

premo[®] servo actuators



premo® – the powerful servo actuator platform

Absolute precision meets perfect motion:
premo® combines precision with motion – more efficiently than ever.

The central idea **behind the first fully scalable servo-actuator platform** from WITTENSTEIN alpha is uncompromising flexibility from the viewpoint of the user. Motors and gearboxes with application-related graduated performance characteristics can be configured modularly **to individual motor / gearbox units**. 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 drive technology, 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.

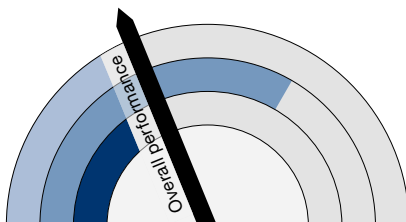
The core of the motor / gearbox unit is a **torsionally rigid precision gearbox** with low backlash and excellent torque density in combination with the equally powerful, **permanent magnet synchronous servo motor**, which

guarantees low cogging and minimal velocity ripple thanks to the split winding.

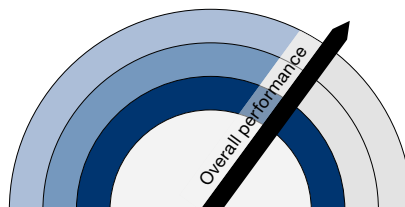
Due to the intelligent design principle implemented for the first time, premo® not only sets **completely new standards with regard to flexibility and sustainability** – the premo® servo actuator generation also opens up new dimensions in performance: **doubled power with minimal increase in size**,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

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

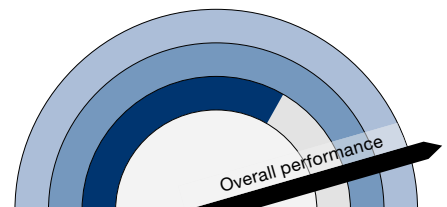
premo® SP Line



premo® TP Line



premo® XP Line



Productivity Efficiency Precision

Flexible mechanical and electrical interfaces for high scalability

premo® SP Line – the entry level class

Optimum performance for all positioning tasks

- Short cycle times thanks to low backlash and extreme rigidity
- Very good positioning accuracy
- Basic configuration with smooth output shaft and resolver

premo® TP Line – the dynamic class

Precision for positioning and processing tasks

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

premo® XP 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® absolute encoder singleturn, SIL 2

Individual upgrading of all lines possible due to a variety of options:

- Analog and digital rotary encoders as well as reliable encoders according to SIL 2
- One and two-connector versions
- Permanent magnet holding brake
- Reduced backlash
- Various output types



premo® – clearly superior in performance

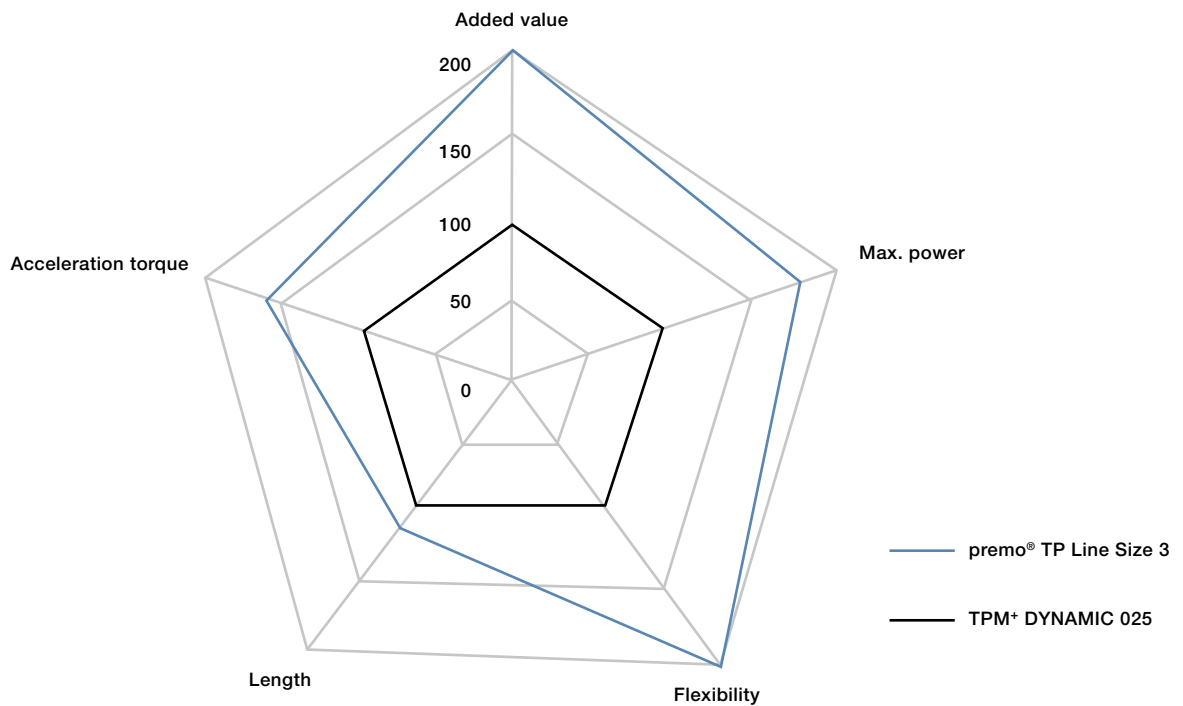
- **Higher machine performance** thanks to higher acceleration torque
- High torque density **combined with a compact design** allow for the realization of higher performance machines with significant space saving
- **Improved connectivity to next generation controllers** from leading system providers due to the use of digital encoders (EnDat 2.2, DSL, HIPERFACE DSL®, DRIVE-CLiQ) and compatibility for high operating voltage up to 750 V DC
- **Reduced wiring requirement** due to single-connector technology
- **Improved reliability and safety** thanks to the use of more powerful brakes and SIL 2 encoders
- **Use in washdown and food applications** thanks to hygienic housing design with smooth surfaces

premo® – the new energy-efficiency class

Utilizing planetary gearboxes with a wide range of gear ratios **and an efficiency up to 97 %**, combined with servo motors with an **efficiency of up to 92 %** – the premo® platform utilizes the entire experience of WITTENSTEIN alpha in the energy-efficient design of servo 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 optimize 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 drives. 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 interface 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.

Our know-how – your benefit

**Flexible gearbox interface
suitable for any application**

B

**All external surfaces with
smooth, hygienic design**

A

**Bayonet-coupling connector
for fast installation**

A

**Conical cover
without screws**

A

C

**Reduced wiring requirement
due to single-cable
technology with digital encoders**

B

C

D

**Robust bearing with
long service life**

A

C

**Brake with enhanced
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 operating voltage and absolute connectivity to system providers	Enhanced performance through intermediate operating voltage up to 750 V DC, interfaces for EnDat 2.2, HIPERFACE DSL®, DRIVE-CLiQ, partly in single-cable technology for the greatest flexibility in adapting to external controllers and maximum productivity
Maximum individual freedom in design	Intelligent premo® modular system with various gearbox outputs, short lengths as optimal design basis, for example in the case of restricted installation space, simplified design for reduced interference contour even on smaller machines, savings in the drive train through improved energy efficiency and single-cable connection, a maximum of design freedom thanks to a wide choice of rotary sensors for different applications
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, cables, fuses and electrical contacts. The single-cable solution offers less wiring and smaller cable tracks while higher braking torques offer faster emergency 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

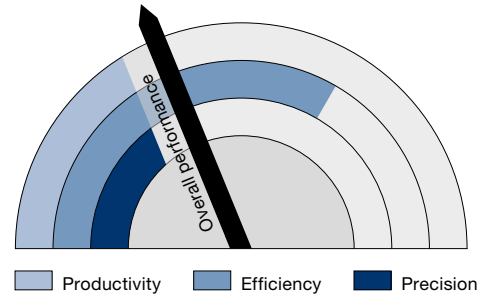
* Overall Equipment Effectiveness

premo[®] SP Line



The entry level class

- Especially suitable for positioning tasks
- Short cycle times
- Special benefits with moving axes:
the low weight and the short overall length
- Mechanical interface with output shaft
- Ideal for connecting couplings, toothed belt pulleys and pinions
- In addition to the smooth shaft version, key and splined shaft versions are also available
- Electric interface with resolver as standard

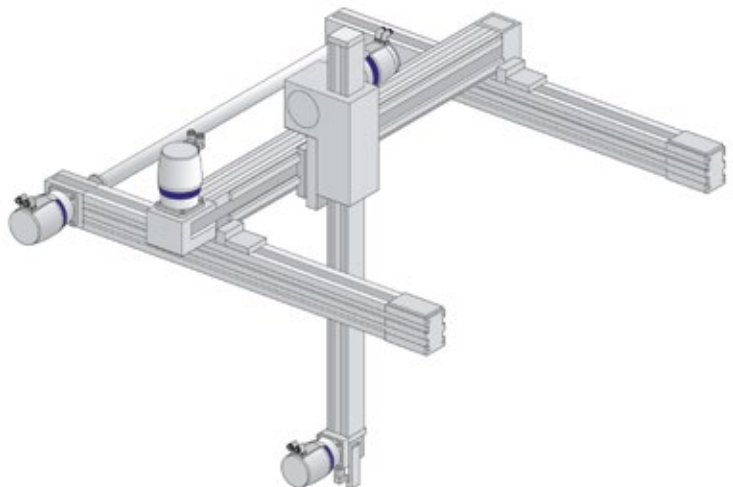


- Precision adequate for most applications
- Optionally extendable with all available encoders and connector versions

Application example

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

premo® SP Line copes with this task thanks to its high power-to-weight ratio and excellent dynamics.



