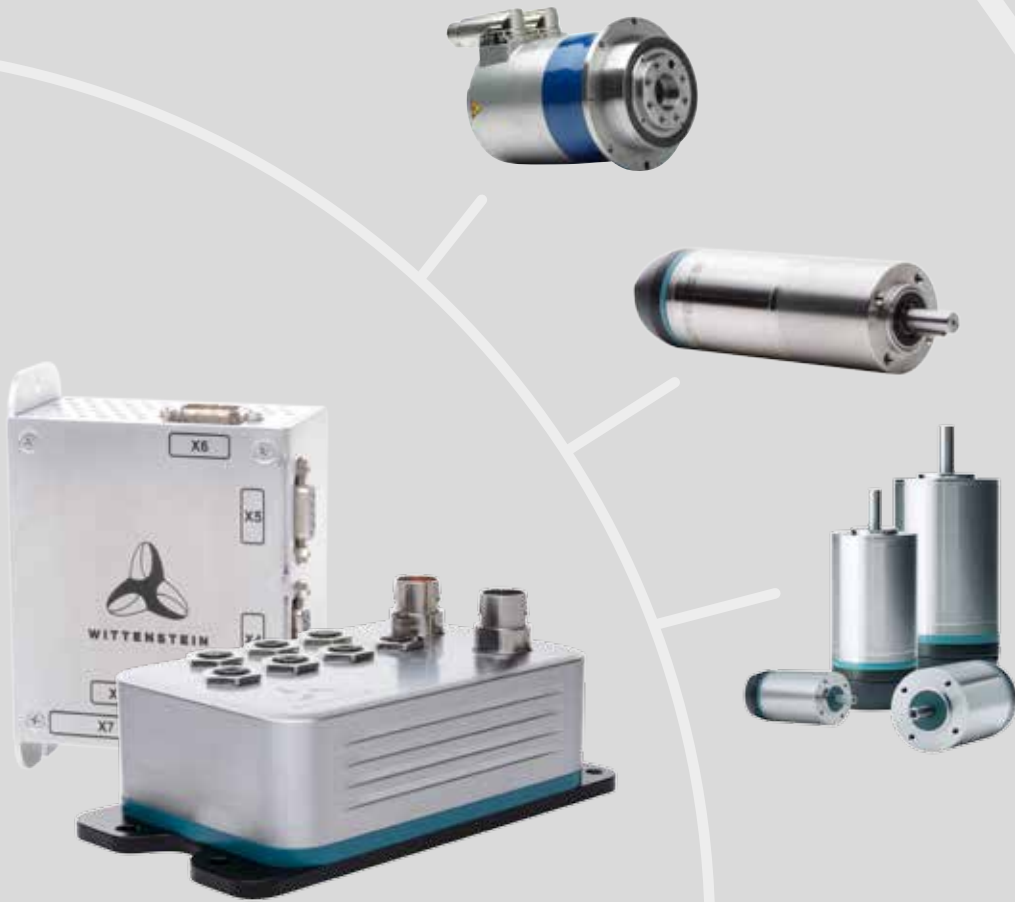


Servo amplifier simco[®] drive





Overview of simco[®] drive



WITTENSTEIN motion control GmbH servo drive systems

As a company within the WITTENSTEIN Group, WITTENSTEIN motion control GmbH develops high-tech, customer oriented servo actuators and servo amplifiers.

With its modular servo drive system, WITTENSTEIN offers you a complete drive system from a single source. The simco® drive servo amplifier and its components are compatible with other sine-commutated drives, offering maximum flexibility. The future-proof system is the ideal solution for fast and precise travel and positioning tasks. WITTENSTEIN motion control thus offers completely new possibilities for intelligent drive solutions and integration concepts.

Comprising the simco® drive servo amplifier and various servo motors and servo actuators, the system offers you numerous options for implementing your drive concept.

simco® = simply motion control.

System components

simco® drive

The simco® drive servo amplifier controls sine-commutated drives and is available as a switch cabinet version with protection class IP20 and a decentralized version with protection class IP65. With a continuous output of up to 500 W and a short-term peak output of 1 kW, the simco® drive servo amplifier is suitable for high-precision applications, e.g. in the machine-tool, electronics or packaging industries.

cyber® dynamic line motor and actuator

The particularly lightweight, brushless synchronous servo motors of the cyber® dynamic line are the professional choice for your application. Equipped with a high-quality stainless steel housing and absolute encoder, this motor series provides maximum reliability and precision. The cyber® dynamic line actuator series is based on combining the cyber® dynamic line motors with a high-precision planetary gearhead.

The cyber® dynamic line actuators offer a large ratio and output range at a DC intermediate circuit voltage of 48 V DC. In the hygiene version with protection class IP69K, the actuator is suitable for environments subject to frequent cleaning.

TPM+

The TPM+ product range is an actuator series that impresses through its dynamic and compact drive system. The brushless servo motor and the high-precision planetary gearbox combine to form a coupling-free, flexibly usable unit. In conjunction with the simco® drive servo amplifier, you receive a compact and high-performance drive system for your plant. The TPM+ product range version with intermediate circuit voltages of 24 and 48 V DC permits optimal use with the simco® drive servo amplifier.

simco® drive portfolio System allocation table			
	Designation Rated power	SIM 2002 125 watt	SIM 2010 500 watt
	DL 17	X	
	DL 22	X	
	DL 32		X
	DL 40		X
	TPM 004		X
	TPM 010		X

simco® drive IP20

Servo amplifier
for use in switch cabinets

simco® drive IP65

Servo amplifier
for decentralized use



TPM+ dynamic

Dynamic and compact
servo actuator



cyber® dynamic line servo motors and servo actuator series

High-precision synchronous servo motors
and actuators



simco® drive – protection class IP20

More intuitive. More efficient. Smaller.

The simco® drive servo amplifier with protection class IP20 and compact design is ideal for central switch cabinet installation. The numerous communication and encoder interfaces provide maximum flexibility for your application. The servo amplifier is available with power ratings of 125 watt and 500 watt. The integrated STO (Safe Torque Off) safety function according to SIL 3 (certification pending) provides safety to your applications.





Applications

simco® drive IP20 for switch cabinet installation controls sine-commutated servo motors e.g. in the machine-tool, electronics and packaging industries. The servo amplifier is also suitable for use in robotic and handling technology. The compact design of the simco® drive IP20 enables use in confined spaces, e.g. for controlling drives in automated guided vehicles.

Communication interfaces	Encoder interfaces
CANopen PROFI NET EtherCAT	EnDat 2.2 BiSS INTERFACE RESOLVER

simco[®] drive

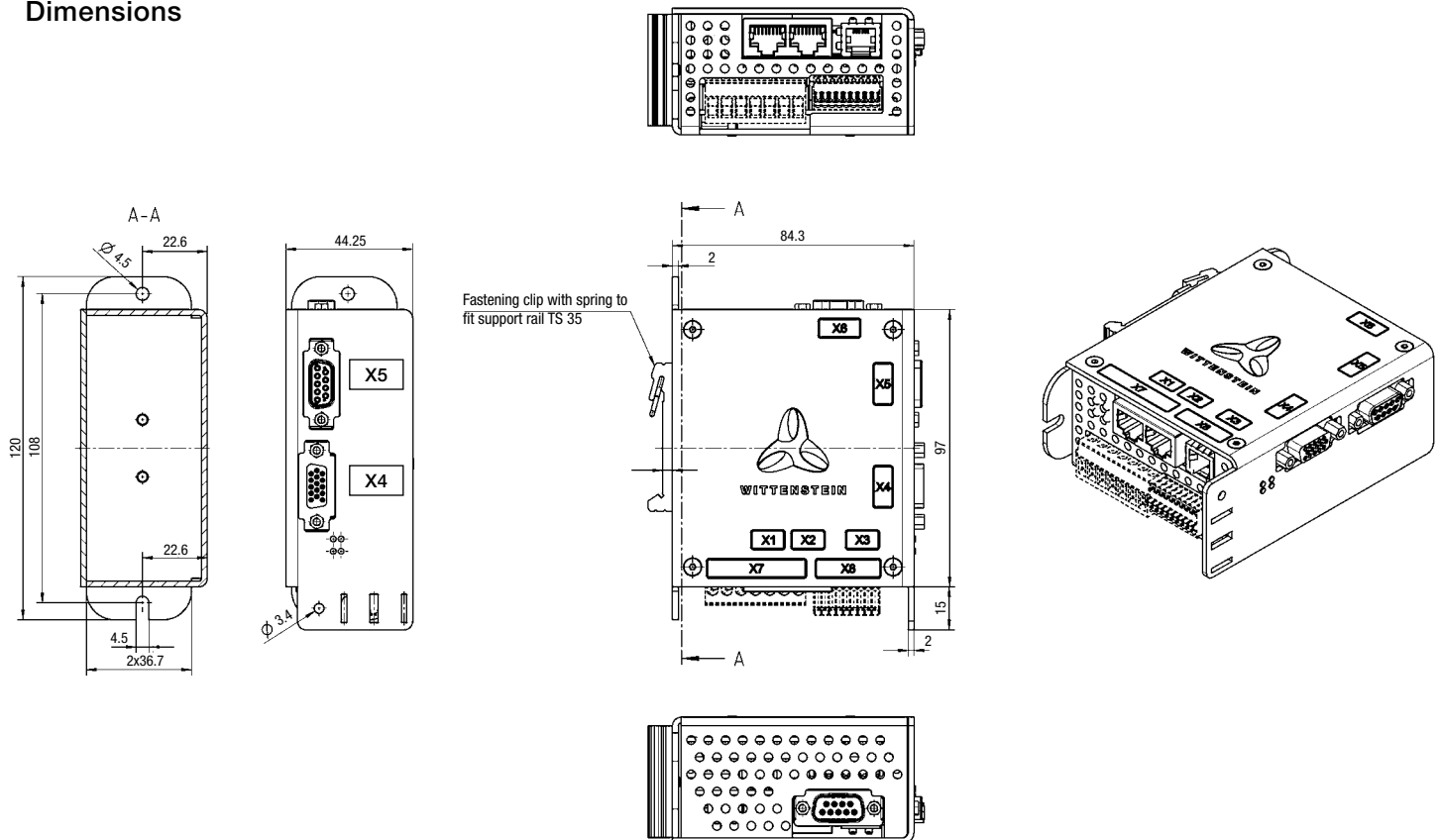
Protection class IP20

Technical data

Rated output current	I_N	A	2.5	10
Supply voltage (power)	V _{DC}	V _{DC}	+24 ... +48 (unregulated)	
Supply voltage (logic)	V _{log}	V _{DC}	+24 (+/- 10%)	
Peak current	I _{max}	A _{eff}	5 (for 5 s)	20 (for 5 s)
Rated power	P _N	W	125	500
Peak power	P _{max}	W	250	1000
Switching frequency	f _{PWM}	kHz	8 ... 32	
Current control resolutions		Bit	14 (effective)	
Communication			- CANopen to DS402 - EtherCAT with CoE - PROFINET RT/IRT - RS 232 - TCP/IP*	
Drive function to DS 402 for CANopen / EtherCAT communication			- Profile position mode - Homing mode - Profile velocity mode - Profile torque mode - Cyclic synchronous position mode - Cyclic synchronous velocity mode	
Supported PROFIdrive application classes for PROFINET communication			- Application class 1 (PROFINET RT) - Application class 3 (PROFINET RT) - Application class 4 (PROFINET IRT)	
Encoder interfaces			- BiSS C - EnDat 2.2 - Hall sensors - Resolver	
Safety function			STO (Safe Torque off) to SIL 3 (certification pending)	
Technology functions			Disk cam, motion tasks	
Protection class			IP20	
Digital inputs			4, opto decoupled, freely programmable function	
Digital outputs			2, opto decoupled, freely programmable function	
Event logging with real-time clock			✓	
Brake actuation			✓	
External ballast resistor			✓	
Drive program with PLC functions			✓	
Operating temperature range	θ _A	°C	0 ... 45°C without derating	
Weight	m	kg	0.3 kg	

* available only with PROFINET interface

Dimensions



Plug connections

Marking	Interface type	Plug connection
X1	Input field bus interface	RJ45
X2	Output field bus interface	RJ45
X3	RS232 diagnostic interface	RJ12
X4	Encoder interface	D-Sub, 15-pin, female
X5	Resolver interface	D-Sub, 9-pin, female
X6	Digital inputs/outputs	D-Sub, 9-pin, male
X7	Motor connection	Phoenix_MSTBA_2.5_HC/7-G
X8	Voltage supply	Phoenix_MC_0.5/9-G-2.5

simco® drive Protection class IP65

More intuitive. More efficient. Decentral.

simco® drive with protection class IP65 enables decentralized use in the field. Thanks to the wide variety of communication and encoder interfaces, you can integrate the system into your machine structure in a modular and flexible manner – with minimal wiring requirements and maximum operating efficiency. The servo amplifier is available with power ratings of 125 watt and 500 watt. The integrated STO (Safe Torque Off) safety function according to SIL 3 (certification pending) provides safety to your applications.

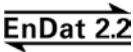




Source: groninger & co. gmbh

Applications

Protection class IP65 of the housing is suitable for decentralized use and therefore enables new integration concepts. It is ideally suited for use in the pharmaceutical, medical technology and packaging industries.

Communication interfaces	Encoder interfaces
  	  RESOLVER

simco[®] drive

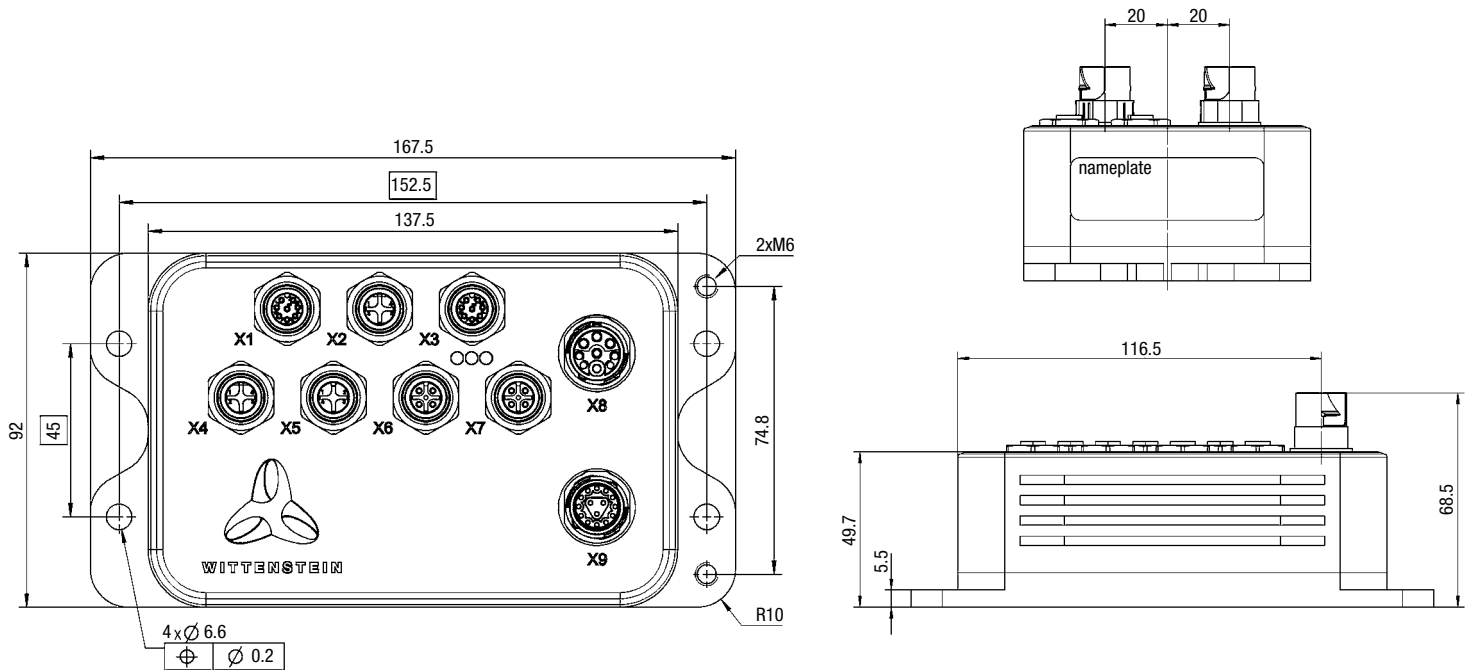
Protection class IP65

Technical data

Rated output current	I_N	A	2.5	10
Supply voltage (power)	V _{DC}	V _{DC}	+24 ... +48 (unregulated)	
Supply voltage (logic)	V _{log}	V _{DC}	+24 (+/- 10%)	
Peak current	I _{max}	A _{eff}	5 (for 5 s)	20 (for 5 s)
Rated power	P _N	W	125	500
Peak power	P _{max}	W	250	1000
Switching frequency	f _{PWM}	kHz	8 ... 32	
Current control resolutions		Bit	14 (effective)	
Communication			- CANopen to DS402 - EtherCAT with CoE - PROFINET RT/IRT (upon request) - RS 232 - TCP/IP*	
Drive function to DS 402 for CANopen / EtherCAT communication			- Profile position mode - Homing mode - Profile velocity mode - Profile torque mode - Cyclic synchronous position mode - Cyclic synchronous velocity mode	
Supported PROFIdrive application classes for PROFINET communication			- Application class 1 (PROFINET RT) - Application class 3 (PROFINET RT) - Application class 4 (PROFINET IRT)	
Sensor interfaces			- BiSS C - EnDat 2.2 - Hall sensors - Resolver	
Safety function			STO (Safe Torque off) to SIL 3 (certification pending)	
Technology functions			Disk cam, motion tasks	
Protection class			IP65	
Digital inputs			4, opto decoupled, freely programmable function	
Digital outputs			2, opto decoupled, freely programmable function	
Event logging with real-time clock			✓	
Brake actuation			✓	
External ballast resistor			✓	
Drive program with PLC functions			✓	
Operating temperature range	θ _A	°C	0 ... 45°C without derating	
Weight	m	kg	0.85 kg	

