



Servo Gear Units

***Geared to a higher
standard™***

**In-Position
Technologies**

www.iptech1.com | (877) 478-3241 | help@iptech1.com



STÖBER

Servo Gear Units



Welcome to STOBBER!

Thank you for your interest in the servo gear reducers offered by STOBBER Drives, Inc.!

In 1934, the Stöber brothers founded a small shop in Pforzheim, Germany that made machines and repaired engines. Today, STOBBER is an international organization with offices in ten countries.

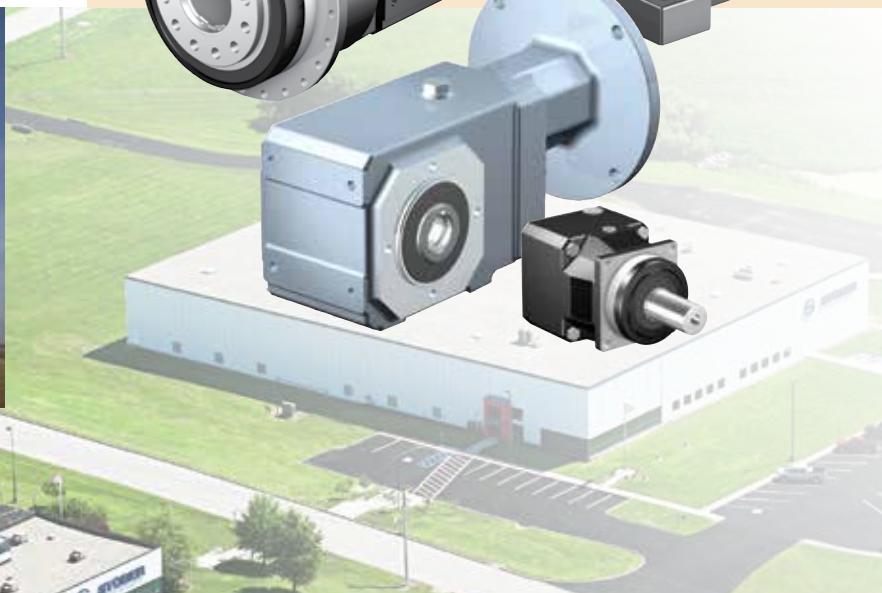
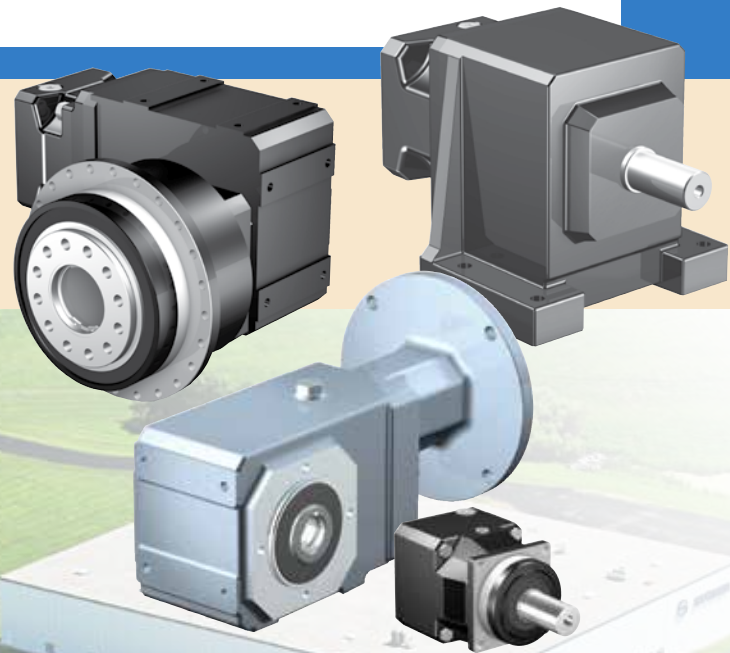
This 80 year heritage has given us expertise in servo gearing for which STOBBER is recognized worldwide as the “gold standard.” STOBBER products are of the highest quality and use only the best components.

This catalog covers our comprehensive servo gearbox products — Servo Precision Planetary and Modular Gearheads. STOBBER is recognized across the United States for its solution design, product durability, and service support. We look forward to the opportunity to work with you, and to help with your servo gearing needs.

Peter Feil, General Manager, STOBBER Drives, Inc.



STOBBER Drives Inc. was founded in 1991. Our Maysville, Kentucky campus includes 85,000 square feet of sales and service offices, assembly, manufacturing, and warehousing space for German-engineered STOBBER products for 1 day shipment nationwide.



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All manufactured components are inspected before being released to assembly. Our quality inspection team ensures every part meets tolerances and is in spec.

Unsurpassed:

STOBER products are designed and built to perform for the toughest applications. Reliability, adaptability and maintainability are our focus, and durability is truly our trademark.

Solution Designs that build quality around every requirement.

Product Durability that enhances the reliability and life of every application.

Service Support that is empowered to meet and exceed client expectations.



STOBER Serviced Industries:

- Beverage
- Food Processing
- Packaging
- Machine Tool
- Robotics
- Material Handling
- Semiconductor
- Printing
- Converting and many others...

Servo Gear Units

The Best you Can Buy...

At STÖBER, offering the best is not a buzz word — it is our passion and way of life. We offer the best product, provided by the best people and processes, and backed by the best service.

Why is STÖBER considered the industry Gold Standard? Our products are backed with superior service, outstanding quality, and the STÖBER guarantee.

- STÖBER gearheads survive in the toughest environments, providing long life under extreme conditions. Their high reliability and durability saves non-productive downtime and cost
- Our product reliability is backed by one of the best warranties in the industry
- We build and ship in 1 day saving you inventory hassle and cost
- Adapts to any servo motor

The Servo Gear Difference

A STÖBER Servo Gearhead helps optimize your total operational performance with:

- High torsional stiffness, superior accuracy
- Smoother running, better efficiency
- Leakage free, maintenance free
- Runs cool – a difference you can feel
- Runs measurably quieter – 16 times more quiet*
- Lower backlash
- The versatility and interchangeability of our components allow most products to be assembled and shipped in 1 day

* Noise Level

If a planetary is loud — something is WRONG!

STÖBER Servo planetary =
60 dB(A)

Convention spur gear planetary =
70-72 dB(A)

Bottom line: 1 conventional gearhead produces the same noise level as 16 STÖBER planetary gearheads with HeliCamber™ gearing

Striving Harder to Deliver the Best Gear Solutions

STÖBER Drives has been assembling products at our Maysville, Kentucky facility for over twenty years. Our expertise in the production and assembly of low-backlash gear units produces products that comply with the highest quality standards.

But, we don't remain satisfied with the status quo. We are continuously improving our modern machining production center including numerous recent acquisitions to improve our manufacture time and to ensure maximum quality levels.

All reducer components (gears, covers, material, etc.) are backed by a five year warranty. Normal wear items (oil seals, bearings, etc.) are covered for two years.

Vision: To be recognized as the gold standard

Mission: To provide the most reliable drive solutions for demanding applications in the shortest lead-time

Values: Seeking the best; operating with integrity; serving others, growth through learning





Assembly stages of “F” Series gearheads: Paint curing oven allows for one day assembly and higher paint durability (left); units awaiting final inspection prior to shipment (right).

Service Support for a Lifetime

We stand behind every drive we sell, which is why our service support is also the gold standard in the industry:

STOBER takes pride in offering knowledgeable, factory-trained USA-based service support for our customers. When you call, you won't get a call center on the other side of the globe. Your call is answered in 3 rings or less, letting you know you've found a support system that values your time.

Our easy order method insures you maintain a single contact throughout the process. And, your service representatives are directly responsible for your account. After the sale, our products are easy to install, but if you do have a question or a problem, we provide application and installation support anywhere in the US. With over 80 years gearing & 30 years motor and electronics experience, we have the expertise to solve your most difficult problems.

Application Support Programs

- For support during normal business hours: call 800-711-3588 or email sales@stober.com
- 24/7 emergency customer service hotline: 606.563.6035
- Consultative product support team available via phone or live chat on our website
- Application Sizing Software
- Online web tools: CAD and configurator
- On-site training available
- Emergency shipments available 24/7



Key STOBER Numbers

1 day shipping

1 hour quoting

3 rings or less when you call in — we answer the phone, not an automated switchboard!

