



LP⁺ / LPB⁺ Value Line

economic and multi-talented

2005 - II



alpha

a WITTENSTEIN AG company



LP+ /LPB+ Value Line

A winning team and right on course

The finest clipper-vessel is nothing without an expert crew – and the success of every production process depends on an impeccable mechanical support “team”.

The highly efficient gearheads in the **LP+ /LPB+ Value Line** are your “crew”. Their job is to make sure your production process rides every wave with ease.

Breathtaking performance combined with maximum cost efficiency – these are the hallmarks of the **LP+ /LPB+ Value Line**. Our low-backlash planetary gearheads are ideal for all applications in handling systems, packaging technology and mechanical engineering in general.

Two series

This product line offers a choice between two distinct series. **LP+** – the basic version – is our versatile performer for a broad spectrum of applications, while the modified **LPB+** series assures smooth sailing of timing belt systems.

And of course, the **LPB+ Value Line** integrates all the familiar characteristics of the **LP+ Value Line**.



LP+ / LPB+ Value Line for economical solutions

Maximum efficiency

LP+/LPB+ Value Line gearheads are economical to purchase, unbeatably efficient in operation and – thanks to a unique lubrication concept – absolutely maintenance-free throughout their entire service life.

Total reliability

The stamina of a top athlete: LP+/LPB+ Value Line gearheads are renowned for their endurance – in cyclic or continuous duty.

Any installation position

It makes no difference to LP+/LPB+ Value Line whether you mount it vertically or horizontally or with the output on top or on the bottom. You get all the design freedom you require.

Maximum power density

Although the predecessor gearhead already offers excellent performance, we have succeeded in increasing the torques of the LP+/LPB+ Value Line – with peak values of up to 12 %.



Cutting edge innovations made by alpha

We have been developing, manufacturing and distributing low-backlash planetary gearheads, servo right-angled gearheads, complete drive units and planetary elevator machines with an integrated servo motor since 1984.

Profit from our comprehensive service package: from individual components to complete systems, supported by our competent engineering services, several hundred employees worldwide are committed to our cause with operations in the US, UK, France, Italy, Belgium and Japan. alpha's headquarters are on the "Romantic Road" in Igersheim / Germany.

alpha is a member of the WITTENSTEIN AG Group which has rightly established a name for itself with numerous innovations in industries such as aerospace and simulation, medical technology, elevator drives and Formula One racing.

High efficiency

LP+/LPB+ Value Line gearheads achieve more than 95 % efficiency at full load.



Added flexibility

The gearheads in the LPB+ Value Line series can also be equipped with a timing belt pulley, with consistently high performance guaranteed. LPB+ – the perfect solution for all timing belt applications.

LPB+ with belt pulley

LPB+ is equally impressive when it comes to the inside and outside centering of the gearheads. This unique drive concept avoids complicated connecting structures and cuts costs.

Powerful planetary gearhead

The two-stage gearhead restricts torsional backlash to less than 10 arcminutes, while the single-stage version offers under 8 arcminutes.

Leaders of the pack

We are driven by a desire to enhance our customers' success with products and systems from alpha. We set benchmarks when it comes to precision, performance and durability. Our trailblazing technology gives our customers an edge in their respective market sectors. Place your trust in premium quality and total reliability from alpha. Choose world class engineering – the foundation for strong partnerships and added value that is passed on to your customers.

alpha benefits at a glance:

- **Record-breaking lifespan**

Extremely long service life resulting from intelligent design, latest synthetic lubrication technology, exclusive sealing technology, and incredibly strong output bearings.

- **Motor mounting is almost foolproof**

Simple and reliable mounting in a single step.

- **Top quality from alpha**

In-house development and manufacture of all products combined with a pioneering spirit and an insatiable urge to improve.



alpha



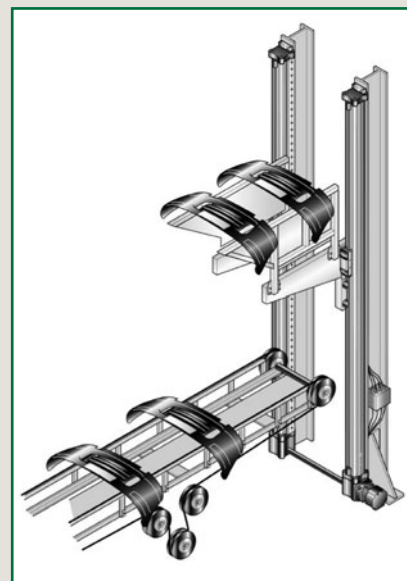
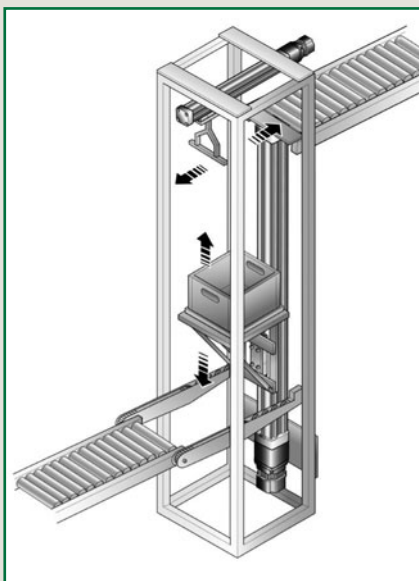
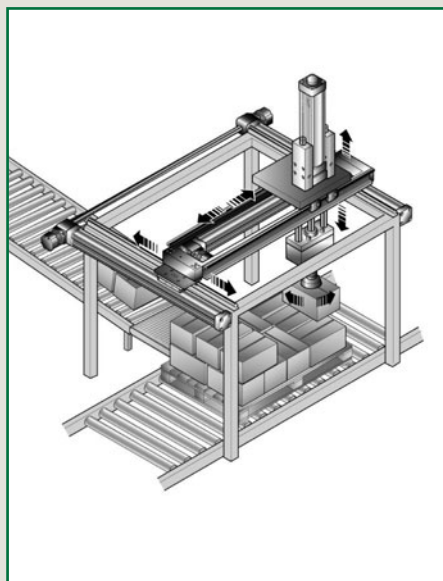
LP⁺ accelerates with the new **alpha speedline**®

If your production process can't wait, why not order LP⁺/LPB⁺ Value Line with alpha's popular speedline service? Dispatch from our factory is guaranteed within a mere 24 or 48 hours.

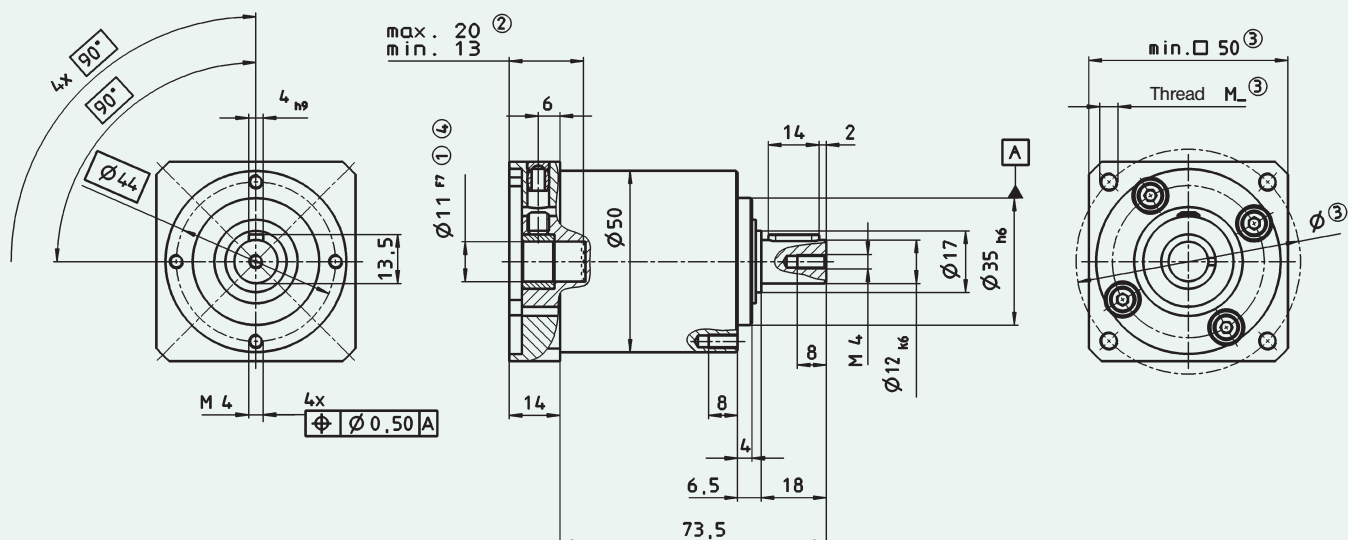
Ask for more information about alpha speedline.
We look forward to speeding up delivery for you.



