

ServoFit® Precision Planetary Gearhead

Introduction and Table of Contents

At Stober Drives, we are continuously seeking new ways to bring you new solutions to solve your drive problems. This ongoing process has resulted in innovative products such as our ServoFit® line of planetary gearheads and, of course, our MGS® line of constant speed reducers. With these two lines of products, Stober Drives can offer you the world's widest variety of servo reducers available from one source.

The products in this catalog are designed to fit your highly dynamic and continuous running applications, such as material handling systems, injection molding equipment, high speed packaging machines, industrial robots – just to name a few.

In addition to innovative and dependable product solutions, we are also concentrating on the services and support needed to help you obtain maximum value from our products. Some of these services include:

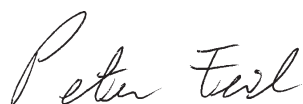
- A North American sales network to provide local support for your drive needs.
- Comprehensive and easy-to-read product selection aids such as this catalog, our web site – which gives a complete overview of all our products and lets you access on-line catalogs—and a lot more.
- Experienced sales engineers to help you solve your gear drive problems.
- In-depth installation instructions to obtain the maximum benefit from our products – today and in the future.
- Responsive customer service personnel you can depend on to provide the right product at the right time.
- Sales agencies and direct sales offices worldwide to help you support your international customers.

On behalf of the worldwide family of Stöber employees, we thank you for choosing our products and pledge to continue to meet your product needs with the newest solutions in the future.

Sincerely,



Bernd Stöber, President
Stober Drives, Inc.



Peter Feil, VP/General Manager
Stober Drives, Inc.

"P" Series

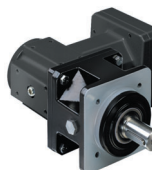
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"P" Series—ClassicLine

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"PH" Series

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Miscellaneous

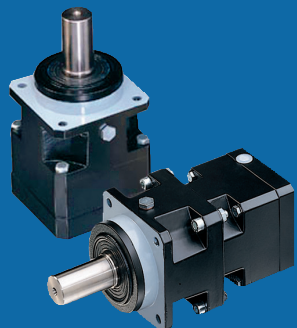
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Miscellaneous

ServoFit® Precision Planetary Gearhead Product Offering Inline Units



"P" Series-ClassicLine



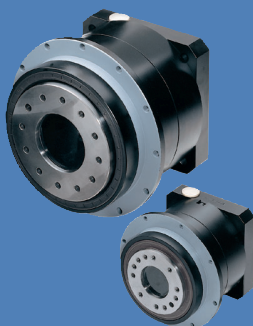
"P" Series – ClassicLine

Output Torque – 40 to 800 Nm (354 to 7,080 in.lbs.)
Input RPM – up to 6,000
Ratios – 3 to 100:1
Backlash – ≤ 3 arc minutes
Noise Level – as low as 58 dB(A)



Available with Input Shaft.

"PH" Series-PowerLine



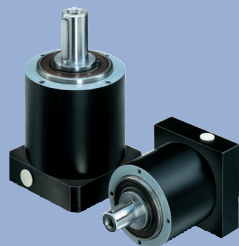
"PH" Series – PowerLine

Output Torque – 80 to 2,500 Nm (708 to 22,125 in.lbs.)
Input RPM – up to 6,000
Ratios – 5 to 400:1
Backlash – ≤ 3 arc minutes
Noise Level – as low as 58 dB(A)



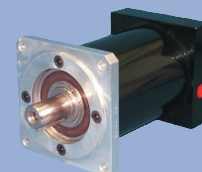
Available with Input Shaft.

"PE" Series-EconoLine



"PE" Series – EconoLine

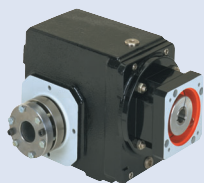
Output Torque – 6.5 to 210 Nm (58 to 1,062 in.lbs.)
Input RPM – up to 8,000
Ratios – 5 to 100:1
Backlash – ≤ 15 arc minutes
Noise Level – as low as 60 dB(A)



Available with NEMA Output Flange

SMS Servo Solutions

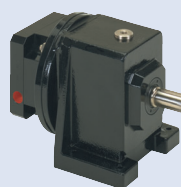
SMS ServoFit® Modular System



"K" Series
Right Angle Helical/Bevel



"F" Series
Offset Helical



"C" Series
Concentric Helical



Ask for
ServoFit® SMS Catalog

See Page 76 for more details.

ServoFit® Precision Planetary Gearhead Product Offering Right Angle Units

"PKX" Series – ClassicLine

Output Torque – 40 to 800 Nm (354 to 7,080 in.lbs.)

Input RPM – up to 6,000

Ratios – 3 to 300:1

Backlash – ≤ 6.5 arc minutes

Noise Level – as low as 69 dB(A)



"P" Series–ClassicLine

"PHKX" Series – PowerLine

Output Torque – 80 to 2,500 Nm (708 to 22,125 in.lbs.)

Input RPM – up to 6,000

Ratios – 5 to 1,200:1

Backlash – ≤ 5 arc minutes

Noise Level – as low as 69 dB(A)



"PH" Series–PowerLine

"PE" Series–EconoLine

"P" Series-ClassicLine

ServoFit® Precision Planetary Gearhead

Performance Specifications



"P" Series-ClassicLine

| | | | Size | P301 | P312 | P401 | P412 | P501 | P512 | P701 | P712 | P801 | P812 | |
|--|--|-----------------------------|--------|--|------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| Permissible Acceleration Torque | T _{2B} | in.lbs. Nm | | 442 | | 885 | | 2,212 | | 4,425 | | 9,735 | | |
| | | | | 50 | | 100 | | 250 | | 500 | | 1,100 | | |
| Nominal Output Torque ¹⁾ | T _{2N} | in.lbs. Nm | | 354 | | 708 | | 1,770 | | 3,540 | | 7,080 | | |
| | | | | 40 | | 80 | | 200 | | 400 | | 800 | | |
| Input Speed Maximum ²⁾ | n _{1MAX} | Continuous | | 3,000 | | 3,000 | | 2,800 | | 2,500 | | 2,000 | | |
| | | | ≤4:1 | 4,000 | 4000 | 4,000 | 4,000 | 3,500 | 4,000 | 3,000 | 3,500 | 2,500 | 3,000 | |
| | | | ≥5:1 | | | | | | | | | | | |
| | | | Cyclic | 6,000 | | 6,000 | | 6,000 | | 6,000 | | 6,000 | | 4,500 | 6,000 |
| Torsional Backlash ³⁾ (Standard) Δφ (Reduced) | | arcmin | | ≤3 | | ≤3 | | ≤3 | | ≤3 | | ≤3 | | |
| | | | | ≤2.5 | | ≤2 | | ≤1.5 | | ≤1 | | ≤1 | | |
| Torsional Stiffness | C _t | in.lbs./arcmin Nm/arcmin | | 35 | | 88 | | 221 | | 442 | | 1,283 | | |
| | | | | 4 | | 10 | | 25 | | 50 | | 145 | | |
| Axial Load Max. | F _{2AMAX} | lbs. N | | 225 | | 337 | | 450 | | 675 | | 900 | | |
| | | | | 1,000 | | 1,500 | | 2,000 | | 3,000 | | 4,000 | | |
| Radial Load Max. ⁴⁾ | F _{2RMAX} | lbs. N | | 675 | | 1,012 | | 1,575 | | 2,025 | | 3,375 | | |
| | | | | 3,000 | | 4,500 | | 7,000 | | 9,000 | | 15,000 | | |
| Tilting Moment Max. ⁴⁾ | T _{2K} | in.lbs. Nm | | 902 | | 1,593 | | 3,380 | | 5,460 | | 9,425 | | |
| | | | | 102 | | 180 | | 382 | | 617 | | 1,065 | | |
| Efficiency (at Nominal Torque) | η | % | | 97% | 95% | 97% | 95% | 97% | 95% | 97% | 95% | 97% | 95% | |
| Weight | m | pounds kg | | 6 | 9 | 9 | 12 | 14 | 19 | 27 | 33 | 57 | 71 | |
| | | | | 2.6 | 4.0 | 4.0 | 5.3 | 6.5 | 8.5 | 12 | 15 | 26 | 32 | |
| Noise Level | LPA | dB(A) ⁵⁾ | | ≤61 | ≤58 | ≤62 | ≤58 | ≤63 | ≤59 | ≤64 | ≤60 | ≤65 | ≤61 | |
| Balance Quality | Q 2.5 (Quality Class-2.5 millimeters per second) | | | | | | | | | | | | | |
| Lubrication | Synthetic Oil (ISO VG 150) | | | | | | | | | | | | | |
| Degree of Protection | IP65 - Viton Shaft Seals | | | | | | | | | | | | | |
| Mounting Position | Unrestricted | | | | | | | | | | | | | |
| Ambient Temperature | 0°C to +40°C (104° F) Other temperatures, contact Stober Drives. | | | | | | | | | | | | | |
| Finish | Black (RAL 9005) | | | | | | | | | | | | | |
| Lifetime. ⁶⁾ | L _h | hours | | L _h > 10,000 hours if T _{2K} /T _{2A} < 1.25 L _h > 20,000 hours if T _{2K} /T _{2A} > 1.25 | | | | | | | | | | |
| Warranty | 5 Year Limited (2 Years on normal wear items: bearings, seals, etc.) | | | | | | | | | | | | | |

 1) Ratings based on input speed (n₁) of 2000 RPM.

 For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed. $T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$

2) For speeds higher than given above, contact Stober Technical Support.

3) Tested at 1.5% of nominal torque and recorded on the input side of the gearhead.

 4) Rating based on output speed (n₂) of 100 RPM. For values at other speeds see Page 29.

 5) Measurement at one (1) meter distance with input speed (n₁) of 3000 RPM.

 6) T_{2A} equals actual tilting moment of the application. See Page 29 for calculation details.

Table No. 1 "P" Series Input – No Load Running Torque – T_R

| Unit No. | | Ratio | | | | | | | | | | | | |
|-----------|---------|-------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | 3 | 4 | 5 | 7 | 10 | 15 | 20 | 25 | 35 | 49 | 50 | 70 | 100 |
| P3 | in.lbs. | 2.7 | 1.8 | 1.8 | 1.8 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 |
| | Nm | .3 | .2 | .2 | .2 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 |
| P4 | in.lbs. | 3.5 | 2.7 | 2.7 | 1.8 | 1.8 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 |
| | Nm | .4 | .3 | .3 | .2 | .2 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 |
| P5 | in.lbs. | 7.0 | 5.3 | 4.4 | 3.5 | 2.7 | 2.7 | 2.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| | Nm | .8 | .6 | .5 | .4 | .3 | .3 | .3 | .2 | .2 | .2 | .2 | .2 | .2 |
| P7 | in.lbs. | 8.0 | 6.2 | 5.3 | 4.4 | 3.5 | 2.7 | 2.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| | Nm | .9 | .7 | .6 | .5 | .4 | .3 | .3 | .2 | .2 | .2 | .2 | .2 | .2 |
| P8 | in.lbs. | 14.2 | 11.5 | 9.7 | 8.0 | 6.2 | 5.3 | 4.4 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| | Nm | 1.6 | 1.3 | 1.1 | .9 | .7 | .6 | .5 | .5 | .4 | .4 | .4 | .4 | .4 |

The torque is measured with the input at 3000 RPM and an ambient temperature of 20° C.

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.



"P" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Features

The "P" Series—ClassicLine of ServoFit Precision Planetary Gearheads feature HeliCamber® gearing, TriAdapt® motor adapter system and many other components which make them the most accurate and efficient planetary gearheads available. Some of these features are:

- Readily Attaches to Any Servo Motor
- High Torsional Stiffness
- 95 to 97% Efficiency
- Readily Available
- Lowest Standard Backlash
- Advanced Gear Technology
- Quiet Running
- 5 Year Limited Warranty (2 years on bearings, seals, etc.)



HeliCamber® gear technology provides minimum wear, low backlash and low noise

Magnetic oil filtration

Ring gear machined integral to the housing – not welded or pressed in— provides greater concentricity and eliminates speed fluctuation

TriAdapt® motor shaft adapter system allows installation of motor in minutes — no special tools required

The patented TriAdapt® motor coupling is designed to allow thermal expansion of the motor shaft—ensuring long motor life by preventing thrust load on the motor bearings.

Viton® seals

Oversized bearings and shafts for high radial load capacity and superior torsional stiffness

Adapter bushings to fit all motor shafts – no key required

ISO (quality number 4) gears are case hardened to 61 Rockwell "C" and ground for maximum efficiency

Triple-split collet – for greater concentricity and low inertia – is rated in excess of 200 percent of the gearheads input torque capacity

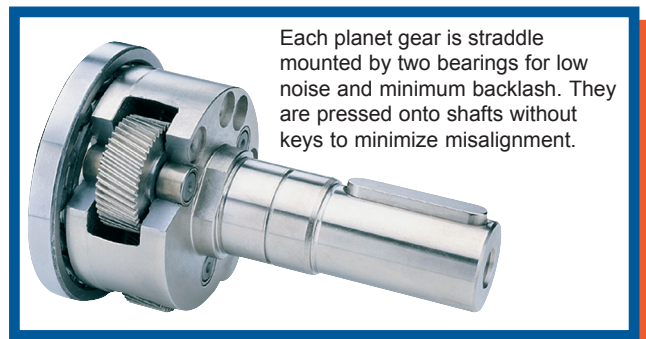
Single piece ductile iron housing (GGG70—101,000 psi tensile strength) for maximum heat dissipation, noise dampening and allows greater lubrication retention on the ring gear

Motor plate can easily be changed to fit your choice of motors

Motor plate pilot toleranced to fit your motor for precise concentricity

Lubricated for life with synthetic oil and sealed to IP65 standards to prevent lubricant contamination for long life

Wide selection of IEC, NEMA, or customized motor adapters



Each planet gear is straddle mounted by two bearings for low noise and minimum backlash. They are pressed onto shafts without keys to minimize misalignment.

* Maximum 10 working days for custom motor plates.



"P" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Selection Data



"P" Series—ClassicLine

| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|-----------------------------------|---------|-----------------------|--|--------|-------------------------------------|---|-------------------|--|---------|--|---------|---------------------------------|--|--|--|
| Gearhead | M AW | | Continuous | Cyclic | | lb-in-s ² | kgcm ² | in.lbs. | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | RPM (n ₁) | RPM | | | per arcmin | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm | | | |

P301 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|-------|------|-----|-----|----|-----|----|-----|-----|
| P301SPN0030 | — | 3.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.808 | 35.4 | 4.0 | 301 | 34 | 443 | 50 | 646 | 73 |
| P301SPN0040 | — | 4.000 | 3,000 | 6,000 | 19 | 0.0006 | 0.684 | 35.4 | 4.0 | 327 | 37 | 443 | 50 | 858 | 97 |
| P301SPN0050 | — | 5.000 | 4,000 | 6,000 | 19 | 0.0006 | 0.638 | 35.4 | 4.0 | 354 | 40 | 443 | 50 | 885 | 100 |
| P301SPN0070 | — | 7.000 | 4,000 | 6,000 | 19 | 0.0005 | 0.592 | 35.4 | 4.0 | 354 | 40 | 443 | 50 | 752 | 85 |
| P301SPN0100 | — | 10.00 | 4,000 | 6,000 | 19 | 0.0005 | 0.573 | 35.4 | 4.0 | 354 | 40 | 443 | 50 | 885 | 100 |

P312 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|-------|------|-----|-----|----|-----|----|-----|-----|
| P312SPN0150 | — | 15.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.648 | 31.9 | 3.6 | 301 | 34 | 443 | 50 | 646 | 73 |
| P312SPN0200 | — | 20.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.643 | 33.6 | 3.8 | 327 | 37 | 443 | 50 | 858 | 97 |
| P312SPN0250 | — | 25.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.641 | 33.6 | 3.8 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN0350 | — | 35.00 | 4,000 | 6,000 | 19 | 0.0005 | 0.593 | 33.6 | 3.8 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN0500 | — | 50.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.630 | 35.4 | 4.0 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN0700 | — | 70.00 | 4,000 | 6,000 | 19 | 0.0005 | 0.592 | 35.4 | 4.0 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN1000 | — | 100.0 | 4,000 | 6,000 | 19 | 0.0005 | 0.573 | 35.4 | 4.0 | 354 | 40 | 443 | 50 | 885 | 100 |

¹⁾ For higher speeds than shown, contact Stöber.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

P 3 01 SPN 0030 M or AW

P Unit No.
 3 No. of Stages (01 = 1 Stage, 12 = 2 Stage)
 01 Output shaft with key
 SPN Ratio (0030 = 3.0:1)
 00 Motor Plate (See Page 28.)
 30 Input Shaft
 M or AW Motor adapter

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

ClassicLine ServoFit Precision Planetary Gearhead

Output Torque (T_{2N}) ≤ 40 Nm (354 in.lbs.)
Ratio (i) = 3 - 100:1
Backlash (Δφ) ≤ 3 arc minutes

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

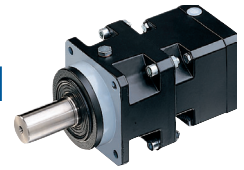
Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.



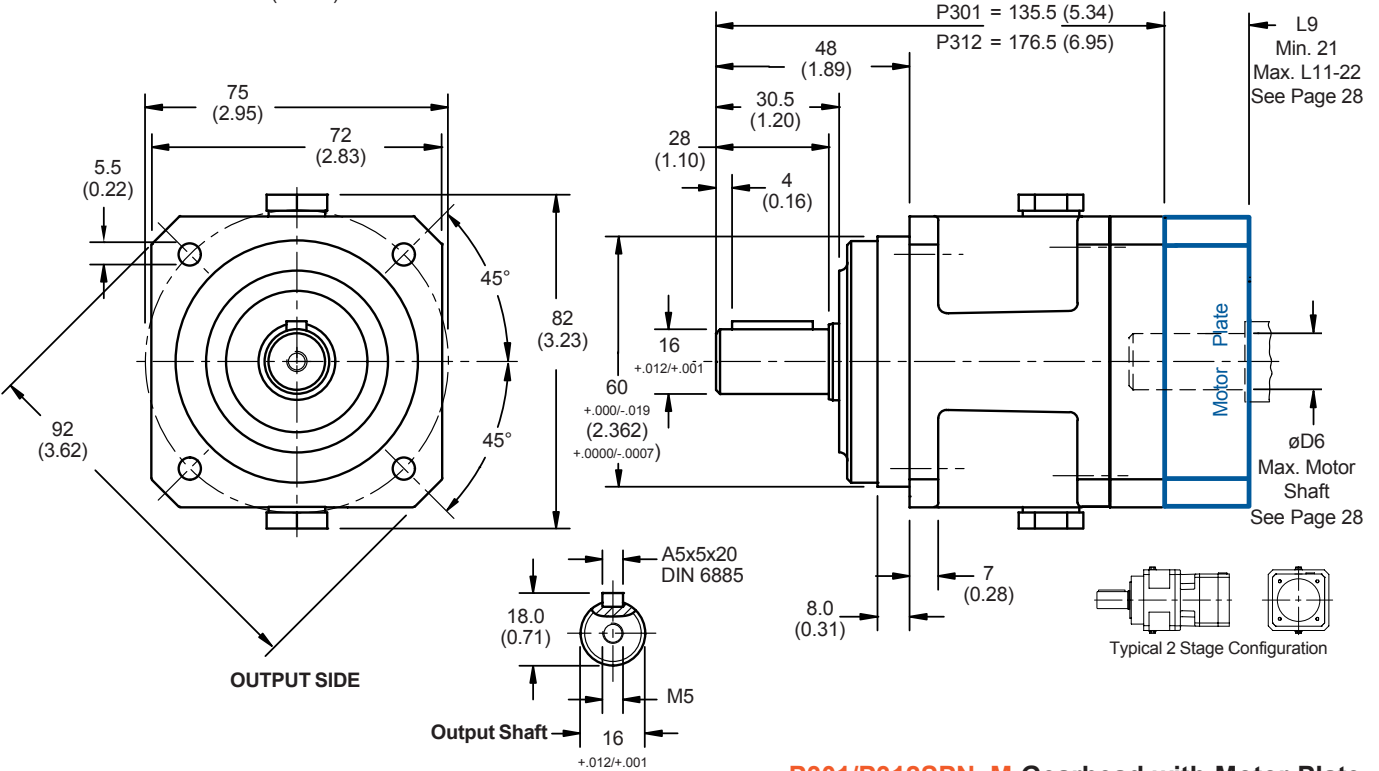
"P" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Dimensional Data

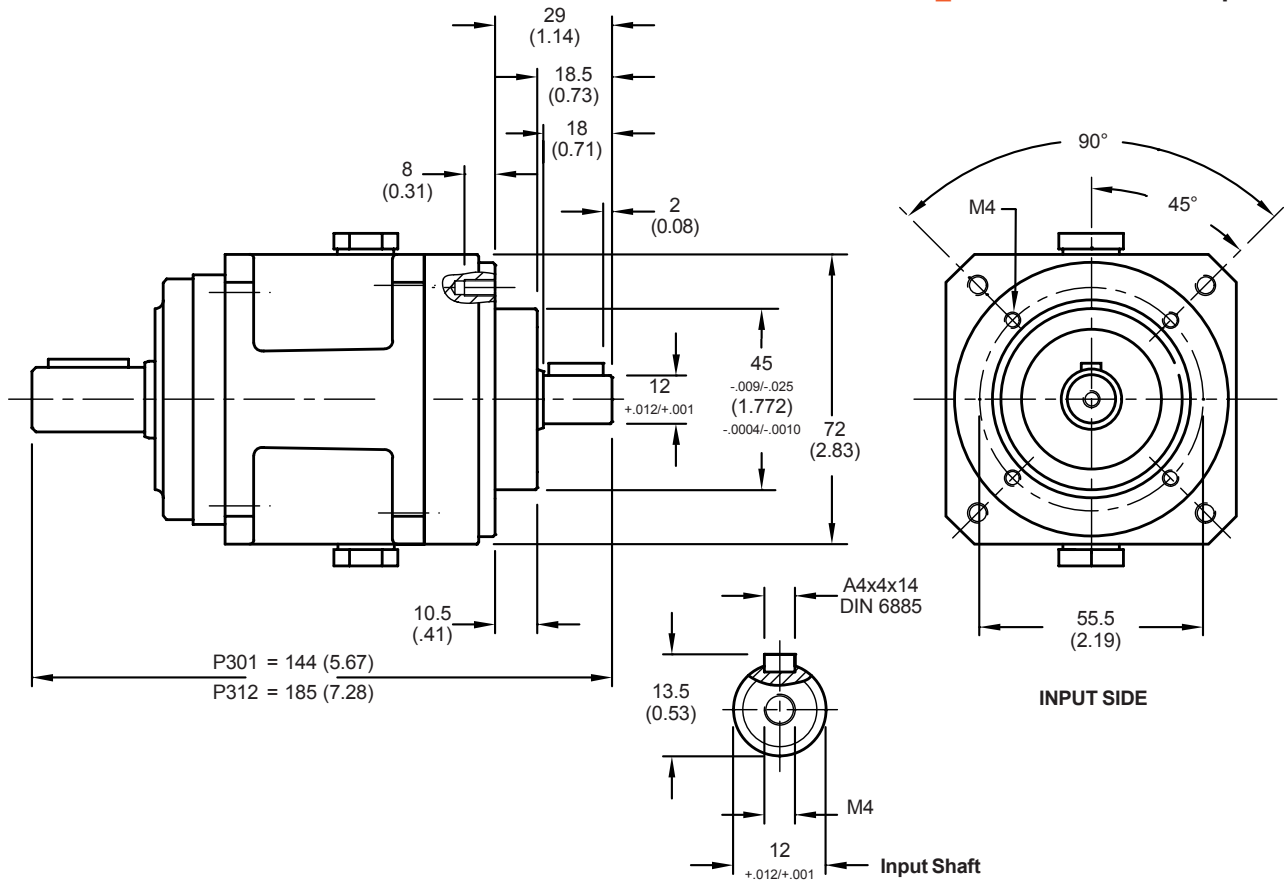


Dimension shown in millimeters (inches).

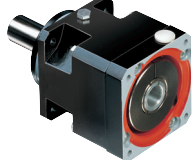


"P" Series—ClassicLine

P301/P312SPN_M Gearhead with Motor Plate
P301/P312SPN_AW Gearhead with Input Shaft



See web site for drawings.



"P" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Selection Data



"P" Series—ClassicLine

| Part Number (Gearhead + Input) | | Exact Ratio <i>i</i> | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia <i>J</i> ₁ | | Torsional Stiffness <i>C</i> _t | | Output Torque | | | | | |
|-----------------------------------|---------|----------------------------|---|---|-------------------------------------|--|-------------------|---|---------|---|---------|--|---------|---|--|
| Gearhead | M AW | | Continuous RPM (<i>n</i> ₁) | Cyclic RPM (<i>n</i> ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ <i>T</i> _{2N} | | Acceleration <i>T</i> _{2B} | | Peak ³⁾ <i>T</i> _{2PEAK} | |
| | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm | |

P401 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|-------|------|------|-----|----|-----|-----|-------|-----|
| P401SPN0030 | — | 3.000 | 3,000 | 6,000 | 24 | 0.0016 | 1.820 | 88.5 | 10.0 | 593 | 67 | 885 | 100 | 1,549 | 175 |
| P401SPN0040 | — | 4.000 | 3,000 | 6,000 | 24 | 0.0013 | 1.510 | 88.5 | 10.0 | 655 | 74 | 885 | 100 | 1,770 | 200 |
| P401SPN0050 | — | 5.000 | 4,000 | 6,000 | 24 | 0.0012 | 1.410 | 88.5 | 10.0 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P401SPN0070 | — | 7.000 | 4,000 | 6,000 | 24 | 0.0012 | 1.310 | 88.5 | 10.0 | 708 | 80 | 885 | 100 | 1,505 | 170 |
| P401SPN0100 | — | 10.00 | 4,000 | 6,000 | 24 | 0.0011 | 1.270 | 88.5 | 10.0 | 708 | 80 | 885 | 100 | 1,770 | 200 |

P412 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|-------|------|-----|-----|----|-----|-----|-------|-----|
| P412SPN0150 | — | 15.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.661 | 69.0 | 7.8 | 593 | 67 | 885 | 100 | 1,549 | 175 |
| P412SPN0200 | — | 20.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.649 | 76.1 | 8.6 | 655 | 74 | 885 | 100 | 1,770 | 200 |
| P412SPN0250 | — | 25.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.644 | 80.5 | 9.1 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P412SPN0350 | — | 35.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.641 | 84.1 | 9.5 | 708 | 80 | 885 | 100 | 1,505 | 170 |
| P412SPN0500 | — | 50.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.640 | 86.7 | 9.8 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P412SPN0700 | — | 70.00 | 4,000 | 6,000 | 19 | 0.0005 | 0.593 | 86.7 | 9.8 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P412SPN1000 | — | 100.0 | 4,000 | 6,000 | 19 | 0.0005 | 0.573 | 86.7 | 9.8 | 708 | 80 | 885 | 100 | 1,770 | 200 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: *n*₁ = 2000 RPM

For torque at higher input speeds (*T*_{2NX}) solve the formula, where *n*₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

P 4 01 SPN 0030 M or AW

Unit No. | No. of Stages (01 = 1 Stage, 12 = 2 Stage) | Output shaft with key | Ratio (0030 = 3.0:1) | Motor Plate (See Page 28) | Input Shaft

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

ClassicLine ServoFit Precision Planetary Gearhead

Index of Symbols

| | | |
|---------------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| <i>i</i> | ..... | Ratio - Exact |
| <i>n</i> ₁ | ..... | Maximum input speed RPM |
| <i>J</i> ₁ | ..... | Mass moment of inertia (input) |
| <i>C</i> _t | ..... | Torsional Stiffness |
| <i>T</i> _{2N} | ..... | Nominal Torque |
| <i>T</i> _{2B} | ..... | Acceleration Torque Maximum |
| <i>T</i> _{2PEAK} | ..... | Peak Torque |

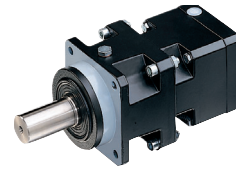
Output Torque (*T*_{2N}) ≤ 80 Nm (708 in.lbs.)
Ratio (*i*) = 3 - 100:1
Backlash (Δφ) ≤ 3 arc minutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

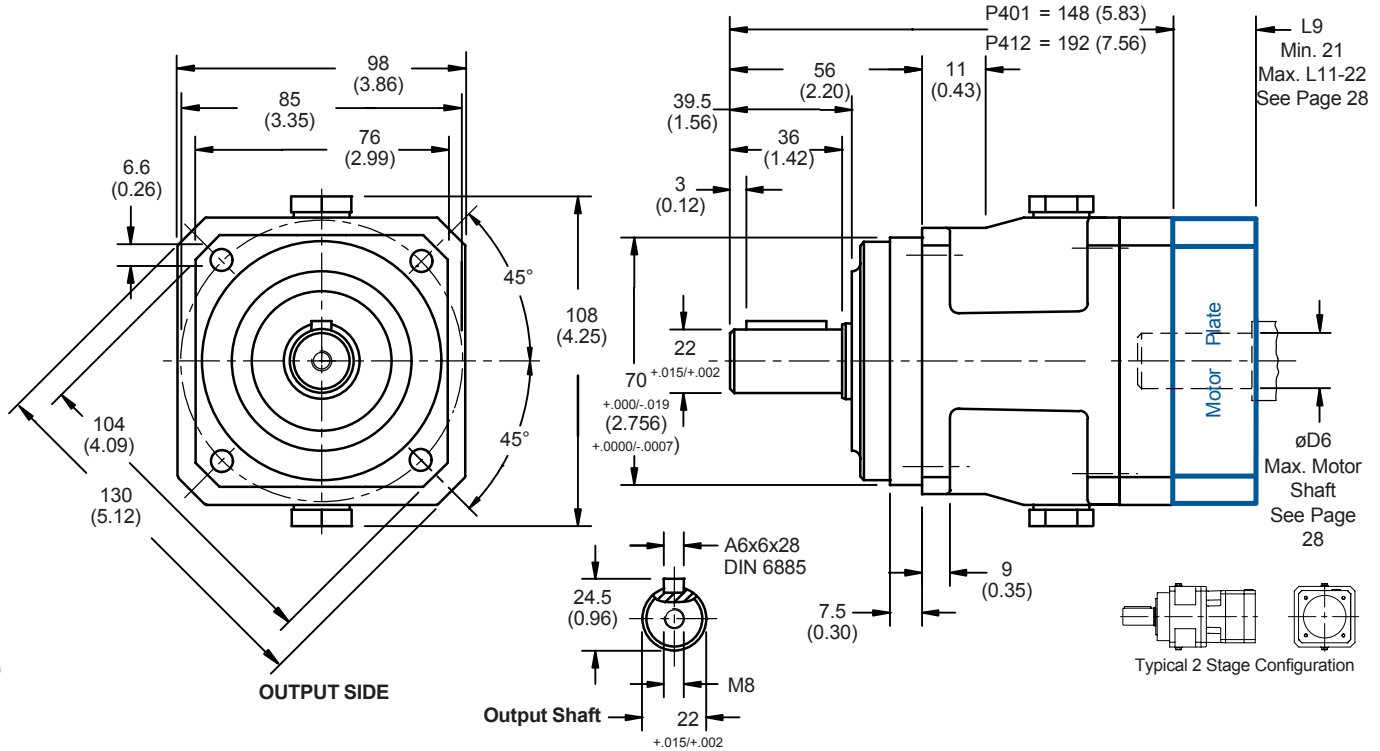
"P" Series-ClassicLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



Dimension shown in millimeters (inches).



P401/P412SPN_M Gearhead with Motor Plate

P401/P412SPN_AW Gearhead with Input Shaft

Table No. 1 Dimensions

| | B7 g6 | | B8 g6 | | D7 k6 |
|-------------|---------------|-----------------|---------------|-----------------|---------------|
| | mm | ins. | mm | ins. | mm |
| P401 | 52 | 2.047 | 58 | 2.283 | 16 |
| | -0.010/-0.029 | -0.0004/-0.0011 | -0.012/-0.034 | -0.0005/-0.0013 | +0.012/+0.001 |
| P412 | 45 | 1.772 | - | - | 12 |
| | -0.010/-0.029 | -0.0004/-0.0011 | - | - | +0.012/+0.001 |

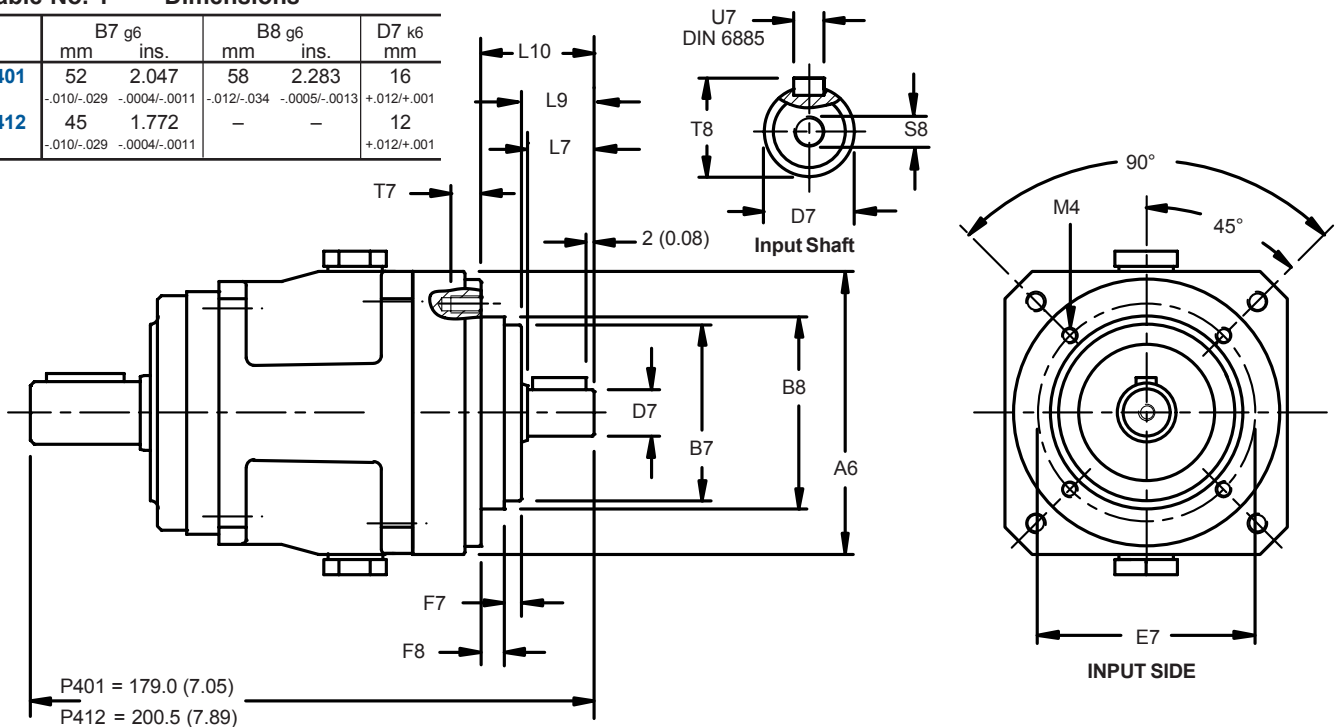


Table No. 2 "P401/P412" Series - Gearhead with Input Shaft - Dimensions

| | A6 Square | | E7 | | F7 | | F8 | | L7 | | L9 | | L10 | | S8 | T7 | | T8 | | U7 |
|-------------|-----------|------|------|------|------|------|----|------|----|------|------|------|-----|------|----|----|------|------|------|---------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | | mm | ins. | mm | ins. | |
| P401 | 98 | 3.86 | 74 | 2.91 | 10 | 0.39 | 11 | 0.43 | 28 | 1.10 | 30 | 1.18 | 51 | 2.01 | M5 | 6 | 0.24 | 18 | 0.71 | A5x5x22 |
| P412 | 72 | 2.83 | 55.5 | 2.19 | 10.5 | 0.41 | - | - | 18 | 0.71 | 18.5 | 0.73 | 29 | 1.14 | M4 | 8 | 0.31 | 13.5 | 0.53 | A4x4x14 |



"P" Series—ClassicLine

ServoFit® Precision Planetary Gearhead Selection Data



"P" Series—ClassicLine

| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ Continuous Cyclic RPM (n ₁) | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ lb-in-s ² kgcm ² | | Torsional Stiffness C _t in.lbs. Nm per arcmin | | Output Torque | | | | | |
|-----------------------------------|---------|---------------------|--|--|-------------------------------------|---|--|--|--|--|--|---|--|--|--|
| Gearhead | M AW | | | | | | | | | Nominal ²⁾ T _{2N} in.lbs. Nm | | Acceleration T _{2B} in.lbs. Nm | | Peak ³⁾ T _{2PEAK} in.lbs. Nm | |

P501 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|-------|-------|------|-------|-----|-------|-----|-------|-----|
| P501SPN0030 | — | 3.000 | 2,800 | 6,000 | 32 | 0.0049 | 5.520 | 221.3 | 25.0 | 1,496 | 169 | 2,213 | 250 | 3,221 | 364 |
| P501SPN0040 | — | 4.000 | 2,800 | 6,000 | 32 | 0.0039 | 4.440 | 221.3 | 25.0 | 1,646 | 186 | 2,213 | 250 | 4,292 | 485 |
| P501SPN0050 | — | 5.000 | 3,500 | 6,000 | 32 | 0.0036 | 4.070 | 221.3 | 25.0 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P501SPN0070 | — | 7.000 | 3,500 | 6,000 | 32 | 0.0033 | 3.760 | 221.3 | 25.0 | 1,770 | 200 | 2,213 | 250 | 3,602 | 407 |
| P501SPN0100 | — | 10.00 | 3,500 | 6,000 | 32 | 0.0032 | 3.610 | 221.3 | 25.0 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |

P512 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|-------|-------|------|-------|-----|-------|-----|-------|-----|
| P512SPN0150 | — | 15.00 | 4,000 | 6,000 | 24 | 0.0013 | 1.490 | 177.0 | 20.0 | 1,496 | 169 | 2,213 | 250 | 3,221 | 364 |
| P512SPN0200 | — | 20.00 | 4,000 | 6,000 | 24 | 0.0013 | 1.450 | 194.7 | 22.0 | 1,646 | 186 | 2,213 | 250 | 4,292 | 485 |
| P512SPN0250 | — | 25.00 | 4,000 | 6,000 | 24 | 0.0013 | 1.430 | 203.6 | 23.0 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P512SPN0350 | — | 35.00 | 4,000 | 6,000 | 24 | 0.0012 | 1.320 | 203.6 | 23.0 | 1,770 | 200 | 2,062 | 233 | 2,575 | 291 |
| P512SPN0500 | — | 50.00 | 4,000 | 6,000 | 24 | 0.0012 | 1.410 | 212.4 | 24.0 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P512SPN0700 | — | 70.00 | 4,000 | 6,000 | 24 | 0.0012 | 1.310 | 212.4 | 24.0 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P512SPN1000 | — | 100.0 | 4,000 | 6,000 | 24 | 0.0011 | 1.270 | 212.4 | 24.0 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

P 5 01 SPN 0030 M or AW

P Unit No.
 5 No. of Stages (01 = 1 Stage, 12 = 2 Stage)
 01 Output shaft with key
 SPN Ratio (0030 = 3.0:1)
 0030 Motor Plate (See Page 28)
 M or AW Input Shaft

ClassicLine ServoFit Precision Planetary Gearhead

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

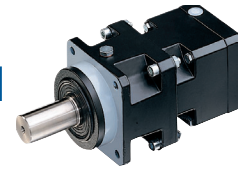
Output Torque (T_{2N}) ≤ 200 Nm (1,770 in.lbs.)
Ratio (i) = 3 - 100:1
Backlash (Δφ) ≤ 3 arc minutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

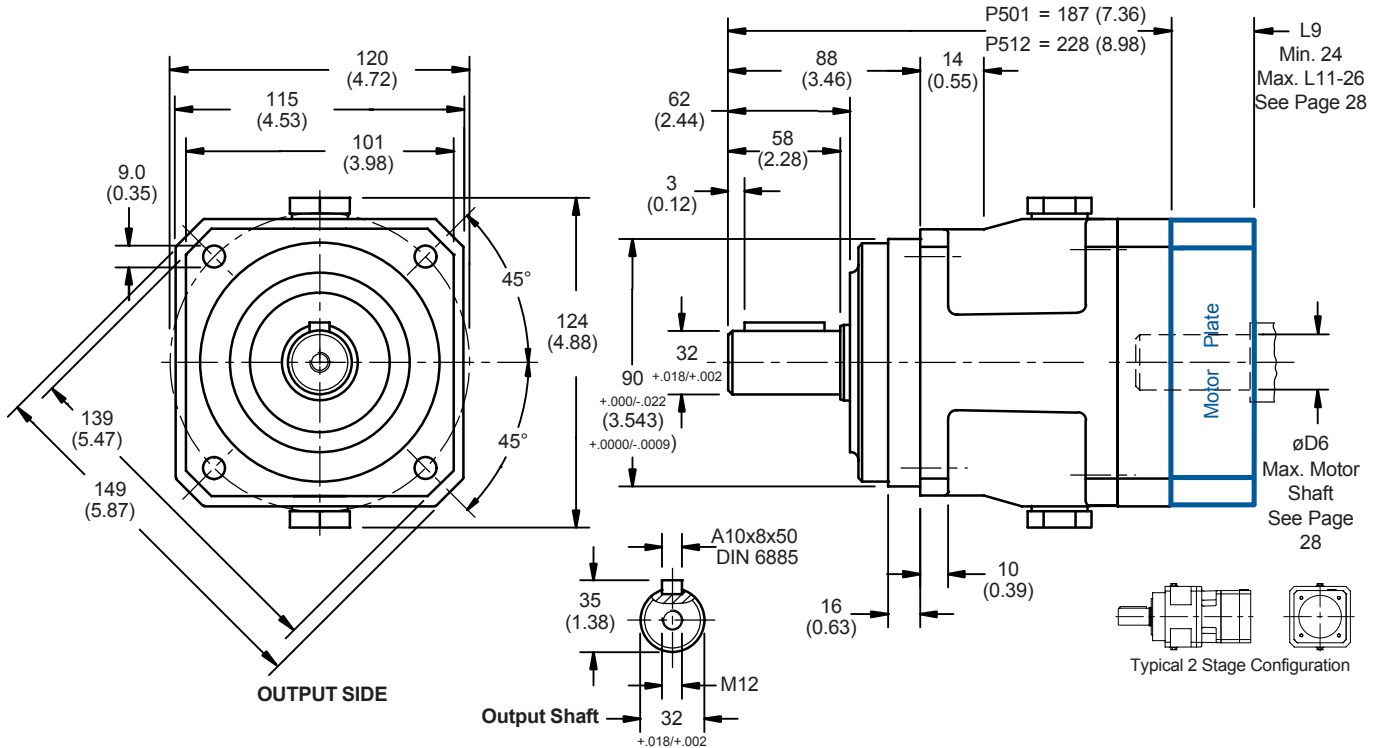
"P" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



Dimension shown in millimeters (inches).



P501/P512SPN_M Gearhead with Motor Plate
P501/P512SPN_AW Gearhead with Input Shaft

Table No. 1 Dimensions

| | B7 g6 | | B8 g6 | | D7 k6 |
|-------------|-------------|---------------|-------------|---------------|--------------|
| | mm | ins. | mm | ins. | mm |
| P501 | 60 | 2.362 | 66 | 2.598 | 22 |
| | -0.10/-0.29 | -0.004/-0.011 | -0.10/-0.29 | -0.004/-0.011 | +0.15/+0.002 |
| P512 | 52 | 2.047 | 58 | 2.283 | 16 |
| | -0.10/-0.29 | -0.004/-0.011 | -0.12/-0.34 | -0.005/-0.013 | +0.12/+0.001 |

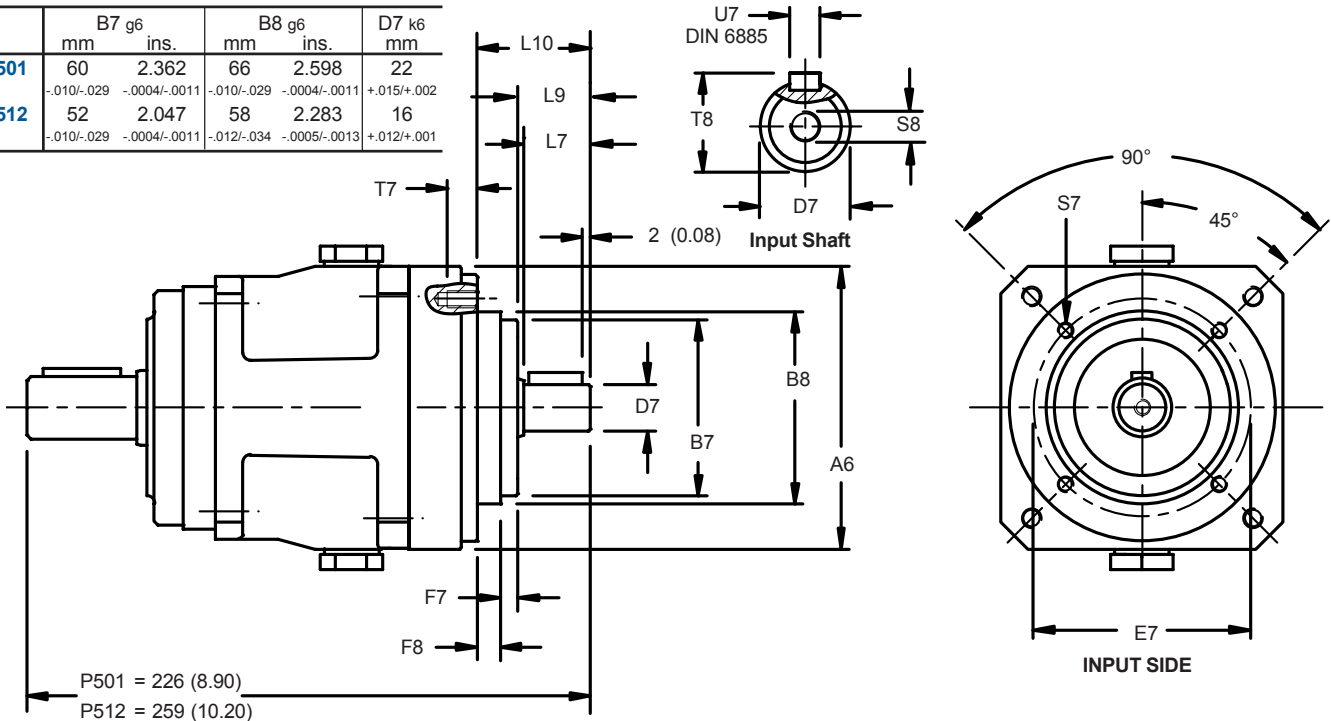


Table No. 2 "P501/P512" Series – Gearhead with Input Shaft – Dimensions

| | A6 Square | | E7 | | F7 | | F8 | | L7 | | L9 | | L10 | | S7 | S8 | T7 | | T8 | | U7 |
|-------------|-----------|------|----|------|----|------|----|------|----|------|----|------|-----|------|----|----|----|------|------|------|---------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | mm | mm | mm | mm | mm | mm |
| P501 | 114 | 4.49 | 97 | 3.82 | 13 | 0.51 | 10 | .39 | 36 | 1.42 | 38 | 1.50 | 61 | 2.40 | M5 | M8 | 9 | 0.35 | 24.5 | 0.96 | A6x6x30 |
| P512 | 98 | 3.86 | 74 | 2.91 | 10 | 0.39 | 11 | .43 | 28 | 1.10 | 30 | 1.18 | 51 | 2.01 | M4 | M5 | 6 | 0.24 | 18 | 0.71 | A5x5x22 |

See web site for drawings.



