

More productive  
More efficient  
More precise

## TPMA/TPM+ product range

### Rotary Servo Actuators





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A system functions best when all the individual parts are integrated perfectly. The harmonious combination of motors, precision gearheads, electronics, sensors and software integrated in bus-compatible, electromechanical rotary and linear servo systems manufactured by WITTENSTEIN motion control GmbH is more than impressive. Integration plays an innovative role here and is a decisive factor in increasing power density and dynamics.

# Overview of the **TPMA/TPM+ product range**

## **TPM product declaration\***

### **Actuators**

The TPM+ product family 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, including genuine benefits in terms of length.

### **Motors**

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

### **Gearheads**

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

## **TPM+: 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. For maximum precision, dynamics and extra 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 as well as reducing energy consumption and investment costs for the overall drive train.

### **More precise ...**

Two negatives make a positive: 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.

#### **Other features at a glance:**

Different encoder systems and permanent magnet holding brake available

Torsional backlash can be reduced to less than 1 arcmin

UL version as standard

Pre-assembled cables available for more than 25 servo controllers

Special instructions for more than 25 servo controllers guarantee easy setup

Electrical connections on the dynamic and power versions feature convenient bayonet connectors

Direct attachment of drive components (pinion, belt pulley, indexing table) to standardized output flange

Robust output bearing eliminates the need for additional bearing points

The TPMA/TPM+ product range is most impressive! Exemplary 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.

### **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+ dynamic**

#### **More dynamic – Shorter – Quieter**

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

### **TPM+ endurance**

#### **More dynamic – Shorter – Cooler**

Extra cool: High power density, high performance. Water-cooled, one-stage actuator for linear applications.



Also available:

### **TPMA High Torque**

#### **Classic actuator**

With straight teeth and three-stage gearhead for rotary applications.  
Combines a high torque, torsional rigidity and compact dimensions.

# **TPMA/TPM+ product range**

Servo actuators **TPM+ dynamic**

## **TPM+ dynamic servo actuators**

Enhanced operating efficiency!

With the dynamic motor gearhead unit in functional design.



### **It's your game!**

TPM+ dynamic: The motor gearhead unit with extremely short response times. The TPM+ dynamic gives you everything: Perfect power density, small dimensions, low sensitivity to dirt and silent operation thanks to a modern design. Real winners rely on the technology of the TPM+ dynamic. And prepare you for any situation, even when the going gets tough. Game, set and match!



**Packaging**

Source: Groninger & Co. GmbH



**Robotics**

Source: Sigpack Systems AG

## Applications

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

Size TPM+ dynamic	Length from	Max. acceleration torque	Max. power
004	113 mm	40 Nm	1.0 kW
010	142 mm	100 Nm	1.5 kW
025	153 mm	300 Nm	4.7 kW
050	187 mm	650 Nm	10.2 kW
110	268 mm	1300 Nm	14.2 kW

### More dynamic ...

Experience extraordinary dynamics: Through modern motor technology boasting high power density, a low moment of inertia and optimized torsional rigidity.

### Shorter ...

Benefit from a reduced length: Thanks to a seamless connection between motor and gearhead as well as the space-saving attachment of motor instruments, over 50 percent more compact than conventional gearhead motors.

### Quieter ...

Power behind the silence: Helical-toothed precision planetary gearheads ensure low-vibration operation that is as quiet as a whisper.



# TPM+ dynamic

# TPM+ dynamic 004

Ratio	i	16		21		31		61		64		91	
		320	560	320	560	320	560	320	560	320	560	320	560
Intermediate circuit voltage	$U_D$ V <sub>DC</sub>	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	29		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 <sup>1)</sup>		70 <sup>1)</sup>		100 <sup>1)</sup>	
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. acceleration torque of motor	$T_{Mmax}$ Nm	2.0		2.0		2.0		1.0		1.0		1.0	
Max. acceleration current of motor	$I_{maxdyn}$ A <sub>eff</sub>	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 <sub>eff</sub>	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 (on motor shaft, without brake, with resolver)	$J_t$ kgm <sup>2</sup> ·10 <sup>-4</sup>	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 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						2.0					
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		IP 65											
Mounting position		Any											
Lubrication		Synthetic oil, lubricated for life											
Insulating material class		F											
Paint		Metallic blue 250 and natural cast aluminum											

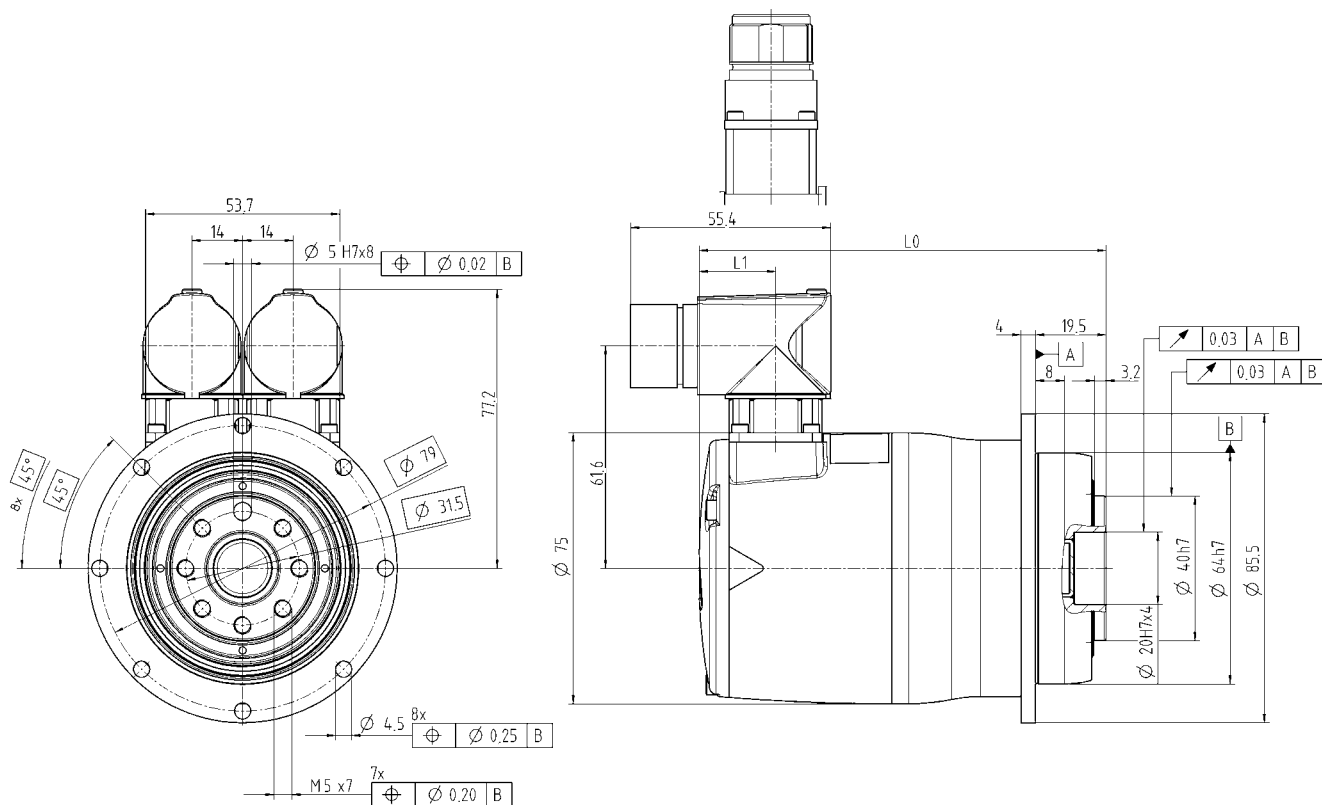
Tolerances T, I and n: Maximum +/- 10%.

<sup>1)</sup> greater than  $T_{2B}$  of the gearhead. In an emergency, 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 "Information".

View A

View B



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	Length L1
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	Length L1
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

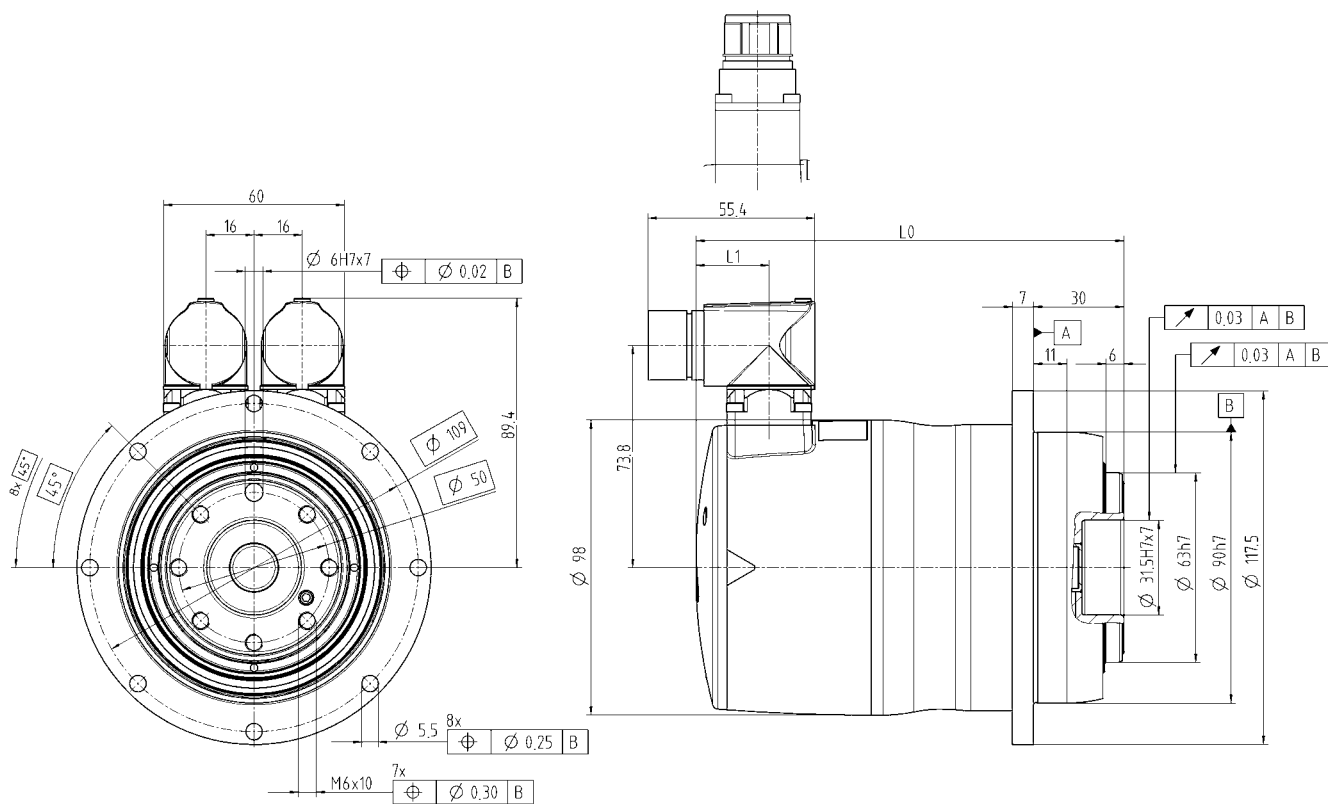
# TPM+ dynamic 010

Ratio	i	16		21		31		61		64		91	
		320	560	320	560	320	560	320	560	320	560	320	560
Intermediate circuit voltage	$U_D$ $V_{DC}$												
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		31		29		35	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	18		23		34		67		70		100 <sup>1)</sup>	
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. acceleration torque of motor	$T_{Mmax}$ Nm	3.8		3.8		3.8		1.9		1.9		1.9	
Max. acceleration current of motor	$I_{maxdyn}$ $A_{eff}$	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 (on motor shaft, without brake, with resolver)	$J_t$ $kgm^2 \cdot 10^{-4}$	0.32		0.32		0.32		0.17		0.17		0.17	
Torsional backlash	$j_t$ arcmin	Standard $\leq 3$ / Reduced $\leq 1$											
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 torque (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)	$\leq 62$											
Max. permitted housing temperature	°C	+90											
Ambient temperature	°C	0 to +40											
Protection class		IP 65											
Mounting position		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 gearhead. In an emergency, 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 "Information".



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	Length L1
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	Length L1
i = 16/21/31	Resolver	178	24
	Hiperface	201	45
	EnDat	205	49
i = 61/64/91	Resolver	165	24
	Hiperface	186	45
	EnDat	190	49

# TPM+ dynamic 025

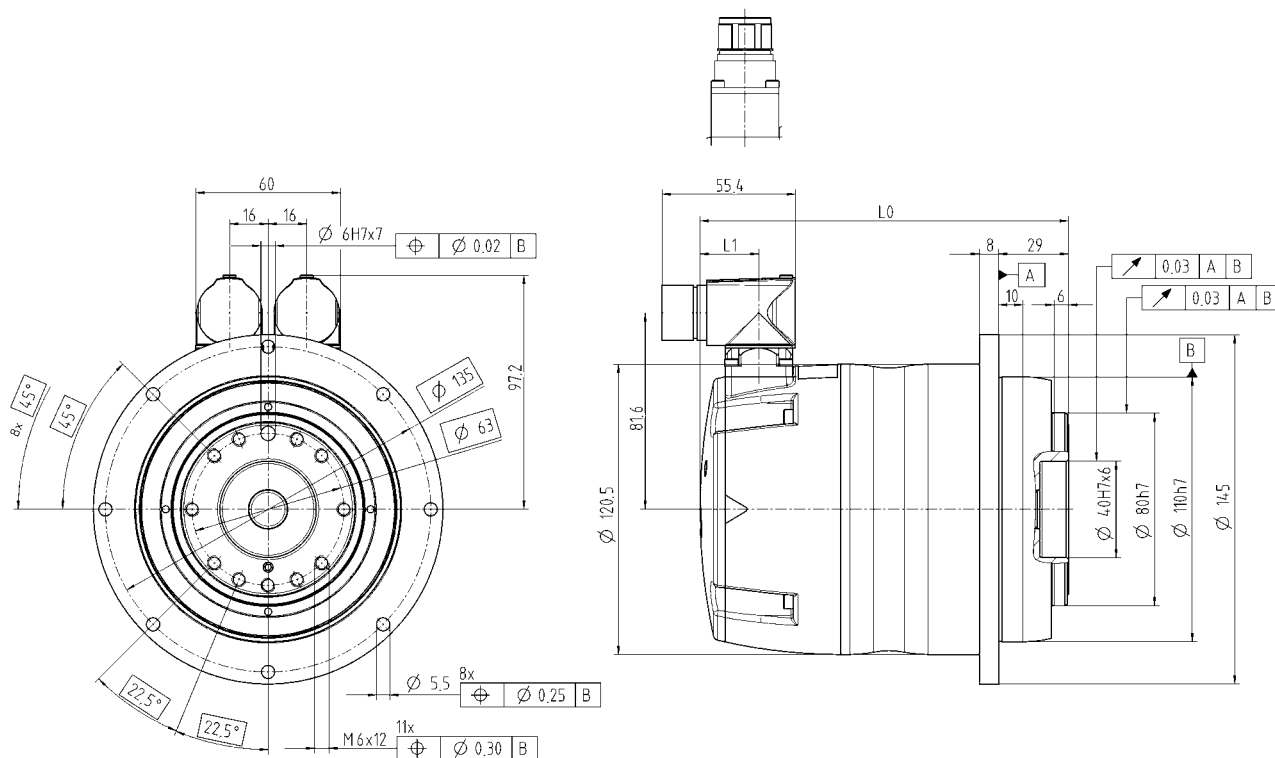
Ratio	i	16		21		31		61		64		91	
		320	560	320	560	320	560	320	560	320	560	320	560
Intermediate circuit voltage	$U_D$ $V_{DC}$												
Max. acceleration torque at output (max. 1000 cycles per hour)	$T_{2B}$ Nm	183		240		300		250		250		250	
Static output torque	$T_{20}$ Nm	74		97		146		87		83		100	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	35		46		68		134		141		200	
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. acceleration torque of motor	$T_{Mmax}$ Nm	12.1		12.1		12.1		4.4		4.4		4.4	
Max. acceleration current of motor	$I_{maxdyn}$ $A_{eff}$	29.5	17.0	29.5	17.0	29.5	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 (on motor shaft, without brake, with resolver)	$J_t$ $kgm^2 \cdot 10^{-4}$	2.16		2.16		2.17		0.77		0.77		0.76	
Torsional backlash	$j_t$ arcmin	Standard $\leq 3$ / Reduced $\leq 1$											
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 torque (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)	$\leq 64$											
Max. permitted housing temperature	°C	+90											
Ambient temperature	°C	0 to +40											
Protection class		IP 65											
Mounting position		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 "Information".