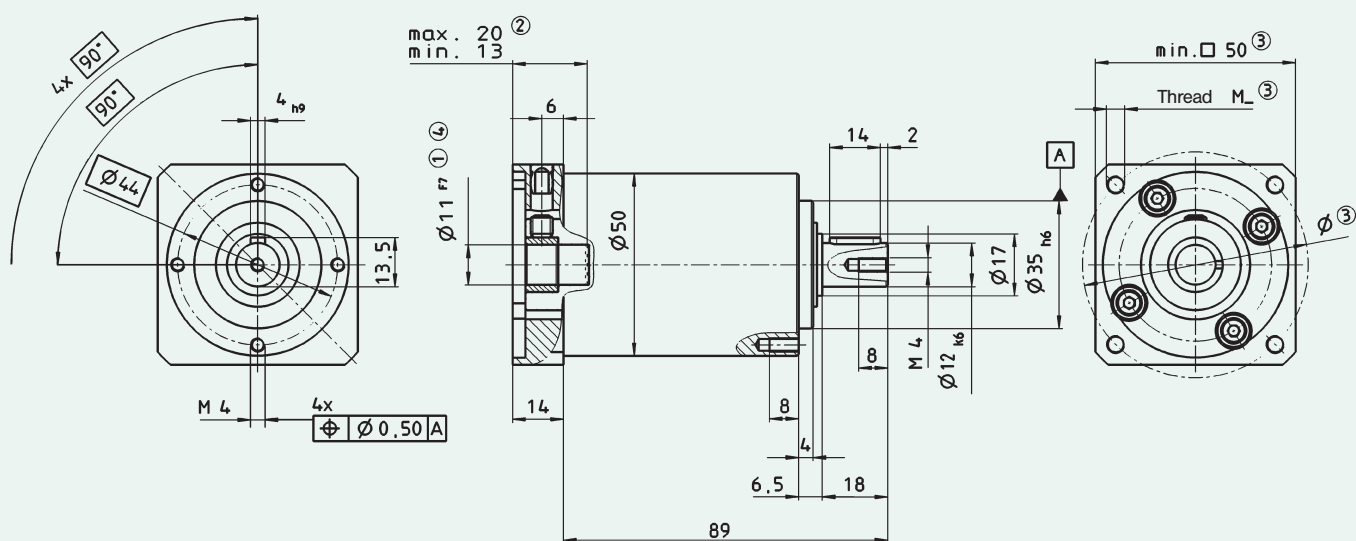
Typical applications of LP⁺/LPB⁺ Value Line gearheads



LP+ 1-stage gearhead:



LP+ 2-stage gearhead:



Non-toleranced dimensions ± 1 mm

- ① Check motor shaft fit.
- ② Min./max. permissible motor shaft length. Longer motor shafts are possible on request; please contact alpha.
- ③ Dimensions depend on motor.
- ④ Smaller motor shaft diameters possible with bushing.

 Motor mounting in accordance with Operating Manual.

Technical Specifications LP+ 050

			1-stage		2-stage		
Ratio	i		5	10	25	50	100
Maximum acceleration torque (max. 1000 cycles per hour)	T _{2B}	Nm	12	11	12	12	11
Nominal output torque	T _{2N}	Nm	5.7	5.2	5.7	5.7	5.2
Emergency stop torque (Permissible 1000 times during the lifespan of the gearhead)	T _{2Not}	Nm	26	26	26	26	26
Nominal input speed (At 20 °C ambient temperature) *	n _{1N}	min ⁻¹	4000	4000	4000	4000	4000
No-load running torque (n ₁ =3000 rpm) (At 20 °C gearhead temperature)	T ₀₁₂	Nm	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05
Maximum input speed	n _{1Max}	min ⁻¹	8000	8000	8000	8000	8000
Torsional backlash	j _t	arcmin	Standard ≤ 12 / Reduced ≤ 10		Standard ≤ 15 / Reduced ≤ 13		
Torsional rigidity	C _{t21}	Nm/arcmin	1.2	0.85	1.2	1.2	0.85
Max. axial force **	F _{2AMax}	N	700		700		
Max. radial force **	F _{2RMMax}	N	650		650		
Efficiency at full load	η	%	> 97		> 95		
Service life (For calculation, see alpha Technical Basics catalog)	L _h	h	20 000		20 000		
Weight	m	kg	0.75		0.95		
Noise level (n ₁ =3000 rpm)	L _{PA}	dB(A)	≤ 68				
Max. permissible housing temperature		°C	+ 90				
Ambient temperature		°C	0 up to +40				
Lubrication			Flow Grease				
Paint			Blue RAL 5002				
Type of protection			IP 64				
Mass moment of inertia (referring to the drive)	J ₁	kgcm²	0.055	0.055	0.055	0.055	0.055

* For higher ambient temperature, reduce nominal input speed n_{1N} .

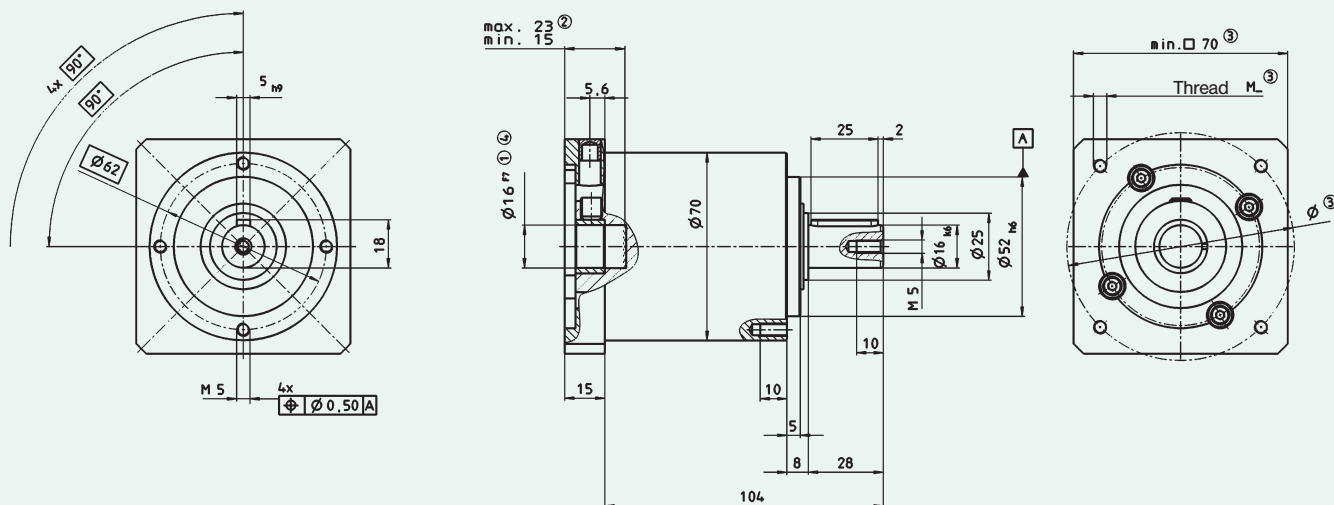
** In reference to the center of the output shaft 100 min⁻¹.