"P" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Selection Data



"P" Series—ClassicLine

| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|-----------------------------------|---------|-----------------------|--|---------|-------------------------------------|---|-------------------|--|---------|-----------------------|---------|--------------|--|--------------------|--|
| Gearhead | M AW | | Continuous | Cyclic | | lb-in-s ² | kgcm ² | in.lbs. | Nm | Nominal ²⁾ | | Acceleration | | Peak ³⁾ | |
| | | RPM (n ₁) | RPM | in.lbs. | Nm | T _{2N} | T _{2B} | T _{2PEAK} | in.lbs. | Nm | in.lbs. | Nm | | | |

P701 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|--------|-------|------|-------|-----|-------|-----|-------|-------|
| P701SPN0030 | — | 3.000 | 2,500 | 6,000 | 38 | 0.0119 | 13.400 | 442.5 | 50.0 | 2,982 | 337 | 4,425 | 500 | 6,443 | 728 |
| P701SPN0040 | — | 4.000 | 2,500 | 6,000 | 38 | 0.0087 | 9.790 | 442.5 | 50.0 | 3,283 | 371 | 4,425 | 500 | 8,585 | 970 |
| P701SPN0050 | — | 5.000 | 3,000 | 6,000 | 38 | 0.0075 | 8.510 | 442.5 | 50.0 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P701SPN0070 | — | 7.000 | 3,000 | 6,000 | 38 | 0.0066 | 7.510 | 442.5 | 50.0 | 3,540 | 400 | 4,425 | 500 | 7,514 | 849 |
| P701SPN0100 | — | 10.00 | 3,000 | 6,000 | 38 | 0.0062 | 7.000 | 442.5 | 50.0 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |

P712 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|-------|-------|------|-------|-----|-------|-----|-------|-------|
| P712SPN0150 | — | 15.00 | 3,500 | 6,000 | 32 | 0.0038 | 4.340 | 362.9 | 41.0 | 2,982 | 337 | 4,425 | 500 | 6,443 | 728 |
| P712SPN0200 | — | 20.00 | 3,500 | 6,000 | 32 | 0.0037 | 4.200 | 389.4 | 44.0 | 3,283 | 371 | 4,425 | 500 | 8,585 | 970 |
| P712SPN0250 | — | 25.00 | 3,500 | 6,000 | 32 | 0.0037 | 4.150 | 407.1 | 46.0 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P712SPN0350 | — | 35.00 | 3,500 | 6,000 | 32 | 0.0034 | 3.800 | 407.1 | 46.0 | 3,540 | 400 | 4,292 | 485 | 5,363 | 606 |
| P712SPN0500 | — | 50.00 | 3,500 | 6,000 | 32 | 0.0036 | 4.090 | 433.7 | 49.0 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P712SPN0700 | — | 70.00 | 3,500 | 6,000 | 32 | 0.0033 | 3.770 | 433.7 | 49.0 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P712SPN1000 | — | 100.0 | 3,500 | 6,000 | 32 | 0.0032 | 3.610 | 433.7 | 49.0 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

P 7 01 SPN 0030 M or AW

P Unit No.
 7 No. of Stages (01 = 1 Stage, 12 = 2 Stage)
 01 Output shaft with key
 30 Ratio (0030 = 3.0:1)
 0030 Motor Plate (See Page 28)
 M or AW Input Shaft

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

ClassicLine ServoFit Precision Planetary Gearhead

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

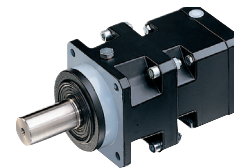
Output Torque (T_{2N}) ≤ 400 Nm (3,540 in.lbs.)
Ratio (i) = 3 - 100:1
Backlash (Δφ) ≤ 3 arc minutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

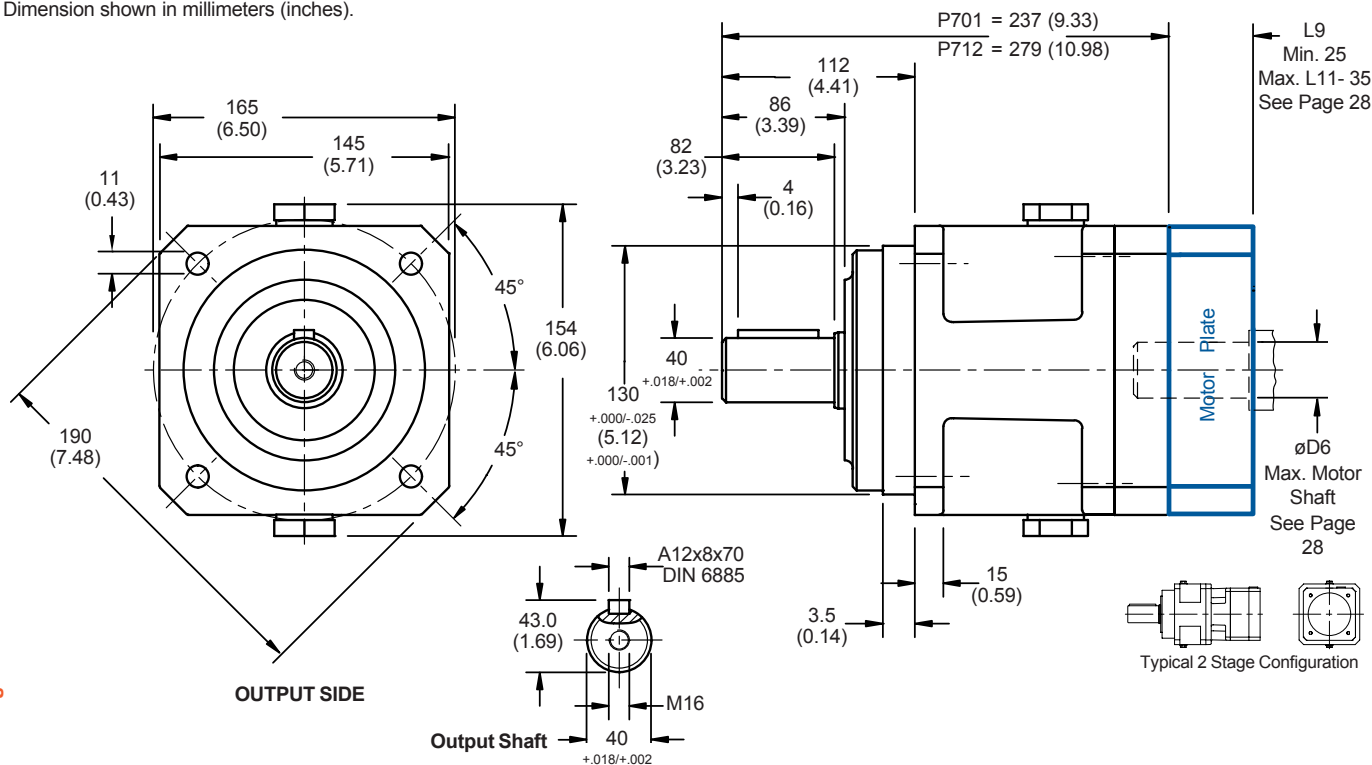
"P" Series-ClassicLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



Dimension shown in millimeters (inches).



See web site for drawings.

P701/P712SPN_M Gearhead with Motor Plate

P701/P712SPN_AW Gearhead with Input Shaft

Table No. 1 Dimensions

| | B7 g6 mm ins. | B8 g6 mm ins. | D7 k6 mm |
|-------------|---|---|---------------------|
| P701 | 80 3.150 -0.010/-0.029 -0.0004/-0.0011 | 93 3.661 -0.012/-0.034 -0.0005/-0.0013 | 32 +0.018/+0.002 |
| P712 | 60 2.362 -0.010/-0.029 -0.0004/-0.0011 | 66 2.598 -0.010/-0.029 -0.0004/-0.0011 | 22 +0.015/+0.002 |

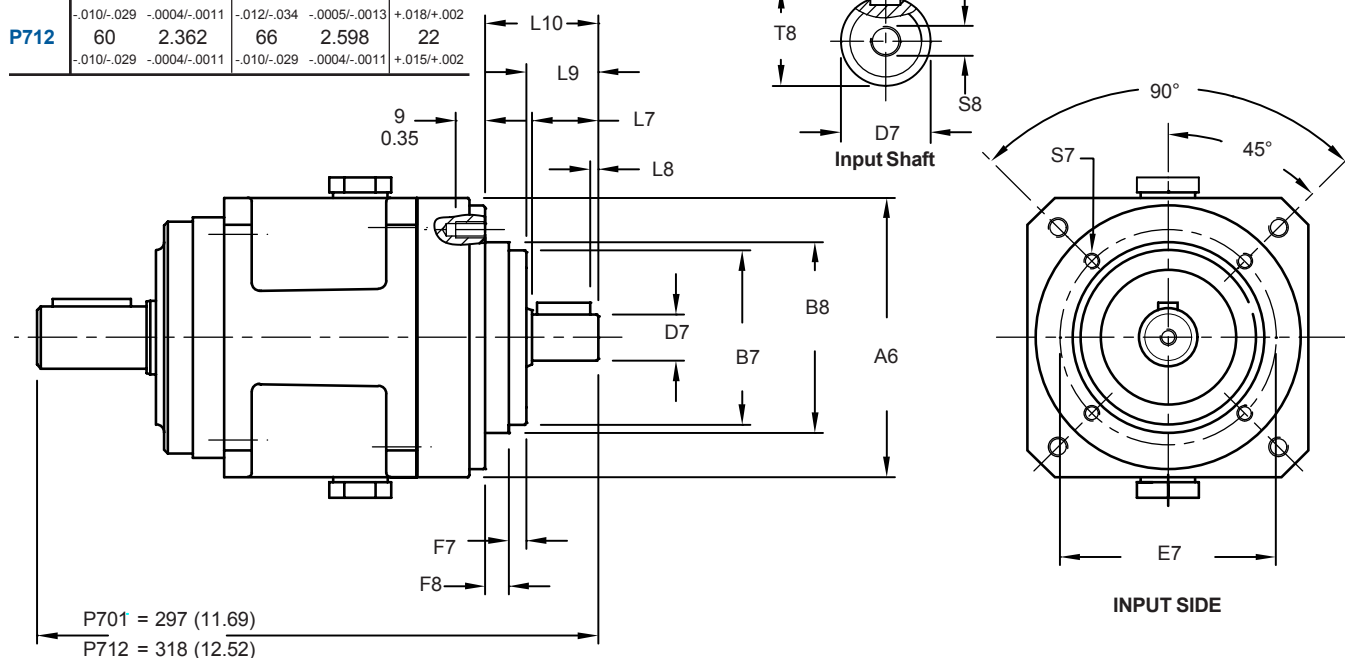


Table No. 2 "P701/P712" Series - Gearhead with Input Shaft - Dimensions

| | A6 Square mm ins. | E7 mm ins. | F7 mm ins. | F8 mm ins. | L7 mm ins. | L8 mm ins. | L9 mm ins. | L10 mm ins. | S7 mm ins. | S8 mm ins. | T8 mm ins. | U7 mm ins. |
|-------------|----------------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|---------------|---------------|---------------|---------------|
| P701 | 144 5.67 | 123 4.84 | 18 0.71 | 12 .47 | 58 2.28 | 3 0.12 | 60 2.36 | 90 3.54 | M6 | M12 | 35 1.38 | A10x8x50 |
| P712 | 114 4.49 | 97 3.82 | 13 0.51 | 10 .39 | 36 1.42 | 2 0.08 | 38 1.50 | 61 2.40 | M5 | M8 | 24.5 0.96 | A6x6x30 |



"P" Series—ClassicLine

ServoFit® Precision Planetary Gearhead Selection Data



"P" Series—ClassicLine

| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|-----------------------------------|---------|-----------------------|--|---------|-------------------------------------|---|-------------------|--|---------|--|---------|---------------------------------|--|--|--|
| Gearhead | M AW | | Continuous | Cyclic | | lb-in-s ² | kgcm ² | in.lbs. | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | RPM (n ₁) | RPM (n ₁) | in.lbs. | Nm | per arcmin | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm | | | |

P801 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|--------|--------|-------|-------|-----|-------|-------|--------|-------|
| P801SPN0030 | — | 3.000 | 2,000 | 4,500 | 48 | 0.0542 | 61.200 | 1283.3 | 145.0 | 5,974 | 675 | 8,956 | 1,012 | 12,877 | 1,455 |
| P801SPN0040 | — | 4.000 | 2,000 | 4,500 | 48 | 0.0373 | 42.200 | 1283.3 | 145.0 | 6,576 | 743 | 9,735 | 1,100 | 17,169 | 1,940 |
| P801SPN0050 | — | 5.000 | 2,500 | 4,500 | 48 | 0.0314 | 35.500 | 1283.3 | 145.0 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P801SPN0070 | — | 7.000 | 2,500 | 4,500 | 48 | 0.0263 | 29.700 | 1283.3 | 145.0 | 7,080 | 800 | 9,735 | 1,100 | 15,027 | 1,698 |
| P801SPN0100 | — | 10.00 | 2,500 | 4,500 | 48 | 0.0238 | 26.900 | 1274.4 | 144.0 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |

P812 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|-------|--------|-------|-------|-----|-------|-------|--------|-------|
| P812SPN0150 | — | 15.00 | 3,000 | 6,000 | 38 | 0.0088 | 9.960 | 973.5 | 110.0 | 5,974 | 675 | 8,956 | 1,012 | 12,877 | 1,455 |
| P812SPN0200 | — | 20.00 | 3,000 | 6,000 | 38 | 0.0081 | 9.200 | 1088.6 | 123.0 | 6,576 | 743 | 9,735 | 1,100 | 17,169 | 1,940 |
| P812SPN0250 | — | 25.00 | 3,000 | 6,000 | 38 | 0.0079 | 8.930 | 1150.5 | 130.0 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P812SPN0350 | — | 35.00 | 3,000 | 6,000 | 38 | 0.0068 | 7.720 | 1150.5 | 130.0 | 7,080 | 800 | 8,585 | 970 | 10,735 | 1,213 |
| P812SPN0500 | — | 50.00 | 3,000 | 6,000 | 38 | 0.0076 | 8.610 | 1239.0 | 140.0 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P812SPN0700 | — | 70.00 | 3,000 | 6,000 | 38 | 0.0067 | 7.560 | 1239.0 | 140.0 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P812SPN1000 | — | 100.0 | 3,000 | 6,000 | 38 | 0.0062 | 7.020 | 1239.0 | 140.0 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

P 8 01 SPN 0030 M or AW

P Unit No.
 8 No. of Stages (01 = 1 Stage, 12 = 2 Stage)
 01 Output shaft with key
 SPN Ratio (0030 = 3.0:1)
 00 Motor Plate (See Page 28)
 30 Input Shaft
 M or AW

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

ClassicLine ServoFit Precision Planetary Gearhead

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

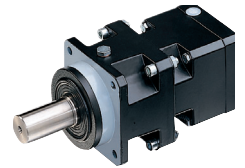
Output Torque (T_{2N}) ≤ 800 Nm (7,080 in.lbs.)
Ratio (i) = 3 - 100:1
Backlash (Δφ) ≤ 3 arc minutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

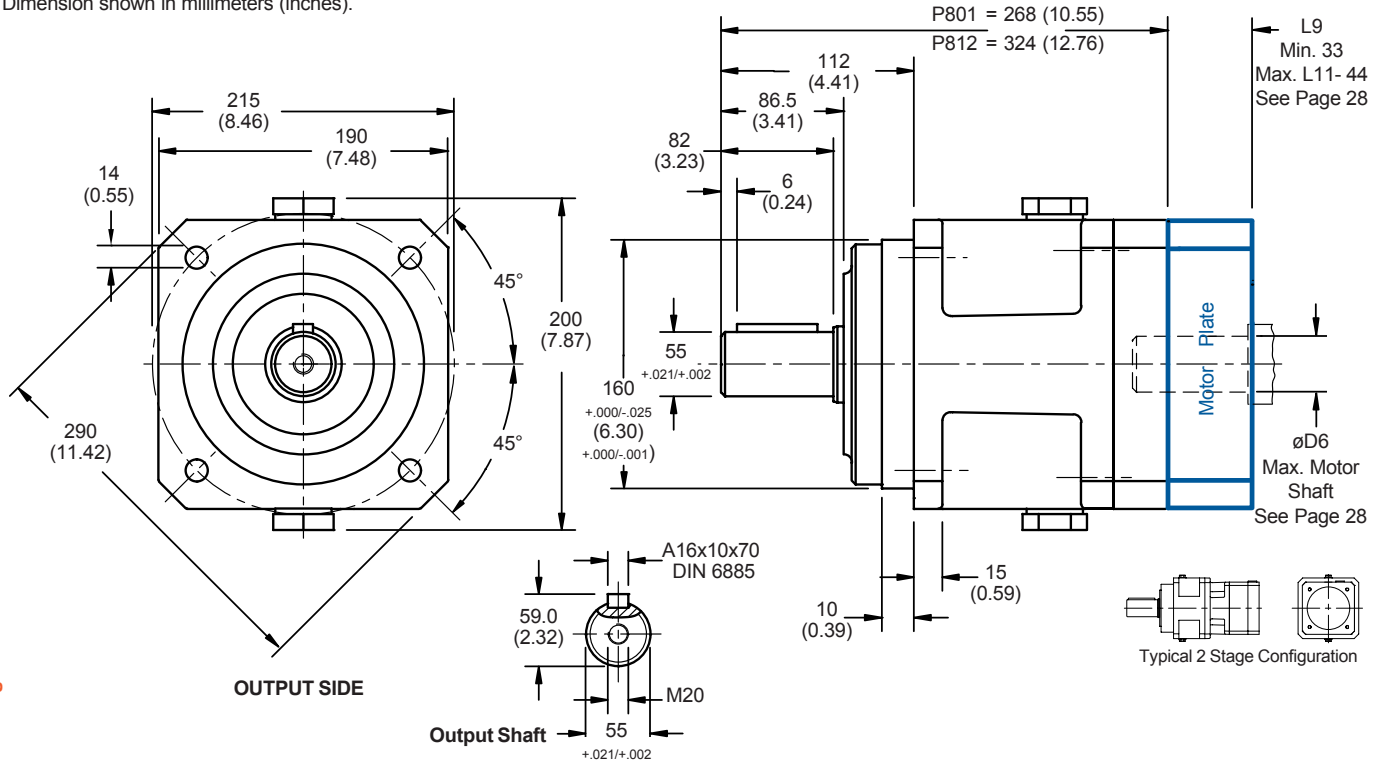
"P" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



Dimension shown in millimeters (inches).



See web site for drawings.

P801/P812SPN_M Gearhead with Motor Plate

P801/P812SPN_AW Gearhead with Input Shaft

Table No. 1 Dimensions

| | B7 g6 | | B8 g6 | | D7 k6 |
|-------------|-----------------------------|-------|-----------------------------|-------|---------------|
| | mm | ins. | mm | ins. | mm |
| P801 | 110 | 4.331 | 134 | 5.276 | 40 |
| | -.012/- .034 -.0005/- .0013 | | -.014/- .039 -.0006/- .0015 | | + .018/+ .002 |
| P812 | 80 | 3.150 | 93 | 3.661 | 32 |
| | -.010/- .029 -.0004/- .0011 | | -.012/- .034 -.0005/- .0013 | | + .018/+ .002 |

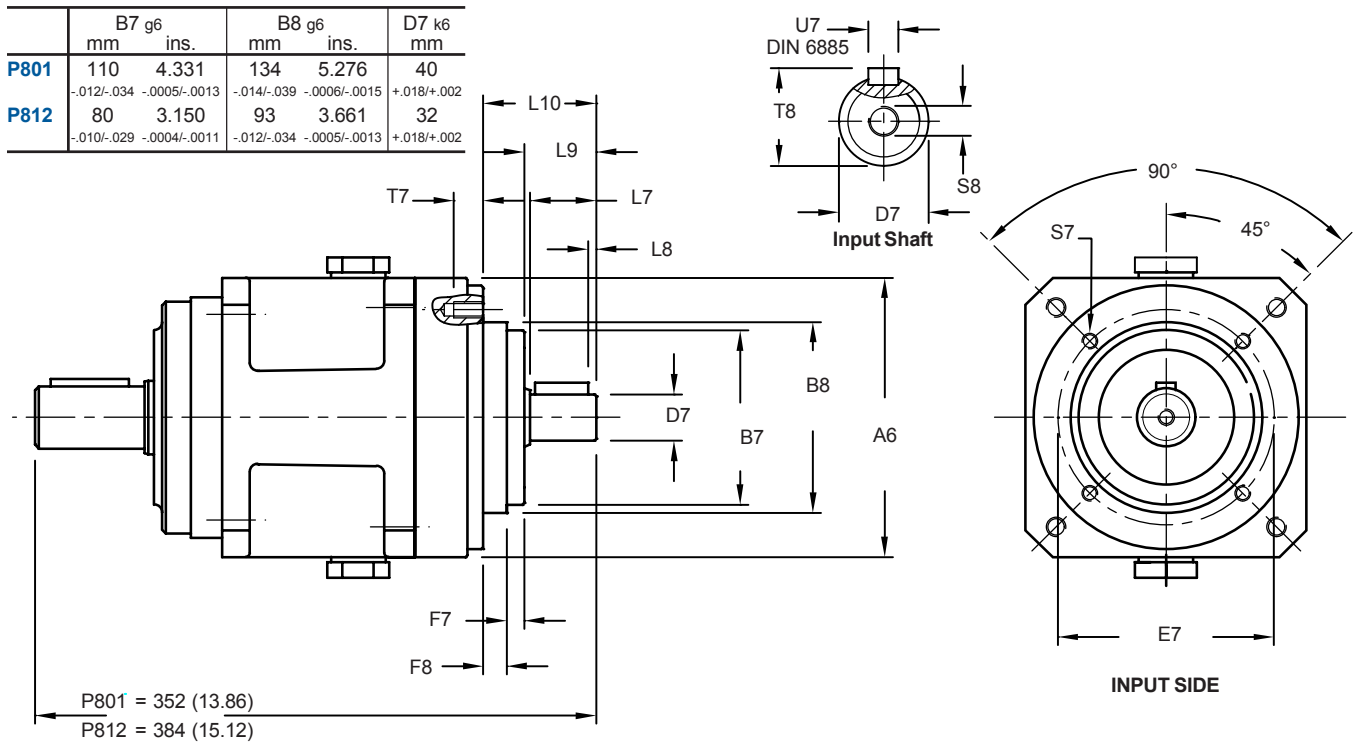


Table No. 2 "P801/P812" Series – Gearhead with Input Shaft – Dimensions

| | A6 Square | | E7 | | F7 | | F8 | | L7 | | L8 | | L9 | | L10 | | S7 | S8 | T7 | T8 | U7 | | |
|-------------|-----------|------|-----|------|----|------|----|------|----|------|----|------|----|------|-----|------|----|-----|----|-----|----|------|----------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | mm | mm | mm | mm | | |
| P801 | 190 | 7.48 | 179 | 7.05 | 21 | 0.83 | 15 | 0.59 | 82 | 3.23 | 4 | 0.16 | 84 | 3.31 | 120 | 4.72 | M8 | M16 | 12 | .47 | 43 | 1.69 | A12x8x70 |
| P812 | 144 | 5.67 | 123 | 4.84 | 18 | 0.71 | 12 | 0.47 | 58 | 2.28 | 3 | 0.12 | 60 | 2.36 | 90 | 3.54 | M6 | M12 | 9 | .35 | 35 | 1.38 | A10x8x50 |

"P" Series—ClassicLine

"PKX" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Performance Specifications



"PKX" Series—ClassicLine

| Size | | | P301 KX3 | P312 KX3 | P401 KX4 | P412 KX3 | P501 KX5 | P512 KX4 | P701 KX7 | P712 KX5 | P801 KX8 | P812 KX7 |
|--|--|--|--|-------------|--------------------------|-------------|--------------------------|-------------|--------------------------|-------------|--------------------------|----------------|
| Permissible Acceleration Torque | T _{2B} | in.lbs. Nm | 443 50 | | 885 100 | | 2,212 250 | | 4,425 500 | | 9,735 1,100 | |
| Nominal Output Torque ¹⁾ | T _{2N} | in.lbs. Nm | 354 40 | | 708 80 | | 1,770 200 | | 3,540 400 | | 7,080 800 | |
| Input Speed Maximum ²⁾ | n _{1MAX} | Continuous Cyclic | 3,000 6,000 | | 3,000 6,000 | | 3,000 4,500 | | 2,500 4,500 | | 1,800 4,000 | 2,500 4,500 |
| Torsional Backlash ³⁾ | Δφ | arcmin Ratio 3,4,5:1 6,7,8:1 10,12,15:1 20 - 300:1 | ≤6.5 ≤5 ≤4 ≤3.5 | | ≤6.5 ≤5 ≤4 ≤3.5 | | ≤6.5 ≤5 ≤4 ≤3.5 | | ≤6 ≤4.5 ≤4 ≤3.5 | | ≤6 ≤4.5 ≤4 ≤3.5 | |
| Torsional Stiffness | C _t | in.lbs./arcmin Nm/arcmin | 35 4 | | 86 9.7 | | 212 24 | | 434 49 | | 1,239 140 | |
| Axial Load Max. | F _{2AMAX} | lbs. N | 225 1,000 | | 337 1,500 | | 450 2,000 | | 675 3,000 | | 900 4,000 | |
| Radial Load Max. ⁴⁾ | F _{2RMAX} | lbs. N | 675 3,000 | | 1,012 4,500 | | 1,575 7,000 | | 2,025 9,000 | | 3,375 15,000 | |
| Tilting Moment Max. ⁴⁾ | T _{2K} | in.lbs. Nm | 902 102 | | 1,593 180 | | 3,380 382 | | 5,460 617 | | 9,435 1,065 | |
| Weight | m | pounds kg | 9.5 4.3 | 13 5.7 | 15 6.8 | 16 7.0 | 28.5 12.8 | 25 11.3 | 51 23.2 | 47 21.3 | 105 47.4 | 95 43.2 |
| Noise Level | L _{PA} | dB(A) ⁵⁾ | ≤69 | ≤69 | ≤70 | ≤69 | ≤71 | ≤70 | ≤73 | ≤71 | ≤75 | ≤73 |
| Efficiency (at Nom. Torque) | η | % | 91-94 | | | | | | | | | |
| Balance Quality | Q 2.5 (Quality Class-2.5 millimeters per second) | | | | | | | | | | | |
| Lubrication | Synthetic Oil (ISO VG 150) | | | | | | | | | | | |
| Degree of Protection | IP65 - Viton Shaft Seals | | | | | | | | | | | |
| Mounting Position | Unrestricted | | | | | | | | | | | |
| Direction of Rotation | OUTPUT rotation direction is opposite the INPUT rotation direction. | | | | | | | | | | | |
| Ambient Temperature | 0°C to +40°C (104° F) Other temperatures, contact Stober Drives. | | | | | | | | | | | |
| Finish | Black (RAL 9005) | | | | | | | | | | | |
| Lifetime ⁶⁾ | L _h | hours | L _h > 10,000 hours if T _{2K} /T _{2A} < 1.25 L _h > 20,000 hours if T _{2K} /T _{2A} > 1.25 | | | | | | | | | |
| Warranty | 5 Year Limited (2 Years on normal wear items: bearings, seals, etc.) | | | | | | | | | | | |

¹⁾ Ratings based on input speed (n₁) of 2000 RPM.

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed. $T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$

²⁾ For speeds higher than given above, contact Stober Technical Support.

³⁾ Lower than standard backlash is available upon request. Contact Stober Technical Support. (Tested at 1.5% of nominal torque and recorded on the input side of the gearhead.)

⁴⁾ Rating based on output speed (n₂) of 100 RPM. For values at other speeds see Page 29.

⁵⁾ Measurement at one (1) meter distance with input speed (n₁) of 3000 RPM.

⁶⁾ T_{2A} equals actual tilting moment of the application. See Page 29 for calculation details.

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.



"PKX" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Features

The "PKX" Series units are a combination of the "P" Series Precision Planetary Gearhead and the "KX" Series Right Angle. This provides all the great features of the "P" Series unit plus the compact design of a right angle. Some of the features include:

- Readily Attaches to Any Servo Motor
- High Torsional Stiffness
- Quiet Running
- Lowest Standard Backlash
- Advanced Gear Technology
- 3 to 300:1 ratios
- Readily Available
- 95 to 97% Efficiency
- 5 Year Limited Warranty (2 Years on bearings, seals, etc.)



Highly efficient spiral bevel gearsets provide quiet operation and excellent torque carrying capacity (ratios 1:1, 2:1, and 3:1 can be provided as a separate unit, see Page 68.)

Motor plate pilot toleranced to fit your motor for precise concentricity

Motor plate can easily be changed to fit your choice of motors

Adapter bushings to fit all motor shafts – no key required

The integrated motor coupling is designed to allow thermal expansion of the motor shaft—ensuring long motor life by preventing thrust load on the motor bearings.

Oversized bearings and shafts for high radial load capacity and superior torsional stiffness

Magnetic oil filtration

Ring gear machined integral to the planetary housing – not welded or pressed in – provides precise concentricity and eliminates speed fluctuations

Single piece ductile iron housing (GGG70—101,000 psi tensile strength) for maximum heat dissipation, noise dampening, and greater lubrication retention on the ring gear

Viton® seals

Gears are case hardened to 61 Rockwell "C" and ground for maximum efficiency

HeliCamber® gear technology provides minimum wear, low backlash, and low noise

Lubricated for life with synthetic oil and sealed to IP65 standards to prevent lubricant contamination for long life

Wide selection of IEC, NEMA, or customized motor adapters

* Maximum 10 working days for custom motor plates.



"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



"PKX" Series—ClassicLine

| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|--|----|---------------------------------|----|--|----|
| | | Continuous RPM (n ₁) | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm |

P301_KX3 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|--------|-------|-------|----|--------|-------|------|-----|-----|----|-----|----|-----|-----|
| P301SPN0030 KX301VF0010M | 3.000 | 2,500 | 6,000 | 19 | 0.0011 | 1.250 | 18.6 | 2.1 | 257 | 29 | 443 | 50 | 504 | 57 |
| P301SPN0040 KX301VF0010M | 4.000 | 2,500 | 6,000 | 19 | 0.0010 | 1.120 | 23.9 | 2.7 | 327 | 37 | 443 | 50 | 673 | 76 |
| P301SPN0050 KX301VF0010M | 5.000 | 2,500 | 6,000 | 19 | 0.0010 | 1.080 | 26.6 | 3.0 | 354 | 40 | 443 | 50 | 841 | 95 |
| P301SPN0030 KX301VF0020M | 6.000 | 3,000 | 6,000 | 19 | 0.0008 | 0.863 | 18.6 | 2.1 | 257 | 29 | 443 | 50 | 646 | 73 |
| P301SPN0070 KX301VF0010M | 7.000 | 2,500 | 6,000 | 19 | 0.0009 | 1.040 | 30.1 | 3.4 | 354 | 40 | 443 | 50 | 752 | 85 |
| P301SPN0040 KX301VF0020M | 8.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.832 | 23.9 | 2.7 | 345 | 39 | 443 | 50 | 858 | 97 |
| P301SPN0050 KX301VF0020M | 10.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.820 | 26.6 | 3.0 | 354 | 40 | 443 | 50 | 885 | 100 |
| P301SPN0040 KX301VF0030M | 12.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.758 | 23.9 | 2.7 | 345 | 39 | 443 | 50 | 858 | 97 |
| P301SPN0050 KX301VF0030M | 15.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.753 | 26.6 | 3.0 | 354 | 40 | 443 | 50 | 885 | 100 |
| P301SPN0100 KX301VF0020M | 20.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.806 | 32.7 | 3.7 | 354 | 40 | 443 | 50 | 885 | 100 |
| P301SPN0100 KX301VF0030M | 30.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.747 | 32.7 | 3.7 | 354 | 40 | 443 | 50 | 885 | 100 |

P312_KX3 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|---------|-------|-------|----|--------|-------|------|-----|-----|----|-----|----|-----|-----|
| P312SPN0350 KX301VF0010M | 35.000 | 2,500 | 6,000 | 19 | 0.0009 | 1.040 | 33.6 | 3.8 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN0250 KX301VF0020M | 50.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.821 | 33.6 | 3.8 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN0700 KX301VF0010M | 70.000 | 2,500 | 6,000 | 19 | 0.0009 | 1.040 | 35.4 | 4.0 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN0500 KX301VF0020M | 100.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.821 | 34.5 | 3.9 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN0500 KX301VF0030M | 150.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.753 | 34.5 | 3.9 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN1000 KX301VF0020M | 200.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.806 | 35.4 | 4.0 | 354 | 40 | 443 | 50 | 885 | 100 |
| P312SPN1000 KX301VF0030M | 300.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.747 | 35.4 | 4.0 | 354 | 40 | 443 | 50 | 885 | 100 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

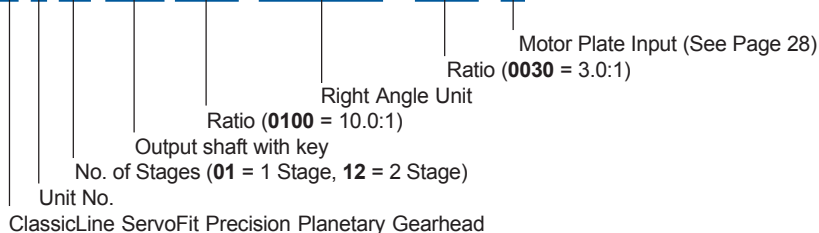
For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

P 3 01 SPN 0100 KX301VF 0030 M



When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

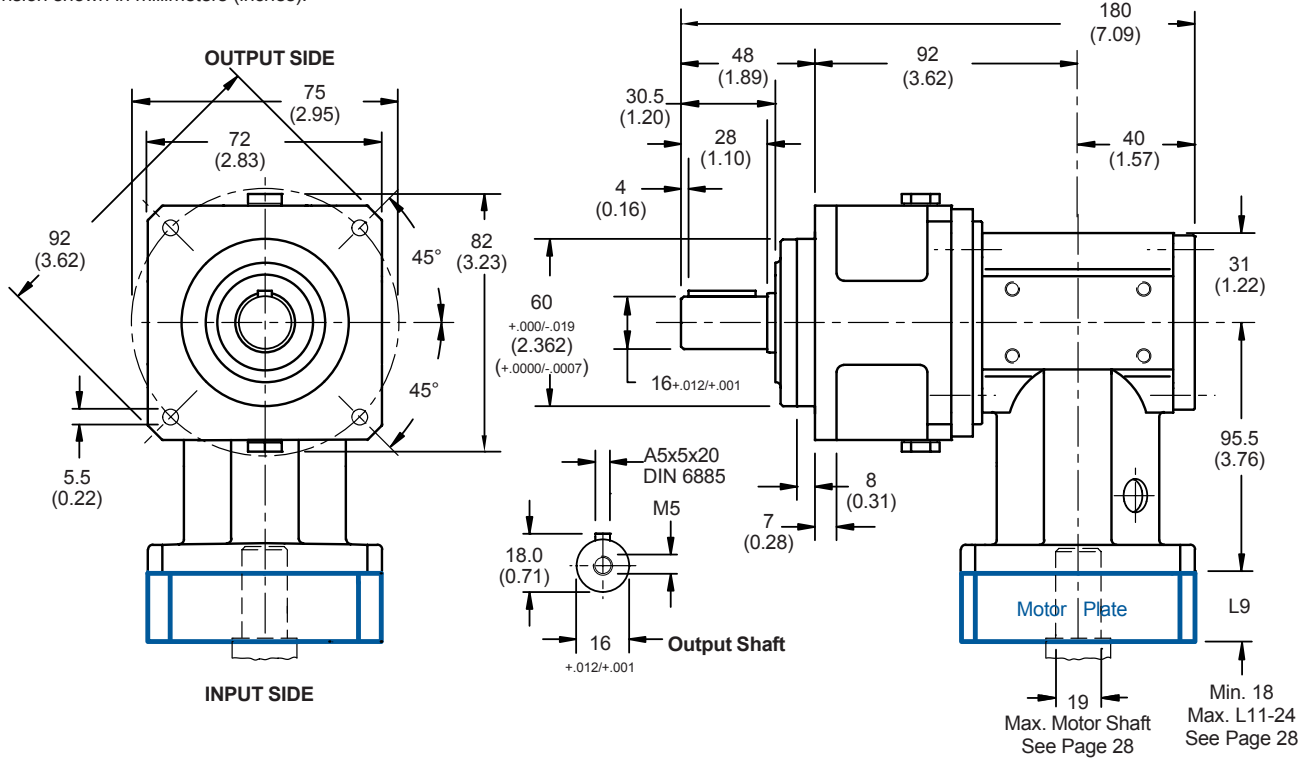
Output Torque (T_{2N}) ≤ 40 Nm (354 in.lbs.)
Ratio (i) = 3 - 300:1
Backlash (Δφ) ≤ 6.5 arcminutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data



Dimension shown in millimeters (inches).

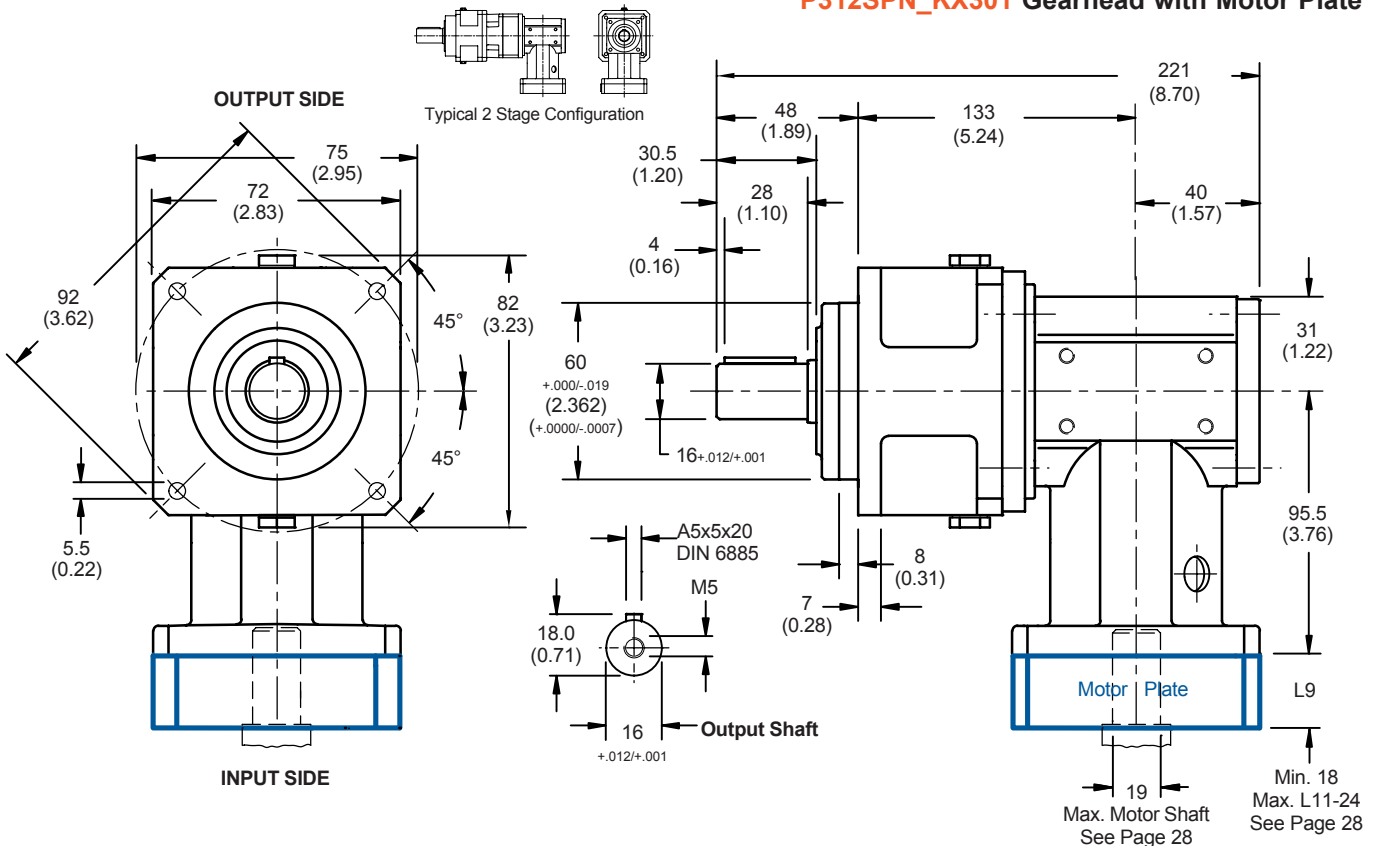


"PKX" Series—ClassicLine

See web site for drawings.

P301SPN_KX301 Gearhead with Motor Plate

P312SPN_KX301 Gearhead with Motor Plate





"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



"PKX" Series—ClassicLine

| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|--|----|---------------------------------|----|--|----|
| | | Continuous RPM | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs per arcmin | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm |

P401_KX4 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|--------|-------|-------|----|--------|------|------|-----|-----|----|-----|-----|-------|-----|
| P401SPN0030 KX401VF0010M | 3.000 | 2,000 | 4,500 | 25 | 0.0026 | 2.93 | 41.6 | 4.7 | 513 | 58 | 885 | 100 | 1,266 | 143 |
| P401SPN0040 KX401VF0010M | 4.000 | 2,000 | 4,500 | 25 | 0.0023 | 2.62 | 54.9 | 6.2 | 655 | 74 | 885 | 100 | 1,682 | 190 |
| P401SPN0050 KX401VF0010M | 5.000 | 2,000 | 4,500 | 25 | 0.0022 | 2.52 | 62.8 | 7.1 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P401SPN0030 KX401VF0020M | 6.000 | 2,500 | 4,500 | 25 | 0.0016 | 1.76 | 41.6 | 4.7 | 513 | 58 | 885 | 100 | 1,549 | 175 |
| P401SPN0070 KX401VF0010M | 7.000 | 2,000 | 4,500 | 25 | 0.0022 | 2.44 | 73.5 | 8.3 | 708 | 80 | 885 | 100 | 1,505 | 170 |
| P401SPN0040 KX401VF0020M | 8.000 | 2,500 | 4,500 | 25 | 0.0015 | 1.69 | 54.9 | 6.2 | 690 | 78 | 885 | 100 | 1,770 | 200 |
| P401SPN0050 KX401VF0020M | 10.000 | 2,500 | 4,500 | 25 | 0.0015 | 1.66 | 62.8 | 7.1 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P401SPN0040 KX401VF0030M | 12.000 | 3,000 | 4,500 | 25 | 0.0013 | 1.46 | 54.9 | 6.2 | 690 | 78 | 885 | 100 | 1,770 | 200 |
| P401SPN0050 KX401VF0030M | 15.000 | 3,000 | 4,500 | 25 | 0.0013 | 1.45 | 62.8 | 7.1 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P401SPN0100 KX401VF0020M | 20.000 | 2,500 | 4,500 | 25 | 0.0014 | 1.63 | 80.5 | 9.1 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P401SPN0100 KX401VF0030M | 30.000 | 3,000 | 4,500 | 25 | 0.0013 | 1.44 | 80.5 | 9.1 | 708 | 80 | 885 | 100 | 1,770 | 200 |

P412_KX3 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|---------|-------|-------|----|--------|-------|------|-----|-----|----|-----|-----|-------|-----|
| P412SPN0350 KX301VF0010M | 35.000 | 2,500 | 6,000 | 19 | 0.0010 | 1.080 | 83.2 | 9.4 | 708 | 80 | 885 | 100 | 1,505 | 170 |
| P412SPN0250 KX301VF0020M | 50.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.822 | 77.9 | 8.8 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P412SPN0700 KX301VF0010M | 70.000 | 2,500 | 6,000 | 19 | 0.0009 | 1.040 | 85.8 | 9.7 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P412SPN0500 KX301VF0020M | 100.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.821 | 85.8 | 9.7 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P412SPN0500 KX301VF0030M | 150.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.753 | 85.8 | 9.7 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P412SPN1000 KX301VF0020M | 200.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.806 | 85.8 | 9.7 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| P412SPN1000 KX301VF0030M | 300.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.747 | 85.8 | 9.7 | 708 | 80 | 885 | 100 | 1,770 | 200 |

¹⁾ For higher speeds than shown, contact Stöber.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

P 4 01 SPN 0100 KX401VF 0030 M

Motor Plate Input (See Page 28)
Ratio (0030 = 3.0:1)
Right Angle Unit
Ratio (0100 = 10.0:1)
Output shaft with key
No. of Stages (01 = 1 Stage, 12 = 2 Stage)
Unit No.
ClassicLine ServoFit Precision Planetary Gearhead

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

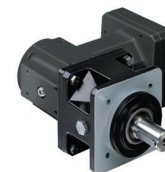
Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

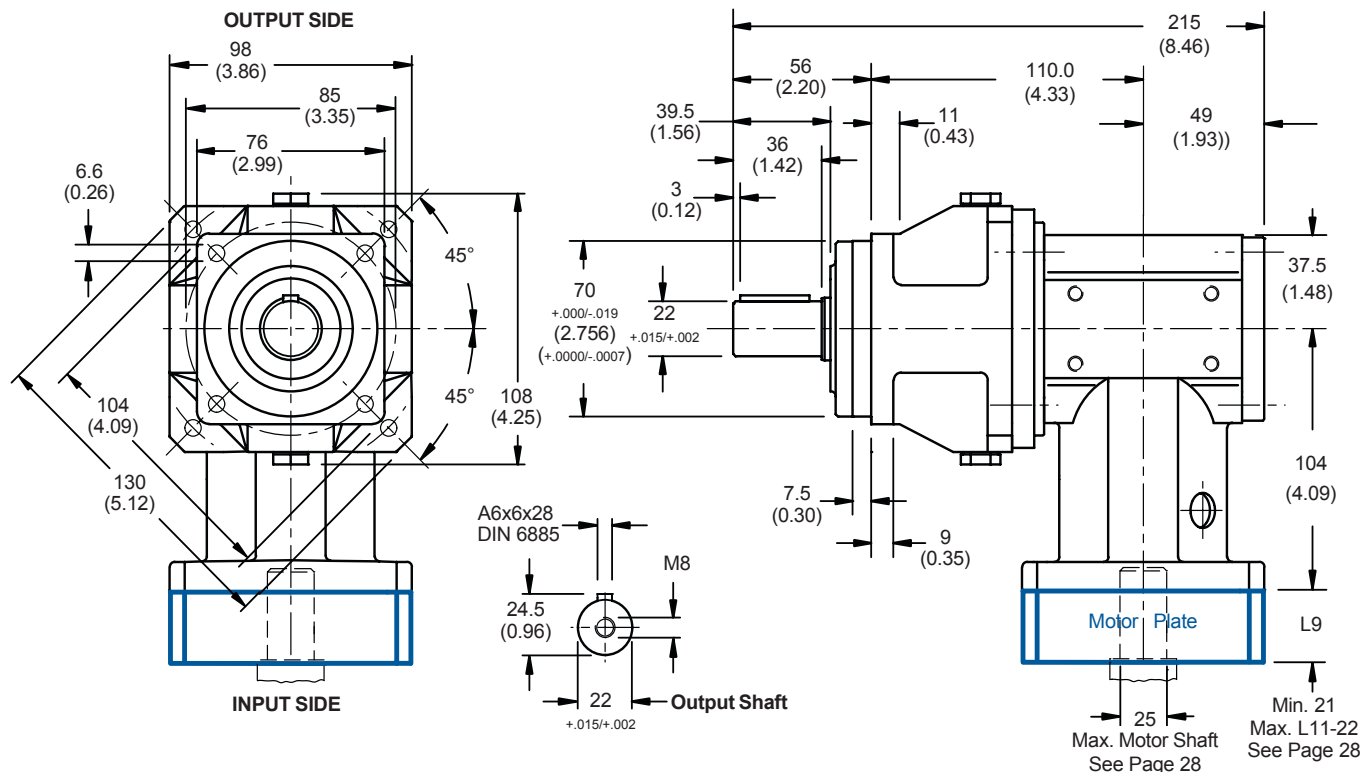
Output Torque (T_{2N}) ≤ 80 Nm (708 in.lbs.)
Ratio (i) = 3 - 300:1
Backlash (Δφ) ≤ 6.5 arcminutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data



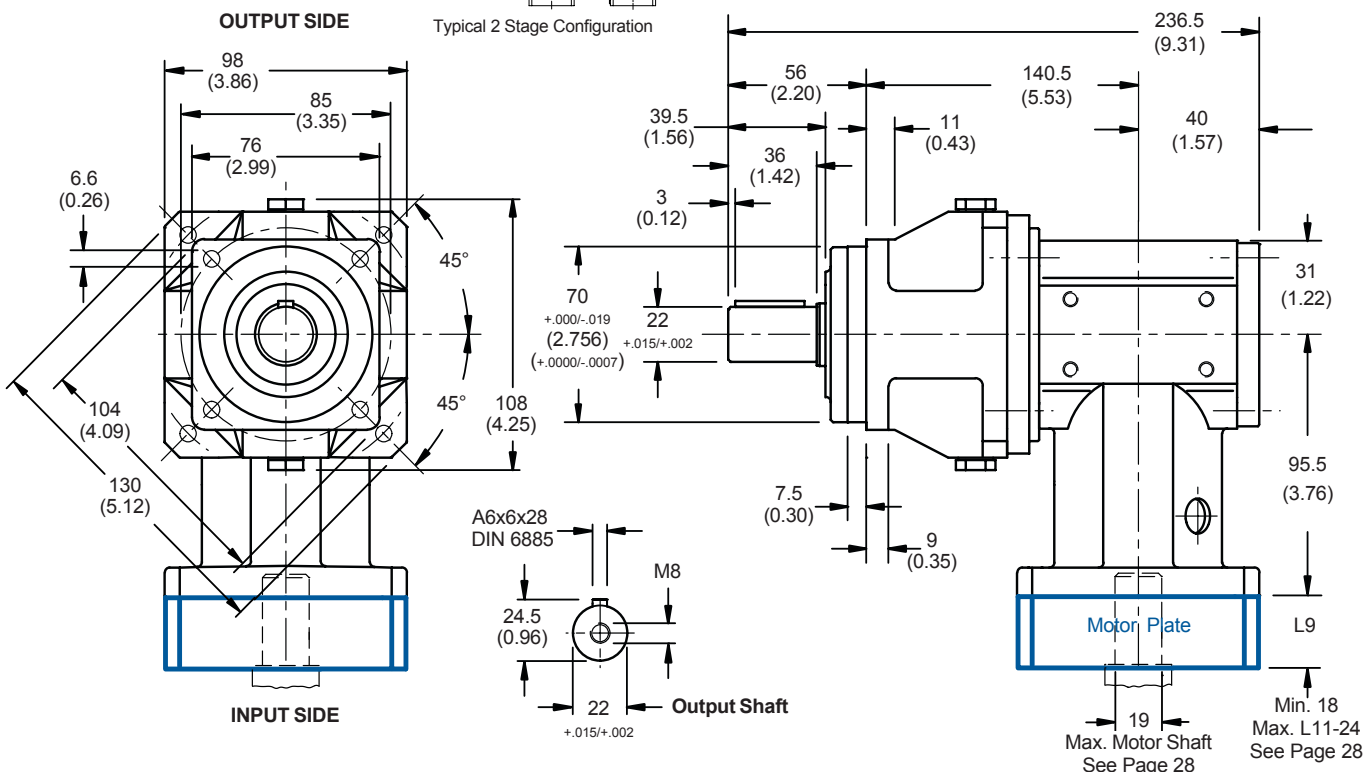
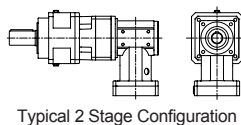
Dimension shown in millimeters (inches).



