

## Servo Gearmotors



**STÖBER**  
Geared to a higher standard™

# STÖBER Drives Inc., Maysville KY

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Manufacturing Center  
1781 Downing Drive

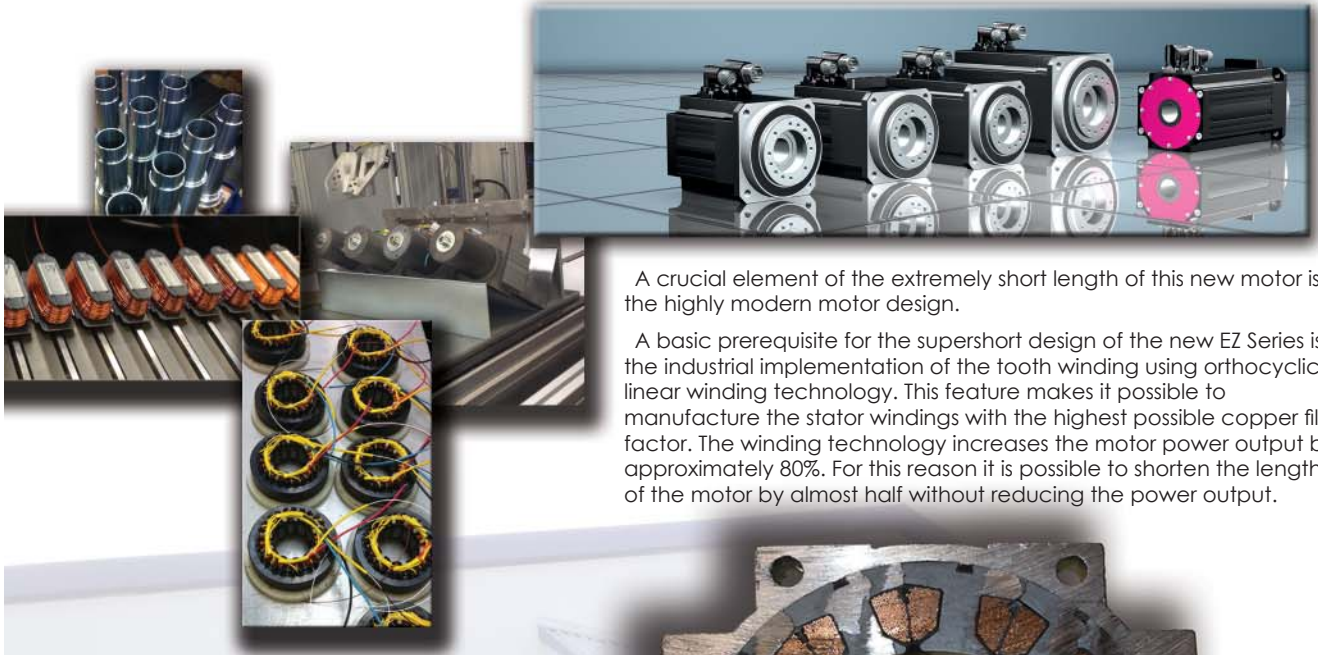


Assembly Center  
1780 Downing Drive



# STÖBER

# New, super compact hollow bore servo motor



A crucial element of the extremely short length of this new motor is the highly modern motor design.

A basic prerequisite for the supershort design of the new EZ Series is the industrial implementation of the tooth winding using orthocyclic linear winding technology. This feature makes it possible to manufacture the stator windings with the highest possible copper fill factor. The winding technology increases the motor power output by approximately 80%. For this reason it is possible to shorten the length of the motor by almost half without reducing the power output.

## STÖBER Servo Motor History

- EFL: 1st Servo Motor (released 1988)
- ES: Electronic Servo (released 1998)
- ED: Electronic Dynamic (released 2005)
- EK: Electric Kompact (released 2005)
- EZ: Electric Zahn (tooth) Wound (released 2010)
  - EZ: Stand alone motor or with gearing
  - EZF: Hollow Bore version
  - PY\_EZH: Hollow Bore Geared Motor
- EZS: Ball Screw Driving version (released 2011)
- EZM: Ball Screw Nut Driving version (released 2011)