100% inspected and tested during assembly for seal pressure test and ratio verification. STOBER also observes the reducer for any abnormal noise or vibrations during testing

5 year warranty

24/7 customer service



STOBER Staff Team Members

Facing page: Earl Bennington, Warehouse Team Leader, 1992, and Anita Truesdell, Picker, 2007;

From top, left to right: Stephanie Berry, LMS Administrator, 2006; Brian Sharp, Product Management Team Leader, 2003; Rick McCall, Machinist, 2007; Lee Thomas, Industrial Engineer, 2003

The Servo Gear Unit Difference

The following outlines some of our quality standards and unique STÖBER features that set Servo gearheads apart from all others...

Food and Corrosion Resistant Duty

P PKX PK C F K/KL KSS

Lifetime lubrication; double output seals (where possible); maintenance free design; stainless output bushing, shaft, or bore — finish is USDA approved for food processing and handling; heat cured.

KSS for extreme high pressure food washdown!

- IP69K certified for extreme high pressure food washdown (sprayed at close distance at 100 bars or 1,450 PSI)
- Certified against dust and water ingress
- 304 stainless steel cast housing

Explosion Proof

P PA PH PHA PHQ PHQA
PKX PHKX C F K

ATEX is often used in process control and converting where unstable gases and dust can be found

ATEX is a directive consisting of two European directives describing equipment or work environment allowed in an environment with an explosive atmosphere. ATEX derives its name from the ATmospheres EXplosible.

Please consult our product support team for assistance selecting an ATEX gearbox.

Large Input Planetary

P PA PE PH PHA PHQ PHQA KS

Equipping a Servo gearhead with the large input option allows a larger shaft diameter motor to be used, keeping gearhead size and cost down! This input is ideal for inertia matching.

ServoCool®

P PA PH PHA



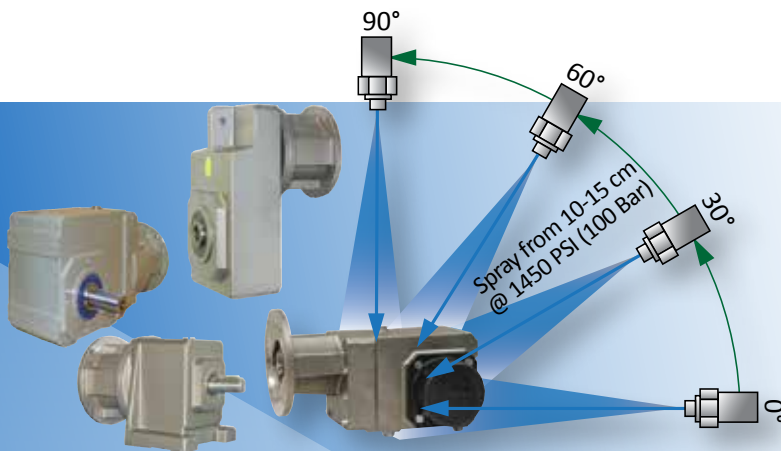
Servo gearheads with the air cooled ServoCool® option reduces the operating temperature 22°C (increases the ambient temperature limit 22°C), increases the output speed 54% and improves the servo motor rating 25%.

Servo motors are connected to Servo gearheads by using a motor adapter.

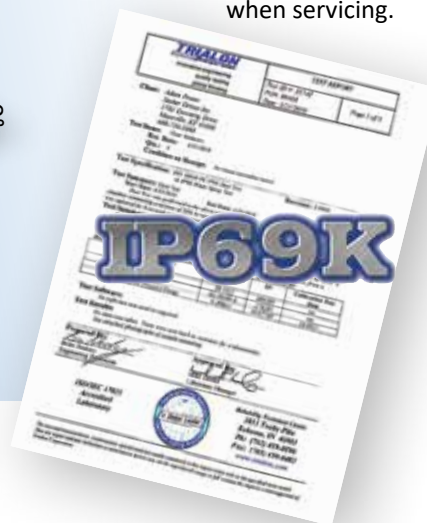
Spiral Groove Hollow Bore

F K KL KS KSS

The inside diameter on our hollow bore units feature a spiral (rifle) bore design providing an anti-seize lubricating groove. This enables the Servo gearhead to slide off freely when servicing without damage to the output shaft. With conventional smooth-surface hollow bore designs, any anti-seize lubricant applied during installation of the output shaft has no where to go except out the other end. Invariably, these designs will seize, making it necessary to cut off the output shaft when servicing.



Above: KSS Servo Gearheads are IP69K certified to withstand frequent pressure cleaning operations typical in the food industry and elsewhere. Other STÖBER products, including C, F and K Series, are optionally available with IP69K compliant protection.

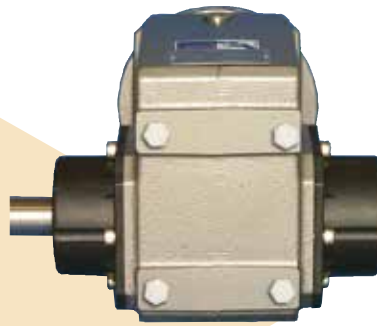


Wobble Free Bushing

F K KL KSS

The STÖBER “Wobble Free” bushing is a unique (U.S. Patent Number 5,496,127), bushing system which can be supplied on a single side or double sides. Each case size can be provided with a variety of bushing bores. The unit is selected based on torque rating, output speed or ratio, and the shaft size of the driven equipment.

- A distinct support side and a clamp side, the dual tapered cones will overcome a wide range of tolerances normally found with standard shaft materials. No shaft key necessary.
- Many unit sizes can be supplied with output covers on one or both sides which protect the seals and also cover the rotating bushing
- The reducer output bore can be changed any time by changing the bushing kit
- The quill, all bushing parts, and hardware can be supplied stainless steel to provide corrosion resistance for washdown applications



Double Sided Bushing:

This unique design allows the unit to be mounted on the shaft from either side of the reducer by reversing the clamp side and support side bushings. The clamp side is determined by the customer but is usually the easily accessible outside bushing.

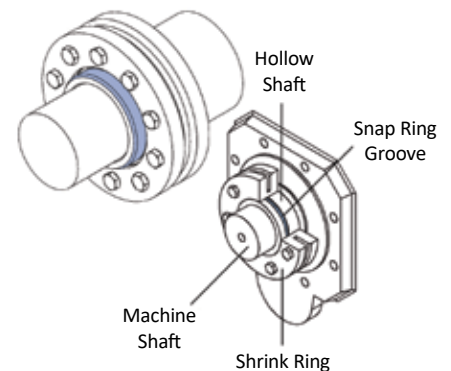
The double sided bushing is not installed into the unit at assembly, but with easy-to-follow installation instructions, the unit and bushing can be mounted on the machinery quickly – without any special tools.

Single Sided Bushing :

The single sided bushing is assembled at the time of the order. The bushing side extension must be specified by the customer before assembly. The bushing is installed into the unit for shipping and is not interchangeable once the unit is assembled.

Shrink Ring Connection

F K KL KS



F, K, KL and KS Series gearheads with a hollow bore can be connected to a finished machine drive shaft by frictional engagement through compression of a shrink ring on the hollow shaft.

This shaft-hub connection is totally free of backlash. Because of its self-centering property, it can transmit high torques and axial thrusts with great accuracy.

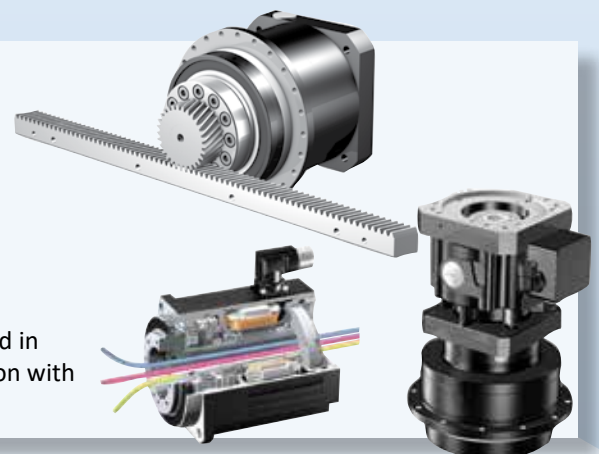
Gear units supplied with a shrink ring, are shipped with the ring installed on the hollow shaft end, ready for assembly.