P401SPN_KX401 Gearhead with Motor Plate

P412SPN_KX301 Gearhead with Motor Plate

See web site for drawings.





"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



"PKX" Series—ClassicLine

| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|--|----|---------------------------------|----|--|--|
| | | Continuous RPM | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. Nm per arcmin | | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm | | |

P501_KX5 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|--------|-------|-------|----|--------|------|-------|----|-------|-----|-------|-----|-------|-----|
| P501SPN0030 KX501VF0010M | 3.000 | 2,000 | 4,500 | 36 | 0.0084 | 9.50 | 106.2 | 12 | 1,292 | 146 | 2,213 | 250 | 3,159 | 357 |
| P501SPN0040 KX501VF0010M | 4.000 | 2,000 | 4,500 | 36 | 0.0075 | 8.42 | 132.8 | 15 | 1,646 | 186 | 2,213 | 250 | 4,204 | 475 |
| P501SPN0050 KX501VF0010M | 5.000 | 2,000 | 4,500 | 36 | 0.0071 | 8.05 | 159.3 | 18 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P501SPN0030 KX501VF0020M | 6.000 | 2,500 | 4,500 | 36 | 0.0051 | 5.78 | 106.2 | 12 | 1,292 | 146 | 2,213 | 250 | 3,221 | 364 |
| P501SPN0070 KX501VF0010M | 7.000 | 2,000 | 4,500 | 36 | 0.0069 | 7.75 | 185.9 | 21 | 1,770 | 200 | 2,213 | 250 | 3,602 | 407 |
| P501SPN0040 KX501VF0020M | 8.000 | 2,500 | 4,500 | 35 | 0.0049 | 5.51 | 132.8 | 15 | 1,717 | 194 | 2,213 | 250 | 4,292 | 485 |
| P501SPN0050 KX501VF0020M | 10.000 | 2,500 | 4,500 | 36 | 0.0048 | 5.42 | 159.3 | 18 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P501SPN0040 KX501VF0030M | 12.000 | 3,000 | 4,500 | 36 | 0.0043 | 4.88 | 132.8 | 15 | 1,717 | 194 | 2,213 | 250 | 4,292 | 485 |
| P501SPN0050 KX501VF0030M | 15.000 | 3,000 | 4,500 | 36 | 0.0043 | 4.84 | 159.3 | 18 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P501SPN0100 KX501VF0020M | 20.000 | 2,500 | 4,500 | 36 | 0.0047 | 5.31 | 203.6 | 23 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P501SPN0100 KX501VF0030M | 30.000 | 3,000 | 4,500 | 36 | 0.0042 | 4.79 | 203.6 | 23 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |

P512_KX4 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|---------|-------|-------|----|--------|------|-------|----|-------|-----|-------|-----|-------|-----|
| P512SPN0350 KX401VF0010M | 35.000 | 2,000 | 4,500 | 25 | 0.0022 | 2.45 | 194.7 | 22 | 1,770 | 200 | 2,062 | 233 | 2,575 | 291 |
| P512SPN0250 KX401VF0020M | 50.000 | 2,500 | 4,500 | 25 | 0.0015 | 1.67 | 194.7 | 22 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P512SPN0700 KX401VF0010M | 70.000 | 2,000 | 4,500 | 25 | 0.0022 | 2.44 | 212.4 | 24 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P512SPN0500 KX401VF0020M | 100.000 | 2,500 | 4,500 | 25 | 0.0015 | 1.66 | 212.4 | 24 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P512SPN0500 KX401VF0030M | 150.000 | 3,000 | 4,500 | 25 | 0.0013 | 1.45 | 212.4 | 24 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P512SPN1000 KX401VF0020M | 200.000 | 2,500 | 4,500 | 25 | 0.0014 | 1.63 | 212.4 | 24 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| P512SPN1000 KX401VF0030M | 300.000 | 3,000 | 4,500 | 25 | 0.0013 | 1.44 | 212.4 | 24 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

P 5 01 SPN 0100 KX501VF 0030 M

Unit No. | No. of Stages (01 = 1 Stage, 12 = 2 Stage) | Output shaft with key | Ratio (0100 = 10.0:1) | Right Angle Unit | Ratio (0030 = 3.0:1) | Motor Plate Input (See Page 28)

ClassicLine ServoFit Precision Planetary Gearhead

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

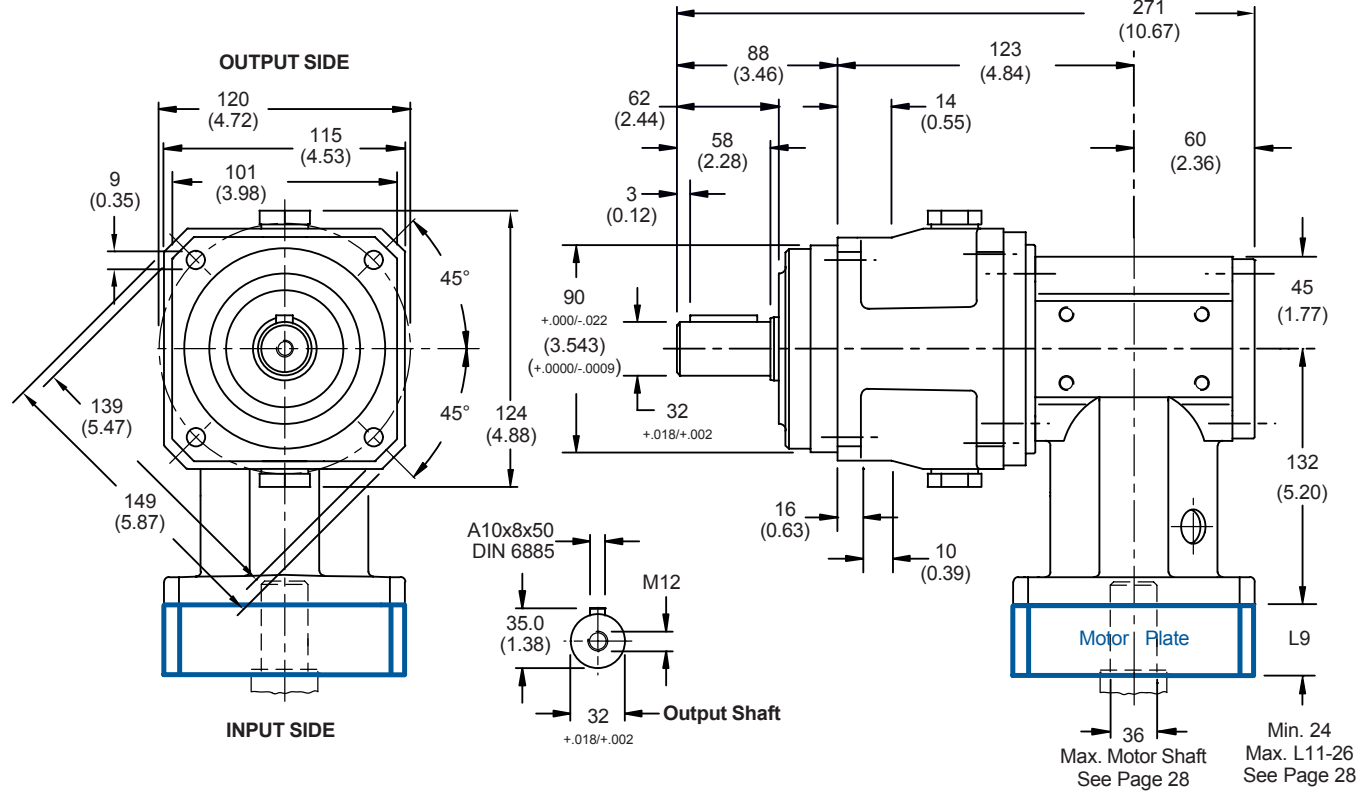
Output Torque (T_{2N}) ≤ 200 Nm (1,770 in.lbs.)
Ratio (i) = 3 - 300:1
Backlash (Δφ) ≤ 6.5 arcminutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data



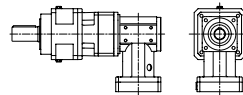
Dimension shown in millimeters (inches).



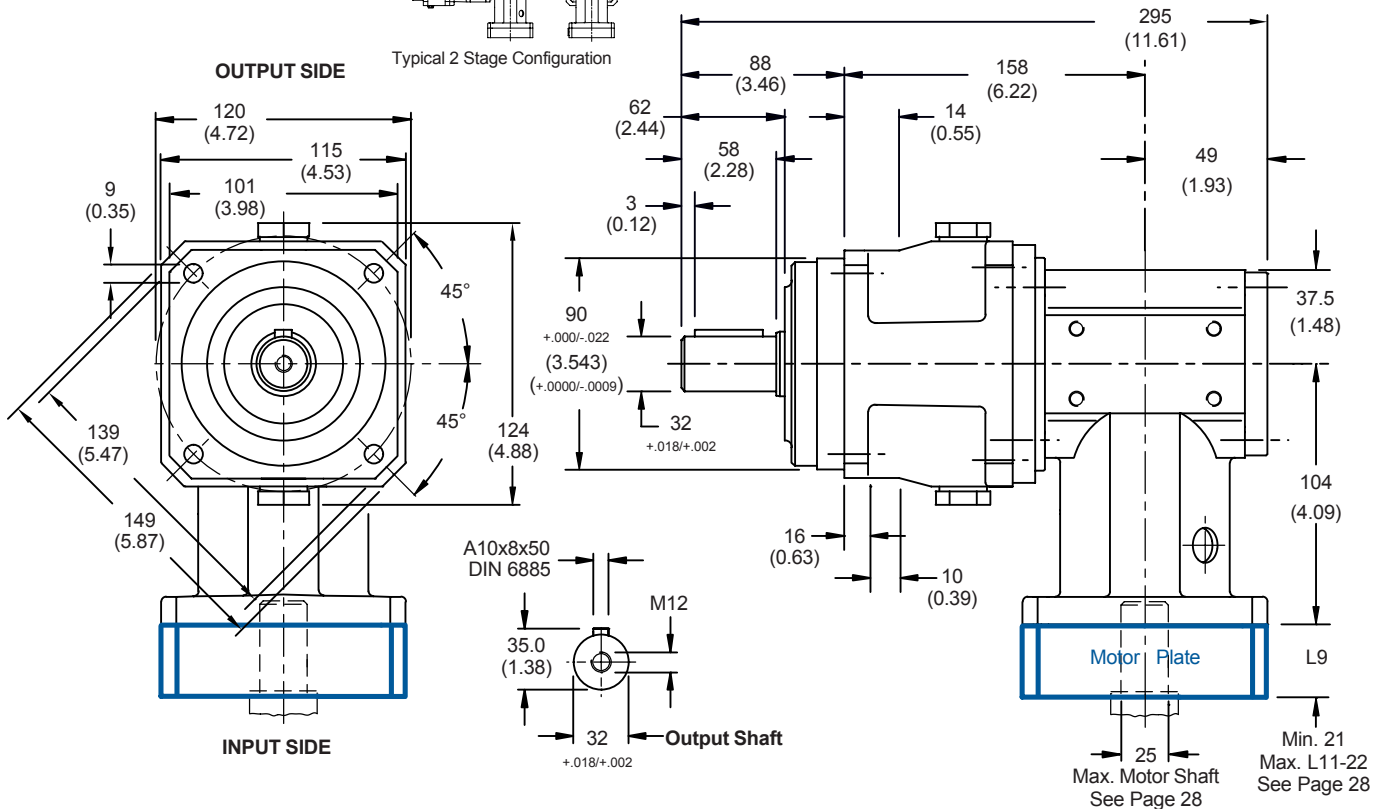
P501SPN_KX501 Gearhead with Motor Plate

P512SPN_KX401 Gearhead with Motor Plate

See web site for drawings.



Typical 2 Stage Configuration





"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



"PKX" Series—ClassicLine

| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|--|----|---------------------------------|----|--|----|
| | | Continuous RPM (n ₁) | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm |

P701_KX7 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|-------|-------|-------|----|--------|----|-------|----|-------|-----|-------|-----|-------|-------|
| P701SPN0030 KX701VF0010M | 3.000 | 1,700 | 4,500 | 43 | 0.0281 | 32 | 283.2 | 32 | 2,575 | 291 | 3,221 | 364 | 5,664 | 640 |
| P701SPN0040 KX701VF0010M | 4.000 | 1,700 | 4,500 | 43 | 0.0249 | 28 | 336.3 | 38 | 3,283 | 371 | 4,292 | 485 | 7,558 | 854 |
| P701SPN0050 KX701VF0010M | 5.000 | 1,700 | 4,500 | 43 | 0.0238 | 27 | 362.9 | 41 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P701SPN0030 KX701VF0020M | 6.000 | 2,100 | 4,500 | 43 | 0.0145 | 16 | 283.2 | 32 | 2,575 | 291 | 3,221 | 364 | 6,443 | 728 |
| P701SPN0070 KX701VF0010M | 7.000 | 1,700 | 4,500 | 43 | 0.0229 | 26 | 398.3 | 45 | 3,540 | 400 | 4,425 | 500 | 7,514 | 849 |
| P701SPN0040 KX701VF0020M | 8.000 | 2,100 | 4,500 | 43 | 0.0137 | 16 | 336.3 | 38 | 3,434 | 388 | 4,292 | 485 | 8,585 | 970 |
| P701SPN0050 KX701VF0020M | 10.00 | 2,100 | 4,500 | 43 | 0.0135 | 15 | 362.9 | 41 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P701SPN0040 KX701VF0030M | 12.00 | 2,500 | 4,500 | 43 | 0.0113 | 13 | 336.3 | 38 | 3,434 | 388 | 4,292 | 485 | 8,585 | 970 |
| P701SPN0050 KX701VF0030M | 15.00 | 2,500 | 4,500 | 43 | 0.0112 | 13 | 362.9 | 41 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P701SPN0100 KX701VF0020M | 20.00 | 2,100 | 4,500 | 43 | 0.0131 | 15 | 424.8 | 48 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P701SPN0100 KX701VF0030M | 30.00 | 2,500 | 4,500 | 43 | 0.0111 | 13 | 424.8 | 48 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |

P712_KX5 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|-------|-------|-------|----|--------|------|-------|----|-------|-----|-------|-----|-------|-------|
| P712SPN0250 KX501VF0010M | 25.00 | 2,000 | 4,500 | 36 | 0.0072 | 8.13 | 398.3 | 45 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P712SPN0350 KX501VF0010M | 35.00 | 2,000 | 4,500 | 36 | 0.0069 | 7.79 | 407.1 | 46 | 3,540 | 400 | 4,292 | 485 | 5,363 | 606 |
| P712SPN0250 KX501VF0020M | 50.00 | 2,500 | 4,500 | 36 | 0.0048 | 5.43 | 398.3 | 45 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P712SPN0700 KX501VF0010M | 70.00 | 2,000 | 4,500 | 36 | 0.0069 | 7.76 | 433.7 | 49 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P712SPN0500 KX501VF0020M | 100.0 | 2,500 | 4,500 | 36 | 0.0048 | 5.42 | 433.7 | 49 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P712SPN0500 KX501VF0030M | 150.0 | 3,000 | 4,500 | 36 | 0.0043 | 4.84 | 433.7 | 49 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P712SPN1000 KX501VF0020M | 200.0 | 2,500 | 4,500 | 36 | 0.0047 | 5.31 | 433.7 | 49 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| P712SPN1000 KX501VF0030M | 300.0 | 3,000 | 4,500 | 36 | 0.0042 | 4.79 | 433.7 | 49 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

P 7 12 SPN 0150 KX501VF 0010 M

Motor Plate Input (See Page 28)
Ratio (0010 = 1.0:1)
Right Angle Unit
Ratio (0150 = 15.0:1)
Output shaft with key
No. of Stages (01 = 1 Stage, 12 = 2 Stage)
Unit No.
ClassicLine ServoFit Precision Planetary Gearhead

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Output Torque (T_{2N}) ≤ 400 Nm (3,540 in.lbs.)
Ratio (i) = 3 - 300:1
Backlash (Δφ) ≤ 6 arcminutes

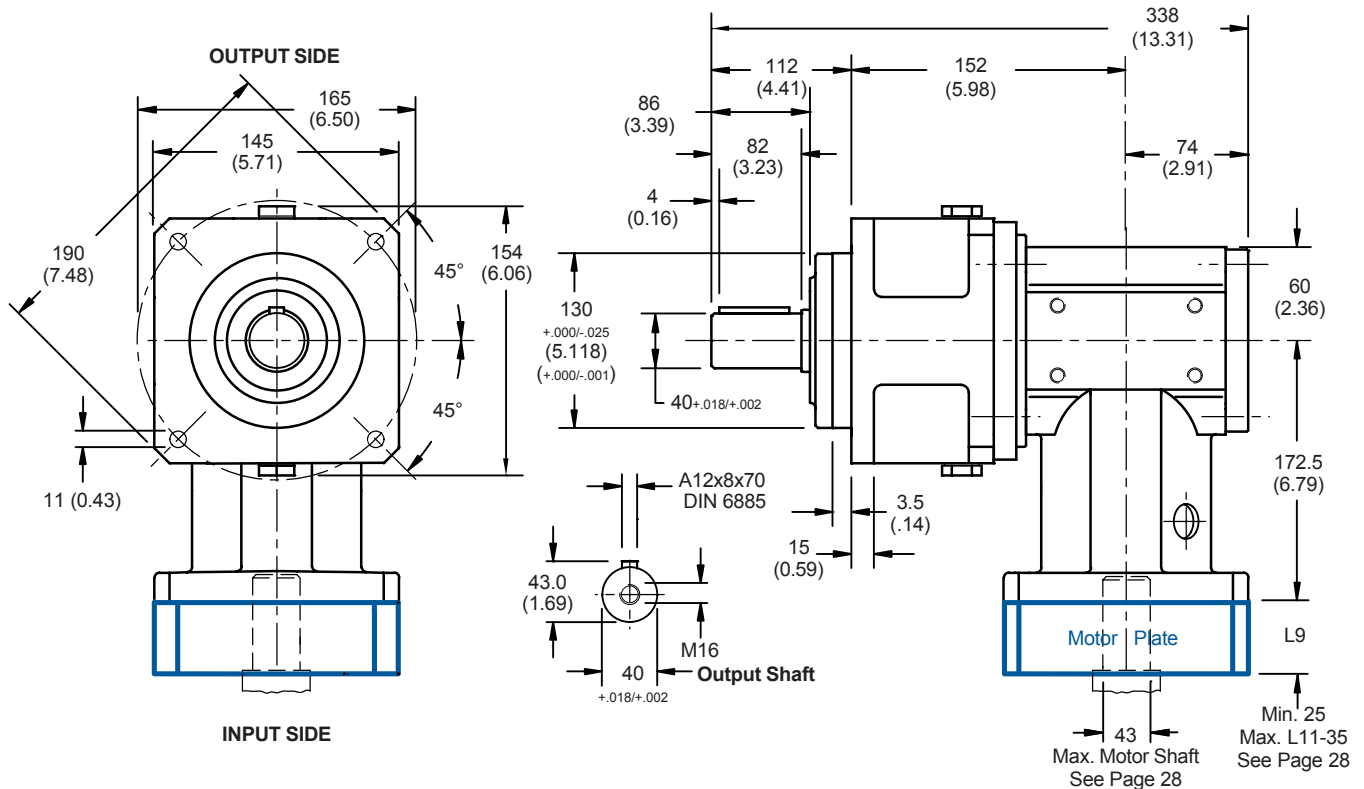
Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data



Dimension shown in millimeters (inches).

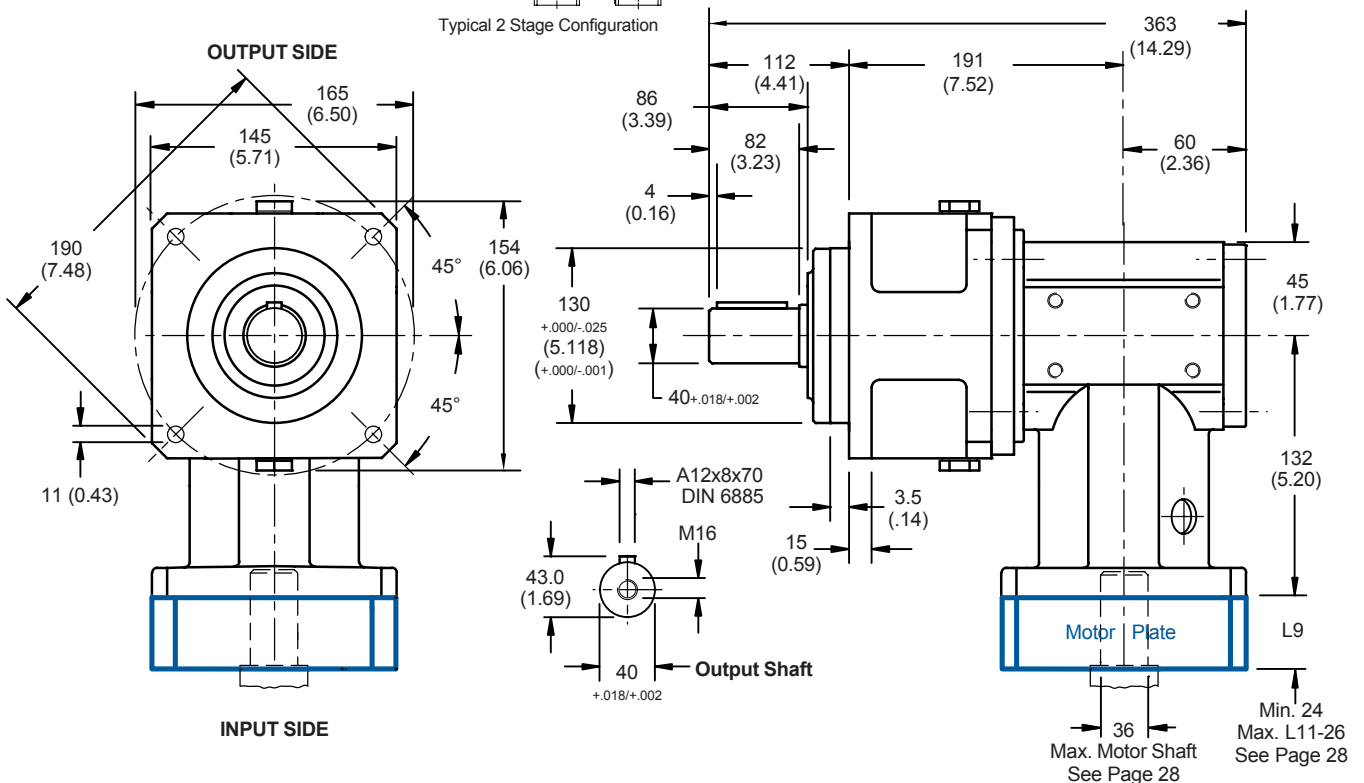
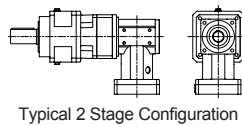
"PKX" Series—ClassicLine



P701SPN_KX701 Gearhead with Motor Plate

P712SPN_KX501 Gearhead with Motor Plate

See web site for drawings.





"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



"PKX" Series—ClassicLine

| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|--|----|---------------------------------|----|--|--|
| | | Continuous RPM | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. Nm per arcmin | | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm | | |

P801_KX8 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|--------|-------|-------|----|--------|-----|--------|-----|-------|-----|-------|-------|--------|-------|
| P801SPN0030 KX801VF0010M | 3.000 | 1,000 | 4,000 | 54 | 0.1009 | 114 | 619.5 | 70 | 5,151 | 582 | 7,080 | 800 | 10,815 | 1,222 |
| P801SPN0040 KX801VF0010M | 4.000 | 1,000 | 4,000 | 54 | 0.0839 | 95 | 796.5 | 90 | 6,576 | 743 | 9,443 | 1,067 | 14,426 | 1,630 |
| P801SPN0050 KX801VF0010M | 5.000 | 1,000 | 4,000 | 54 | 0.0779 | 88 | 929.3 | 105 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P801SPN0030 KX801VF0020M | 6.000 | 1,400 | 4,000 | 54 | 0.0513 | 58 | 619.5 | 70 | 5,151 | 582 | 7,080 | 800 | 12,877 | 1,455 |
| P801SPN0070 KX801VF0010M | 7.000 | 1,000 | 4,000 | 54 | 0.0732 | 83 | 1070.9 | 121 | 7,080 | 800 | 9,735 | 1,100 | 15,027 | 1,698 |
| P801SPN0040 KX801VF0020M | 8.000 | 1,400 | 4,000 | 54 | 0.0472 | 53 | 796.5 | 90 | 6,868 | 776 | 9,443 | 1,067 | 17,169 | 1,940 |
| P801SPN0050 KX801VF0020M | 10.000 | 1,400 | 4,000 | 54 | 0.0457 | 52 | 929.3 | 105 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P801SPN0040 KX801VF0030M | 12.000 | 1,800 | 4,000 | 54 | 0.0400 | 45 | 796.5 | 90 | 6,868 | 776 | 9,443 | 1,067 | 17,169 | 1,940 |
| P801SPN0050 KX801VF0030M | 15.000 | 1,800 | 4,000 | 54 | 0.0393 | 44 | 929.3 | 105 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P801SPN0100 KX801VF0020M | 20.000 | 1,400 | 4,000 | 54 | 0.0439 | 50 | 1159.4 | 131 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P801SPN0100 KX801VF0030M | 30.000 | 1,800 | 4,000 | 54 | 0.0385 | 44 | 1159.4 | 131 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |

P812_KX7 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|--------------------------|---------|-------|-------|----|--------|--------|--------|-----|-------|-----|-------|-------|--------|-------|
| P812SPN0350 KX701VF0010M | 35.000 | 1,700 | 4,500 | 43 | 0.0240 | 27.100 | 1194.8 | 135 | 7,080 | 800 | 9,735 | 1,100 | 15,027 | 1,698 |
| P812SPN0250 KX701VF0020M | 50.000 | 2,100 | 4,500 | 43 | 0.0135 | 15.300 | 1124.0 | 127 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P812SPN0700 KX701VF0010M | 70.000 | 1,700 | 4,500 | 43 | 0.0229 | 25.900 | 1239.0 | 140 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P812SPN0500 KX701VF0020M | 100.000 | 2,100 | 4,500 | 43 | 0.0135 | 15.200 | 1230.2 | 139 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P812SPN0500 KX701VF0030M | 150.000 | 2,500 | 4,500 | 43 | 0.0112 | 12.700 | 1230.2 | 139 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P812SPN1000 KX701VF0020M | 200.000 | 2,100 | 4,500 | 43 | 0.0131 | 14.800 | 1239.0 | 140 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| P812SPN1000 KX701VF0030M | 300.000 | 2,500 | 4,500 | 43 | 0.0111 | 12.500 | 1239.0 | 140 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

| | | | | | | | |
|----------|----------|-----------|------------|-------------|----------------|-------------|---|
| P | 8 | 12 | SPN | 0350 | KX701VF | 0010 | M |
| | | | | | | | Motor Plate Input (See Page 28) |
| | | | | | | | Ratio (0010 = 1.0:1) |
| | | | | | | | Right Angle Unit |
| | | | | | | | Ratio (0350 = 35.0:1) |
| | | | | | | | Output shaft with key |
| | | | | | | | No. of Stages (01 = 1 Stage, 12 = 2 Stage) |
| | | | | | | | Unit No. |

ClassicLine ServoFit Precision Planetary Gearhead

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

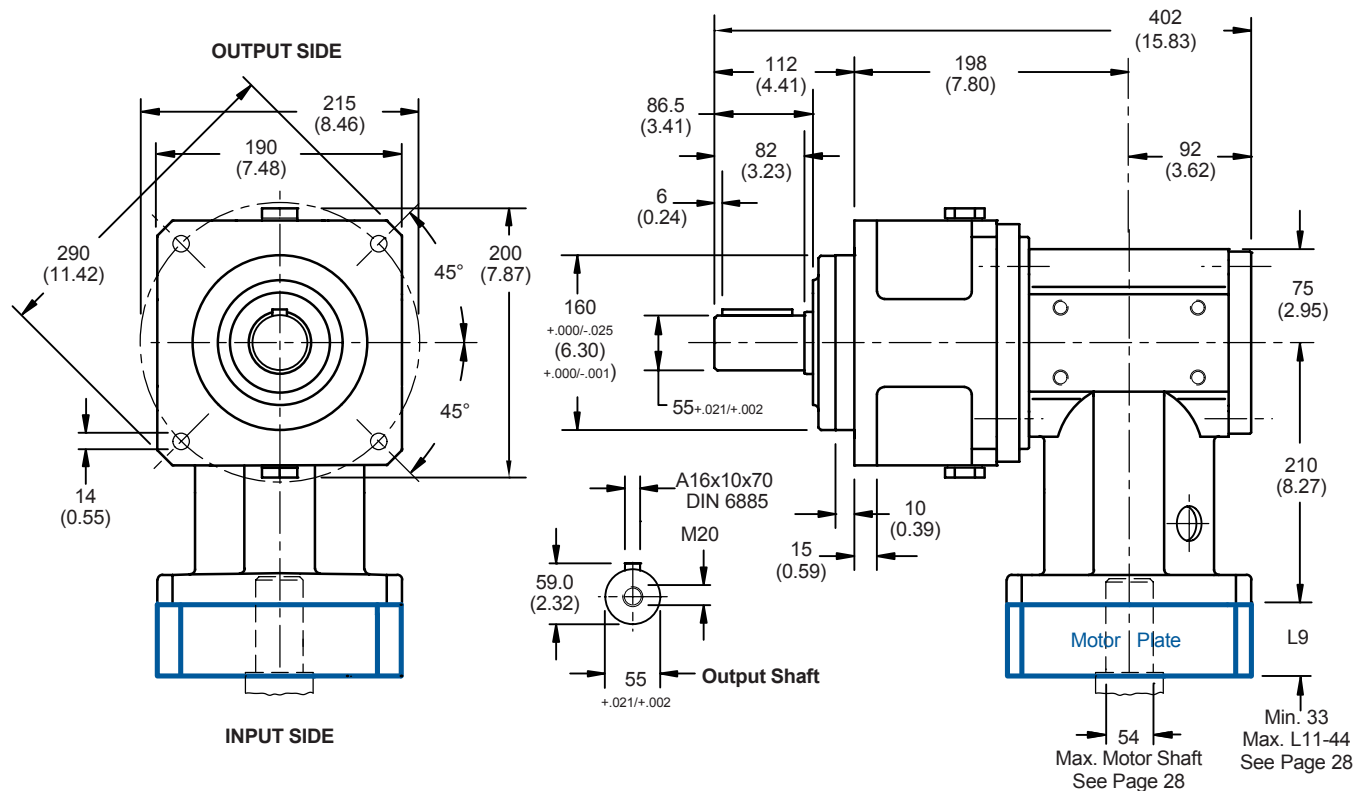
Output Torque (T_{2N}) ≤ 800 Nm (7,080 in.lbs.)
Ratio (i) = 3 - 300:1
Backlash (Δφ) ≤ 6 arcminutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PKX" Series—ClassicLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data



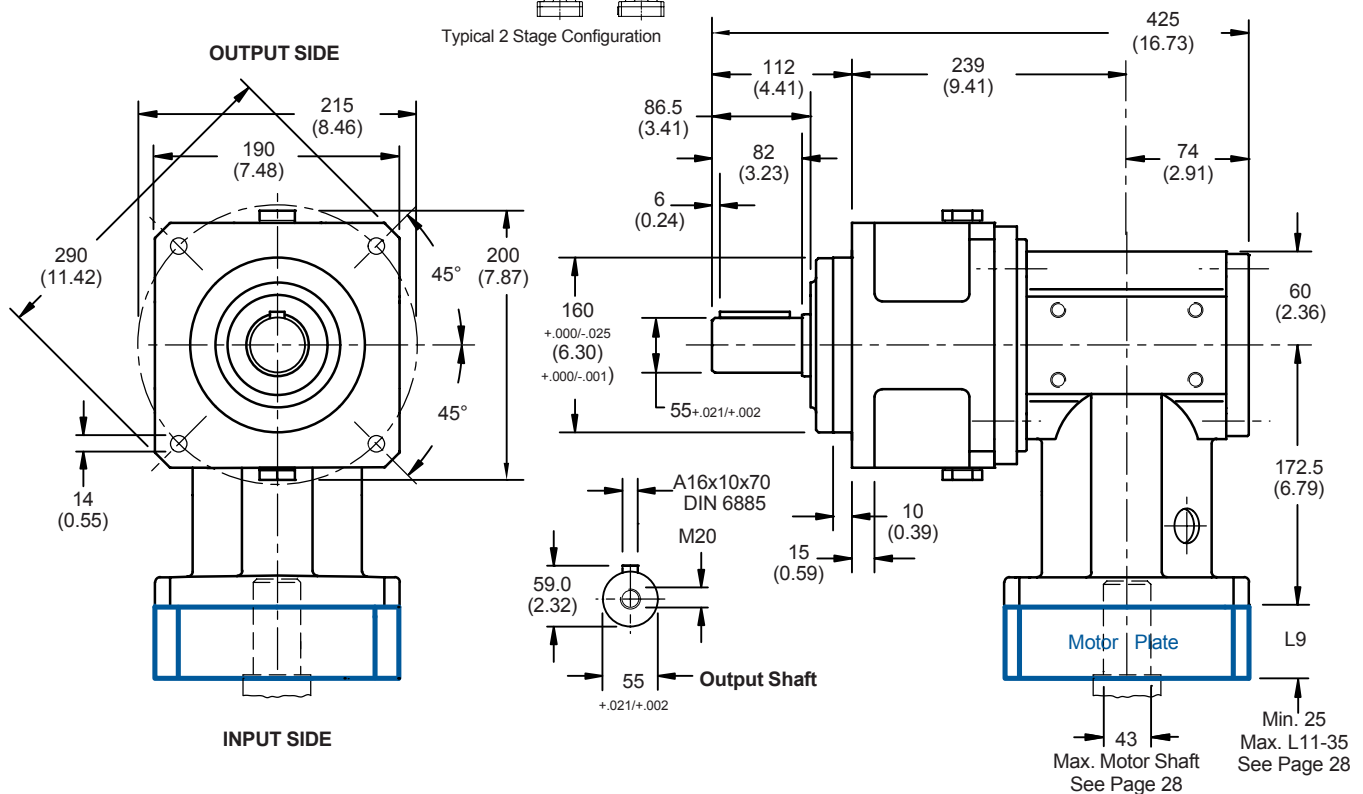
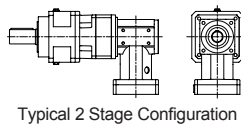
Dimension shown in millimeters (inches).



P801SPN_KX801 Gearhead with Motor Plate

P812SPN_KX701 Gearhead with Motor Plate

See web site for drawings.

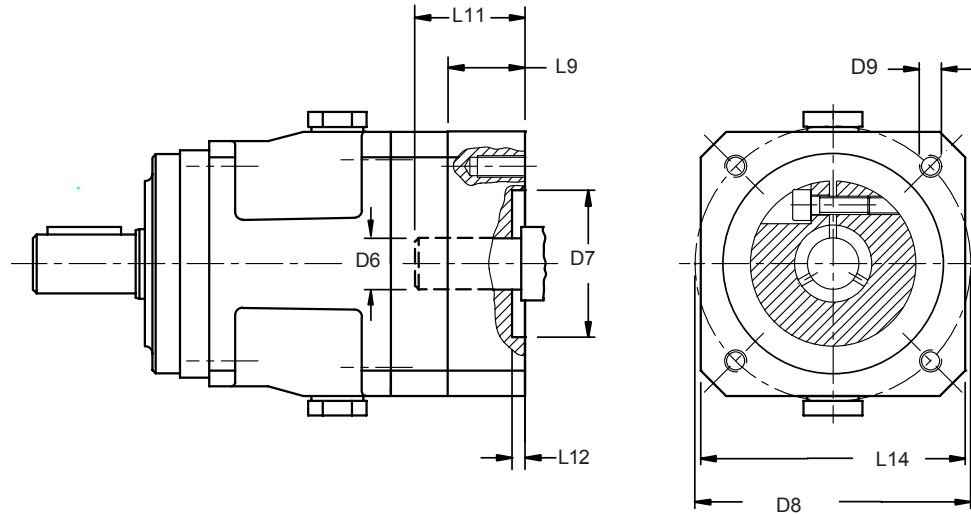
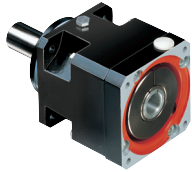


"PKX" Series—ClassicLine

"P and PKX" Series—ClassicLine ServoFit® Precision Planetary Gearhead Motor Plate Specifications



"P" Series—ClassicLine



Stober ServoFit Precision Planetary Gearheads will fit the motor of your choice by assembling the correct motor mounting plate between the motor and the gearhead. When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions. The maximum motor plate thickness (L9) dimension will be determined by the motor shaft length minus the value shown in Table No. 1. The minimum thickness is also shown. For a precise dimension on a specific motor, contact Stober Technical Support.

The following dimensions are required to provide the correct motor mounting plate:

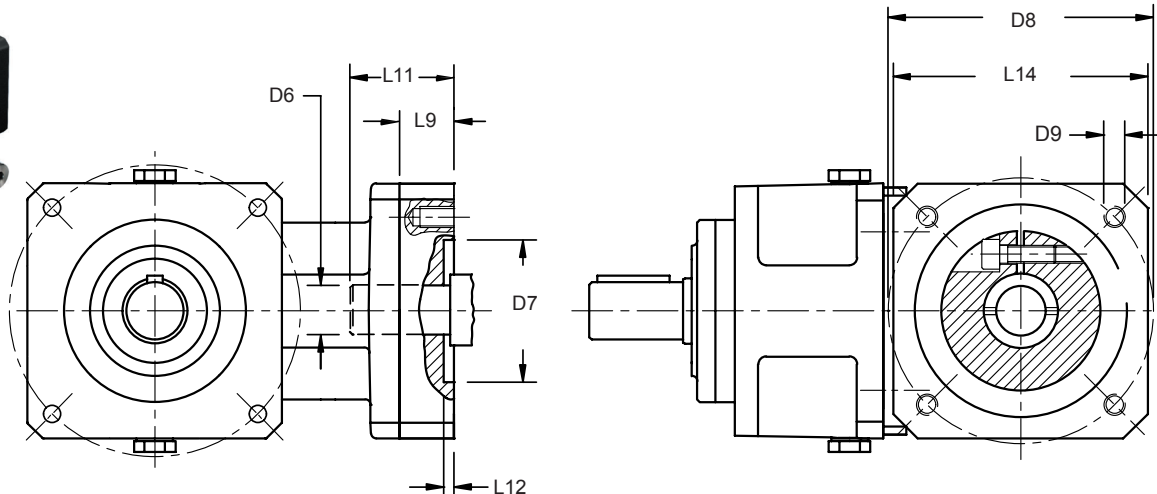
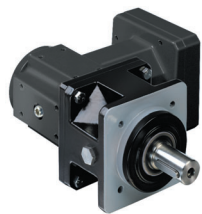
1. D6 Motor Shaft Diameter (See Table No. 1.) *
2. D7 Pilot Diameter
3. D8 Bolt Circle Diameter
4. D9 Bolt Diameter
5. L11 Motor Shaft Length
6. L12 Pilot Length
7. L14 Square Flange
(Optional—Motor plate will typically be made to match.)

Table No. 1 Motor Adapter Dimensions

| Motor Adapter | Motor Shaft D6 Max. ²⁾ mm | Motor Plate ¹⁾ | | | |
|---|--|---------------------------|-----------------|---------------|-------------------|
| | | L9 Min. mm | L9 Min. ins. | L9 Max. mm | L9 Max. inches |
| P301, P312 P301_KX3, P312_KX3 P412, P412_KX3 | 19 | 18 | .77 | L11 - 24 | L11 - .95 |
| P401, P512 P401_KX4, P512_KX4 | 24 25 | 21 | .83 | L11 - 22 | L11 - .87 |
| P501, P712 P501_KX5, P712_KX5 | 32 36 | 24 | .95 | L11 - 26 | L11 - 1.02 |
| P701, P812 P701_KX7, P812_KX7 | 38 43 | 25 | .98 | L11 - 35 | L11 - 1.38 |
| P801 P801_KX8 | 48 54 | 33 | 1.30 | L11 - 44 | L11 - 1.73 |

¹⁾ Motor plate maximum thickness (L9 Max.) will vary with motor shaft length.

²⁾ If an adapter bushing is required it will be supplied as a component of the motor mounting plate.



Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

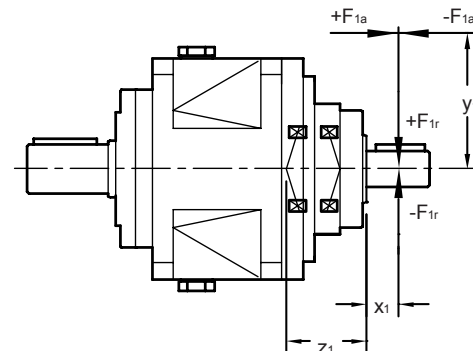
"P and PKX" Series—ClassicLine

ServoFit® Precision Planetary Gearhead

Calculation Details

Table No. 1 INPUT
"P" Series – Permissible Load and Tilting Moments

| Unit No. | Z ₁ | | F _{1A} | | F _{1R} | | T _{1K} | |
|-------------------------------|----------------|--------|-----------------|------|-----------------|-------|-----------------|---------|
| | mm | inches | N | lbs. | N | lbs. | Nm | in.lbs. |
| P301_AW P312_AW P412_AW | 23 | 0.91 | 550 | 124 | 550 | 124 | 26 | 230 |
| P401_AW P512_AW | 39 | 1.54 | 1,150 | 256 | 1,300 | 293 | 69 | 611 |
| P501_AW P712_AW | 47 | 1.85 | 1,600 | 360 | 1,900 | 428 | 124 | 1,097 |
| P701_AW P812_AW | 52 | 2.05 | 2,700 | 608 | 3,000 | 675 | 243 | 2,150 |
| P801_AW | 59 | 2.32 | 4,000 | 900 | 4,500 | 1,012 | 454 | 4,018 |



The permissible load values given are valid with the load applied to the center of the shaft (x₁).