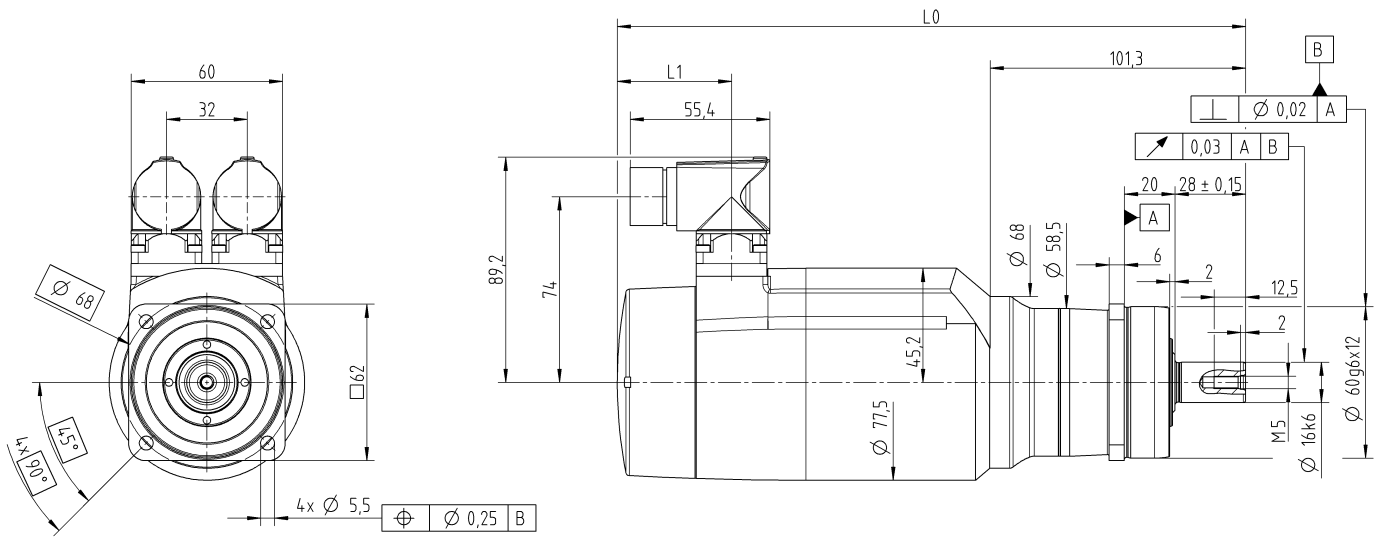
premo® SP Line Size 1 2-stage

			2-stage								
Ratio	i		16	20	25	28	35	40	50	70	100
Operating voltage	U_D	V DC	560								
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	41.6	42	42	42	42	42	42	42	32
		in.lb	368	372	372	372	372	372	372	372	283
Static output torque	T_{20}	Nm	16.5	20.8	26	26	26	19.9	25	26	17
		in.lb	146	184	230	230	230	176	221	230	150
Brake holding torque (at 120 °C)	T_{2Br}	Nm	20.8	26	32.5	36.4	45.5	20.8	26	36.4	52
		in.lb	184	230	288	322	403	184	230	322	460
Max. speed at output	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_{1max}	Nm	2.84	2.84	2.84	2.84	2.84	1.4	1.4	1.4	1.4
		in.lb	25	25	25	25	25	12	12	12	12
Max. motor acceleration current	I_{MaxDyn}	A_{eff}	4.47	4.47	4.47	4.47	4.47	2.52	2.52	2.52	2.52
Static motor current	I_0	A_{eff}	1.71	1.71	1.71	1.71	1.71	1	1	1	1
Max. backlash	j_t	arcmin	Standard ≤ 6 Reduced ≤ 4								
Torsional rigidity (Gearbox)	C_{t21}	Nm/arcmin	3.5								
		in.lb/arcmin	31								
Max. axial force ^{a)}	F_{2AMax}	N	2400								
		lb _f	540								
Max. lateral force ^{a)}	F_{2QMax}	N	2800								
		lb _f	630								
Max. tilting moment	M_{2KMax}	Nm	152								
		in.lb	1345								
Service life ^{b)}	L_h	h	> 20000								
Weight (without brake)	m	kg	3.2 to 3.6								
		lb _m	7.1 to 8								
Ambient temperature		°C	0 to +40								
		°F	+32 to +104								
Lubrication			Lubricated for life								
Insulating material class			F								
Protection class			IP 65								
Paint			Pearl dark grey and innovation blue								
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BC2-00060AA016.000-X								
Bore diameter of coupling on the application side		mm	X = 012.000 - 035.000								
Mass moment of inertia (relates to the drive)	J_1	kgcm ²	0.37	0.37	0.36	0.36	0.36	0.22	0.22	0.22	0.22
		10 ⁻³ in.lb.s ²	0.33	0.33	0.32	0.32	0.32	0.19	0.19	0.19	0.19

Please use our sizing software cymex® for a detailed sizing – www.wittenstein-cymex.com

^{a)} Refers to center of the output shaft or flange

^{b)} Please contact us to discuss application-specific service lifetimes.



without brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	226.6	22.8
	HIPERFACE®	249.1	45.3
	EnDat		
	DRIVE-CLiQ	279.5	75.7
i = 40 – 100	Resolver	211.6	22.8
	HIPERFACE®	234.1	45.3
	EnDat		
	DRIVE-CLiQ	264.5	75.7

with brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	262.6	22.8
	HIPERFACE®	285.1	45.3
	EnDat		
	DRIVE-CLiQ	315.5	75.7
i = 40 – 100	Resolver	239.1	22.8
	HIPERFACE®	261.6	45.3
	EnDat		
	DRIVE-CLiQ	292	75.7