View A

View B



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	Length L1
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	Length L1
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	
		U <sub>D</sub>	V <sub>DC</sub>	320	560	320	560	320	560	320	560	320	560
Intermediate circuit voltage	U <sub>D</sub> V <sub>DC</sub>	320	560	320	560	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	T <sub>2B</sub> Nm	435		500		650		447		469		500	
Static output torque	T <sub>20</sub> Nm	185		220		367		174		166		220	
Brake holding torque at output, 100°C	T <sub>2BR</sub> Nm	208		273		403		793 <sup>1)</sup>		832 <sup>1)</sup>		1183 <sup>1)</sup>	
Max. speed	n <sub>2max</sub> rpm	313		238		161		82		78		55	
Speed limit for T <sub>2B</sub>	n <sub>2B</sub> rpm	225		171		116		59		56		39	
Max. acceleration torque of motor	T <sub>Mmax</sub> Nm	28.9		28.9		28.9		7.8		7.8		7.8	
Max. acceleration current of motor	I <sub>maxdyn</sub> A <sub>eff</sub>	70.0	40.0	70.0	40.0	70.0	40.0	20.8	12.0	20.8	12.0	20.8	12.0
Static motor current	I <sub>0</sub> A <sub>eff</sub>	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 (on motor shaft, without brake, with resolver)	J <sub>I</sub> kgm <sup>2</sup> ·10 <sup>-4</sup>	9.61		9.07		8.94		2.51		2.49		2.49	
Torsional backlash	j <sub>t</sub> arcmin	Standard ≤ 3 / Reduced ≤ 1											
Torsional rigidity	C <sub>t</sub> Nm/arcmin	-		145		130		123		-		100	
Tilting rigidity	C <sub>K</sub> Nm/arcmin	560											
Max. axial force	F <sub>Amax</sub> N	6130											
Max. tilting torque (distance from point of rotation to output flange 81.2 mm)	M <sub>Kmax</sub> Nm	1335											
Weight (with resolver, without brake)	m kg	18.5						14.7					
Operating noise (measured at motor speed of 3000 rpm)	L <sub>PA</sub> dB(A)	≤ 65											
Max. permitted housing temperature	°C	+90											
Ambient temperature	°C	0 to +40											
Protection class		IP 65											
Mounting position		Any											
Lubrication		Synthetic oil, lubricated for life											
Insulating material class		F											
Paint		Metallic blue 250 and natural cast aluminum											

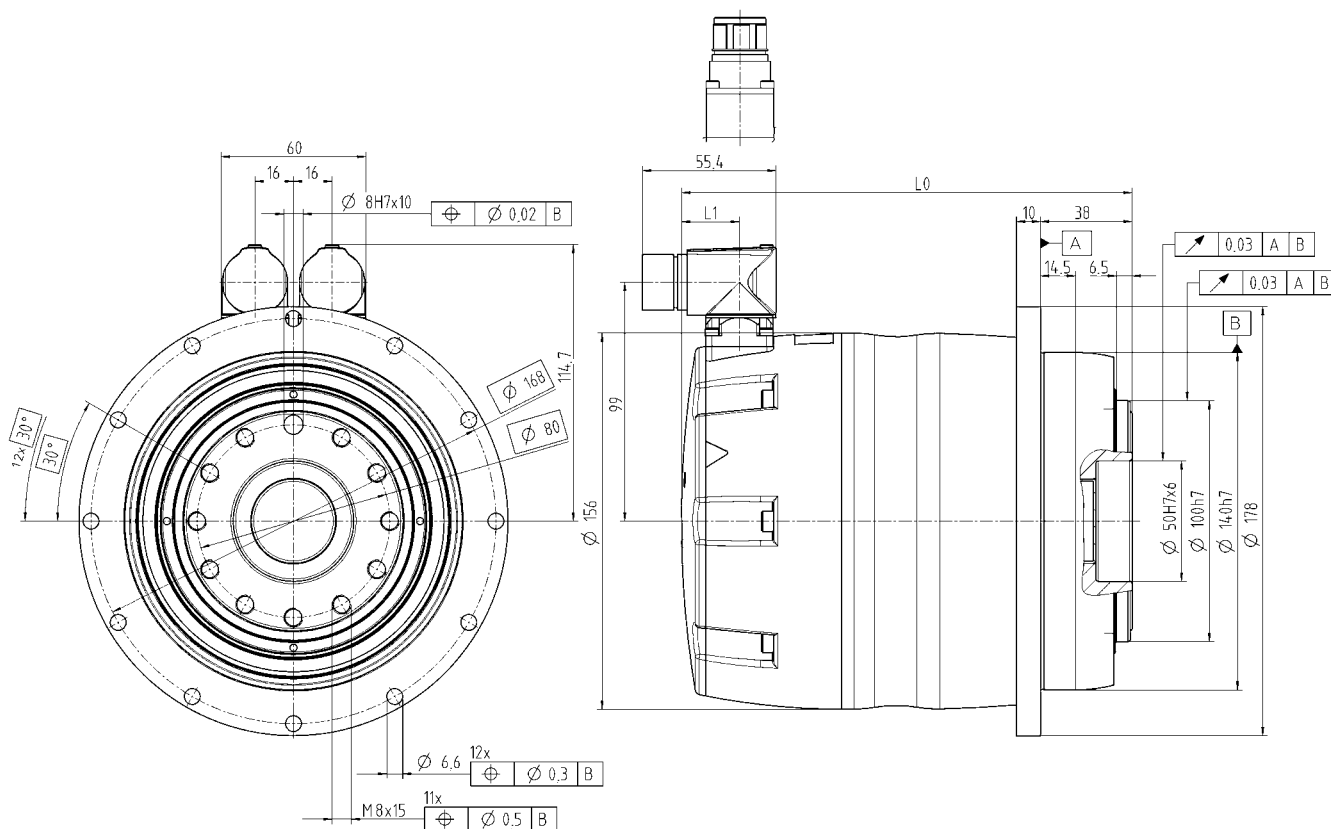
Tolerances T, I and n: Maximum +/- 10%.

<sup>1)</sup> greater than T<sub>2B</sub> of the gearhead. In an emergency, 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 "Information".

View A

View B



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	Length L1
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	Length L1
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

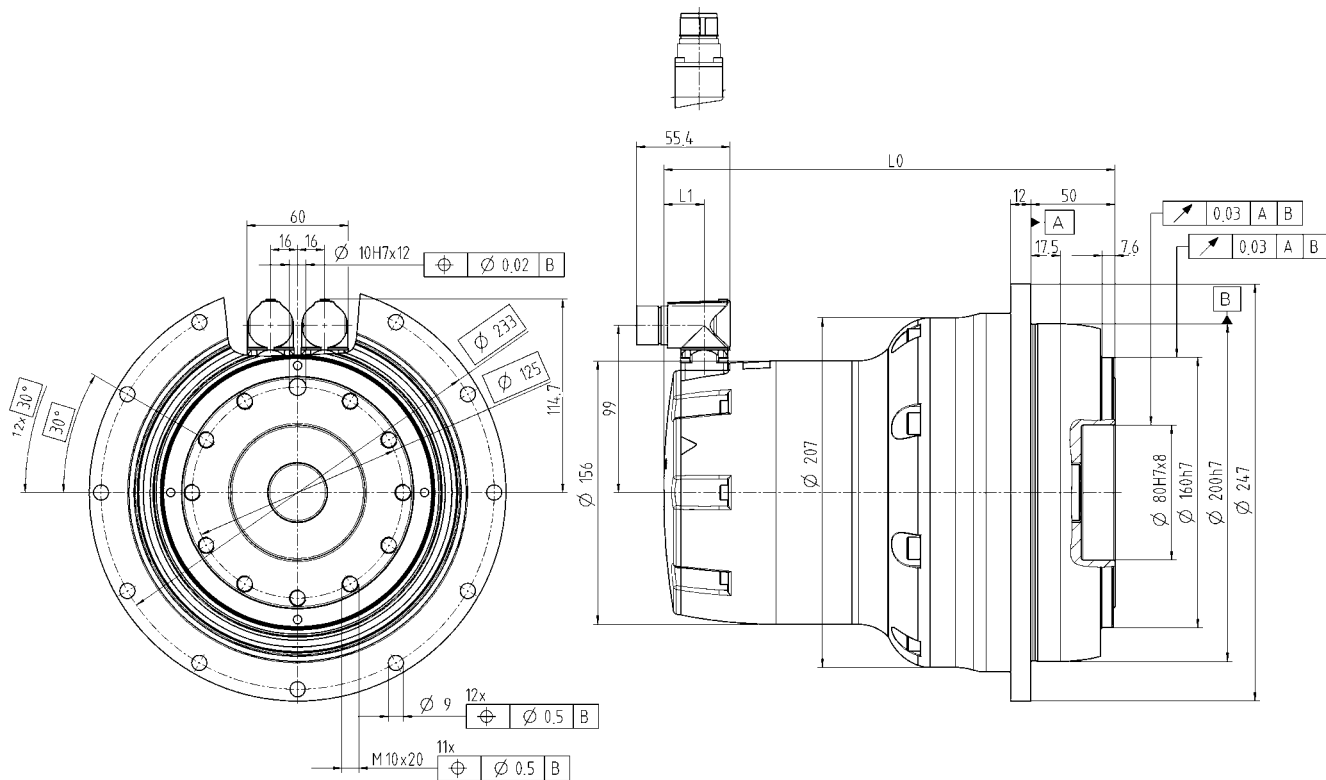
Ratio	i	16		21		31		61		64		91	
		320	560	320	560	320	560	320	560	320	560	320	560
Intermediate circuit voltage	$U_D$ $V_{DC}$												
Max. acceleration torque at output (max. 1000 cycles per hour)	$T_{2B}$ Nm	660		866		1278		1300		1300		1300	
Static output torque	$T_{20}$ Nm	208		278		419		700		700		700	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	208		273		403		793		832		1183	
Max. speed	$n_{2max}$ rpm	231	313	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. acceleration torque of motor	$T_{Mmax}$ Nm	43.9		43.9		43.9		28.9		28.9		28.9	
Max. acceleration current of motor	$I_{maxdyn}$ $A_{eff}$	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 (on motor shaft, without brake, with resolver)	$J_t$ $kgm^2 \cdot 10^{-4}$	13.14		13.14		12.84		8.89		8.83		8.83	
Torsional backlash	$j_t$ arcmin	Standard $\leq 3$ / Reduced $\leq 1$											
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 torque (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)	$\leq 72$											
Max. permitted housing temperature	°C	+90											
Ambient temperature	°C	0 to +40											
Protection class		IP 65											
Mounting position		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 "Information".

View A

View B



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	Length L1
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	Length L1
i = 16/21/31	Resolver	307	24
	Hiperface	329	45
	EnDat	332	49
i = 61/64/91	Resolver	292	24
	Hiperface	314	45
	EnDat	317	49

Servo actuators **TPM+ power**

## **TPM+ power servo actuators**

Generate more power!

With durable motor gearhead  
designed to tackle any application.



### **A real power pack!**

Three attributes that characterize our new TPM+ power drive unit. Powerful: due to its dynamic, high-torque synchronous servo motors. Compact: due to the space-optimized design of motor and gearhead with significantly reduced length. Quiet: due to the proven helical-toothed gearhead. TPM+ power: A real power pack for high-torque applications with and high control accuracy.



**Processing**



**Automation**

Source: MAKA

## Applications

The new TPM+ power drive unit demonstrates its superiority in highly dynamic linear applications with rack and pinions or spindles as well as in rotary movements that generate high masses and disturbing forces. New products for automation and efficient processing.

Size TPM+ power	Length from	Max. acceleration torque	Max. power
004 	149 mm	50 Nm	1.4 kW
010 	175 mm	130 Nm	4.7 kW
025 	197 mm	380 Nm	10.6 kW
050 	236 mm	750 Nm	16.5 kW
110 	307 mm	1600 Nm	32.0 kW

### Stronger ...

More torque, high capability. A perfect combination of motors and efficient planetary gearheads makes a mockery of even the most difficult motion applications.

### More compact ...

40 percent more compact due to the seamless integration of motor and gearhead as well as efficient attachment of motor instruments. Shorter installation length for greater flexibility when mounting.

### Quieter ...

Helical-toothed precision planetary gearheads for extremely quiet low-vibration operation reduce operating noise to very low levels.



# TPM+ power

# TPM+ power 004 1-stage

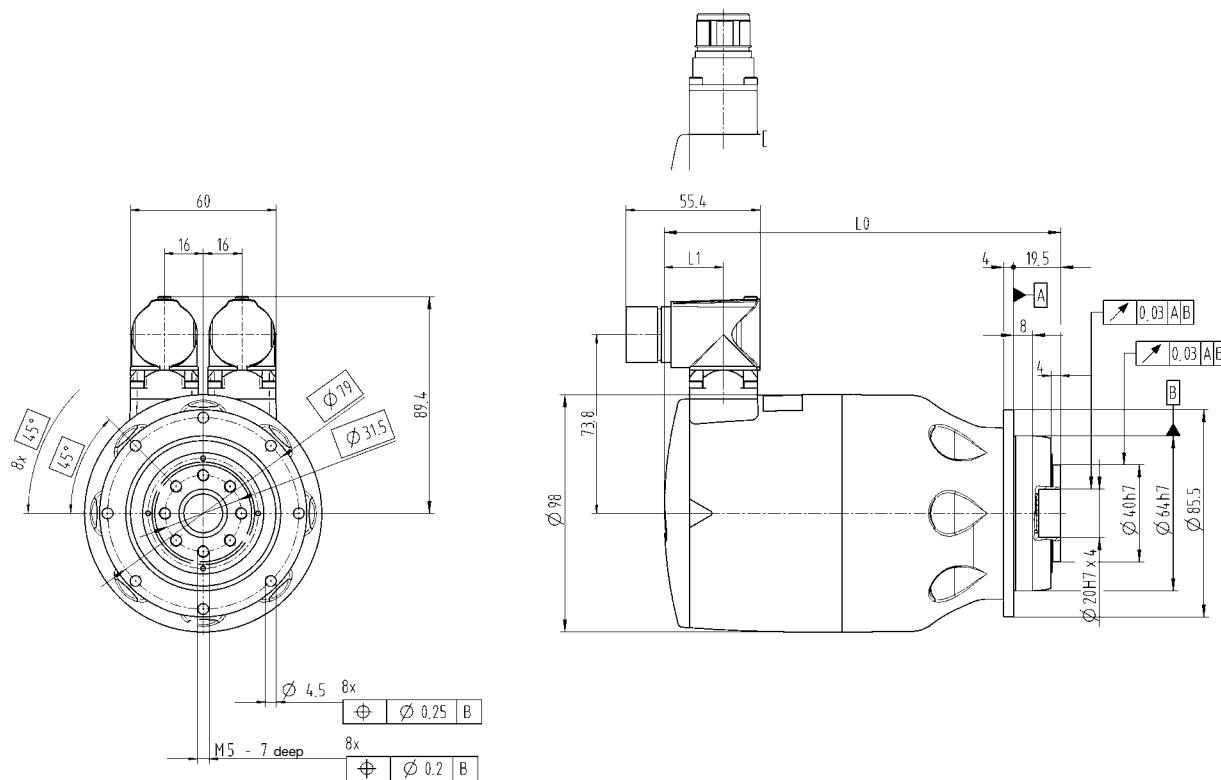
Ratio	i	4		5		7		10	
Intermediate circuit voltage	$U_D$ $V_{DC}$	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	$T_{2B}$ Nm	13		16		22		26	
Static output torque	$T_{20}$ Nm	4		6		8		12	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	4		6		8		11	
Max. speed	$n_{2max}$ rpm	1500		1200		857		600	
Speed limit for $T_{2B}$	$n_{2B}$ rpm	1040		830		590		460	
Max. acceleration torque of motor	$T_{Mmax}$ Nm	3.8		3.8		3.8		3.8	
Max. acceleration current of motor	$I_{maxdyn}$ $A_{eff}$	9.0	5.2	9.0	5.2	9.0	5.2	9.0	5.2
Static motor current	$I_0$ $A_{eff}$	2.3	1.3	2.3	1.3	2.3	1.3	2.3	1.3
Moment of inertia (on motor shaft, without brake, with resolver)	$J_i$ $kgm^2 \cdot 10^{-4}$	0.39		0.36		0.33		0.31	
Torsional backlash	$j_t$ arcmin	Standard $\leq 4$ / Reduced $\leq 2$							
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 torque (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)	$\leq 58$							
Max. permitted housing temperature	°C	+90							
Ambient temperature	°C	0 to +40							
Protection class		IP 65							
Mounting position		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 "Information".