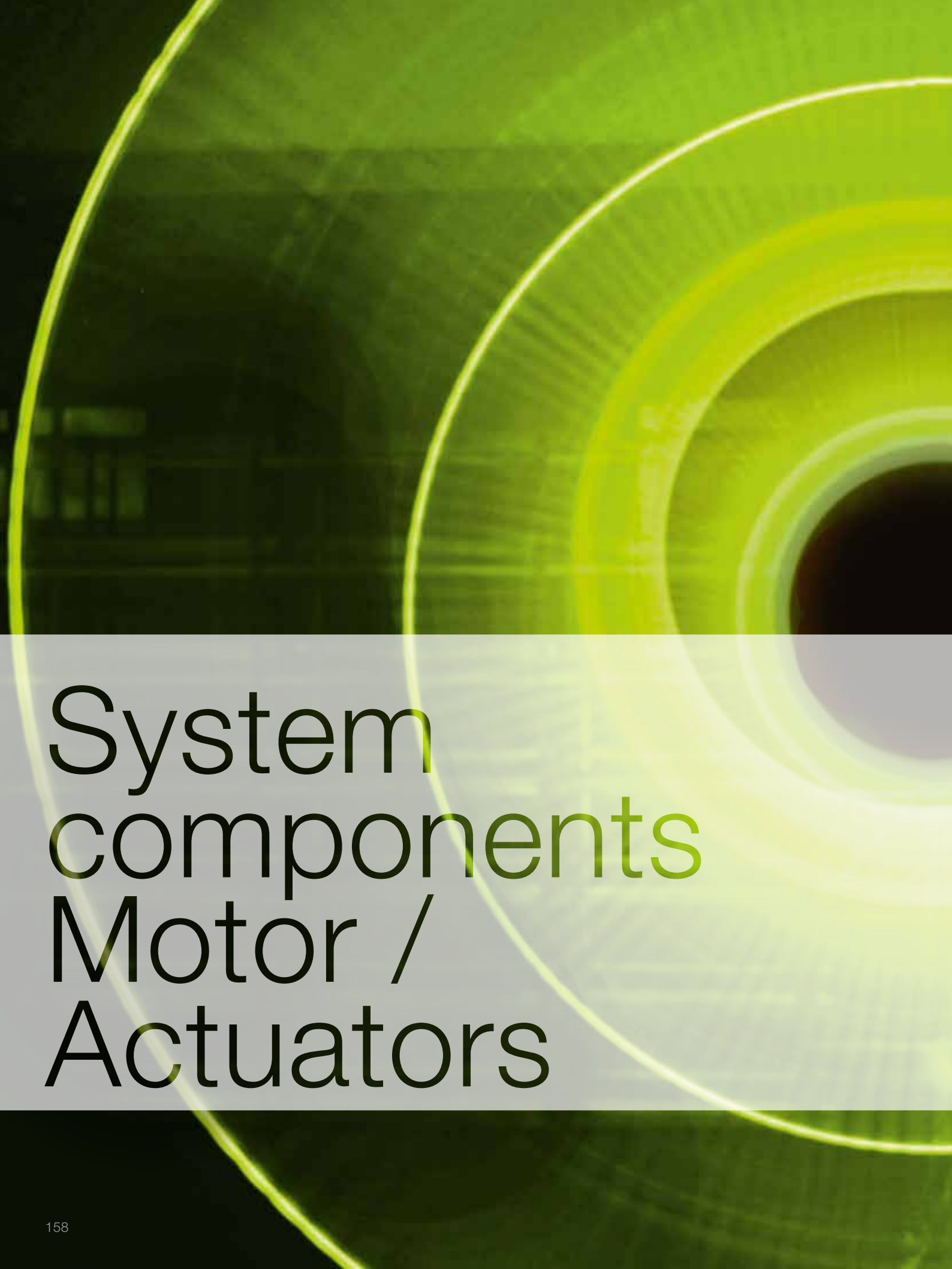
* available only with PROFINET interface

Dimensions

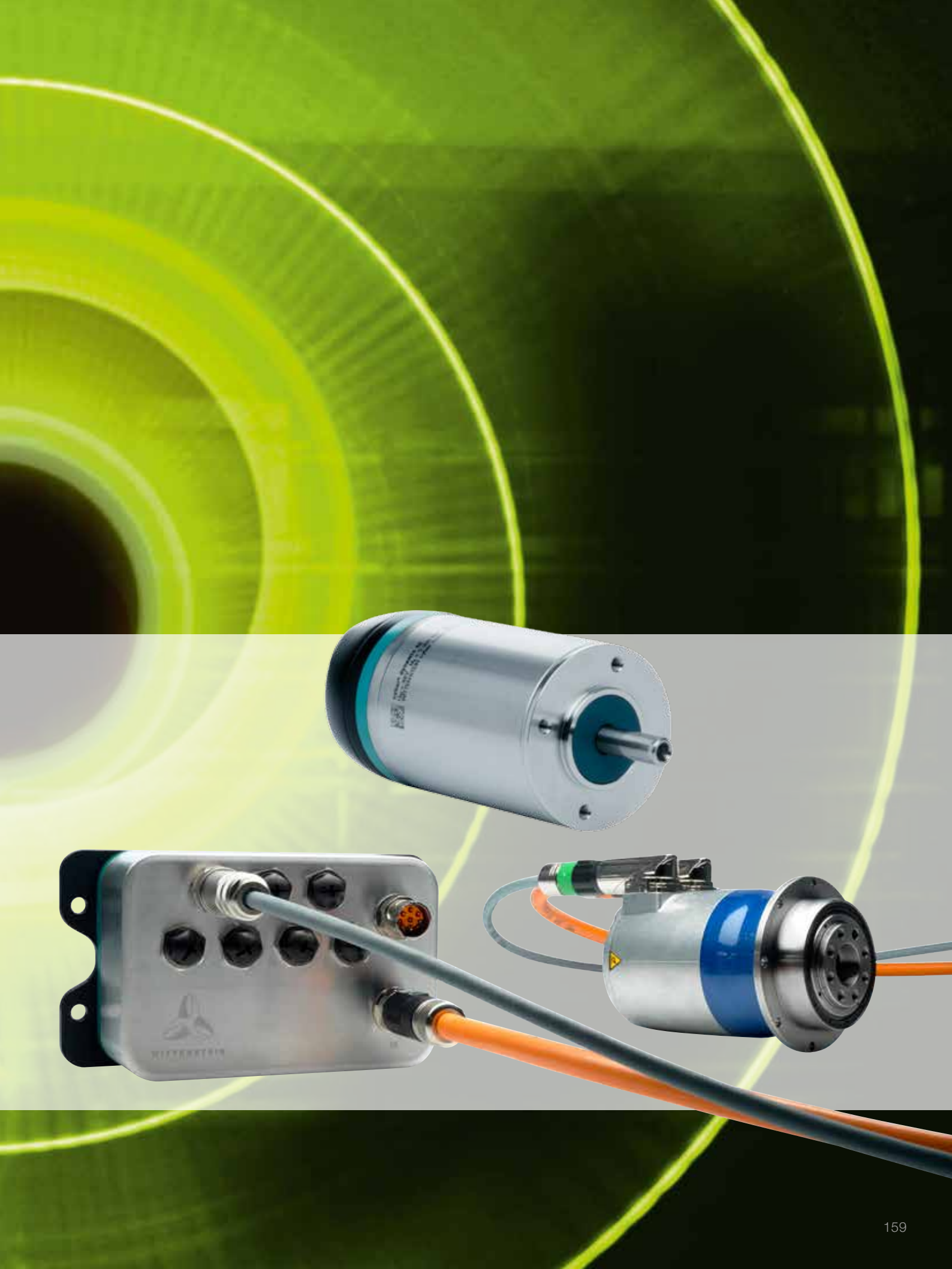


Plug connections

Marking	Interface type	Plug connection
X1	Resolver interface	M12 8-pin, female, A-coded
X2	Digital inputs	M12 5-pin, female, B-coded
X3	Encoder interface	M12 8-pin, female, A-coded
X4	Digital outputs	M12 5-pin, female, B-coded
X5	RS 232 diagnostic interface	M12 4-pin, female, A-coded
X6	Input field bus interface	CAN version: M12 5-pin, female, A-coded EtherCAT version M12 4-pin, female, D-coded
X7	Output field bus interface	CANopen version: M12 5-pin, female, A-coded EtherCAT version M12 4-pin, female, D-coded
X8	Voltage supply	Intercontec itec 915, 9-pin, male
X9	Motor connection	Intercontec itec 915, 15-pin, female



System components Motor / Actuators



cyber[®] dynamic line motor / actuator

More dynamic. More efficient. Lighter.

The brushless servo motors of the cyber[®] dynamic line are the ideal addition to simco[®] drive. Equipped with a high-quality stainless steel housing and absolute encoder, this new motor series provides maximum reliability and precision, opening up completely new possibilities in machine manufacturing. The servo motors cover the power range between 25 and 334 W.

Versions

- 4 sizes
- Hybrid motor cable for power and signal cable
- Feedback system options: BISS C and incremental encoder
- cyber[®] dynamic line actuator: planetary gearhead in stainless steel version
- Several ratio versions
- Protection class: IP54, 66 / 67, 69K





Applications

With the servo motors of the cyber® dynamic line, you can achieve short cycle times through more dynamic movements. The cyber® dynamic line is a weight-optimized and space-saving solution aimed at fast commissioning, single-cable solution and maximum dynamics. The servo motors are used in the food, packaging, machine manufacturing and automation industries.

cyber[®] dynamic line motor

Technical data

Size			17	22	32	40
Intermediate circuit voltage	V_D	V_{DC}	48	48	48	48
Max. torque	M_{max}	Nm	0.035	0.07	0.33	0.96
Permanent static torque	M_0	Nm	0.012	0.034	0.14	0.35
Idling speed	n_0	rpm	21,100	14,450	9,475	5,575
Permanent static current	I_0	A_{eff}	0.52	0.96	2.6	3.8
Mass moment of inertia	J_1	$kgm^2 \cdot 10^{-8}$	5.2	12	57	250
Weight	m	kg	0.04	0.06	0.22	0.43
Ambient temperature	ϑ_A	°C	0 to +40			
Protection class			IP54			

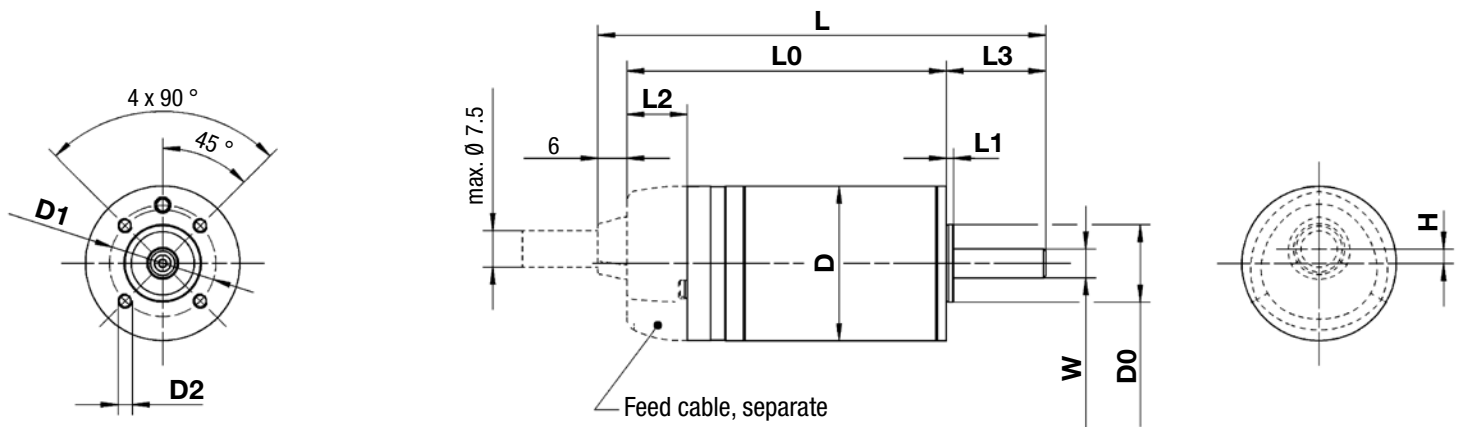
Stainless-steel version / hygienic design



Model	Stainless steel design	Hygienic design
Size (external diameter in mm)*	17 / 22 / 32 / 40	17 / 22 / 32 / 40
Protection class (in mounted condition)	IP66 / 67	IP69K
Contact surfaces	Corrosion-resistant stainless steel	Corrosion-resistant stainless steel
Construction	Standard	Hygienic design
Certification	None	EHEDG (certification pending)
Gearhead option*	For all sizes	For all sizes

* Availability on request

Dimensions

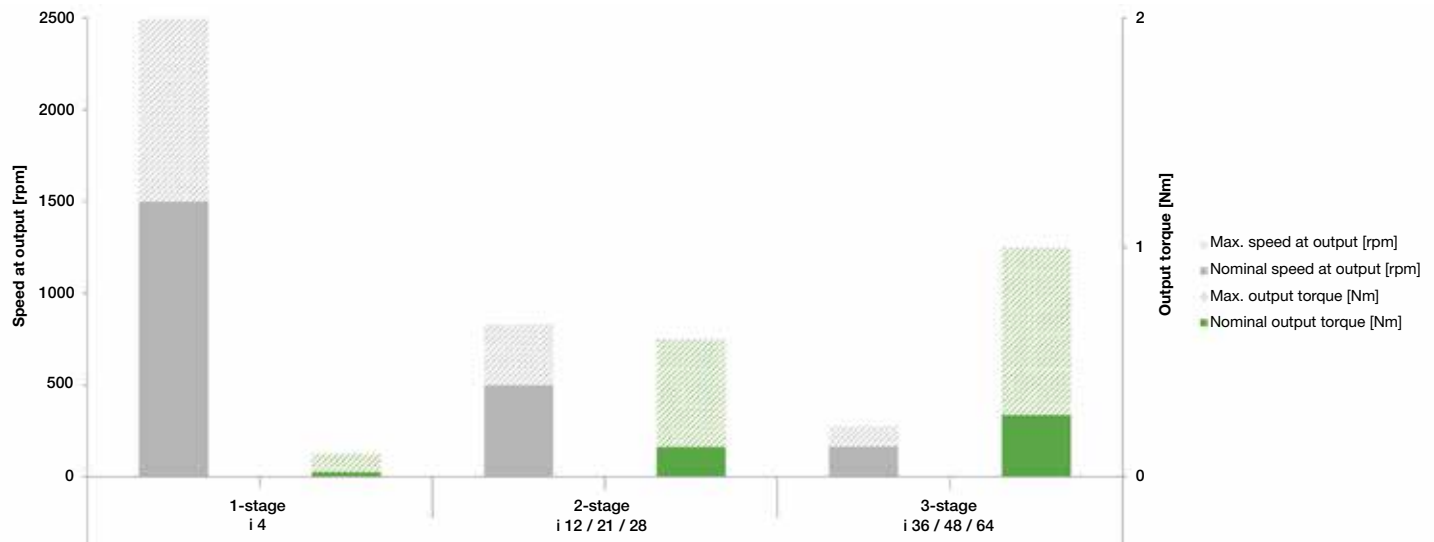


Size	cyber d17	cyber d22	cyber d32	cyber d40
D (in mm)	17	22	32	40
D0 (in mm)	10	13	16	22
D1 (in mm)	12.5	17	22	32
D2	M1.6	M2	M3	M3
W (in mm)	3	4	6	6
L (in mm)	63	67.1	92.7	106.3
L0 (in mm)	47	49.1	66.1	80.3
L1 (in mm)	1.2	1.5	1.5	2
L2 (in mm)	13.3	12.4	12.5	14.5
L3 (in mm)	10	12	20.6	20
H (in mm)	0	0	3	7.5

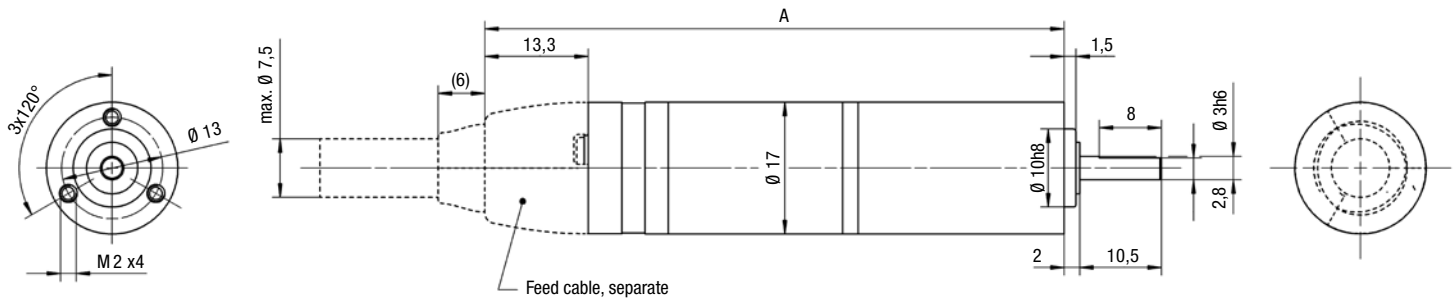
cyber[®] dynamic line actuator – size 17

Technical data

Ratio			4	12	21	28	36	48	64
Intermediate circuit voltage	V_D	V_{DC}	48	48	48	48	48	48	48
Backlash	j_t	arcmin	20	35	35	35	50	50	50
Max. axial force	F_{Amax}	N	10	10	10	10	10	10	10
Weight	m	kg	0.06	0.07	0.07	0.07	0.07	0.07	0.07
Ambient temperature	ϑ_A	°C	0 to +40						
Protection class			IP54 (depending on mounting situation)						
Mount. pos.			Any						
Lubrication			Grease lubricated						