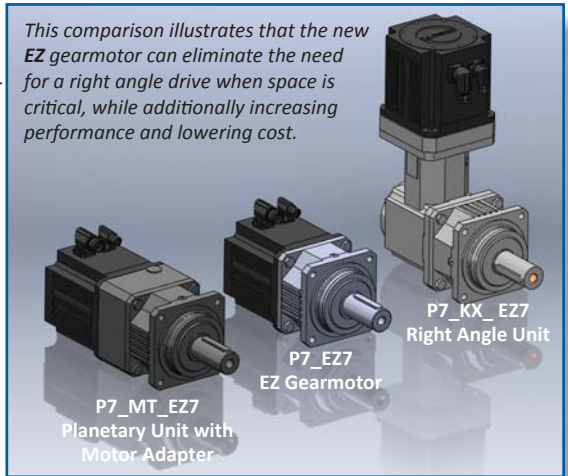
*Image of a section of an orthocyclically wound motor coil – the complex, precision winding technology used by STÖBER for production of the EZ/EZF series motors*

*Enlarged image of orthocyclically linear-wound motor coil.*



# Exceptional Performance

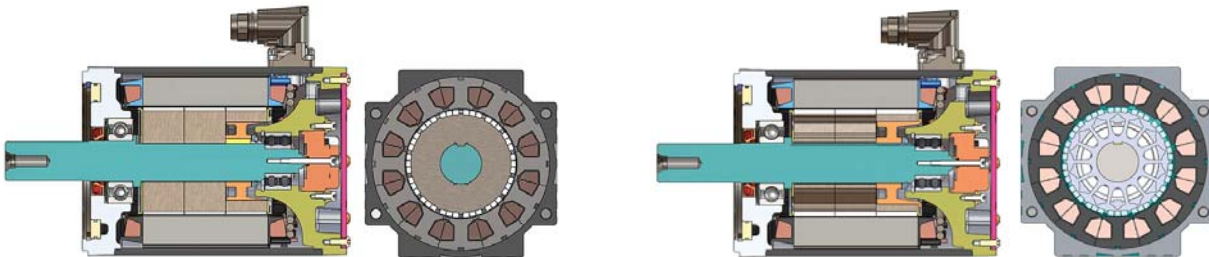
- **Compact** – motor mounts directly to the gearbox eliminating a motor coupling, coupling housing, adapter or additional input seals and bearings.
- **Dynamic** – direct mounting reduces inertia up to 75%
- **High Reliability** – FKM seals; HeliCamber® gear technology; 75 years of gear manufacturing/assembly experience; parts 100% inspected before and after assembly
- **Thermal Protection** – PTC in each phase to ensure each is monitored. Once the PTC reads a certain temperature (145°C) the monitoring system will activate to protect the motor winding from heat damage. Also available temperature sensor KTY-84.
- **Geared Motor Advantages** – smoother running for optimal performance, dynamic, minimal torque/speed ripple, UL/CE/CSA approved.
  - All motors are pressure tested during assembly to ensure performance against outside contaminants
  - Every winding is tested with extremely high voltage to ensure windings are to specification.



- **Water or Forced Air Cooling:** for higher rated power (approximately 35% torque increase) or at high ambient temperature. A fan can be added in the field.
- **Rotatable Connectors**



- **Optional Brake** – magnetic brake
- **High inertia and Low inertia** – provides motor specifications to fit unique applications



# Servo Motor Type Designation and Options

<b>EZF</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>U</b>	<b>S</b>	<b>AB</b>	<b>C4</b>	<b>O</b>	<b>108</b>
1 Motor Type	2 Motor Size	3 Generation Number	4 Number of Rotor Segments	5 Ventilation	6 Design	7 Servo Inverter	8 Encoder	9 Brake	10 Winding K <sub>E</sub> Constant