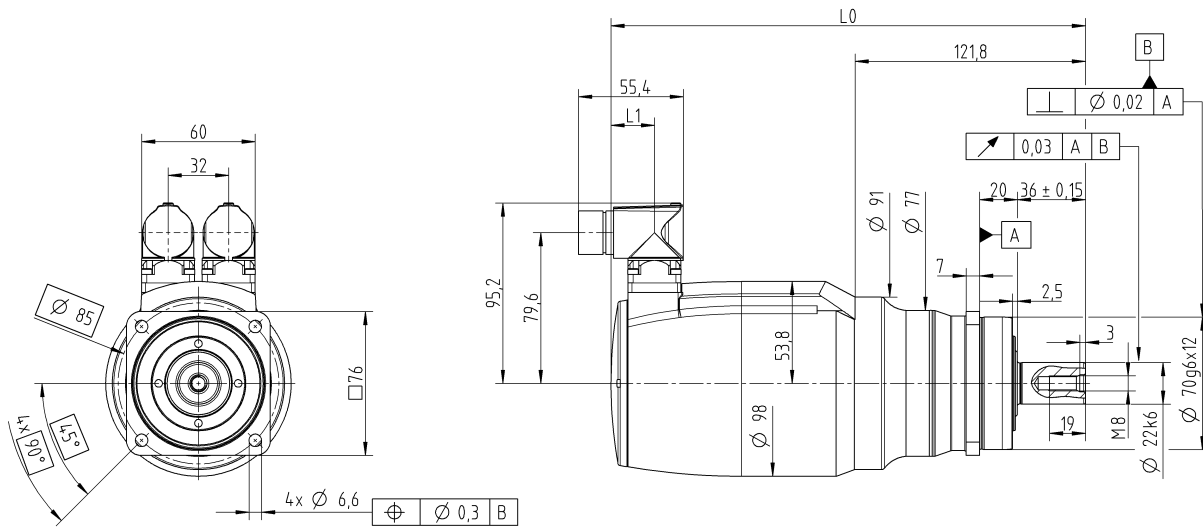
premo® SP Line Size 2 2-stage

			2-stage								
Ratio	i		16	20	25	28	35	40	50	70	100
Operating voltage	U_D	V DC	560								
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	81.5	102	110	110	110	102	110	110	90
		in.lb	721	903	974	974	974	903	974	974	797
Static output torque	T_{20}	Nm	30	37.9	47.8	53.7	67.3	39.1	49.2	69.2	52
		in.lb	266	335	423	475	596	346	435	612	460
Brake holding torque (at 120 °C)	T_{2Br}	Nm	37.4	46.8	58.5	65.5	81.9	52	65	91	130
		in.lb	331	414	518	580	725	460	575	805	1151
Max. speed at output	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	269	215	184	176	155	119	104	85.7	60
Max. motor acceleration torque	T_{1max}	Nm	5.53	5.53	5.53	5.53	5.53	2.76	2.76	2.76	2.76
		in.lb	49	49	49	49	49	24	24	24	24
Max. motor acceleration current	I_{MaxDyn}	A_{eff}	6.94	6.94	6.94	6.94	6.94	4.45	4.45	4.45	4.45
Static motor current	I_0	A_{eff}	2.33	2.33	2.33	2.33	2.33	1.58	1.58	1.58	1.58
Max. backlash	j_t	arcmin	Standard ≤ 6 Reduced ≤ 4								
Torsional rigidity (Gearbox)	C_{t21}	Nm/arcmin	10								
		in.lb/arcmin	89								
Max. axial force ^{a)}	F_{2AMax}	N	3350								
		lb _f	754								
Max. lateral force ^{a)}	F_{2QMax}	N	4200								
		lb _f	945								
Max. tilting moment	M_{2KMax}	Nm	236								
		in.lb	2089								
Service life ^{b)}	L_h	h	> 20000								
Weight (without brake)	m	kg	5.1 to 5.6								
		lb _m	11 to 12								
Ambient temperature		°C	0 to +40								
		°F	+32 to +104								
Lubrication			Lubricated for life								
Insulating material class			F								
Protection class			IP 65								
Paint			Pearl dark grey and innovation blue								
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BC2-00150AA022.000-X								
Bore diameter of coupling on the application side		mm	X = 019.000 - 042.000								
Mass moment of inertia (relates to the drive)	J_1	kgcm ²	0.9	0.87	0.87	0.85	0.85	0.47	0.47	0.47	0.47
		10 ⁻³ in.lb.s ²	0.8	0.77	0.77	0.75	0.75	0.42	0.42	0.42	0.42

Please use our sizing software cymex® for a detailed sizing – www.wittenstein-cymex.com

^{a)} Refers to center of the output shaft or flange

^{b)} Please contact us to discuss application-specific service lifetimes.



without brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	250.8	23
	HIPERFACE®	273.1	45.3
	EnDat		
	DRIVE-CLiQ	303.3	75.5
i = 40 – 100	Resolver	235.8	23
	HIPERFACE®	258.1	45.3
	EnDat		
	DRIVE-CLiQ	288.3	75.5

with brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	289.8	23
	HIPERFACE®	312.1	45.3
	EnDat		
	DRIVE-CLiQ	342.3	75.5
i = 40 – 100	Resolver	251.6	23
	HIPERFACE®	273.9	45.3
	EnDat		
	DRIVE-CLiQ	304.1	75.5

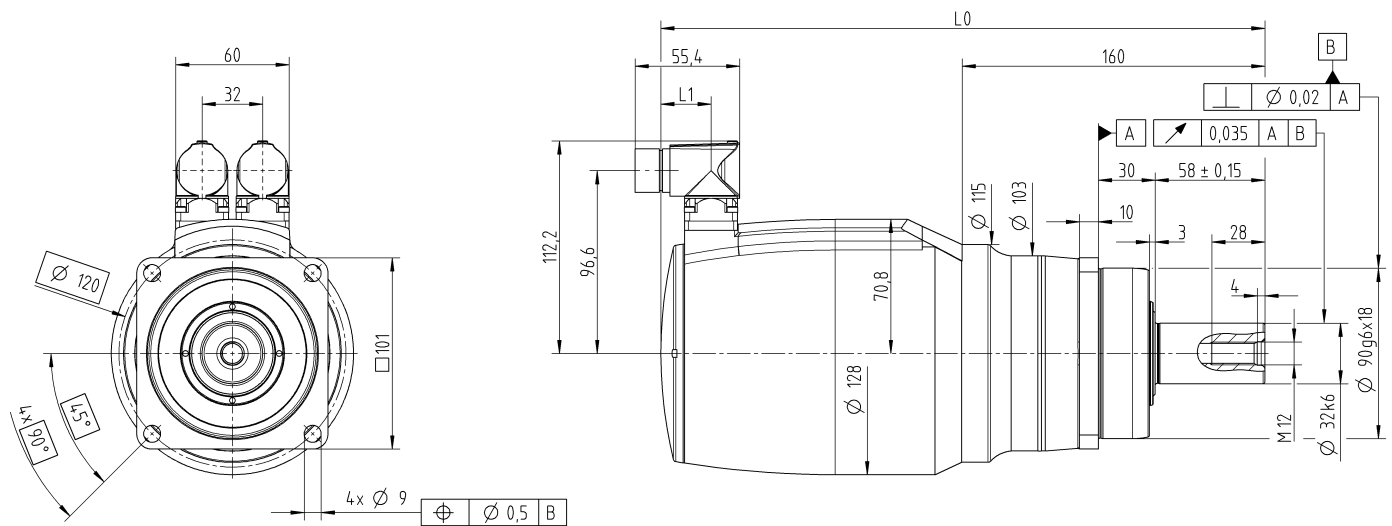
premo® SP Line Size 3 2-stage

			2-stage								
Ratio	i		16	20	25	28	35	40	50	70	100
Operating voltage	U_D	V DC	560								
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	248	310	315	315	315	226	283	315	235
		in.lb	2195	2744	2788	2788	2788	2000	2505	2788	2080
Static output torque	T_{20}	Nm	93	117	146	164	175	89.4	112	158	120
		in.lb	823	1036	1292	1452	1549	791	991	1398	1062
Brake holding torque (at 120 °C)	T_{2Br}	Nm	116	146	182	204	255	93.6	117	164	234
		in.lb	1027	1292	1611	1806	2257	828	1036	1452	2071
Max. speed at output	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	322	257	220	205	171	108	86.4	70	60
Max. motor acceleration torque	T_{1max}	Nm	16.7	16.7	16.7	16.7	16.7	6.09	6.09	6.09	6.09
		in.lb	148	148	148	148	148	54	54	54	54
Max. motor acceleration current	I_{MaxDyn}	A_{eff}	19.8	19.8	19.8	19.8	19.8	7.7	7.7	7.7	7.7
Static motor current	I_0	A_{eff}	7.05	7.05	7.05	7.05	7.05	2.77	2.77	2.77	2.77
Max. backlash	i_t	arcmin	Standard ≤ 5 Reduced ≤ 3								
Torsional rigidity (Gearbox)	C_{t21}	Nm/arcmin	31								
		in.lb/arcmin	274								
Max. axial force ^{a)}	F_{2AMax}	N	5650								
		lb _f	1271								
Max. lateral force ^{a)}	F_{2QMax}	N	6600								
		lb _f	1485								
Max. tilting moment	M_{2KMax}	Nm	487								
		in.lb	4310								
Service life ^{b)}	L_h	h	> 20000								
Weight (without brake)	m	kg	10 to 11.7								
		lb _m	22 to 26								
Ambient temperature		°C	0 to +40								
		°F	+32 to +104								
Lubrication			Lubricated for life								
Insulating material class			F								
Protection class			IP 65								
Paint			Pearl dark grey and innovation blue								
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BC2-00300AA032.000-X								
Bore diameter of coupling on the application side		mm	X = 024.000 - 060.000								
Mass moment of inertia (relates to the drive)	J_1	kgcm ²	4.42	4.32	4.31	4.23	4.22	1.62	1.61	1.61	1.61
		10 ⁻³ in.lb.s ²	3.9	3.8	3.8	3.7	3.7	1.4	1.4	1.4	1.4

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^{a)} Refers to center of the output shaft or flange

^{b)} Please contact us to discuss application-specific service lifetimes.



without brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	319.2	26.5
	HIPERFACE®		
	EnDat	351.2	58.5
	DRIVE-CLiQ		
i = 40 – 100	Resolver	295.1	26.5
	HIPERFACE®		
	EnDat	327.1	58.5
	DRIVE-CLiQ		

with brake

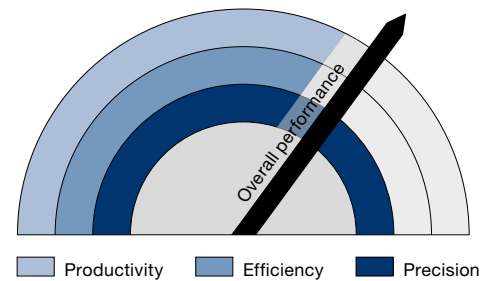
Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	364.7	26.5
	HIPERFACE®		
	EnDat	396.7	58.5
	DRIVE-CLiQ		
i = 40 – 100	Resolver	319.1	26.5
	HIPERFACE®		
	EnDat	351.1	58.5
	DRIVE-CLiQ		

premo[®] TP Line



The dynamic class

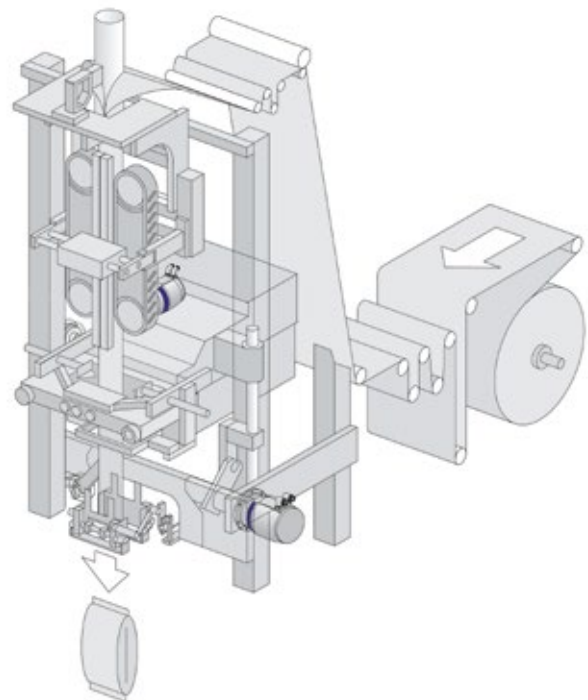
- Ideal for challenging positioning and processing tasks
- Minimal backlash and maximum torsional rigidity allow for the shortest cycle times and excellent surface finish
- Mechanical interface with output flange
- Ideal for connecting lever arms or pinions
- Electric interface with absolute encoder HIPERFACE® singleturn for high positioning accuracy as standard
- Optionally extendable with all available encoders and connector versions



Application example

Tubular bag machines continuously package bulk material of all types – including foodstuffs such as chips or candy. The aim here is to achieve maximum throughput. It is particularly important that all the bags are clean and tightly sealed.

premo® TP Line solves this challenge thanks to its exceptional precision and power density.



premo® TP Line Size 1 2-stage

			2-stage								
Ratio	i		16	20	25	28	35	40	50	70	100
Operating voltage	U_D	V DC	560								
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	41.6	52.3	55	55	55	50.2	55	55	35
		in.lb	368	463	487	487	487	444	487	487	310
Static output torque	T_{20}	Nm	16.5	20.9	26.2	29.3	37	20.1	25.3	35.5	18
		in.lb	146	185	232	259	327	178	224	314	159
Brake holding torque (at 120 °C)	T_{2Br}	Nm	20.8	26	32.5	36.4	45.5	20.8	26	36.4	52
		in.lb	184	230	288	322	403	184	230	322	460
Max. speed at output	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_{1max}	Nm	2.84	2.84	2.84	2.84	2.84	1.4	1.4	1.4	1.4
		in.lb	25	25	25	25	25	12	12	12	12
Max. motor acceleration current	I_{MaxDyn}	A_{eff}	4.47	4.47	4.47	4.47	4.47	2.52	2.52	2.52	2.52
Static motor current	I_0	A_{eff}	1.71	1.71	1.71	1.71	1.71	1	1	1	1
Max. backlash	j_t	arcmin	Standard ≤ 4 Reduced ≤ 2								
Torsional rigidity (Gearbox)	C_{t21}	Nm/arcmin	12	12	12	12	12	11	12	11	8
		in.lb/arcmin	106	106	106	106	106	97	106	97	71
Tilting rigidity	C_{2K}	Nm/arcmin	85								
		in.lb/arcmin	752								
Max. axial force ^{a)}	F_{2AMax}	N	1630								
		lb _f	367								
Max. tilting moment	M_{2KMax}	Nm	110								
		in.lb	974								
Service life ^{b)}	L_h	h	> 20000								
Weight (without brake)	m	kg	2.7 to 3.1								
		lb _m	6 to 6.9								
Ambient temperature		°C	0 to +40								
		°F	+32 to +104								
Lubrication			Lubricated for life								
Insulating material class			F								
Protection class			IP 65								
Paint			Pearl dark grey and innovation blue								
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BCT-00015AAX-031.500								
Bore diameter of coupling on the application side		mm	X = 012.000 - 028.000								
Mass moment of inertia (relates to the drive)	J_1	kgcm ²	0.37	0.37	0.36	0.36	0.36	0.22	0.22	0.22	0.22
		10 ⁻³ in.lb.s ²	0.33	0.33	0.32	0.32	0.32	0.19	0.19	0.19	0.19

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^{a)} Refers to center of the output shaft or flange

^{b)} Please contact us to discuss application-specific service lifetimes.

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	164.8	22.8
	HIPERFACE®	187.3	45.3
	EnDat		
	DRIVE-CLiQ	217.7	75.7
i = 40 – 100	Resolver	149.8	22.8
	HIPERFACE®	172.3	45.3
	EnDat		
	DRIVE-CLiQ	202.7	75.7

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	200.8	22.8
	HIPERFACE®	223.3	45.3
	EnDat		
	DRIVE-CLiQ	253.7	75.7
i = 40 – 100	Resolver	177.3	22.8
	HIPERFACE®	199.8	45.3
	EnDat		
	DRIVE-CLiQ	230.2	75.7

			2-stage								
Ratio	i		16	20	25	28	35	40	50	70	100
Operating voltage	U_D	V DC	560								
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	81.3	102	128	143	143	102	127	143	105
		in.lb	720	903	1133	1266	1266	903	1124	1266	929
Static output torque	T_{20}	Nm	29.9	37.7	47.3	53.2	67.3	38.7	48.4	68.8	60
		in.lb	265	334	419	471	596	343	428	609	531
Brake holding torque (at 120 °C)	T_{2Br}	Nm	37.4	46.8	58.5	65.5	81.9	52	65	91	130
		in.lb	331	414	518	580	725	460	575	805	1151
Max. speed at output	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	138	119	95.2	78	60
Max. motor acceleration torque	T_{1max}	Nm	5.53	5.53	5.53	5.53	5.53	2.76	2.76	2.76	2.76
		in.lb	49	49	49	49	49	24	24	24	24
Max. motor acceleration current	I_{MaxDyn}	A_{eff}	6.94	6.94	6.94	6.94	6.94	4.45	4.45	4.45	4.45
Static motor current	I_0	A_{eff}	2.33	2.33	2.33	2.33	2.33	1.58	1.58	1.58	1.58
Max. backlash	j_t	arcmin	Standard ≤ 3 Reduced ≤ 1								
Torsional rigidity (Gearbox)	C_{t21}	Nm/arcmin	32	32	32	31	32	30	30	28	22
		in.lb/arcmin	283	283	283	274	283	266	266	248	195
Tilting rigidity	C_{2K}	Nm/arcmin	225								
		in.lb/arcmin	1991								
Max. axial force ^{a)}	F_{2AMax}	N	2150								
		lb _f	484								
Max. tilting moment	M_{2KMax}	Nm	270								
		in.lb	2390								
Service life ^{b)}	L_h	h	> 20000								
Weight (without brake)	m	kg	5.1 to 5.6								
		lb _m	11 to 12								
Ambient temperature		°C	0 to +40								
		°F	+32 to +104								
Lubrication			Lubricated for life								
Insulating material class			F								
Protection class			IP 65								
Paint			Pearl dark grey and innovation blue								
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BCT-00060AAX-050.000								
Bore diameter of coupling on the application side		mm	X = 014.000 - 035.000								
Mass moment of inertia (relates to the drive)	J_1	kgcm ²	0.91	0.88	0.87	0.85	0.85	0.48	0.47	0.47	0.47
		10 ⁻³ in.lb.s ²	0.81	0.78	0.77	0.75	0.75	0.42	0.42	0.42	0.42

Please use our sizing software cymex® for a detailed sizing – www.wittenstein-cymex.com

^{a)} Refers to center of the output shaft or flange

^{b)} Please contact us to discuss application-specific service lifetimes.

without brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	189.5	23
	HIPERFACE®	211.8	45.3
	EnDat		
	DRIVE-CLiQ	242	75.5
i = 40 – 100	Resolver	174.5	23
	HIPERFACE®	196.8	45.3
	EnDat		
	DRIVE-CLiQ	227	75.5

with brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	228.5	23
	HIPERFACE®	250.8	45.3
	EnDat		
	DRIVE-CLiQ	281	75.5
i = 40 – 100	Resolver	190.3	23
	HIPERFACE®	212.6	45.3
	EnDat		
	DRIVE-CLiQ	242.8	75.5