Dimensions

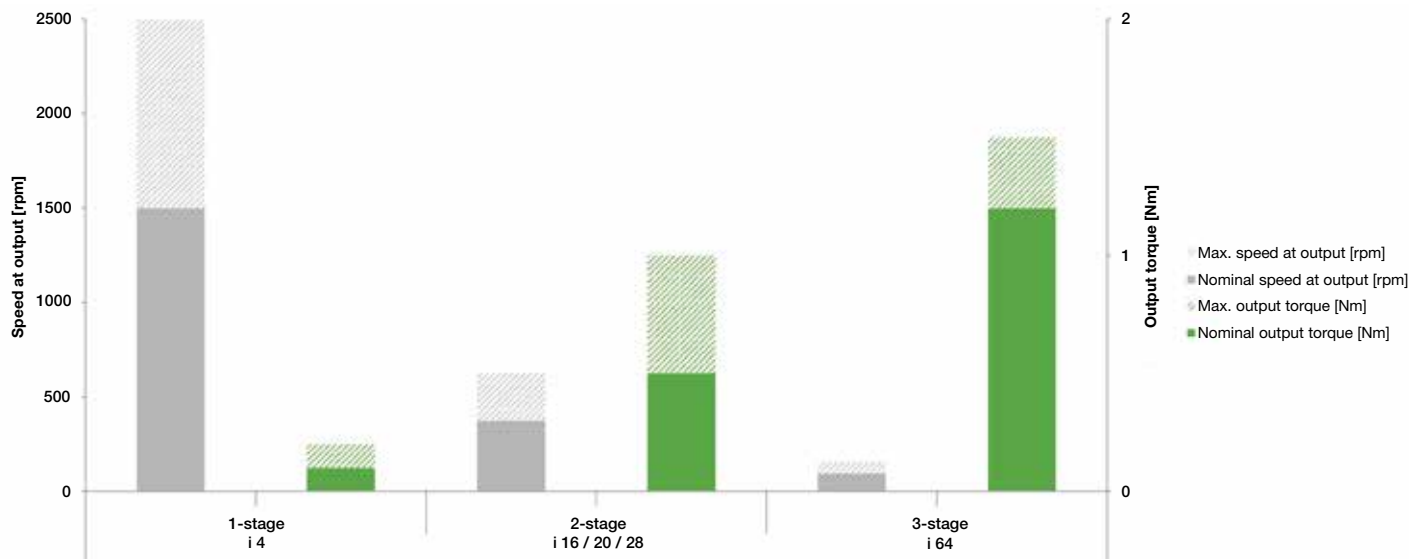


Ratio	Length A in mm
Single-stage, i 4	64.5
Dual-stage, i 12/21/28	69.5
Three-stage, i 36/48/64	74.5

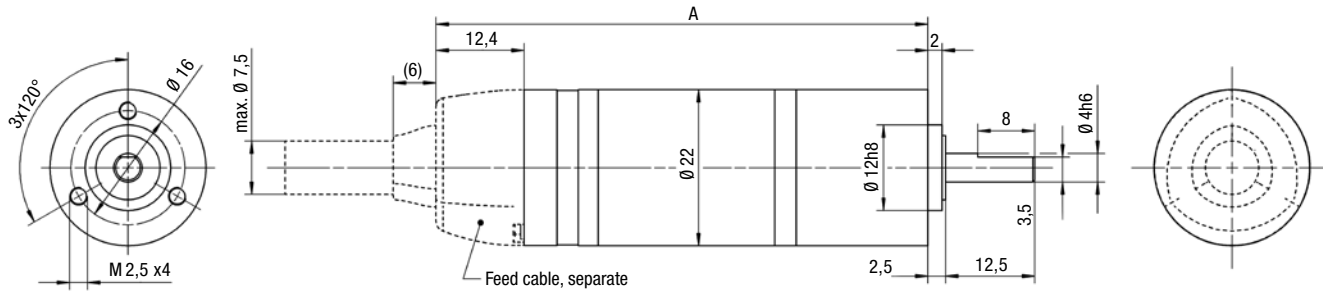
cyber[®] dynamic line actuator – size 22

Technical data

Ratio			4	16	20	28	64
Intermediate circuit voltage	V_D	V_{DC}	48	48	48	48	48
Backlash	j_t	arcmin	20	35	35	35	50
Max. axial force	F_{Amax}	N	24	24	24	24	24
Weight	m	kg	0.15	0.18	0.18	0.18	0.21
Ambient temperature	ϑ_A	°C	0 to +40				
Protection class			IP54 (depending on mounting situation)				
Mount. pos.			Any				
Lubrication			Grease lubricated				



Dimensions

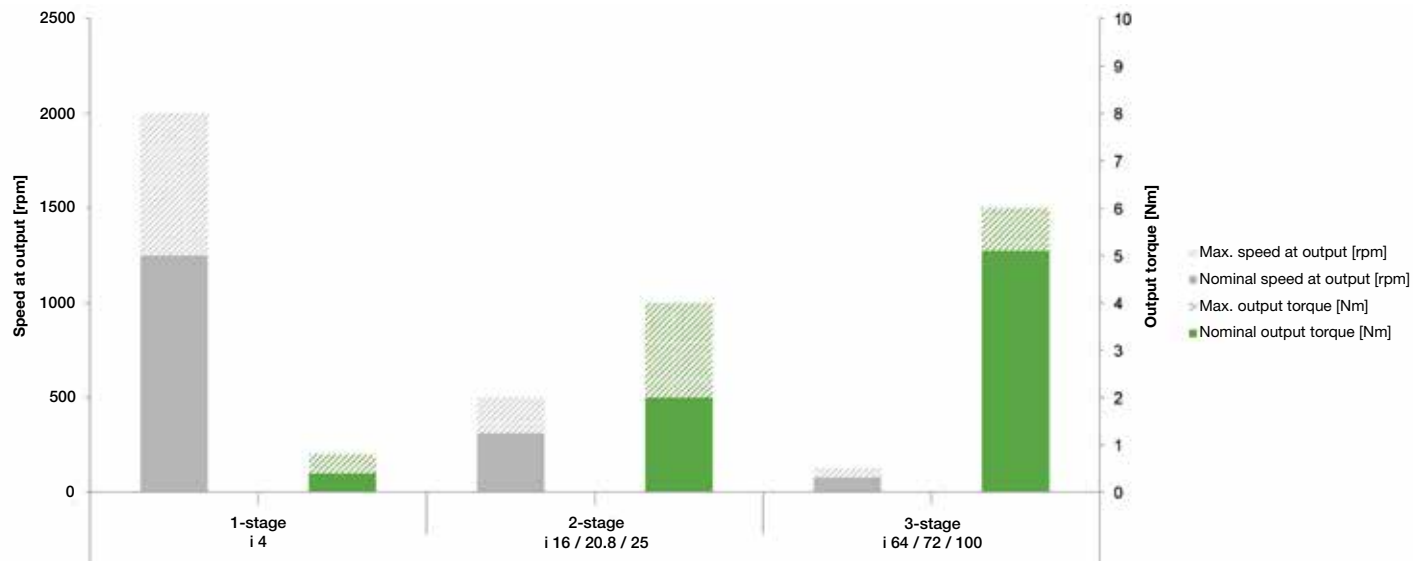


Ratio	Length A in mm
Single-stage, i 4	69.1
Dual-stage, i 16/20/28	76.1
Three-stage, i 64	83.1

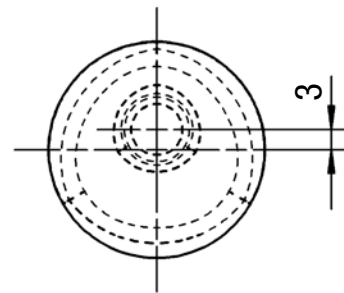
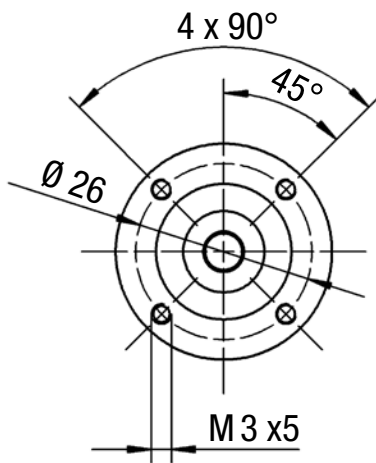
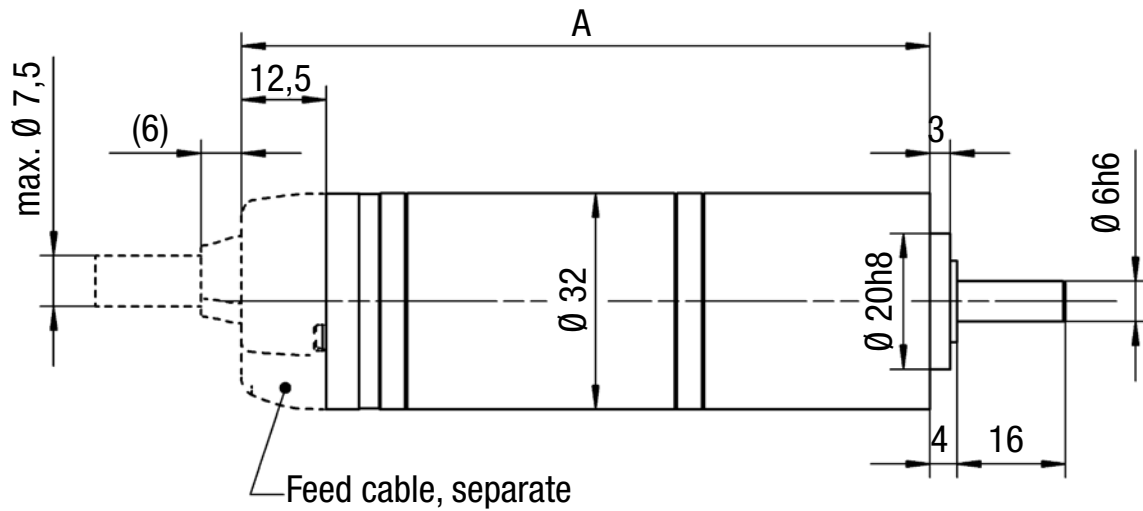
cyber[®] dynamic line actuator – size 32

Technical data

Ratio			4	16	20.8	25	64	72	100
Intermediate circuit voltage	V_D	V_{DC}	48	48	48	48	48	48	48
Backlash	j_t	arcmin	20	35	35	35	50	50	50
Max. axial force	F_{Amax}	N	65	65	65	65	65	65	65
Weight	m	kg	0.39	0.43	0.43	0.43	0.5	0.5	0.5
Ambient temperature	ϑ_A	°C	0 to +40						
Protection class			IP54 (depending on mounting situation)						
Mount. pos.			Any						
Lubrication			Grease lubricated						



Dimensions

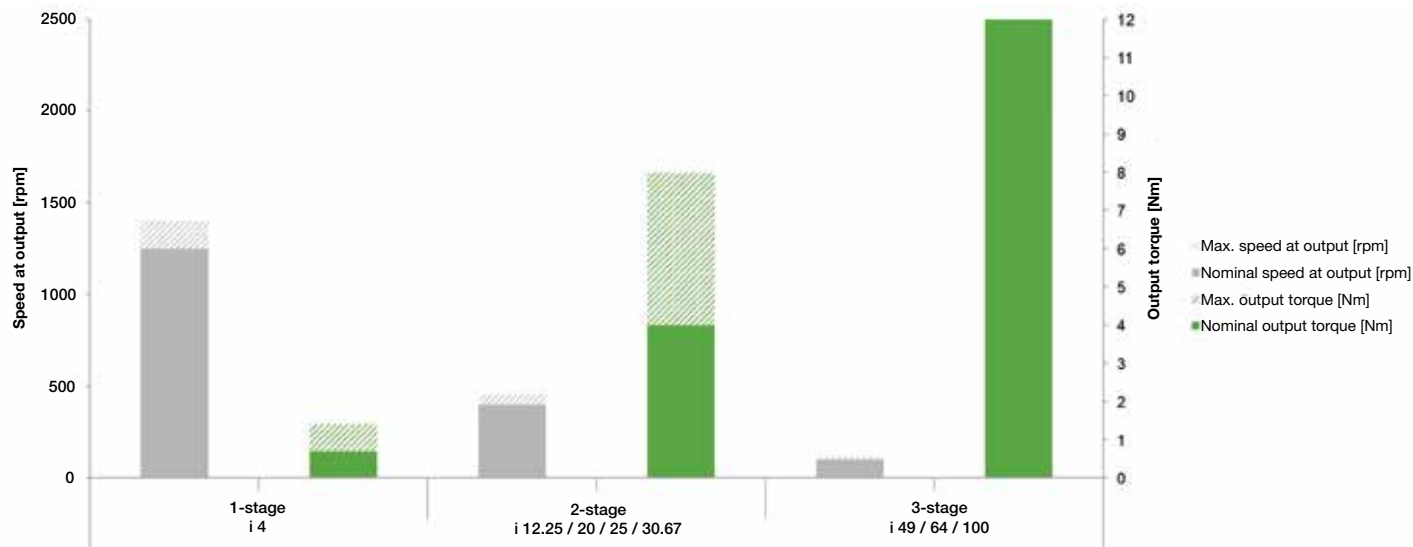


Ratio	Length A in mm
Single-stage, i 4	92.6
Dual-stage, i 16/20.8/25	101.6
Three-stage, i 64/72/100	110.6

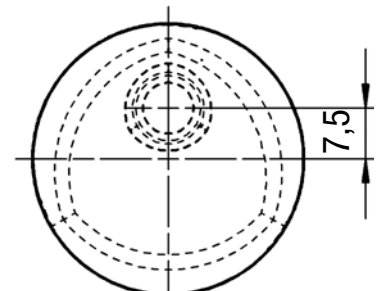
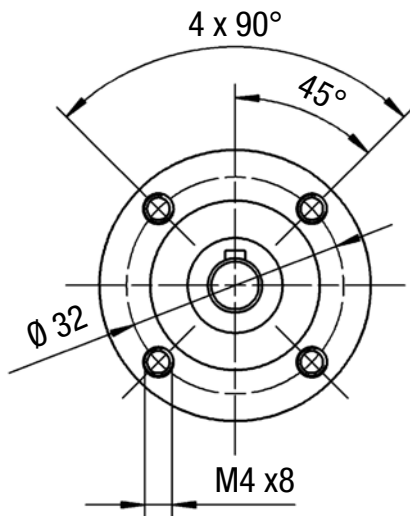
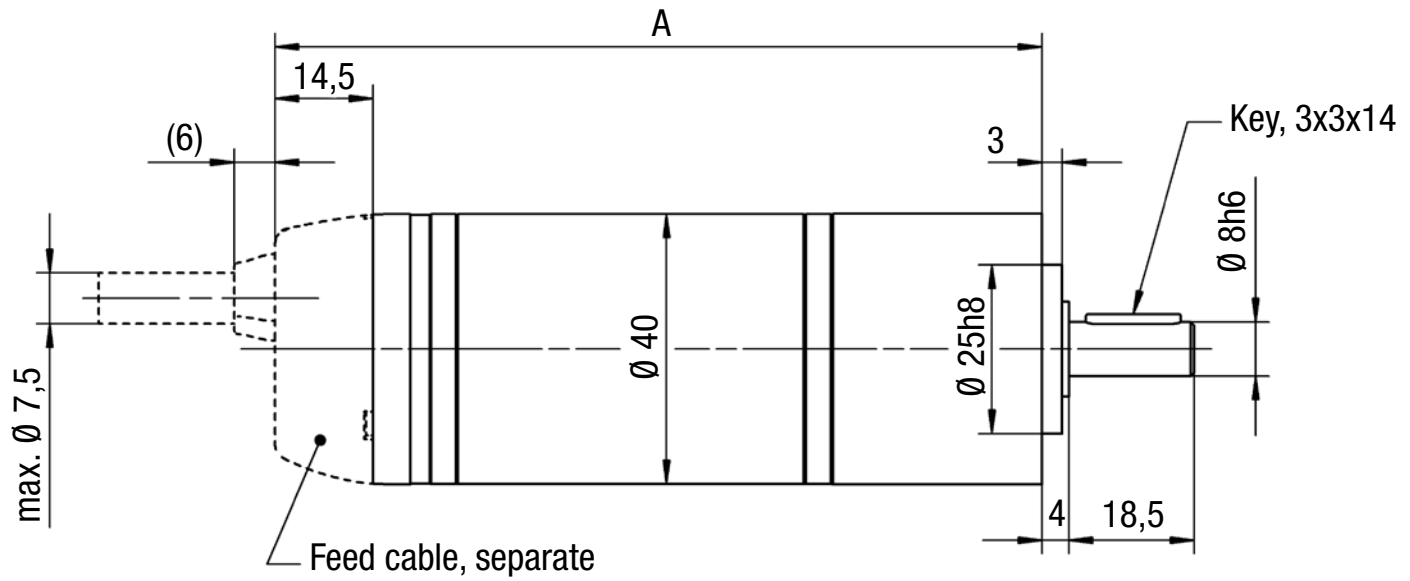
cyber[®] dynamic line actuator – size 40

Technical data

Ratio			4	12.25	20	25	30.67	49	64	100
Intermediate circuit voltage	V_D	V_{DC}	48	48	48	48	48	48	48	48
Backlash	j_t	arcmin	20	35	35	35	35	50	50	50
Max. axial force	F_{Amax}	N	120	120	120	120	120	120	120	120
Weight	m	kg	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9
Ambient temperature	ϑ_A	°C	0 to +40							
Protection class			IP54 (depending on mounting situation)							
Mount. pos.			Any							
Lubrication			Grease lubricated							



Dimensions



Ratio	Length A in mm
Single-stage, i 4	113.3
Dual-stage, i 12.25/20/25/30.67	125.8
Three-stage, i 49/64/100	138.3

TPM⁺ dynamic / power actuator

More compact. More dynamic. More flexible.

The perfect combination for all requirements: The TPM⁺ servo actuators in the dynamic and power versions optimally complement the simco® drive servo amplifier. The compact and dynamic actuators combine the gearhead and servo motor to form a coupling-free, flexibly usable unit.





Quelle: SECKLER AG

Applications

The TPM⁺ actuator series excels through short response times and high dynamics. The dynamic actuator impresses with a high power density as well as a low moment of inertia and optimum torsional rigidity. The TPM⁺ is used in robotics and automation, as a swivel drive in production and in the packaging industry.