View A

View B



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	Length L1
i = 4, 5, 7, 10	Resolver	164	24
	Hiperface	185	45
	EnDat	189	49

#### with brake

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

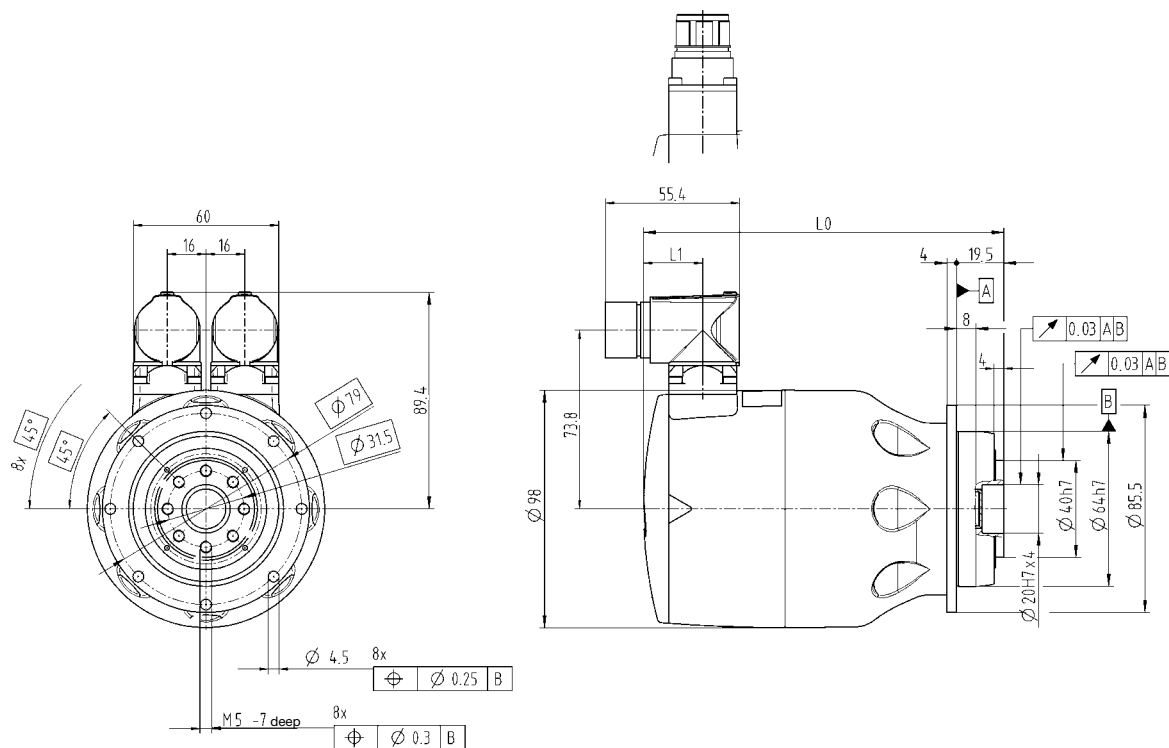
# TPM+ power 004 2-stage

Ratio	i	16		20		25		28		35		40		50		70		100	
		320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560
Intermediate circuit voltage	$U_D$ $V_{DC}$																		
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		29		33		40		24		30		40		18	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	18		22		28		31		39		44		55 <sup>1)</sup>		77 <sup>1)</sup>		100 <sup>1)</sup>	
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. acceleration torque of motor	$T_{Mmax}$ Nm	3.3										1.9							
Max. acceleration current of motor	$I_{maxdyn}$ $A_{off}$	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	$I_0$ $A_{off}$	2.3	1.3	2.3	1.3	2.3	1.3	2.3	1.3	2.3	1.3	1.6	0.9	1.6	0.9	1.6	0.9	1.6	0.9
Moment of inertia (on motor shaft, without brake, with resolver)	$J_t$ $kgm^2 \cdot 10^{-4}$	0.32		0.31		0.31		0.31		0.31		0.16		0.16		0.16		0.16	
Torsional backlash	$j_t$ arcmin	Standard $\leq 4$ / Reduced $\leq 2$																	
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)	$\leq 58$																	
Max. permitted housing temperature	°C	+90																	
Ambient temperature	°C	0 to +40																	
Protection class		IP 65																	
Mounting position		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%.

<sup>1)</sup> greater than  $T_{2B}$  of the gearhead. In an emergency, 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 "Information".



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	Length L1
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

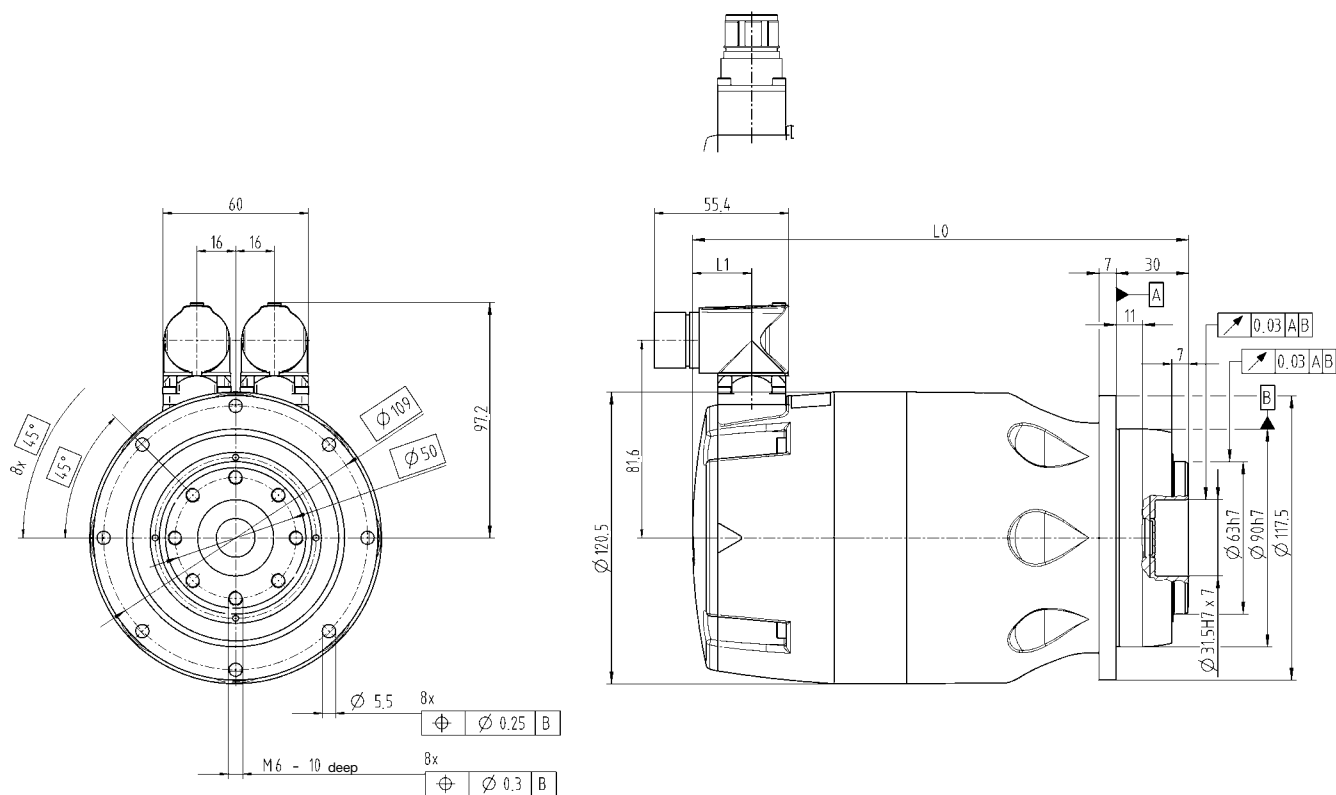
Ratio	Motor feedback	Length L0	Length L1
i = 16, 20, 25, 28, 35	Resolver	184	24
	Hiperface	205	45
	EnDat	209	49
i = 40, 50, 70, 100	Resolver	169	24
	Hiperface	190	45
	EnDat	194	49

# 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	45		57		81		85	
Static output torque	$T_{20}$ Nm	15		20		29		44	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	18		23		32		45	
Max. speed	$n_{2max}$ rpm	1500		1200		857		600	
Speed limit for $T_{2B}$	$n_{2B}$ rpm	980		780		560		440	
Max. acceleration torque of motor	$T_{Mmax}$ Nm	12.1		12.1		12.1		12.1	
Max. acceleration current of motor	$I_{maxdyn}$ $A_{eff}$	29.5	17.0	29.5	17.0	29.5	17.0	29.5	17.0
Static motor current	$I_0$ $A_{eff}$	9.9	5.7	9.9	5.7	9.9	5.7	9.9	5.7
Moment of inertia (on motor shaft, without brake, with resolver)	$J_i$ $kgm^2 \cdot 10^{-4}$	2.38		2.22		2.08		2.00	
Torsional backlash	$j_t$ arcmin	Standard $\leq 3$ / Reduced $\leq 1$							
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 torque (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)	$\leq 60$							
Max. permitted housing temperature	°C	+90							
Ambient temperature	°C	0 to +40							
Protection class		IP 65							
Mounting position		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 "Information".



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	Length L1
i = 4, 5, 7, 10	Resolver	205	24
	Hiperface	226	45
	EnDat	230	49

#### with brake

Ratio	Motor feedback	Length L0	Length L1
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	
		320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560
Intermediate circuit voltage	$U_D$ $V_{DC}$																		
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	71		90		90		90		90		49		63		88		60	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	72		90		113		126		158 <sup>1)</sup>		160 <sup>1)</sup>		200 <sup>1)</sup>		250 <sup>1)</sup>		250 <sup>1)</sup>	
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. acceleration torque of motor	$T_{Mmax}$ Nm	12.1		12.1		12.1		12.1		12.1		4.4		4.4		4.4		4.4	
Max. acceleration current of motor	$I_{maxdyn}$ $A_{eff}$	29.5	17.1	29.5	17.1	29.5	17.1	29.5	17.1	29.5	17.1	10.4	6.0	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	9.9	5.7	9.9	5.7	3.3	1.9	3.3	1.9	3.3	1.9	3.3	1.9
Moment of inertia (on motor shaft, without brake, with resolver)	$J_t$ $kgm^2 \cdot 10^{-4}$	2.02		1.99		1.98		1.96		1.96		0.72		0.72		0.72		0.72	
Torsional backlash	$j_t$ arcmin	Standard $\leq 3$ / Reduced $\leq 1$																	
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)	$\leq 62$																	
Max. permitted housing temperature	°C	+90																	
Ambient temperature	°C	0 to +40																	
Protection class		IP 65																	
Mounting position		Any																	
Lubrication		Synthetic oil, lubricated for life																	
Insulating material class		F																	
Paint		Metallic blue 250 and natural cast aluminum																	

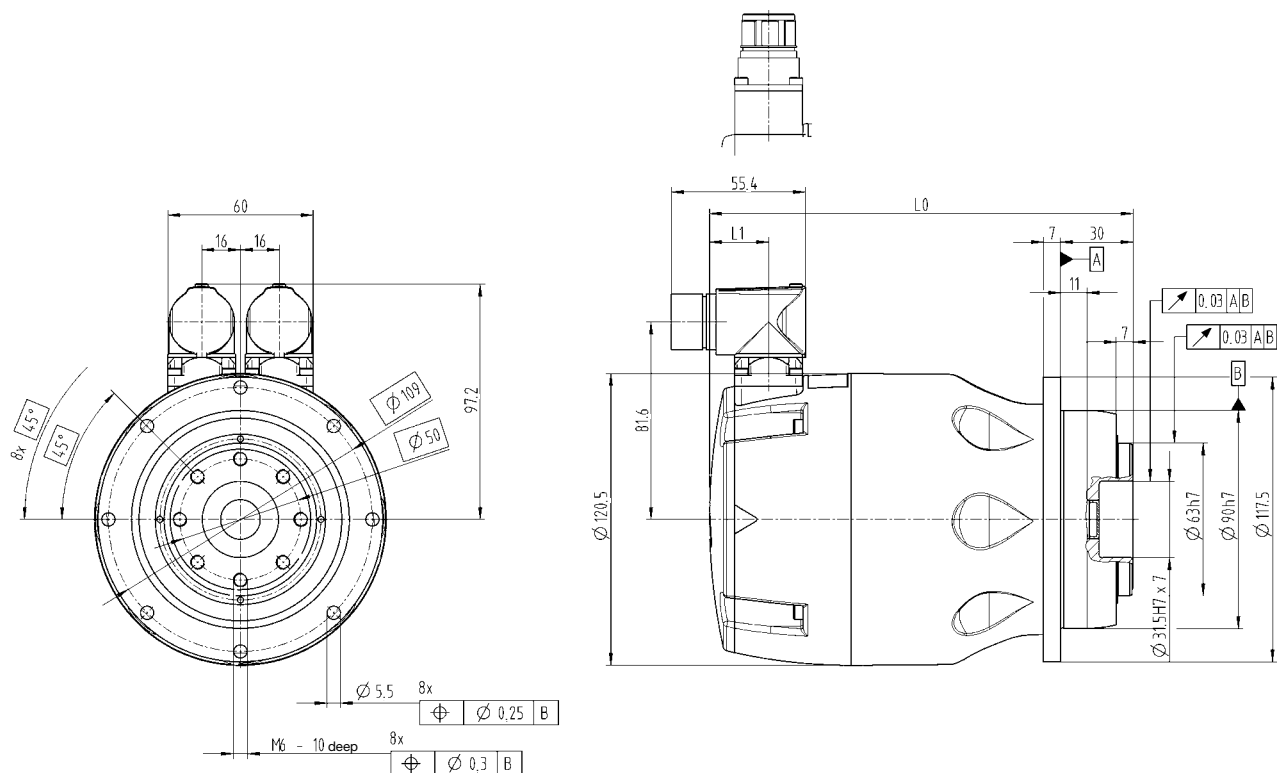
Tolerances T, I and n: Maximum +/- 10%.

<sup>1)</sup> greater than  $T_{2B}$  of the gearhead. In an emergency, 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 "Information".