Conversion table

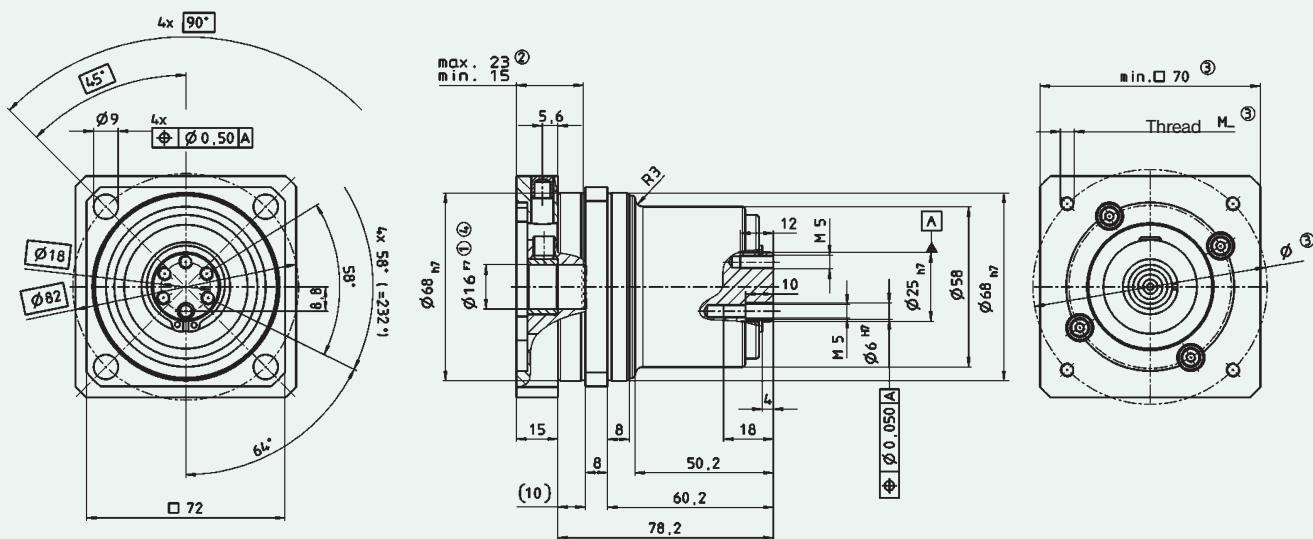
1 mm	= 0.039 in
1 Nm	= 8.85 in.lb
1 kgcm ²	= 8.85 x 10 ⁻⁴ in.lb.s ²
1 N	= 0.225 lb _f
1 kg	= 2.21 lb _m



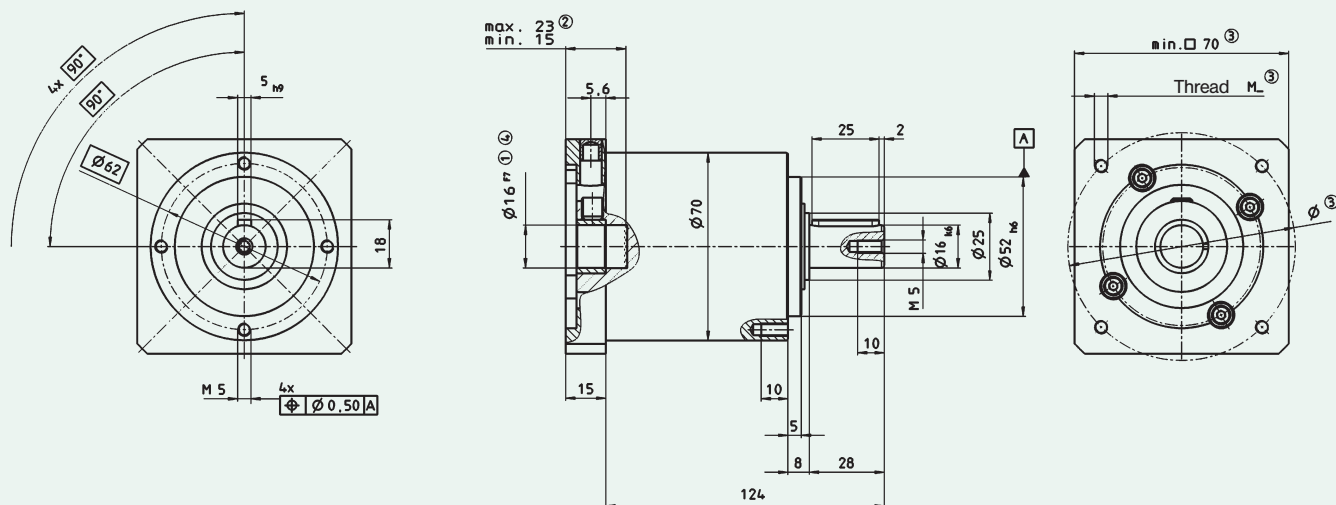
LP+ 1-stage gearhead:



LPB+ 1-stage gearhead:



LP+ 2-stage gearhead:



Non-toleranced dimensions ± 1 mm

① Check motor shaft fit.

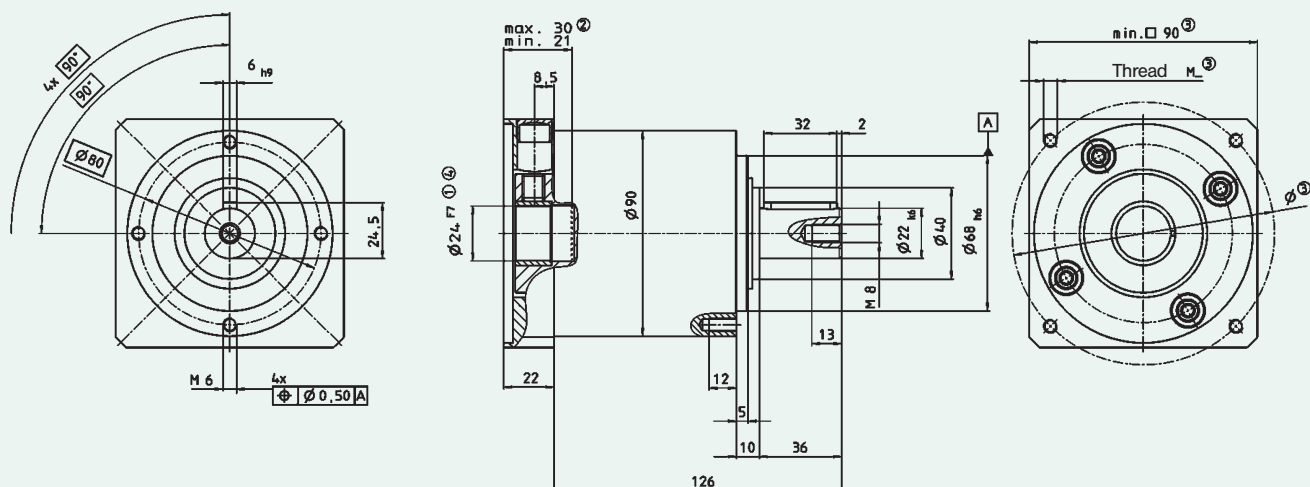
② Min./max. permissible motor shaft length. Longer motor shafts are possible on request; please contact alpha.

③ Dimensions depend on motor.