TPM⁺ dynamic

Size 004 – 24 V / 48 V

Technical data

Ratio	i		16		21		31		61		64		91	
Motor size			53-30	53-30	53-30	53-30	53-30	53-30	53-15	53-15	53-15	53-15	53-15	53-15
Intermediate circuit voltage	V _D	V DC	24	48	24	48	24	48	24	48	24	48	24	48
Max. acceleration torque at drive (max. 1000 cycles per hour)	T _{2B}	Nm	18.8	18.8	24.7	24.7	36.4	36.4	32	32	32	32	32	32
Static output torque	T ₂₀	Nm	6.72	6.72	9.24	9.24	14	14	15	15	14.1	14.1	15	15
Brake holding torque at output, 100°C	T _{2BR}	Nm	17.6	17.6	23.1	23.1	34.1	34.1	67.1	67.1	70.4	70.4	100	100
Max. speed	n _{2max}	rpm	281	375	214	286	145	194	98.4	98.4	93.8	93.8	65.9	65.9
Speed limit for T2B	n _{2B}	rpm	160	375	121.95	285.6	82.61	193.4	87.34	86.36	85.11	84.12	65.93	65.73
Max. motor acceleration torque	T _{rmax}	Nm	1.25	1.25	1.25	1.25	1.25	1.25	0.69	1.03	0.69	1.03	0.69	1.03
Max. motor acceleration current	I _{maxdyn}	A _{eff}	20	20	20	20	20	20	20	15	20	15	20	15
Motor stall current	I ₀	A _{eff}	10	10	10	10	10	10	10	5.01	10	5.01	10	5.01
Mass moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²*10 ⁻⁴	0.21		0.2		0.2		0.12		0.11		0.12	
Backlash	j _t	arcmin	Standard < 4 / Reduced < 2											
Torsional rigidity	C _t	Nm/arcmin	/		10		9		9		/		7	
Tilting rigidity	C _k	Nm/arcmin	/											
Max. axial force	F _{amax}	N	1630											
Max. tilting torque (distance from point of rotation to output flange 57.6 mm)	M _{kmax}	Nm	110											
Weight (with resolver, without brake)	m	kg	2.2						2					
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	< 58											
Max. permitted housing temperature	ϑ _{max}	°C	90											
Ambient temperature	ϑ _A	°C	0 to +40											
Protection class			IP65											
Mount. pos.			Any											
Lubrication			Synthetic oil, lubricated for life											
Insulating material class			F											
Paint			Metallic blue 250 and natural cast aluminum											



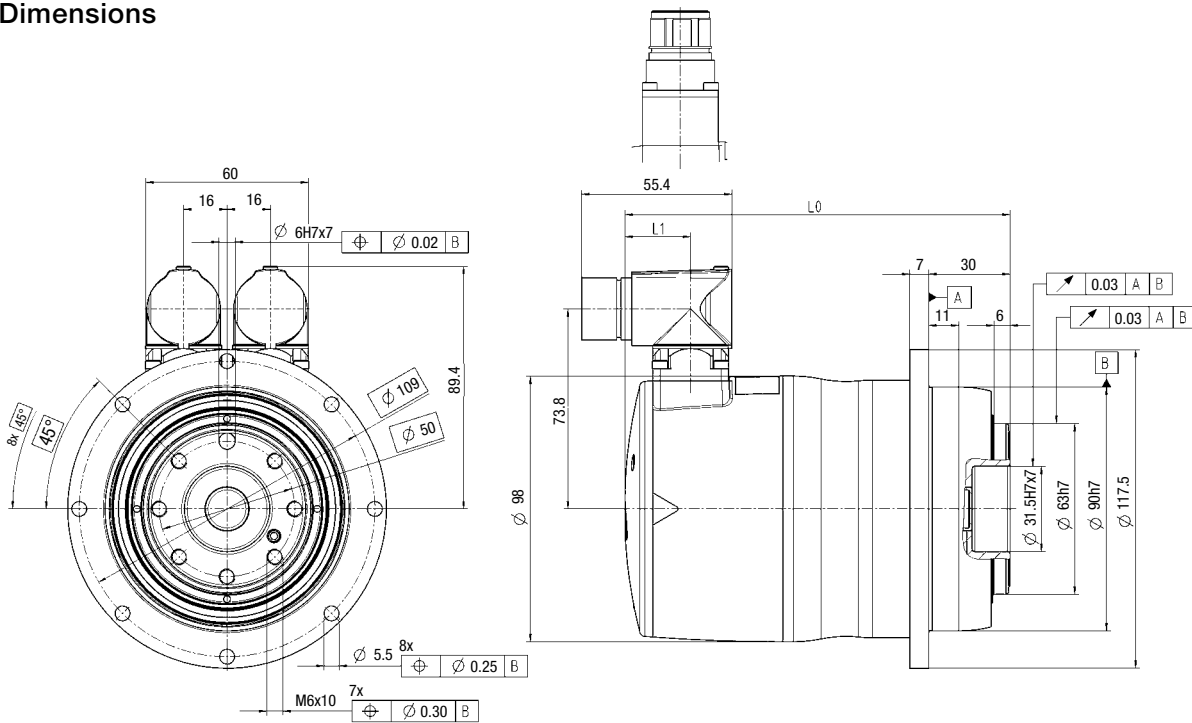
TPM⁺ dynamic

Size 010 – 24V/48V

Technical data

Ratio	i		16	21	31	61		64		91	
Motor size			64-30	64-30	64-30	64-15	64-15	64-15	64-15	64-15	64-15
Intermediate circuit voltage	V _D	V DC	48	48	48	24	48	24	48	24	48
Max. acceleration torque at drive (max. 1000 cycles per hour)	T _{2B}	Nm	24.7	32.4	47.8	50.4	80	52.9	80	75.2	80
Static output torque	T ₂₀	Nm	7.36	10.3	15.8	15.3	26.8	13.4	25.6	23..7	35
Brake holding torque at output, 100°C	T _{2BR}	Nm	17.6	23.1	34.1	67.1	67.1	70.4	70.4	100	100
Max. speed	n _{2max}	rpm	375	286	194	98.4	88.7	93.8	84.6	65.9	59.5
Speed limit for T2B	n _{2B}	rpm	346.69	264.14	178.94	74.75	44.17	71.25	44.07	50.11	39.36
Max. motor acceleration torque	T _{mmax}	Nm	1.64	1.64	1.64	0.88	1.67	0.88	1.67	0.88	1.67
Max. motor acceleration current	I _{maxdyn}	A _{eff}	20	20	20	20	18.7	20	18.7	20	18.7
Motor stall current	I ₀	A _{eff}	10	10	10	10	6.23	10	6.23	10	6.23
Mass moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm²*10 ⁻⁴	0.32	0.32	0.32	0.17		0.17		0.17	
Backlash	j _t	arcmin	Standard < 3 / Reduced < 1								
Torsional rigidity	C _t	Nm/arcmin	/	26	24	24	24	/	/	21	21
Tilting rigidity	C _K	Nm/arcmin	225								
Max. axial force	F _{amax}	N	2150								
Max. tilting torque (distance from point of rotation to output flange 57.6 mm)	M _{kmax}	Nm	270								
Weight (with resolver, without brake)	m	kg	4.8			4.3					
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	< 62								
Max. permitted housing temperature	ϑ _{max}	°C	90								
Ambient temperature	ϑ _A	°C	0 to +40								
Protection class			IP65								
Mount. pos.			Any								
Lubrication			Synthetic oil, lubricated for life								
Insulating material class			F								
Paint			Metallic blue 250 and natural cast aluminum								

Dimensions



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	157	24
	EnDat 2.2	182	49
i = 61/64/91	Resolver	142	24
	EnDat 2.2	167	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16/21/31	Resolver	178	24
	EnDat 2.2	202	49
i = 61/64/91	Resolver	163	24
	EnDat 2.2	187	49

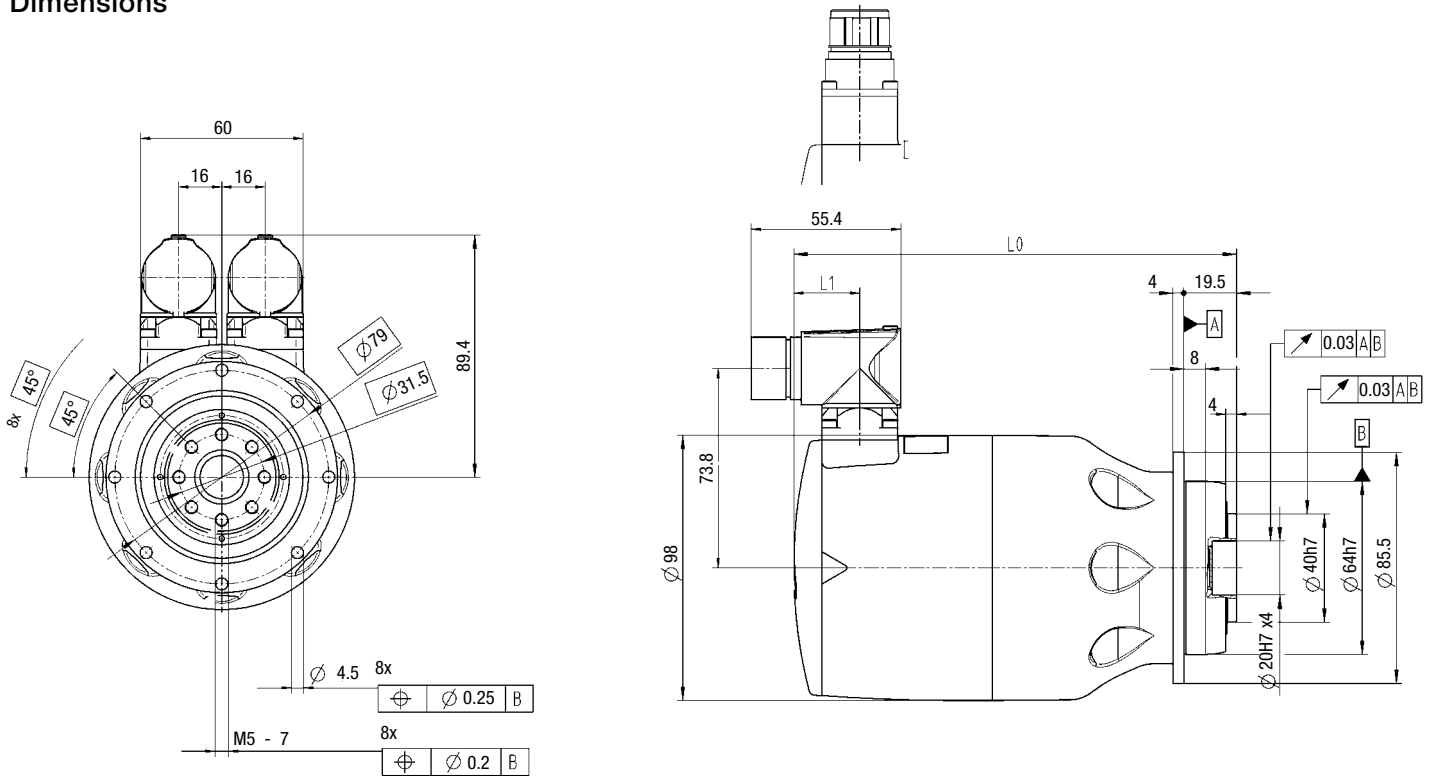
TPM⁺ power

Size 004 – 24 V / 48 V

Technical data

Ratio	i		16	20	25	28	35	40		50		70		100	
Motor size			64-30	64-30	64-30	64-30	64-30	64-15	64-15	64-15	64-15	64-15	64-15	64-15	64-15
Intermediate circuit voltage	V _D	V DC	48	48	48	48	48	24	48	24	48	24	48	24	48
Max. acceleration torque at drive (max. 1000 cycles per hour)	T _{2B}	Nm	24.4	30.5	38.1	43.4	50	32.6	50	40.8	50	50	50	35	35
Static output torque	T ₂₀	Nm	11.4	14.3	17.9	20.7	26.4	15.4	23	19.3	28.8	27.9	40	18	18
Brake holding torque at output, 100°C	T _{2BR}	Nm	17.6	22	27.5	30.8	38.5	44	44	55	55	77	77	110	110
Max. speed	n _{2max}	rpm	375	300	240	214	171	150	135	120	108	85.7	77.3	60	54.1
Speed limit for T2B	n _{2B}	rpm	346.69	277.35	221.88	198.11	160.29	114	71.25	91.2	67.11	67.59	56.71	54.62	46.55
Max. motor acceleration torque	T _{mmax}	Nm	1.64	1.64	1.64	1.64	1.64	0.88	1.67	0.88	1.67	0.88	1.67	0.88	1.67
Max. motor acceleration current	I _{maxdyn}	A _{eff}	20	20	20	20	20	20	18.7	20	18.7	20	18.7	20	18.7
Motor stall current	I ₀	A _{eff}	10	10	10	10	10	10	6.23	10	6.23	10	6.23	10	6.23
Mass moment of inertia (at motor shaft, without brake, with resolver)	J ₁	kgm ² *10 ⁻⁴	0.32	0.31	0.31	0.31	0.31	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Backlash	j _t	arcmin	Standard < 4 / Reduced < 2												
Torsional rigidity	C _t	Nm/arcmin	12	12	12	12	12	11	11	12	12	11	11	8	8
Tilting rigidity	C _K	Nm/arcmin	/												
Max. axial force	F _{amax}	N	1630												
Max. tilting torque (distance from point of rotation to output flange 57.6 mm)	M _{kmax}	Nm	110												
Weight (with resolver, without brake)	m	kg	3.7					3.3							
Operating noise (measured at motor speed of 3000 rpm)	L _{PA}	dB(A)	< 58												
Max. permitted housing temperature	ϑ _{max}	°C	90												
Ambient temperature	ϑ _A	°C	0 to +40												
Protection class			IP65												
Mount. pos.			Any												
Lubrication			Synthetic oil, lubricated for life												
Insulating material class			F												
Paint			Metallic blue 250 and natural cast aluminum												

Dimensions



Electrical connection: Integral sockets, straight or angled, manufactured by Intercontec, speedtec model, series A and B, size 1

without brake

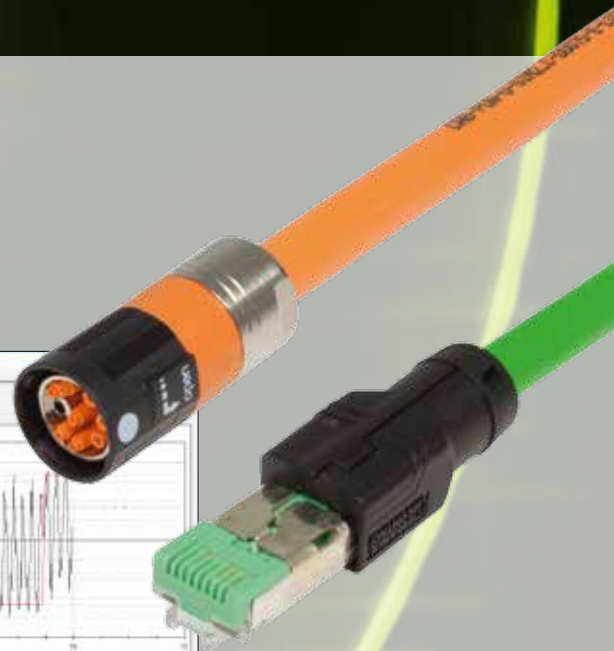
Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16, 20, 25, 28, 35	Resolver	164	24
	EnDat 2.2	189	49
i = 40, 50, 70, 100	Resolver	149	24
	EnDat 2.2	174	49

with brake

Ratio	Motor feedback	Length L0 in mm	Length L1 in mm
i = 16, 20, 25, 28, 35	Resolver	184	24
	EnDat 2.2	209	49
i = 40, 50, 70, 100	Resolver	169	24
	EnDat 2.2	194	49

The background of the page is an abstract composition. It features a horizontal split: the top half is a dark green color with a subtle, fine-grained texture, while the bottom half is a solid, light grey. Overlaid on this background are several concentric circles. A large, thin white circle is centered on the right side of the page. Within this circle, there are several more concentric circles in shades of yellow and light green, creating a tunnel-like or ripple effect. The overall aesthetic is modern and minimalist.

Accessories



Software

MotionGUI

The MotionGUI graphical user interface guides you intuitively during commissioning of your drive system. Diagnoses, optimizations and parametrization of the drive can be performed using numerous functions.

Diagnostic routines and event logging are carried out by means of a real-time clock. This allows condition monitoring as well as integration and maintenance tasks to be performed efficiently and in a time-saving manner.

Functions

- **Diagnosis via the Scope functionality**
- **Loading of cycle parameters via the Motion tasks**
- **Read-out of errors and warnings via the Errors and Warnings function**
- **Monitoring: read-out of the drive parameters in operation, e.g. position, temperature**
- **etc.**

Cables

Pre-terminated lengths

The following pre-assembled cables are available for fast commissioning of your drive system:

- Cables for **voltage supply** of the simco® drive
- **Field bus cables** for CANopen, EtherCAT and PROFINET communication
- Cables for **commissioning**
- **Motor connection cables** for connecting to the servo amplifier.

Further cable lengths are available upon request.