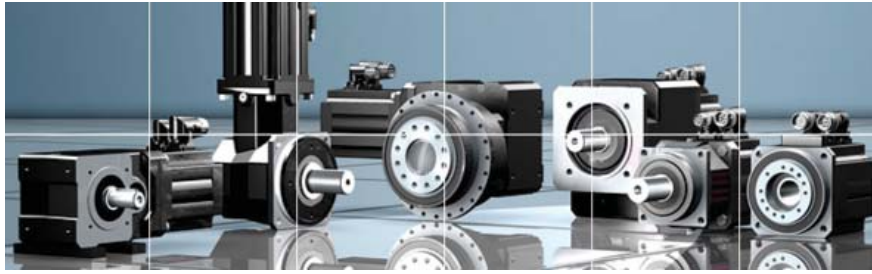
- 1 ..... Motor Type
  - EZF** – Servo motor with hollow shaft
  - EZS** – Servo ball screw motor
  - EZM** – Servo ball screw motor
- 2 ..... Motor Size
- 3 ..... Generation Number
- 4 ..... Number of Rotor Segments
- 5 ..... Ventilation
  - U** – Convection ventilated
  - B** – Forced cooled, EZS only
- 6 ..... Design
  - S** – Standard Design
  - D** – Smallest possible Mass Moment of Inertia (high dynamics)
  - M** – Increased Mass Moment of Inertia
- 7 ..... Servo Inverters (Contact Product Support)
- 8 ..... Encoder (Contact Product Support)
- 9 ..... Brake
  - O** – Without brake
  - P** – Permanent magnet brake
- 10 ..... Winding K<sub>E</sub> Constant in Volt/1,000 RPM

<b>PY</b>	<b>5</b>	<b>0</b>	<b>2</b>	<b>E</b>	<b>0090</b>	<b>EZH</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>U</b>	<b>S</b>	<b>AB</b>	<b>C4</b>	<b>O</b>	<b>108</b>
1 Gear Type	2 Gear Unit Size	3 Generation Number	4 Number of Stages	5 Design	6 Ratio	7 Motor Type	8 Motor Size	9 Generation number	10 Number of rotor segments	11 Ventilation	12 Design	13 Servo Inverter	14 Encoder	15 Brake	16 Winding K <sub>E</sub> Constant

- 1 ..... Gear Type **PY** (planetary gear unit with hollow shaft for attachment to EZ motor)
- 2 ..... Gear Unit Size
- 3 ..... Generation Number
- 4 ..... Number of Gear Stages
- 5 ..... Flange Shaft Design
- 6 ..... Gear ratio x 10 (9:1 = 0090)
- 7 ..... Motor Type **EZH** (hollow bore EZ servo motor for attachment to PY gear unit)
- 8 ..... Motor size
- 9 ..... Generation Number
- 10 ..... Number of Rotor Segments
- 11 ..... Ventilation
  - U** – Convection ventilated
  - W** – Water cooled
- 12 ..... Standard Design
- 13 ..... Servo Inverters (Contact Product Support)
- 14 ..... Encoder (Contact Product Support)
- 15 ..... Brake
  - O** – Without brake
  - P** – Permanent magnet brake
- 16 ..... Winding K<sub>E</sub> Constant in Volt/1,000 RPM