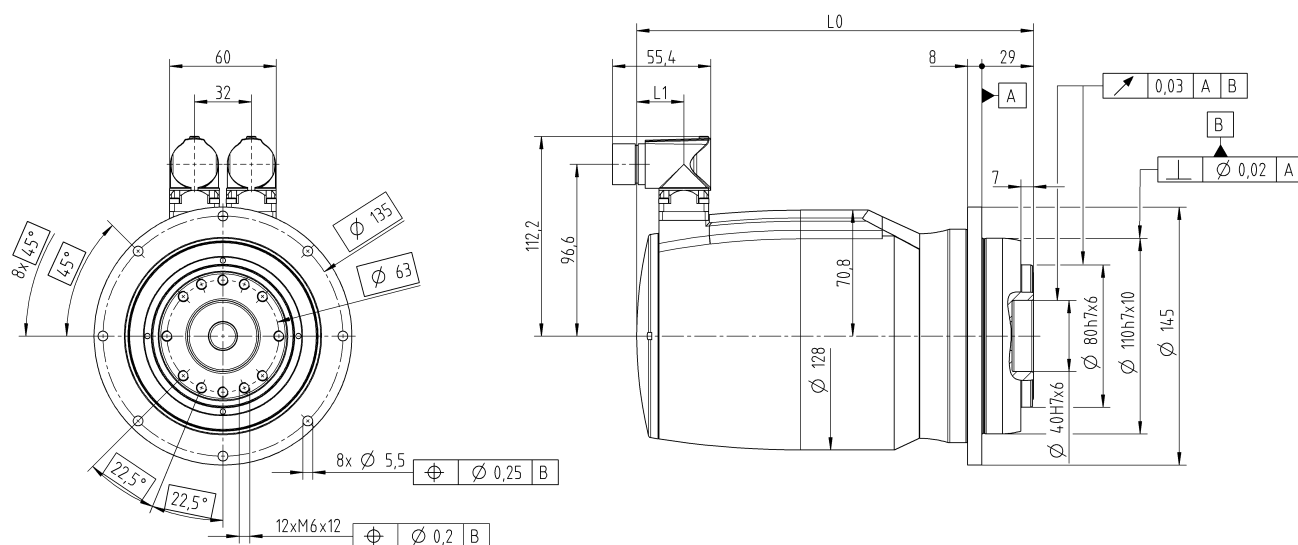
premo® TP Line Size 3 2-stage

			2-stage								
Ratio	i		16	20	25	28	35	40	50	70	100
Operating voltage	U_D	V DC	560								
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	247	310	380	350	380	226	283	330	265
		in.lb	2186	2744	3363	3098	3363	2000	2505	2921	2345
Static output torque	T_{20}	Nm	92.6	116	146	164	206	89.1	112	158	120
		in.lb	820	1027	1292	1452	1823	789	991	1398	1062
Brake holding torque (at 120 °C)	T_{2Br}	Nm	116	146	182	204	255	93.6	117	164	234
		in.lb	1027	1292	1611	1806	2257	828	1036	1452	2071
Max. speed at output	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	322	257	206	197	166	108	86.4	68	60
Max. motor acceleration torque	T_{1max}	Nm	16.7	16.7	16.7	16.7	16.7	6.09	6.09	6.09	6.09
		in.lb	148	148	148	148	148	54	54	54	54
Max. motor acceleration current	I_{MaxDyn}	A_{eff}	19.8	19.8	19.8	19.8	19.8	7.7	7.7	7.7	7.7
Static motor current	I_0	A_{eff}	7.05	7.05	7.05	7.05	7.05	2.77	2.77	2.77	2.77
Max. backlash	j_t	arcmin	Standard ≤ 3 Reduced ≤ 1								
Torsional rigidity (Gearbox)	C_{t21}	Nm/arcmin	81	81	83	80	82	76	80	71	60
		in.lb/arcmin	717	717	735	708	726	673	708	628	531
Tilting rigidity	C_{2K}	Nm/arcmin	550								
		in.lb/arcmin	4868								
Max. axial force ^{a)}	F_{2AMax}	N	4150								
		lb _f	934								
Max. tilting moment	M_{2KMax}	Nm	440								
		in.lb	3894								
Service life ^{b)}	L_h	h	> 20000								
Weight (without brake)	m	kg	8.8 to 10.5								
		lb _m	19 to 23								
Ambient temperature		°C	0 to +40								
		°F	+32 to +104								
Lubrication			Lubricated for life								
Insulating material class			F								
Protection class			IP 65								
Paint			Pearl dark grey and innovation blue								
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BCT-00150AAX-063.000								
Bore diameter of coupling on the application side		mm	X = 019.000 - 042.000								
Mass moment of inertia (relates to the drive)	J_1	kgcm ²	4.46	4.35	4.33	4.24	4.23	1.62	1.62	1.61	1.61
		10 ⁻³ in.lb.s ²	3.9	3.8	3.8	3.8	3.7	1.4	1.4	1.4	1.4

Please use our sizing software cymex® for a detailed sizing – www.wittenstein-cymex.com

^{a)} Refers to center of the output shaft or flange

^{b)} Please contact us to discuss application-specific service lifetimes.



without brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	223.2	26.5
	HIPERFACE®		
	EnDat	255.2	58.5
	DRIVE-CLiQ		
i = 40 – 100	Resolver	199.1	26.5
	HIPERFACE®		
	EnDat	231.1	58.5
	DRIVE-CLiQ		

with brake

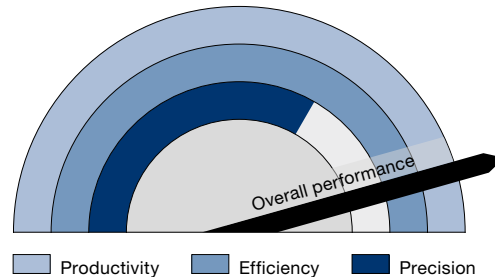
Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	268.7	26.5
	HIPERFACE®		
	EnDat	300.7	58.5
	DRIVE-CLiQ		
i = 40 – 100	Resolver	223.1	26.5
	HIPERFACE®		
	EnDat	255.1	58.5
	DRIVE-CLiQ		

premo[®] XP 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 servo actuator platform for enhanced machine performance
- Mechanical interface with output shaft, ideal for connecting couplings or pinions
- In addition to the smooth shaft version, key and splined shaft versions are also available
- Electric interface with absolute encoder HIPERFACE DSL®, singleturn as standard incl. functional safety and single-cable connection

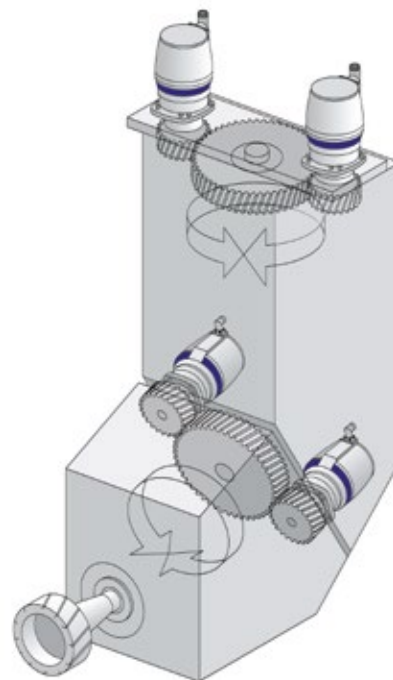


- Safety requirements are united with the latest connection technology
- Optionally extendable with all available encoders and connector versions

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® XP Line offers the ideal solution.