Technical details of the motor connection cables:

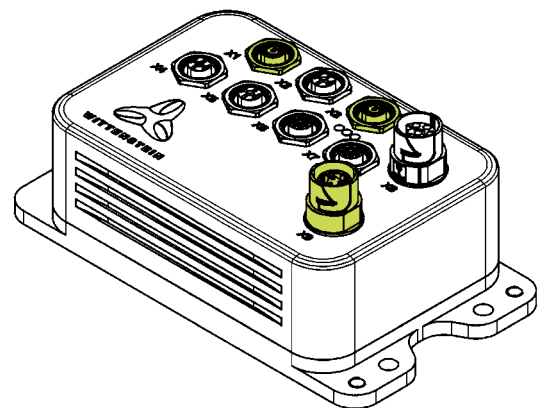
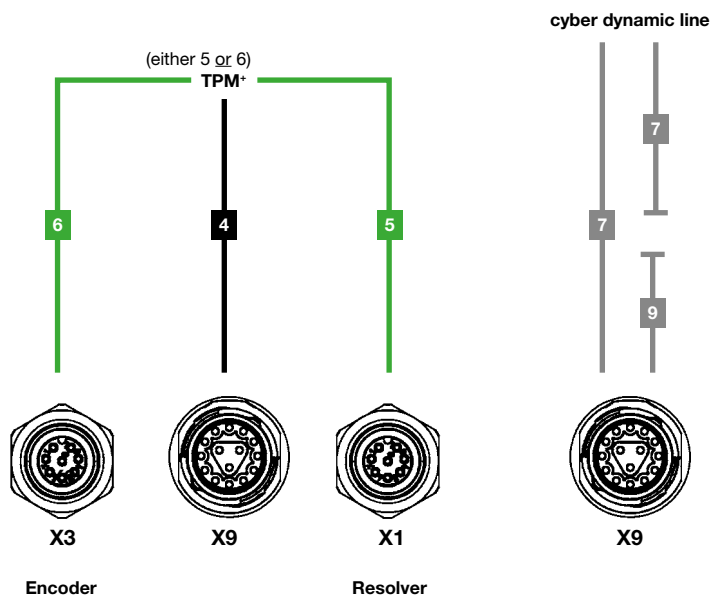
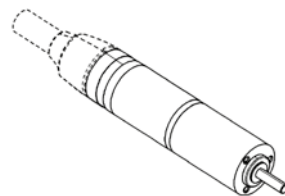
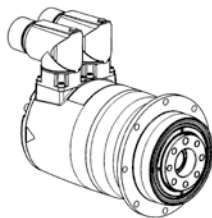
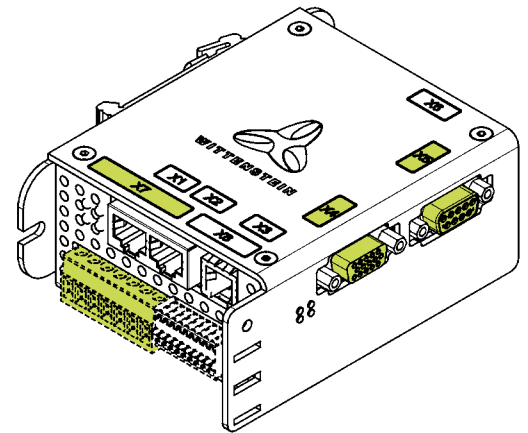
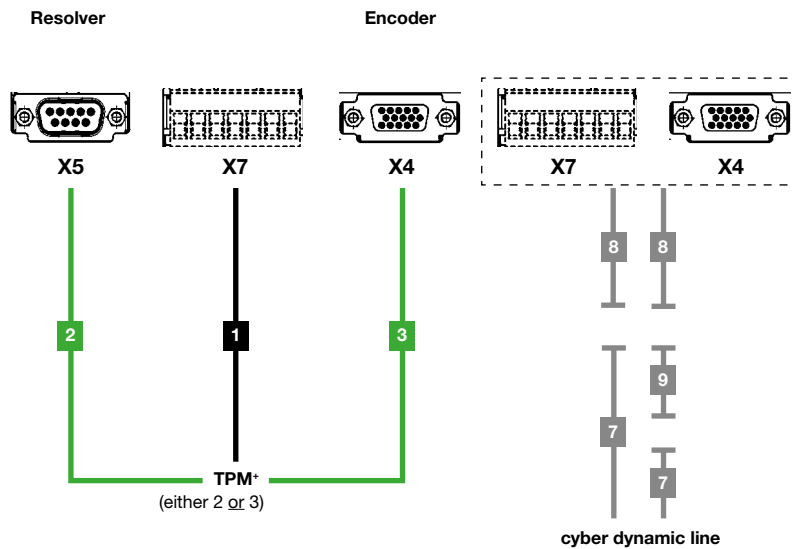
- Temperature range
Cables for TPM+: -30 to 80°C
Cables for cyber® dynamic line: -40 to 70°C
- EMC shielding
- Material: PUR
- Compatible with drag chains

Further technical data is available upon request.

Motor connection cables

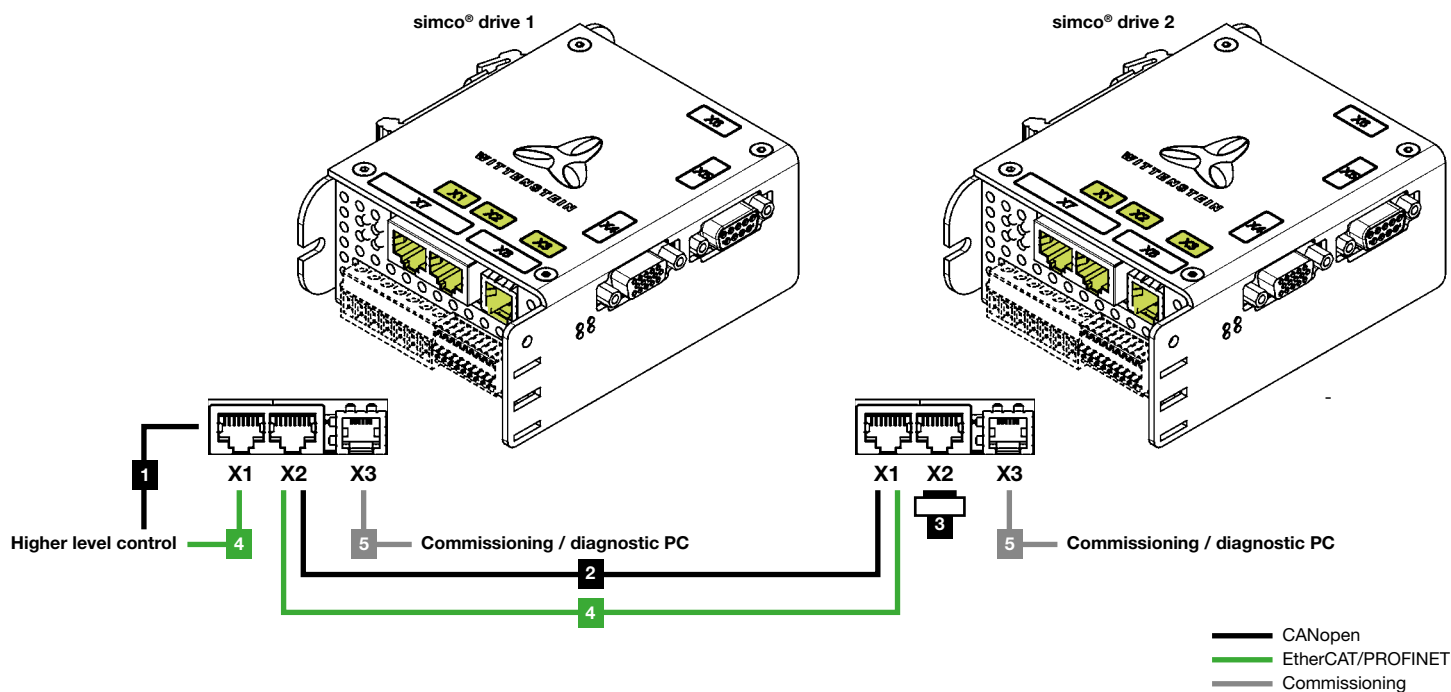
No.	Cable type	Designation	Interfaces		Standard lengths
			Motor	Servo amplifier	
TPM ⁺					
1	Power cable	CAB-POW-U-SIM2-C-D0075-E-LXXXX	itec, series 915	Phoenix Contact connector	2m; 5m; 10m; 15m; 20m
		CAB-POW-U-SIM2-C-D0075-S-LXXXX	speedtec, series 923		
2	Signal cable resolver	CAB-SIG-R-SIM-C-D0000-E-LXXXX	itec, series 615	Sub-D connector, 9-pin	
		CAB-SIG-R-SIM-C-D0000-S-LXXXX	speedtec, series 923		
3	Signal cable encoder	CAB-SIG-W-SIM-C-D0000-E-LXXXX	itec, series 615	Sub-D connector, 15-pin	
		CAB-SIG-W-SIM-C-D0000-S-LXXXX	speedtec, series 923		
4	Power cable	CAB-POW-U-SIM2-F-D0075-E-LXXXX	itec, series 915	itec, series 915	
		CAB-POW-U-SIM2-F-D0075-S-LXXXX	speedtec, series 923		
5	Signal cable resolver	CAB-SIG-R-SIM-F-D0000-E-LXXXX	itec, series 615	M12 connector, 8-pin	
		CAB-SIG-R-SIM-F-D0000-S-LXXXX	speedtec, series 923		
6	Signal cable encoder	CAB-SIG-W-SIM-F-D0000-E-LXXXX	itec, series 615	M12 connector, 8-pin	
		CAB-SIG-W-SIM-F-D0000-S-LXXXX	speedtec, series 923		
cyber dynamic line					
7	Motor connection cable	S/L cable XXXHI-XXXX-BMS0-12/3	Direct cable outlet	itec, series 915	0.5m; 3m
8	Extension cable for IP20	S/L cable XXXHI-XXXX-BAS0-12/3	itec, series 915	Sub-D connector, 15-pin Phoenix Contact connector	0.5m; 3m; 5m; 10m; 15m; 20m
9	Extension cable for IP20	S/L cable XXXHI-XXXX-BVS0-12/3	itec, series 915	itec, series 915	3m; 5m; 10m; 15m; 20m

Overview of motor connection options



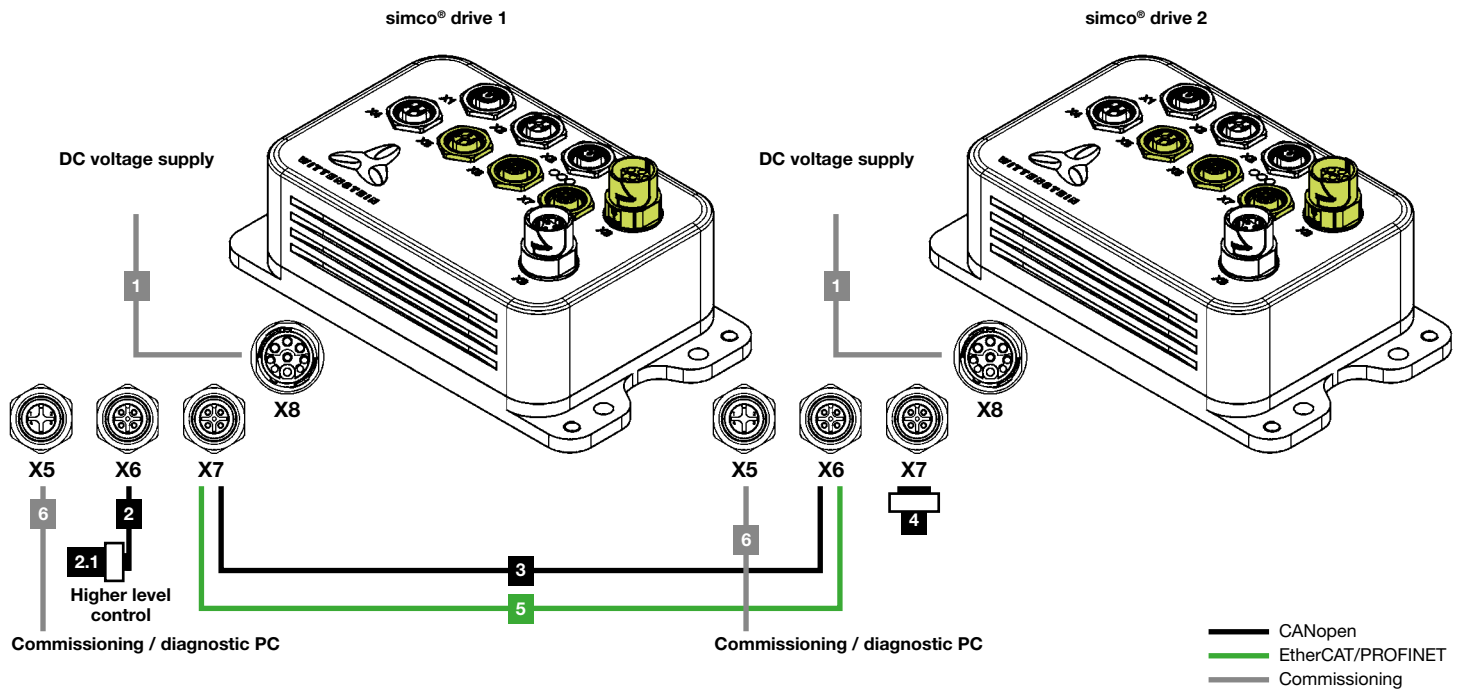
— Power cable
— Signal cable
— Hybrid motor cable

Cables



simco® drive IP20

No.	Type of accessory	Designation	Interfaces		Description	Standard lengths
			Servo amplifier	Control / servo amplifier 2 / PC		
CANopen field bus						
1	CANopen field bus cable	CAB-BUS-CAN-RJ45-FL__-LXXXX	RJ45 connector, 8-pin	Free cable end	-	5 m
2	CANopen field bus extension cable	CAB-BUS-CAN-RJ45-RJ45-LXXXX	RJ45 connector, 8-pin	RJ45 connector, 8-pin	-	0.25 m; 5 m
3	CANopen terminating resistor	CAB-BUS-CAN-RJ45-TERMINAT	-	RJ45 connector, 8-pin	Terminating resistor only necessary for CAN communication	-
EtherCAT / PROFINET field bus cable						
4	EtherCAT / PROFINET field bus cable	CAB-BUS-ETH-RJ45-RJ45-LXXXX	RJ45 connector, 8-pin	RJ45 connector, 8-pin	-	1.5m; 3m; 5m; 7.5m; 10m
Commissioning						
5	Extension cable RS 232	CAB-BUS-RS_-RJ12-SF09-LXXXX	RJ12 connector, 6-pin	Sub-D connector, 9-pin	Connection cable RS 232 for diagnostic purposes, commissioning with MotionGUI	3 m



simco® drive IP65

No.	Type of accessory	Designation	Interfaces		Description	Standard lengths
			Servo amplifier	DC voltage supply / Control / Servo amplifier 2 / PC		
Voltage supply						
1	Voltage supply	CAP-SUP-SIM2010D-F-D0075-LXXXX	itec, series 915	Free cable end	DC voltage supply cable	2 m; 5 m
CANopen field bus						
2	CANopen field bus cable	CAB-BUS-CAN-M12M-FL__-LXXXX	M12 connector, 5-pin, A-coded	Free cable end	-	5 m
2.1	CAN Sub-D connector	SUBCON-PLUS-CAN/PG	-	-	9-pin connector with cable entry and outlet as well as switchable terminating resistor	-
3	CANopen field bus extension cable	CAB-BUS-CAN-M12M-M12M-LXXXX	M12 connector, 5-pin, A-coded	M12 connector, 5-pin, A-coded	-	0.5; 1 m
4	CANopen terminating resistor	CAB-BUS-CAN-M12M-TERMINAT	-	M12 connector, 5-pin, A-coded	Terminating resistor only necessary for CAN communication	-
EtherCAT / PROFINET field bus cable						
5	EtherCAT / PROFINET field bus cable	CAB-BUS-ETH-M12M-M12M-LXXXX	M12 connector, 4-pin, D-coded	M12 connector, 4-pin, D-coded	-	1.5m; 3m; 5m; 10m
Commissioning						
6	Extension cable RS 232	CAB-BUS-RS_-M12M-SF09-LXXXX	M12, 4-pin	Sub-D connector, 9-pin	Connection cable RS 232 for diagnostic purposes, commissioning with MotionGUI	5 m

Order code

simco® drive

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8					
S	I	M	2	0	1	0	D	-	F	C	S	A	-	C	A	0	0	-	0	0	0	0	-	0	0	0	0					
Product range 3 characters (pos. 1-3)			Rated output current 3 characters (pos. 5-7) Number codes 010 = 10 Aeff 002 = 2,5 Aeff			Intermediate circuit voltage 1 character (pos. 4) Number code 2 = 48 V			Housing version 1 character (pos. 10) Letter codes C = Switch cabinet version, IP20 F = Decentralized version, IP65			Field bus interface 2 characters (pos. 15-16) Letter codes CA = CANopen EC = EtherCAT PN = PROFINET			Device generation 1 character (pos. 13) Letter code A = 1st generation			Overload factor 1 character (pos. 12) Letter code S = 2x, internal			Cooling 1 character (pos. 11) Letter codes C = Convection			Safety version 2 characters (pos. 20-21) Number code 00 = STO (certification pending)			Motor encoder return system 2 characters, (pos. 22-23) Number code 00 = Standard EnDat/BiSS/Resolver			Special 4 characters (pos. 25-28) Consecutive numbering 0000 = Standard xxxx = Sequential number, special version		
Voltage supply 1 character (pos. 8) Letter code D = DC voltage			Termination type 2 characters (pos. 17-18) Number code 00 = Standard																													



TPM+

Electr. connection	
Motor size	Electr. connection
064B	W = Angled integral socket, speedtec
	G = Straight integral socket, speedtec
053B	E = Angled integral socket, itec

Order code

TPM+ power cable

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
C A B			-	P O W			-	U	-	S I M 2				-	X	-	D 0 0 7 5					-	E	-	L X X X X				
Cable harness 3 characters (pos. 1-3)			Model 3 characters (pos. 5-7) Letter codes POW = Power cable					Controller manufacturer 4 characters (pos. 11-14) Letter code SIM2 = simco® drive (max. Vint = 48 V)							Controller version 1 character (pos. 16) Letter codes C = IP20 F = IP65					Motor manufacturer 1 character (pos. 24) Letter codes E = Connector, itec (motor size 53 mm) S = Connector, speedtec (motor size 64 mm)					Cable length 5 characters (pos. 26-30) Length L0200 = 2 m L0500 = 5 m L1000 = 10 m L1500 = 15 m				
Power connector assignment 1 character (pos. 9)									Cable cross section 5 characters (pos. 18-22) Letter code D0075 = 0.75 mm ²									Connector size 1.5 U = Universal for all motor feedback											

TPM+ signal cable

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
C	A	B	-	S	I	G	-	X	-	S	I	M	-	C	-	D	0	0	0	0	-	E	-	L	X	X	X	X

Cable harness
3 characters
(pos. 1-3)