Protection rating: EZ – IP56, IP66 optional  
 EZF – IP56  
 PY/EZH – IP54

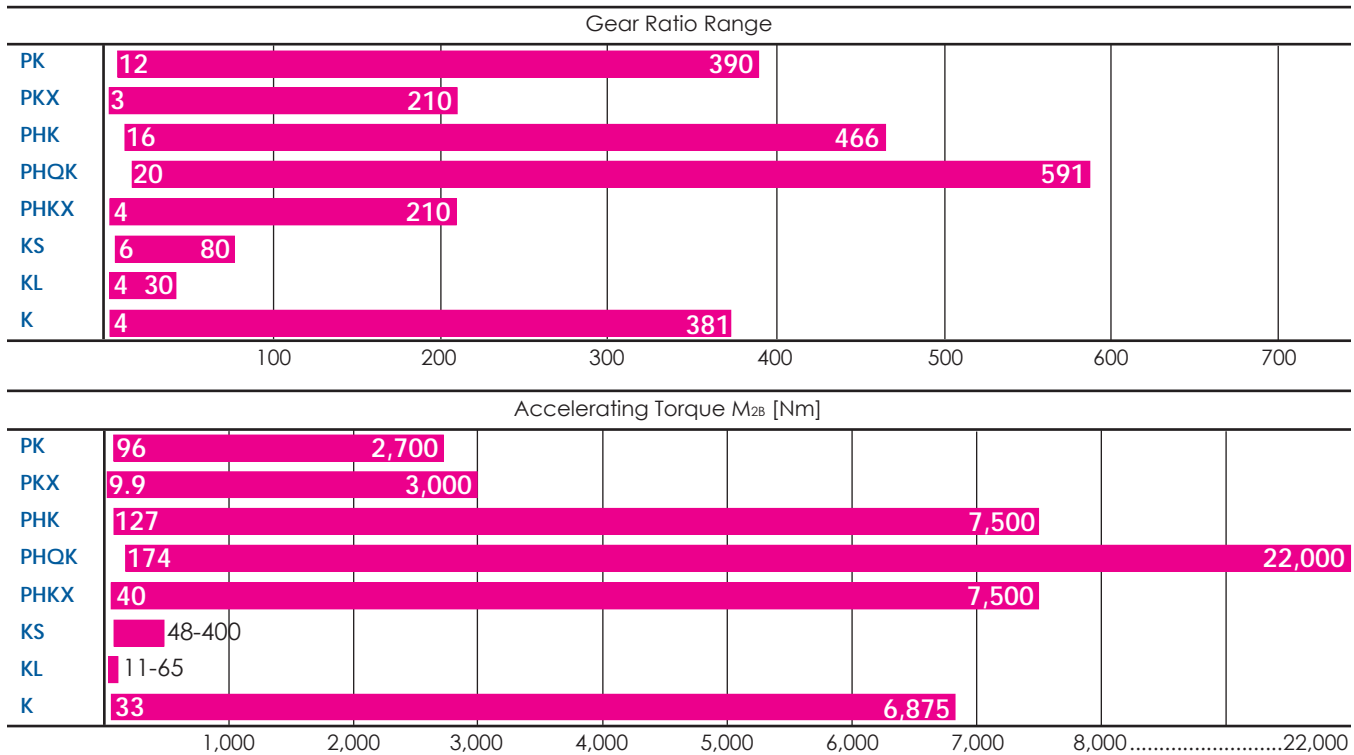
# Right-Angle – EZ Geared Motor



Eight gear unit series combined with the super compact EZ series motors (with modifiable dynamic properties) offer a wide range of applications for servo right-angle geared motors. The PHQK right-angle planetary gear unit and the extremely compact KL helical bevel gear unit are new additions to the range.

The fully integrated servo right angle geared KS motor and the volume saving helical bevel gear unit motor KL in particular, open up new fields of application.