View A

View B



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	Length L1
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	Length L1
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

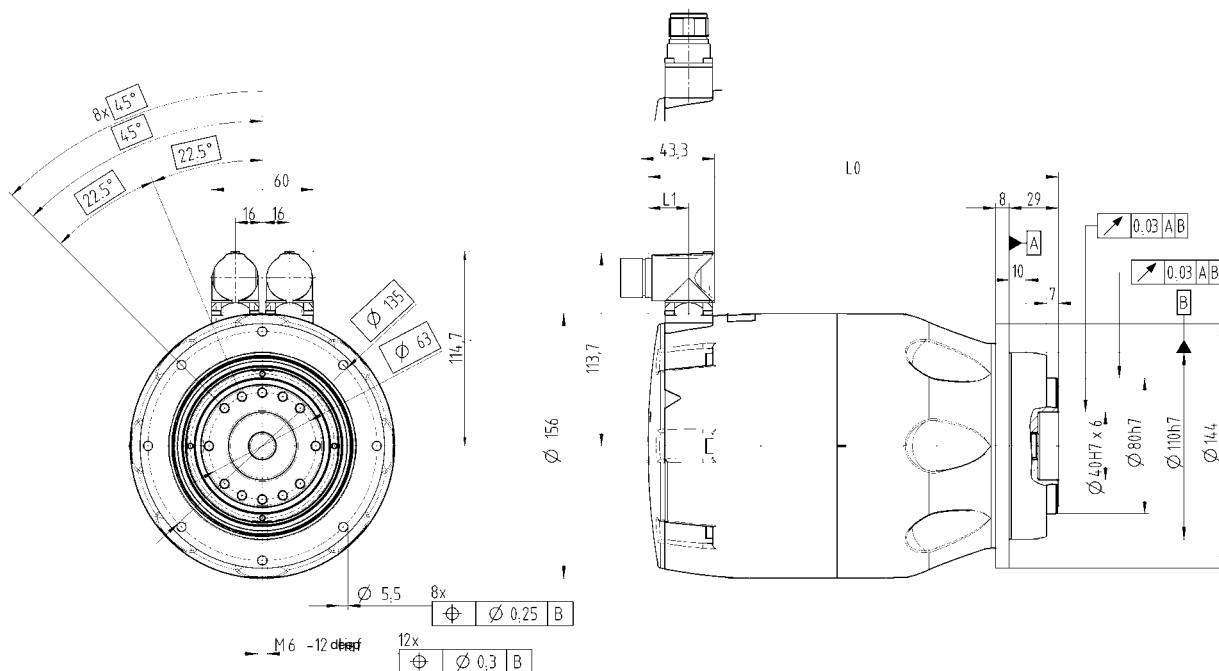
Ratio	i	4		5		7		10	
Intermediate circuit voltage	$U_D$ $V_{DC}$	320	560	320	560	320	560	320	560
Max. acceleration torque at output (max. 1000 cycles per hour)	$T_{2B}$ Nm	112		141		199		200	
Static output torque	$T_{20}$ Nm	44		55		79		114	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	52		65		91		130	
Max. speed	$n_{2max}$ rpm	1500		1200		857		600	
Speed limit for $T_{2B}$	$n_{2B}$ rpm	900		720		520		420	
Max. acceleration torque of motor	$T_{Mmax}$ Nm	28.9		28.9		28.9		28.9	
Max. acceleration current of motor	$I_{maxdyn}$ $A_{eff}$	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 (on motor shaft, without brake, with resolver)	$J_i$ $kgm^2 \cdot 10^{-4}$	9.98		9.51		9.08		8.84	
Torsional backlash	$j_t$ arcmin	Standard $\leq 3$ / Reduced $\leq 1$							
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 torque (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)	$\leq 64$							
Max. permitted housing temperature	°C	+90							
Ambient temperature	°C	0 to +40							
Protection class		IP 65							
Mounting position		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 "Information".

View A

View B



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	Length L1
i = 4, 5, 7, 10	Resolver	242	24
	Hiperface	263	45
	EnDat	267	49

#### with brake

Ratio	Motor feedback	Length L0	Length L1
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	
		320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560	320	560
Intermediate circuit voltage	$U_D$ $V_{DC}$																		
Max. acceleration torque at output (max. 1000 cycles per hour)	$T_{2B}$ Nm	350		350		380		350		380		293		367		330		265	
Static output torque	$T_{20}$ Nm	183		210		200		210		220		113		142		200		120	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	208		260		325		364 <sup>1)</sup>		455 <sup>1)</sup>		392 <sup>1)</sup>		490 <sup>1)</sup>		625 <sup>1)</sup>		625 <sup>1)</sup>	
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. acceleration torque of motor	$T_{Mmax}$ Nm	28.9		28.9		28.9		28.9		28.9		7.5		7.5		7.5		7.5	
Max. acceleration current of motor	$I_{maxdyn}$ $A_{eff}$	70	40	70	40	70	40	70	40	70	40	20.8	12.0	20.8	12.0	20.8	12.0	20.8	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	6.6	3.8	6.6	3.8	6.6	3.8	6.6	3.8
Moment of inertia (on motor shaft, without brake, with resolver)	$J_t$ $kgm^2 \cdot 10^{-4}$	8.94		8.83		8.83		8.72		8.71		2.49		2.48		2.48		2.47	
Torsional backlash	$j_t$ arcmin	Standard $\leq 3$ / Reduced $\leq 1$																	
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 torque (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)	$\leq 64$																	
Max. permitted housing temperature	°C	+90																	
Ambient temperature	°C	0 to +40																	
Protection class		IP 65																	
Mounting position		Any																	
Lubrication		Synthetic oil, lubricated for life																	
Insulating material class		F																	
Paint		Metallic blue 250 and natural cast aluminum																	

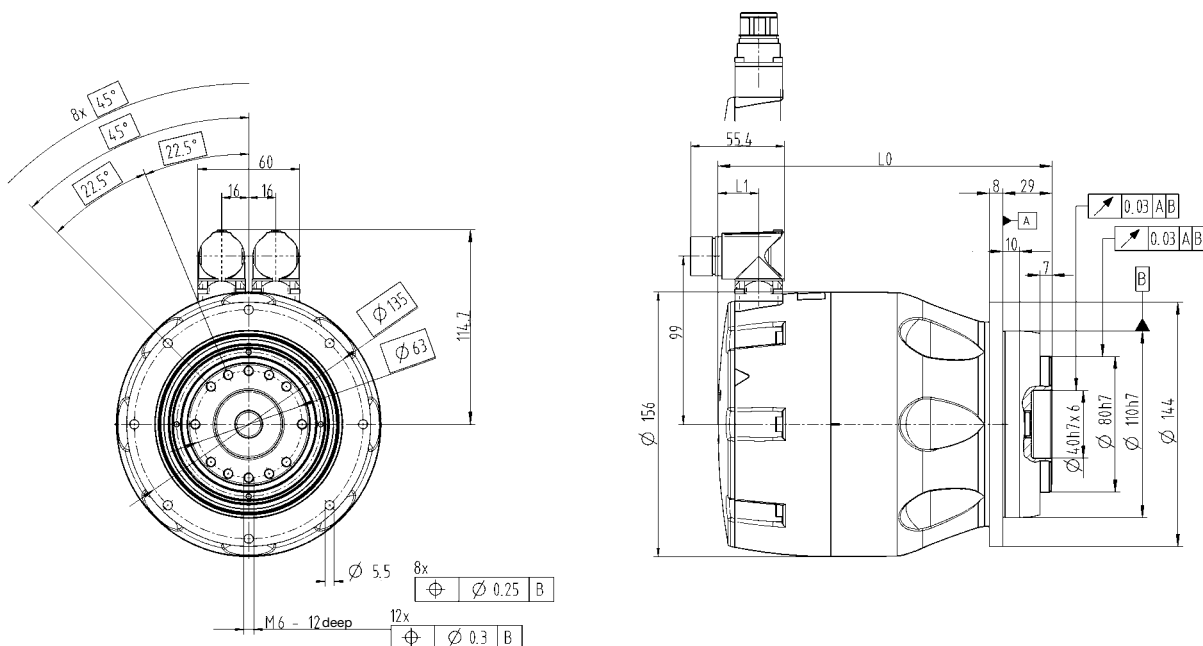
Tolerances T, I and n: Maximum +/- 10%.

<sup>1)</sup> greater than  $T_{2B}$  of the gearhead. In an emergency, 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 "Information".

View A

View B



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	Length L1
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	Length L1
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 <sub>DC</sub>	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	187
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. acceleration torque of motor	$T_{Mmax}$ Nm	56.6			
Max. acceleration current of motor	$I_{maxdyn}$ A <sub>eff</sub>	63.5			
Static motor current	$I_0$ A <sub>eff</sub>	19			
Moment of inertia (on motor shaft, without brake, with resolver)	$J_i$ kgm <sup>2</sup> ·10 <sup>-4</sup>	26.4	24.8	23.3	22.5
Torsional backlash	$j_t$ 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 torque (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		IP 65			
Mounting position		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 "Information".



# TPM+ power 050 2-stage

Ratio	i	16	20	25	28	35	40	50	70	100	
Intermediate circuit voltage	$U_D$ V <sub>DC</sub>	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	290	240	
Brake holding torque at output, 100°C	$T_{2BR}$ Nm	368	460	575	644	805 <sup>1)</sup>	920 <sup>1)</sup>	1150 <sup>1)</sup>	1250 <sup>1)</sup>	1250	
Max. speed	$n_{2max}$ rpm	313	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. acceleration torque of motor	$T_{Mmax}$ Nm	56,6					15,6				
Max. acceleration current of motor	$I_{maxdyn}$ A <sub>eff</sub>	63,5					33				
Static motor current	$I_0$ A <sub>eff</sub>	19					7,5				
Moment of inertia (on motor shaft, without brake, with resolver)	$J_t$ kgm <sup>2</sup> ·10 <sup>-4</sup>	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		IP 65									
Mounting position		Any									
Lubrication		Synthetic oil, lubricated for life									
Insulating material class		F									
Paint		Metallic blue 250 and natural cast aluminum									

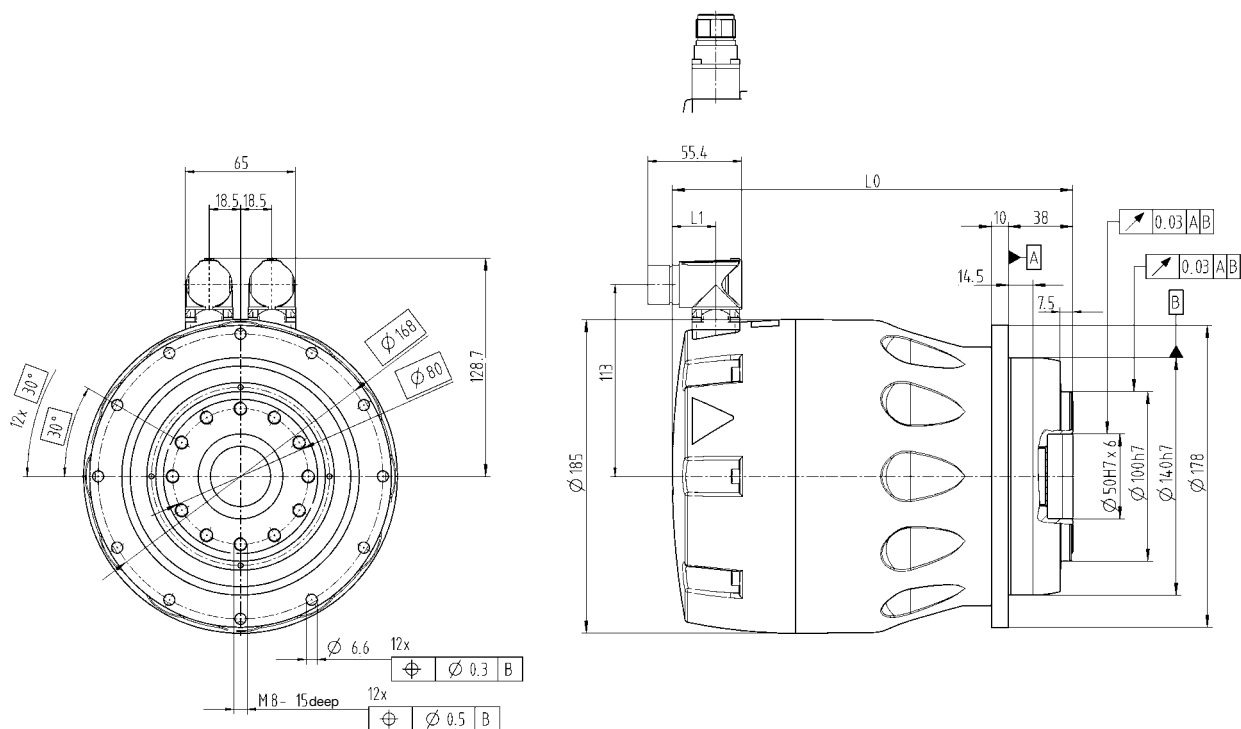
Tolerances T, I and n: Maximum +/- 10%.

<sup>1)</sup> greater than  $T_{2B}$  of the gearhead. In an emergency, 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 "Information".

View A

View B



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	Length L1
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	Length L1
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 <sub>DC</sub>	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 <sup>1)</sup>
Max. speed	$n_{2max}$ rpm	1050	840	643	450
Speed limit for $T_{2B}$	$n_{2B}$ rpm	950	750	540	450
Max. acceleration torque of motor	$T_{Mmax}$ Nm	88			
Max. acceleration current of motor	$I_{maxdyn}$ A <sub>eff</sub>	100			
Static motor current	$I_0$ A <sub>eff</sub>	38.6			
Moment of inertia (on motor shaft, without brake, with resolver)	$J_i$ kgm <sup>2</sup> ·10 <sup>-4</sup>	142	132	123	118
Torsional backlash	$j_t$ 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 torque (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		IP 65			
Mounting position		Any			
Lubrication		Synthetic oil, lubricated for life			
Insulating material class		F			
Paint		Metallic blue 250 and natural cast aluminum			

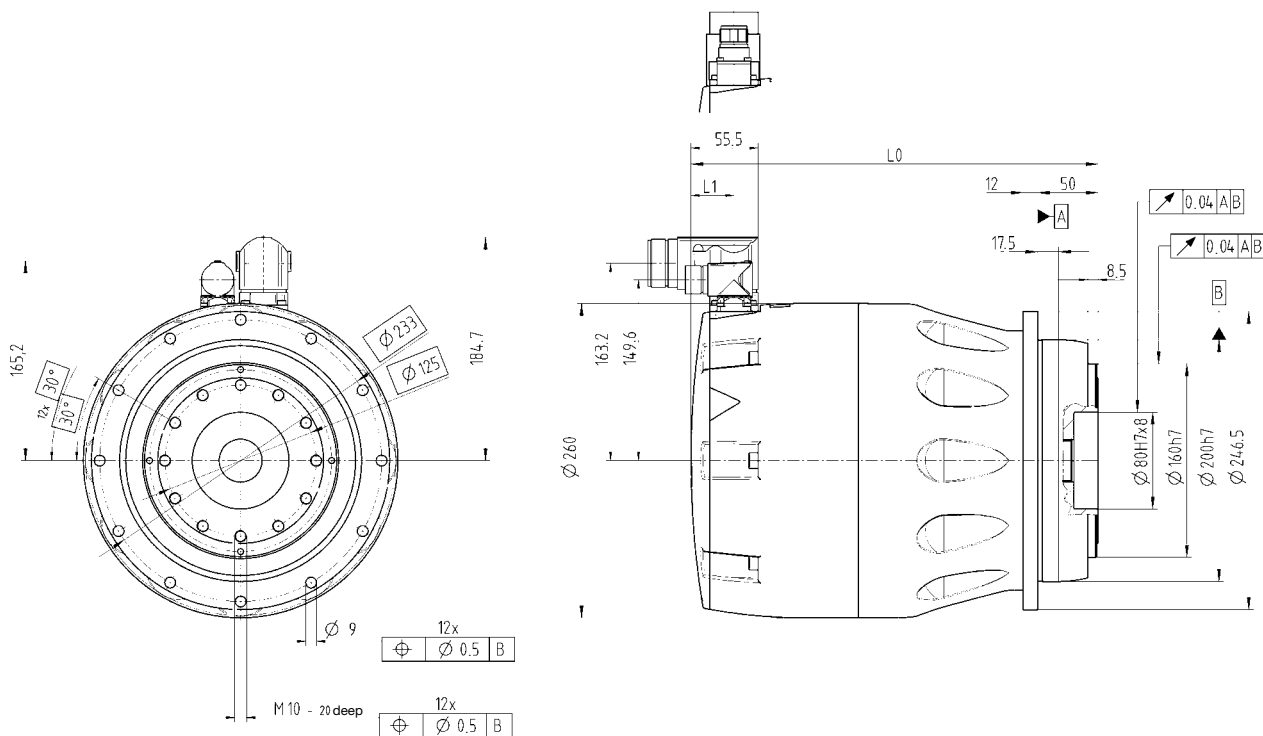
Tolerances T, I and n: Maximum +/- 10%.