Model
3 characters (pos. 5-7)

Letter code
SIG = Signal cable

Controller manufacturer
3 characters (pos. 11-13)

Letter code
SIM = simco® drive

Feedback system
1 character (pos. 9)

Letter codes
R = Resolver
W = EnDat 2.2 absolute encoder,
single-turn / multi-turn

Controller version
1 character (pos. 15)

Letter codes
C = IP20
F = IP65

Cable length
5 characters (pos. 25-29)

Length
L0200 = 2 m
L0500 = 5 m
L1000 = 10 m
L1500 = 15 m

Motor manufacturer
1 character (pos. 23)

Letter codes
E = Connector, itec (motor size 53 mm)
S = Connector, speedtec (motor size 64 mm)

Cable cross section
5 characters (pos. 17-21)

Letter codes
D0000 = Standard for all sizes

Order code

simco® drive power supply

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
C	A	B	-	S	U	P	-	S	I	M	2	0	1	0	D	-	F	-	D	0	0	7	5	-	L	0	5	0	0

Cable harness
3 characters
(pos. 1-3)

Controller manufacturer
8 characters (pos. 9-16)
Letter code
SIM2010 = simco® drive
(2,5 / 10 A nominal current)

Controller version
1 character (pos. 18)
Letter code
F = IP65

Cable length
5 characters (pos. 26-30)
Length
Length in cm:
Note available cable lengths
on page 46 / 47

Cable cross section
5 characters (pos. 20-24)
Letter code
D0075 = 0.75 mm²

Model
3 characters (pos. 5-7)
Letter code
SUP = Voltage supply cable

Fieldbus cable and RS232 connection cable

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7
C	A	B	-	B	U	S	-	X	X	X	-	X	X	X	X	-	X	X	X	X	-	L	X	X	X	X

Cable harness
3 characters
(pos. 1-3)

Model
3 characters (pos. 5-7)
Letter code
BUS = Field bus cable

Cable length
5 characters (pos. 23-27)

Length
Length in cm:
Note available cable lengths
on page 46/47

Control cable end
4 characters (pos. 18-21)

Letter codes
M12M = M12 connector, 5-pin, straight
RJ45 = RJ45 connector, 8-pin
FL__ = Free cable end
SF09 = Sub-D connector, 9-pin

simco® drive cable end
4 characters (pos. 13-16)

Letter codes
M12M = M12 connector, 5-pin, straight
RJ45 = RJ45 connector, 8-pin
RJ12 = RJ12 connector, 6-pin

Type of connection
3 characters (pos. 9-11)

Letter codes
CAN = CANopen field bus cable
RS_ = RS232 connection cable
ETH = EtherCAT/PROFINET field bus cable



ternary[®] All-in-One System



ternary® product overview

ternary® is an intelligent, fully integrated all-in-one positioning system with perfectly adapted components. All components such as motors, electronic systems, sensors, controls, firmware and precision mechanisms are enclosed in a compact housing, opening up new possibilities in the implementation of modular machine concepts. Through the integration of all drive elements, some additional interfaces can be dispensed with and offer a plug & play system.

Areas of application

ternary® positioning drives are available in a rotary and linear design, each with three different variants of brushless motor. The rotary model is delivered with a high-precision planetary gearhead with a number of ratios. The ternary® linear actuators feature a maintenance-free stainless steel actuator rod, which is driven via a ball screw spindle. Thanks to numerous optional field bus interfaces (e.g. Profibus, Ethernet/IP and CAN) the ternary® drive system can be easily integrated in a multitude of system architectures.

Fields of application

- Packaging machines
- Filling and dosing machines
- Feed motions
- Joining applications
- Pick&Place applications
- Valve activation
- Sorting systems

Special technical features

- Plug & Play drive ready for connection
- Simple integration in existing machines and drive and control architectures
- All components are compatible and originate from the same source
- Costs easy to calculate
- Maintenance-free components
- All components are enclosed in a robust metal housing and protected from external influences
- Simple field bus connection and commissioning
- Optional PLC function modules for easy integration
- Optional programming software for simple parameter configuration and implementation
- High-quality multiturn absolute encoder available on request
- Custom programming of position, speed, acceleration and power

System benefits

- Modular machine design
- Fewer cables and smaller switch cabinets reduce costs
- Reduced energy costs through lower switch cabinet cooling requirement
- Lower commissioning costs

Linear actuators

At a glance:

- Maximum torque up to 35 Nm
- Maximum speed up to 5000 rpm depending on the standard gearhead ratio 1, 5, 10 and 25:1

Rotary actuators

At a glance:

- Stroke lengths from 25 to 300 mm
- Maximum feed force up to 1000 N
- Maximum speed up to 1000 mm/s





Benefits at a glance

- **Simple integration** in existing machines and drive and control architectures
- All components are compatible and originate **from a single source**
- **Costs** easy to calculate
- **Drive ready for connection**
- **Cost reduction** through fewer cables and no switch cabinet
- **Maintenance-free**
- All components are enclosed in a robust metal housing **and protected from external influences**
- **Simple field bus connection** and commissioning
- No additional **cooling system** required
- Optional PLC function modules for **easy integration**
- **Simple parameter configuration** and implementation through optional TET programming software
- **Profibus hardware** address switch available for easy commissioning and automatic initialization
- High-quality **multiturn absolute encoder** available on request
- **Custom programming** of position, speed, acceleration and power
- **Sophisticated firmware** allows for easy adaptation of parameters to virtually all applications



Source: DESOTEC GmbH Sondermaschinenbau

Applications

Closure applications necessitate highly compact systems that ensure precise force and torque requirements and short response times, as well as featuring high rotation dynamics and linear movements. The ternary® is tailored for such applications. As a decentralized drive system, ternary enables® smaller switch cabinets and reduced wiring requirements.

Rotary actuator with STP motor type

Technical data	Unit	TRSA046AA*-XXX*05	TRSA046AA*-XXX*10	TRSA046AA*-XXX*25
Motor type		Brushless servo motor (STP)		
Gearhead ratio		5	10	25
Max. torque	Nm	1.4	2.8	6.9
Max. speed (output)	rpm	800	400	160
Dimensions	mm	See dimension sheets on the following pages		
Shaft diameter	mm	12, with key		
Gearhead torsional backlash	arcmin	< 12	< 12	< 15
Motor mass moment of inertia	$\times 10^{-7}$ kgm ²	83		
Gearhead mass moment of inertia	$\times 10^{-7}$ kgm ²	59	59	55
Permitted lateral force on the shaft	N	650		
Permitted axial force on the shaft	N	700		
Protection class		IP64 ¹⁾		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60		
Air humidity	%	Operation and storage: 90% RH _{max}		
Supply voltage/current	V/A	24 V DC $\pm$ 10% / 1.5 A (with brake 1.7 A)		
Logic supply	V/A	24 V / 0.2 A		
Interfaces		RS485 + PIO / Profibus DP + PIO / DeviceNet + PIO / CANopen + PIO / EtherNet/IP + PIO		
PIO interface		Inputs: 8, outputs: 5		
Internally stored motion profiles		16		
Control		Closed-loop control, programming of position/speed/acceleration/torque		

¹⁾ IP67 with air purge connection available on request

Encoder system

Incremental encoder resolution (relates to the motor output)	Resolution/rev	800
	arcmin	27

Optional holding brake

The ternary® rotary actuator can be supplied with an optional holding brake, which is integrated in the mechatronic unit. Technical data, additional dimensions and mass are as follows:

Type designation	TR*A046AA* -XXX ■ **	■ = N without holding brake	■ = B with holding brake
-------------------------	----------------------	-----------------------------	--------------------------

	Unit	TRSA046AA*-XXXB05	TRSA046AA*-XXXB10	TRSA046AA*-XXXB25
holding torque	Nm	0.96	1.9	4.75
Additional length	mm	26		
Additional mass	kg	0.23		
Additional mass moment of inertia	$\times 10^{-7}$ kgm ²	3.2		

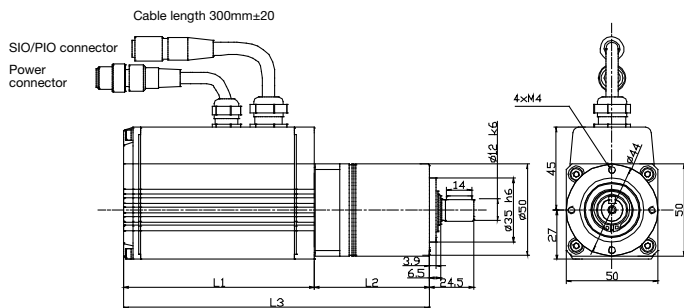
Note: The static holding brake is not suitable for dynamic braking.

The brake was designed exclusively for retaining the position of the actuator when disconnected from the power.

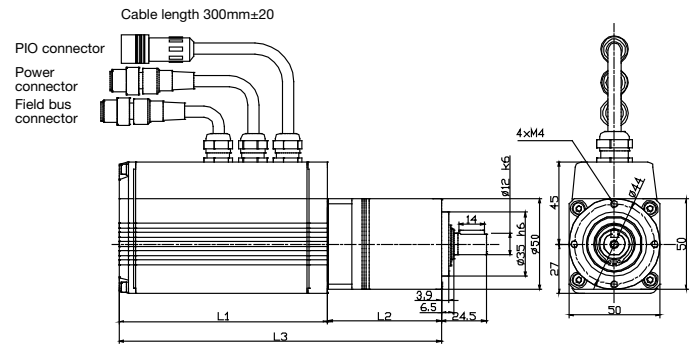
TRSA046 with gearhead

Type designation	Interface	Gearhead ratio	L1 [mm]		L2 [mm]	L3 [mm]		Mass [kg]	
			Without brake	With brake		Without brake	With brake	Without brake	With brake
TRSA046AAB-XXX*05 / *10	RS485	5 or 10	104	130	63	167	193	1.55	1.78
TRSA046AA*-XXX*05 / *10	All field buses		114	140		177	203	1.6	1.83
TRSA046AAB-XXX*25	RS485	25	104	130	78.5	182.5	208.5	1.75	1.98
TRSA046AAX-XXX*25	All field buses		114	140		192.5	218.5	1.8	2.03

RS485 interface TRSA046AAB

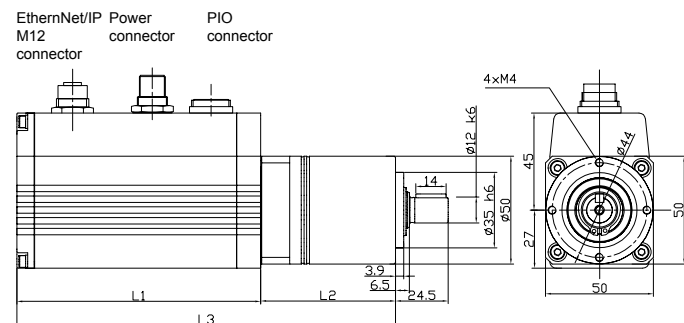


DeviceNet Interface TRSA046AAQ

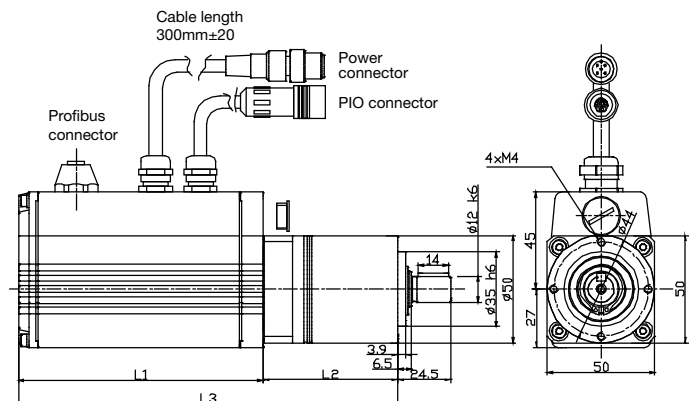


CANopen interface TRSA046AAS

EtherNet/IP interface TRSA046AAH



Profibus DP interface with address switch TRSA046AAU



Note: The drawings shown may differ from the original in some isolated cases. Subject to change.

Rotary actuator with BLM motor type

Technical data	Unit	TRSB046B**-XXX*05	TRSB046B**-XXX*10	TRSB046B**-XXX*25
Motor type		Brushless AC servo motor (BLM)		
Gearhead ratio		5	10	25
Permanent torque	Nm	1.0	2.0	5.0
Max. torque	Nm	3.46	6.39	11.5
Max. speed (output)	rpm	1000	500	200
Dimensions	mm	See dimension sheets on the following pages		
Shaft diameter	mm	12, with key		
Gearhead torsional backlash	arcmin	< 12	< 12	< 15
Motor mass moment of inertia	x 10 ⁻⁷ kgm ²	36.5		
Gearhead mass moment of inertia	x 10 ⁻⁷ kgm ²	59	59	55
Permitted lateral force on the shaft	N	650		
Permitted axial force on the shaft	N	700		
Protection class		IP64 ¹⁾		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60		
Air humidity	%	Operation and storage: 90% RH _{max}		
Supply voltage/current	V/A	48 V DC ± 10% / 9 A max ²⁾		
Logic supply	V/A	12-48 V / 0.2 A		
Interfaces		RS485+PIO/Profibus DP+PIO+RS485/DeviceNet+PIO+RS485/CANopen+PIO+RS485/EtherNet/IP+PIO+RS485		
PIO interface		Inputs: 8, outputs: 5		
Internally stored motion profiles		64		
Control		Closed-loop control, programming of position/speed/acceleration/torque		

¹⁾ IP67 with air purge connection available on request

²⁾ Drives for 24 V DC ±10% / 6 A with reduced performance data are also available on request

Encoder system Two encoder systems are available, an incremental encoder and a multturn absolute encoder.

Type designation	TR*B046B■* -XXX**	■ = B Incremental encoder	■ = C Absolute encoder
-------------------------	-------------------	---------------------------	------------------------

Incremental encoder resolution (relates to the motor output)	Resolution/rev	2000
	arcmin	10.8

Absolute encoder resolution (relates to the motor output)	Resolution/rev	65536
	arcmin	0.33
	multiturn	4096

Optional holding brake

The ternary® rotary actuator can be supplied with an optional holding brake, which is integrated in the mechatronic unit. Technical data, additional dimensions and mass are as follows:

Type designation	TR*B046B**-XXX ■ **	■ = N without holding brake	■ = B with holding brake
-------------------------	---------------------	-----------------------------	--------------------------

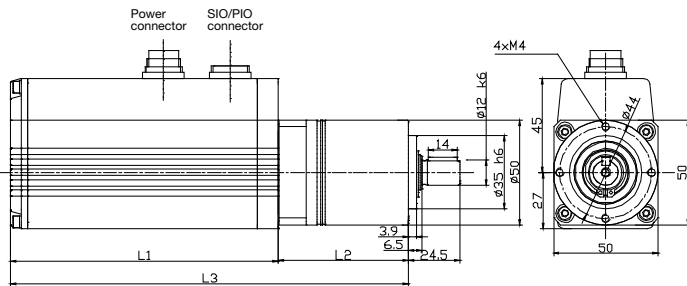
	Unit	TRSB046B**-XXXB05	TRSB046B**-XXXB10	TRSB046B**-XXXB25
holding torque	Nm	1.65	3.3	8.25
Additional length	mm	26.5		
Additional mass	kg	0.18		
Additional mass moment of inertia	x10 ⁻⁷ kgm ²	4.0		

Note: The static holding brake is not suitable for dynamic braking. The brake was designed exclusively for retaining the position of the actuator when disconnected from the power.

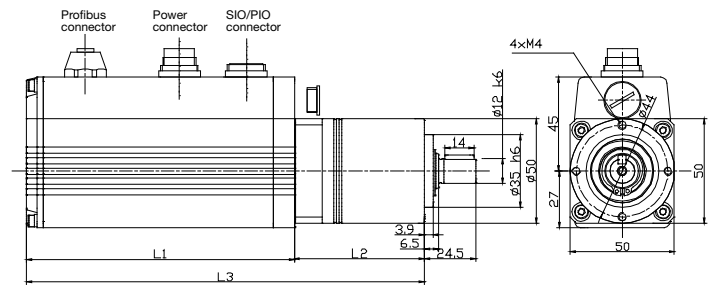
TRSB046 with gearhead

Type designation		Gearhead ratio	L1 [mm]		L2 [mm]	L3 [mm]		Mass [kg]	
			Without brake	With brake		without brake	With brake	Without brake	With brake
Rotary actuator with gearhead and incremental encoder TRSB046BB*-XXX									
TRSB046BB*-XXX*05 / *10	All field buses	5 or 10	128.5	155	63	191.5	218	1.55	1.73
TRSB046BBX-XXX*25	All field buses	25	128.5	155	78.5	207	233.5	1.75	1.93
Rotary actuator with gearhead and absolute encoder TRSB046BC*-XXX									
TRSB046BC*-XXX*05 / *10	All field buses	5 or 10	139	165	63	202	228	1.65	1.83
TRSB046BCX-XXX*25	All field buses	25	139	165	78.5	217.5	243.5	1.85	2.03

RS485 interface TRSB046B*B



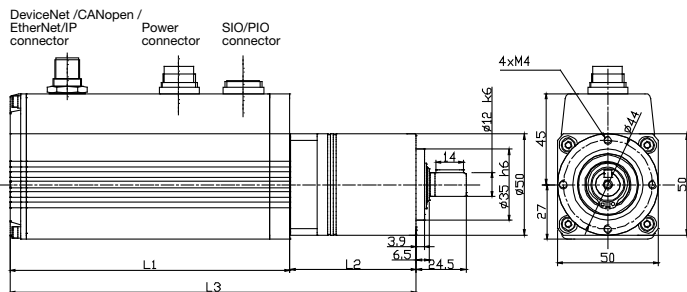
Profibus DP interface with address switch TRSB046B*U



DeviceNet interface TRSB046B*Q

CANopen interface TRSB046B*S

EtherNet/IP interface TRSB046B*H



Note: The drawings shown may differ from the original in some isolated cases. Subject to change.