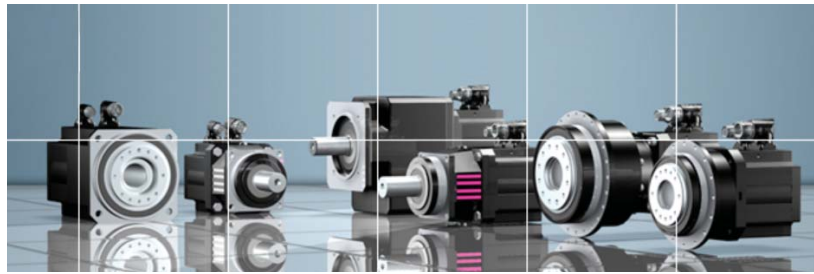
## Performance Data



## Right-Angle Geared Motors EZ



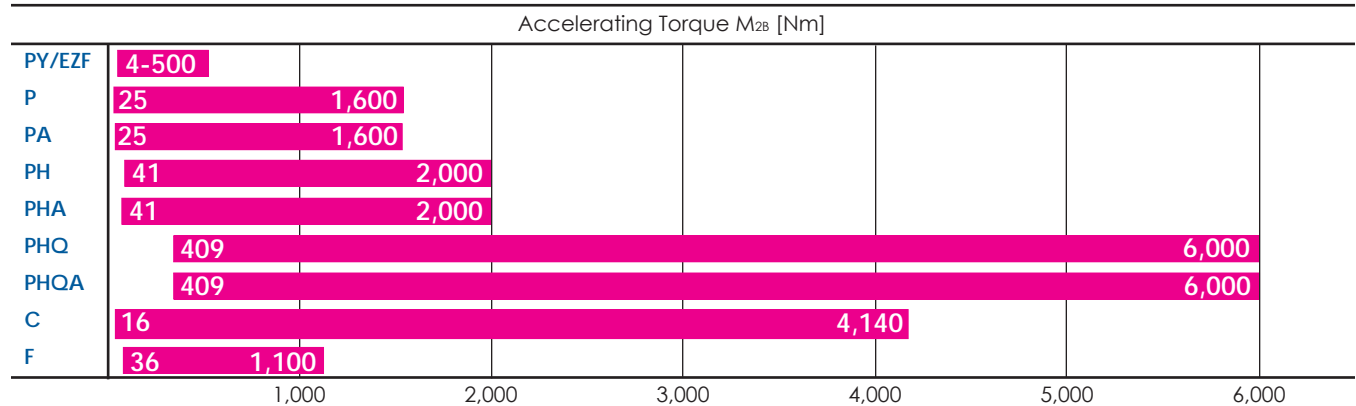
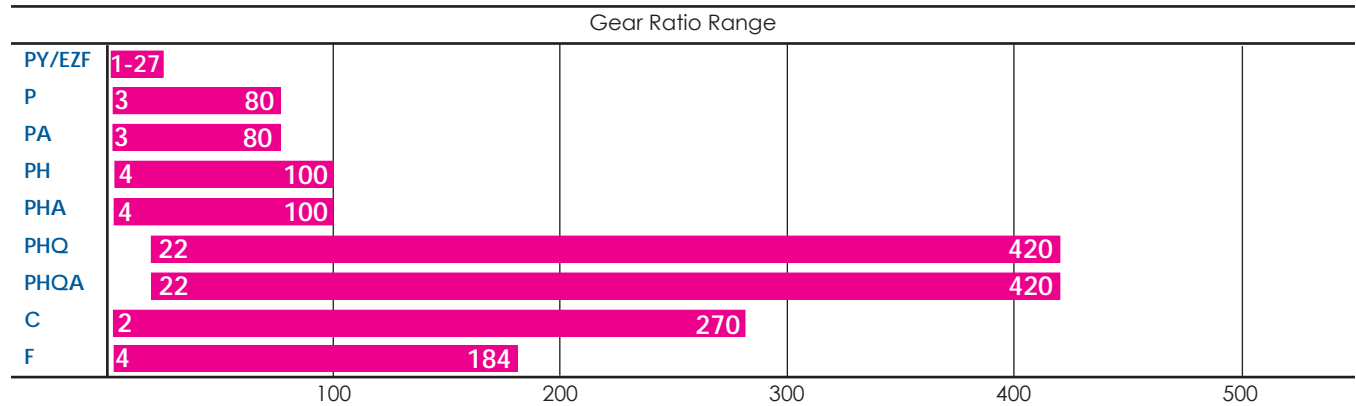
# In Line – EZ Geared Motor



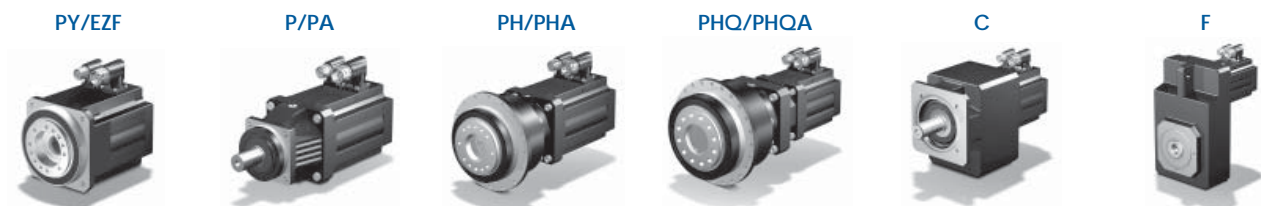
Nine gear unit series with direct flange mounted EZ servo motors provide a particularly high level of flexibility due to their wide range of possible gear ratios and acceleration torques.

The EZ servo motor's dynamic properties are modifiable and therefore provide an additional opportunity for drive optimisation.

## Performance Data



### In-Line Geared Motors EZ



# Hollow Servo Motor – PipeDrive PY and EZF

## Servo drive with hollow bore



The central feature of this servo motor, is the generously designed flange mount hollow bore making it possible to feed supplies (power cables, pipes, hoses, shafts, laser lights, etc.) through the motor. To protect these components and media the flange-mount motor has a continuous pipe, which rotates with the system, mounted through the hollow bore.