1) greater than T2B of gearhead. In an emergency, 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 "Information".

View A

View B



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	Length L1
i = 4, 5, 7, 10	Resolver	337	36
	Hiperface	361	60
	EnDat	361	60

#### with brake

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

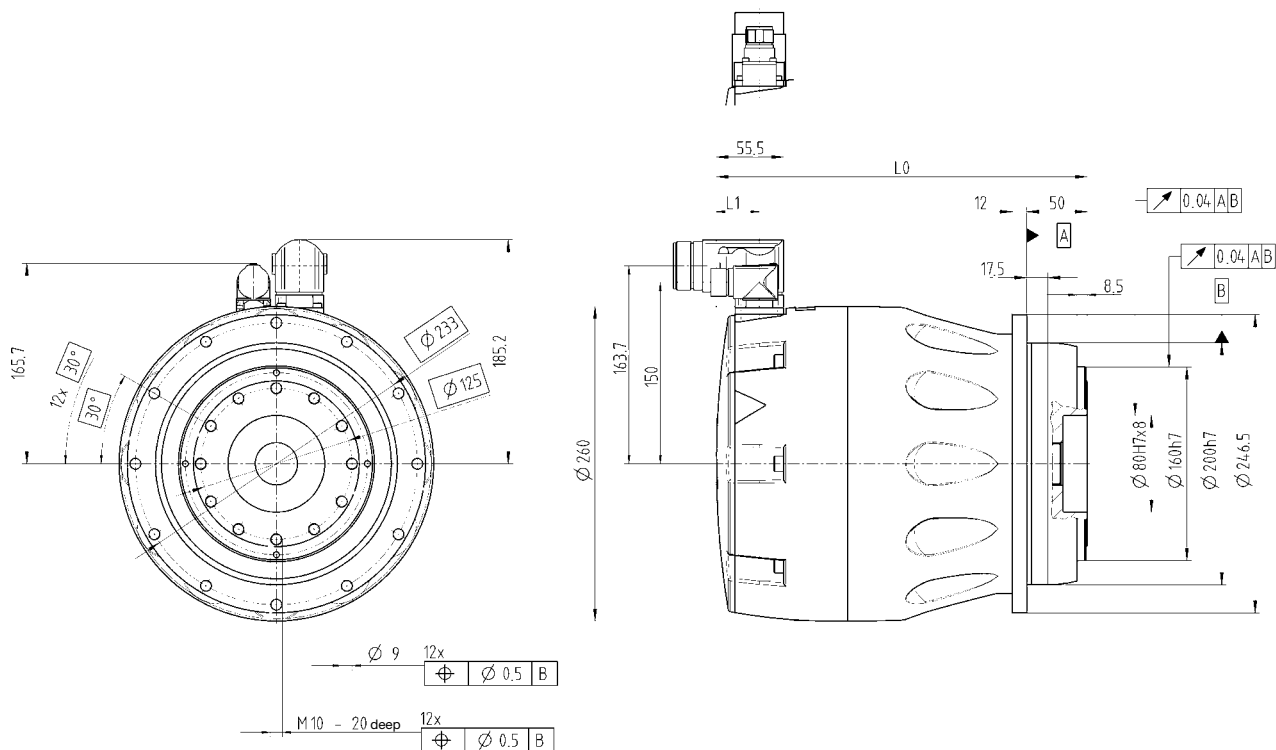
# TPM+ power 110 2-stage

Ratio	i	16	20	25	28	35	40	50	70	100	
Intermediate circuit voltage	$U_D$ V <sub>DC</sub>	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 <sup>1)</sup>	2016 <sup>1)</sup>	2520 <sup>1)</sup>	1800 <sup>1)</sup>	2250 <sup>1)</sup>	2750 <sup>1)</sup>	2750 <sup>1)</sup>	
Max. speed	$n_{2max}$ rpm	281	225	180	161	129	113	90	64	45	
Speed limit for $T_{2B}$	$n_{2B}$ rpm	230	190	170	160	135	95	85	65	50	
Max. acceleration torque of motor	$T_{Mmax}$ Nm	88					44.2				
Max. acceleration current of motor	$I_{maxdyn}$ A <sub>eff</sub>	100					50				
Static motor current	$I_0$ A <sub>eff</sub>	38.6					21.9				
Moment of inertia (on motor shaft, without brake, with resolver)	$J_t$ kgm <sup>2</sup> ·10 <sup>-4</sup>	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 torque (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		IP 65									
Mounting position		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%.

<sup>1)</sup> greater than  $T_{2B}$  of the gearhead. In an emergency, 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 "Information".



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	Length L1
i = 16, 20, 25, 28, 35	Resolver	337	36
	Hiperface	361	60
	EnDat	361	60
i = 40, 50, 70, 100	Resolver	307	36
	Hiperface	331	60
	EnDat	331	60

#### with brake

Ratio	Motor feedback	Length L0	Length L1
i = 16, 20, 25, 28, 35	Resolver	387	36
	Hiperface	411	60
	EnDat	411	60
i = 40, 50, 70, 100	Resolver	357	36
	Hiperface	381	60
	EnDat	381	60

Servo actuator **TPM+ endurance**

## Servo actuator TPM+ endurance

Work without limitations!

Water-cooled for continuous duty, this actuator merges dynamic performance with outstanding design.



### Go the distance!

TPM+ endurance sets new standards for continuous applications, bringing to you cutting-edge motor technology for extreme power density, unparalleled dynamic control as well as optimized moment of inertia. This product is the marathon runner of the actuator world. The integrated water-cooling technology is part of this compact and powerful package, combining practical use with revolutionary design. The result for you: an actuator solution which keeps going and going to get you ahead.



machine tools, laser machining

Foto: TRUMPF Gruppe

## Applications

TPM+ endurance proves its strength particularly well in linear applications, i.e. with WITTENSTEIN's rack and pinion systems. The TPM+ endurance requires minimal idle time, if at all, and continues to guarantee high dynamics and stamina for your application.

### Size TPM endurance



Length from      Continuous power

203 mm      1,4 kW

308 mm      6,4 kW

More sizes on request

### More dynamic ...

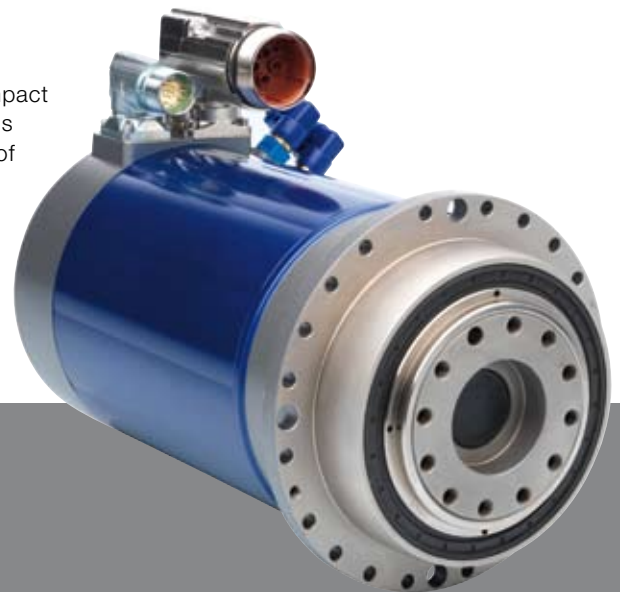
Bringing together cutting-edge motor technology, the highest power density, optimized moment of inertia and dynamic control with minimal backlash are achieved with this actuator. Including the drives, a weight advantage of up to 50% is possible.

### Shorter ...

Optimal integration between motor and gearbox is designed in this very compact design solution. A length advantage of about 40% on comparable solutions is made possible by the coupling-free mounting and the optimized integration of components.

### Cooler ...

A well designed liquid cooling system with outstanding efficiency leads to a product which is always ready to outperform.



# TPM+ endurance

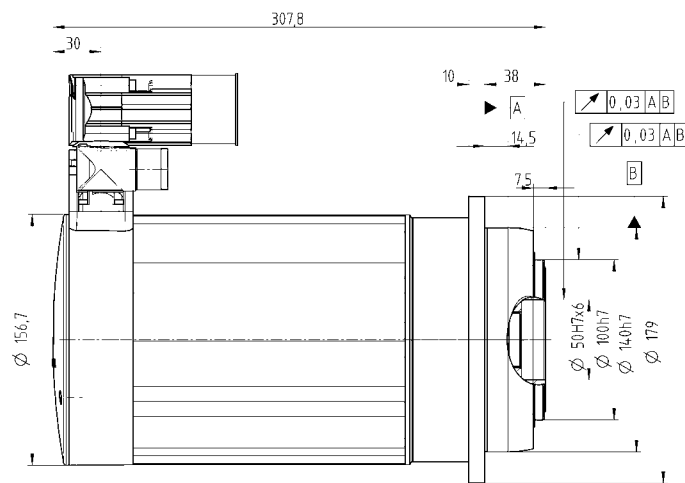
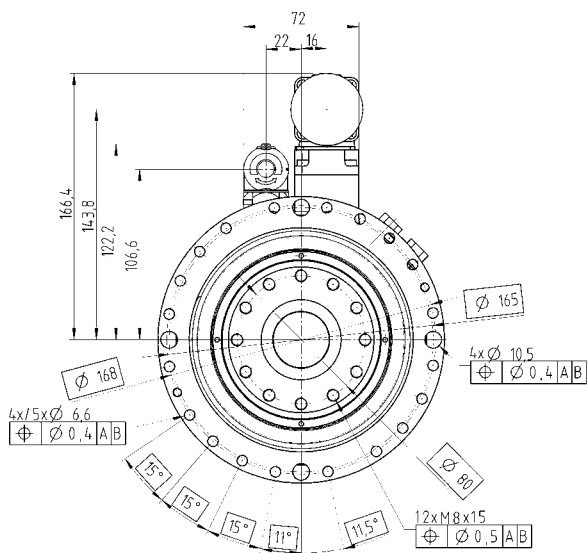
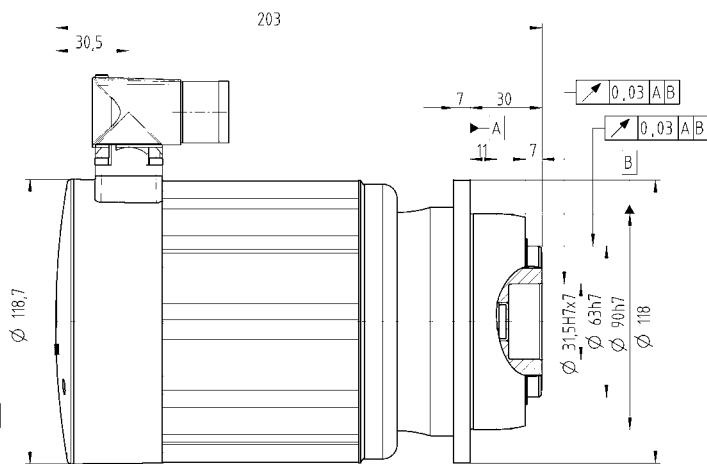
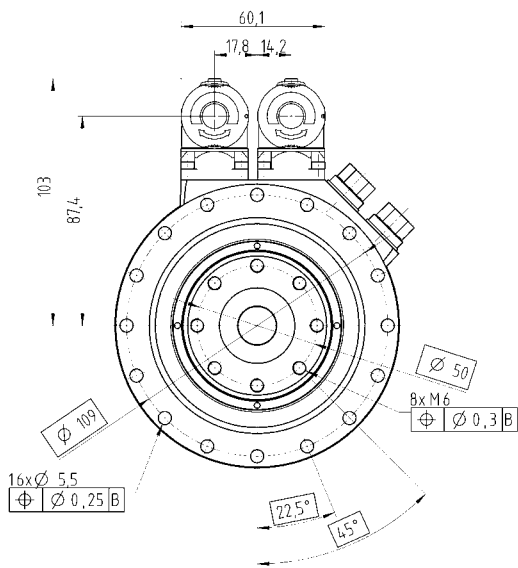
# TPM+ endurance

Size		010	050
Ratio	$i$	5	5
Intermediate circuit voltage	$U_D$ $V_{DC}$	560	560
Max. acceleration torque at output (max. 1000 cycles per hour)	$T_{2B}$ Nm	53	216
Static output torque	$T_{20}$ Nm	24	161
Max. speed	$n_{2max}$ $min^{-1}$	1200	1000
Speed limit for $T_{2B}$	$n_{2B}$ $min^{-1}$	580	400
Max. acceleration torque of motor	$T_{Mmax}$ Nm	10,8	45
Max. acceleration current of motor	$I_{maxdyn}$ $A_{eff}$	25	90
Static motor current	$I_0$ $A_{eff}$	11	58
Moment of inertia (on motor shaft)	$J_2$ $kgm^2 \cdot 10^{-4}$	1,97	16,95
Torsional backlash	$j_t$ arcmin	Standard $\leq 1$ / Reduced $\leq 3$	
Torsional rigidity	$C_t$ Nm/arcmin	33	187
Tilting rigidity	$C_K$ Nm/arcmin	255	560
Max. axial force	$F_{Amax}$ N	2150	6130
Max. tilting torque	$M_{Kmax}$ Nm	270	1335
Distance from point of rotation to output flange 57.6 mm (For turning moment calculation)	$z_2$ mm	82,7	81,2
Weight	$m$ kg	6,3	20,8
Operating noise (measured at motor speed of 3000 rpm)	$L_{PA}$ dB(A)	$\leq 59$	$\leq 65$
Max. permitted housing temperature	$^{\circ}C$	90	
Ambient temperature	$^{\circ}C$	40	
Protection class		IP 65	
Mounting position		Any	
Lubrication		Synthetic oil, lubricated for life	
Insulating material class		F	
Paint		Metallic blue 250	

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

Please refer to the instructions and graphic illustration of the speed and torque values in the chapter "Information".

Layout with incremental encoder / EnDat, without brake



Other sizes and/or designs available upon request

## **TPMA servo actuators**

State-of-the-art classic model with straight teeth, high torque and compact dimensions.





## Applications

The TPMA is mainly used in applications where extremely good control characteristics are required. The high degree of rigidity and compact dimensions of the three-stage high-torque gearheads is more than impressive. Proven technology for demanding requirements.