Rotary actuator with BLM high power motor type

Technical data	Unit	TRSB267B**-xxx*05	TRSB267B**-xxx*10	TRSB267B**-xxx*25
Motor type		Brushless AC servo motor (BLM high power)		
Gearhead ratio		5	10	25
Permanent torque	Nm	3.0	6.5	16.4
Max. torque	Nm	10.8	22.0	35.0
Max. speed (output)	rpm	1000	500	200
Dimensions	mm	See dimension sheets on the following pages		
Shaft diameter	mm	16, with key		
		LP070	LP070	LP070
Gearhead torsional backlash	arcmin	< 12	< 12	< 15
Motor mass moment of inertia	x 10 ⁻⁷ kgm ²	340		
Gearhead mass moment of inertia	x 10 ⁻⁷ kgm ²	230	210	220
Permitted lateral force on the shaft	N	1450		
Permitted axial force on the shaft	N	1550		
Protection class		IP64 ¹⁾		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60		
Air humidity	%	20 bis 90 (non-condensing)		
Supply voltage/current	V/A	48 V DC ± 10% / 24.2 Amax ²⁾		
Logic supply	V/A	12-48 V / 0.4 Amax		
Interfaces		RS485+PIO/Profibus DP+PIO+RS485/EtherNet/IP+PIO+RS485/DeviceNet+PIO+RS485/CANopen+PIO+RS485		
PIO interface		Inputs: 8, outputs: 5		
Internally stored motion profiles		64		
Control		Closed-loop control, programming of position/speed/acceleration/feed force		

¹⁾ Also available in protection class IP67 with air purge connection

²⁾ The actuator can also be operated as a 24 V DC version with reduced performance data

Encoder system Two encoder systems are available, an incremental encoder and an inductive absolute encoder.

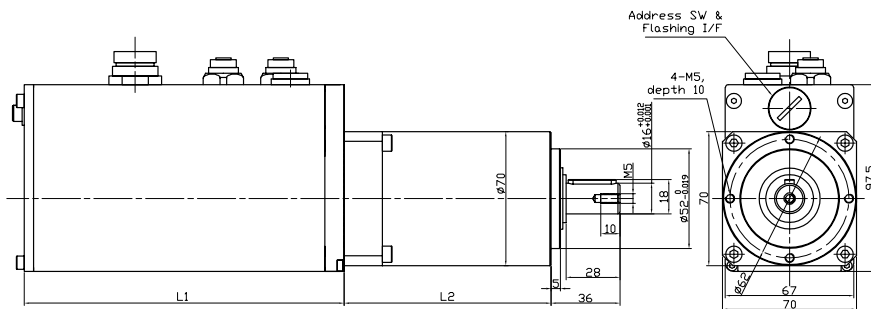
Type designation	TRBB267B■* -XXX***	TRSB267B■* -XXX***	■ = B Incremental encoder	■ = C Absolute encoder
-------------------------	--------------------	--------------------	---------------------------	------------------------

	Resolution/revolutions	arcmin	multiturn
Incremental encoder resolution (relates to the motor output)	2000	10.8	–
Absolute encoder resolution (relates to the motor output)	65536	0.33	4096

TRSB267B with gearhead

Type designation	Gearhead ratio	L1 [mm]		L2 [mm]	Mass [kg]	
		Without brake	With brake		Without brake	With brake
TRSB267B**-XXX-*05	5	167	198	88	4.1	4.7
TRSB267B**-XXX-*10	10	167	198	88	4.1	4.7
TRSB267B**-XXX-*25	25	167	198	108	4.5	5.1

TRSB267B



Linear actuator with STP motor type

Technical data	Unit	TLSA046AA*-3XX*01	TLSA046AA*-6XX*01	TLSA046AA*-CXX*01
Motor type		Brushless servo motor (STP)		
Screw pitch	mm	3	6	12
Stroke length	mm	25, 50, 75, 100, 150, 225, 300		
Max. feed force	N	600	300	150
Max. movement speed	mm/s	225	450	900
Dimensions	mm	See dimension sheets on the following pages		
Actuator rod dimensions	mm			
Backlash without load	mm	0.05		
Repeat accuracy	mm	± 0.0045	± 0.009	± 0.018
Permitted torsional torque on actuator rod	Nm	0.5 (depending on position)		
Protection class		IP65 ¹⁾		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60		
Air humidity	%	Operation and storage: 90% RH _{max}		
Supply voltage/current	V/A	24 V DC ± 10% / 1.5 A (with brake 1.7 A)		
Logic supply	V/A	24 V / 0.2 A		
Interfaces		RS485 + PIO / Profibus DP + PIO / DeviceNet + PIO / CANopen + PIO / EtherNet/IP + PIO		
PIO interface		Inputs: 8, outputs: 5		
Internally stored motion profiles		16		
Control		Closed-loop control, programming of position/speed/acceleration/feed force		

¹⁾ IP67 with air purge connection available on request

Encoder system

Linear resolution with incremental encoder (screw pitch/800)	Unit	TLSA046AA*-3XX*01	TLSA046AA*-6XX*01	TLSA046AA*-CXX*01
	µm	3.75	7.5	15

Optional holding brake

The ternary® linear actuator can be supplied with an optional holding brake, which is integrated in the mechatronic unit. Technical data, additional dimensions and mass are as follows:

Type designation	TLSA046AA* -XXX■01	■ = N without holding brake	■ = B with holding brake
-------------------------	--------------------	-----------------------------	--------------------------

	Unit	TLSA046AA*-3XXB01	TLSA046AA*-6XXB01	TLSA046AA*-CXXB01
Holding force	N	600	300	150
Additional length	mm	26		
Additional mass	kg	0.23		

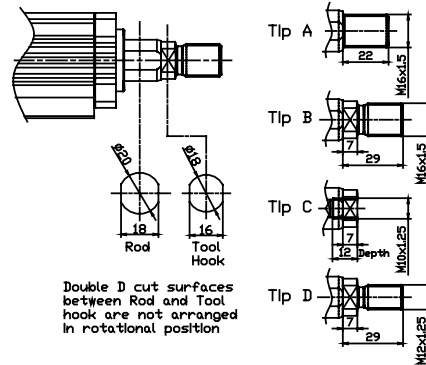
Note: The static holding brake is not suitable for dynamic braking.

The brake was designed exclusively for retaining the position of the actuator when disconnected from the power.

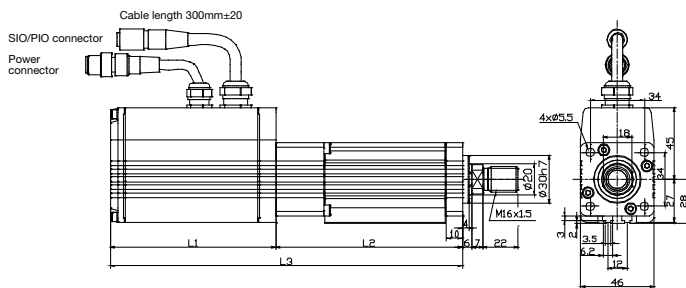
Selectable attachment parts for the actuator rod

Attached components	
Tip A	Outer thread M16 x 1.5
Tip B	Outer thread M16 x 1.5 with double D profile
Tip C	Inner thread M10 x 1.25 with double D profile
Tip D	Outer thread M12 x 1.25 with double D profile

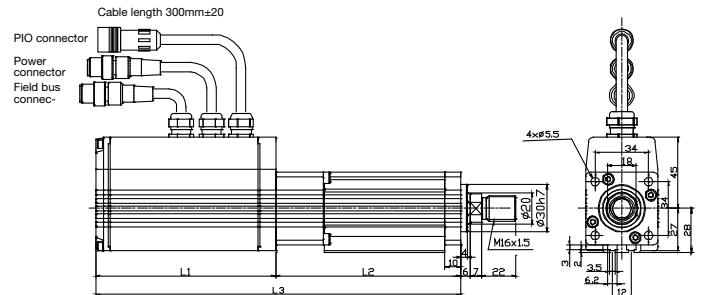
Standard attached part tip B is always used unless otherwise requested Double D profile: Adjustable wrench attachment for secure attachment of parts to the actuator rod



RS485 interface TLSA046AAB

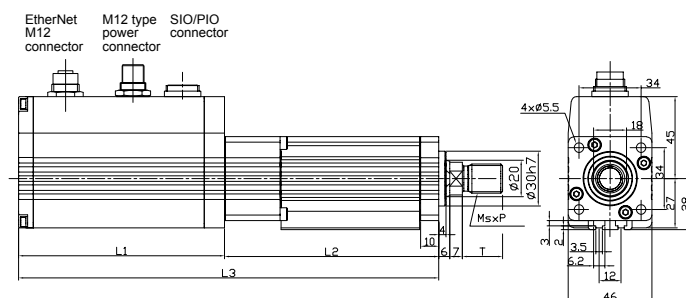


DeviceNet interface TLSA046AAQ

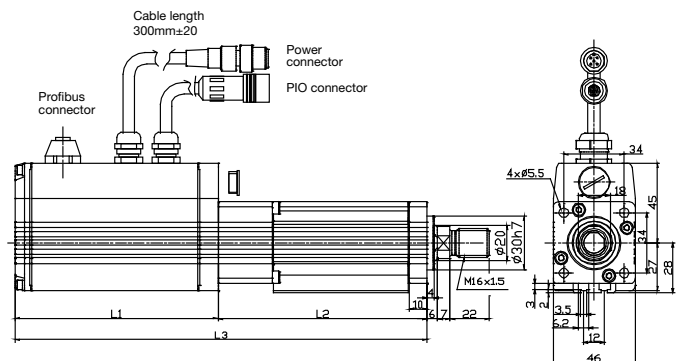


CANopen interface TLSA046AAS

EtherNet/IP interface TLSA046AAH



Profibus DP interface with address switch TLSA046AAU



Note: The drawings shown may differ from the original in some isolated cases. Subject to change.

Linear actuator with BLM motor type

Technical data	Unit	TLSB046B**-3XX*01	TLSB046B**-6XX*01	TLSB046B**-CXX*01
Motor type		Brushless AC servo motor (BLM)		
Screw pitch	mm	3	6	12
Stroke length	mm	25, 50, 75, 100, 150, 225, 300		
Permanent feed force	N	470	240	100
Max. feed force	N	700	1000 ¹⁾	370
Max. movement speed	mm/s	250	500	1000
Dimensions	mm	See dimension sheets on the following pages		
Actuator rod dimensions	mm			
Backlash without load	mm	0.05		
Repeat accuracy	mm	± 0.0045	± 0.009	± 0.018
Permitted torsional torque on actuator rod	Nm	0.5 (depending on position)		
Protection class		IP65 ²⁾		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60		
Air humidity	%	Operation and storage: 90% RH _{max}		
Supply voltage/current	V/A	48 V DC ± 10% / 9 A max		
Logic supply	V/A	12-48 V / 0.2 A		
Interfaces		RS485+PIO/Profibus DP+PIO+RS485/DeviceNet+PIO+RS485/CANopen+PIO+RS485/EtherNet/IP+PIO+RS485		
PIO interface		Inputs: 8, outputs: 5		
Internally stored motion profiles		64		
Control		Closed-loop control, programming of position/speed/acceleration/feed force		

¹⁾ More durable HCC cylinders (High Capacity Cylinder) are available for a screw pitch of 3 mm on request. The maximum feed force of cylinders with a stroke length of 300 mm is limited to 700 N due to the permitted buckling stress.

²⁾ IP67 with air purge connection available on request

Encoder system Two encoder systems are available, an incremental encoder and a multiturn absolute encoder.

	Unit	TLSB046B**-3XX*01	TLSB046B**-6XX*01	TLSB046B**-CXX*01
Linear resolution with incremental encoder TLSB046BB* (screw pitch/2000)	µm	1.5	3	6
Linear resolution with absolute encoder TLSB046BC* (screw pitch/65536)	µm	0.046	0.092	0.183

Optional holding brake

The ternary® linear actuator can be supplied with an optional holding brake, which is integrated in the mechatronic unit. Technical data, additional dimensions and mass are as follows:

Type designation TLSB046B**-XXX■01	■ = N without holding brake	■ = B with holding brake
---	-----------------------------	--------------------------

	Unit	TLSB046B**-3XXB01	TLSB046B**-6XXB01	TLSB046B**-CXXB01
Holding force	N	600	300	150
Additional length	mm	26.5		
Additional mass	kg	0.18		

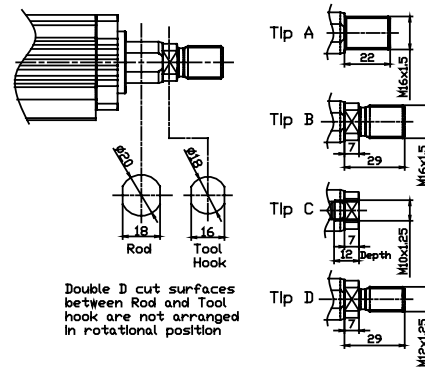
Note: The static holding brake is not suitable for dynamic braking.

The brake was designed exclusively for retaining the position of the actuator when disconnected from the power.

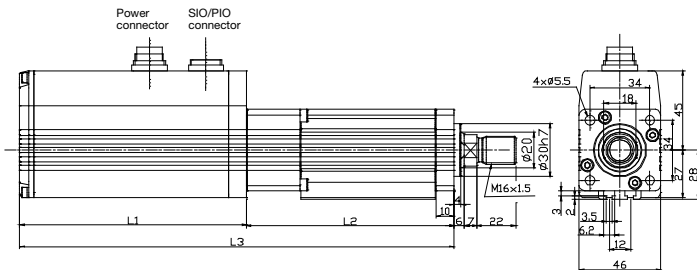
Selectable attachment parts for the actuator rod

Attached components	
Tip A	Outer thread M16 x 1.5
Tip B	Outer thread M16 x 1.5 with double D profile
Tip C	Inner thread M10 x 1.25 with double D profile
Tip D	Outer thread M12 x 1.25 with double D profile

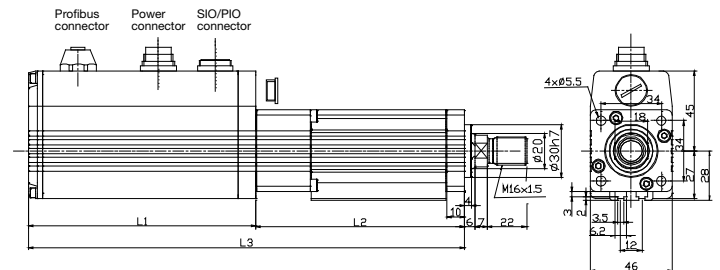
Standard attached part tip B is always used unless otherwise requested
 Double D profile: Adjustable wrench attachment for secure attachment of parts to the actuator rod



RS485 interface TLSB046B*B



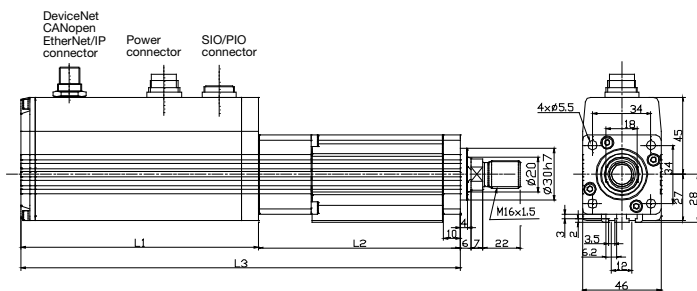
Profibus DP interface with address switch TLSB046B*U



DeviceNet interface TLSB046B*Q

CANopen interface TLSB046B*S

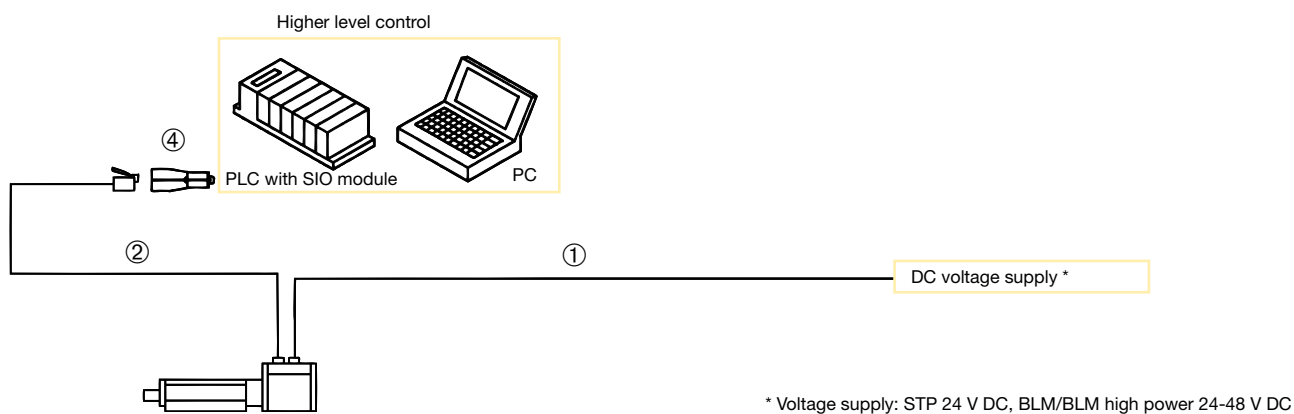
EtherNet/IP interface TLSB046B*H



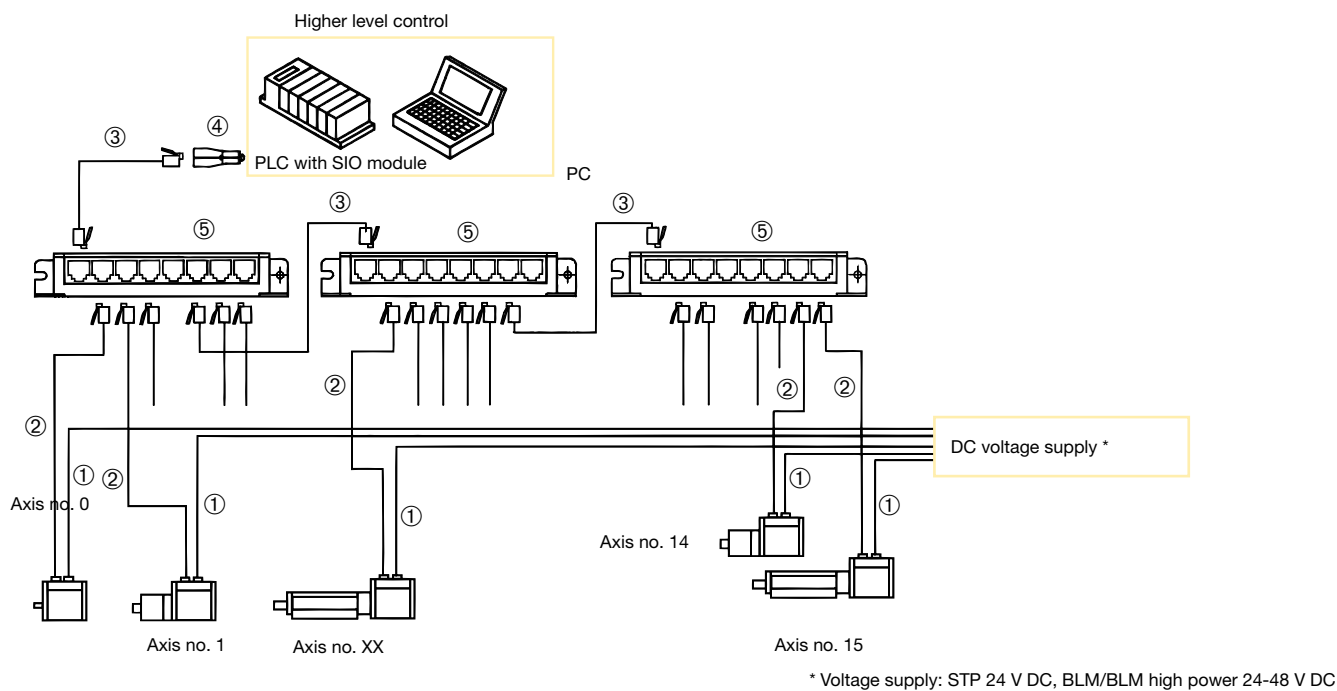
Note: The drawings shown may differ from the original in some isolated cases. Subject to change.