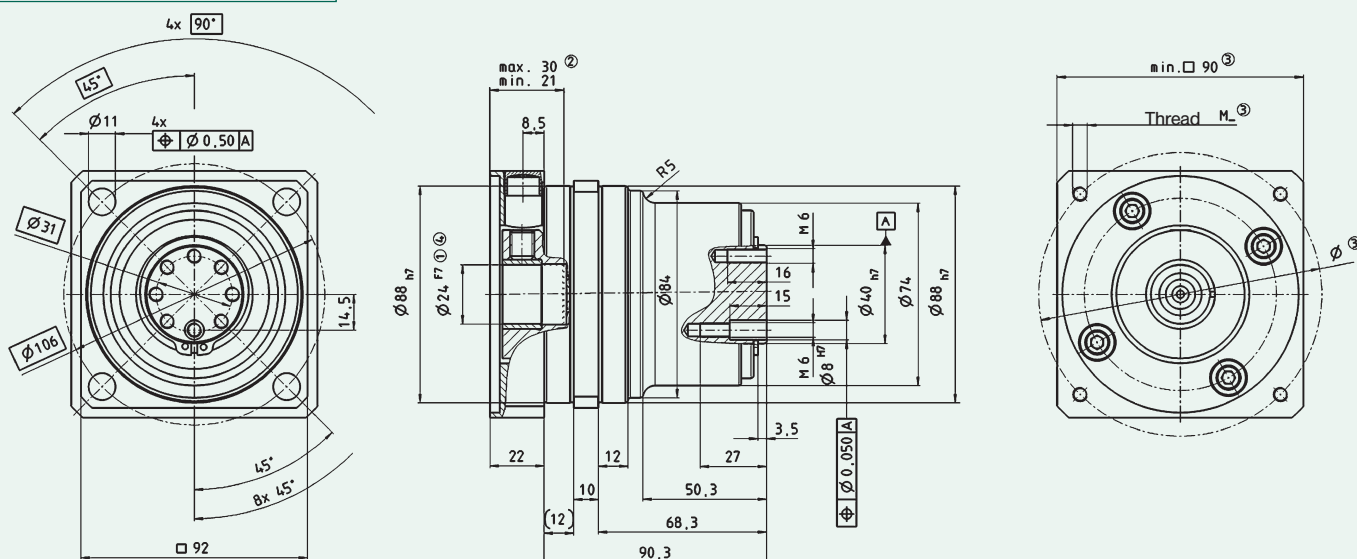
④ Smaller motor shaft diameters possible with bushing.

⚠ Motor mounting in accordance with Operating Manual.

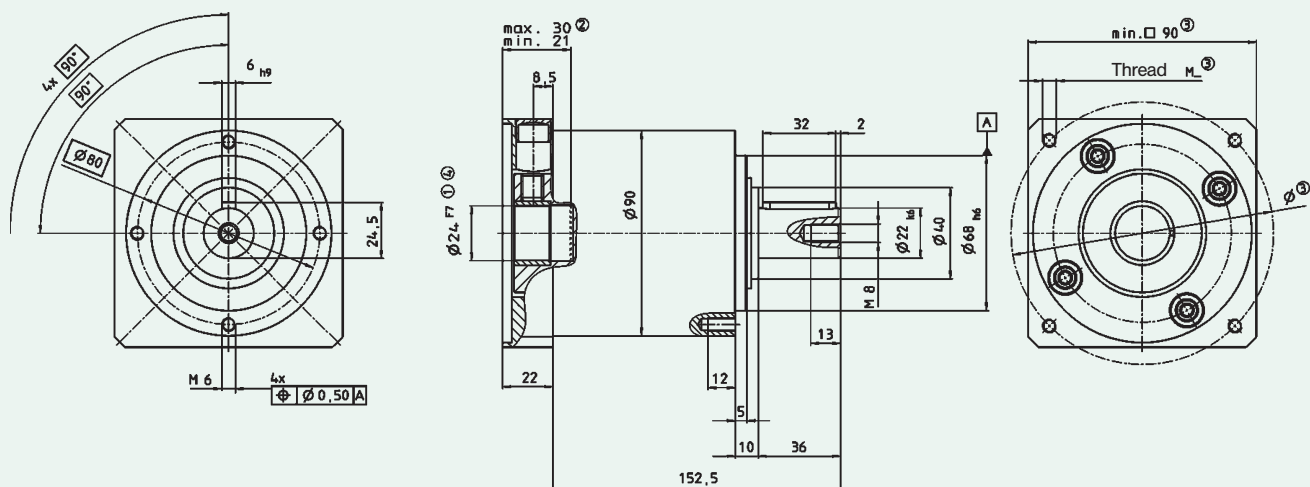
LP+ 1-stage gearhead:



LPB+ 1-stage gearhead:



LP+ 2-stage gearhead:



Non-toleranced dimensions ± 1 mm

① Check motor shaft fit.

② Min./max. permissible motor shaft length. Longer motor shafts are possible on request; please contact alpha.

③ Dimensions depend on motor.

④ Smaller motor shaft diameters possible with bushing.

⚠ Motor mounting in accordance with Operating Manual.

Technical Specifications LP+/LPB+ 090

			1-stage				2-stage				
Ratio *	i		3	5	7	10	15	25	30	50	100
Maximum acceleration torque (max. 1000 cycles per hour)	T _{2B}	Nm	80	90	90	80	80	90	80	90	80
Nominal output torque	T _{2N}	Nm	40	45	45	40	40	45	40	45	40
Emergency stop torque (Permissible 1000 times during the lifespan of the gearhead)	T _{2Not}	Nm	190	190	190	190	190	190	190	190	190
Nominal input speed (At 20 °C ambient temperature) **	n _{1N}	min ⁻¹	3400	3400	3400	3400	3400	3400	3400	3400	3400
No-load running torque (n ₁ =3000 rpm) (At 20 °C gearhead temperature)	T ₀₁₂	Nm	≤ 0.60	≤ 0.50	≤ 0.40	≤ 0.38	≤ 0.30	≤ 0.30	≤ 0.30	≤ 0.25	≤ 0.25
Maximum input speed	n _{1Max}	min ⁻¹	6000	6000	6000	6000	6000	6000	6000	6000	6000
Torsional backlash	j _t	arcmin	Standard ≤ 12 / Reduced ≤ 8				Standard ≤ 15 / Reduced ≤ 10				
Torsional rigidity	C _{t21}	LP	8.5	9.5	9.5	8.5	8.5	9.5	8.5	9.5	8.5
		LPB	-	-	-	-	-	-	-	-	-
Max. axial force ***	F _{2AMax}	N	1900				1900				
Max. radial force	F _{2RMax}	LP ***	2400				2400				
		LPB ****	4300				-				
Efficiency at full load	η	%	> 97				> 95				
Service life (For calculation, see alpha Technical Basics catalog)	L _h	h	> 20 000				> 20 000				
Weight	m	kg	LP+ 4.0 / LPB+ 3.3				LP+ 5.0				
Noise level (n ₁ =3000 rpm) ****	L _{PA}	dB(A)	≤ 72								
Max. permissible housing temperature		°C	+90								
Ambient temperature		°C	0 up to +40								
Lubrication			Flow Grease								
Paint			Blue RAL 5002								
Type of protection			IP 64								
Mass moment of inertia (referring to the drive)	J ₁	kgcm ²	LP	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
		LPB	1.76	1.77	-	1.76	-	-	-	-	-

* LPB is available for ratio 3, 5, 10.

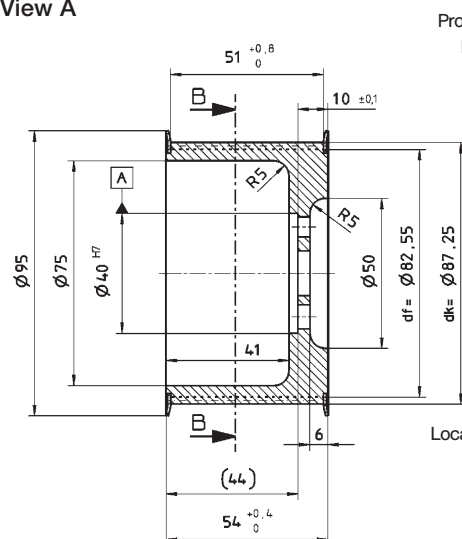
** For higher ambient temperature, reduce nominal input speed n_{1N} .