See page 331 for More Servo Gearhead Compatible Products...

EZ Series Servo Motors available to fit all Servo gearheads

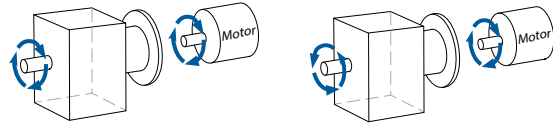
Rack and Pinion Servo gearhead systems are a ready to install engineered solution for precision automation applications requiring forces up to 122 kN (27,400 lbs.) with linear backlash as low as 7 µm

ServoStop automatic, electrically-actuated integrated holding brake used in place of a servo motor brake for dynamic safety braking, or in conjunction with the servo motor brake for redundancy in safety applications



Servo Gear Units

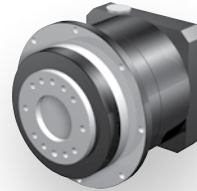
Inline & Offset Inline Gearheads



P/PA — Shaft Output *

STOB P Series is the cornerstone of most of our inline family of precision planetary gearheads. They are the most accurate and efficient planetary gearheads available. HeliCamber® gear technology provides minimum wear, low backlash and low noise. The PA Advanced Series takes backlash to the absolute minimum, and performance to the max.

- 3:1 to 100:1
- Up to 2,000 Nm torque (nom)
- Up to 8,000 RPM input speed
- Backlash: P: <3 arc min; PA: <1 arc min



PH/PHA/PHQ/PHQA — Flange Output*

STOB PH family gearheads offer a rotating flange output version of the P Series. The PHA Advanced Series takes backlash to the absolute minimum, and the PHQ and PHQA feature “Quattro” power planetary gearing for extreme torque and ratio capabilities.

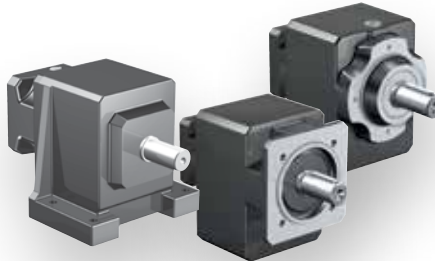
- 4:1 to 600:1
- Up to 13,000 Nm torque (nom)
- Up to 8,000 RPM input speed
- Backlash: PH/PHQ: <3 arc min; PHA/PHQA: <1 arc min



PE — Shaft Output*

STOB PE Series Servo Precision Planetary Gearheads are available for applications where very low backlash is not a criteria. They are an economical helical tooth planetary, comparable in quality to other STOB units.

- 3:1 to 100:1
- Up to 160 Nm torque (nom)
- Up to 8,000 RPM input speed
- Backlash: < 8 arc min



C — Shaft Output*

STOB C Series gear drives offer performance, durability, and economy for a wide range of applications. High efficiency helical gearing keeps motor size to a minimum while running almost silently.

- 2:1 to 276:1
- Up to 7,000 Nm torque (nom)
- Up to 6,500 RPM input speed
- Backlash: < 14 arc min

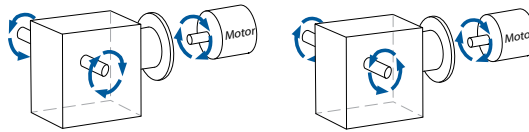
F — Versatile Outputs*

STOB F Series gear drives are a popular choice for applications that require high performance, efficiency, durability, and flexibility. F Series are available with a wide selection of configurations to match almost any mounting requirement.

- 4:1 to 551:1
- Up to 1,100 Nm torque (nom)
- Up to 7,000 RPM input speed
- Backlash: < 10 arc min

* See page 326 for comparison of all output options and sizes available

Right Angle Gearheads



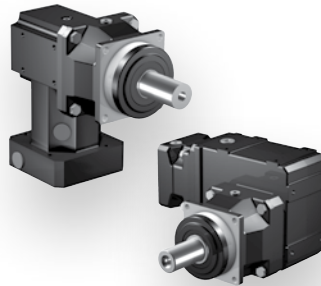
Many right angle gearheads offer output on either or both sides



K – Versatile Outputs*

STOBER K Series helical/bevel gear drives are the most popular and versatile Servo right angle gearheads. They are the optimal drive for truly demanding continuous-duty applications, offering higher efficiencies than conventional worm gear drives or planetary gearheads.

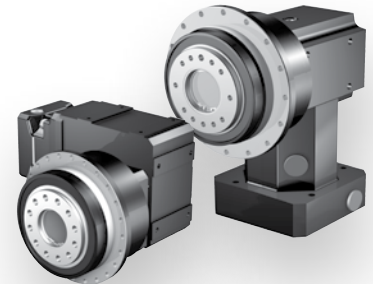
- 4:1 to 381:1
- Up to 12,000 Nm torque (nom)
- Up to 7,000 RPM input speed
- Backlash <10 arc min



PKX/PK – Shaft Output*

STOBER PKX and PK Series precision planetary gearheads combine the P Series gearhead with the low ratio “KX” right angle platform or the reduced backlash K Series platform.

- Ratios: 3:1 to 300:1;
- Up to 2,000 Nm torque (nom)
- Up to 6,000 RPM input speed
- Backlash: PKX: ≤4 arc min;
PK: ≤3.5 arc min



PHKX/PHK/PHQK – Flange Output*

STOBER PH right angle gearhead configurations offer a rotating flange output combining the P Series gearhead with the low ratio “KX” or reduced backlash K Series. The PHQK features the “Quattro” power planetary gearing for extreme torque and ratio capabilities.

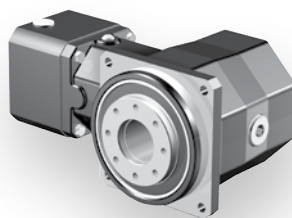
- 4:1 to 591:1
- Torque: 13,000 Nm (nom)
- Up to 7,000 RPM input speed
- Backlash <3.5 arc min



KL – Versatile Outputs*

The STOBER KL Series offers the same output and housing versatility as the K series, but is much more compact and ideal for smaller gearhead size applications.

- 4:1 to 32:1
- Up to 50 Nm torque (nom)
- Up to 6,000 RPM input speed
- Backlash: ≤20 arc min



KS – Versatile Outputs*

STOBER KS Series precision planetary gearheads use time-tested helical gearing and finish ground spiral bevel gears to provide a low backlash unit, that is smooth running, with high efficiency, high power density, and high input speed capacity..

- 6:1 to 200:1
- Up to 250 Nm torque (nom)
- Up to 6,000 RPM input speed
- Backlash: < 4 arc min



KSS – Versatile Outputs*

STOBER is proud to offer our quality-proven, high-efficiency KSS Series Helical/Bevel speed reducer in a stainless steel housing necessary for the toughest washdown applications.

- 4:1 to 70:1
- Up to 346 Nm torque (nom)
- Up to 6,000 RPM input speed
- Backlash: < 10 arc min

Servo Gear Units

Versatility

STOBER Drives offers the world's largest variety of gearheads to fit virtually all servo needs.