Cable accessories

Single-axis control with serial RS485 interface



Multi-axis control with serial RS485 interface



Connection accessories

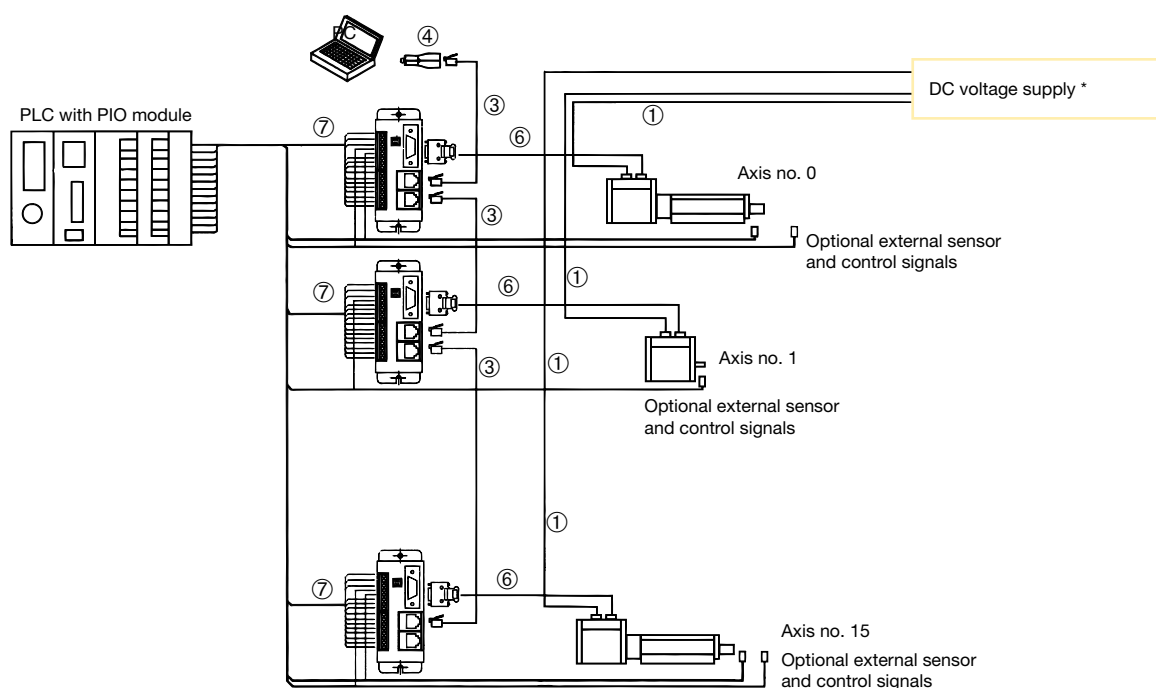
Motor type	No.	Description	Order codes
STP	1	24 V supply cable for STP	TCC 001-001-***R
STP	2	Serial command cable	TCC 002-005-***R
BLM	1	24-48 V supply cable for BLM	TCC 001-007-***R1-PUR
BLM high power	1	24-48 V supply cable for BLM high power	TCC 001-015-***
BLM/BLM high power	2	Serial command cable	TCC 002-024-***R1-PVC
STP/BLM/BLM high power	3	Serial daisy chain command cable	TCC 002-001-***R
STP/BLM/BLM high power	4	Bus converter RS485 to RS232	TBG 001-001
STP/BLM/BLM high power	4	Bus converter RS485 to USB	TBG 001-002
STP/BLM/BLM high power	5	Serial chaining terminal	TBG 002-004

*** indicates the cable length, available in:	
1 m	010
2 m	020
5 m	050
10 m	100
15 m	150

Note: The connection diagrams are only examples. Please see technical documentation for the exact geometric dimensions.

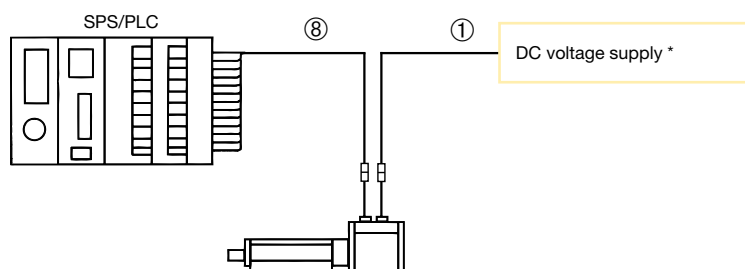
Cable accessories

Multi-axe control with serial and parallel interface



* Voltage supply: STP 24 V DC, BLM/BLM high power 24-48 V DC

Single-axe control with parallel wiring to an SPS/PLC



* Voltage supply: STP 24 V DC, BLM/BLM high power 24-48 V DC

Connection accessories

Motor type	No.	Description	Order codes
STP	1	24 V supply cable for STP	TCC 001-001-***R
STP	6	Serial command cable	TCC 002-008-***R
STP	8	Serial/Parallel command cable	TCC 002-009-***R
BLM	1	24-48 V supply cable for BLM	TCC 001-007-***R1-PUR
BLM high power	1	24-48 V supply cable for BLM high power	TCC 001-015-***
BLM/BLM high power	6	Serial command cable	TCC 002-020-***R1-PUR
BLM/BLM high power	8	Serial/Parallel command cable	TCC 002-022-***R1-PUR
STP/BLM/BLM high power	3	Serial daisy chain command cable	TCC 002-001-***R
STP/BLM/BLM high power	4	Bus converter RS485 to RS232	TBG 001-001
STP/BLM/BLM high power	4	Bus converter RS485 to USB	TBG 001-002
STP/BLM/BLM high power	7	Serial/Parallel chaining board	TBG 002-003-NC

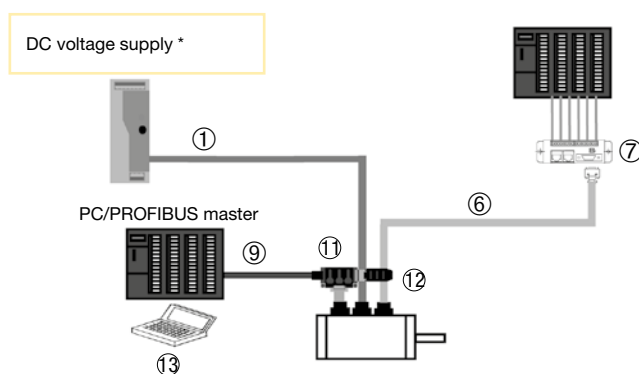
*** indicates the cable length, available in:	
1 m	010
2 m	020
5 m	050
10 m	100
15 m	150

Note: The connection diagrams are only examples. Please see technical documentation for the exact geometric dimensions.

Cable accessories / Software

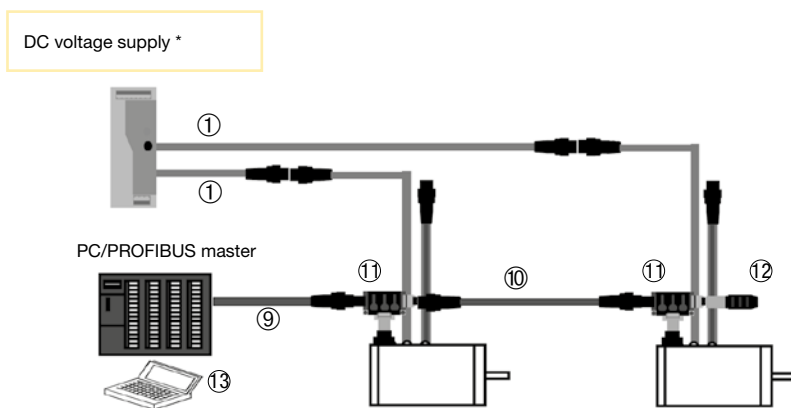
Field bus connection with DeviceNet, CANopen or Profibus DP

Single-axe control with parallel I/Os and field bus connection



* Voltage supply: STP 24 V DC, BLM/BLM high power 24-48 V DC

Multi-axe control with field bus connection



* Voltage supply: STP 24 V DC, BLM/BLM high power 24-48 V DC

Connection accessories

No.	Description	Order codes
1	24 V supply cable for STP	TCC 001-001-***R
1	24-48 V supply cable for BLM	TCC 001-007-***R1-PUR
1	24-48 V supply cable for BLM high power	TCC 001-015-***
6	Parallel command cable for STP	TCC 002-012-***R
6	Serial/Parallel command cable for BLM/BLM high power	TCC 002-020-***R1-PUR
7	Serial/Parallel chaining board	TBG 002-003-NC

*** indicates the cable length, available in:	
1 m	010
2 m	020
5 m	050
10 m	100
15 m	150

Connection accessories

Interface	No.	Description	Order codes
Profibus DP	9	Profibus cable	TCC 002-018-***R
Profibus DP	10	Profibus extension cable	TCC 002-016-***R
Profibus DP	11	Profibus T connecting element ¹⁾	TBG 002-007
Profibus DP	12	Profibus terminating resistor	TBG 002-008
DeviceNet/CANopen	9	Field bus cable	TCC 002-013-***R
DeviceNet/CANopen	10	Field bus extension cable	TCC 002-014-***R
DeviceNet/CANopen	11	Field bus T connecting element	TBG 002-005
DeviceNet/CANopen	12	Field bus terminating resistor	TBG 002-006
DeviceNet/CANopen	13	Beckhoff PLC function modules for STP	TFB CANopenV01

¹⁾ Not necessary for BLM high power as already integrated

Note: The connection diagrams are only examples. Please see technical documentation for the exact geometric dimensions.

Cable accessories for EtherNet/IP

No.	Description	Order codes
9	EtherNet/IP command cable, M12 to RJ45	TCC 002-025-***R
9	EtherNet/IP command cable, M12 to M12	TCC 002-026-***R
9	EtherNet/IP command cable, RJ45 to RJ45	TCC 002-027-***R
14	Converter, M12 to RJ45	TBG 002 012
15	Switch cabinet version M12 to M12	TBG 002 013

*** indicates the cable length, available in:	
1 m	010
2 m	020
5 m	050
10 m	100
15 m	150

TET setup software

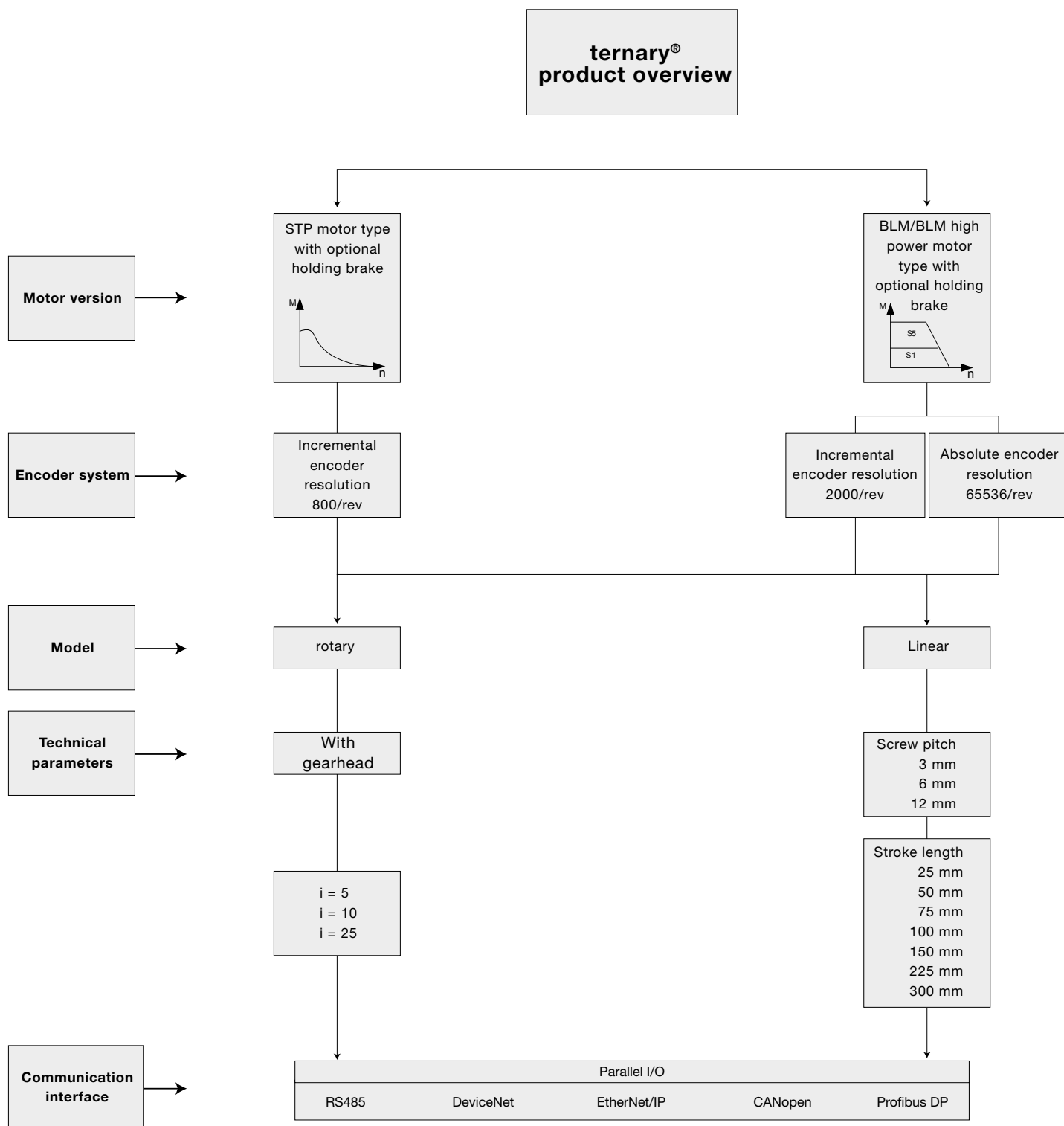
Windows-based TET software is an efficient solution for the quick, easy and convenient setup and implementation of ternary® actuators via a serial interface. In addition to the rapid adjustment of important technical actuator parameters, movement parameter records can be optimized and modified via the internal oscilloscope memory function. A documentation and archiving function also offers the advantage of tracing any modifications made.

Description	Order code
TET setup software, English	TET 002-001

Note: TET setup software is not designed to control a machine permanently. No TET software is required for drives with field bus interfaces (Profibus, CANopen, DeviceNet, EtherNet/IP).



Product overview / Order codes



ternary®

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9		
T	L	S	A	0	4	6	A	A	B	-	3	0	2	N	0	1	-	X		
Actuator model TLS – Linear drive (not for BLM high power) TRS– Rotary actuator with gearhead			Motor type A: STP B: BLM/BLM high power			Flange 046 for STP/PLM 267 for BLM high power			Motor version A: STP B: BLM E: BLM high power			Stroke length XX = not applicable because rotary actuator 02 = 25 mm 05 = 50 mm 07 = 75 mm 10 = 100 mm 15 = 150 mm 22 = 225 mm 30 = 300 mm			Optional holding brake N = Without brake B = With brake			Configuration index Determined by WITTENSTEIN motion control.		
										Screw pitch X = not applicable because rotary actuator 3 = 3 mm/revolution 6 = 6 mm/revolution C = 12 mm/revolution			Gearhead ratio 01 = No gearhead 05 = Transmission ratio 1:5 10 = Transmission ratio 1:10 25 = Transmission ratio 1:25							
																			Communication interface B: RS485+PIO H: EtherNet/IP+PIO+RS485* Q: DeviceNet+PIO+RS485* S: CANopen+PIO+RS485* U: Profibus DP+PIO+RS485*	
									Feedback A: 800 P/rev encoder for STP motor type B: 2000 P/rev encoder for BLM motor type C: 65536 P/U absolute encoder for BLM motor type											



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Our service concept continues to raise the bar for service quality. We are there for you, from the initial concept and throughout the entire life cycle of your application.

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Consultation & design Info & CAD-Finder customer training	cymex® sizing software Engineering Sensors cymex® Statistics	Instructions for use Commissioning Pick-up & return service Repair service Preventive maintenance	Modernization service

Contact data

PRE-SALES	AFTER-SALES
Support hotline	Service hotline

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motion control

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