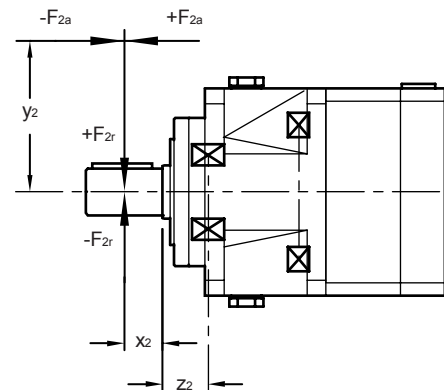
The permissible load and tilting moment values are based on an input speed of 2000 RPM. For higher speeds the following applies, where n₁ is the desired speed:

$$F_{1RX} = \frac{F_{1R}}{\sqrt[3]{\frac{n_1}{2000}}} \quad T_{1KX} = \frac{T_{1K}}{\sqrt[3]{\frac{n_1}{2000}}}$$

The application input tilting moment should be determined by the following formula: $T_{1A} = \frac{F_{1a} \cdot y_1 + F_{1r} \cdot (x_1 + z_1)}{1000} \leq T_{1K}$

Table No. 2 OUTPUT
"P" and "PKX" Series – Permissible Load and Tilting Moments

| Unit No. | Z ₂ | | F _{2A} | | F _{2R} | | T _{2K} | |
|------------------------------|----------------|--------|-----------------|------|-----------------|-------|-----------------|---------|
| | mm | inches | N | lbs. | N | lbs. | Nm | in.lbs. |
| P301, P312 P301KX, P312KX | 20 | 0.79 | 1,000 | 225 | 3,000 | 685 | 102 | 903 |
| P401, P412 P401KX, P412KX | 22 | 0.87 | 1,500 | 338 | 4,500 | 1,012 | 180 | 1,593 |
| P501, P512 P501KX, P512KX | 26 | 1.02 | 2,000 | 450 | 7,000 | 1,575 | 382 | 3,380 |
| P701, P712 P701KX, P712KX | 28 | 1.10 | 3,000 | 675 | 9,000 | 2,025 | 617 | 5,460 |
| P801, P812 P801KX, P812KX | 30 | 1.18 | 4,000 | 900 | 15,000 | 3,375 | 1,065 | 9,425 |



The permissible load values given are valid with the load applied to the center of the output shaft (x₂).

The permissible load and tilting moment values are based on an output speed of 100 RPM. For higher speeds the following applies, where n₂ is the desired speed:

$$F_{2RX} = \frac{F_{2R}}{\sqrt[3]{\frac{n_2}{100}}} \quad T_{2KX} = \frac{T_{2K}}{\sqrt[3]{\frac{n_2}{100}}}$$

The application input tilting moment should be determined by the following formula: $T_{2A} = \frac{F_{2a} \cdot y_2 + F_{2r} \cdot (x_2 + z_2)}{1000} \leq T_{2K}$

The hours of life (L_h) of the unit can be determined by the following formula: L_h > 10,000 hours if T_{2K}/T_{2A} < 1.25
L_h > 20,000 hours if T_{2K}/T_{2A} > 1.25

All formulas shown are based on metric values.

"PH" Series—PowerLine

ServoFit® Precision Planetary Gearhead

Performance Specifications



"PH" Series—PowerLine

| Size | | | PH401 | PH412 | PH501 | PH512 | PH701 | PH712 | PH801 | PH812 | PH912 | PH923 | PH1023 | PH1024 | |
|---|--|---------------------|--|-------|-------|-------|--------|-------|--------|-------|--------|-------|--------|--------|--|
| Permissible Acceleration Torque | Ratio 5, 7, 25, 35 | in.lbs. | 885 | | 2,655 | | 5,752 | | 11,505 | | — | | — | | |
| | | Nm | 100 | | 300 | | 650 | | 1,300 | | | | | | |
| | Ratio 10, 50, 70, 100 | in.lbs. | 885 | | 2,212 | | 4,425 | | 9,735 | | — | | — | | |
| | | Nm | 100 | | 250 | | 500 | | 1,100 | | | | | | |
| | All Ratios | in.lbs. | | | | | | | | | 37,612 | | 66,375 | | |
| | T _{2B} | Nm | | | | | | | | | 4,250 | | 7,500 | | |
| Nominal Output Torque ¹⁾ | T _{2N} | in.lbs. | 708 | | 1,770 | | 3,540 | | 7,080 | | 22,125 | | 22,125 | | |
| | | Nm | 80 | | 200 | | 400 | | 800 | | 2,500 | | 2,500 | | |
| Input Speed Maximum ²⁾ | n _{1MAX} | Continuous | 3,000 | 4,000 | 3,000 | 4,000 | 2,500 | 3,500 | 2,500 | 3,000 | 2,500 | 4,500 | 2,500 | 4,500 | |
| | | Cyclic | 6,000 | | 6,000 | | 5,000 | 6,000 | 4,000 | 6,000 | | | | | |
| Torsional Backlash ³⁾ | Δφ | (Standard) | ≤3 | | ≤3 | | ≤3 | | ≤3 | | ≤3 | | ≤3 | | |
| | | arcmin (Reduced) | ≤1 | | ≤1 | | ≤1 | | ≤1 | | ≤1 | | ≤1 | | |
| Torsional Stiffness | C _t | in.lbs./arcmin | ≤274 | | ≤752 | | ≤1504 | | ≤3,894 | | ≤4,956 | | ≤4,867 | | |
| | | Nm/arcmin | ≤31 | | ≤85 | | ≤170 | | ≤440 | | ≤560 | | ≤550 | | |
| Axial Load Maximum | F _{2AMAX} | lbs. | 484 | | 934 | | 1,384 | | 2,260 | | 7,425 | | 11,250 | | |
| | | N | 2,150 | | 4,150 | | 6,150 | | 10,050 | | 33,000 | | 50,000 | | |
| Tilting Moment Maximum ²⁾ | T _{2K} | in.lbs. | 2,124 | | 3,717 | | 13,275 | | 30,975 | | 57,525 | | 77,880 | | |
| | | Nm | 240 | | 420 | | 1,500 | | 3,500 | | 6,500 | | 8,800 | | |
| Tilting Stiffness | C _{2K} | in.lbs./arcmin | 1,593 | | 3,363 | | 5,752 | | 12,832 | | 48,675 | | 84,075 | | |
| | | Nm/arcmin | 180 | | 380 | | 650 | | 1,450 | | 5,500 | | 9,500 | | |
| Efficiency (at Nominal Torque) | η | % | 96% | 94% | 96% | 94% | 96% | 94% | 96% | 94% | 94% | 92% | 92% | 90% | |
| Weight | m | pounds | 6.6 | 9.5 | 11 | 15.5 | 22 | 29 | 55 | 69 | 157 | 139 | 216 | 218 | |
| | | kg | 3 | 4.3 | 5.0 | 7.0 | 10.0 | 13.0 | 25 | 31 | 71 | 63 | 98 | 99 | |
| Noise Level | LPA | dB(A) ⁵⁾ | ≤60 | ≤58 | ≤61 | ≤59 | ≤62 | ≤60 | ≤63 | ≤61 | ≤65 | ≤61 | ≤63 | ≤63 | |
| Balance Quality | Q 2.5 (Quality Class-2.5 millimeters per second) | | | | | | | | | | | | | | |
| Lubrication | Synthetic Oil (ISO VG 150) | | | | | | | | | | | | | | |
| Degree of Protection | IP65 | | | | | | | | | | | | | | |
| Mounting Position | Unrestricted | | | | | | | | | | | | | | |
| Ambient Temperature | 0°C to +40°C (104° F) Other temperatures, contact Stober Drives. | | | | | | | | | | | | | | |
| Finish | Black (RAL 9005) | | | | | | | | | | | | | | |
| Lifetime ⁶⁾ | L _h | hours | L _h > 10,000 hours if T _{2K} /T _{2A} < 1.25 | | | | | | | | | | | | |
| | | | L _h > 20,000 hours if T _{2K} /T _{2A} > 1.25 | | | | | | | | | | | | |
| Warranty | 5 Year Limited (2 Years on normal wear items: bearings, seals, etc.) | | | | | | | | | | | | | | |

 1) Ratings based on input speed (n₁) of 2000 RPM.

 For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

2) For speeds higher than given above, contact Stober Technical Support.

3) Tested at 1.5% of nominal torque and recorded on the input side of the gearhead.

 4) Rating based on output speed (n₂) of 100 RPM. For values at other speeds see Page 57.

 5) Measurement at one (1) meter distance with input speed (n₁) of 3000 RPM.

 6) T_{2A} equals actual tilting moment of the application. See Page 57 for calculation details.

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PH" Series–PowerLine

ServoFit® Precision Planetary Gearhead

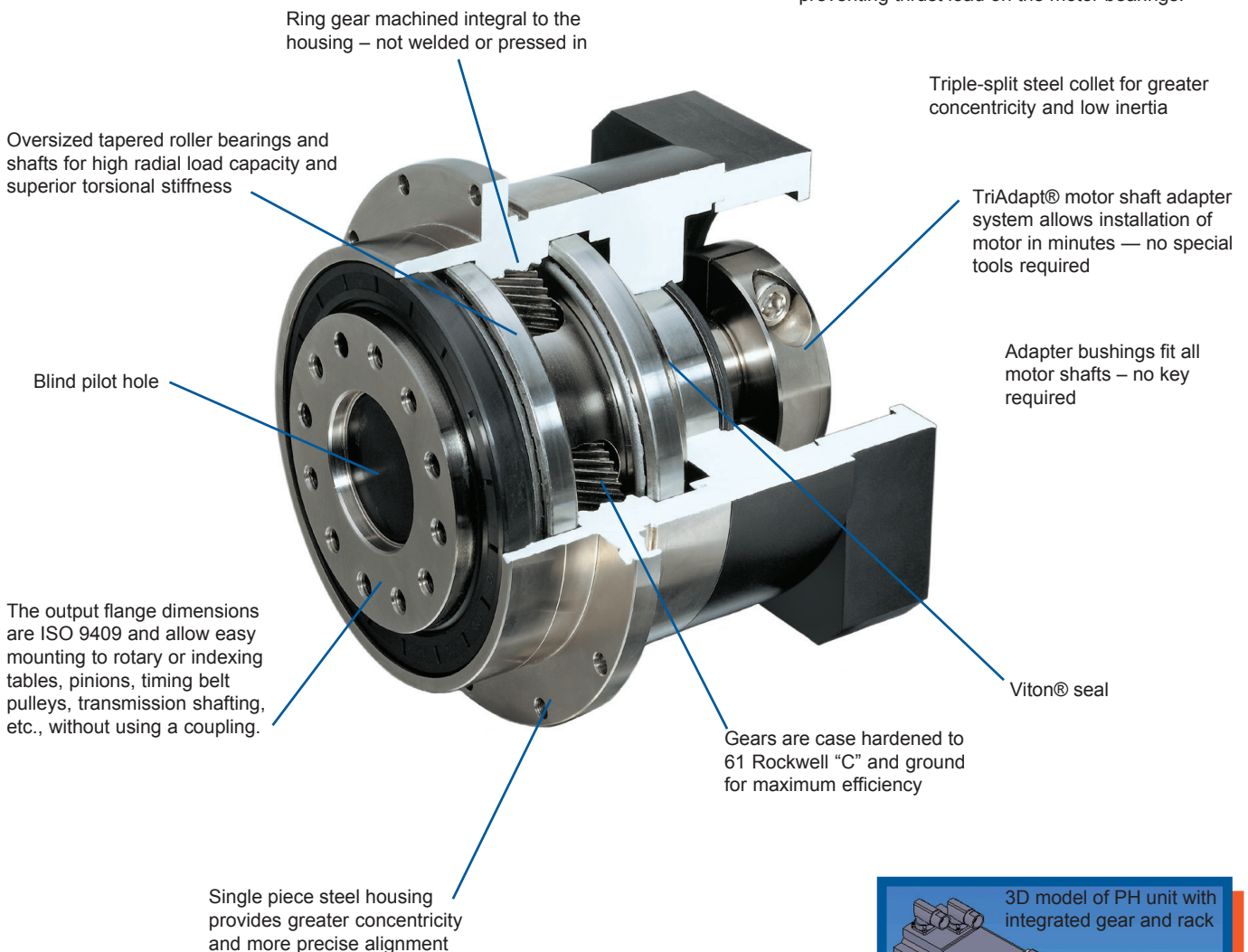
Features

The "PH" Series–PowerLine of ServoFit Precision Planetary Gearheads are designed for the exacting demands on torsional and tilting rigidity. The "PH" series is well suited where a smooth, precise, reliable drive is needed. Some features are:

- Readily Attaches to Any Servo Motor
- Superior Torsional Stiffness
- 90-96% Efficiency
- Excellent Axial Load Capacity
- ISO Output Flange for Coupling Free Mounting
- Advanced HeliCamber Gear Technology
- 5 Year Limited Warranty (2 Year on bearings, seals, etc.)

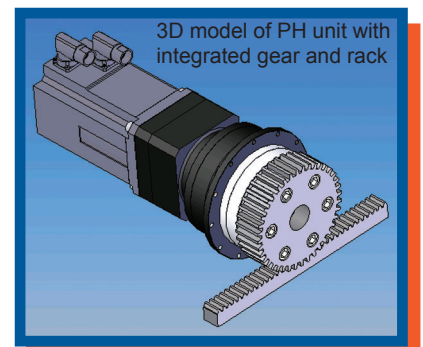
HeliCamber® gear technology provides minimum wear, low backlash, and low noise

The patented TriAdapt® motor coupling is designed to allow thermal expansion of the motor shaft—ensuring long motor life by preventing thrust load on the motor bearings.



Lubricated for life with synthetic oil and sealed to IP65 standards to prevent lubricant contamination for long life.

Wide selection of IEC, NEMA, or customized motor adapters.



"PH" Series–PowerLine



"PH" Series—PowerLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ Continuous Cyclic RPM (n ₁) | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ lb-in-s ² kgcm ² | | Torsional Stiffness C _t in.lbs. Nm per arcmin | | Output Torque | | | | | |
|-----------------------------------|---------|---------------------|--|--|-------------------------------------|---|--|--|--|--|--|---|--|--|--|
| Gearhead | M AW | | | | | | | | | Nominal ²⁾ T _{2N} in.lbs. Nm | | Acceleration T _{2B} in.lbs. Nm | | Peak ³⁾ T _{2PEAK} in.lbs. Nm | |

PH401 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|------|-------|----|-----|----|-----|-----|-------|-----|
| PH401F0050 | — | 5.000 | 3,000 | 6,000 | 24 | 0.0014 | 1.55 | 274.4 | 31 | 708 | 80 | 885 | 100 | 2,213 | 250 |
| PH401F0070 | — | 7.000 | 3,000 | 6,000 | 24 | 0.0012 | 1.38 | 274.4 | 31 | 708 | 80 | 885 | 100 | 1,505 | 170 |
| PH401F0100 | — | 10.00 | 3,000 | 6,000 | 24 | 0.0012 | 1.30 | 274.4 | 31 | 708 | 80 | 885 | 100 | 1,770 | 200 |

PH412 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|-------|-------|----|-----|----|-----|-----|-------|-----|
| PH412F0250 | — | 25.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.650 | 212.4 | 24 | 708 | 80 | 885 | 100 | 2,213 | 250 |
| PH412F0350 | — | 35.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.644 | 239.0 | 27 | 708 | 80 | 885 | 100 | 1,505 | 170 |
| PH412F0500 | — | 50.00 | 4,000 | 6,000 | 19 | 0.0006 | 0.641 | 256.7 | 29 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| PH412F0700 | — | 70.00 | 4,000 | 6,000 | 19 | 0.0005 | 0.594 | 256.7 | 29 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| PH412F1000 | — | 100.0 | 4,000 | 6,000 | 19 | 0.0005 | 0.574 | 256.7 | 29 | 708 | 80 | 885 | 100 | 1,770 | 200 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

"PH" Series—PowerLine

Part No. Explanation

PH 4 01 F 0050 M or AW

PH PowerLine ServoFit Precision Planetary Gearhead
 4 Unit No.
 01 No. of Stages (01 = 1 Stage, 12 = 2 Stage)
 F Output Flange
 0050 Ratio (0050 = 5.0:1)
 M Motor Plate (See Page 56)
 AW Input Shaft

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

PowerLine ServoFit Precision Planetary Gearhead

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Output Torque (T_{2N}) ≤ 80 Nm (708 in.lbs.)
Ratio (i) = 5 - 100:1
Backlash (Δφ) ≤ 3 arc minutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

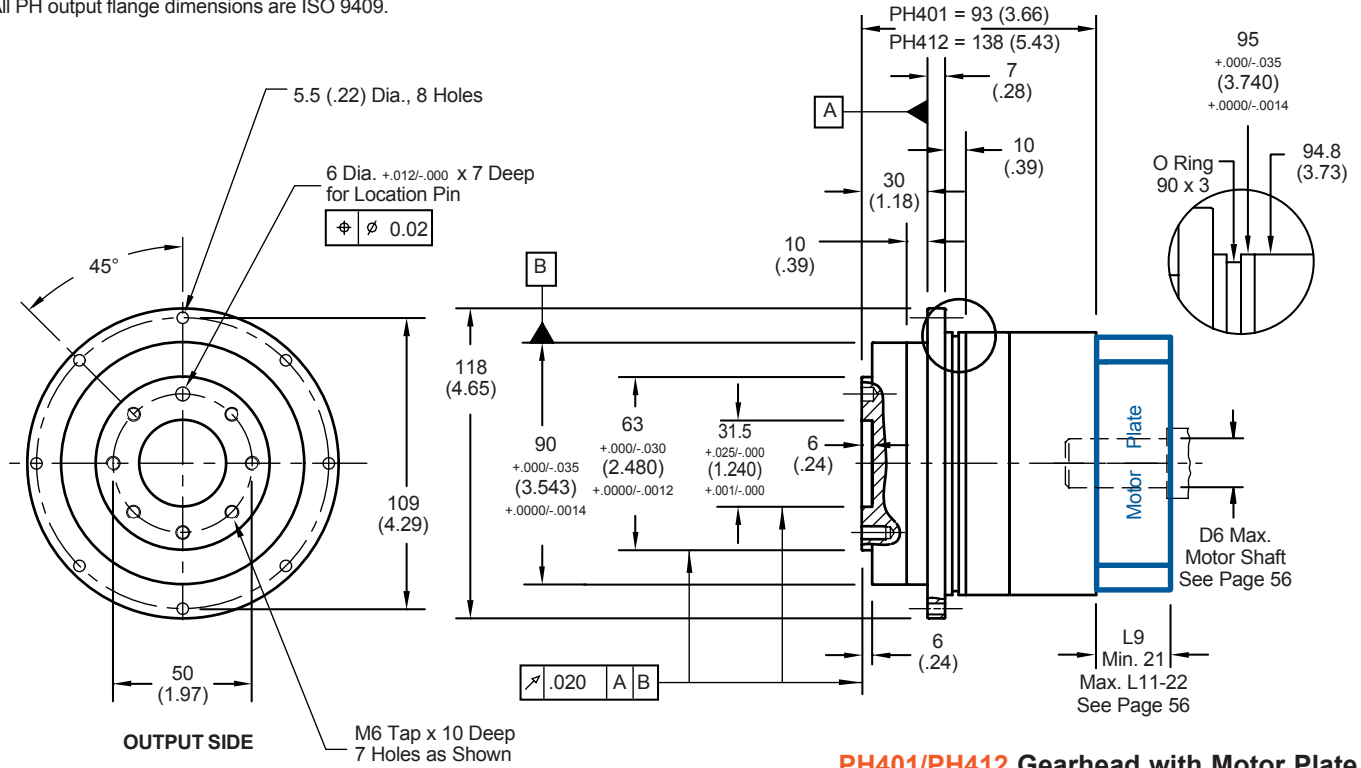
"PH" Series-PowerLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



Dimension shown in millimeters (inches).
 All PH output flange dimensions are ISO 9409.



See web site for drawings.

"PH" Series-PowerLine

PH401/PH412 Gearhead with Motor Plate

PH401/PH412 Gearhead with Input Shaft

Table No. 1 Dimensions

| | B7 g6 | | B8 g6 | | D7 k6 |
|-------|----------------|-------------------|----------------|-------------------|-----------------|
| | mm | ins. | mm | ins. | mm |
| PH401 | 52 | 2.047 | 58 | 2.283 | 16 |
| | $-0.10/-0.029$ | $-0.0004/-0.0011$ | $-0.12/-0.034$ | $-0.0005/-0.0013$ | $+0.012/+0.001$ |
| PH412 | 45 | 1.772 | - | - | 12 |
| | $-0.10/-0.029$ | $-0.0004/-0.0011$ | | | $+0.012/+0.001$ |

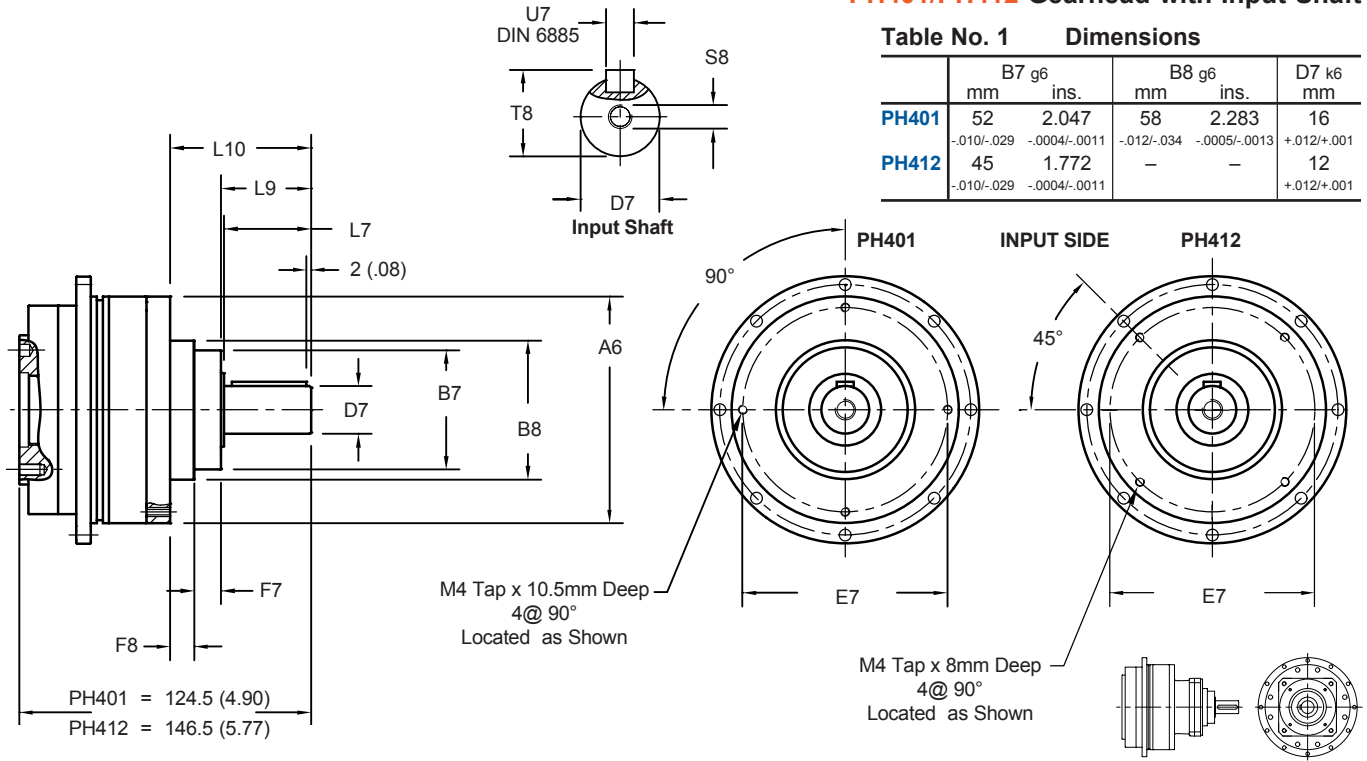


Table No. 2 "PH401/P412" Series - Gearhead with Input Shaft - Dimensions

| | A6 | | E7 | | F7 | | F8 | | L7 | | L9 | | L10 | | S8 | T8 | | U7 |
|-------|------|------|------|------|------|------|----|------|----|------|------|------|-----|------|----|------|------|---------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | | mm | ins. | |
| PH401 | 94.8 | 3.73 | 84 | 3.31 | 14 | 0.55 | 10 | 0.39 | 28 | 1.10 | 30 | 1.18 | 54 | 2.13 | M5 | 18 | 0.71 | A5x5x22 |
| PH412 | 72 | 2.83 | 55.5 | 2.19 | 10.5 | 0.41 | - | - | 18 | 0.71 | 18.5 | 0.73 | 29 | 1.14 | M4 | 13.5 | 0.53 | A4x4x14 |



"PH" Series—PowerLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ Continuous Cyclic RPM (n ₁) | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ lb-in-s ² kgcm ² | | Torsional Stiffness C _t in.lbs. Nm per arcmin | | Output Torque | | | | | |
|-----------------------------------|---------|---------------------|--|-------------------------------|-------------------------------------|---|-----------------------|--|--------------|---------------|-----------------|--|-----------------|--|--------------------|
| Gearhead | M AW | | T _{2N} in.lbs. Nm | T _{2B} in.lbs. Nm | | Peak ³⁾ T _{2PEAK} in.lbs. Nm | Nominal ²⁾ | | Acceleration | | T _{2N} | | T _{2B} | | T _{2PEAK} |

PH501 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|------|-------|----|-------|-----|-------|-----|-------|-----|
| PH501F0050 | — | 5.000 | 3,000 | 6,000 | 32 | 0.0039 | 4.46 | 752.3 | 85 | 1,770 | 200 | 2,655 | 300 | 5,363 | 606 |
| PH501F0070 | — | 7.000 | 3,000 | 6,000 | 32 | 0.0035 | 3.95 | 752.3 | 85 | 1,770 | 200 | 2,655 | 300 | 3,602 | 407 |
| PH501F0100 | — | 10.00 | 3,000 | 6,000 | 32 | 0.0033 | 3.71 | 752.3 | 85 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |

PH512 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|------|-------|----|-------|-----|-------|-----|-------|-----|
| PH512F0250 | — | 25.00 | 4,000 | 6,000 | 24 | 0.0013 | 1.45 | 557.6 | 63 | 1,770 | 200 | 2,655 | 300 | 5,363 | 606 |
| PH512F0350 | — | 35.00 | 4,000 | 6,000 | 24 | 0.0012 | 1.33 | 557.6 | 63 | 1,770 | 200 | 2,062 | 233 | 2,575 | 291 |
| PH512F0500 | — | 50.00 | 4,000 | 6,000 | 24 | 0.0013 | 1.42 | 690.3 | 78 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| PH512F0700 | — | 70.00 | 4,000 | 6,000 | 24 | 0.0012 | 1.31 | 690.3 | 78 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| PH512F1000 | — | 100.0 | 4,000 | 6,000 | 24 | 0.0011 | 1.27 | 690.3 | 78 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PH 5 01 F 0050 M or AW

PH PowerLine ServoFit Precision Planetary Gearhead
 5 Output Flange
 01 No. of Stages (01 = 1 Stage, 12 = 2 Stage)
 F Ratio (0050 = 5.0:1)
 0050 Motor Plate (See Page 56)
 M or AW Input Shaft

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

PowerLine ServoFit Precision Planetary Gearhead

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Output Torque (T_{2N}) ≤ 200 Nm (1,770 in.lbs.)
Ratio (i) = 5 - 100:1
Backlash (Δφ) ≤ 3 arc minutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

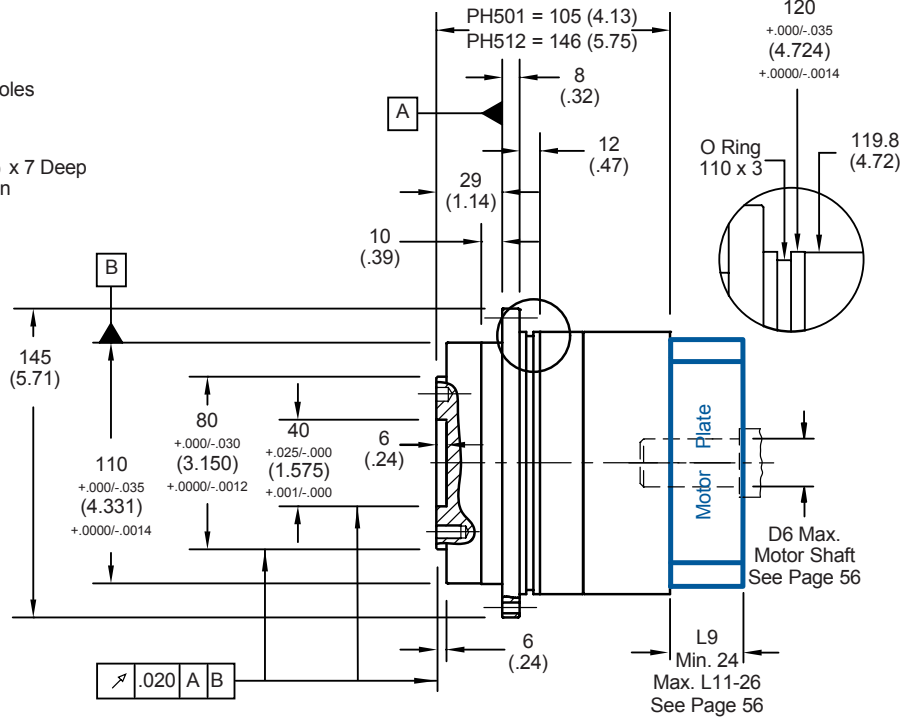
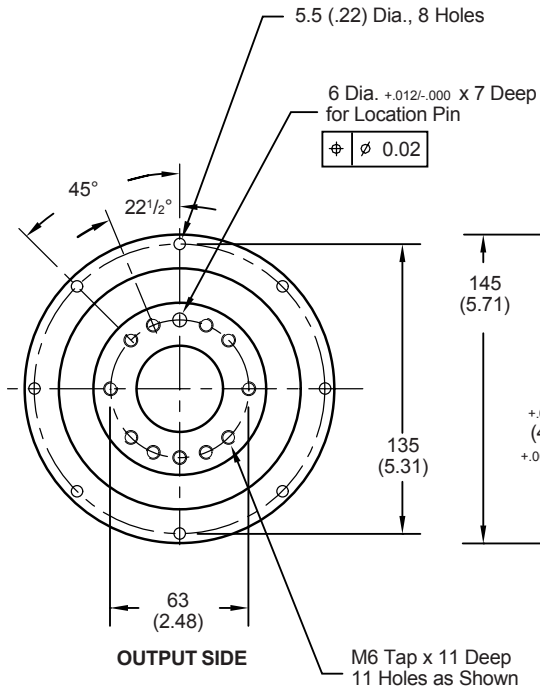
"PH" Series-PowerLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



Dimension shown in millimeters (inches).
 All PH output flange dimensions are ISO 9409.



PH501/PH512 Gearhead with Motor Plate

PH501/PH512 Gearhead with Input Shaft

Table No. 1 Dimensions

| | B7 g6 | | B8 g6 | | D7 k6 |
|--------------|----------------|-------------------|----------------|-------------------|-----------------|
| | mm | ins. | mm | ins. | mm |
| PH501 | 60 | 2.362 | 66 | 2.598 | 22 |
| | $-0.10/-0.029$ | $-0.0004/-0.0011$ | $-0.10/-0.029$ | $-0.0004/-0.0011$ | $+0.015/+0.002$ |
| PH512 | 52 | 2.047 | 58 | 2.283 | 16 |
| | $-0.10/-0.029$ | $-0.0004/-0.0011$ | $-0.12/-0.034$ | $-0.0005/-0.0013$ | $+0.012/+0.001$ |

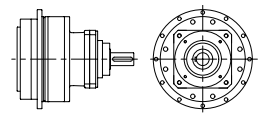
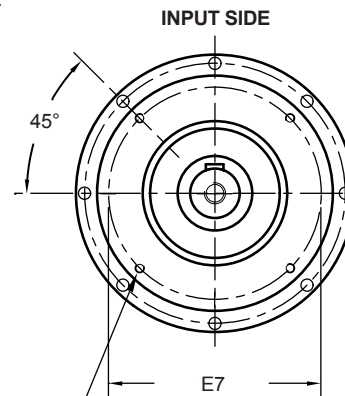
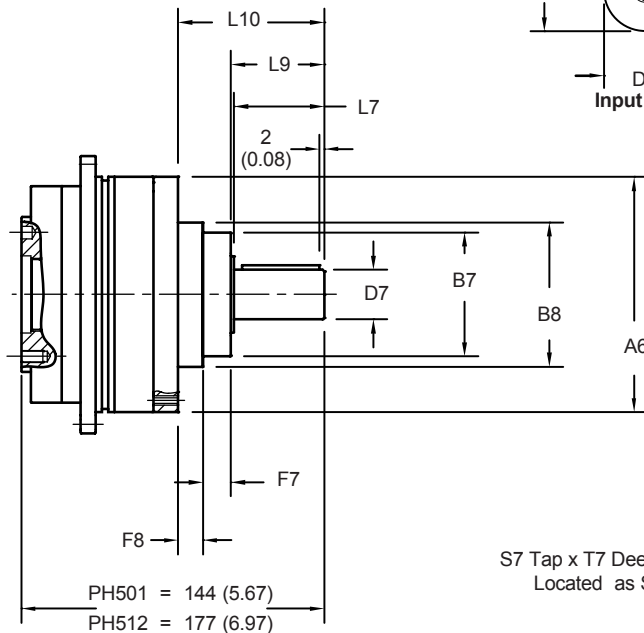
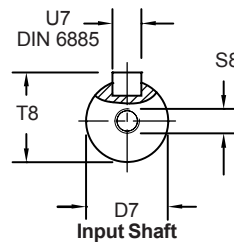


Table No. 2 "PH501/PH512" Series - Gearhead with Input Shaft - Dimensions

| | A6 | | E7 | | F7 | | F8 | | L7 | | L9 | | L10 | | S7 | S8 | T7 | | T8 | | U7 |
|--------------|-------|------|-----|------|----|------|----|------|----|------|----|------|-----|------|----|----|----|------|------|------|---------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | mm | mm | mm | mm | mm | mm |
| PH501 | 119.8 | 4.72 | 107 | 4.21 | 14 | 0.55 | 13 | 0.51 | 36 | 1.42 | 38 | 1.50 | 65 | 2.56 | M5 | M8 | 14 | 0.55 | 24.5 | 0.96 | A6x6x30 |
| PH512 | 98 | 3.86 | 74 | 2.91 | 10 | 0.39 | 11 | 0.43 | 28 | 1.10 | 30 | 1.18 | 51 | 2.01 | M4 | M5 | 6 | 0.24 | 18 | 0.71 | A5x5x22 |

See web site for drawings.

"PH" Series-PowerLine



"PH" Series—PowerLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|-----------------------------------|---------|----------------------------|--|---------------|-------------------------------------|---|-------------------|--|----|-----------------------|----|---------------------------------|----|--------------------|--|
| Gearhead | M AW | | Continuous RPM (n ₁) | Cyclic RPM | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ | | Acceleration T _{2B} | | Peak ³⁾ | |
| | | T _{2N} in.lbs. | | | Nm | | | | | in.lbs. | Nm | in.lbs. | Nm | | |

PH701 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|------|--------|-----|-------|-----|-------|-----|--------|-------|
| PH701F0050 | — | 5.000 | 2,500 | 5,000 | 38 | 0.0081 | 9.19 | 1504.5 | 170 | 3,540 | 400 | 5,753 | 650 | 10,735 | 1,213 |
| PH701F0070 | — | 7.000 | 2,500 | 5,000 | 38 | 0.0070 | 7.86 | 1504.5 | 170 | 3,540 | 400 | 5,753 | 650 | 7,514 | 849 |
| PH701F0100 | — | 10.00 | 2,500 | 5,000 | 38 | 0.0063 | 7.17 | 1504.5 | 170 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |

PH712 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|------|--------|-----|-------|-----|-------|-----|--------|-------|
| PH712F0250 | — | 25.00 | 3,500 | 6,000 | 32 | 0.0037 | 4.18 | 1185.9 | 134 | 3,540 | 400 | 5,753 | 650 | 10,735 | 1,213 |
| PH712F0350 | — | 35.00 | 3,500 | 6,000 | 32 | 0.0034 | 3.81 | 1185.9 | 134 | 3,540 | 400 | 4,292 | 485 | 5,363 | 606 |
| PH712F0500 | — | 50.00 | 3,500 | 6,000 | 32 | 0.0036 | 4.10 | 1407.2 | 159 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| PH712F0700 | — | 70.00 | 3,500 | 6,000 | 32 | 0.0033 | 3.77 | 1407.2 | 159 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| PH712F1000 | — | 100.0 | 3,500 | 6,000 | 32 | 0.0032 | 3.61 | 1407.2 | 159 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

"PH" Series—PowerLine

Part No. Explanation

| | | | | | | |
|-----------|----------|-----------|----------|-------------|-----------------------|--|
| PH | 7 | 01 | F | 0050 | M or AW | |
| | | | | | | Input Shaft |
| | | | | | | Motor Plate (See Page 56) |
| | | | | | | Ratio (0050 = 5.0:1) |
| | | | | | | Output Flange |
| | | | | | | No. of Stages (01 = 1 Stage, 12 = 2 Stage) |
| | | | | | | Unit No. |

PowerLine ServoFit Precision Planetary Gearhead

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Output Torque (T_{2N}) ≤ 400 Nm (3,540 in.lbs.)
Ratio (i) = 5 - 100:1
Backlash (Δφ) ≤ 3 arc minutes

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

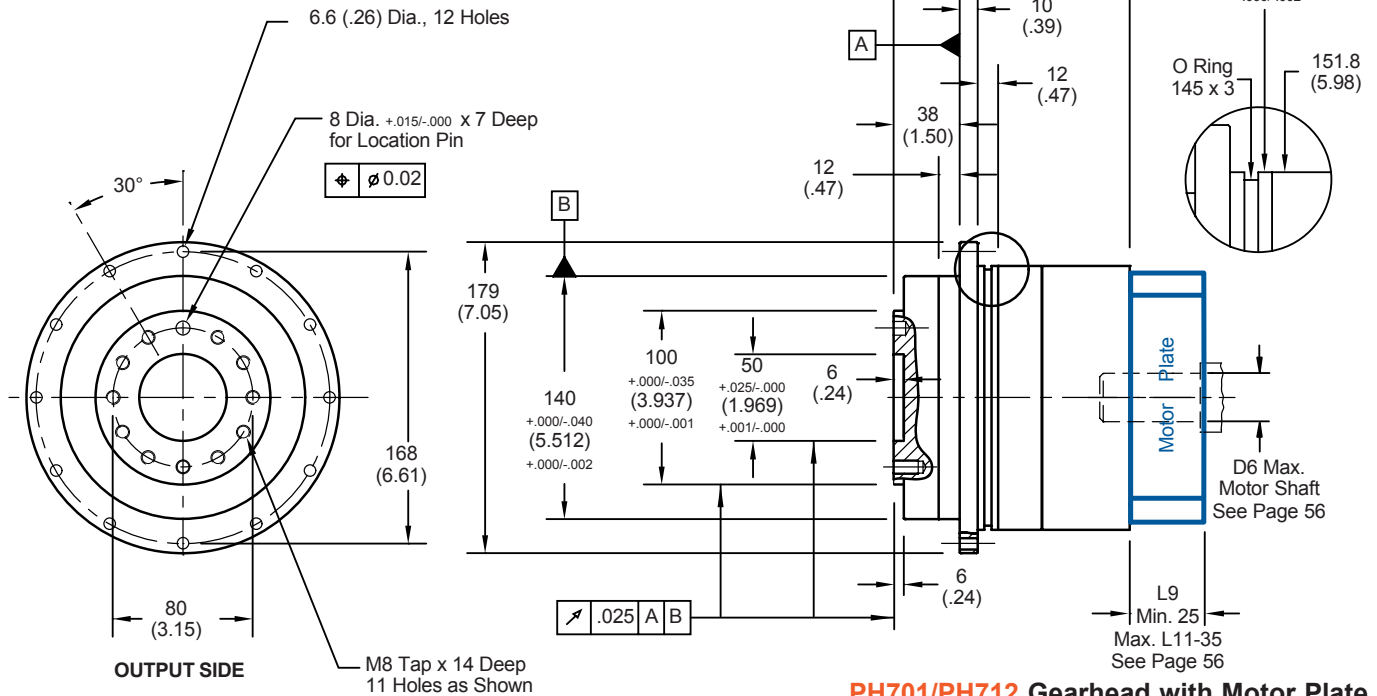
"PH" Series-PowerLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



Dimension shown in millimeters (inches).
 All PH output flange dimensions are ISO 9409.



PH701/PH712 Gearhead with Motor Plate

PH701/PH712 Gearhead with Input Shaft

Table No. 1 Dimensions

| | B7 g6 | | B8 g6 | | D7 k6 |
|--------------|---------------|-----------------|---------------|-----------------|---------------|
| | mm | ins. | mm | ins. | |
| PH701 | 80 | 3.150 | 93 | 3.661 | 32 |
| | -0.010/-0.029 | -0.0004/-0.0011 | -0.012/-0.034 | -0.0005/-0.0013 | +0.018/+0.002 |
| PH712 | 60 | 2.362 | 66 | 2.598 | 22 |
| | -0.010/-0.029 | -0.0004/-0.0011 | -0.010/-0.029 | -0.0004/-0.0011 | +0.015/+0.002 |

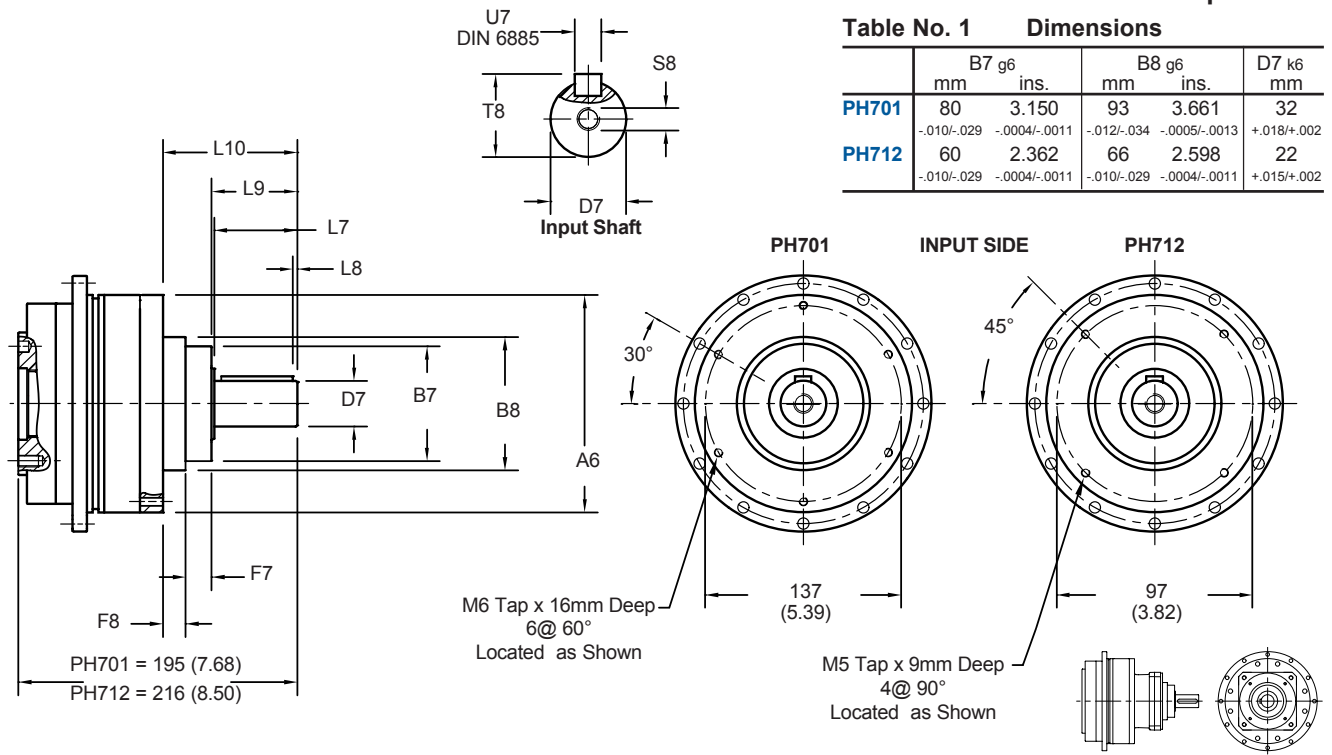


Table No. 2 "PH701/PH712" Series - Gearhead with Input Shaft - Dimensions

| | A6 | | F7 | | F8 | | L7 | | L8 | | L9 | | L10 | | S8 | T8 | | U7 |
|--------------|-------|------|----|------|----|------|----|------|----|------|----|------|-----|------|-----|------|------|----------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | | mm | ins. | |
| PH701 | 151.8 | 5.98 | 16 | 0.63 | 18 | 0.71 | 58 | 2.28 | 3 | 0.12 | 60 | 2.36 | 94 | 3.70 | M12 | 35 | 1.38 | A10x8x50 |
| PH712 | 114 | 4.49 | 13 | 0.51 | 10 | 0.39 | 36 | 1.42 | 2 | 0.08 | 38 | 1.50 | 61 | 2.40 | M8 | 24.5 | 0.96 | A6x6x30 |

Typical 2 Stage Configuration

See web site for drawings.