INLINE & OFFSET INLINE GEARHEADS



Performance, Configurations and Options

		P	PA	PH	PHA	PHQ	PHQA	PE	C	F
		page 14		page 46				page 92	page 102	page 140
Input	Large Input	•	•	•	•	•	•	•		
	ServoCool	•	•	•	•					
Output (see page 326 for details)	Solid Shaft	•	•					•	•	•
	Hollow Bore									•
	Rotating Flange			•	•	•	•		•	•
	Shrink Ring									•
	Single Bushing									•
	Double Bushing									•
	Flange								•	•
Housing	Foot Mount								•	•
	Tapped Holes								•	•
	IP65	•	•	•	•	•	•	IP64	•	•
Protection	IP69K Washdown								Opt	Opt
	ATEX Certified	Opt	Opt	Opt	Opt	Opt	Opt		Opt	Opt
	304SS Housing									
Paint/Coatings	Standard Black	•	•	•	•	•	•	•	•	•
	Food Duty	•							•	•
	Corrosion Resistant Duty								•	•
Added Functionality	ServoStop*	•	•	•	•				•	•
	Rack and Pinion*	•	•	•				•		
Performance + Good +++ Better +++++ Best	Continuous RPM	+++	+++	++	++	++	++	+++	+++	++
	Stiffness	+++	+++	++	++++	+++++	+++++	+	+	++++
	Torque Density	+++	+++	++	++++	+++++	+++++	+	+	++++
Precision ArcMin Backlash	1	•		Opt		Opt				
	1-3			•		•			•	
	3-5				•					
	5-10						Opt			Opt
	10-15		•				•			•
	15-20							•		
Nominal Output Torque Ranges Nm	0-50	•	•	•	•			•	•	•
	50-200	•	•	•	•			•	•	•
	200-1,000	•	•			•	•	•	•	•
	1,000-5,000	•	•			•	•	•	•	•
	5,000-10,000					•	•	•	•	•
	10,000-23,000					•	•			

* See page 331 for more information

RIGHT ANGLE GEARHEADS

SS304



	K	KL	PKX	PK	PHKX	PHK	PHQK	KS	KSS
	page 162		page 214		page 248			page 298	page 312
								•	
	•	•	•	•				•	•
	•	•						•	•
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Servo Gear Units Application-Tailored Solutions

Industry	Ideal Gearhead Applications	Recommended STÖBER Gearhead
Aerospace	<ul style="list-style-type: none"> Automated Guided Vehicles (AGV) Drilling and Riveting Machine Tool Testing and Inspection 	<ul style="list-style-type: none"> Carbon Fiber Placement Fuselage Space Tracking Systems Wing assembly
Automation	<ul style="list-style-type: none"> Assembly turn tables Linear presses Robotics auxiliary axis Palletizing 	<ul style="list-style-type: none"> Custom assembly machines Radar Pipe and wire bending
Automotive Manufacturing	<ul style="list-style-type: none"> Transfer lines Robotic auxiliary Machining Tire manufacturing Carbon fiber production 	<ul style="list-style-type: none"> Metal cutting and bending Pick and place Index tables Electronics assembly
Converting	<ul style="list-style-type: none"> Cutting Tension Control Web Lines 	<ul style="list-style-type: none"> Winding Paper Converting
Machine Tool	<ul style="list-style-type: none"> Horizontal and vertical mills Large gantry cranes Carbon fiber placement Flame, laser, water jet, and plasma cutting Back gauging 	<ul style="list-style-type: none"> Grinding X-Y tables Indexing tables Chip conveyors Bending and forming Tool changers
Material Handling	<ul style="list-style-type: none"> Pick and place Line diverter Sorting/diverting 	<ul style="list-style-type: none"> Linear transfer Palletizing
Medical	<ul style="list-style-type: none"> Imaging Radiation Centrifuge 	
Packaging	<ul style="list-style-type: none"> Continuous or intermittent filling applications 	
Plastics/Composites	<ul style="list-style-type: none"> Often used to replace hydraulic actuators in injection molding Injection molding Carbon fiber placement 	<ul style="list-style-type: none"> Extrusion lines Blow molding Thermoforming Rubber molding
Printing	<ul style="list-style-type: none"> Labels Flexographic printing 	<ul style="list-style-type: none"> Circuit Boards Sheet
Robotics	<ul style="list-style-type: none"> Delta Pick and place Telescoping arms 	<ul style="list-style-type: none"> Auxiliary axis to rotate and move robot Positioning axis
Semiconductor	<ul style="list-style-type: none"> Wafer polishing Wafer handling 	<ul style="list-style-type: none"> Circuit web printing
Valve Control	<ul style="list-style-type: none"> Ideal for handling rapid dithering positioning Ball, gate, and globe valves 	<ul style="list-style-type: none"> Throttle/governor valves Chokes Process valves ATEX explosion proof available

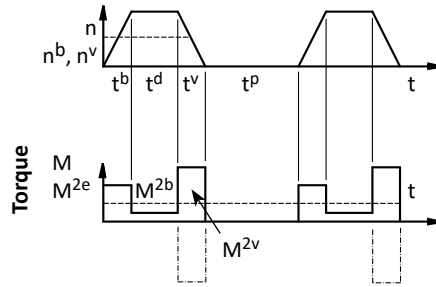
Gearhead Sizing to your Specific Application Requirements

Sizing/Selection

Use the chart on the facing page and below to determine the best series and the right size gearhead to meet your specific application requirements. In each product section of this catalog, the necessary data and a "Load/Life/Speed Calculation" section are provided to help you work through these equations..

By all means, please feel free to call or email (sales@stober.com), if you have any questions or need assistance determining the best solution for your application.

Cycle Run



$$M_{2e} = \sqrt[3]{\frac{n_{2b} \cdot t_b \cdot M_{2b}^3 + \dots + n_{2n} \cdot t_n \cdot M_{2n}^3}{n_{2b} \cdot t_b + \dots + n_{2n} \cdot t_n}}$$

Service Factor

Apply to Nominal Rating ONLY

P, PA, PE PH, PHA PHV, PHVA, PHQ, PHQA, KS	PKX, PK, PHKX, PHK, PHQK, C, F, K, KSS
--	---

Load Factor f_B

Operating Mode

Continuous	1.0	1.0
Cyclic	1.0	1.25
Cyclic-	1.0	1.4
Reversing		

Running Time Factor f_L

≤8 hours	1.0
≤16 hours	1.15
≤24 hours	1.2

Apply to Input RPM

Temperature Factor f_T

	Without Ventilation	Fan Cooled
<20°C	1.00	0.90
<30°C	1.10	1.00
<40°C	1.25	1.15

Continuous Duty: Drive is considered continuous duty if the running time ($t^r = t^b + t^d + t^v$) is 60% of the complete cycle time ($t^b + t^d + t^v + t^p$) or longer than 20 minutes.

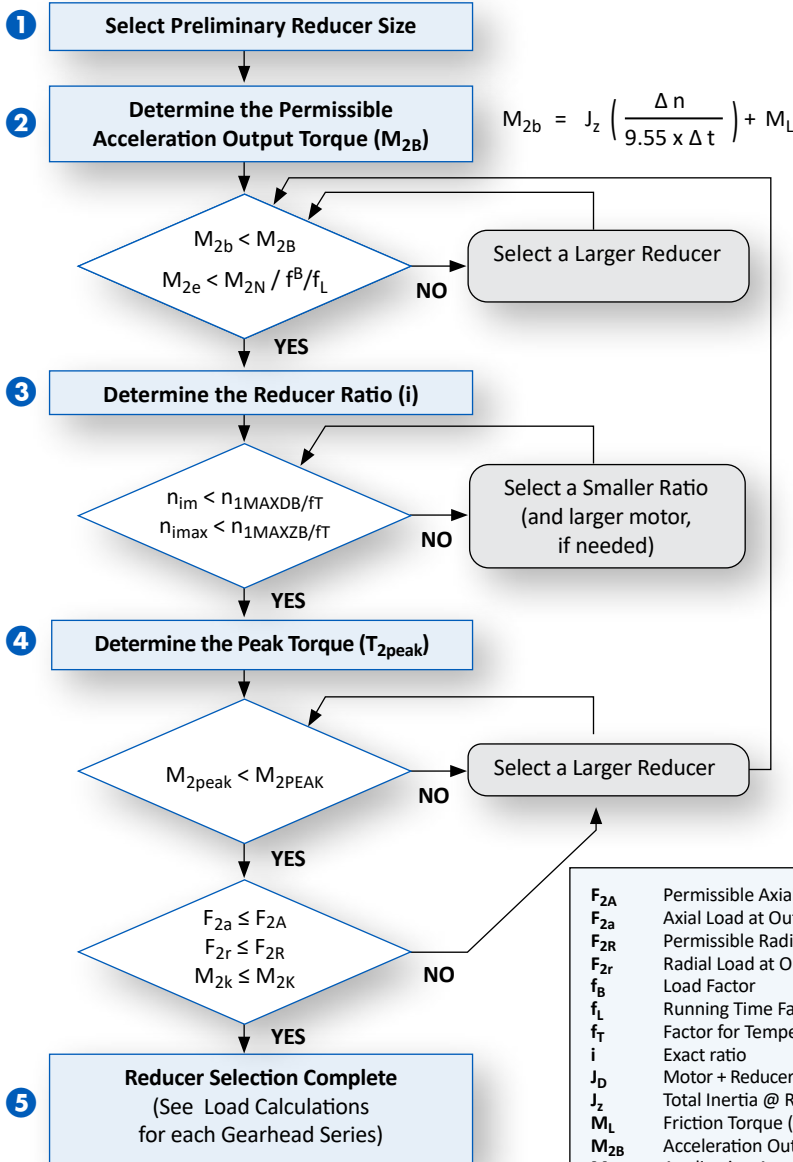
Cyclic Duty: Drive will cycle on and off.