Size TPM High Torque	Length from	Max. acceleration torque	Max. power
025	171 mm	480 Nm	1.7 kW
050	221 mm	950 Nm	2.3 kW
110	316 mm	2600 Nm	10.3 kW



# TPMA

# TPMA 025

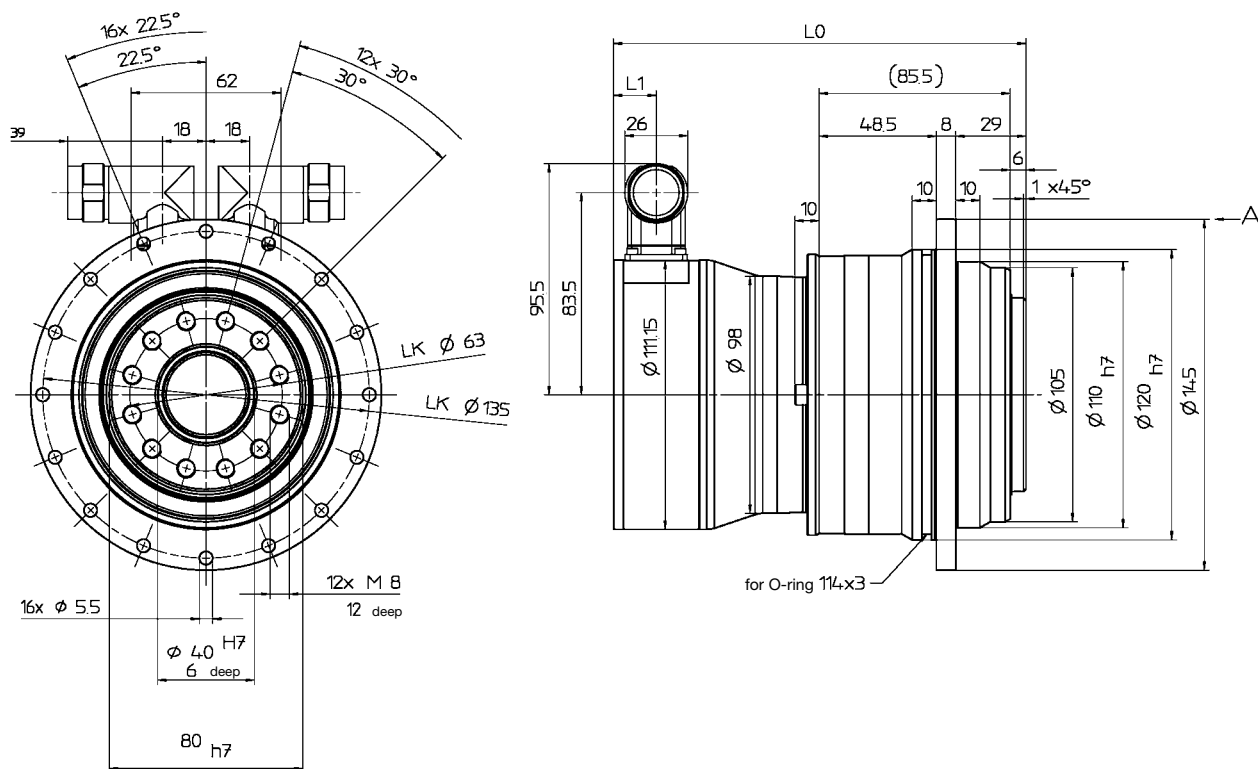
Classic TPM model with straight-toothed high-torque gearhead

Ratio	<i>i</i>		110	220
Intermediate circuit voltage	$U_D$	V DC	560	
Max. acceleration torque (max. 1000 cycles per hour)	$T_{2B}$	Nm	430	480
Static torque	$T_{20}$	Nm	142	260
Brake holding torque at output, 100°C	$T_{2BR}$	Nm	220	440
Max. speed	$n_{2max}$	rpm	54	27
Speed limit for $T_{2B}$	$n_{2B}$	rpm	38	19
Maximum current	$I_{max}$	$A_{eff}$	7.0	3.7
Static current	$I_0$	$A_{eff}$	2.2	2.1
Moment of inertia (on motor shaft, without brake, with resolver)	$J_t$	kgcm <sup>2</sup>	0.89	0.87
Torsional backlash	$j_t$	arcmin	≤ 1	
Torsional rigidity	$C_t$	Nm/arcmin	97	
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	413	
Weight	$m$	kg	8.4	
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			IP 64	
Mounting position			Any	
Lubrication			Synthetic oil, lubricated for life	
Insulating material class			F	
Paint			RAL 5002 (blue) or RAL 9005 (jet black)	

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

View A

View B



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

#### without brake

Ratio	Motor feedback	Length L0	Length L1
i = 110/220	Resolver	171	17.8
	Hiperface	213	62.8
	EnDat	217	64.3

#### with brake

Ratio	Motor feedback	Length L0	Length L1
i = 110/220	Resolver	193	39.8
	Hiperface	241.6	88.8
	EnDat	258.6	105.8

# TPMA 050

Classic TPM model with straight-toothed high-torque gearhead

Ratio	<i>i</i>		110	220
Intermediate circuit voltage	$U_D$	V DC	560	
Max. acceleration torque (max. 1000 cycles per hour)	$T_{2B}$	Nm	798	950
Static torque	$T_{20}$	Nm	292	583
Brake holding torque at output, 100°C	$T_{2BR}$	Nm	495	990
Max. speed	$n_{2max}$	rpm	46	23
Speed limit for $T_{2B}$	$n_{2B}$	rpm	28	14
Maximum current	$I_{max}$	$A_{eff}$	13.7	7.1
Static current	$I_0$	$A_{eff}$	3.4	3.4
Moment of inertia (on motor shaft, without brake, with resolver)	$J_t$	kgcm <sup>2</sup>	2.43	2.31
Torsional backlash	$j_t$	arcmin	≤ 1	
Torsional rigidity	$C_t$	Nm/arcmin	186	
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	1295	
Weight	$m$	kg	17.6	
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			IP 64	
Mounting position			Any	
Lubrication			Synthetic oil, lubricated for life	
Insulating material class			F	
Paint			RAL 5002 (blue) or RAL 9005 (jet black)	

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



# TPMA 110

Classic TPM model with straight-toothed high-torque gearhead

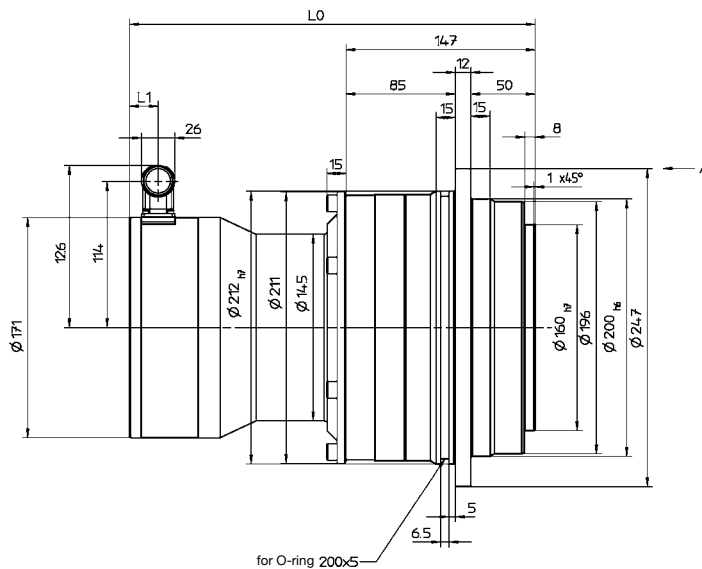
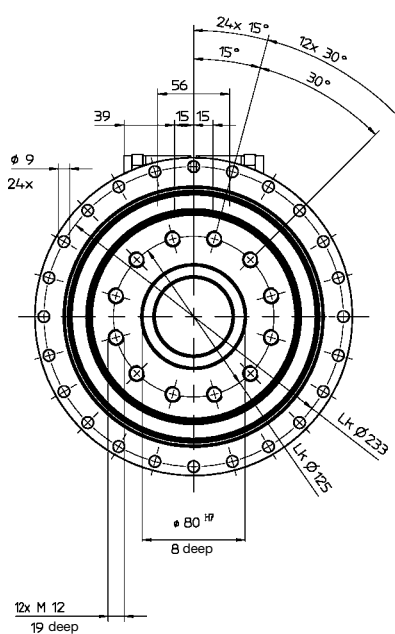
Ratio	<i>i</i>		110	220
Intermediate circuit voltage	$U_D$	V DC	560	
Max. acceleration torque (max. 1000 cycles per hour)	$T_{2B}$	Nm	2600	2600
Static torque	$T_{20}$	Nm	1309	1570
Brake holding torque at output, 100°C	$T_{2BR}$	Nm	1980	3960 <sup>1)</sup>
Max. speed	$n_{2max}$	rpm	41	21
Speed limit for $T_{2B}$	$n_{2B}$	rpm	34	17
Maximum current	$I_{max}$	$A_{eff}$	41.4	19.2
Static current	$I_0$	$A_{eff}$	15	9.7
Moment of inertia (on motor shaft, without brake, with resolver)	$J_t$	kgcm <sup>2</sup>	10.32	9.84
Torsional backlash	$j_t$	arcmin	≤ 1	
Torsional rigidity	$C_t$	Nm/arcmin	550	
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	3064	
Weight	$m$	kg	43.6	
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			IP 64	
Mounting position			Any	
Lubrication			Synthetic oil, lubricated for life	
Insulating material class			F	
Paint			RAL 5002 (blue) or RAL 9005 (jet black)	

<sup>1)</sup> greater than  $T_{2B}$  of the gearhead. In an emergency, 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 “Information”.

View A

View B



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

#### without brake

Ratio	Motor feedback	Length L0	Length L1
i = 110/220	Resolver	315.5	22.3
	Hiperface	330.5	37.3
	EnDat	356.5	63.3

#### with brake

Ratio	Motor feedback	Length L0	Length L1
i = 110/220	Resolver	356.5	63.8
	Hiperface	402.5	109.3
	EnDat	420.5	127.3

# Options for our **servo actuators**

## 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		025	050	110
Holding torque at 100°C	Nm	1.8	4.0	15
Power supply	V DC	24+6% / -10%		
Current	A	0.50	0.55	1.10

## Temperature sensors

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

Standard: PTC resistor, type STM160 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-pin, 1 sin/cos cycle per rotation  
Optional: Singleturn, EnDat 2.1 with 1V<sub>SS</sub>, 512 S/R  
Multiturn, EnDat 2.1 with 1V<sub>SS</sub>, 512 S/R, 4096 R  
Hiperface Singleturn, 128 S/R  
Hiperface Multiturn, 128 S/R, 4096 R  
TTL incremental encoder with hall signals and rectangular incremental signals 2048 S/R  
Incremental encoder, 1V<sub>SS</sub>, 2048 S/R (TPMA only)

## Cables

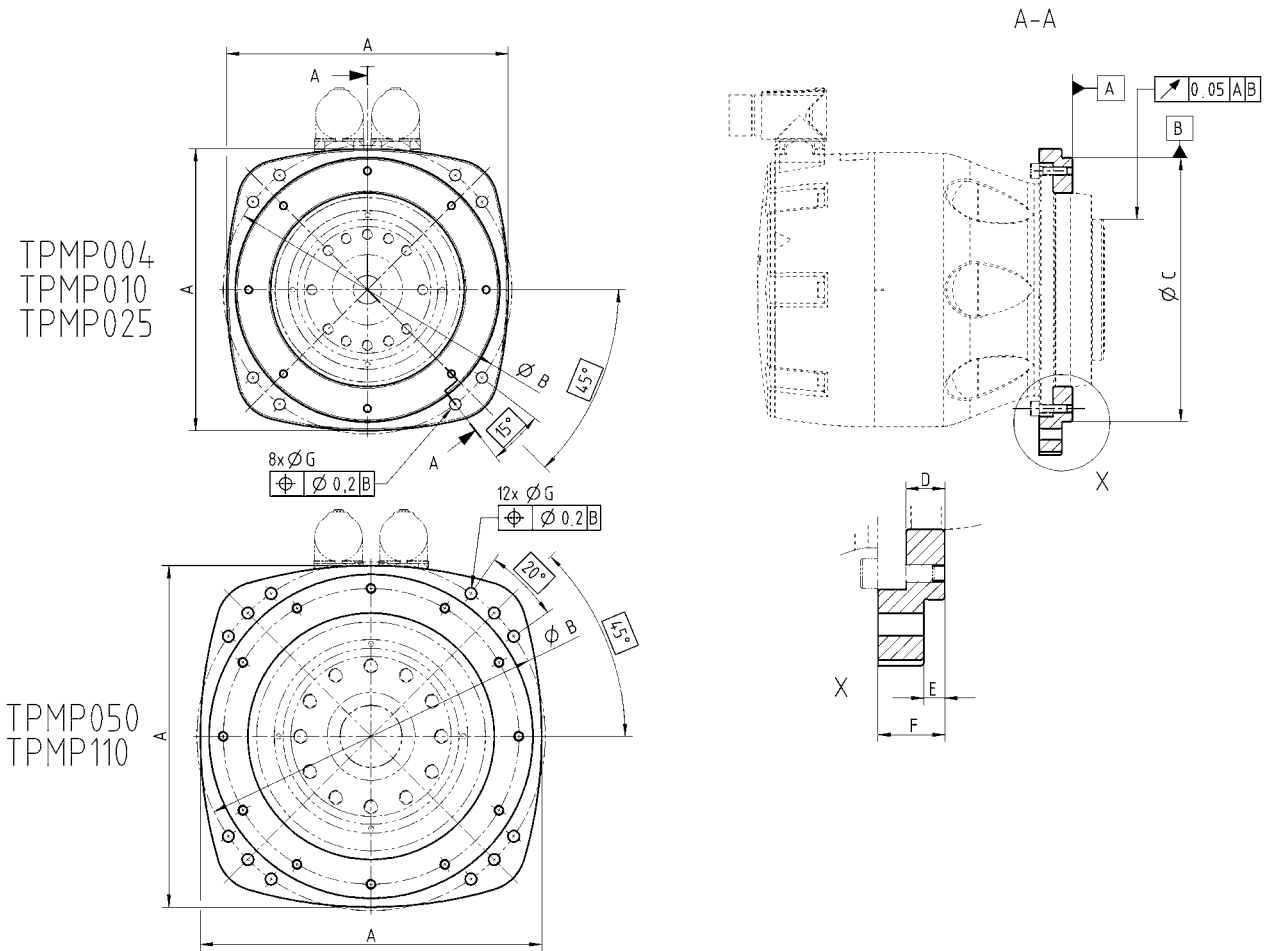
Pre-assembled cable harnesses for power and signals are available for all tested servo controllers (see page 50). Available in 5, 10, 15, 20, 25, 30, 40 and 50 meters

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 of halogen, silicone and CFCs

## Adapter flange

In certain installation situations, the flange bore holes must be accessed from the behind, for example. An adapter flange with a large hole circle is therefore 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

## Servo controllers

TPMA/TPM+ actuators can be operated using a wide selection of different servo controllers. The table below contains a list of all servo controllers already tested with the TPMA/TPM+ and provides information to assist in selecting the correct options. You can request a set of quick start instructions containing all the most important parameters for configuring the servo controller.