"PH" Series-PowerLine



"PH" Series—PowerLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ Continuous Cyclic RPM (n ₁) | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ lb-in-s ² kgcm ² | | Torsional Stiffness C _t in.lbs. Nm per arcmin | | Output Torque | | | | | |
|-----------------------------------|---------|---------------------|--|--|-------------------------------------|---|--|--|--|--|--|---|--|--|--|
| Gearhead | M AW | | | | | | | | | Nominal ²⁾ T _{2N} in.lbs. Nm | | Acceleration T _{2B} in.lbs. Nm | | Peak ³⁾ T _{2PEAK} in.lbs. Nm | |

PH801 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|------|--------|-----|-------|-----|--------|-------|--------|-------|
| PH801F0050 | — | 5.000 | 2,500 | 4,000 | 48 | 0.0364 | 41.1 | 3894.0 | 440 | 7,080 | 800 | 11,505 | 1,300 | 21,461 | 2,425 |
| PH801F0070 | — | 7.000 | 2,500 | 4,000 | 48 | 0.0288 | 32.5 | 3894.0 | 440 | 7,080 | 800 | 11,505 | 1,300 | 15,027 | 1,698 |
| PH801F0100 | — | 10.00 | 2,500 | 4,000 | 48 | 0.0250 | 28.3 | 3894.0 | 440 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |

PH812 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|------|---------|-----|-------|-----|--------|-------|--------|-------|
| PH812F0250 | — | 25.00 | 3,000 | 6,000 | 38 | 0.0081 | 9.16 | 2876.3 | 325 | 7,080 | 800 | 11,505 | 1,300 | 21,461 | 2,425 |
| PH812F0350 | — | 35.00 | 3,000 | 6,000 | 38 | 0.0078 | 8.83 | 3,301.1 | 373 | 7,080 | 800 | 11,505 | 1,300 | 15,027 | 1,698 |
| PH812F0500 | — | 50.00 | 3,000 | 6,000 | 38 | 0.0077 | 8.66 | 3575.4 | 404 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| PH812F0700 | — | 70.00 | 3,000 | 6,000 | 38 | 0.0067 | 7.59 | 3575.4 | 404 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| PH812F1000 | — | 100.0 | 3,000 | 6,000 | 38 | 0.0062 | 7.04 | 3575.4 | 404 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |

¹⁾ For higher speeds than shown, contact Stöber.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

"PH" Series—PowerLine

Part No. Explanation

| | | | | | | |
|-----------|----------|-----------|----------|-------------|-----------------------|---|
| PH | 8 | 01 | F | 0050 | M or AW | |
| | | | | | | Input Shaft |
| | | | | | | Motor Plate (See Page 56) |
| | | | | | | Ratio (0050 = 5.0:1) |
| | | | | | | Output Flange |
| | | | | | | No. of Stages (01 = 1 Stage, 12 = 2 Stage) |
| | | | | | | Unit No. |

PowerLine ServoFit Precision Planetary Gearhead

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Output Torque (T_{2N}) ≤ 800 Nm (7,080 in.lbs.)
Ratio (i) = 5 - 100:1
Backlash (Δφ) ≤ 3 arc minutes

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

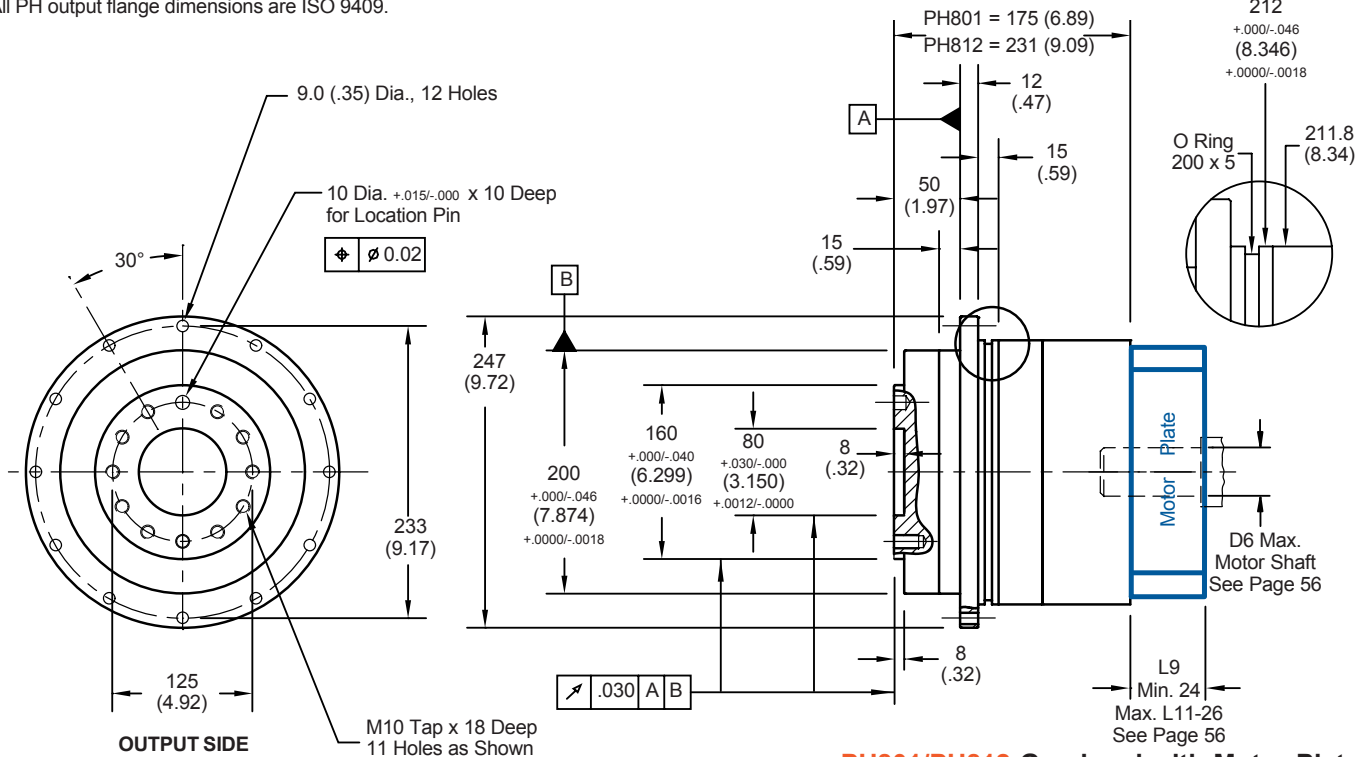
"PH" Series—PowerLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



Dimension shown in millimeters (inches).
 All PH output flange dimensions are ISO 9409.



PH801/PH812 Gearhead with Motor Plate

PH801/PH812 Gearhead with Input Shaft

See web site for drawings.

"PH" Series—PowerLine

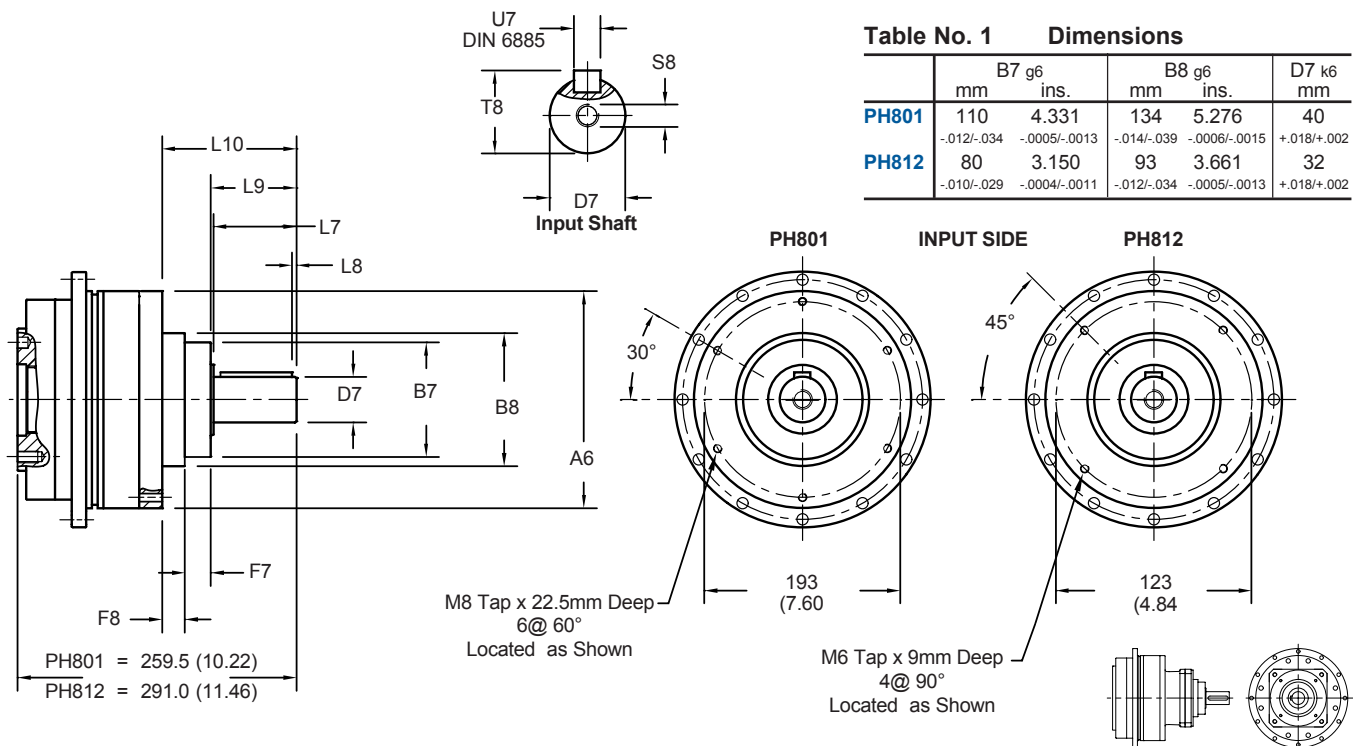


Table No. 1 Dimensions

| | B7 g6 | | B8 g6 | | D7 k6 |
|--------------|--------------|----------------|--------------|----------------|---------------|
| | mm | ins. | mm | ins. | mm |
| PH801 | 110 | 4.331 | 134 | 5.276 | 40 |
| | -.012/-0.034 | -.0005/-0.0013 | -.014/-0.039 | -.0006/-0.0015 | +0.018/+0.002 |
| PH812 | 80 | 3.150 | 93 | 3.661 | 32 |
| | -.010/-0.029 | -.0004/-0.0011 | -.012/-0.034 | -.0005/-0.0013 | +0.018/+0.002 |

Table No. 2 "PH801/PH812" Series – Gearhead with Input Shaft – Dimensions

| | A6 | | F7 | | F8 | | L7 | | L8 | | L9 | | L10 | | S8 | T8 | | U7 |
|--------------|-------|------|----|------|----|------|----|------|----|------|----|------|-----|------|-----|----|------|----------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | | mm | ins. | |
| PH801 | 211.8 | 8.34 | 14 | 0.55 | 21 | 0.83 | 82 | 3.23 | 4 | 0.16 | 84 | 3.31 | 119 | 4.69 | M16 | 43 | 1.69 | A12x8x70 |
| PH812 | 144 | 5.67 | 18 | 0.71 | 12 | 0.47 | 58 | 2.28 | 3 | 0.12 | 60 | 2.36 | 90 | 3.54 | M12 | 35 | 1.38 | A10x8x50 |



"PH" Series—PowerLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|-----------------------------------|---------|---------------------|--|---------------|-------------------------------------|---|-------------------|--|----|--|----|---------------------------------|----|--|----|
| Gearhead | M AW | | Continuous RPM (n ₁) | Cyclic RPM | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm |

PH912 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|------|---------|-----|--------|-------|--------|-------|--------|-------|
| PH912F0120 | — | 12.00 | 2,000 | 4,500 | 48 | 0.0606 | 68.5 | 4,956.0 | 560 | 22,125 | 2,500 | 37,613 | 4,250 | 49,445 | 5,587 |
| PH912F0160 | — | 16.00 | 2,000 | 4,500 | 48 | 0.0411 | 46.4 | 4,956.0 | 560 | 22,125 | 2,500 | 37,613 | 4,250 | 65,932 | 7,450 |
| PH912F0200 | — | 20.00 | 2,500 | 4,500 | 48 | 0.0337 | 38.1 | 4,956.0 | 560 | 22,125 | 2,500 | 37,613 | 4,250 | 75,225 | 8,500 |
| PH912F0280 | — | 28.00 | 2,500 | 4,500 | 48 | 0.0274 | 31.0 | 4,956.0 | 560 | 22,125 | 2,500 | 37,613 | 4,250 | 57,684 | 6,518 |
| PH912F0400 | — | 40.00 | 2,500 | 4,500 | 48 | 0.0244 | 27.6 | 4,956.0 | 560 | 22,125 | 2,500 | 37,613 | 4,250 | 75,225 | 8,500 |

PH923 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|------------|---|-------|-------|-------|----|--------|------|---------|-----|--------|-------|--------|-------|--------|-------|
| PH923F0610 | — | 61.00 | 2,500 | 4,500 | 38 | 0.0123 | 13.9 | 3,540.0 | 400 | 22,125 | 2,500 | 37,613 | 4,250 | 75,225 | 8,500 |
| PH923F0910 | — | 91.00 | 2,500 | 4,500 | 38 | 0.0088 | 9.94 | 3,540.0 | 400 | 22,125 | 2,500 | 37,613 | 4,250 | 75,225 | 8,500 |
| PH923F1210 | — | 121.0 | 2,500 | 4,500 | 38 | 0.0075 | 8.49 | 3,540.0 | 400 | 22,125 | 2,500 | 37,613 | 4,250 | 75,225 | 8,500 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

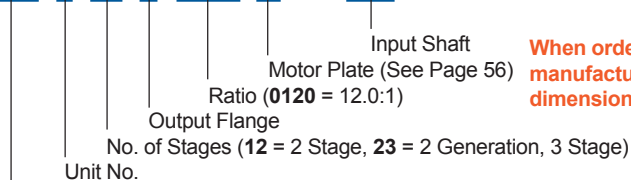
For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PH 9 12 F 0120 M or AW



When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

PowerLine ServoFit Precision Planetary Gearhead

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Output Torque (T_{2N}) ≤ 2,500 Nm (22,125 in.lbs.)
Ratio (i) = 12 - 121:1
Backlash (Δφ) ≤ 3 arc minutes

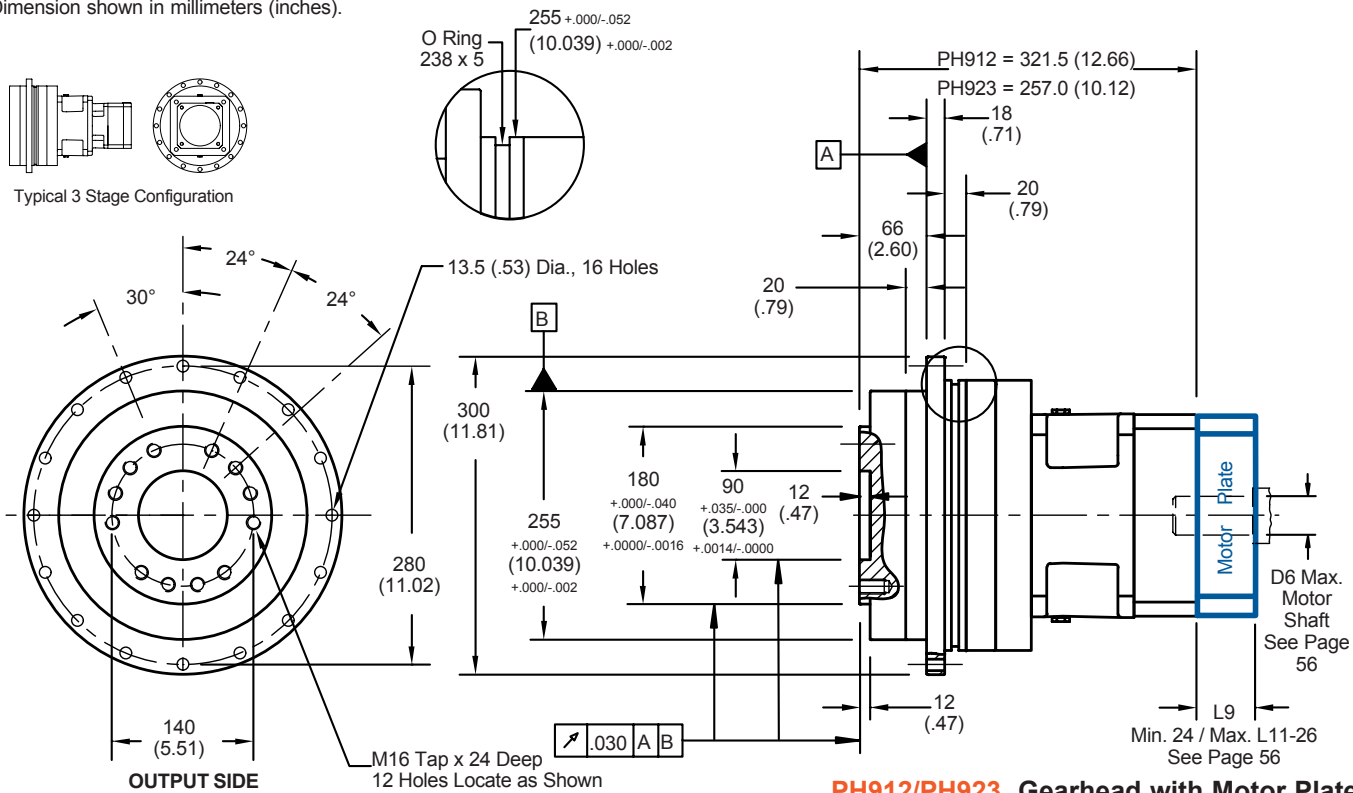
Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.



"PH" Series—PowerLine ServoFit® Precision Planetary Gearhead Dimensional Data



Dimension shown in millimeters (inches).



PH912/PH923 Gearhead with Motor Plate
PH912/PH923 Gearhead with Input Shaft

See web site for drawings.

"PH" Series—PowerLine

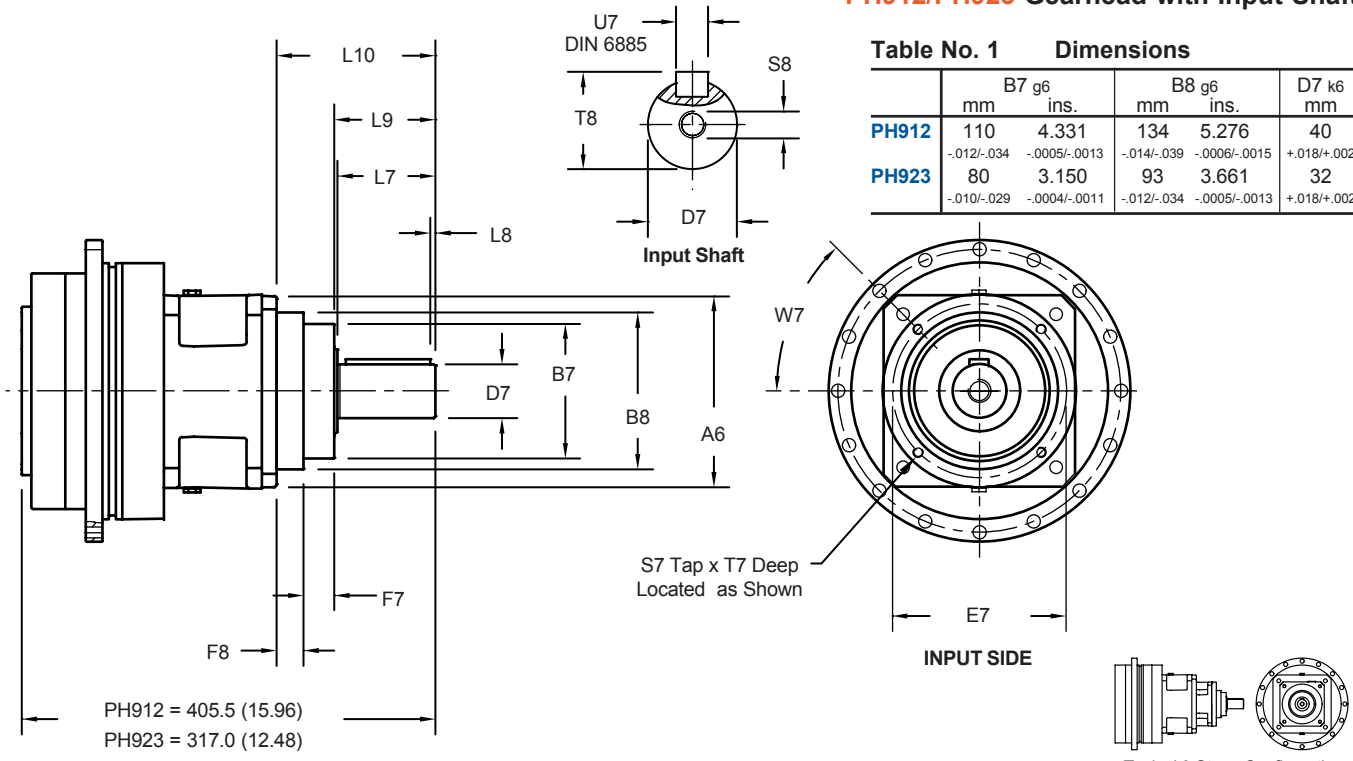


Table No. 1 Dimensions

| | B7 g6 | | B8 g6 | | D7 k6 |
|-------|---------------|-----------------|---------------|-----------------|---------------|
| | mm | ins. | mm | ins. | mm |
| PH912 | 110 | 4.331 | 134 | 5.276 | 40 |
| | -0.012/-0.034 | -0.0005/-0.0013 | -0.014/-0.039 | -0.0006/-0.0015 | +0.018/+0.002 |
| PH923 | 80 | 3.150 | 93 | 3.661 | 32 |
| | -0.010/-0.029 | -0.0004/-0.0011 | -0.012/-0.034 | -0.0005/-0.0013 | +0.018/+0.002 |

Table No. 2 "PH912/PH923" Series – Gearhead with Input Shaft – Dimensions

| | A6 | | E7 | | F7 | | F8 | | L7 | | L8 | | L9 | | L10 | | S7 | S8 | T7 | T8 | U7 | W7 | | |
|-------|-------|------|-----|------|----|------|----|------|----|------|----|------|----|------|-----|------|----|------|----|------|----|------|----------|------------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | | | | |
| PH912 | 190 | 7.48 | 179 | 7.05 | 21 | 0.83 | 15 | 0.59 | 82 | 3.23 | 4 | 0.16 | 84 | 3.31 | 120 | 4.72 | M8 | M16 | 12 | 0.47 | 43 | 1.69 | A12x8x70 | 45°, 4@90° |
| PH923 | 151.8 | 5.98 | 137 | 5.39 | 16 | 0.63 | 18 | 0.71 | 58 | 2.28 | 3 | 0.12 | 60 | 2.36 | 94 | 3.70 | M6 | M12 | 16 | 0.63 | 35 | 1.38 | A10x8x50 | 30°, 6@60° |



"PH" Series—PowerLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|-----------------------------------|---------|---------------------|--|---------------------------------|-------------------------------------|---|-------------------|--|---------|--|---------|---------------------------------|---------|--|--|
| Gearhead | M AW | | Continuous RPM (n ₁) | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm | |

PH1023 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|------|---------|-----|--------|-------|--------|-------|---------|--------|
| PH1023F0610 | — | 61.00 | 2,500 | 4,500 | 48 | 0.0680 | 76.8 | 4,867.5 | 550 | 35,400 | 4,000 | 66,375 | 7,500 | 132,750 | 15,000 |
| PH1023F0910 | — | 91.00 | 2,500 | 4,500 | 48 | 0.0435 | 49.2 | 4,867.5 | 550 | 35,400 | 4,000 | 66,375 | 7,500 | 132,750 | 15,000 |

PH1024 with Motor Mounting Plate or Input Shaft

| | | | | | | | | | | | | | | | |
|-------------|---|--------|-------|-------|----|--------|------|---------|-----|--------|-------|--------|-------|---------|--------|
| PH1024F1830 | — | 183.00 | 2,500 | 4,500 | 38 | 0.0170 | 19.2 | 4,867.5 | 550 | 35,400 | 4,000 | 66,375 | 7,500 | 132,750 | 15,000 |
| PH1024F3050 | — | 305.00 | 2,500 | 4,500 | 38 | 0.0094 | 10.6 | 4,867.5 | 550 | 35,400 | 4,000 | 66,375 | 7,500 | 132,750 | 15,000 |
| PH1024F4550 | — | 455.00 | 2,500 | 4,500 | 38 | 0.0084 | 9.50 | 4,867.5 | 550 | 35,400 | 4,000 | 66,375 | 7,500 | 132,750 | 15,000 |
| PH1024F6370 | — | 637.00 | 2,500 | 4,500 | 38 | 0.0071 | 8.01 | 4,867.5 | 550 | 35,400 | 4,000 | 66,375 | 7,500 | 132,750 | 15,000 |
| PH1024F9100 | — | 910.00 | 2,500 | 4,500 | 38 | 0.0064 | 7.25 | 4,867.5 | 550 | 35,400 | 4,000 | 66,375 | 7,500 | 132,750 | 15,000 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

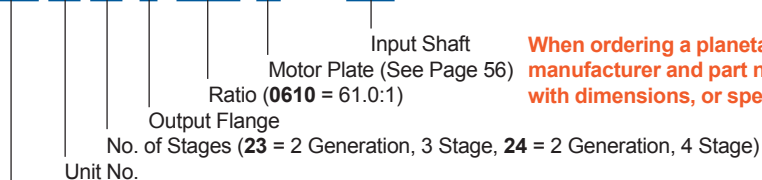
For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PH 10 23 F 0610 M or AW



When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

PowerLine ServoFit Precision Planetary Gearhead

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Output Torque (T_{2N}) ≤ 4,000 Nm (35,400 in.lbs.)
Ratio (i) = 61 - 910:1
Backlash (Δφ) ≤ 3 arc minutes

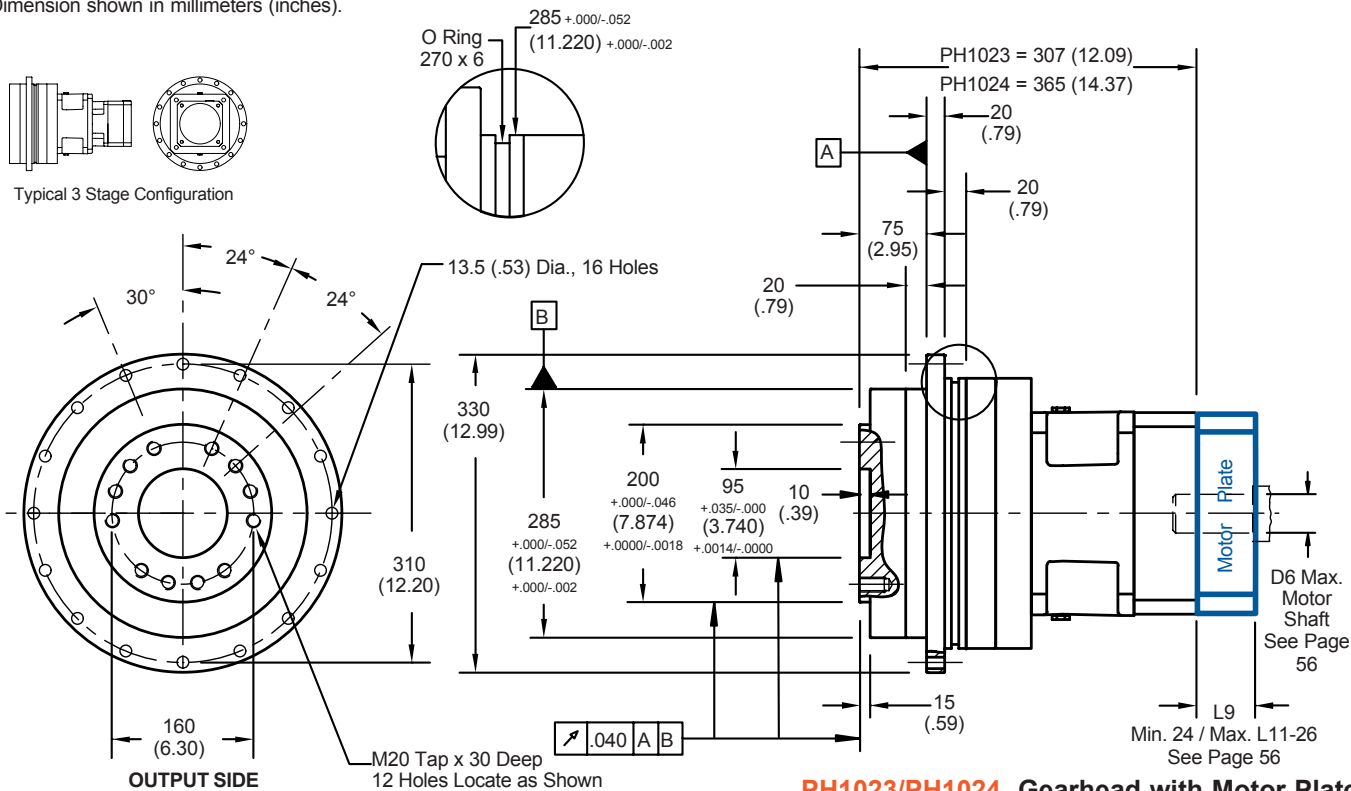
Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.



"PH" Series—PowerLine ServoFit® Precision Planetary Gearhead Dimensional Data



Dimension shown in millimeters (inches).



PH1023/PH1024 Gearhead with Input Shaft

See web site for drawings.

"PH" Series—PowerLine

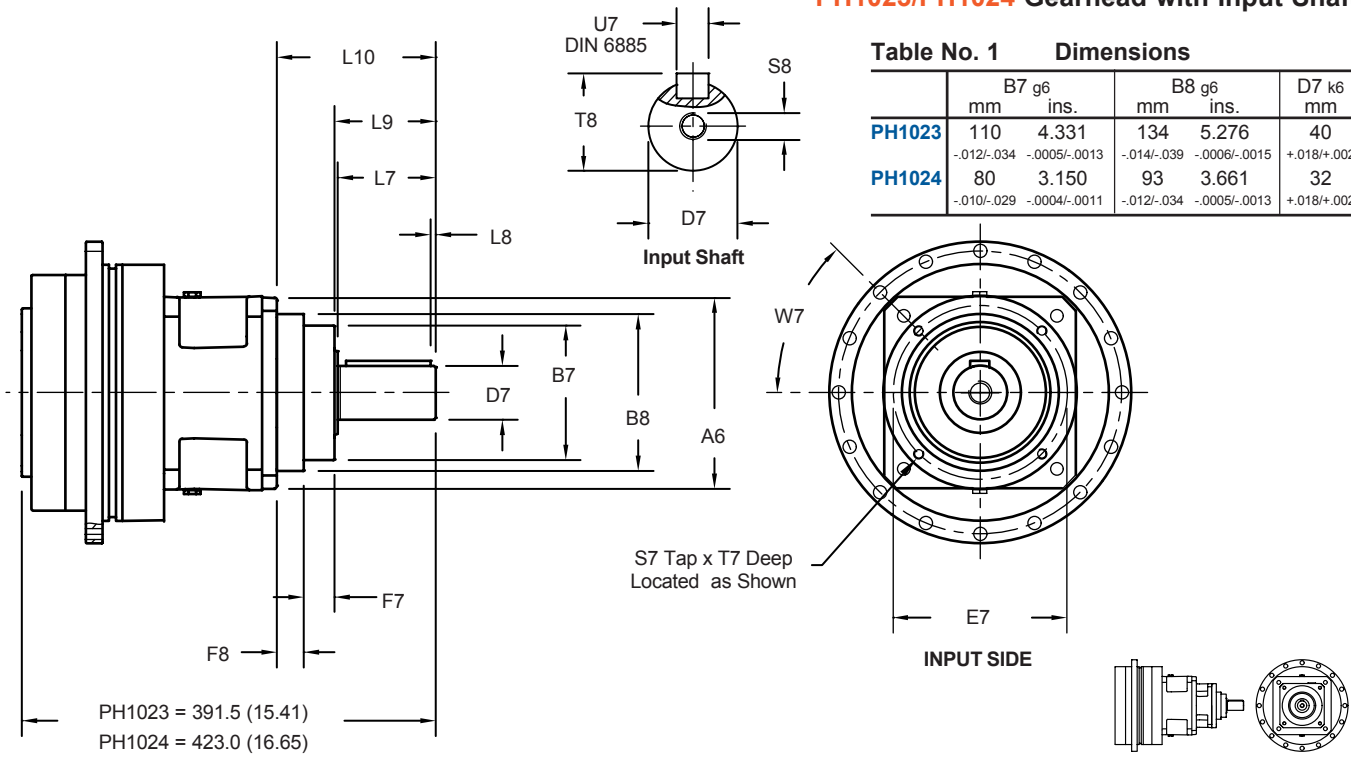


Table No. 2 "PH1023/PH1024" Series – Gearhead with Input Shaft – Dimensions

| | A6 | E7 | F7 | F8 | L7 | L8 | L9 | L10 | S7 | S8 | T7 | T8 | U7 | W7 |
|--------|------------|----------|---------|---------|---------|---------|---------|----------|---------|---------|-----------|---------|----------|------------|
| | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. | mm ins. |
| PH1023 | 211.8 8.34 | 179 7.05 | 21 0.83 | 15 0.59 | 82 3.23 | 4 0.16 | 84 3.31 | 119 4.68 | M8 | M16 | 22.5 0.89 | 43 1.69 | A12x8x70 | 30°, 6@60° |
| PH1024 | 144 5.67 | 193 7.59 | 14 0.55 | 21 0.83 | 58 2.28 | 3 0.12 | 60 2.36 | 94 3.70 | M6 | M12 | 9 0.63 | 35 1.38 | A10x8x50 | 45°, 4@90° |

"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Performance Specifications



"PHKX" Series—PowerLine

| Size | | | PH401 KX4 | PH412 KX3 | PH501 KX5 | PH512 KX4 | PH701 KX7 | PH712 KX5 | PH801 KX8 | PH812 KX7 | PH912 KX8 |
|--|--|---------------------|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Permissible Acceleration Torque | T _{2B} | in.lbs. | 885 | | 2,655 | | 5,753 | | 11,505 | | 37,612 |
| | Nm | | 100 | | 300 | | 650 | | 1300 | | 4250 |
| Nominal Output Torque ¹⁾ | T _{2N} | in.lbs. | 708 | | 1,770 | | 3,540 | | 7,080 | | 22,125 |
| | | Nm | 80 | | 200 | | 400 | | 800 | | 2500 |
| Input Speed, Maximum ²⁾ | n _{1MAX} | Continuous | 3,000 | | 3,000 | | 3,000 | | 2,500 | | 1,800 |
| | | Cyclic | 4,500 | 6,000 | 4,500 | | 4,500 | | 4,000 | 4,500 | 4,000 |
| Torsional Backlash ³⁾ | Δφ | arcmin | | | | | | | | | |
| | | Ratio | 5,7:1 | | ≤5 | | ≤4.5 | | ≤4.5 | | ≤4.5 |
| | | | 10,15:1 | | ≤4 | | ≤4 | | ≤4 | | ≤4 |
| | | | 20 - 300:1 | | ≤3.5 | | ≤3.5 | | ≤3.5 | | ≤3.5 |
| Torsional Stiffness, Maximum | C _t | in.lbs./arcmin | 212 | 257 | 558 | 690 | 1,274 | 1,398 | 3,009 | 3,566 | 4,840 |
| | | Nm/arcmin | 24 | 29 | 63 | 78 | 144 | 158 | 340 | 403 | 547 |
| Axial Load Max. | F _{2AMAX} | lbs. | 484 | | 934 | | 1,384 | | 2,261 | | 7,425 |
| | | N | 2,150 | | 4,150 | | 6,150 | | 10,050 | | 33,000 |
| Tilting Moment, Maximum ⁴⁾ | T _{2K} | in.lbs. | 2,124 | | 3,717 | | 2,593 | | 30,975 | | 57,525 |
| | | Nm | 240 | | 420 | | 1,500 | | 3,500 | | 6,500 |
| Weight | m | pounds | 13 | 13.5 | 25 | 22 | 47 | 43 | 102 | 93 | 203 |
| | | kg | 5.8 | 6.0 | 11.3 | 9.8 | 21.2 | 19.3 | 46.4 | 42.2 | 92.0 |
| Noise Level | L _{PA} | dB(A) ⁵⁾ | ≤70 | ≤69 | ≤71 | ≤70 | ≤73 | ≤71 | ≤75 | ≤73 | ≤75 |
| Efficiency (at Nominal Torque) | η | % | ≥93 - 96 | | | | | | | | |
| Balance Quality | Q 2.5 (Quality Class - 2.5 millimeters per second) | | | | | | | | | | |
| Lubrication | Synthetic Oil (ISO VG 150) | | | | | | | | | | |
| Mounting Position | Unrestricted | | | | | | | | | | |
| Direction of Rotation | OUTPUT rotation direction is opposite the INPUT rotation direction. | | | | | | | | | | |
| Ambient Temperature | 0°C to +40°C (104° F) Other temperatures, contact Stober Drives. | | | | | | | | | | |
| Finish | Black (RAL 9005) | | | | | | | | | | |
| Lifetime ⁶⁾ | L _h | hours | L _h > 10,000 hours if T _{2K} /T _{2A} < 1.25 L _h > 20,000 hours if T _{2K} /T _{2A} > 1.25 | | | | | | | | |
| Warranty | 5 Year Limited (2 Years on normal wear items: bearings, seals, etc.) | | | | | | | | | | |

¹⁾ Ratings based on input speed (n₁) of 2000 RPM.

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed. $T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$

²⁾ For speeds higher than given above, contact Stober Technical Support.

³⁾ Contact Stober Technical Support.

⁴⁾ Rating based on output speed (n₂) of 100 RPM. For values at other speeds see Page 57.

⁵⁾ Measurement at one (1) meter distance with input speed (n₁) of 3000 RPM.

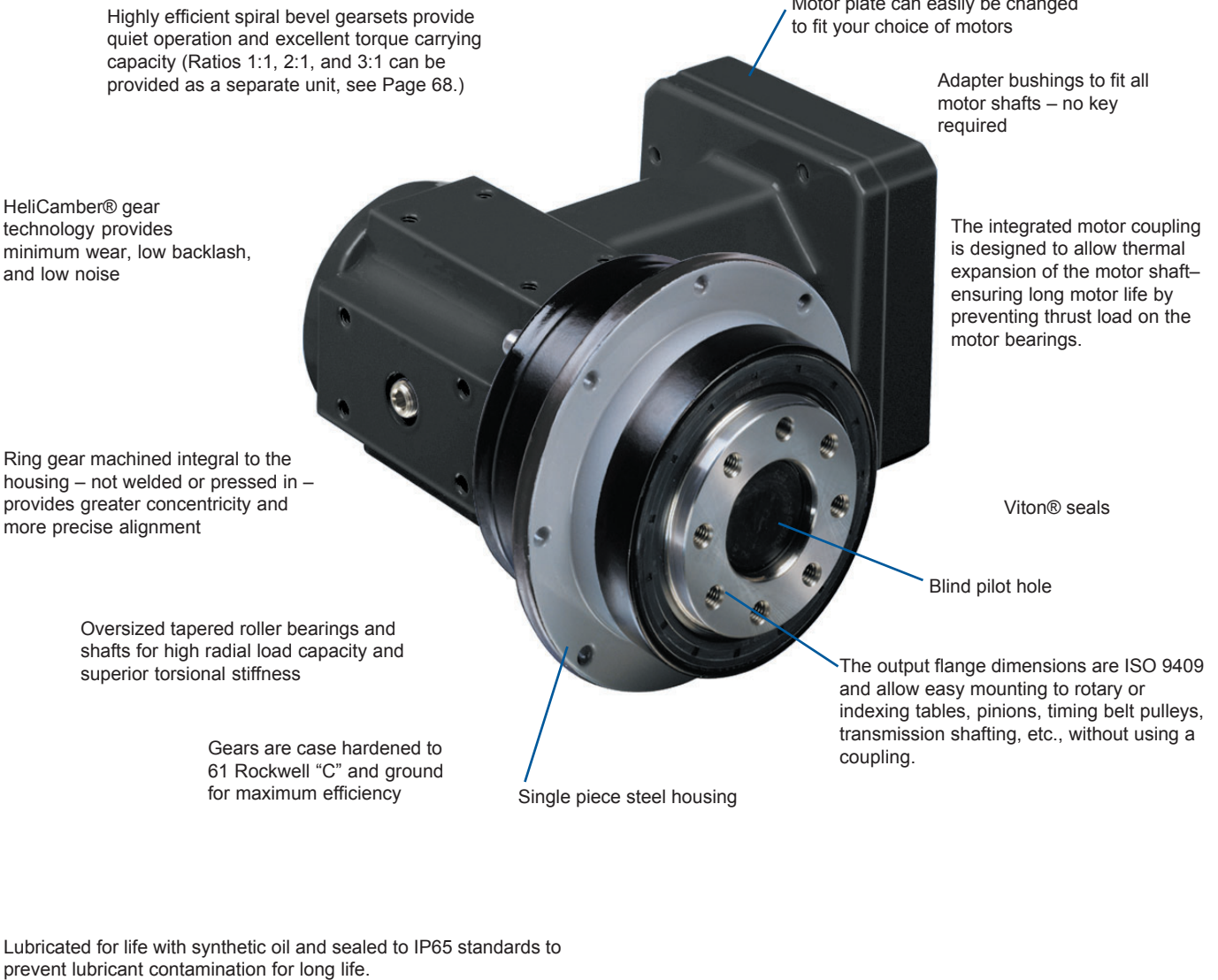
⁶⁾ T_{2A} equals actual tilting moment of the application. See Page 57 for overhung loads.

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Features

The "PHKX" Series combines the "PH" Series—PowerLine of ServoFit Precision Planetary Gearheads and the "KX" Series Right Angle. This combination provides a right angle configuration in a smooth, precise, reliable drive with the benefit of direct mounting to many types of equipment without a coupling.

- High Axial Load Capacity
- Superior Torsional Stiffness
- 5-300:1 Ratio Range
- Lowest Backlash
- Advanced Helical Gear Technology
- 5 Year Limited Warranty (2 Year on bearings, seals, etc.)



HeliCamber® gear technology provides minimum wear, low backlash, and low noise

Ring gear machined integral to the housing – not welded or pressed in – provides greater concentricity and more precise alignment

Oversized tapered roller bearings and shafts for high radial load capacity and superior torsional stiffness

Gears are case hardened to 61 Rockwell “C” and ground for maximum efficiency

Lubricated for life with synthetic oil and sealed to IP65 standards to prevent lubricant contamination for long life.

Wide selection of IEC, NEMA, or customized motor adapters.



"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|--|----|---------------------------------|----|--|----|
| | | Continuous RPM (n ₁) | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm |

PH401_KX4 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|-------------------------|--------|-------|-------|----|--------|------|-----|----|-----|----|-----|-----|-------|-----|
| PH401F0050 KX401VF0010M | 5.000 | 2,000 | 4,500 | 25 | 0.0024 | 2.66 | 124 | 14 | 708 | 80 | 885 | 100 | 2,106 | 238 |
| PH401F0070 KX401VF0010M | 7.000 | 2,000 | 4,500 | 25 | 0.0022 | 2.51 | 168 | 19 | 708 | 80 | 885 | 100 | 1,505 | 170 |
| PH401F0050 KX401VF0020M | 10.000 | 2,500 | 4,500 | 25 | 0.0015 | 1.70 | 124 | 14 | 708 | 80 | 885 | 100 | 2,213 | 250 |
| PH401F0050 KX401VF0030M | 15.000 | 3,000 | 4,500 | 25 | 0.0013 | 1.47 | 124 | 14 | 708 | 80 | 885 | 100 | 2,213 | 250 |
| PH401F0100 KX401VF0020M | 20.000 | 2,500 | 4,500 | 25 | 0.0015 | 1.64 | 212 | 24 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| PH401F0100 KX401VF0030M | 30.000 | 3,000 | 4,500 | 25 | 0.0013 | 1.44 | 212 | 24 | 708 | 80 | 885 | 100 | 1,770 | 200 |

PH412_KX3 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|-------------------------|---------|-------|-------|----|--------|-------|-----|----|-----|----|-----|-----|-------|-----|
| PH412F0350 KX301VF0010M | 35.000 | 2,500 | 6,000 | 19 | 0.0010 | 1.08 | 230 | 26 | 708 | 80 | 885 | 100 | 1,505 | 170 |
| PH412F0250 KX301VF0020M | 50.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.823 | 195 | 22 | 708 | 80 | 885 | 100 | 2,213 | 250 |
| PH412F0700 KX301VF0010M | 70.000 | 2,500 | 6,000 | 19 | 0.0009 | 1.04 | 248 | 28 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| PH412F0500 KX301VF0020M | 100.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.821 | 248 | 28 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| PH412F0500 KX301VF0030M | 150.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.753 | 248 | 28 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| PH412F1000 KX301VF0020M | 200.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.806 | 257 | 29 | 708 | 80 | 885 | 100 | 1,770 | 200 |
| PH412F1000 KX301VF0030M | 300.000 | 3,000 | 6,000 | 19 | 0.0007 | 0.747 | 257 | 29 | 708 | 80 | 885 | 100 | 1,770 | 200 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

"PHKX" Series—PowerLine

Part No. Explanation

| | | | | | | | |
|---|----------|-----------|----------|-------------|----------------|-------------|--|
| PH | 4 | 01 | F | 0100 | KX401VF | 0030 | M |
| PowerLine ServoFit Precision Planetary Gearhead | | | | | | | |
| | | | | | | | Motor Plate Input (See Page 56) |
| | | | | | | | Ratio (0030 = 3.0:1) |
| | | | | | | | Right Angle Unit |
| | | | | | | | Ratio (0100 = 10.0:1) |
| | | | | | | | Output Flange |
| | | | | | | | No. of Stages (01 = 1 Stage, 12 = 2 Stage) |
| | | | | | | | Unit No. |

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Output Torque (T_{2N}) ≤ 80 Nm (708 in.lbs.)
Ratio (i) = 5 - 300:1
Backlash (Δφ) ≤ 5 arcminutes

Index of Symbols

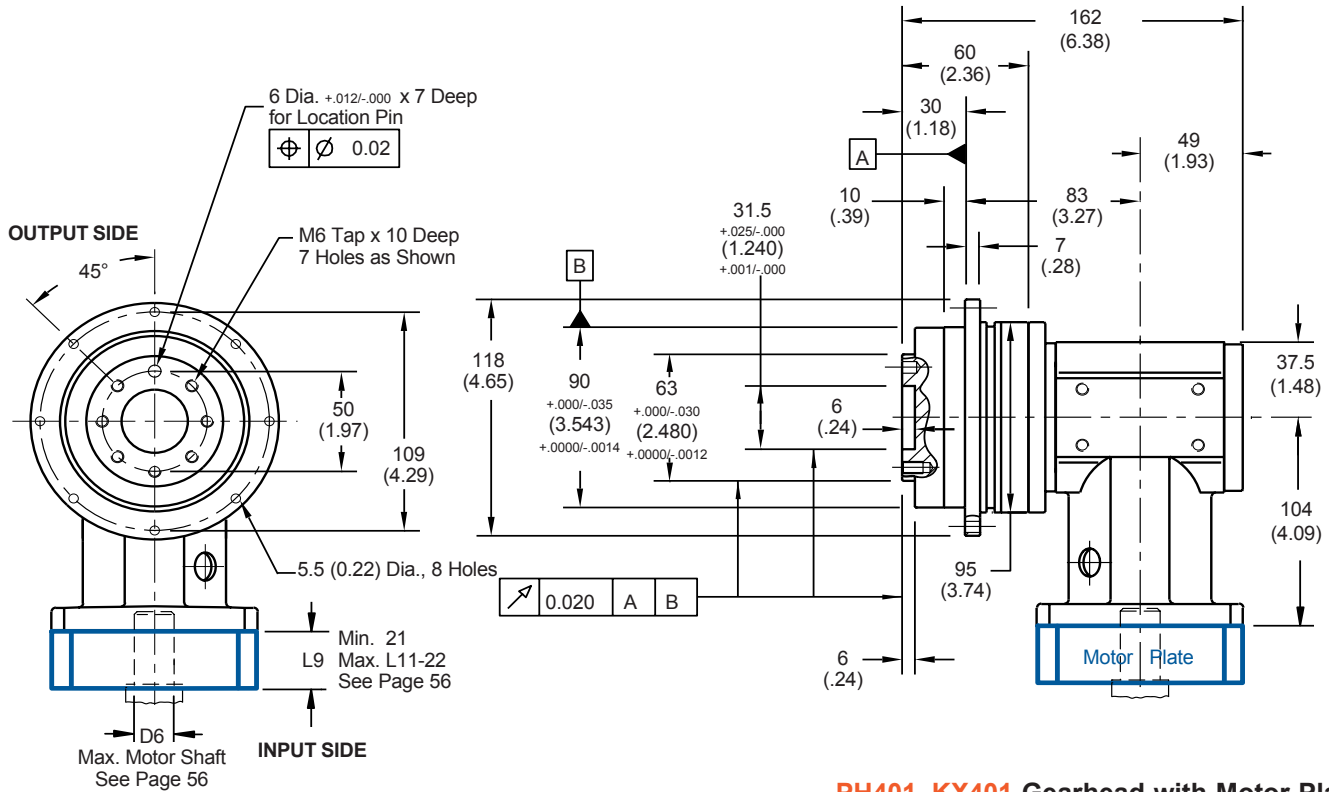
| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data



Dimension shown in millimeters (inches).
 All PHKX output flange dimensions are ISO 9409.