For cyclic operation, the recommended ratio of external (application) inertia to gearhead inertia can be determined by the following equation:

$$\frac{J_z}{i^2} = 4 \cdot J_D$$

The gearhead selected, using the following equation for inertia ratio, will result in the lowest motor torque demand and the optimum drive selection:

$$\frac{J_z}{i^2} = J_D$$



F_{2A}	Permissible Axial Load	M_{2K}	Rated Tilting Torque
F_{2a}	Axial Load at Output Shaft	M_{2k}	Equivalent Tilting Load
F_{2R}	Permissible Radial load	M_{2N}	Nominal Output Torque
F_{2r}	Radial Load at Output Shaft	M_{2peak}	Peak Output Torque
f_B	Load Factor	n_{1db}	Maximum Continuous Input
f_L	Running Time Factor	n_{1zb}	Maximum Cyclic Input
f_T	Factor for Temperature	n_{im}	Maximum Continuous Speed
i	Exact ratio	n_{imax}	Maximum Cyclic Speed
J_D	Motor + Reducer Inertia @ Motor RPM	T_{2PEAK}	Peak Torque
J_z	Total Inertia @ Reducer RPM	t_r	Running Time
M_L	Friction Torque (Losses)	t_b	Acceleration Time
M_{2B}	Acceleration Output Torque	t_d	Duration Time
M_{2b}	Application Acceleration Torque	t_v	Deceleration Time
M_{2e}	Equivalent Torque (Avg RMS Torque)		

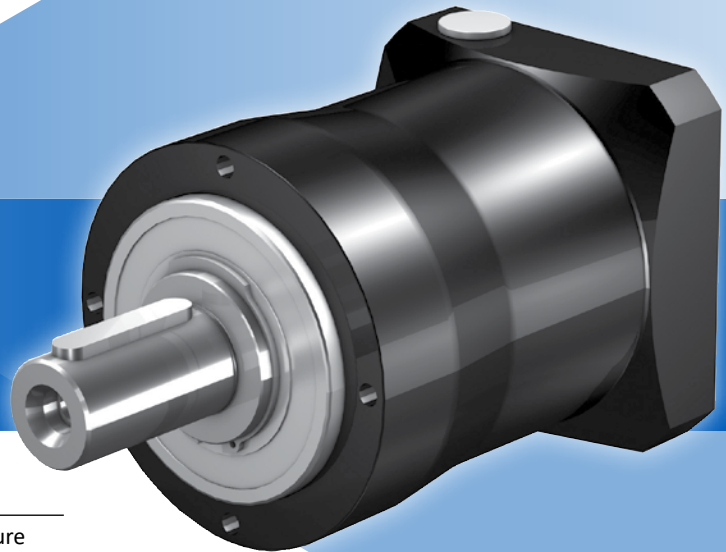
PE Series: INLINE — Shaft Output

Features

- 3:1 to 100:1 ratios
- Helical gearing produces more torque while running quieter compared to spur tooth gearing
- Input coupling design transfers more torque with lower inertia for vibration free operation
- Large motor input option to accept bigger diameter motor shafts so you don't use an oversized gearbox
- Error free motor mounting and quick changeover with toleranced pilot on motor plate
- Low no load running torque, giving you more torque for your application
- Optional food grade grease (Contact STÖBER.)
- Build and ship in one day
- Assembled in the USA

STÖBER PE Series Servo Precision Planetary Gearheads are available for applications where very low backlash is not important. They are an economical helical tooth planetary, comparable in quality to other STÖBER units. Every gearbox is made to order. STÖBER will custom whatever you need to fit your application. Contact us today to learn more

**SHIPS in
1 DAY!**
NO EXPEDITE FEE FOR 24
HOUR SERVICE



General Specifications

Ambient Temperature	0°C to +40°C (104°F) [Unit temperature <90°C Max]
Backlash	≤8 arcmins, see performance overview chart page
Coating	Black (RAL 790-4)
Degree of Protection	IP64
Direction of Rotation	Input and output rotate the SAME direction
Efficiency	1 stage 97%; 2 stage 95%
Input RPM	Up to 8,000 RPM
Installation	Requires 10.9 fasteners. See page 328 for more information
Grease	Synthetic grease (NLGI 2)/ Food grease - lubricated for life
Mounting Position	Unrestricted
Warranty	5 Year Limited (2 Years on normal wear items: bearings, seals, etc.)

Comparative Advantages

	MA	MAL
Length	Standard	Long
Cost	\$\$	\$\$\$
Input Adaptability	Unlimited	Unlimited

Options

Large Input (MAL)

- Accommodates a larger diameter motor shaft without going to a larger size gearbox

Coating Option

Available with a multi-layer, industrial 316 stainless steel epoxy coating (contact factory)



Overview

Selection Options At-a-Glance

Using the **Selection Data** table later in this section, select the PE Series Gearhead with the appropriate performance and design options tailored to your motor choice and exact application requirements. Use the part number guide below as a reference to build a part number for the complete gearhead assembly.

Part Number Examples: ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨
PE 3 1 1 S P R 0030 MA

Design Option	Part Number Code	Description
① Series	PE	Economical planetary
② Size	2 3 4 5	4 sizes of gearhead
③ Generation	1	Version of gearhead
④ # of Stages	1 2	One stage for ratios of ≤ 10:1 Two stage for ratios >10:1
⑤ Housing	S	Standard mounting style
⑥ Output	P	Shaft with key
⑦ Bearings	R	Normal
⑧ Ratio	0030	Ratios range from 3:1 to 100:1 (0030=3:1; 0200=20:1; 1000=100:1, etc.)
⑨ Motor Adapter	MA MAL	Motor adapter w/standard input* Motor adapter w/large Input* *See Motor Mounting Plate Option, page 94

PE Series: INLINE — Shaft Output

PE Series Performance Overview

PE Series performance is dependent on several factors including duty cycle, bearing design, gearhead size and stage configuration, among others. Use the chart below for preliminary evaluation, then use the following performance chart and selection information on the following pages for specific performance sizing and selection.

	Size/Generation	PE21		PE31		PE41		PE51	
		# of Stages	1	2	1	2	1	2	1
Permissible Acceleration Torque M_{2BMAX}	Nm	15	15	42	55	100	120	250	310
Output Torque Nom. ¹⁾ M_{2NMAX}	Nm	8	8	23	30	50	65	130	160
Torsional Stiffness C_2	Nm/arcmin	1.4	1.4	4.1	4.2	13	14	33	35
Torsional Backlash ²⁾ $\Delta\phi$	arcmin	≤10	≤13	≤8	≤10	≤8	≤10	≤8	≤10
Input Speed Max. n_{1MAX}	Continuous Cyclic	4000 8000		4000 6000		3600 6000		3000 5000	
Efficiency (@nom torque)	%	1 Stage = 97; 2 Stage = 95							
Weight	kg lbs	1.3 2.87	1.2 2.65	3.0 6.61	3.0 6.61	5.2 11.46	5.7 12.57	9.9 21.83	10.6 23.37
Noise ³⁾	dB(A)	≤60	≤60	≤62	≤61	≤64	≤63	≤65	≤64

¹⁾ Ratings based on input speed (n_1) of 1500 RPM.