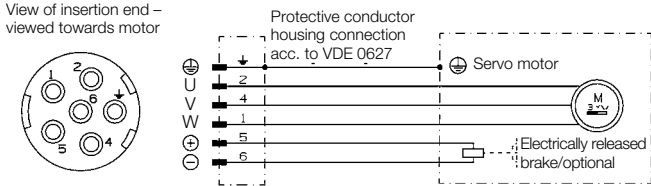
Manufacturer	Version/Type	TPM(A) size					Encoder signal				Temperature sensor		DC bus voltage	
		004	010	025	050	110	Resol- ver	EnDat	Hiper- face	TTL en- coder	PTC	KTY	320V DC	560V DC
AMK	AMKAYSN KU	x	x	x	x	x	x	x	x	-	x	-	x	x
Baldor	Flex + II	x	-	-	-	-	x	x	-	x	-	-	x	-
Bosch	EcoDrive 03	-	x	x	x	x	x	x	-	-	x	-	x	x
	DIAx 04	-	x	x	x	x	x	x	-	-	x	-	x	x
	IndraDrive	x	x	x	x	x	x	x	x	-	x	x	x	x
B & R	AcoPos	x	x	x	x	x	x	x	-	-	x	x	-	x
Control Techniques	UniDrive SP	x	x	x	x	x	x	x	x	x	x	-	-	x
Danaher motion	Servostar 300	x	x	x	x/-	-	x	x	x	-	x	-	x	x
	Servostar 400	x	x	x	x/-	-	x	x	x	-	x	-	x	x
	Servostar 600	x	x	x	x	x	x	x	x	-	x	-	x	x
	Servostar 700	x	x	x	x	x	x	x	x	-	x	-	x	x
ESR Pollmeier	TrioDrive D/xS	x	x	x	x	-	x	x	x	-	x	x	x	-
	MidiDrive D/xS	x	x	x	x	x	x	x	x	-	x	x	-	x
ELAU	PacDrive MC-4	x	x	x	x	x	-	-	x	-	x	-	x	x
Hannifin Hauser	Compax	x	x	x	x	x	x	-	x	-	x	-	x	x
	Compax 3	x	x	x	x	x	x	-	x	x	x	-	x	x
KEB	Combivert S4	x	x	x	x	x	x	-	-	-	x	-	x	x
	Combivert F5-Servo	x	x	x	x	x	x	x	x	-	x	-	x	x
	Combivert F5-A Servo	x	x	x	x	x	x	-	-	-	x	-	x	x
Lenze	Global Drive 93xxx	x	x	x	x	x	x	-	x	-	x	x	-	x
	Global Drive 94xx	x	x	x	x	x	x	-	x	-	x	x	x	x
	ECS Servosystem	x	x	x	x	x	x	-	x	-	x	x	x	x
NUM	MDLU 3	x	x	x	x	x	-	-	x	-	x	-	-	x
Rockwell <sup>1)</sup>	Kinetix 6000	x	x	x	x	x	-	-	x	-	x	-	x	x
	Ultra 3000	x	x	x	x	x	-	-	x	-	-	-	x	x
Siemens	SimoDrive 611U	x	x	x	x	x	x	x	-	-	-	x	-	x
	SimoDrive 611D	x	x	x	x	x	-	x	-	-	-	x	-	x
	Masterdrive MC	x	x	x	x	x	x	x	-	-	x	x	-	x
	Sinamics S120	x	x	x	x	x	x	x	-	-	-	x	-	x

<sup>1)</sup> TPM+ dynamic only: Order with encoder option E or V and pin assignment 5

# Pin assignment 1 for TPMA and TPM+ dynamic/power

## Version with resolver

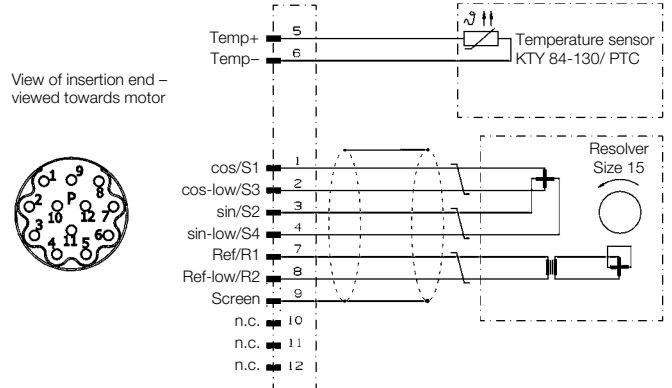
Integral power socket: SpeedTEC BED size 1, Intercontec 6-pin, pin contact ø2mm



TPMA power connector: Intercontec B E\_ C088 MR  
 TPMA feedback connector: Intercontec A E\_ C052 MR04

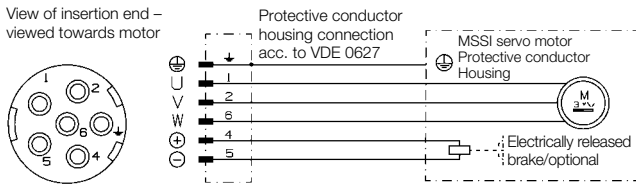
## Option „R”

Integral signal socket: SpeedTEC AED size 1, Intercontec 12-pin, P-part, pin contact ø1mm, housing code 0°



## Version with optical sensor

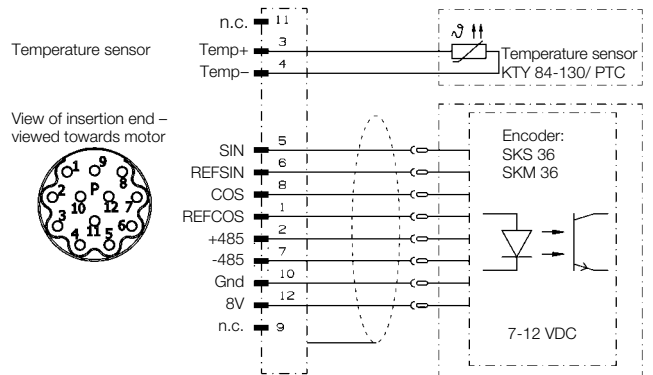
Power connector: SpeedTEC BED size 1, Intercontec 6-pin, pin contact ø2mm



TPMA power connector: Intercontec B E\_ C088 MR  
 TPMA feedback connector: Intercontec A E\_ C052 MR04  
 TPMA motor encoder: Singleturn SRS 50, Multiturn: SRM50

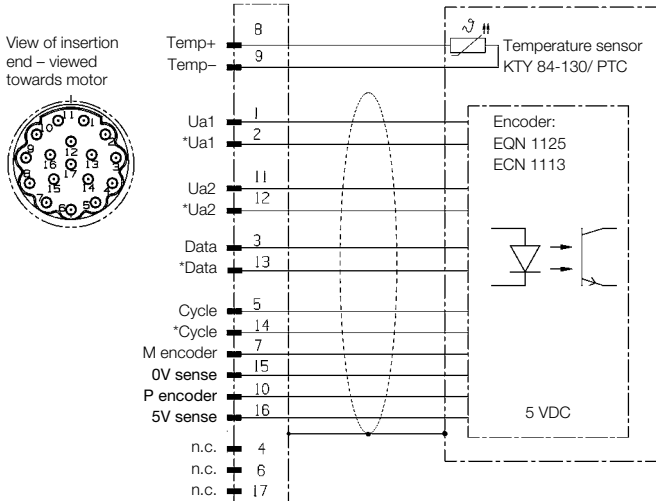
## Options “N” and “K”

Signal connector: SpeedTEC AED size 1, Intercontec 12-pin, P-part, pin contact ø1mm, housing code 0°



## Options “S” and “M”

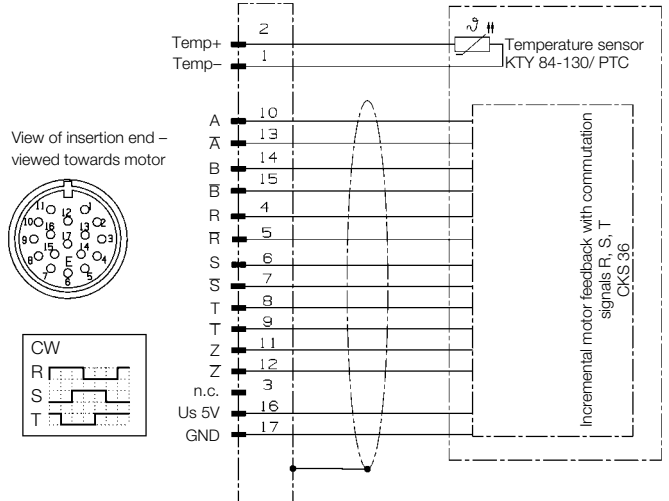
Integral signal socket: SpeedTEC AED size 1, Intercontec 17-pin, E-part, pin contact ø1mm, housing code 0°



TPMA power connector: Intercontec B E\_ C088 MR  
 TPMA feedback connector: Intercontec A E\_ C113 MR04  
 TPMA motor encoder: Singleturn ECN1313, Multiturn: EQN1325

## Option “T”

Integral signal socket: SpeedTEC AED size 1, Intercontec 17-pin, E-part, pin contact ø1mm, housing code 0°

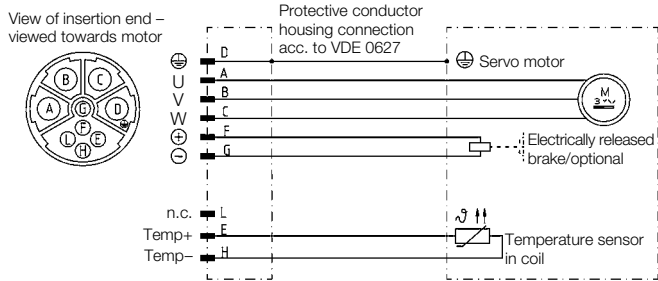


Not available for TPMA.

# Pin assignment 4 for TPM+ dynamic/power

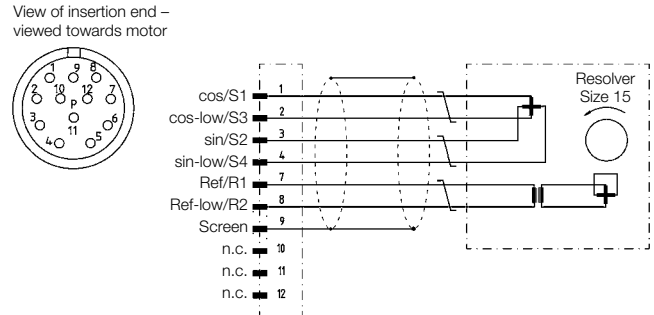
## Version with resolver and optical sensor

Integral power socket: SpeedTEC BED size 1, Intercontec 9-pin, pin contact 4x ø2mm + 5 x ø1mm



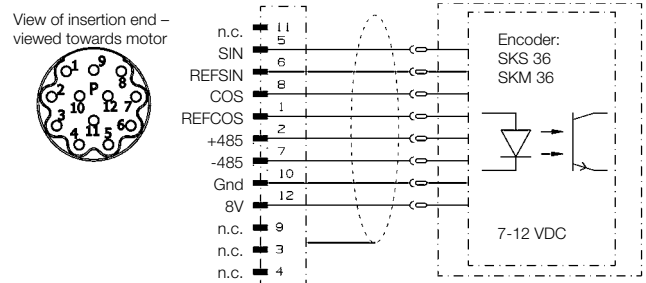
## Option “R”

Integral signal socket: SpeedTEC AED size 1, Intercontec 12-pin, P-part, pin contact ø1mm, housing code 0°



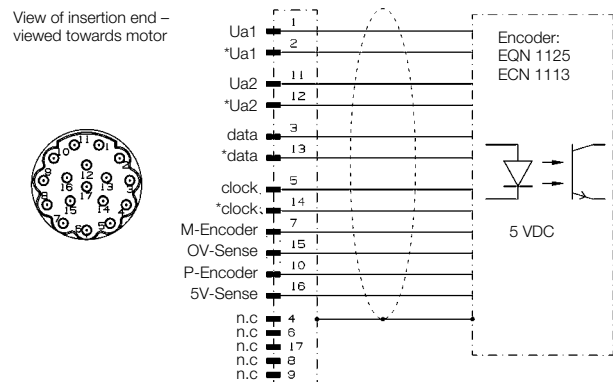
## Options “N” and “K”

Signal connector: SpeedTEC AED size 1, Intercontec 12-pin, P-part, pin contact ø1mm, housing code 0°



## Options “S” and “M”

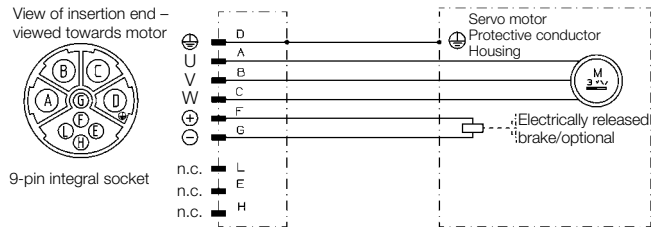
Signal connector: SpeedTEC AED size 1, Intercontec 17-pin, E-part, pin contact ø1mm, housing code 0°



# Pin assignment 5 only for TPM+ dynamic

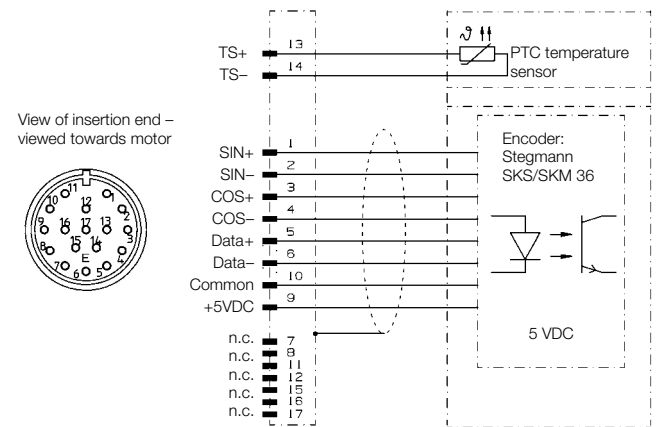
## Version with optical sensor

Integral power socket: SpeedTEC BED size 1, Intercontec 9-pin, pin contact 4x ø2mm + 5 x ø1mm



## Options “E” and “V”

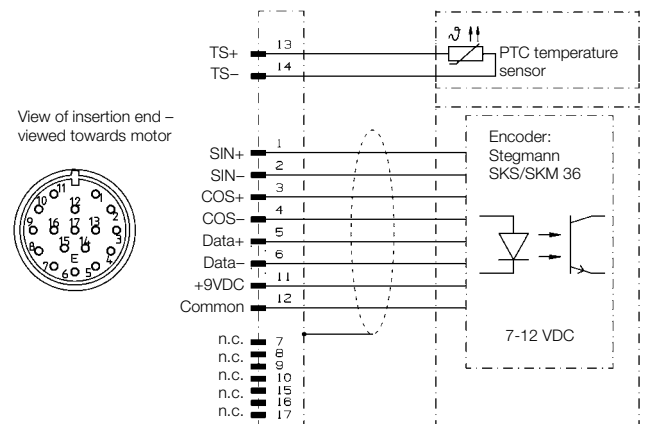
Integral signal socket: SpeedTEC AED size 1, Intercontec 17-pin, E-part, pin contact ø1mm, housing code 0°



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

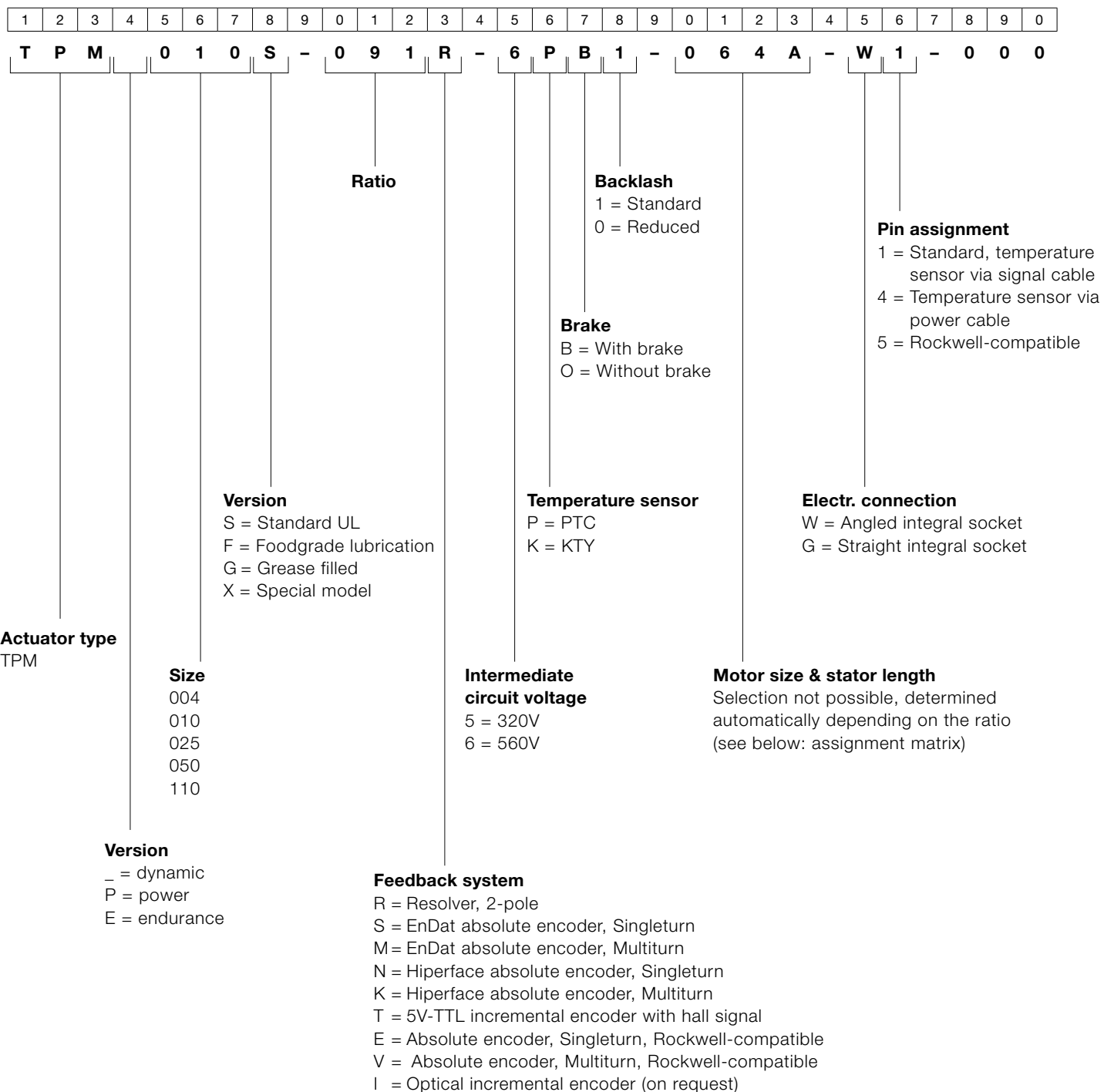
## Options “E” and “V”

Integral signal socket: SpeedTEC AED size 1, Intercontec 17-pin, E-part, pin contact ø1mm, housing code 0°



On TPM+ dynamic with 560V intermediate circuit voltage.