*** In reference to the center of the output shaft 100 min⁻¹.

**** With assembled pulley at 100 min⁻¹.

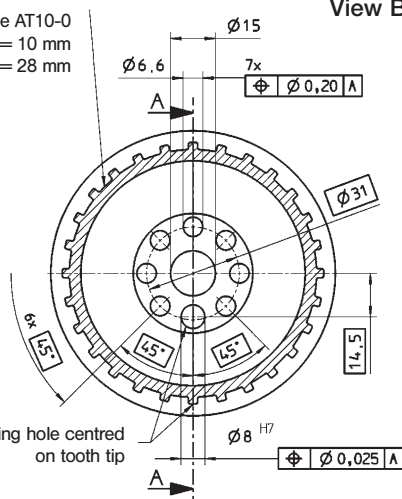
Optional timing belt pulley P LPB+

View A



Profile AT10-0
p = 10 mm
z = 28 mm

View B



PCD pitch circle diameter	$d_o = \frac{z \cdot p}{\pi}$	
Weight	m	kg
Mass moment of inertia of inertia	J_1	kgcm ²

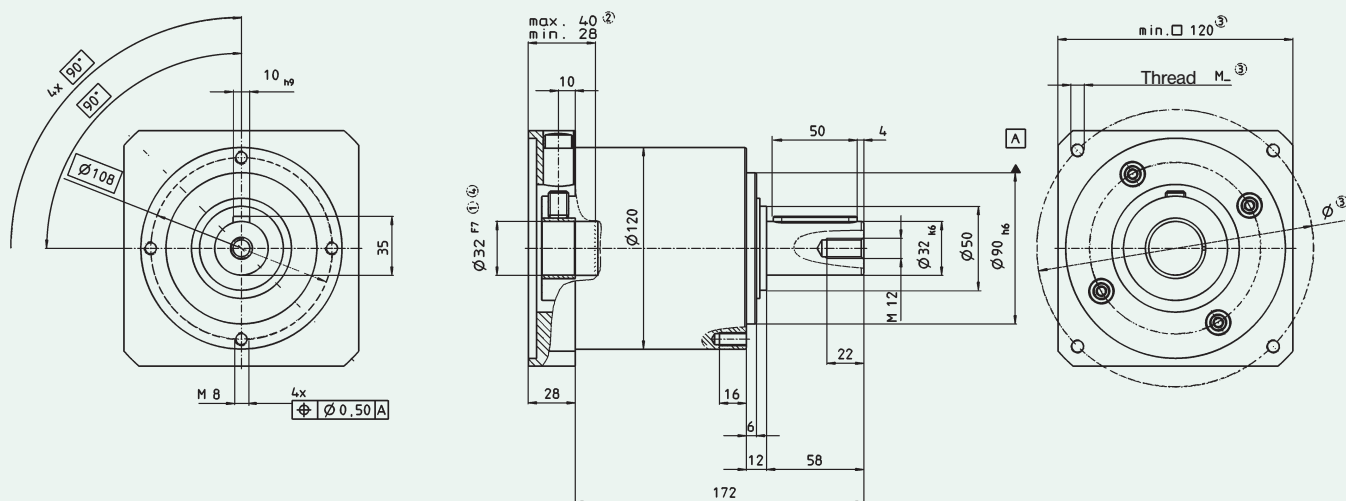
Conversion table

1 mm	= 0.039 in
1 Nm	= 8.85 in.lb
1 kgcm ²	= 8.85 x 10 ⁻⁴ in.lb.s ²
1 N	= 0.225 lb _f
1 kg	= 2.21 lb _m

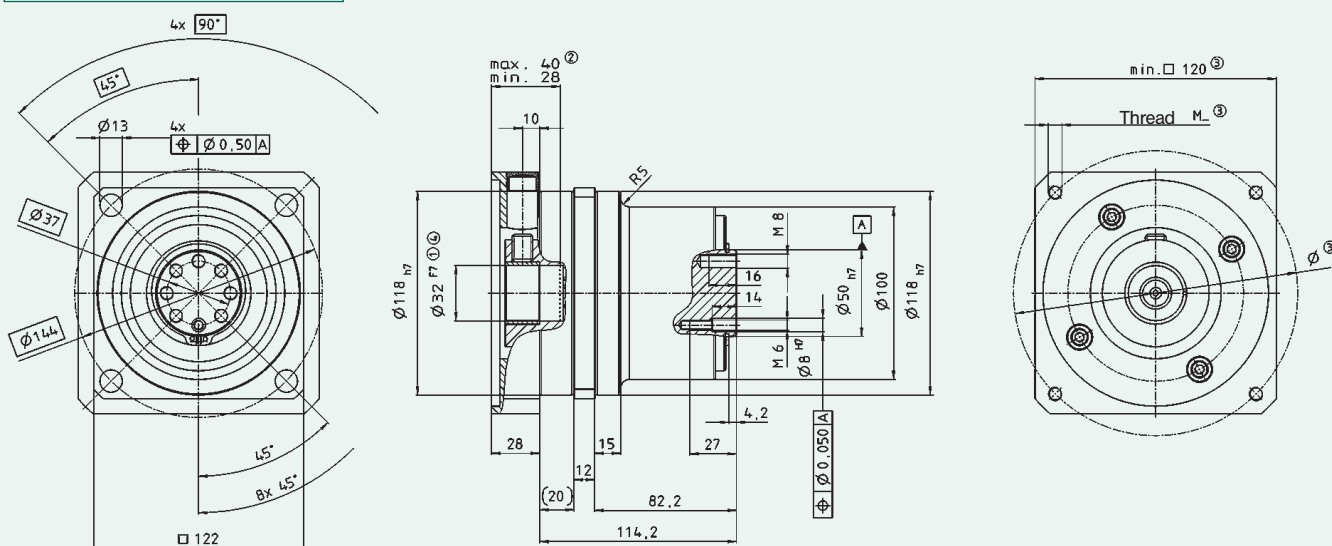


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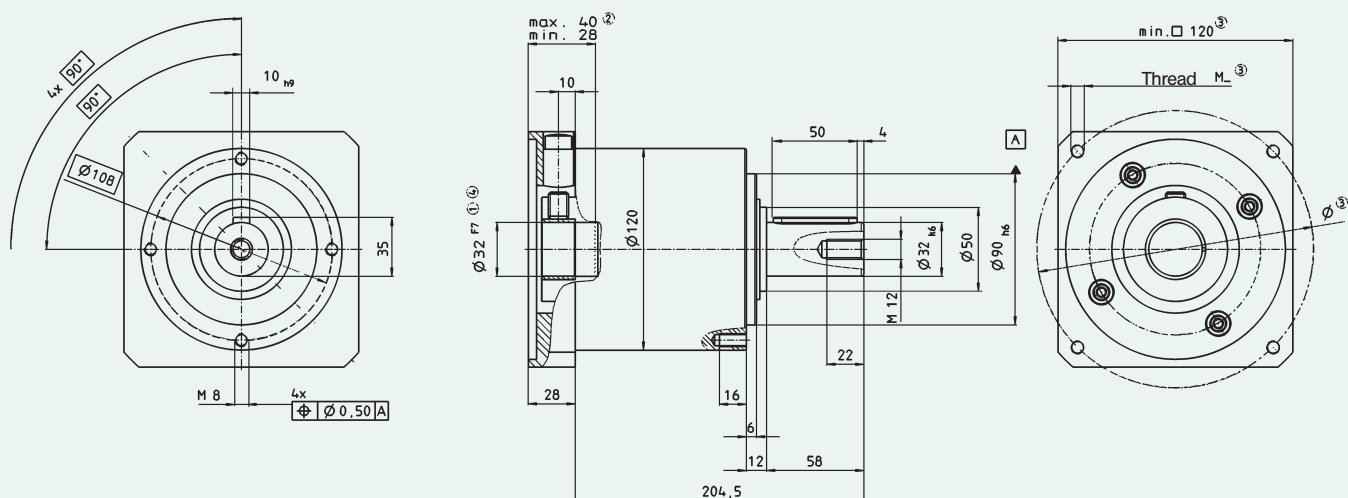
LP+ 1-stage gearhead:



LPB+ 1-stage gearhead:



LP+ 2-stage gearhead:



Non-toleranced dimensions ± 1 mm

① Check motor shaft fit.

② Min./max. permissible motor shaft length. Longer motor shafts are possible on request; please contact alpha.

③ Dimensions depend on motor.

④ Smaller motor shaft diameters possible with bushing.

⚠ Motor mounting in accordance with Operating Manual.