For torque at higher input speeds (M_{2NX}) solve the formula:
where n_1 = Actual Input Speed.

$$M_{2NX} = \frac{M_{2N}}{\sqrt[3]{\frac{n_1}{1500}}}$$

²⁾ Tested at 1.5% of nominal torque and recorded on the output side of the gearhead. For lower backlash, contact STÖBER technical support.

³⁾ Measurement at one (1) meter distance with input speed (n_1) of 2000 RPM.

PE Series: INLINE – Shaft Output

PE Series Motor Mounting Plate Option (Motor information required with Motor Adapter option)

STOBER Servo Gearheads fit the motor of your choice with the appropriate motor mounting plate assembled between the motor and the gearhead.

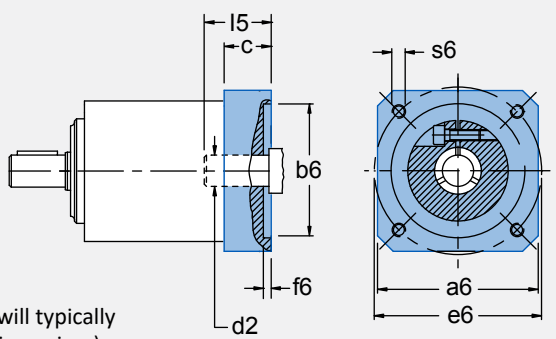
NOTE: When ordering a gearhead:

- Specify the motor manufacturer and part number
- Provide the motor drawing with dimensions, or specify the motor mounting dimensions (per the list shown at right)

For a precise dimension on a specific motor, or for general assistance, we recommend you contact STOBER Technical Support.

Customer Required Dimensions for Properly Sized Motor Mounting Plate

d2	Motor Shaft Diameter (If an adapter bushing is required it will be supplied with the motor plate.)
b6	Pilot Diameter
e6	Bolt Circle Diameter
s6	Bolt Diameter
l5	Motor Shaft Length
f6	Pilot Length
a6	Square Flange (Optional – motor plate will typically be made to match this dimension.)

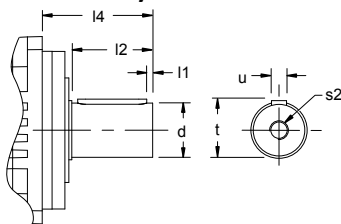


Motor Mounting Plate Dimensions — mm (Gearhead Part Number Specific)	PE211 PE212	PE211...L PE311 PE312	PE311...L PE411 PE412	PE411...L PE511 PE512	PE511...L
Maximum Allowed Motor Shaft Dia. d2	14	19	24	32	38
Minimum Allowed Motor Plate Thickness c*	15	18	21	24	26

* Note that the c motor plate thickness is determined by the motor shaft length. The minimum motor plate thickness is the value listed.

PE Series Output Shaft Options ("P" designated in part number, for example: PE211S P 0040 MAL)

P Shaft with Key



Unit	d k6 mm	l1	l2	l4	s2 ⁽¹⁾	t	u ⁽²⁾	
		mm	mm	mm		mm	W x H x L	
PE2	12	+0.012/+0.001	2	18	24.5	M4	13.5	A4x4x14
PE3	16	+0.012/+0.001	2	28	36	M5	18.0	A5x5x22
PE4	22	+0.015/+0.002	2	36	46	M8	24.5	A6x6x32
PE5	32	+0.018/+0.002	4	58	70	M12	35.0	A10x8x50

⁽¹⁾ The center hole in shafts with keys (Option "P") are machined to DIN 332 T2 shape DR.

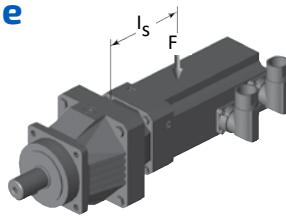
⁽²⁾ Feather keys are toleranced according to standard DIN 6885.



Overview

Permissible Motor Tilting Torque

The permissible tilting torque of the motor attached to the gear unit is a result of the static and dynamic load “F” from the motor weight, mass acceleration, and vibration multiplied by the distance from the center of gravity “ l_s ” of the motor.



$$M_{1k} = F \times l_s \leq M_{1K}$$

M_{1K}	PE211 PE212	PE311 PE312	PE411 PE412	PE511 PE512
Nm	10	20	40	80

PE Permissible Output Shaft Load and Tilting Moments*

Unit	Z_2 mm	F_{2A} N	F_{2R} N	M_{2K} Nm
PE211, PE212	8	400	800	13
PE311, PE312	11	800	1600	40
PE411, PE412	13	1900	2400	73
PE511, PE512	16	4000	4600	206

* Refer to illustration and definitions below. During EMERGENCY OFF operation (maximum stops per gearhead = 1000) the permissible values in the table for F_{2A} , F_{2R} and M_{2K} can be multiplied by a factor of 2. Rating based on output speed (n_2) of 100 RPM. For values at other speeds see below.

PE Series Load/Life/Speed Calculations

All formulas shown are based on METRIC values

Upper case letters are permissible values. Lower case letters are for existing values.

The permissible load and tilting moment values are based on an output speed of 100 RPM. For higher speeds the following applies, where n_2 is the desired speed:

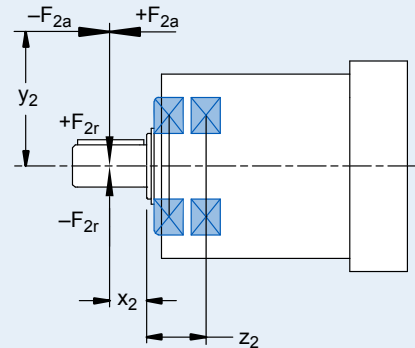
$$F_{2AX} = \frac{F_{2A}}{\sqrt[3]{\frac{n_2}{100}}}, \quad F_{2RX} = \frac{F_{2R}}{\sqrt[3]{\frac{n_2}{100}}}, \quad M_{2KX} = \frac{M_{2K}}{\sqrt[3]{\frac{n_2}{100}}}$$

The application output tilting moment should be determined by the following formula:

$$M_{2A} = \frac{2 \cdot F_{2a} \cdot y_2 + F_{2r} \cdot (x_2 + z_2)}{1000} \leq M_{2KB}$$

Where:

F_{2a}	Axial Load at Output Shaft	F_{2RB}	Acceleration Permissible Radial Load
F_{2A}	Permissible Axial Load	M_{2K}	Rated Tilting Torque
F_{2r}	Radial Load at Output Shaft	M_{2k}	Equivalent Tilting Load
F_{2R}	Permissible Radial Load	z_2	Distance Factor



The hours of life (L_h) of the unit can be determined by the following formula:

bearing life for duty cycle $\leq 40\%$

$$L_h > 10,000 \text{ hours if } M_{2K}/M_{2A} < 1.25 \text{ and } > 1$$

$$L_h > 20,000 \text{ hours if } M_{2K}/M_{2A} > 1.25 \text{ and } > 1.5$$

bearing life for duty cycle $\geq 40\%$

$$L_{hA} = L_h \left(\frac{40\%}{\text{Duty Cycle}} \right)$$

PE Series: INLINE — Shaft Output

PE Series: INLINE – Shaft Output

Exact Ratio (i)	Output Torque			Part Number* (Gearhead + Input)	Maximum Input Speed RMP (n1)		Motor Shaft Max Ø D ⁶	Input Inertia ³⁾ j ₁	Torsional Stiffness C ₂ (per arcmin)
	Nominal ¹⁾ M _{2N}	Acceleration M _{2B}	Peak ²⁾ M _{2PEAK}		Cont.	Cyclic			
	Nm	Nm	Nm				mm	kgcm ²	Nm

PE2

4.000	7	14	26	PE211_0040MA	4000	8000	>11≤14	0.1	1.4
				PE211_0040MAL			>14≤19	0.4	
5.000	8	15	26	PE211_0050MA	4000	8000	>11≤14	0.1	1.3
				PE211_0050MAL			>14≤19	0.4	1.4
7.000	8	15	26	PE211_0070MA	4000	8000	>11≤14	0.1	1.3
				PE211_0070MAL			>14≤19	0.4	
10.00	7	13	22	PE211_0100MA	4000	8000	>11≤14	0.1	1.1
				PE211_0100MAL			>14≤19	0.4	
16.00	7	14	26	PE212_0160MA	4000	8000	>11≤14	0.1	1.4
20.00	8	15	26	PE212_0200MA	4000	8000	>11≤14	0.1	1.3
25.00	8	15	26	PE212_0250MA	4000	8000	>11≤14	0.1	1.3
28.00	7	14	26	PE212_0280MA	4000	8000	>11≤14	0.1	1.3
35.00	8	15	26	PE212_0350MA	4000	8000	>11≤14	0.1	1.3
40.00	7	14	26	PE212_0400MA	4000	8000	>11≤14	0.1	1.3
50.00	8	15	26	PE212_0500MA	4000	8000	>11≤14	0.1	1.3
70.00	8	15	26	PE212_0700MA	4000	8000	>11≤14	0.1	1.3
100.0	7	13	22	PE212_1000MA	4000	8000	>11≤14	0.1	1.1

¹⁾ Based on input speed of 1500 RPM. See page 95 for details on torque calculations.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Inertia based on maximum input. For lower inertia, using smaller diameter input, contact STÖBER.