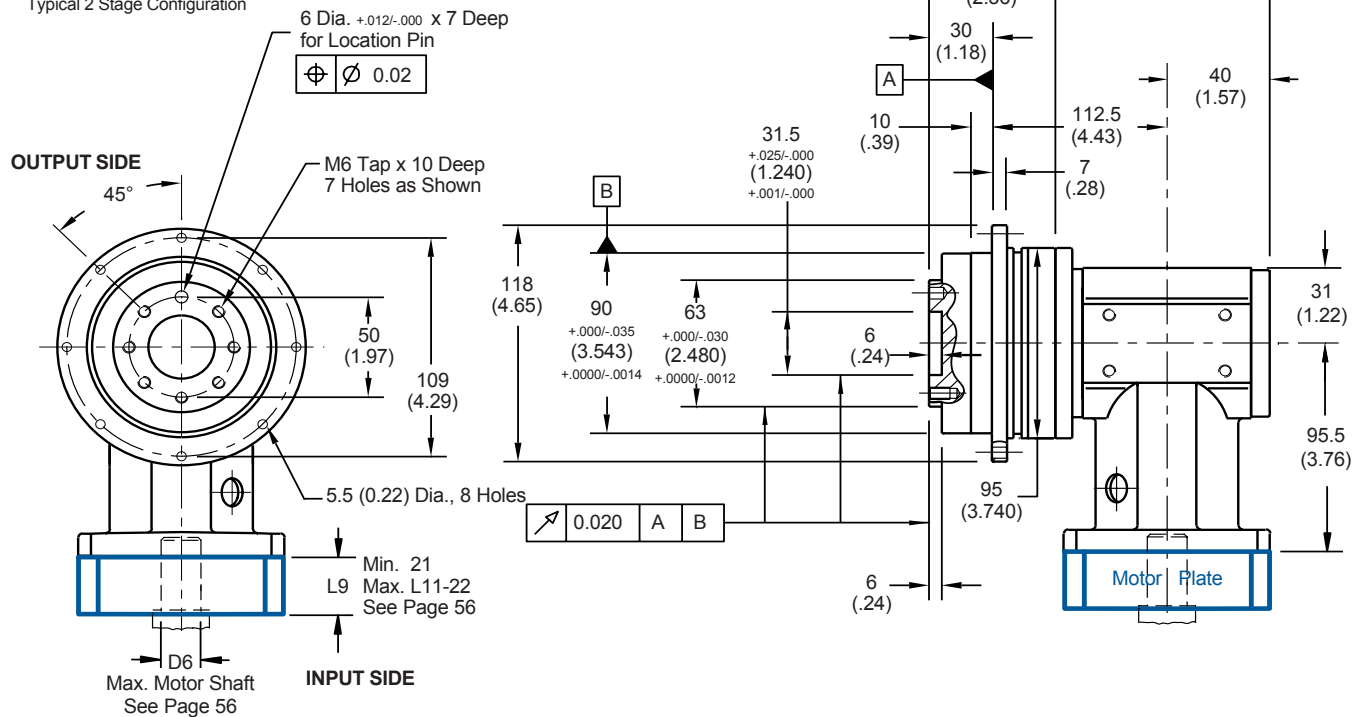
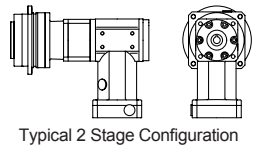


See web site for drawings.

"PHKX" Series—PowerLine

PH401_KX401 Gearhead with Motor Plate

PH412_KX301 Gearhead with Motor Plate





"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|--|----|---------------------------------|----|--|----|
| | | Continuous RPM (n ₁) | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm |

PH501_KX5 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|-------------------------|-------|-------|-------|----|--------|------|-----|----|-------|-----|-------|-----|-------|-----|
| PH501F0050 KX501VF0010M | 5.000 | 2,000 | 4,500 | 36 | 0.0075 | 8.43 | 310 | 35 | 1,770 | 200 | 2,655 | 300 | 5,257 | 594 |
| PH501F0070 KX501VF0010M | 7.000 | 2,000 | 4,500 | 36 | 0.0070 | 7.95 | 434 | 49 | 1,770 | 200 | 2,655 | 300 | 3,602 | 407 |
| PH501F0050 KX501VF0020M | 10.00 | 2,500 | 4,500 | 36 | 0.0049 | 5.51 | 310 | 35 | 1,770 | 200 | 2,655 | 300 | 5,363 | 606 |
| PH501F0050 KX501VF0030M | 15.00 | 3,000 | 4,500 | 36 | 0.0043 | 4.88 | 310 | 35 | 1,770 | 200 | 2,655 | 300 | 5,363 | 606 |
| PH501F0100 KX501VF0020M | 20.00 | 2,500 | 4,500 | 36 | 0.0047 | 5.33 | 558 | 63 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| PH501F0100 KX501VF0030M | 30.00 | 3,000 | 4,500 | 36 | 0.0042 | 4.80 | 558 | 63 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |

PH512_KX4 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|-------------------------|-------|-------|-------|----|--------|------|-----|----|-------|-----|-------|-----|-------|-----|
| PH512F0350 KX401VF0010M | 35.00 | 2,000 | 4,500 | 25 | 0.0022 | 2.46 | 531 | 60 | 1,770 | 200 | 2,062 | 233 | 2,575 | 291 |
| PH512F0250 KX401VF0020M | 50.00 | 2,500 | 4,500 | 25 | 0.0015 | 1.67 | 513 | 58 | 1,770 | 200 | 2,655 | 300 | 5,363 | 606 |
| PH512F0700 KX401VF0010M | 70.00 | 2,000 | 4,500 | 25 | 0.0022 | 2.44 | 681 | 77 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| PH512F0500 KX401VF0020M | 100.0 | 2,500 | 4,500 | 25 | 0.0015 | 1.66 | 673 | 76 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| PH512F0500 KX401VF0030M | 150.0 | 3,000 | 4,500 | 25 | 0.0013 | 1.45 | 673 | 76 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| PH512F1000 KX401VF0020M | 200.0 | 2,500 | 4,500 | 25 | 0.0014 | 1.63 | 690 | 78 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |
| PH512F1000 KX401VF0030M | 300.0 | 3,000 | 4,500 | 25 | 0.0013 | 1.44 | 690 | 78 | 1,770 | 200 | 2,213 | 250 | 4,425 | 500 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PH 5 01 F 0100 KX501VF 0030 M

PH PowerLine ServoFit Precision Planetary Gearhead
 5 Unit No.
 01 No. of Stages (01 = 1 Stage, 12 = 2 Stage)
 F Output Flange
 0100 Ratio (0100 = 10.0:1)
 Right Angle Unit
 KX501VF Motor Plate Input (See Page 56)
 0030 Ratio (0030 = 3.0:1)
 M Motor adapter

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

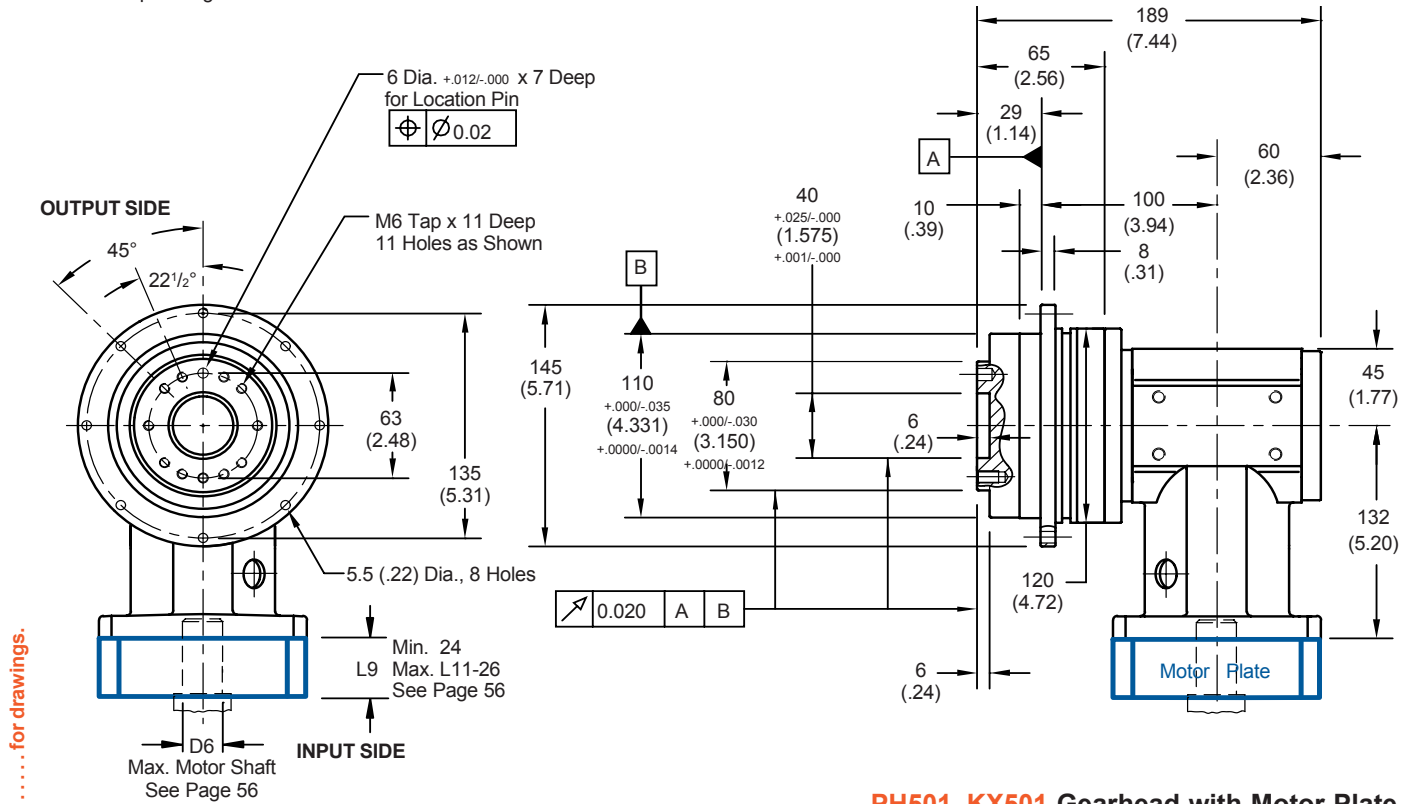
Output Torque (T_{2N}) ≤ 200 Nm (1,770 in.lbs.)
Ratio (i) = 5 - 300:1
Backlash (Δφ) ≤ 5 arcminutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data



Dimension shown in millimeters (inches).
 All PHKX output flange dimensions are ISO 9409.

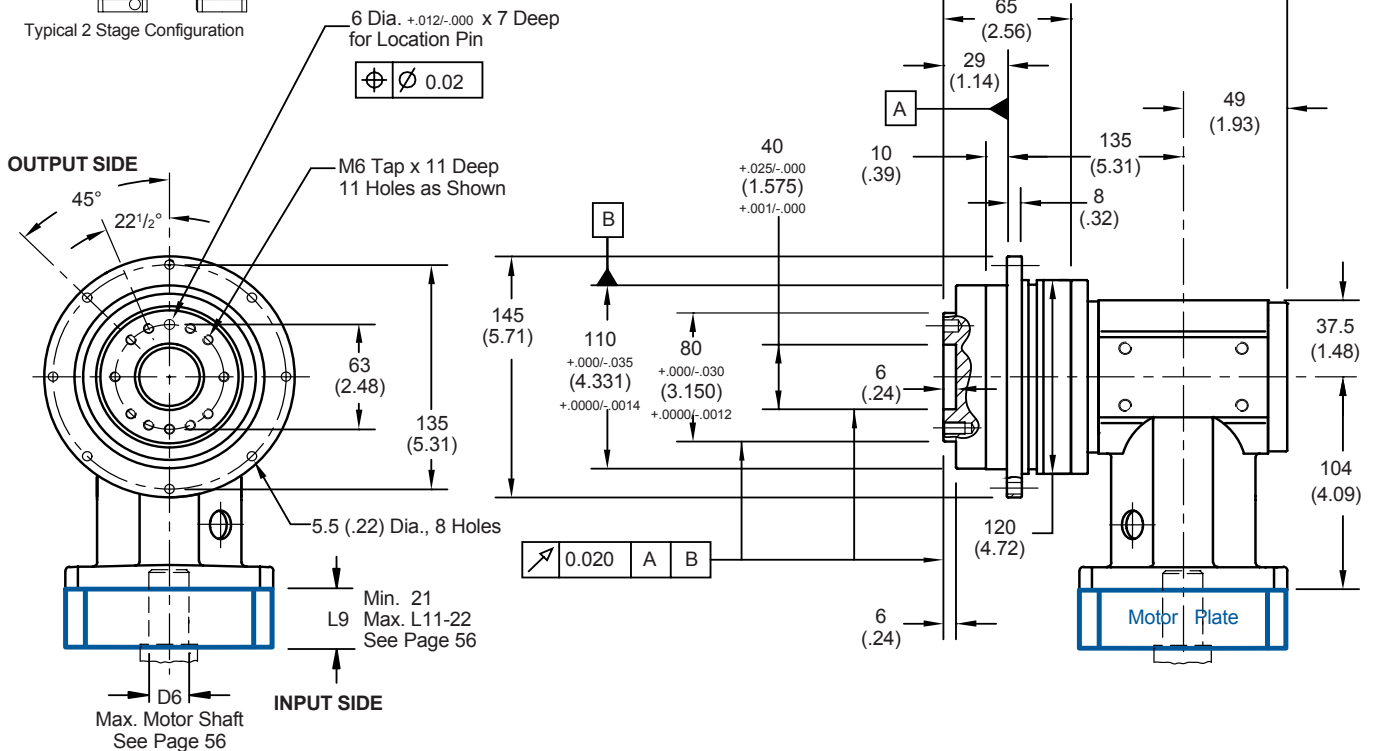
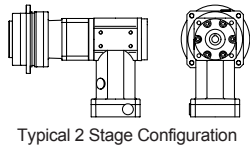


See web site for drawings.

"PHKX" Series—PowerLine

PH501_KX501 Gearhead with Motor Plate

PH512_KX401 Gearhead with Motor Plate





"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft ØD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|--|----|---------------------------------|----|--|----|
| | | Continuous RPM (n ₁) | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm |

PH701_KX7 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|-------------------------|-------|-------|-------|----|--------|------|-------|-----|-------|-----|-------|-----|--------|-------|
| PH701F0050 KX701VF0010M | 5.000 | 1,700 | 4,500 | 43 | 0.0244 | 27.6 | 876 | 99 | 3,540 | 400 | 5,310 | 600 | 9,346 | 1,056 |
| PH701F0070 KX701VF0010M | 7.000 | 1,700 | 4,500 | 43 | 0.0232 | 26.2 | 1,106 | 125 | 3,540 | 400 | 5,753 | 650 | 7,514 | 849 |
| PH701F0050 KX701VF0020M | 10.00 | 2,100 | 4,500 | 43 | 0.0136 | 15.4 | 876 | 99 | 3,540 | 400 | 5,310 | 600 | 10,620 | 1,200 |
| PH701F0050 KX701VF0030M | 15.00 | 2,500 | 4,500 | 43 | 0.0112 | 12.7 | 876 | 99 | 3,540 | 400 | 5,310 | 600 | 10,620 | 1,200 |
| PH701F0100 KX701VF0020M | 20.00 | 2,100 | 4,500 | 43 | 0.0132 | 14.9 | 1,274 | 144 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| PH701F0100 KX701VF0030M | 30.00 | 2,500 | 4,500 | 43 | 0.0111 | 12.5 | 1,274 | 144 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |

PH712_KX5 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|-------------------------|-------|-------|-------|----|--------|------|-------|-----|-------|-----|-------|-----|--------|-------|
| PH712F0250 KX501VF0010M | 25.00 | 2,000 | 4,500 | 36 | 0.0072 | 8.15 | 1,089 | 123 | 3,540 | 400 | 5,753 | 650 | 10,735 | 1,213 |
| PH712F0350 KX501VF0010M | 35.00 | 2,000 | 4,500 | 36 | 0.0069 | 7.81 | 1,133 | 128 | 3,540 | 400 | 4,292 | 485 | 5,363 | 606 |
| PH712F0250 KX501VF0020M | 50.00 | 2,500 | 4,500 | 36 | 0.0048 | 5.44 | 1,089 | 123 | 3,540 | 400 | 5,753 | 650 | 10,735 | 1,213 |
| PH712F0700 KX501VF0010M | 70.00 | 2,000 | 4,500 | 36 | 0.0069 | 7.77 | 1,389 | 157 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| PH712F0500 KX501VF0020M | 100.0 | 2,500 | 4,500 | 36 | 0.0048 | 5.42 | 1,372 | 155 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| PH712F0500 KX501VF0030M | 150.0 | 3,000 | 4,500 | 36 | 0.0043 | 4.84 | 1,372 | 155 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| PH712F1000 KX501VF0020M | 200.0 | 2,500 | 4,500 | 36 | 0.0047 | 5.31 | 1,398 | 158 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |
| PH712F1000 KX501VF0030M | 300.0 | 3,000 | 4,500 | 36 | 0.0042 | 4.79 | 1,398 | 158 | 3,540 | 400 | 4,425 | 500 | 8,850 | 1,000 |

¹⁾ For higher speeds than shown, contact Stöber.

²⁾ Based on input speed: n₁ = 2000 RPM

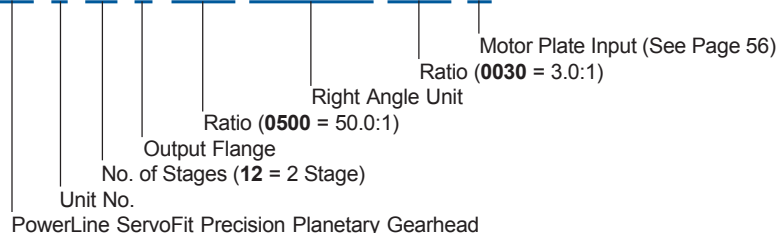
For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PH 7 12 F 0500 KX501VF 0030 M



When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

PowerLine ServoFit Precision Planetary Gearhead

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

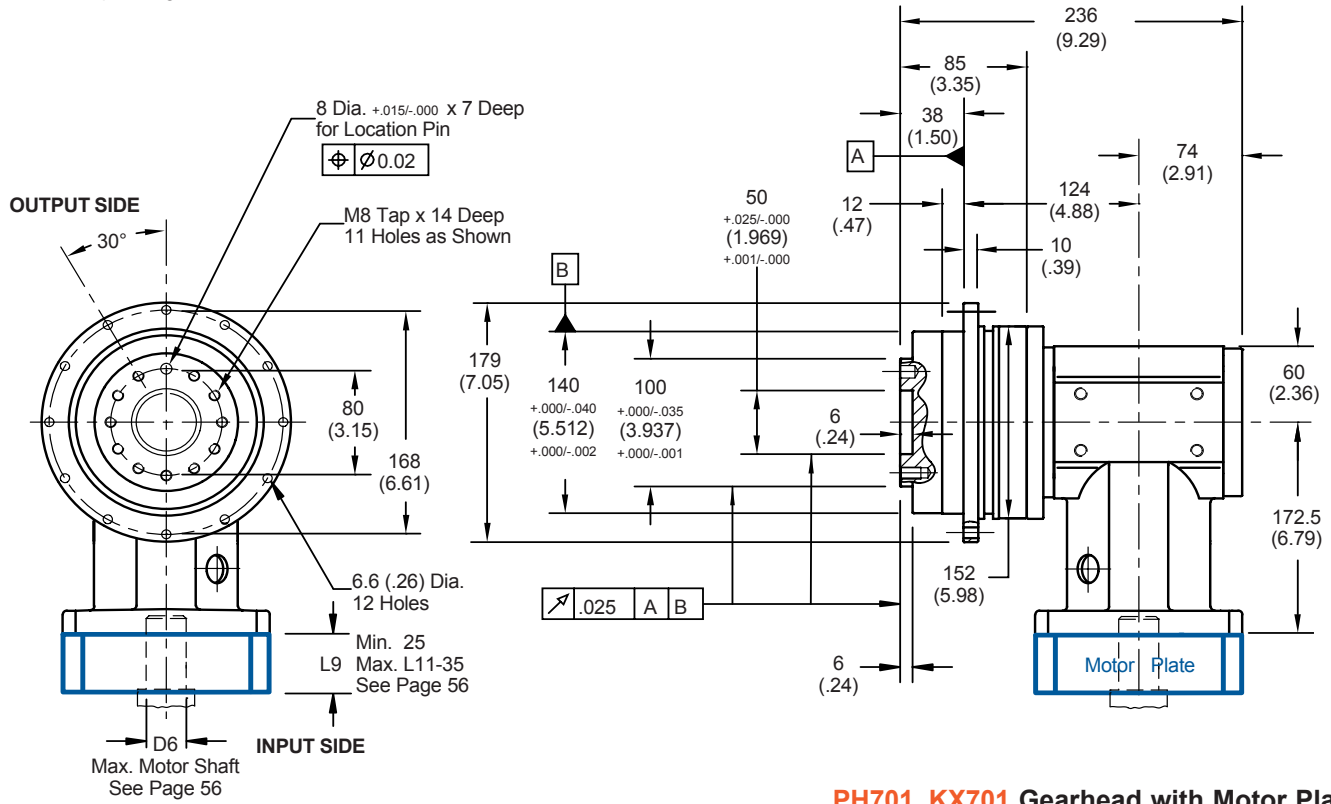
Output Torque (T_{2N}) ≤ 400 Nm (3,540 in.lbs.)
Ratio (i) = 25 - 300:1
Backlash (Δφ) ≤ 3.5 arcminutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data



Dimension shown in millimeters (inches).
 All PHKX output flange dimensions are ISO 9409.

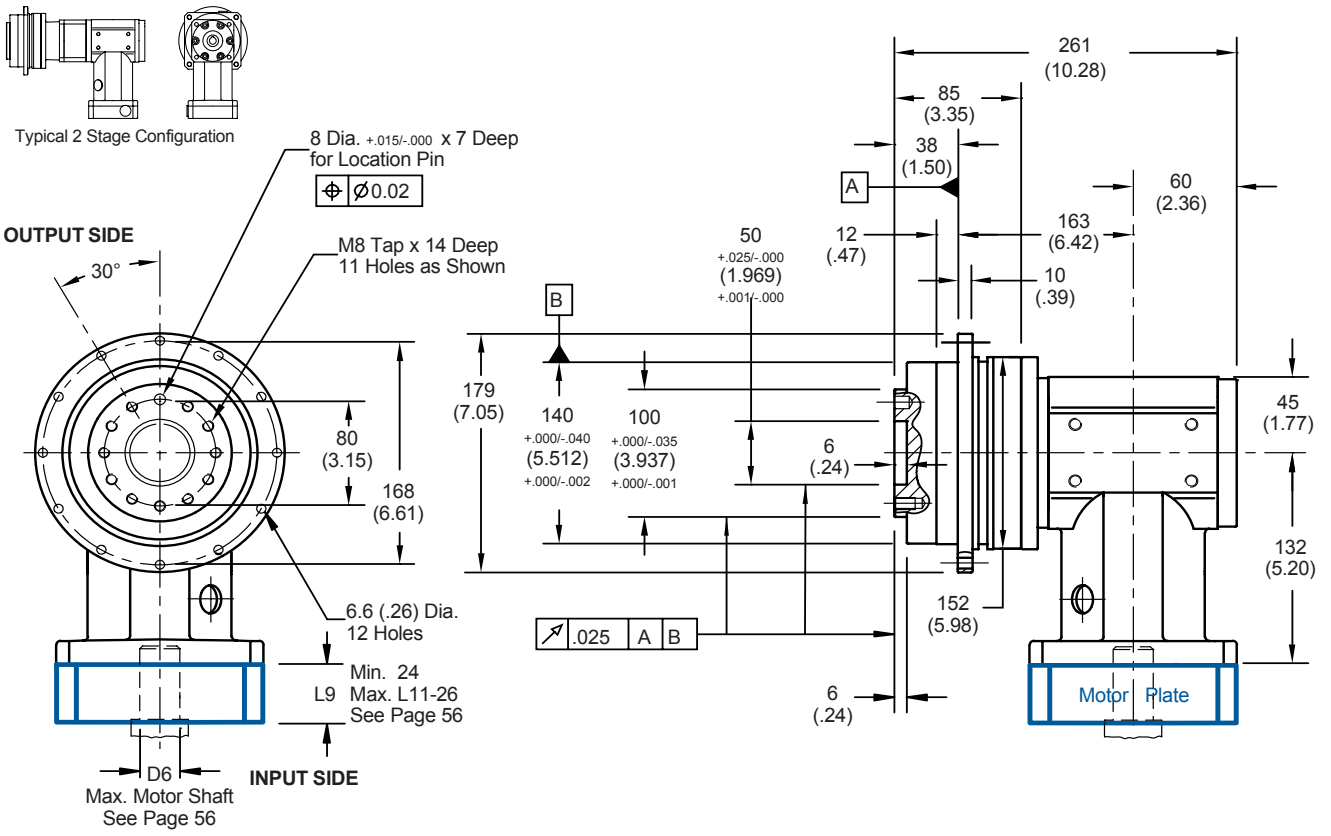


See web site for drawings.

"PHKX" Series—PowerLine

PH701_KX701 Gearhead with Motor Plate

PH712_KX501 Gearhead with Motor Plate





"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|--|----|---------------------------------|----|--|----|
| | | Continuous RPM (n ₁) | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ T _{2N} | | Acceleration T _{2B} | | Peak ³⁾ T _{2PEAK} | |
| | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm |

PH801_KX8 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|-------------------------|-------|-------|-------|----|--------|------|-------|-----|-------|-----|--------|-------|--------|-------|
| PH801F0050 KX801VF0010M | 5.00 | 1,000 | 4,000 | 54 | 0.0829 | 93.7 | 1,788 | 202 | 7,080 | 800 | 11,505 | 1,300 | 17,842 | 2,016 |
| PH801F0070 KX801VF0010M | 7.00 | 1,000 | 4,000 | 54 | 0.0757 | 85.5 | 2,434 | 275 | 7,080 | 800 | 11,505 | 1,300 | 15,027 | 1,698 |
| PH801F0050 KX801VF0020M | 10.00 | 1,400 | 4,000 | 54 | 0.0469 | 53 | 1,788 | 202 | 7,080 | 800 | 11,505 | 1,300 | 21,240 | 2,400 |
| PH801F0050 KX801VF0030M | 15.00 | 1,800 | 4,000 | 54 | 0.0399 | 45.1 | 1,788 | 202 | 7,080 | 800 | 11,505 | 1,300 | 21,240 | 2,400 |
| PH801F0100 KX801VF0020M | 20.00 | 1,400 | 4,000 | 54 | 0.0442 | 49.9 | 3,009 | 340 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| PH801F0100 KX801VF0030M | 30.00 | 1,800 | 4,000 | 54 | 0.0387 | 43.7 | 3,009 | 340 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |

PH812KX7 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|-------------------------|--------|-------|-------|----|--------|------|-------|-----|-------|-----|--------|-------|--------|-------|
| PH812F0350 KX701VF0010M | 35.00 | 1,700 | 4,500 | 43 | 0.0241 | 27.2 | 3,195 | 361 | 7,080 | 800 | 11,505 | 1,300 | 15,027 | 1,698 |
| PH812F0250 KX701VF0020M | 50.00 | 2,100 | 4,500 | 43 | 0.0136 | 15.4 | 2,735 | 309 | 7,080 | 800 | 11,505 | 1,300 | 21,461 | 2,425 |
| PH812F0700 KX701VF0010M | 70.00 | 1,700 | 4,500 | 43 | 0.0229 | 25.9 | 3,549 | 401 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| PH812F0500 KX701VF0020M | 100.00 | 2,100 | 4,500 | 43 | 0.0135 | 15.3 | 3,522 | 398 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| PH812F0500 KX701VF0030M | 150.00 | 2,500 | 4,500 | 43 | 0.0112 | 12.7 | 3,522 | 398 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| PH812F1000 KX701VF0020M | 200.00 | 2,100 | 4,500 | 43 | 0.0131 | 14.8 | 3,567 | 403 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |
| PH812F1000 KX701VF0030M | 300.00 | 2,500 | 4,500 | 43 | 0.0111 | 12.5 | 3,567 | 403 | 7,080 | 800 | 9,735 | 1,100 | 17,700 | 2,000 |

¹⁾ For higher speeds than shown, contact Stöber.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PH 8 12 F 0500 KX701VF 0030 M

PH PowerLine ServoFit Precision Planetary Gearhead
 8 Unit No.
 12 No. of Stages (12 = 2 Stage)
 F Output Flange
 0500 Ratio (0500 = 50.0:1)
 KX701VF Right Angle Unit
 0030 Ratio (0030 = 3.0:1)
 M Motor Plate Input (See Page 56)

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

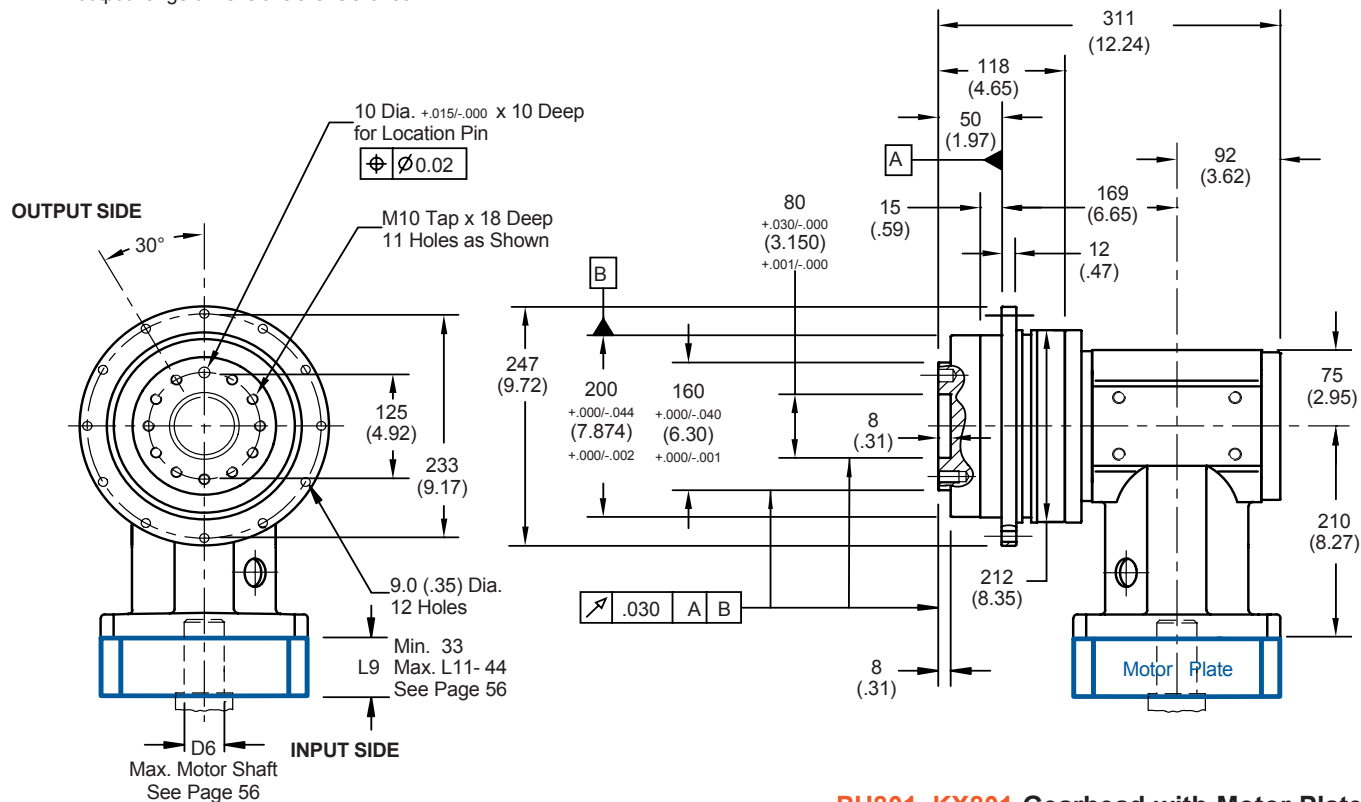
Output Torque (T_{2N}) ≤ 800 Nm (7,080 in.lbs.)
Ratio (i) = 5 - 300:1
Backlash (Δφ) ≤ 5 arcminutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

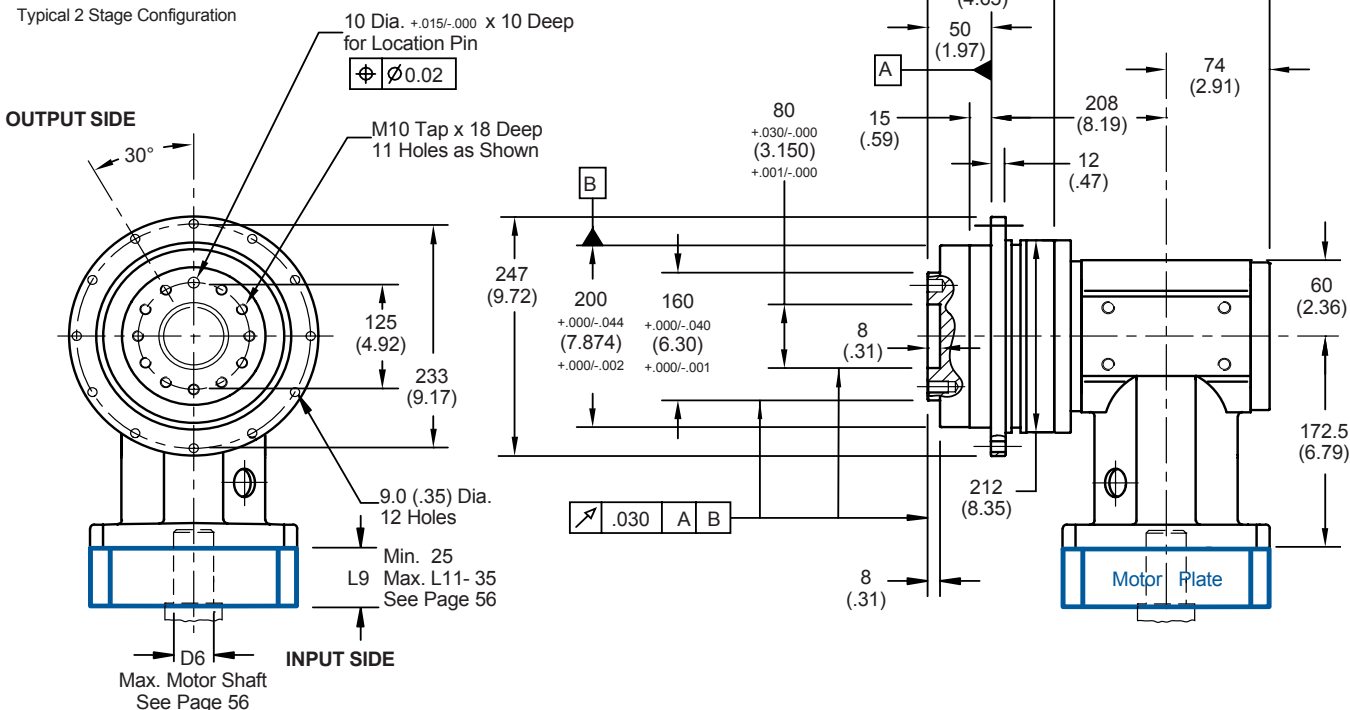
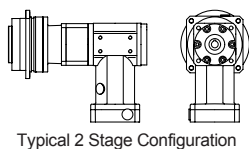
"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data



Dimension shown in millimeters (inches).
 All PHKX output flange dimensions are ISO 9409.



See web site for drawings.



"PHKX" Series—PowerLine

PH801_KX801 Gearhead with Motor Plate

PH812_KX701 Gearhead with Motor Plate



"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Selection Data



| Part Number (Gearhead + Input) | Exact Ratio i | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ | | Torsional Stiffness C _t | | Output Torque | | | | | |
|---------------------------------------|----------------------|----------------------------------|------------------------------|-------------------------------|--|-------------------|---------------------------------------|----|-----------------------|----|-----------------|----|--------------------|----|
| | | Continuous RPM (n ₁) | Cyclic RPM (n ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ | | Acceleration | | Peak ³⁾ | |
| | | | | | | | | | T _{2N} | Nm | T _{2B} | Nm | T _{2PEAK} | Nm |

PH912_KX8 with Motor Mounting Plate

| | | | | | | | | | | | | | | |
|-------------------------|--------|-------|-------|----|--------|------|-------|-----|--------|-------|--------|-------|--------|-------|
| PH912F0120 KX801VF0010M | 12.00 | 1,000 | 4,000 | 54 | 0.1071 | 121 | 3,938 | 445 | 19,753 | 2,232 | 27,161 | 3,069 | 41,489 | 4,688 |
| PH912F0160 KX801VF0010M | 16.00 | 1,000 | 4,000 | 54 | 0.0875 | 98.9 | 4,328 | 489 | 22,125 | 2,500 | 36,214 | 4,092 | 55,313 | 6,250 |
| PH912F0200 KX801VF0010M | 20.00 | 1,000 | 4,000 | 54 | 0.0803 | 90.7 | 4,540 | 513 | 22,125 | 2,500 | 37,613 | 4,250 | 69,145 | 7,813 |
| PH912F0120 KX801VF0020M | 24.00 | 1,400 | 4,000 | 54 | 0.0529 | 59.8 | 3,938 | 445 | 19,753 | 2,232 | 27,161 | 3,069 | 49,383 | 5,580 |
| PH912F0160 KX801VF0020M | 32.00 | 1,400 | 4,000 | 54 | 0.0481 | 54.3 | 4,328 | 489 | 22,125 | 2,500 | 36,214 | 4,092 | 65,844 | 7,440 |
| PH912F0120 KX801VF0030M | 36.00 | 1,800 | 4,000 | 54 | 0.0426 | 48.1 | 3,938 | 445 | 19,753 | 2,232 | 27,161 | 3,069 | 49,383 | 5,580 |
| PH912F0200 KX801VF0020M | 40.00 | 1,400 | 4,000 | 54 | 0.0462 | 52.2 | 4,540 | 513 | 22,125 | 2,500 | 37,613 | 4,250 | 75,225 | 8,500 |
| PH912F0160 KX801VF0030M | 48.00 | 1,800 | 4,000 | 54 | 0.0404 | 45.6 | 4,328 | 489 | 22,125 | 2,500 | 36,214 | 4,092 | 65,844 | 7,440 |
| PH912F0200 KX801VF0030M | 60.00 | 1,800 | 4,000 | 54 | 0.0396 | 44.7 | 4,540 | 513 | 22,125 | 2,500 | 37,613 | 4,250 | 75,225 | 8,500 |
| PH912F0400 KX801VF0020M | 80.00 | 1,400 | 4,000 | 54 | 0.0440 | 49.7 | 4,841 | 547 | 22,125 | 2,500 | 37,613 | 4,250 | 75,225 | 8,500 |
| PH912F0400 KX801VF0030M | 120.00 | 1,800 | 4,000 | 54 | 0.0386 | 43.6 | 4,841 | 547 | 22,125 | 2,500 | 37,613 | 4,250 | 75,225 | 8,500 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PH 9 12 F 0160 KX801VF 0020 M

PH PowerLine ServoFit Precision Planetary Gearhead
 9 Unit No.
 12 No. of Stages (12 = 2 Stage)
 F Output Flange
 0160 Ratio (0160 = 16.0:1)
 KX801VF Right Angle Unit
 0020 Ratio (0020 = 2.0:1)
 M Motor Plate Input (See Page 56)

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

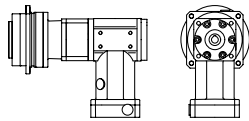
Output Torque (T_{2N}) ≤ 2500 Nm (22,125 in.lbs.)
Ratio (i) = 12 - 120:1
Backlash (Δφ) ≤ 5 arcminutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PHKX" Series—PowerLine Right Angle ServoFit® Precision Planetary Gearhead Dimensional Data

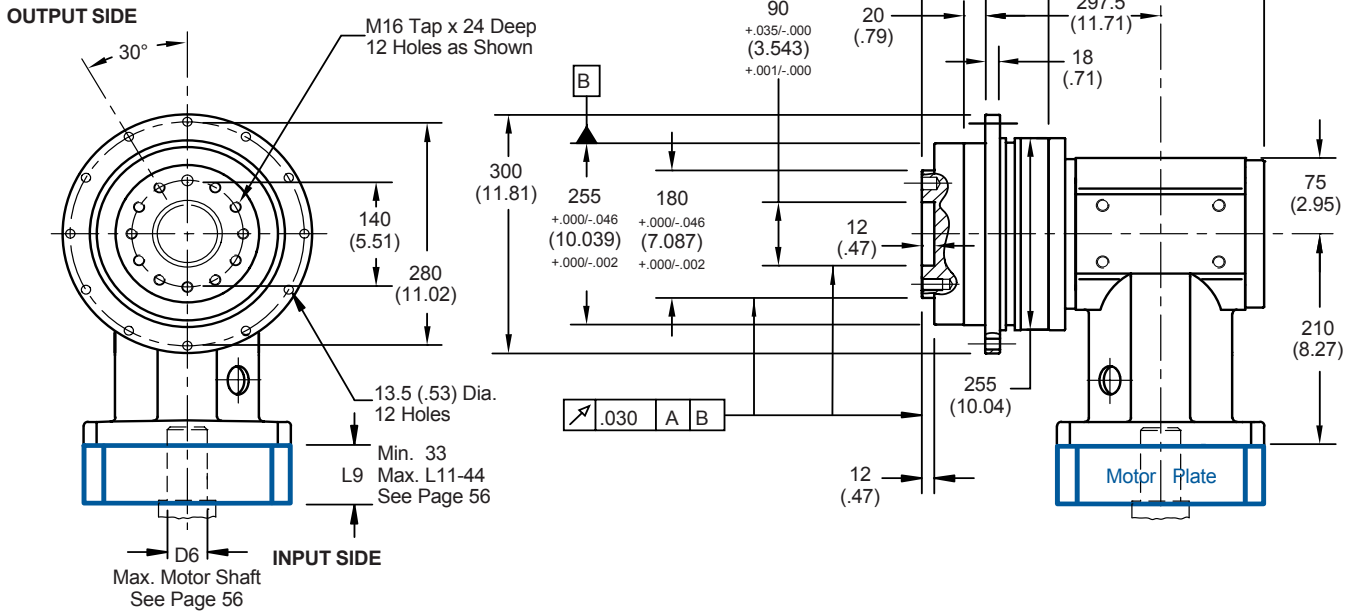


Dimension shown in millimeters (inches).
 All PHKX output flange dimensions are ISO 9409.



Typical 2 Stage Configuration

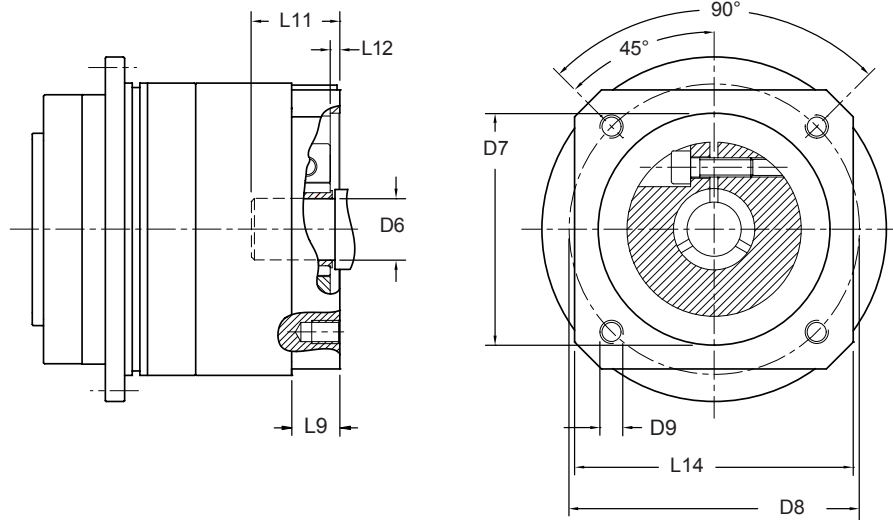
See web site for drawings.



"PHKX" Series—PowerLine

PH912_KX801 Gearhead with Motor Plate

"PH and PHKX" Series—PowerLine ServoFit® Precision Planetary Gearhead Motor Plate Specifications



"PH" Series—PowerLine

Stober ServoFit Precision Planetary Gearheads will fit the motor of your choice by assembling the correct motor mounting plate between the motor and the gearhead. When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions. The maximum motor plate thickness (L9) dimension will be determined by the motor shaft length minus the value shown in Table No. 1. The minimum thickness is also shown. For a precise dimension on a specific motor, contact Stober Technical Support.

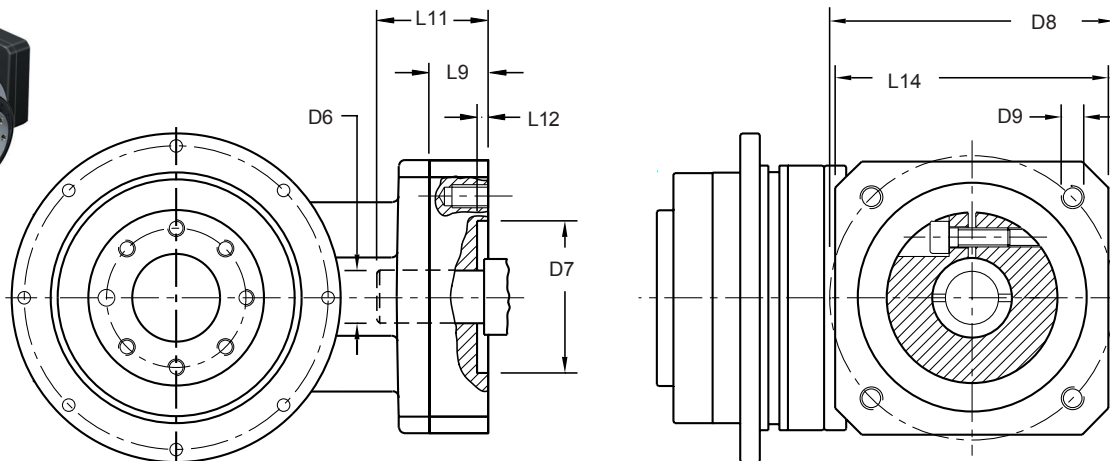
The following dimensions are required to provide the correct motor mounting plate:

1. D6 Motor Shaft Diameter (See Table No. 1.) *
2. D7 Pilot Diameter
3. D8 Bolt Circle Diameter
4. D9 Bolt Diameter
5. L11 Motor Shaft Length
6. L12 Pilot Length
7. L14 Square Flange
(Optional—Motor plate will typically be made to match.)