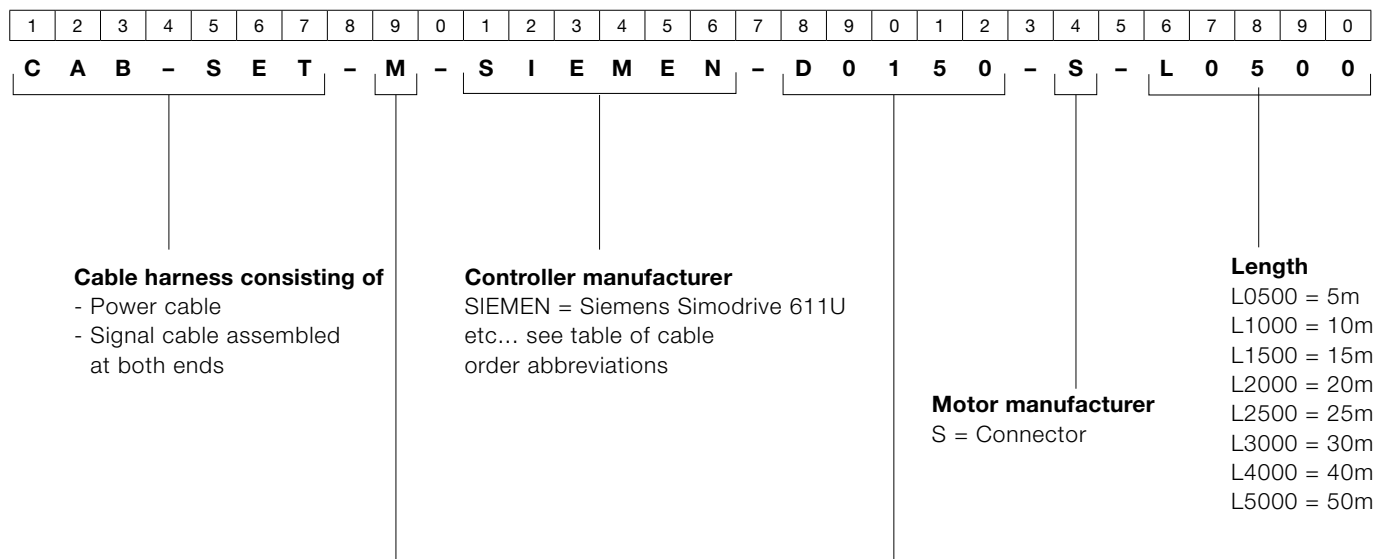
## TPM+ dynamic/power/endurance order codes



### Assignment matrix

dynamic	i = 16, 21, 31	i = 61, 64, 91	power	i = 4 – 35	i = 40 – 100
TPM+ dynamic 004	053B	053A	TPM+ power 004	064 B	064 A
TPM+ dynamic 010	064B	064A	TPM+ power 010	094C	094A
TPM+ dynamic 025	094C	094A	TPM+ power 025	130D	130A
TPM+ dynamic 050	130D	130A	TPM+ power 050	155D	155A
TPM+ dynamic 110	130E	130D	TPM+ power 110	220D	220B

## Order codes for TPM+ dynamic/power cable harnesses



### Feedback system

R = Resolver, 2-pole  
M = EnDat absolute encoder  
K = Hiperface absolute encoder  
T = 5V-TTL incremental encoder with hall signal

### Cable cross section

dynamic	i = 16, 21, 31	i = 61, 64, 91
TPM+ dynamic 004	1,5 mm <sup>2</sup>	1,5 mm <sup>2</sup>
TPM+ dynamic 010	1,5 mm <sup>2</sup>	1,5 mm <sup>2</sup>
TPM+ dynamic 025	1,5 mm <sup>2</sup>	1,5 mm <sup>2</sup>
TPM+ dynamic 050	2,5 mm <sup>2</sup>	1,5 mm <sup>2</sup>
TPM+ dynamic 110	2,5 mm <sup>2</sup>	2,5 mm <sup>2</sup>

power	i = 4 - 35	i = 40 - 100
TPM+ power 004	1,5 mm <sup>2</sup>	1,5 mm <sup>2</sup>
TPM+ power 010	1,5 mm <sup>2</sup>	1,5 mm <sup>2</sup>
TPM+ power 025	2,5 mm <sup>2</sup>	1,5 mm <sup>2</sup>
TPM+ power 050	2,5 mm <sup>2</sup>	1,5 mm <sup>2</sup>
TPM+ power 110	10 mm <sup>2</sup>	4 mm <sup>2</sup>

Selection of the cross section according to EN 60204-1, ambient temperature 40 °C

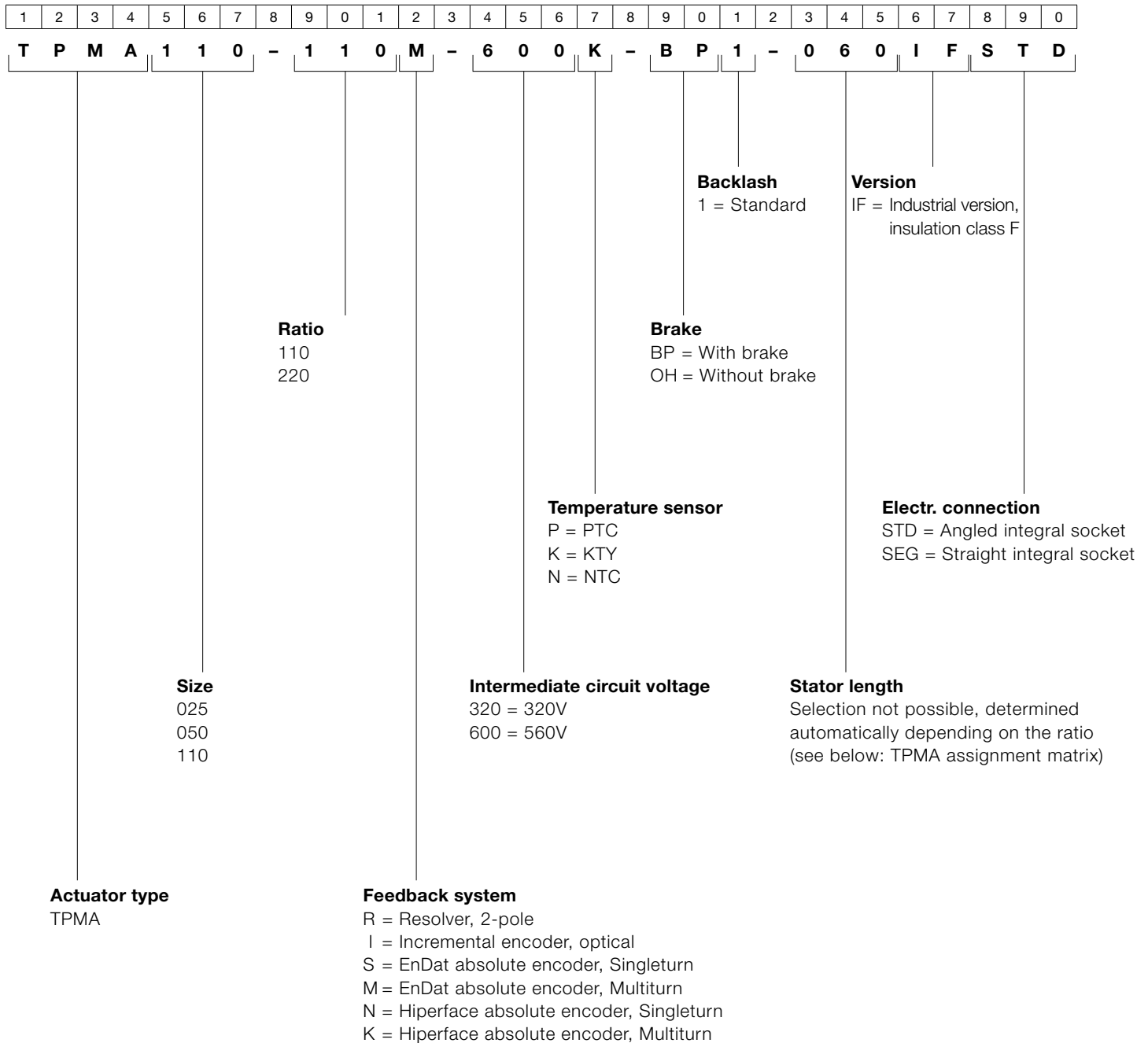
## Cable order abbreviations

Manufacturer	Controller	Cable order abbreviation
Bosch Rexroth	EcoDrive 03	BRCECO
	EcoDrive 03 16A	BRCECO
	IndraDrive	BRCIND
B&R	AcoPos	BURACO
	AcoPos Multi	BURACO
Control Technique	UniDrive SP	CT_SP_
Danaher motion	Servostar 600	DANSR_
	Servostar 400	DANSR_
	Servostar 300	DANSR_
	Servostar 700	DANSR_
ESR Pollmeier	Trio / MidiDrive Digital	ESRTMD
	Trio / MidiDrive D/xS	ESRTMD
ELAU	PacDrive MC-4	ELAMC4

Manufacturer	Controller	Cable order abbreviation
Hannifin / Hauser	Compax	PARCO_
	Compax 3	PARCO3
KEB	Combivert S4	KEBS4_
	Combivert F5-Servo	KEBF5_
	Combivert F5-A Servo	KEBF5_
Lenze	Global Drive 93xxx	LENZE_
	Global Drive 94xx	LENZ94
	ECS Servosystem	LENZE_
NUM	MDLU 3	NUMMD3
Siemens	SimoDrive 611U	SIEMEN
	SimoDrive 611D	SIEMEN
	Masterdrive MC	SIEMEN
	Sinamics S120	SIEMEN

Please remember: Always order TPM+ dynamic und power with pin assignment W1.

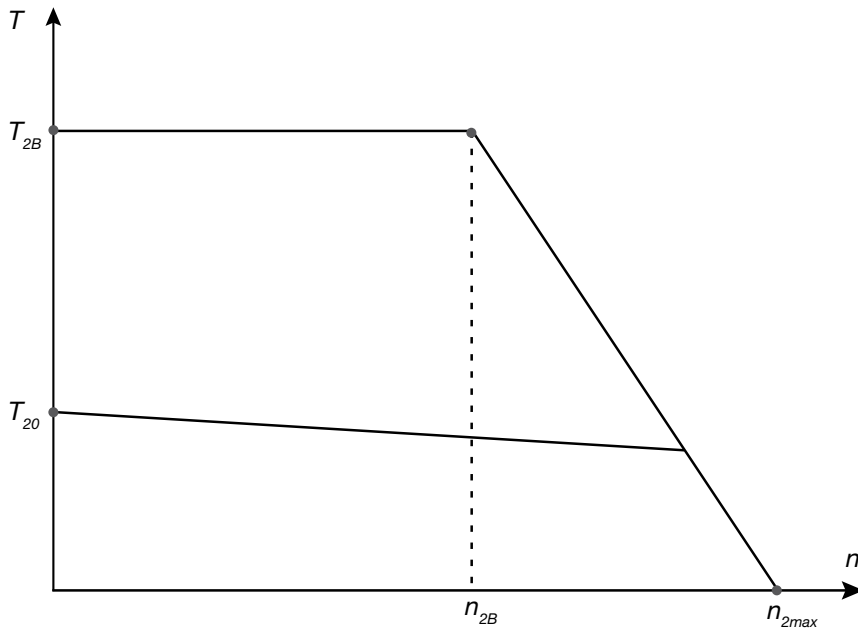
# TPMA order codes



## Assignment matrix TPMA

	<b>i = 110, 220</b>
TPMA 025	015
TPMA 050	015
TPMA 110	060

## Information



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 <sup>2</sup>
$J_1$	Mass moment of inertia of drive (motor side)	kgm <sup>2</sup>
$i$	Gearhead ratio	–
$\eta$	Gearhead efficiency (1stage 0.97 / 2-stage 0.94)	–
$\alpha$	Acceleration of external load	rad/s <sup>2</sup>
$n_{2B}$	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.

## Information

To fully utilize gearhead actuators from the TPMA/TPM+ family, 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 guaranteed:

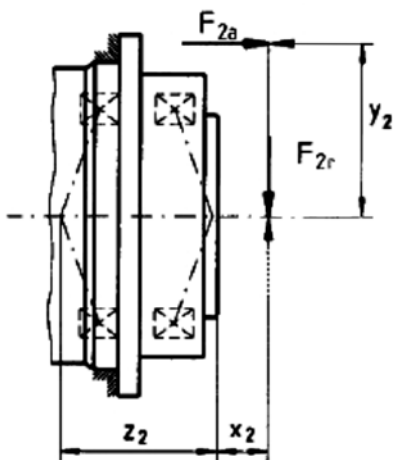
Condition for the total load torque at the gearhead output:

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

Condition for the total load torque at the motor:

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

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



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

$$M_{2k} \leq M_{2Kmax}$$

## Information

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

<b>TPM+ dynamic</b>	<b>004</b>	<b>010</b>	<b>025</b>	<b>050</b>	<b>110</b>
$Z_2$ [mm]	57.6	82.7	94.5	81.2	106.8

<b>TPM+ power</b>	<b>004</b>	<b>010</b>	<b>025</b>	<b>050</b>	<b>110</b>
$Z_2$ [mm]	57.6	82.7	94.5	81.2	106.8

<b>TPM+ endurance</b>	<b>010</b>	<b>050</b>
$Z_2$ [mm]	82,7	81,2

<b>TPMA</b>	<b>025</b>	<b>050</b>	<b>110</b>
$Z_2$ [mm]	94.5	81.2	106.8

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®.

## Do you still have questions?

Do you have any special questions about our products and services?

Visit our homepage [www.wittenstein-us.com](http://www.wittenstein-us.com) for further information.

Alternatively, you can contact and speak to our specialist staff in person at 630-540-5300.



motion control

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**[www.wittenstein-motion-control.de](http://www.wittenstein-motion-control.de)**