Technical Specifications LP+/LPB+ 120

			1-stage				2-stage					
Ratio *	i		3	5	7	10	15	25	30	50	100	
Maximum acceleration torque (max. 1000 cycles per hour)	T _{2B}	Nm	200	220	220	200	200	220	200	220	200	
Nominal output torque	T _{2N}	Nm	100	110	110	100	100	110	100	110	100	
Emergency stop torque (Permissible 1000 times during the lifespan of the gearhead)	T _{2Not}	Nm	480	480	480	480	480	480	480	480	480	
Nominal input speed (At 20 °C ambient temperature) **	n _{1N}	min ⁻¹	2600	2600	2600	2600	2600	2600	2600	2600	2600	
No-load running torque (n ₁ =3000 rpm) (At 20 °C gearhead temperature)	T ₀₁₂	Nm	≤ 1.1	≤ 0.9	≤ 0.8	≤ 0.8	≤ 0.6	≤ 0.5	≤ 0.4	≤ 0.4	≤ 0.4	
Maximum input speed	n _{1Max}	min ⁻¹	4800	4800	4800	4800	4800	4800	4800	4800	4800	
Torsional backlash	j _t	arcmin	Standard ≤ 12 / Reduced ≤ 8				Standard ≤ 15 / Reduced ≤ 10					
Torsional rigidity	C _{t21}	Nm/arcmin	LP	22	25	25	22	22	25	22	25	22
			LPB	-	-	-	-	-	-	-	-	-
Max. axial force ***	F _{2AMax}	N	4000				4000					
Max. radial force	F _{2RMax}	N	LP ***	4600				4600				
			LPB ****	9500				-				
Efficiency at full load	η	%	> 97				> 95					
Service life (For calculation, see alpha Technical Basics catalog)	L _h	h	> 20 000				> 20 000					
Weight	m	kg	LP+ 8.6 / LPB+ 7.3				LP+ 11.0					
Noise level (n ₁ =3000 rpm) ****	L _{PA}	dB(A)	≤ 74									
Max. permissible housing temperature		°C	+90									
Ambient temperature		°C	0 up to +40									
Lubrication			Flow Grease									
Paint			Blue RAL 5002									
Type of protection			IP 64									
Mass moment of inertia (referring to the drive)	J ₁	kgcm ²	LP	5.42	5.42	5.42	5.42	5.49	5.49	5.49	5.49	5.49
			LPB	5.37	5.40	-	5.42	-	-	-	-	-

* LPB is available for ratio 3, 5, 10.

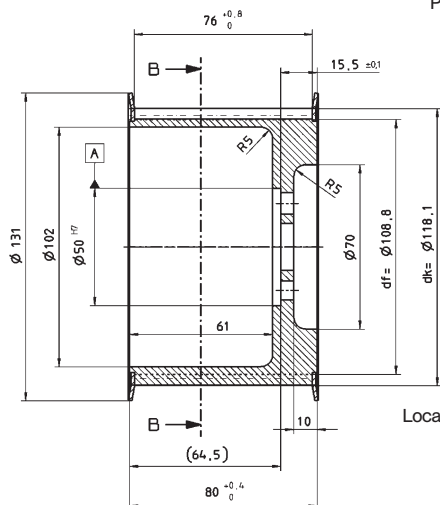
** For higher ambient temperature, reduce nominal input speed n_{1N} .

*** In reference to the center of the output shaft 100 min⁻¹.

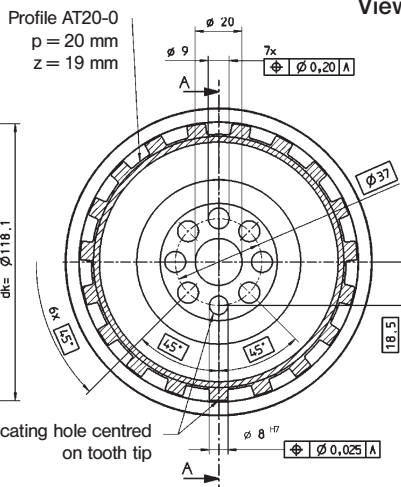
**** With assembled pulley at 100 min⁻¹

Optional timing belt pulley P LPB+

View A



View B



PCD pitch circle diameter	$d_o = \frac{z \cdot p}{\pi}$	
Weight	m	kg
Mass moment of inertia of inertia	J_1	kgcm ²

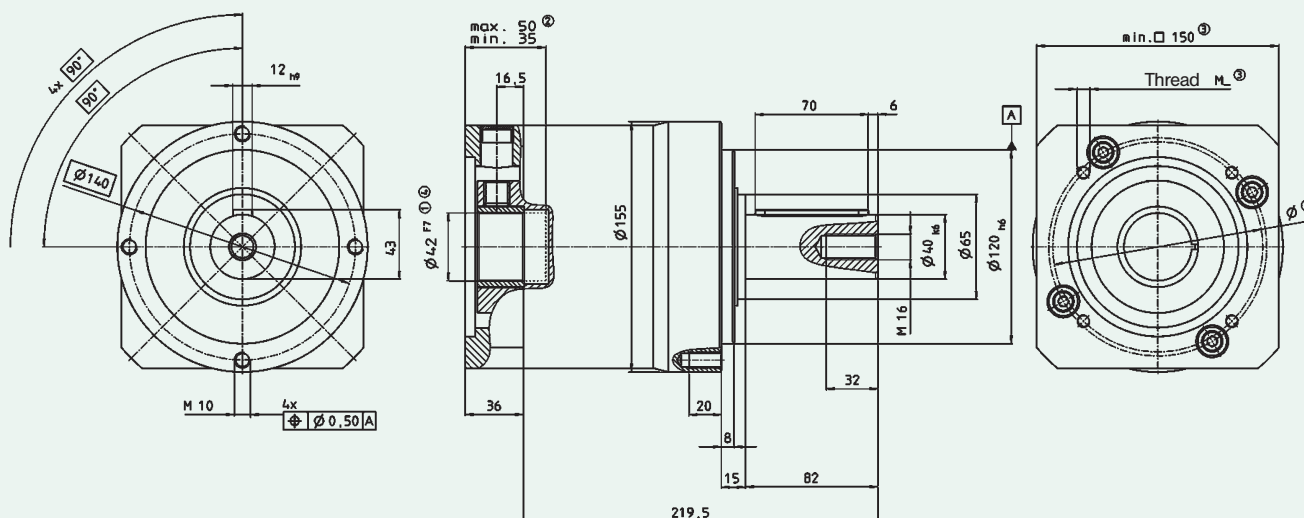
Conversion table

1 mm	= 0.039 in
1 Nm	= 8.85 in.lb
1 kgcm ²	= 8.85 x 10 ⁻⁴ in.lb.s ²
1 N	= 0.225 lb _f
1 kg	= 2.21 lb _m

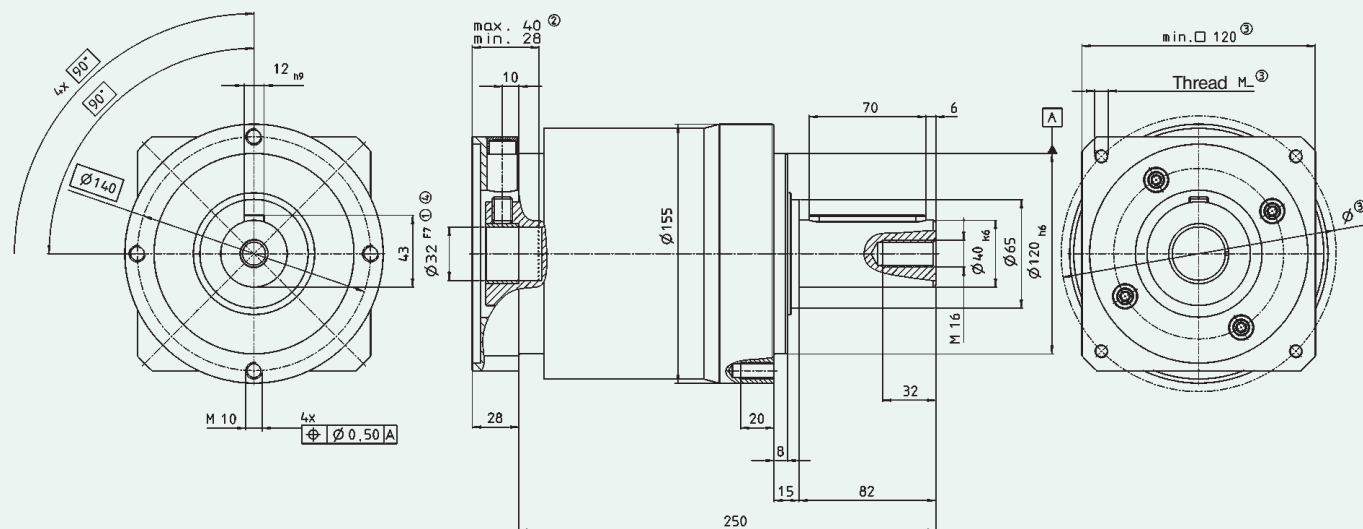


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LP+ 1-stage gearhead:



LP+ 2-stage gearhead:



Non-toleranced dimensions ± 1 mm

① Check motor shaft fit.