* MA = Motor Accurate L = Large Input Option



Selection Data

Exact Ratio (i)	Output Torque			Part Number* (Gearhead + Input)	Maximum Input Speed RMP (n ₁)		Motor Shaft Max Ø D ⁶	Input Inertia ³⁾ j ₁	Torsional Stiffness C ₂ (per arcmin)
	Nominal ¹⁾ M _{2N}	Acceleration M _{2B}	Peak ²⁾ M _{2PEAK}		Cont.	Cyclic			
	Nm	Nm	Nm				mm	kgcm ²	Nm

PE3

3.000	21	40	65	PE311_0030MA	3500	6000	>14≤19	0.5	3.3
				PE311_0030MAL			>19≤24	1.0	3.5
4.000	22	42	75	PE311_0040MA	3700	6000	>14≤19	0.4	4.0
				PE311_0040MAL			>19≤24	0.9	4.1
5.000	23	40	75	PE311_0050MA	3700	6000	>14≤19	0.4	3.9
				PE311_0050MAL			>19≤24	0.9	4.0
7.000	23	40	75	PE311_0070MA	4000	6000	>14≤19	0.4	3.8
				PE311_0070MAL			>19≤24	0.9	
10.00	19	37	75	PE311_0100MA	4000	6000	>14≤19	0.4	3.4
				PE311_0100MAL			>19≤24	0.9	
12.00	30	55	75	PE312_0120MA	3700	6000	>14≤19	0.5	4.1
15.00	23	40	75	PE312_0150MA	3700	6000	>14≤19	0.5	4.0
16.00	30	55	75	PE312_0160MA	3700	6000	>14≤19	0.4	4.2
20.00	30	55	75	PE312_0200MA	3700	6000	>14≤19	0.4	4.2
25.00	23	40	75	PE312_0250MA	3700	6000	>14≤19	0.4	4.0
28.00	30	55	75	PE312_0280MA	4000	6000	>14≤19	0.4	4.2
35.00	23	40	75	PE312_0350MA	4000	6000	>14≤19	0.4	4.0
40.00	30	55	75	PE312_0400MA	4000	6000	>14≤19	0.4	4.1
50.00	23	40	75	PE312_0500MA	4000	6000	>14≤19	0.4	4.0
70.00	23	40	75	PE312_0700MA	4000	6000	>14≤19	0.4	3.8
100.0	20	37	75	PE312_1000MA	4000	6000	>14≤19	0.4	3.4

PE Series: INLINE — Shaft Output

¹⁾ Based on input speed of 1500 RPM. See page 95 for details on torque calculations.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Inertia based on maximum input. For lower inertia, using smaller diameter input, contact STÖBER.

* MA = Motor Accurate L = Large Input Option

PE Series: INLINE – Shaft Output

Exact Ratio (i)	Output Torque			Part Number* (Gearhead + Input)	Maximum Input Speed RMP (n1)		Motor Shaft Max Ø D ⁶	Input Inertia ³⁾ j ₁	Torsional Stiffness C ₂ (per arcmin)
	Nominal ¹⁾ M _{2N}	Acceleration M _{2B}	Peak ²⁾ M _{2PEAK}		Cont.	Cyclic			
	Nm	Nm	Nm				mm	kgcm ²	Nm

PE4

3.000	45	90	180	PE411_0030MA	3000	5500	>19≤24	1.4	11.7
				PE411_0030MAL			>24≤32	3.0	12.1
4.000	50	100	190	PE411_0040MA	3400	6000	>19≤24	1.2	12.8
				PE411_0040MAL			>24≤32	2.8	13.0
5.000	50	100	190	PE411_0050MA	3400	6000	>19≤24	1.2	12.2
				PE411_0050MAL			>24≤32	2.8	12.4
7.000	50	100	190	PE411_0070MA	3600	6000	>19≤24	0.9	11.5
				PE411_0070MAL			>24≤32	2.6	11.6
10.00	45	90	190	PE411_0100MA	3600	6000	>19≤24	0.9	10.1
				PE411_0100MAL			>24≤32	2.5	
12.00	65	120	190	PE412_0120MA	3400	5500	>19≤24	1.3	13.4
15.00	50	100	190	PE412_0150MA	3400	6000	>19≤24	1.3	12.4
16.00	65	120	190	PE412_0160MA	3400	6000	>19≤24	1.1	13.5
20.00	65	120	190	PE412_0200MA	3400	6000	>19≤24	1.1	13.5
25.00	50	100	190	PE412_0250MA	3400	6000	>19≤24	1.1	12.5
28.00	65	120	190	PE412_0280MA	3600	6000	>19≤24	0.9	13.4
35.00	50	100	190	PE412_0350MA	3600	6000	>19≤24	0.9	12.4
40.00	65	120	190	PE412_0400MA	3600	6000	>19≤24	0.9	13.3
50.00	50	100	190	PE412_0500MA	3600	6000	>19≤24	0.9	12.4
70.00	50	100	190	PE412_0700MA	3600	6000	>19≤24	0.9	11.6
100.0	45	90	190	PE412_1000MA	3600	6000	>19≤24	0.9	10.1

¹⁾ Based on input speed of 1500 RPM. See page 95 for details on torque calculations.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Inertia based on maximum input. For lower inertia, using smaller diameter input, contact STÖBER.

* MA = Motor Accurate L = Large Input Option



Selection Data

Exact Ratio (i)	Output Torque			Part Number* (Gearhead + Input)	Maximum Input Speed RMP (n ₁)		Motor Shaft Max Ø D ⁶	Input Inertia ³⁾ j ₁	Torsional Stiffness C ₂ (per arcmin)
	Nominal ¹⁾ M _{2N}	Acceleration M _{2B}	Peak ²⁾ M _{2PEAK}		Cont.	Cyclic			
	Nm	Nm	Nm				mm	kgcm ²	Nm

PE5

3.000	90	180	392	PE511_0030MA	2500	4500	>24≤32	2.7	29.5
				PE511_0030MAL			>32≤38	6.5	31.6
4.000	130	250	400	PE511_0040MA	2600	5000	>24≤32	3.1	31.6
				PE511_0040MAL			>32≤38	6.9	32.9
5.000	130	250	400	PE511_0050MA	2600	5000	>24≤32	2.9	31.6
				PE511_0050MAL			>32≤38	6.7	32.5
7.000	130	250	400	PE511_0070MA	2800	5000	>24≤32	2.6	29.9
				PE511_0070MAL			>32≤38	6.4	30.4
15.00	130	250	480	PE512_0150MA	2500	4500	>24≤32	3.8	32.8
16.00	160	310	480	PE512_0160MA	2600	5000	>24≤32	3.2	34.6
20.00	160	310	480	PE512_0200MA	2600	5000	>24≤32	3.0	34.6
25.00	130	250	480	PE512_0250MA	2600	5000	>24≤32	3.0	32.9
28.00	160	310	480	PE512_0280MA	2800	5000	>24≤32	2.7	34.5
35.00	130	250	480	PE512_0350MA	2800	5000	>24≤32	2.7	32.8
40.00	160	310	480	PE512_0400MA	3000	5000	>24≤32	2.6	34.2
50.00	130	250	480	PE512_0500MA	3000	5000	>24≤32	2.6	32.6
70.00	130	250	480	PE512_0700MA	3000	5000	>24≤32	2.6	30.6
100.0	110	220	480	PE512_1000MA	3000	5000	>24≤32	2.6	26.9

PE Series: INLINE — Shaft Output

¹⁾ Based on input speed of 1500 RPM. See page 95 for details on torque calculations.