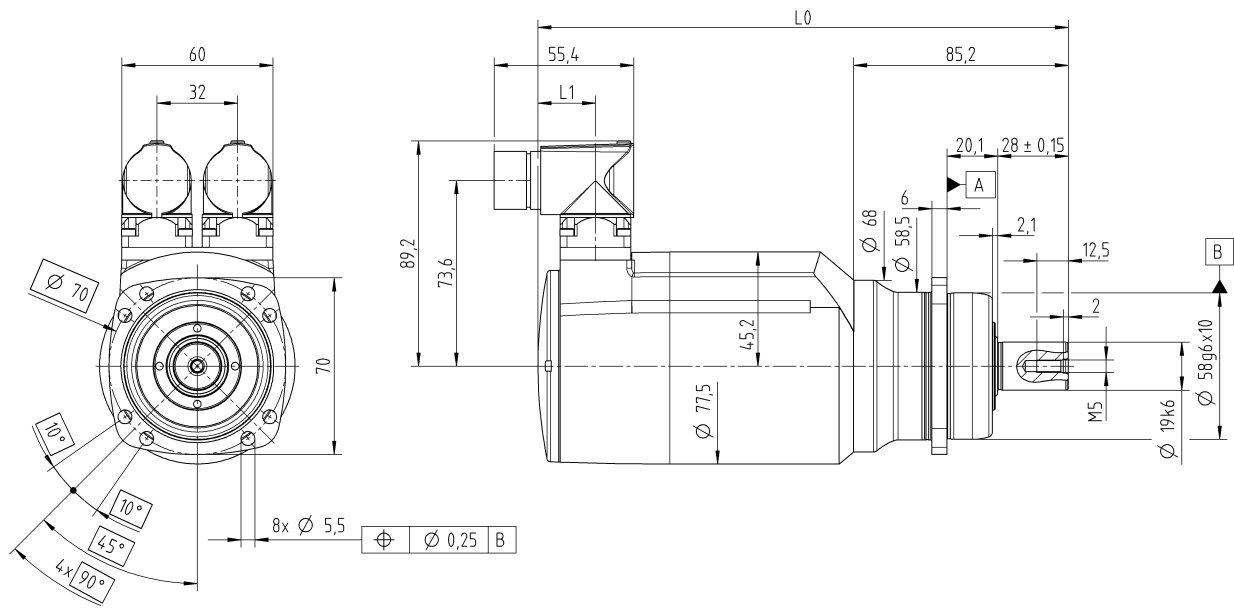
premo® XP Line Size 1 2-stage

			2-stage								
Ratio	i		16	20	25	28	35	40	50	70	100
Operating voltage	U_D	V DC	560								
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	41.8	52.3	65.3	73.4	80	50.3	62.9	60	35
		in.lb	370	463	578	650	708	445	557	531	310
Static output torque	T_{20}	Nm	16.6	20.9	26	29.4	36.9	20.3	25.3	35.5	20
		in.lb	147	185	230	260	327	180	224	314	177
Brake holding torque (at 120 °C)	T_{2Br}	Nm	20.8	26	32.5	36.4	45.5	20.8	26	36.4	52
		in.lb	184	230	288	322	403	184	230	322	460
Max. speed at output	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_{1max}	Nm	2.84	2.84	2.84	2.84	2.84	1.4	1.4	1.4	1.4
		in.lb	25	25	25	25	25	12	12	12	12
Max. motor acceleration current	I_{MaxDyn}	A_{eff}	4.47	4.47	4.47	4.47	4.47	2.52	2.52	2.52	2.52
Static motor current	I_0	A_{eff}	1.71	1.71	1.71	1.71	1.71	1	1	1	1
Max. backlash	j_t	arcmin	Standard ≤ 5 Reduced ≤ 3								
Torsional rigidity (Gearbox)	C_{t21}	Nm/arcmin	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	5
		in.lb/arcmin	58	58	58	58	58	58	58	58	44
Max. axial force ^{a)}	F_{2AMax}	N	3925								
		lb _f	883								
Max. lateral force ^{a)}	F_{2QMax}	N	3800								
		lb _f	855								
Max. tilting moment	M_{2KMax}	Nm	339								
		in.lb	3000								
Service life ^{b)}	L_h	h	> 20000								
Weight (without brake)	m	kg	2.9 to 3.3								
		lb _m	6.4 to 7.3								
Ambient temperature		°C	0 to +40								
		°F	+32 to +104								
Lubrication			Lubricated for life								
Insulating material class			F								
Protection class			IP 65								
Paint			Pearl dark grey and innovation blue								
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BC3-00150AA019.000-X								
Bore diameter of coupling on the application side		mm	X = 015.000 - 038.000								
Mass moment of inertia (relates to the drive)	J_1	kgcm ²	0.38	0.37	0.37	0.36	0.36	0.22	0.22	0.22	0.22
		10 ⁻³ in.lb.s ²	0.34	0.33	0.33	0.32	0.32	0.19	0.19	0.19	0.19

Please use our sizing software cymex® for a detailed sizing – www.wittenstein-cymex.com

^{a)} Refers to center of the output shaft or flange

^{b)} Please contact us to discuss application-specific service lifetimes.



without brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	210.3	22.8
	HIPERFACE®	232.8	45.3
	EnDat		
	DRIVE-CLiQ	263.2	75.7
i = 40 – 100	Resolver	195.3	22.8
	HIPERFACE®	217.8	45.3
	EnDat		
	DRIVE-CLiQ	248.2	75.7

with brake

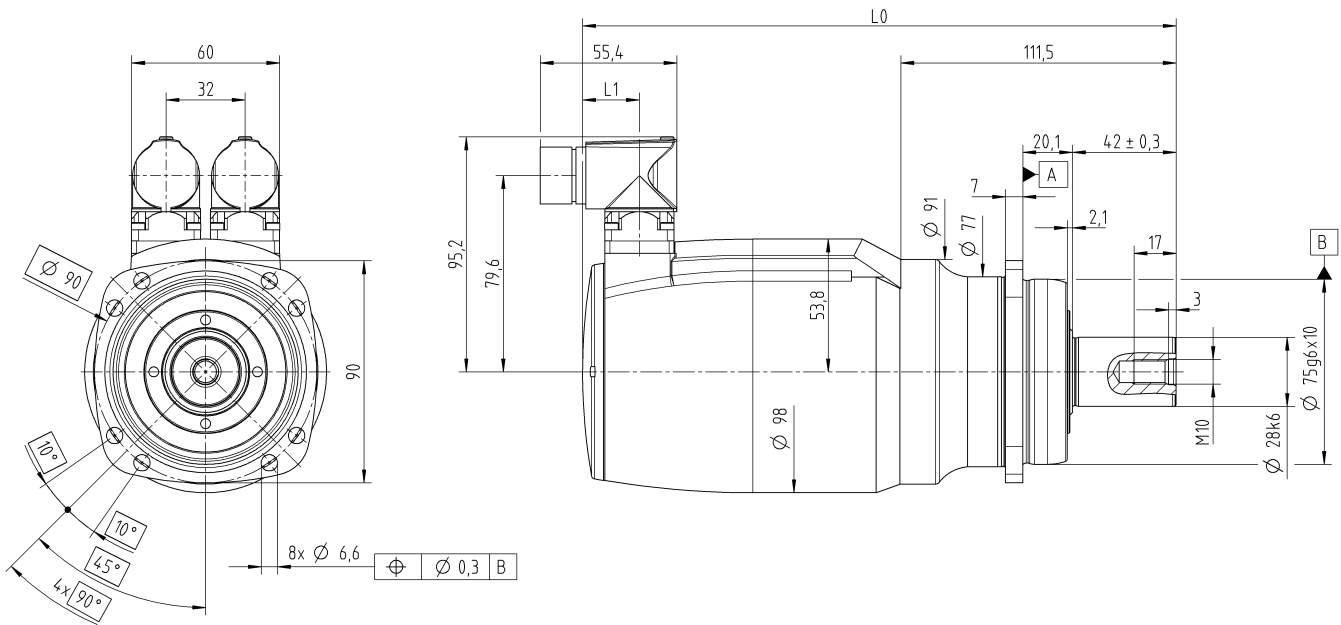
Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	246.3	22.8
	HIPERFACE®	268.8	45.3
	EnDat		
	DRIVE-CLiQ	299.2	75.7
i = 40 – 100	Resolver	222.8	22.8
	HIPERFACE®	245.3	45.3
	EnDat		
	DRIVE-CLiQ	275.7	75.7

			2-stage								
Ratio	i		16	20	25	28	35	40	50	70	100
Operating voltage	U_D	V DC	560								
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	81.9	103	128	144	180	102	128	165	105
		in.lb	725	912	1133	1275	1593	903	1133	1460	929
Static output torque	T_{20}	Nm	30.5	38.4	47.8	54	67.5	39.1	49	68.8	60
		in.lb	270	340	423	478	597	346	434	609	531
Brake holding torque (at 120 °C)	T_{2Br}	Nm	37.4	46.8	58.5	65.5	81.9	52	65	91	130
		in.lb	331	414	518	580	725	460	575	805	1151
Max. speed at output	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	123	119	95.2	70.1	60
Max. motor acceleration torque	T_{1max}	Nm	5.53	5.53	5.53	5.53	5.53	2.76	2.76	2.76	2.76
		in.lb	49	49	49	49	49	24	24	24	24
Max. motor acceleration current	I_{MaxDyn}	A_{eff}	6.94	6.94	6.94	6.94	6.94	4.45	4.45	4.45	4.45
Static motor current	I_0	A_{eff}	2.33	2.33	2.33	2.33	2.33	1.58	1.58	1.58	1.58
Max. backlash	j_t	arcmin	Standard ≤ 4 Reduced ≤ 2								
Torsional rigidity (Gearbox)	C_{t21}	Nm/arcmin	19.5	19.5	19.5	19.5	19.5	19.5	19.5	18	15
		in.lb/arcmin	173	173	173	173	173	173	173	159	133
Max. axial force ^{a)}	F_{2AMax}	N	4840								
		lb _f	1089								
Max. lateral force ^{a)}	F_{2QMax}	N	6000								
		lb _f	1350								
Max. tilting moment	M_{2KMax}	Nm	675								
		in.lb	5974								
Service life ^{b)}	L_h	h	> 20000								
Weight (without brake)	m	kg	5 to 5.5								
		lb _m	11 to 12								
Ambient temperature		°C	0 to +40								
		°F	+32 to +104								
Lubrication			Lubricated for life								
Insulating material class			F								
Protection class			IP 65								
Paint			Pearl dark grey and innovation blue								
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BC3-00300AA028.000-X								
Bore diameter of coupling on the application side		mm	X = 024.000 - 056.000								
Mass moment of inertia (relates to the drive)	J_1	kgcm ²	0.91	0.88	0.87	0.85	0.85	0.48	0.47	0.47	0.47
		10 ⁻³ in.lb.s ²	0.81	0.78	0.77	0.75	0.75	0.42	0.42	0.42	0.42