② Min./max. permissible motor shaft length. Longer motor shafts are possible on request; please contact alpha.

③ Dimensions depend on motor.

④ Smaller motor shaft diameters possible with bushing.

⚠ Motor mounting in accordance with Operating Manual.

Technical Specifications LP+ 155

			1-stage		2-stage		
Ratio	i		5	10	25	50	100
Maximum acceleration torque (max. 1000 cycles per hour)	T _{2B}	Nm	450	350	450	450	350
Nominal output torque	T _{2N}	Nm	320	190	320	320	190
Emergency stop torque (Permissible 1000 times during the lifespan of the gearhead)	T _{2Not}	Nm	1000	1000	1000	1000	1000
Nominal input speed (At 20 °C ambient temperature) *	n _{1N}	min ⁻¹	2000	2000	2000	2000	2000
No-load running torque (n ₁ =3000 rpm) (At 20 °C gearhead temperature)	T ₀₁₂	Nm	≤ 2.8	≤ 2.5	≤ 1.0	≤ 0.8	≤ 0.7
Maximum input speed	n _{1Max}	min ⁻¹	3600	3600	3600	3600	3600
Torsional backlash	j _t	arcmin	Standard ≤ 12 / Reduced ≤ 8		Standard ≤ 15 / Reduced ≤ 10		
Torsional rigidity	C _{t21}	Nm/arcmin	55	44	55	55	44
Max. axial force **	F _{2AMax}	N	6000		6000		
Max. radial force **	F _{2RMax}	N	7500		7500		
Efficiency at full load	η	%	> 97		> 95		
Service life (For calculation, see alpha Technical Basics catalog)	L _h	h	> 20 000		> 20 000		
Weight	m	kg	17.0		21.0		
Noise level (n ₁ =3000 rpm)	L _{PA}	dB(A)	≤ 75				
Max. permissible housing temperature		°C	+90				
Ambient temperature		°C	0 up to +40				
Lubrication			Flow Grease				
Paint			Blue RAL 5002				
Type of protection			IP 64				
Mass moment of inertia (referring to the drive)	J ₁	kgcm ²	25.73	25.73	5.60	5.60	5.60

* For higher ambient temperature, reduce nominal input speed n_{1N} .

** In reference to the center of the output shaft 100 min⁻¹.

Conversion table

1 mm	= 0.039 in
1 Nm	= 8.85 in.lb
1 kgcm ²	= 8.85 x 10 ⁻⁴ in.lb.s ²
1 N	= 0.225 lb _f
1 kg	= 2.21 lb _m

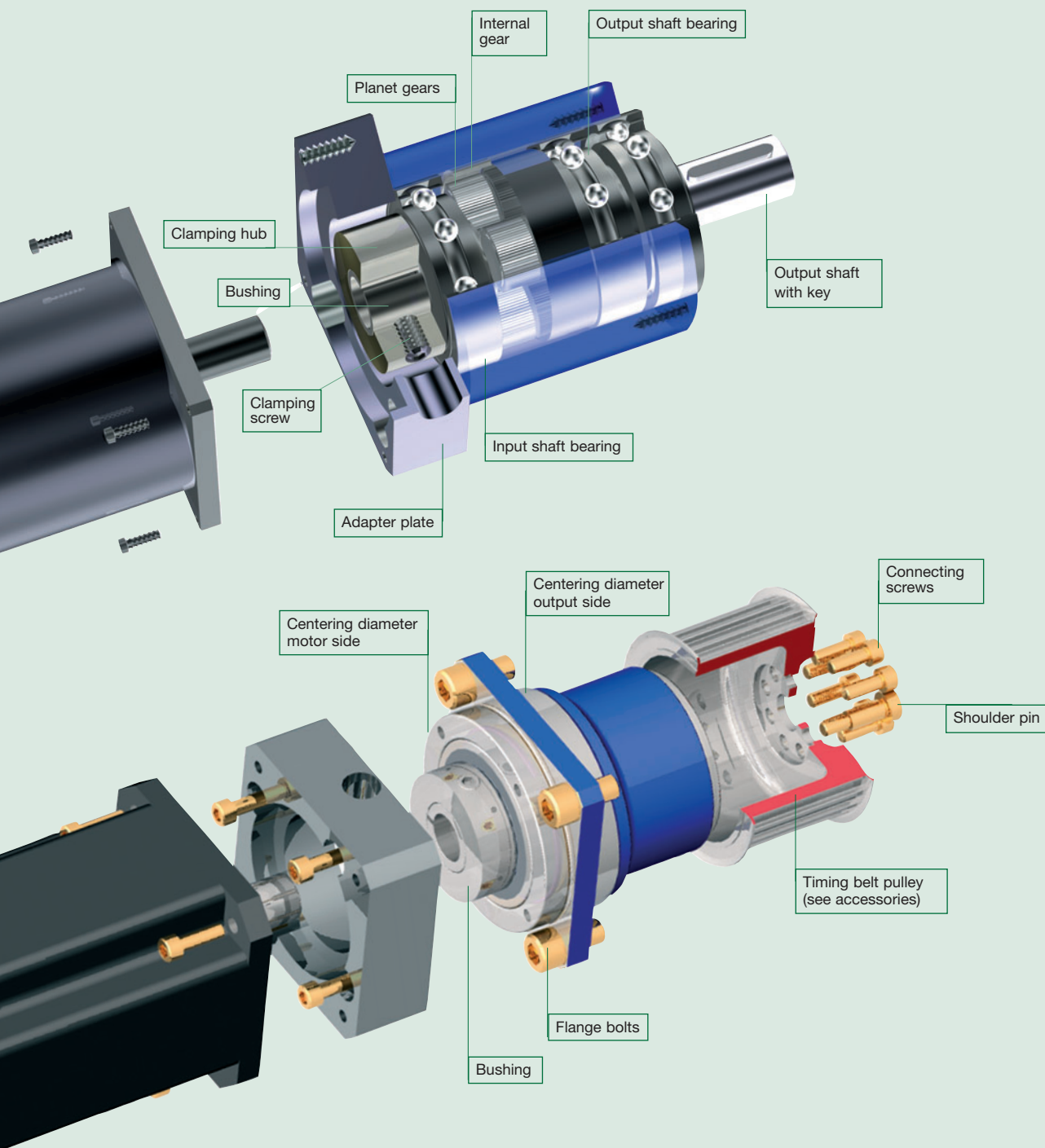


LP+ / LPB+ – robust design, low price, quick delivery!

Simple adapter kits allow the Value Line to be mounted to any motor in just two minutes.

A clamping hub connects the motor shaft to the input shaft of the gearhead.

The clamping screw in the clamping hub is tightened through an access hole in the adapter plate.