Table No. 1 Motor Adapter Dimensions

| Motor Adapter | Motor Shaft D6 Max. ²⁾ mm | Motor Plate | | | |
|--|--|-------------|------|-----------------------|------------|
| | | L9 Min. | | L9 Max. ¹⁾ | |
| | | mm | ins. | mm | inches |
| PH412, PH412_KX3 | 19 | 18 | .77 | L11 - 24 | L11 - .95 |
| PH401, PH512 PH401_KX4, PH512_KX4 | 24 25 | 21 | .83 | L11 - 22 | L11 - .87 |
| PH501, PH712 PH501_KX5, PH712_KX5 | 32 36 | 24 | .95 | L11 - 26 | L11 - 1.02 |
| PH701, PH812 PH701_KX7, PH812_KX7 | 38 43 | 25 | .98 | L11 - 35 | L11 - 1.38 |
| PH801, PH912 PH801_KX8, PH912_KX8 | 48 54 | 33 | 1.30 | L11 - 44 | L11 - 1.73 |

¹⁾ Motor plate maximum thickness (L9 Max.) will vary with motor shaft length.
²⁾ If an adapter bushing is required it will be supplied as a component of the motor mounting plate.

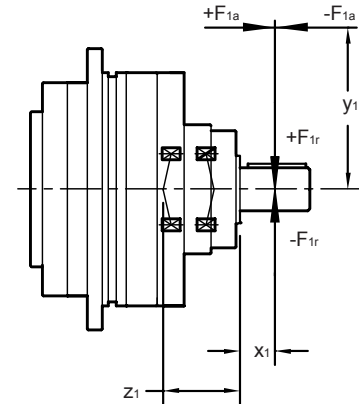


Refer to Page 82 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PH and PHKX" Series—PowerLine ServoFit® Precision Planetary Gearhead Calculation Details

Table No. 1 INPUT
"PH" Series – Permissible Load and Tilting Moments

| Unit No. | Z1 | | F1A | | F1R | | T1K | |
|----------------------------------|----|--------|-------|------|-------|-------|-----|---------|
| | mm | inches | N | lbs. | N | lbs. | Nm | in.lbs. |
| PH412_AW | 23 | 0.91 | 550 | 124 | 550 | 124 | 26 | 230 |
| PH401_AW PH512_AW | 39 | 1.54 | 1,150 | 259 | 1,300 | 293 | 69 | 611 |
| PH501_AW PH712_AW | 47 | 1.85 | 1,600 | 360 | 1,900 | 428 | 124 | 1,097 |
| PH701_AW PH812_AW PH923_AW | 52 | 2.05 | 2,700 | 608 | 3,000 | 675 | 243 | 2,150 |
| PH801_AW PH912_AW | 59 | 2.32 | 4,000 | 900 | 4,500 | 1,012 | 454 | 4,018 |



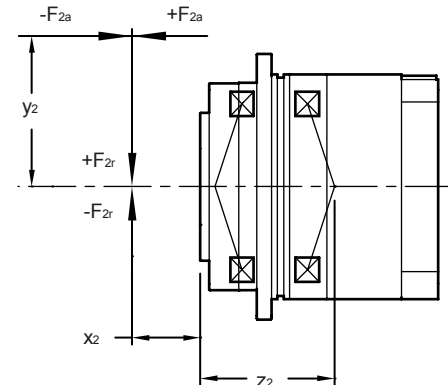
The permissible load and tilting moment values are based on an input speed of 2000 RPM. For higher speeds the following applies, where n_1 is the desired speed:

$$F_{1RX} = \frac{F_{1R}}{\sqrt[3]{\frac{n_1}{2000}}} \quad T_{1KX} = \frac{T_{1K}}{\sqrt[3]{\frac{n_1}{2000}}}$$

The application input tilting moment should be determined by the following formula: $T_{1A} = \frac{F_{1a} \cdot y_1 + F_{1r} \cdot (X_1 + Z_1)}{1000} \leq T_{1K}$

Table No. 2 OUTPUT
"PH" and "PHKX" Series – Permissible Load and Tilting Moments

| Unit No. | Z2 | | F2A | | T2K | |
|----------------------------------|-----|--------|--------|-------|-------|---------|
| | mm | inches | N | lbs. | Nm | in.lbs. |
| PH401, PH412 PH401KX, PH412KX | 78 | 3.07 | 2,150 | 484 | 240 | 2,124 |
| PH501, PH512 PH501KX, PH512KX | 92 | 3.62 | 4,150 | 934 | 420 | 3,717 |
| PH701, PH712 PH712KX | 84 | 3.31 | 6,150 | 1,384 | 1,500 | 13,275 |
| PH801, PH812 PH801KX, PH812KX | 118 | 4.65 | 10,050 | 2,261 | 3,500 | 30,975 |
| PH912, PH923 PH912KX | 140 | 5.51 | 33,000 | 7,425 | 6,500 | 57,525 |



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:

$$F_{2RX} = \frac{F_{2R}}{\sqrt[3]{\frac{n_2}{100}}} \quad T_{2KX} = \frac{T_{2K}}{\sqrt[3]{\frac{n_2}{100}}}$$

The application input tilting moment should be determined by the following formula: $T_{2A} = \frac{F_{2a} \cdot y_2 + F_{2r} \cdot (X_2 + Z_2)}{1000} \leq T_{2K}$

The application input tilting angle can be determined by the following formula: $\Delta\phi = \frac{T_{2A}}{C_{2K}}$ Value is in arcminutes. C_{2K} is found on Page 30.

The hours of life (L_h) of the unit can be determined by the following formula: $L_h > 10,000$ hours if $T_{2K}/T_{2A} < 1.25$
 $L_h > 20,000$ hours if $T_{2K}/T_{2A} > 1.25$

All formulas shown are based on metric values.

"PE" Series—EconoLine

ServoFit® Precision Planetary Gearhead

Performance Specifications



| | | Size | Ratio | PE201 PE202 | PE301 PE302 | PE401 PE402 | PE501 PE502 |
|--|--|-----------------------------|-----------|--|-------------|-------------|-------------|
| Permissible Acceleration Torque | T _{2B} | in.lbs. | 5, 25, 50 | 132 | 292 | 725 | 1,858 |
| | | | Nm | 15 | 33 | 82 | 210 |
| | | in.lbs. | 10, 100 | 106 | 265 | 637 | 1,593 |
| | | | Nm | 12 | 30 | 72 | 180 |
| Nominal Output Torque ¹⁾ | T _{2N} | in.lbs. | | 58 | 159 | 398 | 1,062 |
| | | Nm | | 6.5 | 18 | 45 | 120 |
| Input Speed Maximum ²⁾ | n _{1MAX} | Continuous Cyclic | | 4,000 | 3,700 | 3,400 | 2,600 |
| | | | | 8,000 | 6,000 | 6,000 | 5,000 |
| Torsional Stiffness | C _t | in.lbs./arcmin Nm/arcmin | | 9 | 31 | 89 | 221 |
| | | | | 1 | 3.5 | 10 | 25 |
| Axial Load Max. | F _{2AMAX} | lbs. N | | 56 | 93 | 146 | 270 |
| | | | | 250 | 412 | 650 | 1,200 |
| Radial Load Max. ³⁾ | F _{2RMAX} | lbs. N | | 190 | 370 | 585 | 1,080 |
| | | | | 850 | 1,650 | 2,600 | 4,800 |
| Tilting Moment Max. ³⁾ | T _{2K} | in.lbs. Nm | | 221 | 451 | 991 | 2,973 |
| | | | | 25 | 51 | 112 | 336 |
| Weight | m | pounds kg | | 1.8 2.2 | 4.4 5.5 | 9.4 11.6 | 20.2 25.1 |
| | | | | 0.8 1.0 | 2.0 2.5 | 4.3 5.3 | 9.2 11.4 |
| Noise Level | L _{PA} | dB(A) ⁴⁾ | | ≤60 | ≤62 | ≤62 | ≤64 |
| Torsional Backlash ³⁾ | Δφ | arcmin | | 1 Stage (5, 10:1) = ≤12; 2 Stage (25, 50, 100:1) = ≤15 | | | |
| Efficiency (at Nominal Torque) | η | % | | 1 Stage (5, 10:1) = ≥96; 2 Stage (25, 50, 100:1) = ≥94 | | | |
| Lubrication | Synthetic Grease (NLGI 2) Lubricated for Life | | | | | | |
| Mounting Position | Unrestricted | | | | | | |
| Ambient Temperature | 0°C to +40°C (104° F) Other temperatures, contact Stober Drives. | | | | | | |
| Finish | Black (RAL 9005) | | | | | | |
| Lifetime ⁵⁾ | L _h | hours | | L _h > 10,000 hours if T _{2K} /T _{2A} < 1.25 L _h > 20,000 hours if T _{2K} /T _{2A} > 1.25 | | | |
| Warranty | 5 Year Limited (2 Years on normal wear items: bearings, seals, etc.) | | | | | | |

"PE" Series—EconoLine

- 1) Ratings based on input speed (n₁) of 2000 RPM.
For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.
- 2) For speeds higher than given above, contact Stober Technical Support.
- 3) Rating based on output speed (n₂) of 100 RPM. For values at other speeds see Page 69.
- 4) Measurement at one (1) meter distance with input speed (n₁) of 3000 RPM.
- 5) T_{2A} equals actual tilting moment of the application. See Page 69 for overhung loads.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.



"PE" Series–EconoLine ServoFit® Precision Planetary Gearhead Features

The "PE" Series–EconoLine of ServoFit Precision Planetary Gearheads are available for applications where very low backlash is not a criteria. They are an economical straight tooth planetary, comparable in quality to other Stober units. "PE" Series units are shipped with a motor adapter to fit your specific motor, can be supplied with NEMA output adapters, and have a two year warranty.

- Readily Attaches to Any Servo Motor
- Quiet Running ≤ 64 dB(A)
- Readily Available
- 94 to 96% Efficiency
- NEMA Output Available
- 5 Year Limited Warranty (2 Years bearings, seals, etc.)



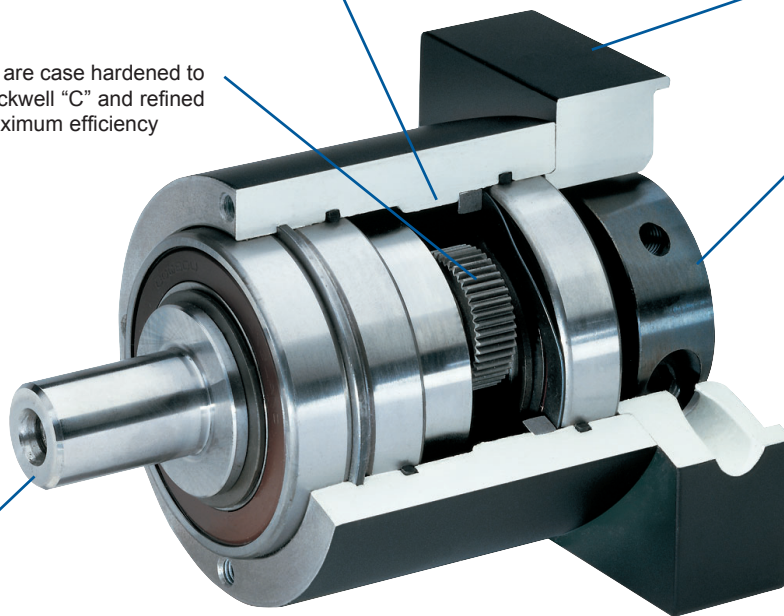
Ring gear machined integral to the housing – not welded or pressed in

Motor plate pilot toleranced to fit your motor for precise concentricity

Gears are case hardened to 61 Rockwell "C" and refined for maximum efficiency

Motor plate can easily be changed to fit your choice of motors

The integrated motor coupling is designed to allow thermal expansion of the motor shaft—ensuring long motor life by preventing thrust load on the motor bearings.



Adapter bushings fit all motor shafts – no key required

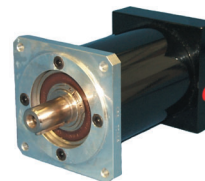
Single piece planet carrier and shaft for greater concentricity and more precise alignment

Lubricated for life with synthetic grease and enclosed to IP65 standards to prevent lubricant contamination for long life

Wide selection of IEC, NEMA, or customized motor adapters

* Maximum 10 working days for custom motor plates.

Available with NEMA Output Adapters (shaft remains metric)



"PE" Series–EconoLine



"PE" Series–EconoLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ Continuous Cyclic RPM (n ₁) | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ lb-in-s ² kgcm ² | | Torsional Stiffness C _t in.lbs. Nm per arcmin | | Output Torque | | | | | |
|-----------------------------------|---|---------------------|--|--|-------------------------------------|---|--|--|--|--|--|---|--|--|--|
| Gearhead | M | | | | | | | | | Nominal ²⁾ T _{2N} in.lbs. Nm | | Acceleration T _{2B} in.lbs. Nm | | Peak ³⁾ T _{2PEAK} in.lbs. Nm | |

PE201 with Motor Mounting Plate

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|---------|-------|-----|-----|----|-----|-----|----|-----|----|
| PE201SP0050 | M | 5.000 | 4,000 | 8,000 | 11 | 0.00006 | 0.063 | 8.9 | 1.0 | 58 | 6.5 | 133 | 15 | 248 | 28 |
| PE201SP0100 | M | 10.00 | 4,000 | 8,000 | 11 | 0.00006 | 0.063 | 8.9 | 1.0 | 49 | 5.5 | 106 | 12 | 248 | 28 |

PE202 with Motor Mounting Plate

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|---------|-------|-----|-----|----|-----|-----|----|-----|----|
| PE202SP0250 | M | 25.00 | 4,000 | 8,000 | 11 | 0.00005 | 0.052 | 8.9 | 1.0 | 58 | 6.5 | 133 | 15 | 248 | 28 |
| PE202SP0500 | M | 50.00 | 4,000 | 8,000 | 11 | 0.00005 | 0.052 | 8.9 | 1.0 | 58 | 6.5 | 133 | 15 | 248 | 28 |
| PE202SP1000 | M | 100.0 | 4,000 | 8,000 | 11 | 0.00005 | 0.052 | 8.9 | 1.0 | 49 | 5.5 | 106 | 12 | 248 | 28 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PE 2 01 SP 0050 M

Unit No.
No. of Stages (01 = 1 Stage, 02 = 2 Stage)
Output shaft with key
Ratio (0050 = 5.0:1)
Motor Plate (See Page 68)

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

EconoLine ServoFit Precision Planetary Gearhead

Output Torque (T_{2N}) ≤ 6.5 Nm (58 in.lbs.)
Ratio (i) = 5 - 100:1
Backlash (Δφ) ≤ 15 arc minutes

Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

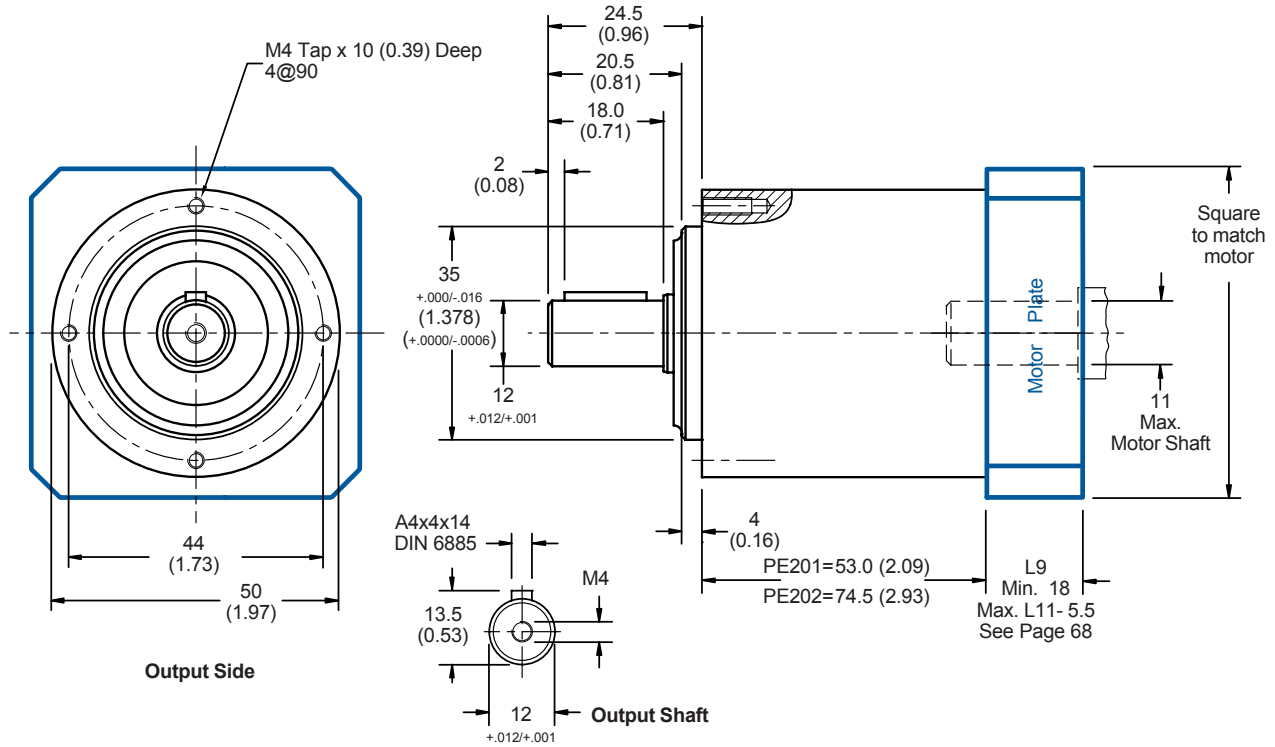
"PE" Series-EconoLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



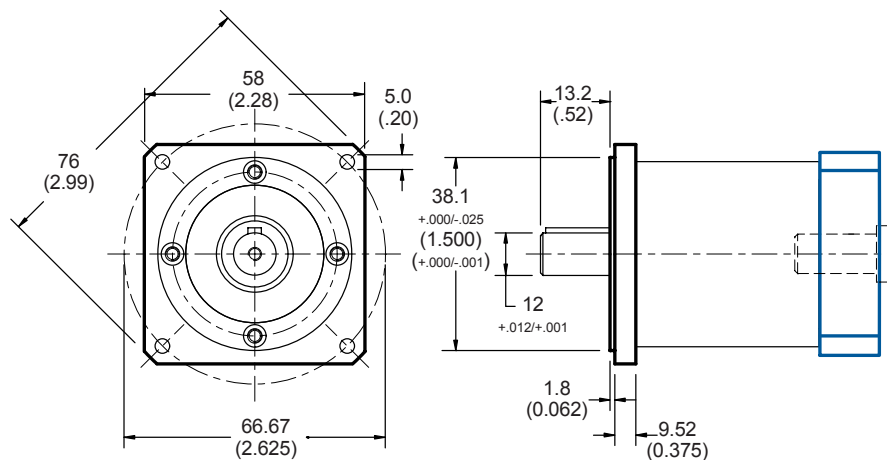
Dimension shown in millimeters (inches).



See web site for drawings.

PE201/PE202 Gearhead with Motor Plate

PE201/PE202 Gearhead with NEMA Output Adapter



NEMA 23

"PE" Series-EconoLine



"PE" Series–EconoLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ Continuous Cyclic RPM (n ₁) | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ lb-in-s ² kgcm ² | | Torsional Stiffness C _t in.lbs. Nm per arcmin | | Output Torque | | | | | |
|-----------------------------------|---|---------------------|--|--|-------------------------------------|---|--|--|--|--|--|---|--|--|--|
| Gearhead | M | | | | | | | | | Nominal ²⁾ T _{2N} in.lbs. Nm | | Acceleration T _{2B} in.lbs. Nm | | Peak ³⁾ T _{2PEAK} in.lbs. Nm | |

PE301 with Motor Mounting Plate

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|------|----|-----|-----|----|-----|----|-----|----|
| PE301SP0050 | M | 5.000 | 3,700 | 6,000 | 14 | 0.0003 | 0.31 | 31 | 3.5 | 159 | 18 | 292 | 33 | 664 | 75 |
| PE301SP0100 | M | 10.00 | 3,700 | 6,000 | 14 | 0.0003 | 0.31 | 31 | 3.5 | 150 | 17 | 266 | 30 | 664 | 75 |

PE302 with Motor Mounting Plate

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|------|----|-----|-----|----|-----|----|-----|----|
| PE302SP0250 | M | 25.00 | 3,700 | 6,000 | 14 | 0.0002 | 0.25 | 31 | 3.5 | 159 | 18 | 292 | 33 | 664 | 75 |
| PE302SP0500 | M | 50.00 | 3,700 | 6,000 | 14 | 0.0002 | 0.25 | 31 | 3.5 | 159 | 18 | 292 | 33 | 664 | 75 |
| PE302SP1000 | M | 100.0 | 3,700 | 6,000 | 14 | 0.0002 | 0.25 | 31 | 3.5 | 150 | 17 | 266 | 30 | 664 | 75 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PE 3 01 SP 0050 M

PE EconoLine ServoFit Precision Planetary Gearhead
 3 Unit No.
 01 No. of Stages (01 = 1 Stage, 02 = 2 Stage)
 SP Output shaft with key
 0050 Ratio (0050 = 5.0:1)
 M Motor Plate (See Page 68)

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Output Torque (T_{2N}) ≤ 18 Nm (159 in.lbs.)
Ratio (i) = 5 - 100:1
Backlash (Δφ) ≤ 15 arc minutes

Index of Symbols

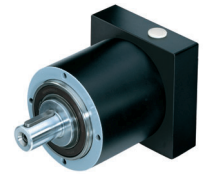
| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

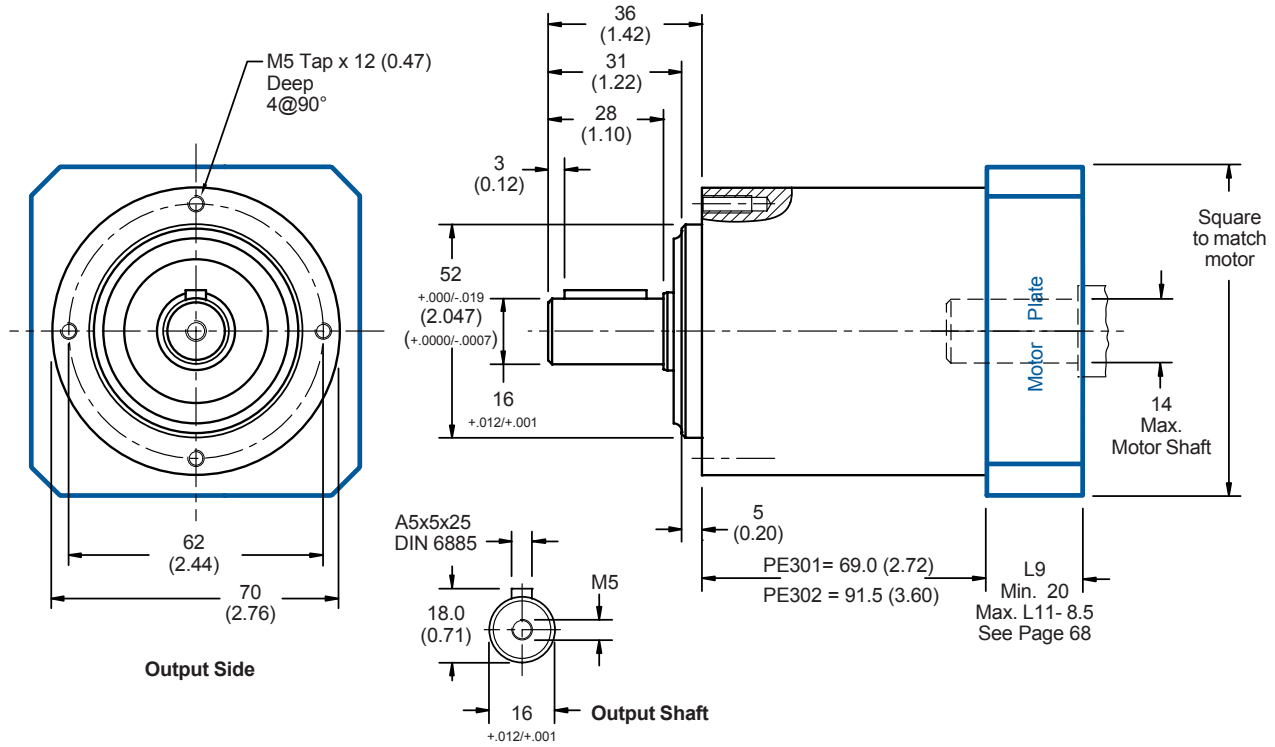
"PE" Series-EconoLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



Dimension shown in millimeters (inches).



See web site for drawings.

PE301/PE302 Gearhead with Motor Plate

PE301/PE302 Gearhead with NEMA Output Adapter

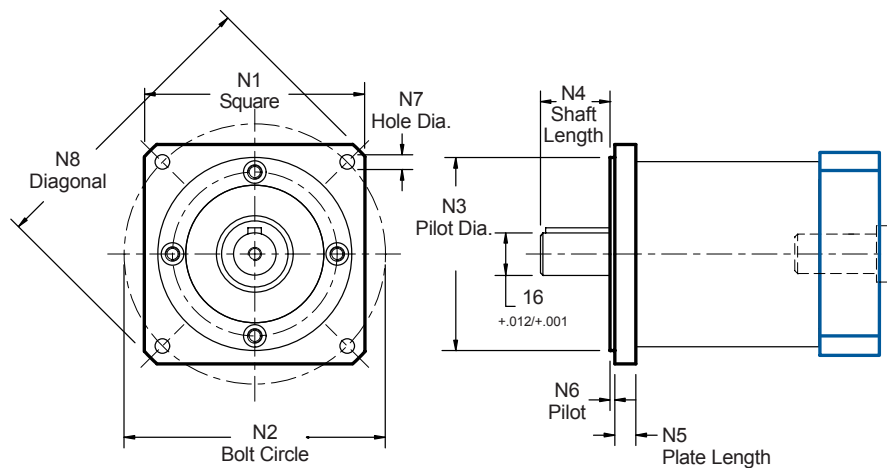


Table No. 1 NEMA 34 and 42 – Dimensions

| NEMA | N1 | | N2 | | N3 | | N4 | | N5 | | N6 | | N7 | | N8 | | | |
|------|-----|------|--------|-------|-------|--------------|-------|--------------|------|------|------|-------|-----|-------|-----|------|-----|------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | | |
| 34 | 83 | 3.27 | 98.43 | 3.875 | 73.03 | +0.00/-0.030 | 2.875 | +0.00/-0.001 | 24.9 | .98 | 9.52 | 0.375 | 1.6 | 0.063 | 5.5 | 0.22 | 111 | 4.37 |
| 42 | 107 | 4.21 | 125.73 | 4.950 | 55.52 | +0.00/-0.030 | 2.186 | +0.00/-0.001 | 24.2 | .95 | 9.52 | 0.375 | 2.4 | 0.093 | 7.1 | 0.28 | 143 | 5.63 |



"PE" Series–EconoLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio i | Maximum Input Speed ¹ Continuous Cyclic RPM (n ₁) | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia J ₁ lb-in-s ² kgcm ² | | Torsional Stiffness C _t in.lbs. Nm per arcmin | | Output Torque | | | | | |
|-----------------------------------|---|---------------------|--|--|-------------------------------------|---|--|--|--|--|--|---|--|--|--|
| Gearhead | M | | | | | | | | | Nominal ²⁾ T _{2N} in.lbs. Nm | | Acceleration T _{2B} in.lbs. Nm | | Peak ³⁾ T _{2PEAK} in.lbs. Nm | |

PE401 with Motor Mounting Plate

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|------|------|----|-----|----|-----|----|-------|-----|
| PE401SP0050 | M | 5.000 | 3,400 | 6,000 | 19 | 0.0015 | 1.72 | 88.5 | 10 | 398 | 45 | 726 | 82 | 1,770 | 200 |
| PE401SP0100 | M | 10.00 | 3,400 | 6,000 | 19 | 0.0015 | 1.72 | 88.5 | 10 | 354 | 40 | 637 | 72 | 1,770 | 200 |

PE402 with Motor Mounting Plate

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|------|------|----|-----|----|-----|----|-------|-----|
| PE402SP0250 | M | 25.00 | 3,400 | 6,000 | 19 | 0.0013 | 1.47 | 88.5 | 10 | 398 | 45 | 726 | 82 | 1,770 | 200 |
| PE402SP0500 | M | 50.00 | 3,400 | 6,000 | 19 | 0.0013 | 1.47 | 88.5 | 10 | 398 | 45 | 726 | 82 | 1,770 | 200 |
| PE402SP1000 | M | 100.0 | 3,400 | 6,000 | 19 | 0.0013 | 1.47 | 88.5 | 10 | 354 | 40 | 637 | 72 | 1,770 | 200 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: n₁ = 2000 RPM

For torque at higher input speeds (T_{2NX}) solve the formula, where n₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PE 4 01 SP 0050 M

PE EconoLine ServoFit Precision Planetary Gearhead
 4 Unit No.
 01 No. of Stages (01 = 1 Stage, 02 = 2 Stage)
 SP Output shaft with key
 0050 Ratio (0050 = 5.0:1)
 M Motor Plate (See Page 68)

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

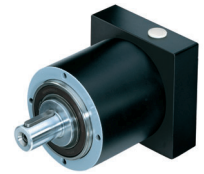
Index of Symbols

| | | |
|--------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| i | ..... | Ratio - Exact |
| n ₁ | ..... | Maximum input speed RPM |
| J ₁ | ..... | Mass moment of inertia (input) |
| C _t | ..... | Torsional Stiffness |
| T _{2N} | ..... | Nominal Torque |
| T _{2B} | ..... | Acceleration Torque Maximum |
| T _{2PEAK} | ..... | Peak Torque |

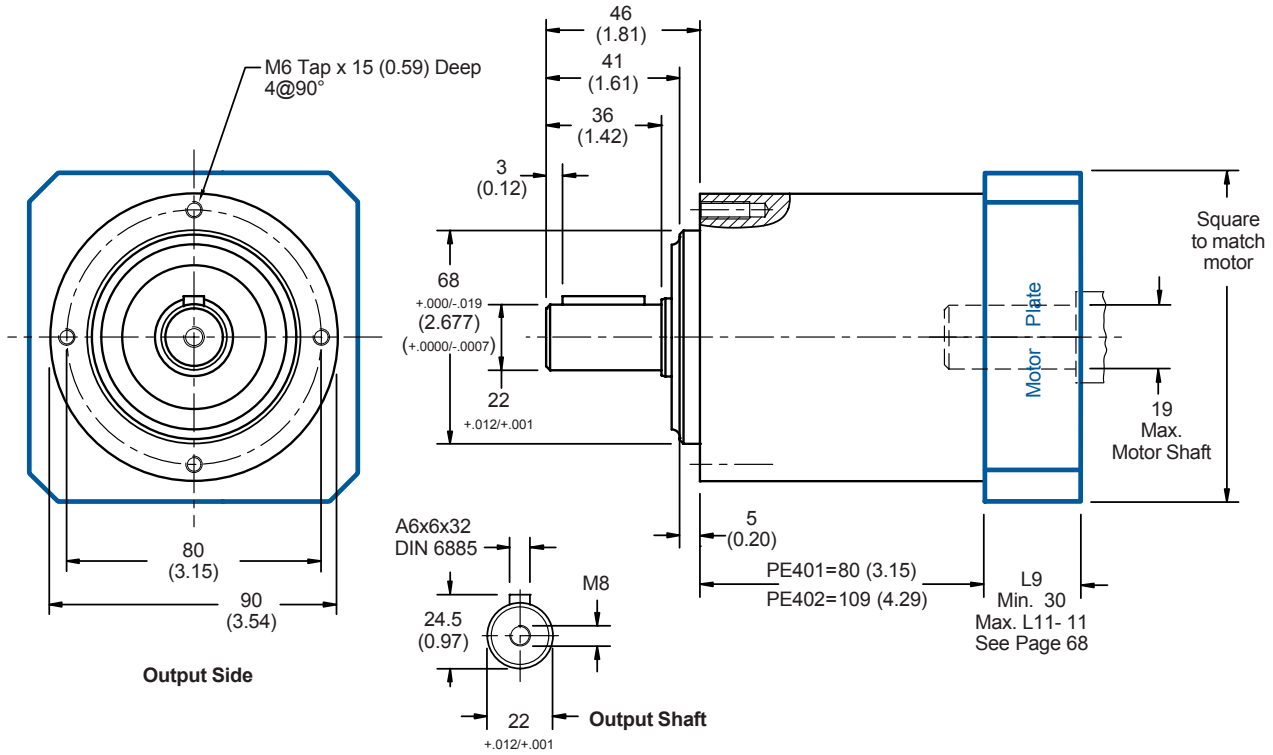
Output Torque (T_{2N}) ≤ 45 Nm (398 in.lbs.)
Ratio (i) = 5 - 100:1
Backlash (Δφ) ≤ 15 arc minutes

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PE" Series-EconoLine ServoFit® Precision Planetary Gearhead Dimensional Data



Dimension shown in millimeters (inches).



See web site for drawings.

PE401/PE402 Gearhead with Motor Plate

PE401/PE402 Gearhead with NEMA Output Adapter

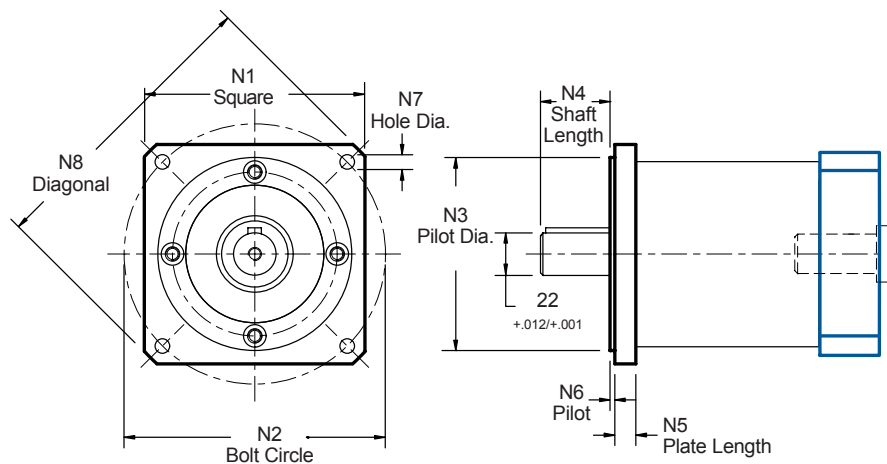


Table No. 1 NEMA 34 and 42 – Dimensions

| NEMA | N1 | | N2 | | N3 | | N4 | | N5 | | N6 | | N7 | | N8 | | | |
|-----------|-----|------|--------|-------|-------|---------------|-------|---------------|------|------|------|-------|-----|-------|-----|------|-----|------|
| | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | mm | ins. | | |
| 34 | 83 | 3.27 | 98.43 | 3.875 | 73.03 | +0.000/-0.030 | 2.875 | +0.000/-0.001 | 34.8 | 1.37 | 9.52 | 0.375 | 1.6 | 0.063 | 5.5 | 0.22 | 111 | 4.37 |
| 42 | 107 | 4.21 | 125.73 | 4.950 | 55.52 | +0.000/-0.030 | 2.186 | +0.000/-0.001 | 34.0 | 1.34 | 9.52 | 0.375 | 2.4 | 0.093 | 7.1 | 0.28 | 143 | 5.63 |

"PE" Series-EconoLine



"PE" Series–EconoLine

ServoFit® Precision Planetary Gearhead

Selection Data



| Part Number (Gearhead + Input) | | Exact Ratio <i>i</i> | Maximum Input Speed ¹ | | Max. Motor Shaft øD6 mm | Mass Moment of Inertia <i>J</i> ₁ | | Torsional Stiffness <i>C</i> _t | | Output Torque | | | | | |
|-----------------------------------|---|----------------------------|---|---|-------------------------------------|--|-------------------|---|----|---|----|--|----|---|----|
| Gearhead | M | | Continuous RPM (<i>n</i> ₁) | Cyclic RPM (<i>n</i> ₁) | | lb-in-s ² | kgcm ² | in.lbs. per arcmin | Nm | Nominal ²⁾ <i>T</i> _{2N} | | Acceleration <i>T</i> _{2B} | | Peak ³⁾ <i>T</i> _{2PEAK} | |
| | | | | | | | | | | in.lbs. | Nm | in.lbs. | Nm | in.lbs. | Nm |

PE501 with Motor Mounting Plate

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|------|-------|----|-------|-----|-------|-----|-------|-----|
| PE501SP0050 | M | 5.000 | 2,600 | 5,000 | 24 | 0.0049 | 5.50 | 221.3 | 25 | 1,062 | 120 | 1,859 | 210 | 4,248 | 480 |
| PE501SP0100 | M | 10.00 | 2,600 | 5,000 | 24 | 0.0049 | 5.50 | 221.3 | 25 | 885 | 100 | 1,593 | 180 | 4,248 | 480 |

PE502 with Motor Mounting Plate

| | | | | | | | | | | | | | | | |
|-------------|---|-------|-------|-------|----|--------|------|-------|----|-------|-----|-------|-----|-------|-----|
| PE502SP0250 | M | 25.00 | 2,600 | 5,000 | 24 | 0.0039 | 4.45 | 221.3 | 25 | 1,062 | 120 | 1,859 | 210 | 4,248 | 480 |
| PE502SP0500 | M | 50.00 | 2,600 | 5,000 | 24 | 0.0039 | 4.45 | 221.3 | 25 | 1,062 | 120 | 1,859 | 210 | 4,248 | 480 |
| PE502SP1000 | M | 100.0 | 2,600 | 5,000 | 24 | 0.0039 | 4.45 | 221.3 | 25 | 885 | 100 | 1,593 | 180 | 4,248 | 480 |

¹⁾ For higher speeds than shown, contact Stober.

²⁾ Based on input speed: *n*₁ = 2000 RPM

For torque at higher input speeds (*T*_{2NX}) solve the formula, where *n*₁ = Actual Input Speed.

$$T_{2NX} = \frac{T_{2N}}{\sqrt[3]{\frac{n_1}{2000}}}$$

³⁾ Maximum momentary torque for emergency stops or heavy shock load. Admissible stops per life of gearhead = 10,000 stops maximum.

Part No. Explanation

PE 5 01 SP 0050 M

Motor Plate (See Page 68)
Ratio (**0050** = 5.0:1)
Output shaft with key
No. of Stages (**01** = 1 Stage, **02** = 2 Stage)
Unit No.
EconoLine ServoFit Precision Planetary Gearhead

When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions.

Output Torque (*T*_{2N}) ≤ 120 Nm (1,062 in.lbs.)
Ratio (*i*) = 5 - 100:1
Backlash (Δφ) ≤ 15 arc minutes

Index of Symbols

| | | |
|---------------------------|-------|--------------------------------|
| M | ..... | Motor adapter |
| AW | ..... | Input shaft |
| <i>i</i> | ..... | Ratio - Exact |
| <i>n</i> ₁ | ..... | Maximum input speed RPM |
| <i>J</i> ₁ | ..... | Mass moment of inertia (input) |
| <i>C</i> _t | ..... | Torsional Stiffness |
| <i>T</i> _{2N} | ..... | Nominal Torque |
| <i>T</i> _{2B} | ..... | Acceleration Torque Maximum |
| <i>T</i> _{2PEAK} | ..... | Peak Torque |

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

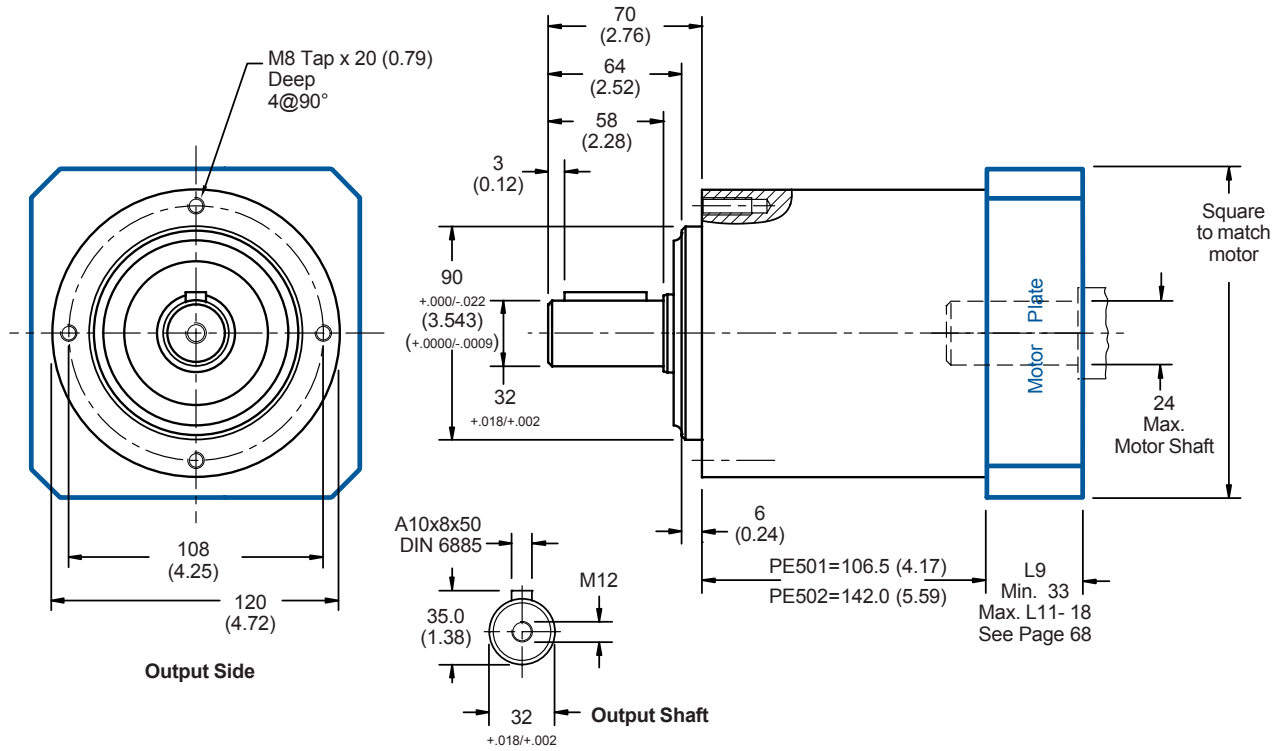
"PE" Series-EconoLine

ServoFit® Precision Planetary Gearhead

Dimensional Data



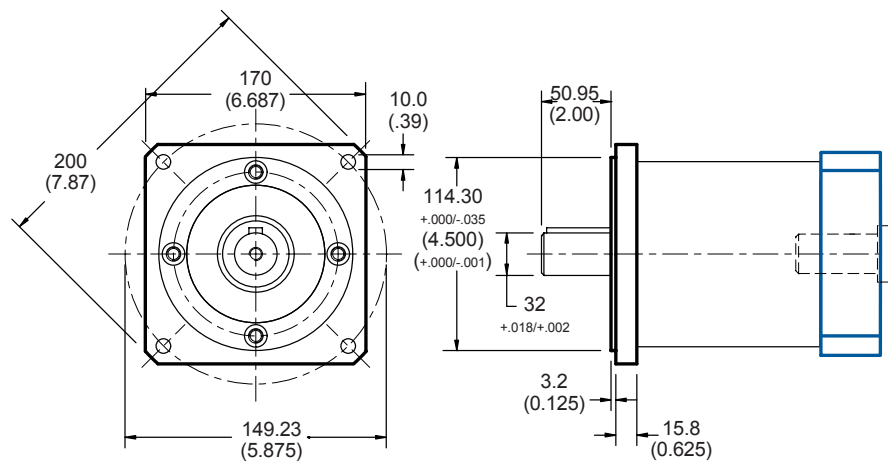
Dimension shown in millimeters (inches).



See web site for drawings.

PE501/PE502 Gearhead with Motor Plate

PE501/PE502 Gearhead with NEMA Output Adapter

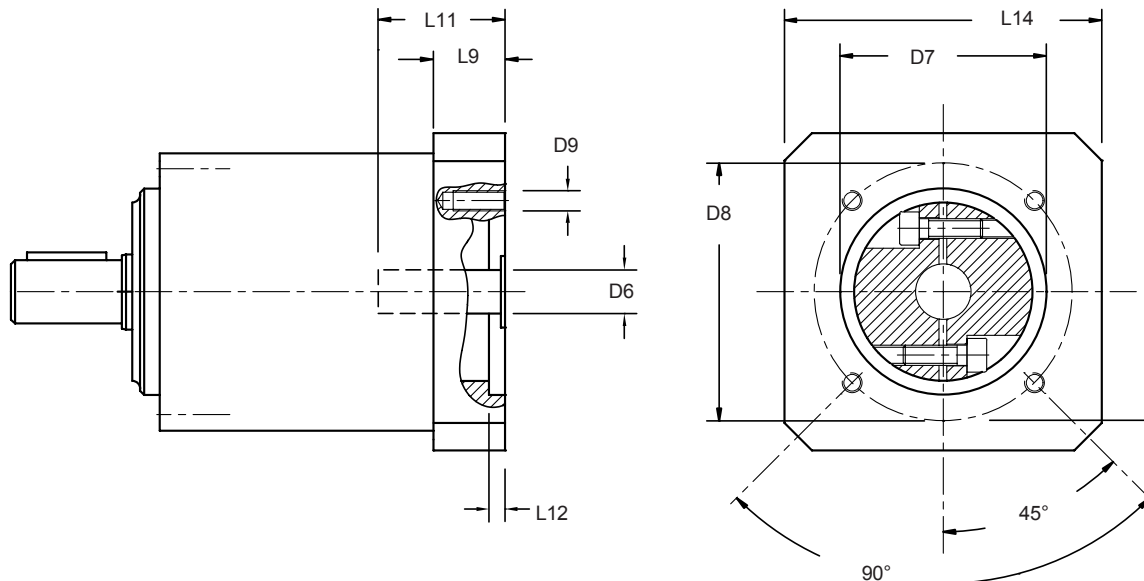


NEMA 56

"PE" Series-EconoLine



"PE" Series–EconoLine ServoFit® Planetary Gearhead Motor Plate Specifications



"PE" Series–EconoLine

Stober ServoFit Precision Planetary Gearheads will fit the motor of your choice by assembling the correct motor mounting plate between the motor and the gearhead. When ordering a planetary gearhead, specify the motor manufacturer and part number, provide the motor drawing with dimensions, or specify the motor mounting dimensions. The maximum motor plate thickness (L9) dimension will be determined by the motor shaft length minus the value shown in Table No. 1. The minimum thickness is also shown. For a precise dimension on a specific motor, contact Stober Technical Support.

The following dimensions are required to provide the correct motor mounting plate:

1. D6 Motor Shaft Diameter (See Table No. 1.) *
2. D7 Pilot Diameter
3. D8 Bolt Circle Diameter
4. D9 Bolt Diameter
5. L11 Motor Shaft Length
6. L12 Pilot Length
7. L14 Square Flange
(Optional–Motor plate will typically be made to match.)