The direct, central path through the complete drive simplifies typical designs for industrial robots, machinery, machine tools, automatic assembly machines, converting and printing, handling equipment, and laser machine tools.

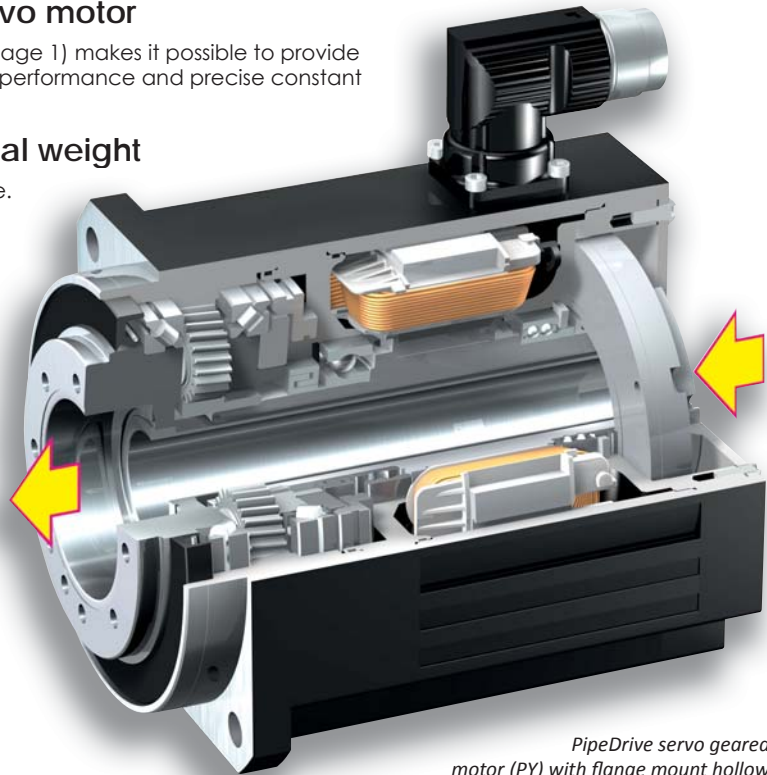
## New, super compact hollow bore servo motor

The orthocyclic linear tooth winding technology (see Page 1) makes it possible to provide a balanced motor with powerful torque, high dynamic performance and precise constant speed running.

## Powerful torque, high stiffness, low total weight

Motor and gearbox are optimized for maximum torque.

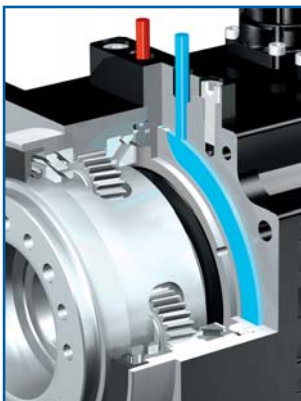
With the liquid cooling option, higher continuous and rated torques can be used. The extremely compact design of these servo drives provides very high torsional stiffness. Due to the weight-saving design, the PipeDrive is particularly suitable for applications in which the motor is also moved.



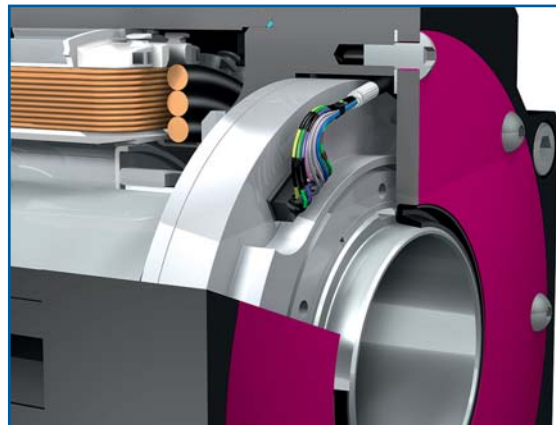
*PipeDrive servo geared motor (PY) with flange mount hollow bore and EnDat® inductive absolute encoder as a digital feedback system.*

### Optional cooling channel

*The flange between the motor and gear unit can be supplied with a liquid cooling feature increasing the energy efficiency of the unit through heat dissipation. This feature is only available with the PY Series.*



*Section: View of the B-side of the EZF 501 flange mount, hollow bore motor with EnDat® absolute encoder digital feedback system*





# Hollow Servo Motor – PipeDrive PY and EZF

## Designed and developed by experienced system manufacturers

The design and manufacture of this innovative geared motor is based on decades of application experience, paired with mechatronic production know-how and the willingness to tread new ground in drive technology.