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^{a)} Refers to center of the output shaft or flange

^{b)} Please contact us to discuss application-specific service lifetimes.



without brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	240.5	23
	HIPERFACE®	262.8	45.3
	EnDat		
	DRIVE-CLiQ	293	75.5
i = 40 – 100	Resolver	225.5	23
	HIPERFACE®	247.8	45.3
	EnDat		
	DRIVE-CLiQ	278	75.5

with brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	279.5	23
	HIPERFACE®	301.8	45.3
	EnDat		
	DRIVE-CLiQ	332	75.5
i = 40 – 100	Resolver	241.3	23
	HIPERFACE®	263.6	45.3
	EnDat		
	DRIVE-CLiQ	293.8	75.5

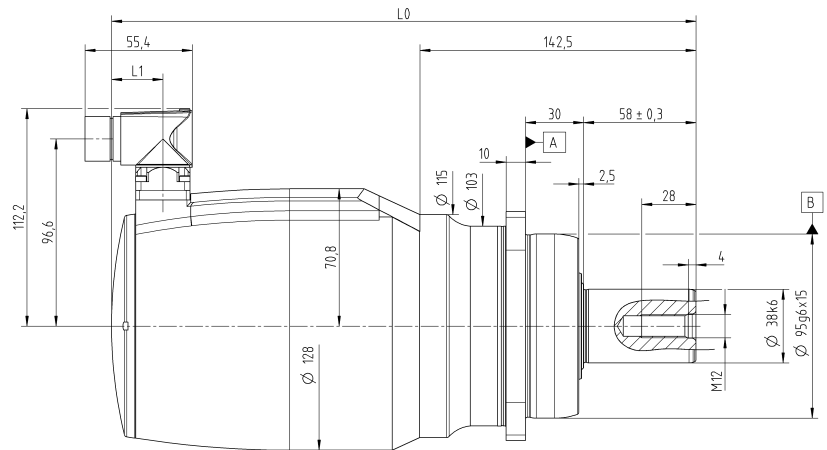
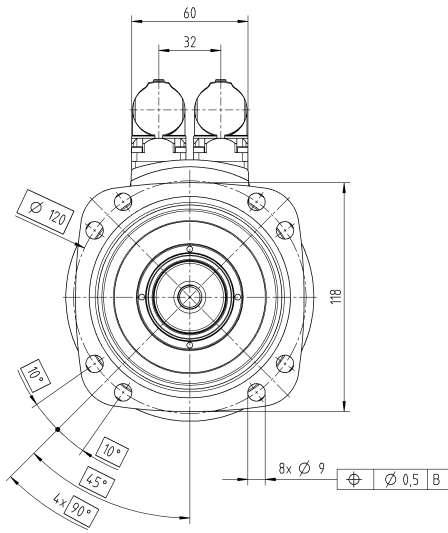
premo® XP Line Size 3 2-stage

			2-stage								
Ratio	i		16	20	25	28	35	40	50	70	100
Operating voltage	U_D	V DC	560								
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	248	310	388	435	450	226	283	350	275
		in.lb	2195	2744	3434	3850	3983	2000	2505	3098	2434
Static output torque	T_{20}	Nm	93.3	117	147	164	206	89.3	112	158	130
		in.lb	826	1036	1301	1452	1823	790	991	1398	1151
Brake holding torque (at 120 °C)	T_{2Br}	Nm	116	146	182	204	255	93.6	117	164	234
		in.lb	1027	1292	1611	1806	2257	828	1036	1452	2071
Max. speed at output	n_{2max}	rpm	375	300	240	214	171	150	120	85.7	60
Speed limit for T_{2B}	n_{2B}	rpm	322	257	206	184	157	108	86.4	65.7	60
Max. motor acceleration torque	T_{1max}	Nm	16.7	16.7	16.7	16.7	16.7	6.09	6.09	6.09	6.09
		in.lb	148	148	148	148	148	54	54	54	54
Max. motor acceleration current	I_{MaxDyn}	A_{eff}	19.8	19.8	19.8	19.8	19.8	7.7	7.7	7.7	7.7
Static motor current	I_0	A_{eff}	7.05	7.05	7.05	7.05	7.05	2.77	2.77	2.77	2.77
Max. backlash	j_t	arcmin	Standard ≤ 4 Reduced ≤ 2								
Torsional rigidity (Gearbox)	C_{t21}	Nm/arcmin	45	45	45	45	45	45	45	42	35
		in.lb/arcmin	398	398	398	398	398	398	398	372	310
Max. axial force ^{a)}	F_{2AMax}	N	6700								
		lb _f	1508								
Max. lateral force ^{a)}	F_{2QMax}	N	9000								
		lb _f	2025								
Max. tilting moment	M_{2KMax}	Nm	1296								
		in.lb	11471								
Service life ^{b)}	L_h	h	> 20000								
Weight (without brake)	m	kg	9.7 to 11.4								
		lb _m	21 to 25								
Ambient temperature		°C	0 to +40								
		°F	+32 to +104								
Lubrication			Lubricated for life								
Insulating material class			F								
Protection class			IP 65								
Paint			Pearl dark grey and innovation blue								
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BC3-00500AA038.000-X								
Bore diameter of coupling on the application side		mm	X = 024.000 - 056.000								
Mass moment of inertia (relates to the drive)	J_1	kgcm ²	4.46	4.35	4.33	4.24	4.23	1.62	1.62	1.61	1.61
		10 ⁻³ in.lb.s ²	3.9	3.8	3.8	3.8	3.7	1.4	1.4	1.4	1.4

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^{a)} Refers to center of the output shaft or flange

^{b)} Please contact us to discuss application-specific service lifetimes.



without brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	301.7	26.5
	HIPERFACE®		
	EnDat	333.7	58.5
	DRIVE-CLiQ		
i = 40 – 100	Resolver	277.6	26.5
	HIPERFACE®		
	EnDat	309.6	58.5
	DRIVE-CLiQ		

with brake

Ratio	Encoder	Length L0 in mm	Length L1 in mm
i = 16 – 35	Resolver	347.2	26.5
	HIPERFACE®		
	EnDat	379.2	58.5
	DRIVE-CLiQ		
i = 40 – 100	Resolver	301.6	26.5
	HIPERFACE®		
	EnDat	333.6	58.5
	DRIVE-CLiQ		



premo[®] options

Electrical connection

Straight or right-angled version, alignment of outlets to gearbox flange (XP Line) and single-cable connection for DSL protocol and EnDAT 2.2 available.

Encoder

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

Pin assignment

For a number of servo controllers, we offer special pin assignments for power and signal.

Temperature sensor

PTC / PT1000

Operating voltage

Depending on the application and servo controller, windings for 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.

Backlash

To improve precision, the gearbox backlash can be reduced.

Multiple output configurations for greater flexibility

Smooth shaft, Shaft with key, Splined shaft (DIN 5480), Flange, System output



Gearbox model

Several mechanical interface versions are available:

Version	SP Line	TP Line	XP Line
Output	<ul style="list-style-type: none"> - Smooth shaft (standard) - Key (option) - Splined (option) 	<ul style="list-style-type: none"> - Flange (standard) - System output (option) 	<ul style="list-style-type: none"> - Smooth shaft (standard) - Key (option) - Splined (option) - System output (option)
Housing	Round through bore (standard)	Round through bore (standard)	<ul style="list-style-type: none"> - Round through bore (standard) - Slotted through bore (option)

Lubrication

Depending on the application, the requirements regarding the lubricant in the gearbox change.

The following lubricants are available for our servo actuators:

- Oil lubricant (Standard)
- Grease lubricant
(Reduction of output torque by up to 20 %)
- Food-grade oil lubricant
(Reduction of output torque by up to 20 %)
- Food-grade grease lubricant
(Reduction of output torque by up to 40 %)

Operating voltage

The premo[®] servo actuators are available for operating voltages of 320 V and 560 V. The dielectric strength goes up to 750 V, so the use with servo controllers with the appropriate operating voltage is possible.