Table No. 1 Motor Adapter Dimensions

| Motor Adapter | Motor Shaft D6 Max. ²⁾ mm | Motor Plate | | | |
|--------------------|--|-------------|------|-----------------------|-----------|
| | | L9 Min. | | L9 Max. ¹⁾ | |
| | | mm | ins. | mm | inches |
| PE201/PE202 | 11 | 18 | .71 | L11 - 5.5 | L11 - .22 |
| PE301/PE302 | 14 | 20 | .79 | L11 - 8.5 | L11 - .33 |
| PE401/PE402 | 19 | 30 | 1.18 | L11 - 11 | L11 - .43 |
| PE501/PE502 | 24 | 33 | 1.30 | L11 - 18 | L11 - .71 |

¹⁾ Motor plate maximum thickness (L9 Max.) will vary with motor shaft length.

²⁾ If an adapter bushing is required it will be supplied as a component of the motor mounting plate.

Refer to Page 70 for ServoFit Precision Planetary Gearhead Selection Procedure.

"PE" Series–EconoLine ServoFit® Planetary Gearhead Calculation Details

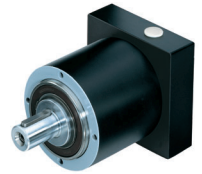
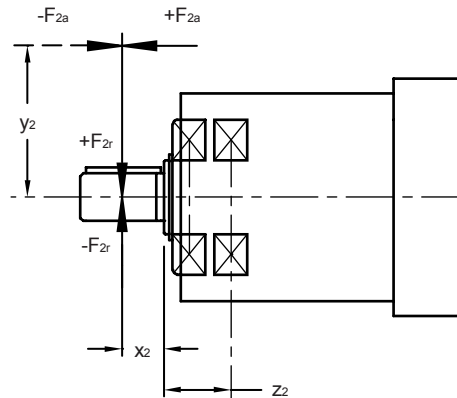


Table No. 1 **OUTPUT**
"PE" Series – Permissible Load and Tilting Moments

| Unit No. | Z ₂ | | F _{2A} | | F _{2R} | | T _{2K} | |
|---------------------|----------------|--------|-----------------|------|-----------------|-------|-----------------|---------|
| | mm | inches | N | lbs. | N | lbs. | Nm | in.lbs. |
| PE201, PE202 | 20 | 0.79 | 250 | 56 | 850 | 191 | 25 | 221 |
| PE301, PE302 | 28 | 1.10 | 412 | 93 | 1,650 | 371 | 69 | 610 |
| PE401, PE402 | 31 | 1.22 | 650 | 146 | 2,600 | 585 | 127 | 1,124 |
| PE501, PE502 | 41 | 1.61 | 1,200 | 270 | 4,800 | 1,080 | 336 | 2,974 |



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:

$$F_{2RX} = \frac{F_{2R}}{\sqrt[3]{\frac{n_2}{100}}} \quad T_{2KX} = \frac{T_{2K}}{\sqrt[3]{\frac{n_2}{100}}}$$

The application input tilting moment should be determined by the following formula: $T_{2A} = \frac{F_{2a} \cdot y_2 + F_{2r} \cdot (x_2 + Z_2)}{1000} \leq T_{2K}$

The hours of life (L_h) of the unit can be determined by the following formula: $L_h > 10,000$ hours if $T_{2K}/T_{2A} < 1.25$
 $L_h > 20,000$ hours if $T_{2K}/T_{2A} > 1.25$

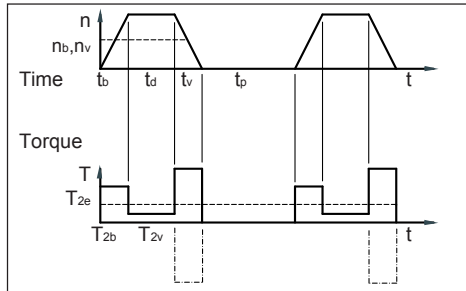
All formulas shown are based on metric values.

ServoFit® Precision Planetary Gearhead Selection Procedures Flow Chart



Continuous Duty – a drive can be 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:

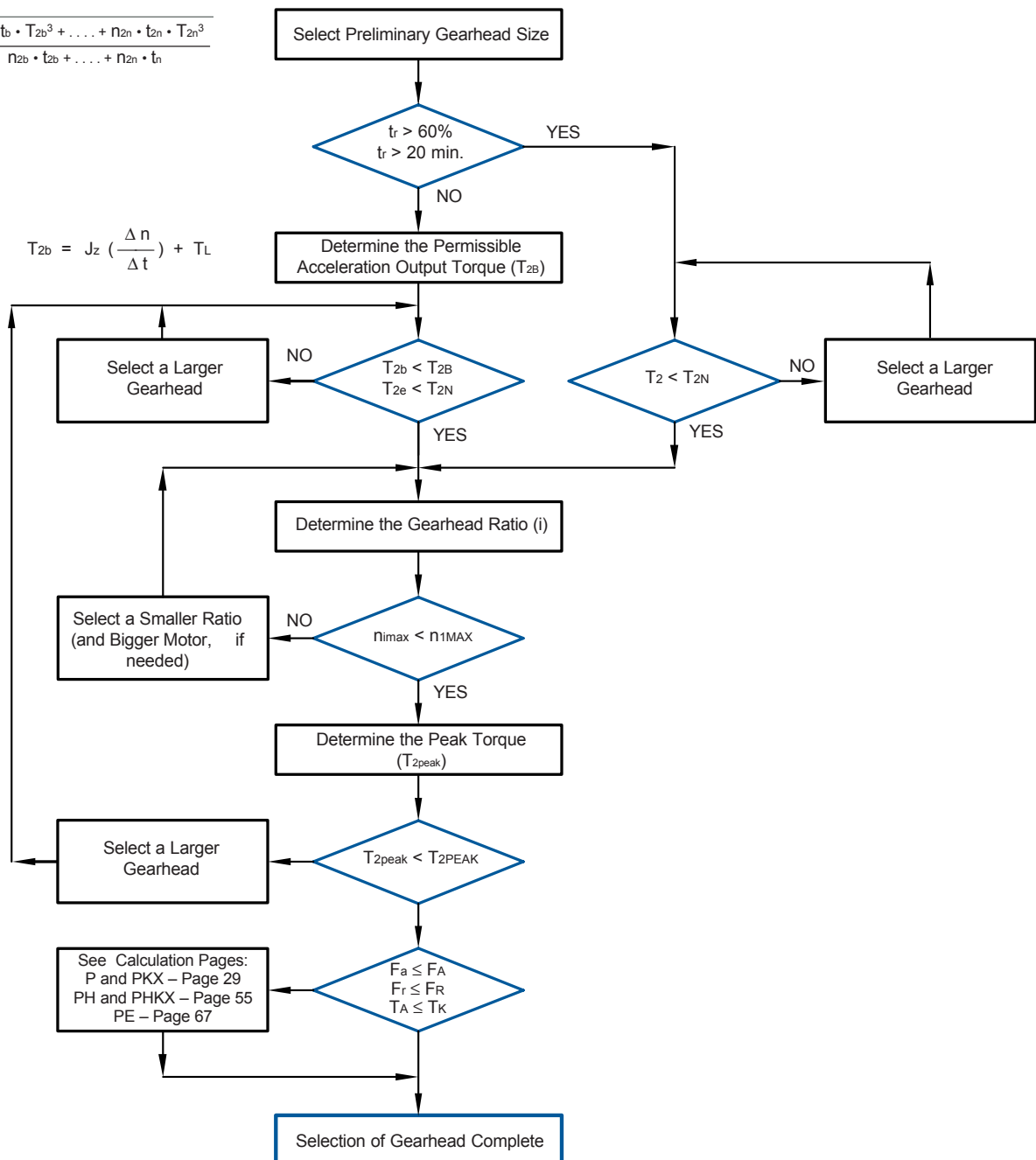
$$\frac{J_z}{j^2} = 4 \cdot J_D$$

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

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

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

$$T_{2b} = J_z \left(\frac{\Delta n}{\Delta t} \right) + T_L$$



"P" Series-ClassiLine

"PH" Series-PowerLine

"PE" Series-EconLine

Miscellaneous

ServoFit® Precision Planetary Gearhead Symbol Explanation

Table No. 1 Index of Values and Symbols

| Symbol | Value | | | Description |
|--------------------|----------------------|----------------------|-------------------|---|
| | Imperial | Multiplier | Metric | |
| F _{2a} | lbs. | 4.45 | N | Axial Force @ Output Shaft |
| F _{2A} | lbs. | 4.45 | N | Permissible Axial Force (see Page 80) |
| F _{2r} | lbs. | 4.45 | N | Radial Force @ Output Shaft |
| F _{2R} | lbs. | 4.45 | N | Permissible Radial Load (see Page 80) |
| i | — | — | — | Reducer Ratio |
| J _D | lb-in-s ² | 1.13×10 ³ | kgcm ² | Motor + Reducer Inertia @ Motor RPM |
| J _Z | lb-in-s ² | 1.13×10 ³ | kgcm ² | Total Inertia @ Reducer RPM |
| n | RPM | — | min ⁻¹ | Speed |
| n _b | RPM | — | min ⁻¹ | Acceleration Speed |
| n _v | RPM | — | min ⁻¹ | Deceleration Speed |
| n ₁ | RPM | — | min ⁻¹ | Input Speed |
| n ₂ | RPM | — | min ⁻¹ | Reducer Output Speed |
| T | in.lbs. | .113 | Nm | Torque |
| T ₂ | in.lbs. | .113 | Nm | Application Torque |
| T _{2e} | in.lbs. | .113 | Nm | Equivalent Torque (Average RMS Torques) |
| T _{2K} | in.lbs. | .113 | Nm | Reducer Tilting Moment (see Page 80) |
| T _L | in.lbs. | .113 | Nm | Friction Torque (Losses) |
| T _{2b} | in.lbs. | .113 | Nm | Application Acceleration Torque |
| T _{2B} | in.lbs. | .113 | Nm | Reducer Acceleration Torque |
| T _{2N} | in.lbs. | .113 | Nm | Reducer Nominal Output Torque |
| T _{2peak} | in.lbs. | .113 | Nm | Application Peak Torque |
| T _{2PEAK} | in.lbs. | .113 | Nm | Reducer Peak Torque |
| T _{2V} | in.lbs. | .113 | Nm | Application Deceleration Torque |
| t | seconds | — | seconds | Time |
| t _b | seconds | — | seconds | Acceleration Time |
| t _d | seconds | — | seconds | Duration Time |
| t _v | seconds | — | seconds | Deceleration Time |
| t _p | seconds | — | seconds | Pause Time |
| t _r | seconds | — | seconds | Running Time |

Table No. 2 Backlash Comparison – Arcminute vs Linear Distance

| Arcminute | Degrees | Linear Distance in Inches | | | |
|-----------|---------|---------------------------|----------|----------|----------|
| | | at 3" R | at 12" R | at 24" R | at 48" R |
| 1 | .017 | .0009 | .0035 | .0070 | .0140 |
| 2 | .033 | .0017 | .0070 | .0140 | .0279 |
| 3 | .050 | .0026 | .0105 | .0209 | .0419 |
| 4 | .067 | .0035 | .0140 | .0279 | .0558 |
| 5 | .083 | .0044 | .0175 | .0349 | .0698 |
| 6 | .100 | .0052 | .0209 | .0419 | .0838 |
| 7 | .117 | .0061 | .0244 | .0489 | .0977 |
| 8 | .133 | .0070 | .0279 | .0558 | .1117 |
| 9 | .150 | .0079 | .0314 | .0628 | .1257 |
| 10 | .167 | .0087 | .0349 | .0698 | .1396 |
| 11 | .183 | .0096 | .0384 | .0768 | .1536 |
| 12 | .200 | .0105 | .0419 | .0838 | .1675 |
| 13 | .217 | .0113 | .0454 | .0908 | .1815 |
| 14 | .233 | .0122 | .0489 | .0977 | .1955 |
| 15 | .250 | .0131 | .0524 | .1047 | .2094 |
| 16 | .267 | .0140 | .0558 | .1117 | .2234 |
| 17 | .283 | .0148 | .0593 | .1187 | .2373 |
| 18 | .300 | .0157 | .0628 | .1257 | .2513 |
| 19 | .317 | .0166 | .0663 | .1326 | .2653 |
| 20 | .333 | .0175 | .0698 | .1396 | .2792 |

These values can be interpolated for backlash or distances not shown in the table.

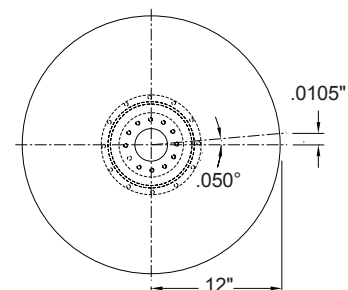
Table No. 4 can be used to determine the amount of linear movement that will be realized with a given backlash value.

Example:

A "PH" Series gearhead is vertically mounted under a 24" diameter turntable. The gearhead backlash is 3 arcminutes.

Reading across the table, the angular value of 3 arcminutes is .050 degrees.

Further determination indicates 3 arcminutes backlash will allow a linear movement of .0105 inches when measured at a 12 inch radius.



ServoFit® Precision Planetary Gearhead

Whispering Gearheads



"P" Series—ClassicLine

"PH" Series—PowerLine

"PE" Series—EconLine

Miscellaneous

Planetary gearheads are often used in high-speed precision drive applications. Here are some ways to make sure these speed reducers run silently and with minimal vibration.

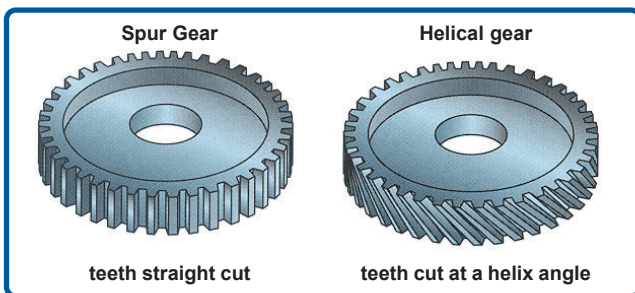
by Bernd Stöber



Planetary gear system consists of a central sun gear, three or four planet gears that rotate around the sun gear, and a ring gear with internal teeth that mesh with the planet gears.

Precision drive applications often call for planetary gearheads connected to servomotors with high output speeds, 3,000 to 10,000 rpm. These gearheads offer more than three times the torque and up to 30% higher speed-reduction ratios than comparable in-line reducers.

All of these parameters — high input speed, high torque, and high speed-reduction ratios — can cause gearheads to emit unacceptable noise unless the drive designer takes appropriate counter measures. Such measures start with speci-



Spur gears have teeth cut straight across, making them easy to manufacture. But because only one or two teeth engage at a time, load capacity is low and noise high. With helical gears, teeth are cut at an angle. This makes the tooth face longer and increases the number of teeth in engagement to 3, which boosts capacity and cuts noise.

fying certain gearhead design parameters, then following with an installation process that minimizes vibration sources in both the gearhead and other drive components.

Basic construction

Traditional planetary gearheads consist of three or four spur gears, called planets, and a smaller central pinion, or sun, surrounded by a ring gear with teeth on the inside diameter. The ring gear is usually stationary and the planets rotate within the ring. This multiple planet arrangement spreads the torque among several gears, increasing torque capacity per unit volume.

More advanced planetary configurations use helical gears. The teeth are cut across each gear at an angle, such that the gears gradually mesh, thereby producing less noise and vibration. This design also increases the number of teeth in contact to 3 between mating gears, which alleviates the load on each tooth, further reducing noise, vibration, and wear.

Noise factors

Using helical gears is one way to limit noise and vibration. But other factors contribute to noise as well. They include design shortcomings, manufacturing process limitations, and assembly errors.

The three main causes are:

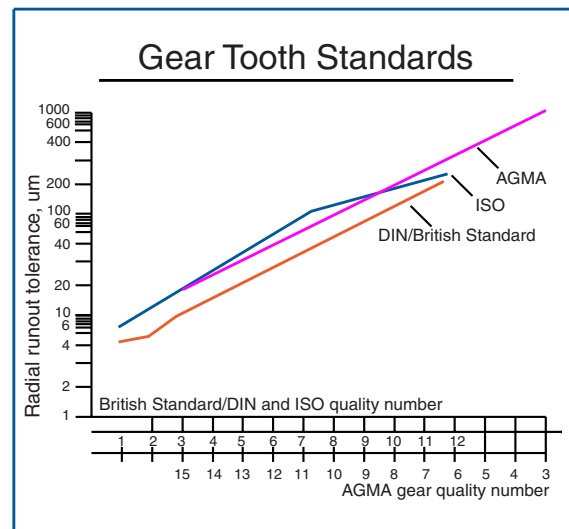
- Tooth profile deviation.
- Impact between mating gears as they engage.
- Changing stiffness of mating teeth during contact.

As a system designer, you can avoid problems by using the following parameters.

Tooth profile deviation

If mating gears had perfect involute tooth profiles, they would run very smoothly. Because of limited accuracy, however, gear cutting machines only approximate this perfect tooth profile.

To minimize this approximation, request precision planetary gearheads containing sun and planet gears that meet American Gear Manufacturers Association (AGMA) quality number 14 or Deutsche Industrie Norm (DIN) quality number 4. For standard industrial gears, AGMA numbers 10 to 12 (DIN numbers 6 to 8) are adequate.



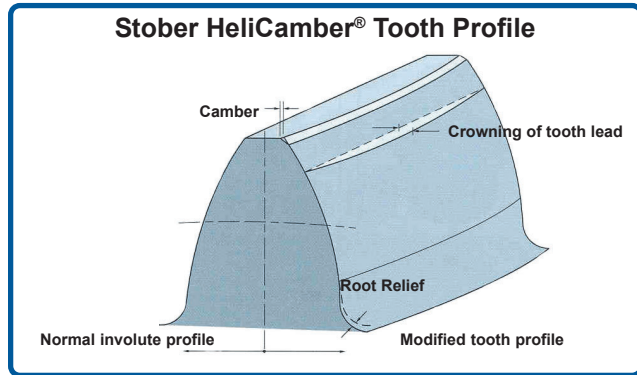
ServoFit® Precision Planetary Gearhead

Whispering Gearheads

Impact between gears.

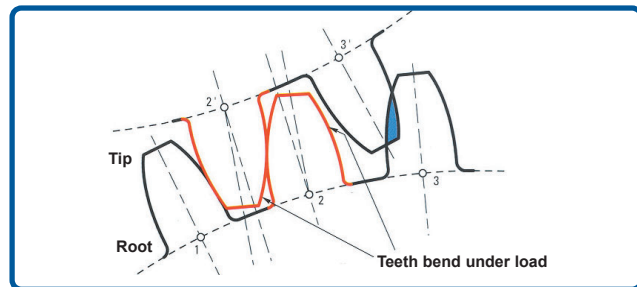
When gear teeth engage, the impact between them may cause noise and wear, depending on the gear design and manufacturing methods. Severity of this impact depends on bending stiffness of the teeth as they deform under load after the tip of one tooth contacts the base of the mating tooth near its root (fillet radius).

The impact severity can be relieved during manufacturing by grinding a small relief (about 0.00004 in.) at both tip and root areas of the tooth profile.



Nominal involute tooth profile generates a noise-producing impact when meshing with another gear. HeliCamber® tooth profile features tip and root relief to diminish the impact and noise. The crowned face minimizes impact due to edge contact when gears are misaligned.

Additionally, gear shaft misalignment causes mating gear teeth to contact at one edge of each tooth face. This contact is usually accompanied by a noise-producing impact, and subsequent tooth deformation. Crowning the tooth face (by grinding) reduces the impact and counteracts the resultant noise and vibration.



When mating teeth engage, the transmitted load causes them to bend at the root (teeth 2 and 2') a condition that causes noise. Without this bending, a theoretical interference would occur (teeth 3 and 3'). This effect is minimized by providing a relief at the tooth tip and root.

Changing tooth stiffness

Most gear pairs have a fractional number of teeth in contact as they roll against each other, and this causes the stiffness to vary. With a contact ratio of 2.7, for example, the number of teeth in contact continually changes between two and three. When three teeth are in contact, their combined stiffness is larger and the deflection is smaller than during the contact of two teeth.

This continually changing stiffness is another source of noise and vibration. Its effect can be minimized by having a large, whole-number contact ratio, preferably 3.0, provided by helical gears.

Further measures.

The following features will also reduce noise:

- Use a ductile cast iron GGG60 housing, which has good damping characteristics, and reinforces the input side to make it more rigid.
- Machine the bearing seats in one operation to ensure accurate alignment of the gear shafts and the mating gears.
- For high-speed operation (over 1,000 rpm), use balanced shafts.
- Make sure the gear pairs and housing are dimensionally matched before assembling the gearhead.

Application tips

As the drive designer, you can require that the gearhead manufacturer implement any of the noise-reduction measures described earlier. However you can also apply the drive components in ways that ensure quiet, vibration-free performance. The following steps will help, especially in high-speed servo applications:

- Bolt the gearhead mounting flange to a stiff and rugged support.
- Use a balanced motor (manufactured to close tolerances).
- In attaching the motor and gearhead, set clamp screws with a torque wrench per manufacturer's instructions.
- If the maximum speed is over 500 RPM, dynamically balance timing belt pulleys on the gearhead output shaft.
- Place belt pulleys as close as possible to the gearhead on its output shaft so the radial overhung load is minimal and does not exceed the permissible value for the gearhead.
- When mounting any device on the gearhead output shaft, don't strike it with a hammer because this can damage the shaft and bearings.
- If the planetary unit drives a rack and pinion system, make sure they are properly aligned and that the center distance of rack and pinion are accurately set according to the rack manufacturer's directions. Otherwise, gear tooth chatter may result.
- Select a control and resolver with comparable accuracy. A mismatch can cause rough acceleration that leads to gearhead rattling.
- Make sure the control has a fine tuning adjustment to minimize overshooting after accelerating to a desired speed. Overshooting also leads to gearhead rattling.
- Select a gearhead such that the ratio of gearhead and motor inertia to machine inertia is low, preferably 1:1. If the ratio exceeds 1:4, the large machine inertia can also lead to rough acceleration and rattling.

The above mentioned features are used in Stöber ServoFit® gearheads. If you're not using a ServoFit planetary gearheads for your applications, you're losing accuracy. These gearheads have just 3 arc/minutes of backlash—40% better precision than most gearheads now available. Need optimum accuracy? We can supply reduced backlash as low as 1 arc/minute.

Bernd Stöber is president of Stober Drives, Inc., Maysville, KY.

SPG ServoFit® Gearhead Motor Mounting Instructions



"P" Series-Classiline

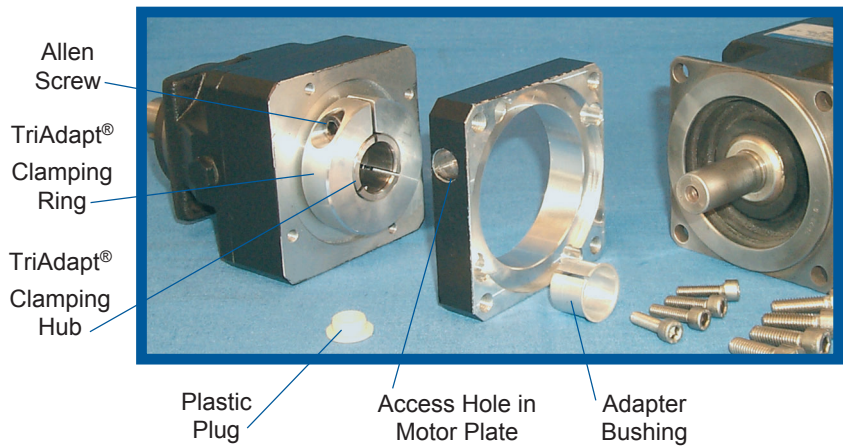
"PH" Series-PowerLine

"PE" Series-Econoline

Miscellaneous

Table No. 1 Tolerances for Motors

| k6 - Shaft Diameter | Metric (µm) | Imperial (ins.) |
|---------------------|-------------|--------------------|
| over 6 - 10 | +10 / +1 | +0.00039 / +.00004 |
| over 10 - 18 | +12 / +1 | +0.00047 / +.00004 |
| over 18 - 30 | +15 / +2 | +0.00059 / +.00008 |
| over 30 - 50 | +18 / +2 | +0.0007 / +.00008 |
| j6 - Pilot Diameter | Metric (µm) | Imperial (ins.) |
| over 10 - 18 | +8 / -3 | +0.0003 / -.00012 |
| over 18 - 30 | +9 / -4 | +0.00035 / -.00016 |
| over 30 - 50 | +11 / -5 | +0.0004 / -.0002 |
| over 50 - 80 | +12 / -7 | +0.00047 / -.00027 |
| over 80 - 120 | +13 / -9 | +0.0005 / -.00035 |
| over 120 - 180 | +14 / -11 | +0.00055 / -.0004 |
| over 180 - 250 | +16 / -13 | +0.0006 / -.0005 |
| over 250 - 315 | +16 / -16 | +0.0006 / -.0006 |
| over 315 - 400 | +18 / -18 | +0.0007 / -.0007 |



General Information

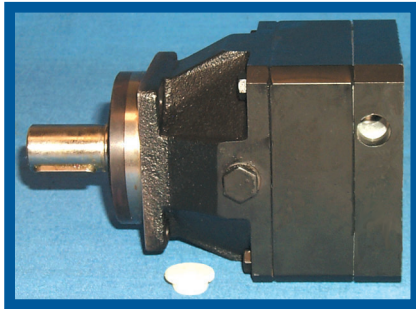
Servo motors are mounted to ServoFit® Gearheads by using a TriAdapt® motor adapter with a clamp coupling. This patented adapter requires no key but uses a friction locking triple split collet to clamp the shaft. A split bushing is included when the motor shaft is smaller than the input bore in the gearhead. The coupling operates free of backlash and, if installed correctly, requires no maintenance.

Tolerances for the motor must be ISO j6 on the pilot diameter and ISO k6 on the motor shaft, see Table No. 1. The motor shaft does not require a key but shaft runout, pilot concentricity and perpendicularity should meet DIN standard 42955-N when possible.

Important: Clean the motor shaft with degreaser to remove any film of oil or grease.

STEP 1. Remove the access hole plug.

Carefully remove the plastic plug from the access hole in the motor plate.

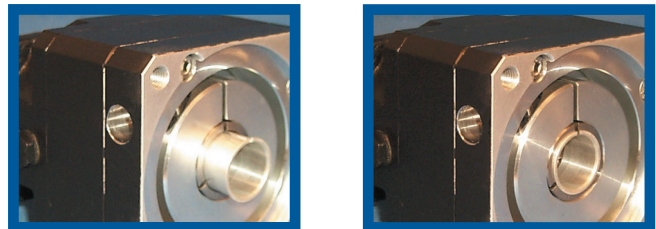


STEP 2. Align TriAdapt screw with access hole.



Visually align the access hole with the Allen screw in the clamping ring by turning the gearhead output shaft or the input coupling. (Shown with wrench for illustration only.)

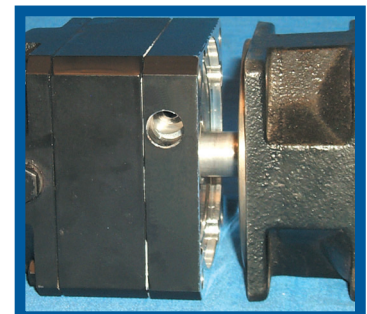
STEP 3. Install bushing (when applicable).



If an adapter bushing is needed, degrease the bushing inside and outside. Align the slot in the adapter bushing with the slot in the TriAdapt coupling hub. Slide the bushing into the input bore until the collar of the bushing touches the shaft end.

STEP 4. Carefully mount the motor.

Place the gearhead (with the bushing installed where necessary) onto the motor shaft. (If there is a keyway in the motor shaft, align the slot in the clamping hub with the keyway.) Support the gearhead while sliding it onto the motor shaft.

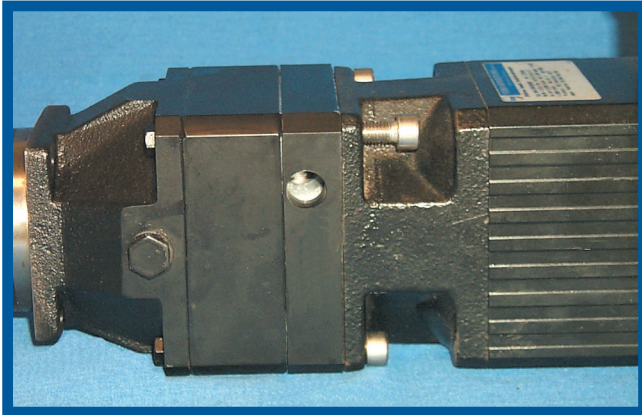


IT IS VERY IMPORTANT THAT THE GEARHEAD IS NOT FORCED ONTO THE SHAFT AND THE MOTOR IS CONCENTRIC WITH THE GEARHEAD COUPLING.



SPG ServoFit® Gearhead Motor Mounting Instructions

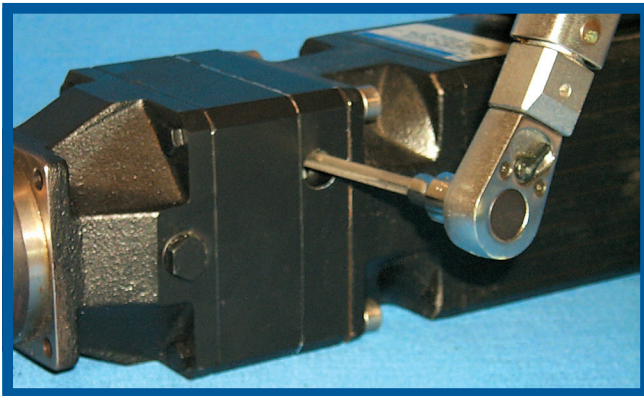
STEP 5. Bolt the motor to the motor plate.



Bolt the motor flange to the gearhead motor plate.

Tighten the motor bolts to the recommended tightening torque shown in Table No. 2.

STEP 6. Tighten the TriAdapt coupling screw.



With a torque wrench, tighten the Allen screw on the TriAdapt coupling to the recommended torque shown in Table No. 2. A torque wrench extension is provided with each gearhead. If there are two (2) screws, be sure to tighten them equally.

STEP 7. Re-insert the plastic plug.

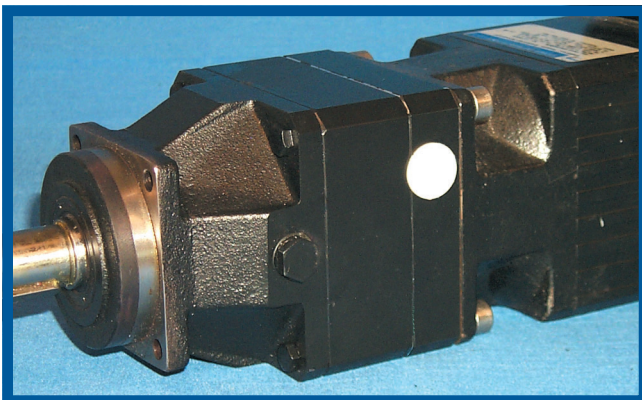


Table No. 2 Capscrew Tightening Torque

| Unit | Allen Wrench Size | Tightening Torque | |
|----------------------|-------------------|-------------------|----------|
| | | Nm. | in. lbs. |
| SPG Gearheads | | | |
| P301 | 5 | 10 | 88.5 |
| P312 | 5 | 10 | 88.5 |
| P401 | 5 | 10 | 88.5 |
| P412 | 5 | 10 | 88.5 |
| P501 | 6 | 25 | 221.25 |
| P512 | 5 | 10 | 88.5 |
| P701 | 8 | 45 | 398.25 |
| P712 | 6 | 25 | 221.25 |
| P801 | 10 | 60 | 531 |
| P812 | 8 | 45 | 398.25 |
| P301KX3 | 4 | 10 | 88.5 |
| P312KX3 | 4 | 10 | 88.5 |
| P401KX4 | 5 | 14 | 123.9 |
| P412KX3 | 4 | 10 | 88.5 |
| P501KX5 | 5 | 14 | 123.9 |
| P512KX4 | 5 | 14 | 123.9 |
| P701KX7 | 8 | 45 | 398.25 |
| P712KX5 | 5 | 14 | 123.9 |
| P801KX8 | 10 | 60 | 531 |
| P812KX7 | 8 | 45 | 398.25 |
| PH401 | 5 | 10 | 88.5 |
| PH412 | 5 | 10 | 88.5 |
| PH501 | 6 | 25 | 221.25 |
| PH512 | 5 | 10 | 88.5 |
| PH701 | 8 | 45 | 398.25 |
| PH712 | 6 | 25 | 221.25 |
| PH801 | 10 | 60 | 531 |
| PH812 | 8 | 45 | 398.25 |
| PH912 | 10 | 60 | 531 |
| PH923 | 8 | 45 | 398.25 |
| PH1023 | 10 | 60 | 531 |
| PH1024 | 8 | 45 | 398.25 |
| PH401KX4 | 5 | 14 | 123.9 |
| PH412KX3 | 4 | 10 | 88.5 |
| PH501KX5 | 5 | 14 | 123.9 |
| PH512KX4 | 5 | 14 | 123.9 |
| PH701KX7 | 8 | 45 | 398.25 |
| PH712KX5 | 5 | 14 | 123.9 |
| PH801KX8 | 10 | 60 | 531 |
| PH812KX7 | 8 | 45 | 398.25 |
| PH912KX8 | 10 | 60 | 531 |
| PE2 | 4 | 10 | 88.5 |
| PE3 | 5 | 17 | 150.45 |
| PE4 | 6 | 42 | 371.7 |
| PE5 | 8 | 83 | 734.55 |

"P" Series—ClassicLine

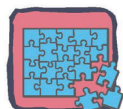
"PH" Series—PowerLine

"PE" Series—EconoLine

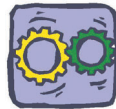
Miscellaneous

The SMS, or **Servo Modular System**, developed by Stöber design engineers is the foundation for a perfect match in the high precision servo world. There are three basic series of reducers with many input and output configurations available. Some of the main features of this system are:

Fits All Servo Motors



Modular
Gear System



Low
Backlash



Maintenance
Free



Leakage
Free



Low
Noise

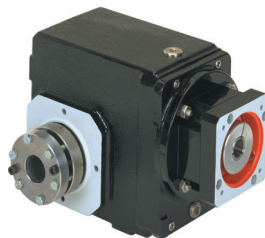
5 Year Warranty

The patented TriAdapt® motor coupling has been proven in the ClassicLine of ServoFit® Precision Planetary gearheads. It is designed to allow thermal expansion of the motor shaft—ensuring long motor life by preventing thrust load on the motor bearings.

STANDARD 3-DAY DELIVERY

"K" Series – Right Angle Helical/Bevel

- 10 Sizes
- Acceleration Torque to 13,200 Nm (116,820 in.lbs.)
- Ratios from 4:1 to 381:1
- Solid Output Shaft, Hollow Output, Patented Wobble Free Bushing System
- Standard Backlash ≤ 12 arcminutes
- Efficiency – 98.5% per stage



"F" Series – Helical Offset

- 5 Sizes
- Acceleration Torque to 1,100 Nm (9,735 in.lbs.)
- Ratios from 4.31:1 to 540:1
- Solid Output Shaft, Hollow Output, Patented Wobble Free Bushing System
- Standard Backlash ≤ 11 arcminutes
- Efficiency – 98.5% per stage

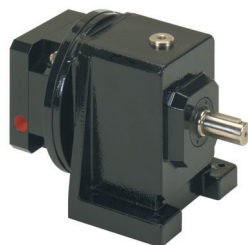


Ask for the ServoFit® SMS
Catalog or find it @:
www.stober.com.



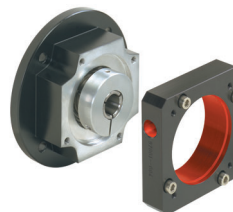
"C" Series – Concentric Helical

- 11 Sizes
- Acceleration Torque to 9,000 Nm (79,650 in.lbs.)
- Ratios from 1.997:1 to 276:1
- Housing Styles: Foot Mount, Round Output Flange, Square Output Flange, Tapped Holes
- Standard Backlash ≤ 20 arcminutes, Size 4 and Larger, ≤ 15 arcminutes
- Efficiency – 98.5% per stage



TriAdapt® Motor Adapter

- Will fit a wide selection of IEC, NEMA, or customized motors
- Triple-split collet—for greater concentricity and low inertia
- Motor installs in minutes with no special tools
- Motor plate pilot toleranced for a precise fit to motor
- Adapter bushings to fit all motor shafts—no key required
- Motor plate can easily be changed to fit your motor



* Maximum 10 working days for custom motor plates.



ServoFit Precision Planetary Gearhead Ad

What did you say?



I wish we had chosen Stober!

At Stober, we design our helical gear reducers so well that they run almost silently. So when it's time for your next purchase give us a call and we'll have a QUIET discussion.

STANDARD
3-DAY
DELIVERY



"we don't say we're best...our customers do"



www.stober.com

Stober Drives, Inc., 1781 Downing Drive, Maysville, KY 41056 • Fax: 606-759-5045 • Tel. 606-759-5090

"P" Series—ClassicLine

"PH" Series—PowerLine

"PE" Series—EconoLine

Miscellaneous

"P" Series—ClassicLine

"PH" Series—PowerLine

"PE" Series—EconLine

Miscellaneous

You'll be surprised at how our planetary gear offerings have multiplied



Stober has the widest selection of Planetary Gears available.



High Performance Gearing Technology

www.stober.com

No, we didn't just come out to the factory floor one morning and find that our Servofit® Planetary Gearheads had multiplied all over the place. Instead, we spoke with engineers, listened to our customers, read trade publications, and in general found out what was needed in the marketplace. Then we very carefully began the planning that developed into our having the widest selection of planetary gears available. And

with typical Stober detail, we began producing the quietest, smoothest running planetary gearheads that can be found. If you need planetary gearheads, your next move should be to call Stober, or check out our Website for specifics about our product. When you find that we can easily meet your specific needs, you'll think that we pulled a rabbit (maybe several rabbits) out of a hat, just for you.



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"P" Series—ClassicLine

"PH" Series—PowerLine

"PE" Series—EconoLine

Miscellaneous

Terms and Conditions of Sale



"P" Series—ClassicLine

"PH" Series—PowerLine

"PE" Series—Econoline

Miscellaneous

1. **GENERAL.** All orders for products supplied by STÖBER DRIVES INC. ("Stober") shall be subject to these terms and conditions of sales. All transactions shall be governed by the laws of the Commonwealth of Kentucky. No modifications hereto will be binding unless agreed to in writing by Stober.

2. **CUSTOMER.** The term "Customer," as used herein, means the distributor, resale dealer, original equipment manufacturer or first end-user customer that purchases the Stober products.

3. **WARRANTY.** Stober products shall be free from defects in material and workmanship for a maximum of 5-years (single shift operation or 30 months multiple shift operation) for ServoFit products; 3-years (single shift operation or 18 months multiple shift operation) for MGS products; 2-years (single shift operation or 12 months multiple shift operation) for TD products, from the date of shipment to the Customer. For ServoFit products, all normal wear items, including oil seals and bearings, shall be covered for a period of 2-years (single shift operation or 12 months multiple shift operation). In the event that a product proves to be defective, Stober's sole obligation shall be, at its option, to repair or replace the product. The repaired or replacement product will be shipped F.O.B. Stober's facilities, freight prepaid by Stober.

No employee, agent or representative of Stober has the authority to waive, alter, vary or add to the terms hereof without the prior written approval of an officer of Stober. It is expressly agreed that (a) this section constitutes the final expression of the parties' understanding with respect to the warranty and (b) this section is a complete and exclusive statement of the terms of the warranty.

Stober shall have no obligation under the warranty set forth above in the event that:

- (a) The Customer fails, within the warranty period to notify Stober in writing and provide Stober with evidence satisfactory to Stober of the alleged defect within five (5) days after it becomes known to the customer;
- (b) After inspection of a product, Stober determines, in its sole discretion, that it is not defective in material or workmanship;
- (c) Repair or replacement of a product is required through normal wear and tear;
- (d) Any part in a product or any ingredient contained in a product requires replacement or repair through routine usage or normal wear and tear;
- (e) A product is not maintained or used in accordance with Stober's applicable operating and/or maintenance manuals, whether by the Customer or any third party;
- (f) A product has been subject to misuse, misapplication, negligence, neglect (including, but not limited to, improper maintenance or storage), accident, catastrophe, improper installation, modification, adjustment, repair or lubrication, whether by the Customer or any third party, without the prior written consent of Stober. Misuse shall include, but not be limited to, deterioration in a product due to chemical action and wear caused by the presence of abrasive materials;
- (g) The system of connected rotating parts into which the product becomes incorporated is not compatible with the product, or it is not free from critical speed or torsional or other type of vibration within the specified operating range, no matter how induced; or
- (h) The transmitted load and imposed torsional thrust and overhung loads are not within the published capacity limits for the unit sold.

Items manufactured by other parties but installed in or affixed to Stober's products are not warranted by Stober and bear only those warranties, express or implied, which are given by the manufacturer of such items, if any.

THE WARRANTY SET FORTH ABOVE IS INTENDED

SOLELY FOR THE BENEFIT OF THE Customer AND DOES NOT APPLY TO ANY THIRD PARTY. ALL CLAIMS MUST BE MADE BY THE Customer AND MAY NOT BE MADE BY ANY THIRD PARTY. THIS WARRANTY MAY NOT BE TRANSFERRED OR ASSIGNED, IN WHOLE OR IN PART, BY THE Customer FOR ANY REASON WHATSOEVER. ANY SUCH ATTEMPTED TRANSFER OR ASSIGNMENT SHALL BE NULL AND VOID.

THIS WARRANTY TAKES THE PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH ARE HEREBY DISCLAIMED AND EXCLUDED BY STÖBER, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF USE AND ALL OBLIGATIONS OR LIABILITIES ON THE PART OF STÖBER FOR DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE, REPAIR OR PERFORMANCE OF THE PRODUCTS.

4. **MODIFICATIONS.** Stober reserves the right, without notice to the Customer, to (a) change the specifications of any product, (b) improve a product in any manner that Stober deems necessary or appropriate and (c) discontinue the manufacture of any product.

5. **PURCHASE ORDERS.** The Customer will submit purchase orders for the products to Stober in writing, whether by mail or telefax, which shall set forth, at a minimum: (a) an identification of the products ordered, (b) prices for such products, (c) quantities, (d) requested delivery dates and (e) shipping instructions and shipping addresses.

6. **ACCEPTANCE OF ORDERS.** All purchase orders received from the Customer are subject to acceptance by Stober in writing.

7. **MODIFICATION OF ORDERS.** No accepted purchase order shall be modified or canceled except upon the written agreement of Stober and the Customer. Mutually agreed cancellations shall be subject to reasonable charges based upon expenses already incurred by Stober and commitments made by Stober. Mutually agreed change orders shall be subject to all provisions of these Terms and Conditions of Sale.

8. **PRICE INCREASES.** Stober may increase its prices for the products by providing the original purchaser of the products with at least thirty (30) days' prior written notice. Increased prices for products shall not apply to purchase orders accepted prior to the effective date of the price increase unless such orders provide for delivery more than thirty (30) days after the date of acceptance of the order.

9. **PRICING AND DELIVERY TERMS.** In accordance with KRS 355.2-319(1)(b), all products are delivered F.O.B. Stober's warehouse facility in Maysville, Kentucky, or such other facility as Stober may designate. Orders are then shipped per Customer's shipping instructions as set forth in Customer's purchase order. **CATALOG PRICING DOES NOT INCLUDE SHIPPING, HANDLING AND TAXES.** Once delivered to a common carrier of the Customer's choosing [or of Stober's choosing if Customer has failed to specify a common carrier on or before five (5) days prior to the requested delivery date] Stober shall have no further responsibility for the products and all risk of damage, loss or delay shall pass to the Customer. A handling fee is added to freight costs by Stober to cover the cost of having to pay the carrier within seven (7) days when the terms with the Customer are net 30. The Customer has the option of shipping collect with our carrier or the carrier of choice.

10. **PAYMENT TERMS.** Net 30 days. All orders will be shipped either prepaid by the Customer or C.O.D., at Stober's option, unless the Customer has established a previously approved credit line. If Stober approves a credit line for the Customer, all payments shall be due within thirty (30) days of the date of the invoice. If any invoice is not paid in full within such thirty (30) day period, then finance charges shall be assessed at the rate of one and one-half percent (1½%) per month (eighteen percent (18%) per year). If such rate is deemed to be usurious at any time, it shall be reduced

to the maximum rate permitted by applicable law. Stober may stop or withhold shipment of products if the Customer does not fulfill its payment obligations. If Stober is insecure about payment for any reason, Stober may require full or partial payment in advance and as a condition to the continuation of its delivery of products.

11. **SECURITY INTEREST.** Unless and until the products are paid for in full, Stober reserves a security interest in them to secure the unpaid balance of the purchase price. The Customer hereby grants to Stober a power of attorney, coupled with an interest, to execute and file on behalf of the Customer all necessary financing statements and other documents required or appropriate to protect the security interest granted herein.

12. **ACCEPTANCE OF PRODUCTS.** The Customer will conduct any incoming inspection tests as soon as possible upon arrival of the products, but in no event later than ten (10) days after the date of receipt. Any products not rejected by written notice to Stober within such period shall be deemed accepted by the Customer. Stober shall not be liable for any additional costs, expenses or damages incurred by the Customer, directly or indirectly, as a result of any shortage, damage or discrepancy in a shipment.

13. **LIMITATION OF REMEDIES.**
- (a) STÖBER SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE CAUSED BY DELAY IN FURNISHING THE CUSTOMER WITH PRODUCTS.
 - (b) IN NO EVENT SHALL STÖBER'S LIABILITY INCLUDE ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL LOSSES OR DAMAGES, EVEN IF STÖBER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH POTENTIAL LOSS OR DAMAGE.

14. **MADE-TO-ORDER PRODUCTS.** Stober reserves the right to revoke and amend any price quotations offered to the Customer for made-to-order products, provided that such price quotations have not been accepted by the Customer prior to the date of revocation or amendment.

15. **DIES, TOOLS AND EQUIPMENT.** Charges incurred by the Customer for dies, tools and other equipment shall not confer ownership or the right to possession therein by the Customer. All such dies, tools and equipment shall remain the property of Stober, and Stober shall have the exclusive right to possession thereof. Stober shall maintain such tools and equipment in good working order.

16. **REGULATORY LAWS AND STANDARDS.** Stober makes no representation that its products conform to state or local laws, ordinances, regulations, codes or standards except as may be otherwise agreed to in writing by Stober.

17. **SIZES AND WEIGHTS.** Stober's products are made only in the sizes and to the specifications set forth in its catalogs and other literature. If any alteration is requested, such altered product will be treated as a made-to-order item. Stober assumes no responsibility for typographical errors which may appear in its catalogs or literature, and cannot accept alteration charges caused by such errors. Since weights shown in Stober's catalogs are approximate, they cannot be used in determining freight allowances set forth in its catalogs and other literature. Freight allowances will be determined at the time of shipment and shall be based on actual shipping weight.

18. **SYSTEM DESIGN.** Responsibility for system design to ensure proper use and application of Stober's products within their published specifications and ratings rests solely with the Customer. This includes, but is not limited to, an analysis of loads created by torsional vibrations within the entire system, regardless of how induced.

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