Symbols and indices

Symbol	Unit	Designation
c	Nm /arcmin	Rigidity
F	N	Force
i	-	Ratio
j	arcmin	Backlash
J	kgcm ²	Mass moment of inertia
L	h	Service life
M	Nm	Moment
n	rpm	Speed
η	%	Efficiency
T	Nm	Torque
d_f		circle of contact
d_k		addendum circle

Index

1	input
2	output
A/a	axial
B/b	acceleration
h	hours
K/k	tilt
m	mean
Max/max	maximum
Mot	motor
N	nominal
Not/not	emergency stop
0	no-load running
R/r	radial
t	torsional

capital letters
small letters

permissible values
actual values

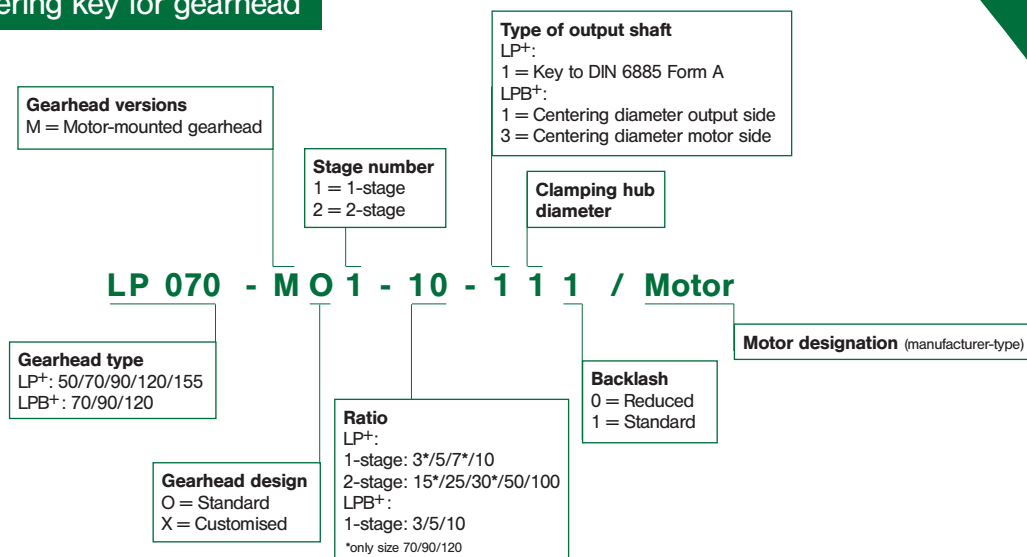
Quick selection

The following chart can be used to quickly select a gearhead. However, for best results, we recommend that you utilise the gearhead selection charts in the **alpha Technical Basics** catalogue (can be downloaded from www.alphagetriebe.com) or use alpha's **cymex® 3.0** servo/gearhead sizing software to design your drive train.

Cyclic operation S5 Applies to ≤ 1000 cycles / hour Duty cycle $< 60\%$ and < 20 min.*	- Determine the maximum motor acceleration torque from the motor ratings $T_{\text{MaxMot}} [\text{Nm}]$ - Determine the maximum acceleration torque at the gearhead output $T_{2b} [\text{Nm}]$ $T_{2b} = T_{\text{MaxMot}} \cdot i$ - Compare the maximum acceleration torque $T_{2b} [\text{Nm}]$ with the maximum permissible acceleration torque $T_{2B} [\text{Nm}]$ at the gearhead output $T_{2b} \leq T_{2B}$	- Compare the bore diameter of the clamping hub with the table on page 20 - Compare the motor shaft length $L_{\text{Mot}} [\text{mm}]$ with the minimum and maximum dimensions in the relevant dimension drawing
Continuous operation S1 Duty cycle $\geq 60\%$ or ≥ 20 min.*	- Select as described for cyclic operation S5 - Determine the motor nominal torque $T_{1\text{NMot}} [\text{Nm}]$ - Determine the nominal torque at the gearhead output $T_{2n} [\text{Nm}]$ $T_{2n} = T_{1\text{NMot}} \cdot i$	- Compare the nominal torque $T_{2n} [\text{Nm}]$ with the permissible nominal torque $T_{2N} [\text{Nm}]$ at the gearhead output $T_{2n} \leq T_{2N}$ - Determine the input speed $n_{1n} [\text{min}^{-1}]$ - Compare the input speed $n_{1n} [\text{min}^{-1}]$ with the permissible nominal speed $n_{1N} [\text{min}^{-1}]$ $n_{1n} \leq n_{1N}$

* Recommended by alpha. We will gladly assist if required: call +49 (0) 79 31 / 4 93-0

Ordering key for gearhead

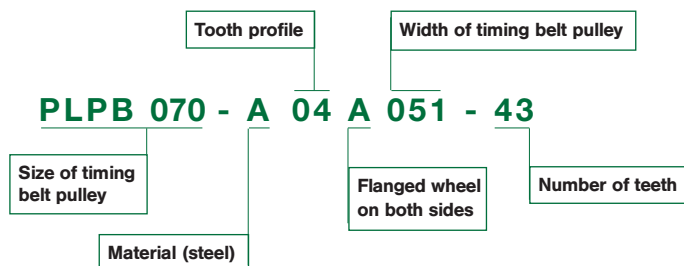


Ordering key for timing belt pulley

PLPB 070 - A 04A051 - 43 for LPB070

PLPB 090 - A 06A051 - 28 for LPB090

PLPB 120 - A 08A076 - 19 for LPB120



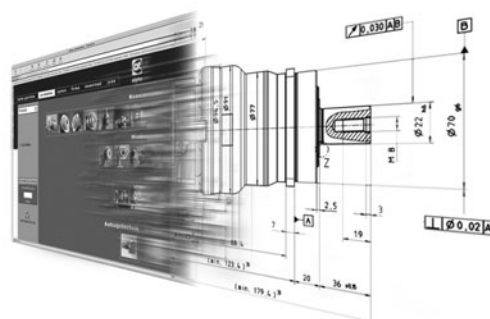
alpha's **cymex®** calculation software makes it easier than ever to design the most complex drive trains with just a few mouse clicks.

application – gearhead – motor

cymex® simplifies technical documentation, and customised engineering designs are possible at any time thanks to data in DXF format.

Use **cymex®**.

easy – quick – reliable



Additional **alpha** products



SP+® - The New Generation

Cyclic and continuous operation.
Torsional backlash ≤ 1 arcmin.
Acceleration torque up to 1100 Nm.
New: Can be installed on the servomotor in any position.



TP+ - Compact Precision

Standardised gearhead with ISO flange.
Cyclic and continuous duty operations.
Torsional backlash ≤ 1 arcmin.
Acceleration torque up to 6000 Nm.



TP - High Torque®

The gear reducer with the highest torques.
90 % increased torque.
900 % overload capacity.
110 % increased stiffness.



HG+ - Hollow-Shaft Gearheads

Optional shrink disc connection.
Cyclic and continuous operation.
Torsional backlash ≤ 4 arcmin.
Acceleration torque up to 640 Nm.



SK+ Right-angle Gearhead

Mount to any motor.
Torsional backlash ≤ 3 arcmin.
Extremely flexible and can be mounted in any position.



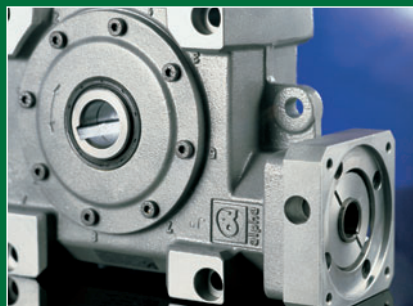
TPM / TPMA Servo Actuators

High dynamics and easy integration.
40 % shorter than equivalent design.
Acceleration torque up to 2600 Nm.



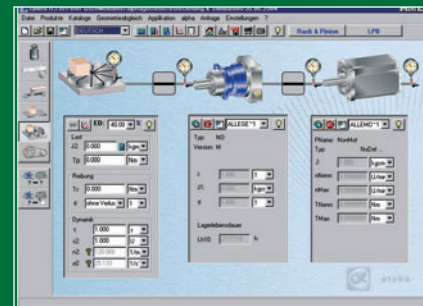
Rack & Pinion System

Optimised smooth running and low noise emission. Maximum possible feed dynamics with short acceleration times.
Precision and operating reliability.



V - Drive®

Cyclic and continuous duty operations.
Torsional backlash ≤ 3 arcmin.
Acceleration torque up to 718 Nm.
Direct mounting to servo motor.



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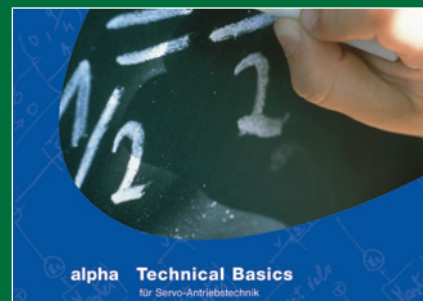
The software for drive technology.
Design a complete drive train with a few mouse clicks.
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