Temperature sensor

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

- PTC resistor, type STM 160 according to DIN 44081/82
- PT1000

Encoder

Connectivity is the magic word. Here, WITTENSTEIN alpha offers its customers maximum flexibility.

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

Resolver

- 2 poles, one sine/ cosine cycle per revolution
(standard SP Line)

HIPERFACE[®] absolute encoder, safety acc. to SIL 2

- Singleturn, resolution 4096 positions per revolution, 128 sine/cosine (standard TP Line)
- Multiturn, resolution 4096 positions per revolution, 128 sine/cosine, 4096 revolutions

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

- Singleturn, resolution 20 bits per revolution, (standard XP Line)
- Multiturn, resolution 20 bits per revolution, 4096 revolutions

EnDat 2.1, absolute encoder

- Singleturn, resolution 8192 positions per revolution, 512 sine/cosine
- Multiturn, resolution 8192 positions per revolution, 512 sine/cosine, 4096 revolutions

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

- Singleturn, resolution 23 bits per revolution
- Multiturn, resolution 23 bits per revolution, 4096 revolutions

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

- Singleturn, resolution 24 bits per revolution
- Multiturn, resolution 24 bits per revolution, 4096 revolutions

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 and unlimited duty cycles at zero speed.

		Size 1		Size 2		Size 3	
Ratio		16 – 35	40 – 100	16 – 35	40 – 100	16 – 35	40 – 100
Static holding torque at 120 °C ¹⁾	Nm	1.3	0.52	2.34	1.3	7.28	2.34
Supply voltage	V DC	24	24	24	24	24	24
Current at nominal voltage and 20 °C	A DC	0.46	0.42	0.5	0.46	0.71	0.5
Connection time	ms	≤ 8	≤ 10	≤ 20	≤ 8	–	≤ 20
Separation time	ms	≤ 35	≤ 18	≤ 50	≤ 35	≤ 60	≤ 50

¹⁾ Please refer to our project planning note on the brake.

For the precise holding torques at the output, please refer to the relevant data tables for the servo actuators, e.g. premo® TP Line Size 3. In the case of transmission ratios in which the holding torque at the output is above T_{2B} , the brake can be used max. 1000 times on the rotating motor.

Electrical connection

In addition to the conventional connection via two integral sockets for power and signal, a version for a single-cable connection in conjunction with EnDat 2.2 or HIPERFACE DSL® is available.

Integral sockets used:

Single-cable connection	Power and signal	Integral power socket M23 Bayonet coupling, 13/9-pin
Two-cable connection	Power	Integral power socket M23 Bayonet coupling, 6/9-pin
	Signal	Integral signal socket M23 Bayonet coupling, 9/12/17-pin

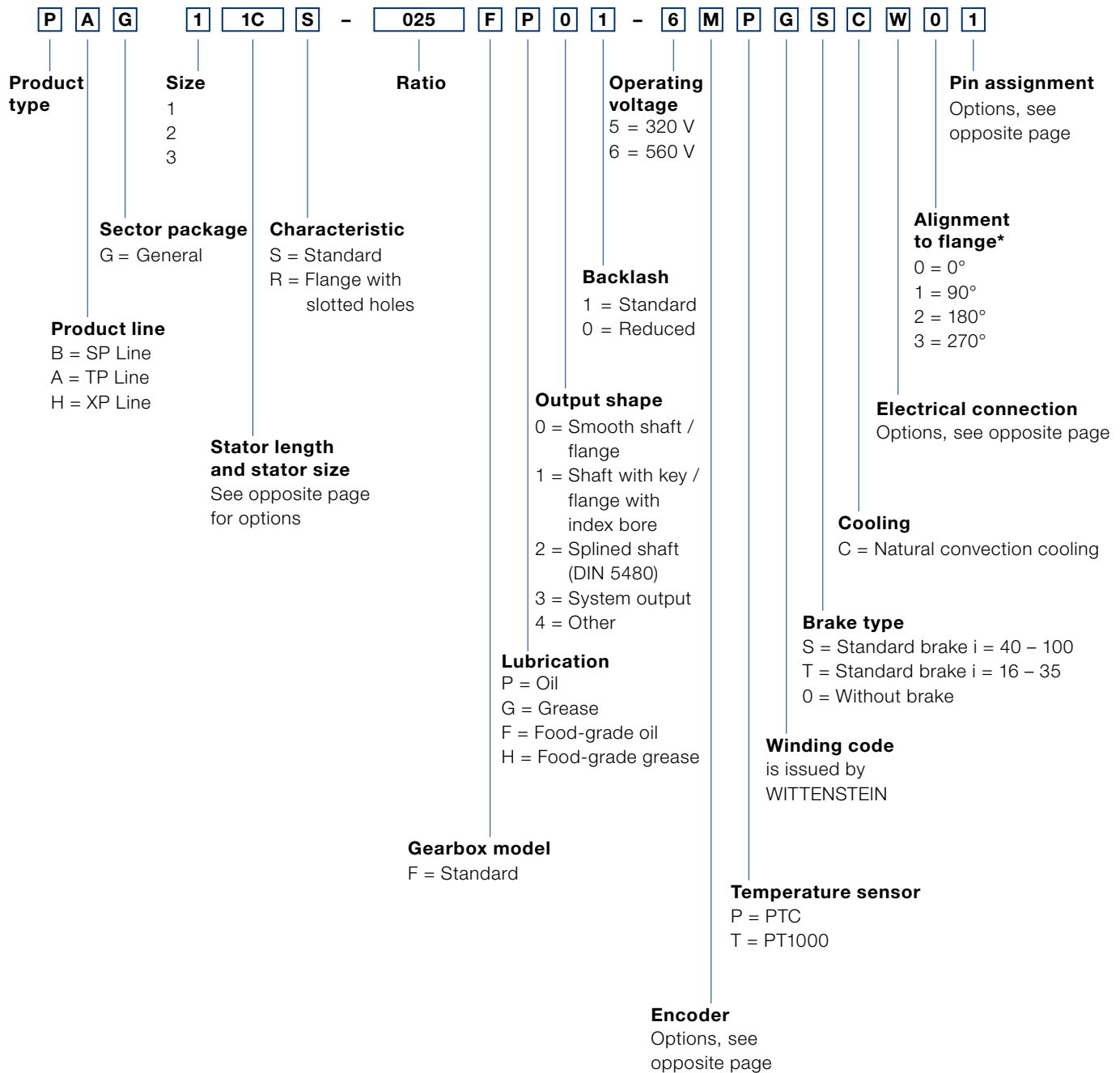
Pin assignment

The great flexibility of the new premo® servo actuator platform is also demonstrated by 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 alpha-Standard, temperature sensor in signal cable Resolver, DRIVE-CLiQ
Pin assignment 2	Siemens-compatible (except DRIVE-CLiQ), temperature sensor in signal cable Resolver, EnDat 2.1
Pin assignment 4	WITTENSTEIN alpha-Standard, temperature sensor in power cable HIPERFACE®, EnDat 2.2
Pin assignment 5	Rockwell compatible HIPERFACE®, HIPERFACE DSL® (single-cable)

Pin assignment 6	B&R compatible Resolver, EnDat 2.2 (single-cable)
Pin assignment 8	Schneider compatible HIPERFACE®
Pin assignment 9	Beckhoff compatible HIPERFACE DSL® (single-cable)

premo® Ordering code



* The position of the electrical connection with respect to the flange is relevant for XP Line with characteristic R (flange with slotted holes). This information relates to the offset of the integral sockets to the slotted holes as seen on the servo actuator from the rear.

Electrical connection options

R	Angled integral socket, 1-cab
W	Angled integral socket, 2-cab
S	Straight integral socket, 1-cab
G	Straight integral socket, 2-cab

Pin assignment options

1	WITTENSTEIN alpha Standard with temperature sensor in signal line
2	Siemens compatible w/o DRIVE-CLiQ
4	WITTENSTEIN alpha Standard with temperature sensor in power cable
5	Rockwell compatible
6	B&R compatible
8	Schneider compatible
9	Beckhoff compatible

Encoder options

R	Resolver, 2 poles
S	EnDat 2.1 absolute, singleturn
M	EnDat 2.1 absolute, multiturn
F	EnDat 2.2 absolute, singleturn
W	EnDat 2.2 absolute, multiturn
N	HIPERFACE® absolute, singleturn
K	HIPERFACE® absolute, multiturn
G	HIPERFACE DSL® absolute, singleturn
H	HIPERFACE DSL® absolute, multiturn
L	DRIVE-CLiQ absolute, singleturn
D	DRIVE-CLiQ absolute, multiturn
E	Rockwell absolute, singleturn
V	Rockwell absolute, multiturn
J	Rockwell DSL absolute, singleturn
P	Rockwell DSL absolute, multiturn

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