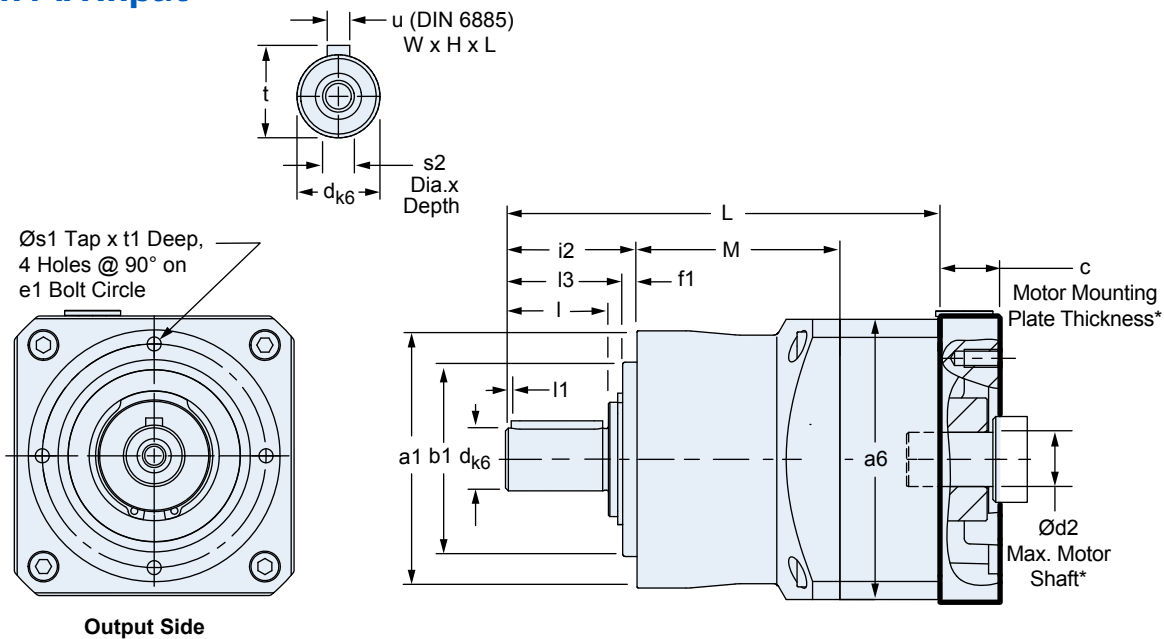
²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Inertia based on maximum input. For lower inertia, using smaller diameter input, contact STÖBER.

* MA = Motor Accurate L = Large Input Option

PE Series: INLINE — Shaft Output

PE with MA Input



* See Motor Mounting Plate Option, page 94 for details.

Table 1 PE Unit Dimensions (mm)

Unit	a1	a6	b1	h6	d	k6	e1	f1	i2	l	l1	l3	s1	s2	t	t1	u
PE211/PE212	50	55	35	+0.000/-0.016	12	+0.012/+0.001	44	4	24.5	18	2	20.5	M4x0.70	M4x0.70	13.5	8	A4x4x14
PE311/PE312	70	72	52	+0.000/-0.019	16	+0.012/+0.001	62	5	36	28	2	31	M5x0.80	M5x0.80	18	10	A5x5x22
PE411/PE412	90	98	68	+0.000/-0.019	22	+0.015/+0.002	80	5	46	36	2	41	M6x1.00	M8x1.25	24.5	13	A6x6x32
PE511/PE512	120	115	90	+0.000/-0.022	32	+0.018/+0.002	108	6	70	58	4	64	M8x1.25	M12x1.75	35	16	A10x8x50

Table 2 PE Unit Dimensions (mm)

Unit	L	M
PE211	94	52.5
PE212	121.5	80
PE311	135.5	66
PE312	168	98.5
PE411	152	71
PE412	190	109
PE511	199.5	89.5
PE512	245	135

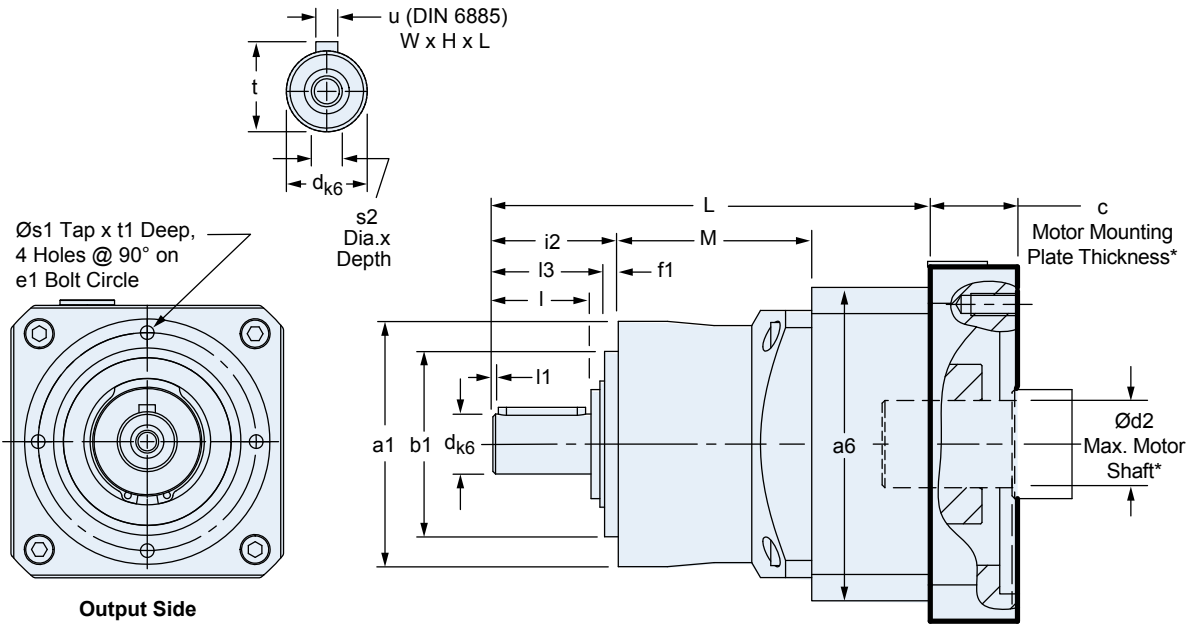
Table 3 MA Dimensions (mm)

Unit	c	Ød2
PE211/PE212	15	14
PE311/PE312	18	19
PE411/PE412	21	24
PE511/PE512	24	32



Dimensional Data

PE with MAL Input



PE Series: INLINE — Shaft Output

Table 1 PE Unit Dimensions (mm)

Unit	a1	a6	b1	h6	d	k6	e1	f1	i2	l	l1	l3	s1	s2	t	t1	u
PE211	50	55	35	+0.000/-0.016	12	+0.012/+0.001	44	4	24.5	18	2	20.5	M4x0.70	M4x0.70	13.5	8	A4x4x14
PE311	70	72	52	+0.000/-0.019	16	+0.012/+0.001	62	5	36	28	2	31	M5x0.80	M5x0.80	18	10	A5x5x22
PE411	90	98	68	+0.000/-0.019	22	+0.015/+0.002	80	5	46	36	2	41	M6x1.00	M8x1.25	24.5	13	A6x6x32
PE511	120	115	90	+0.000/-0.022	32	+0.018/+0.002	108	6	70	58	4	64	M8x1.25	M12x1.75	35	16	A10x8x50

Table 2 PE Unit Dimensions (mm)

Unit	L	M
PE211	110.5	52.5
PE311	138.8	66
PE411	160.5	71
PE511	213.5	89.5

Table 3 MAL Dimensions (mm)

Unit	c	Ød2
PE211	18	19
PE311	21	24
PE411	24	32
PE511	26	38