The hollow shaft motors are available in lengths specified as 1, 2, 3, and 5. This specification relates to the number of rotor segments in each case. Each additional segment adds 25 mm.

The EZF Series direct drive motor is available in 2 sizes and features torques up to 104 Nm.

The new PY Series PipeDrive geared motors is initially available in 2 sizes, 1, 2, or 3-stage, and ratios of 1:1, 3:1, 9:1, and 27:1.

### Size 5, 115mm Square

Model	EZF501	EZF502	EZF503	EZF505	PY5_EZH501			PY5_EZH502		PY5_EZH503		PY5_EZH505
Length (mm)	121.5	146.5	171.5	221.5	165	189	213	190	214	215	239	265
Nom. Torque (Nm)	3.9	7	9.3	13.1	14	40	118	23	68	32	95	47
Acc Torque (Nm)	16	31	43	67	47	140	200	90	200	130	200	190
Ratio		1			3	9	27	3	9	3	9	3
Backlash (arcmin)		0			3	4	4	3	4	3	4	3
Nom. Output Speed (RPM)		3000			1000	333	111	1000	333	1000	333	1000
Max Axial Load (N)		750							4150			
Rated Radial Load (N)		2400							5029			
Hollow Bore Dia. (mm)		42							28			

### Size 7, 145mm Square

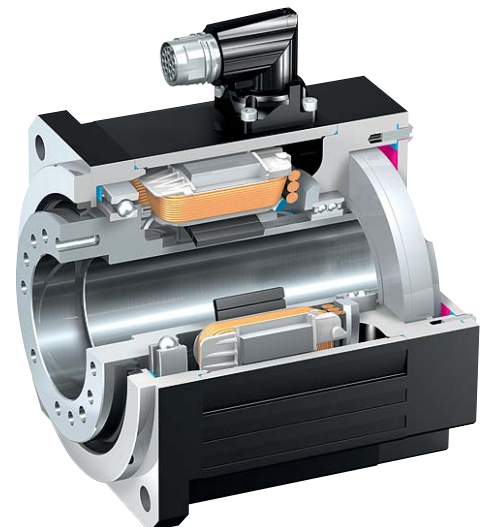
Model	EZF701	EZF702	EZF703	EF705	PY7_EZH701			PY7_EZH702		PY7_EZH703		PY7_EZH705
Length (mm)	119	144	169	224	186	213	241	211	238	236	263	291
Nom. Torque (Nm)	6.7	11.3	15.8	20.6	24	71	208	42	123	61	178	88
Acc Torque (Nm)	20	41	65	104	58	170	500	120	350	190	500	300
Ratio		1			3	9	27	3	9	3	9	3
Backlash (arcmin)		0			3	4	4	3	4	3	4	3
Nom. Output Speed (RPM)		3000			1000	333	111	1000	333	1000	333	333
Max Axial Load (N)		1300							5000			
Rated Radial Load (N)	3700	3900	4100	4200					9070			
Hollow Bore Dia. (mm)		45							38			

*PipeDrive servo geared motor type PY702 EZH701, two-stage gear unit with flange mount hollow shaft, and adapter for liquid cooling.*



*PipeDrive servo geared motor, type PY501 EZH501, one-stage gear unit with flange mount, hollow shaft, convection cooled.*

*EZF – Non-geared, Flange Mount, Hollow Shaft*



# EZS – The latest servo technology for ball screw drives



## For spindles of your choice

The universal, super compact STOBER servo ball screw motors are designed for universal mounting to spindles from many different manufacturers.

## For individual solutions

The STOBER EZS and EZM ball screw motors in 2 sizes (5 and 7) and 3 stack lengths (power stages) offer a broadly based range for standard applications.

All models are also available as brake motors.

Additional options include a fully integrated liquid cooling system – without changing the dimensions. Forced cooling fans are also available for the EZS ball screw motors.

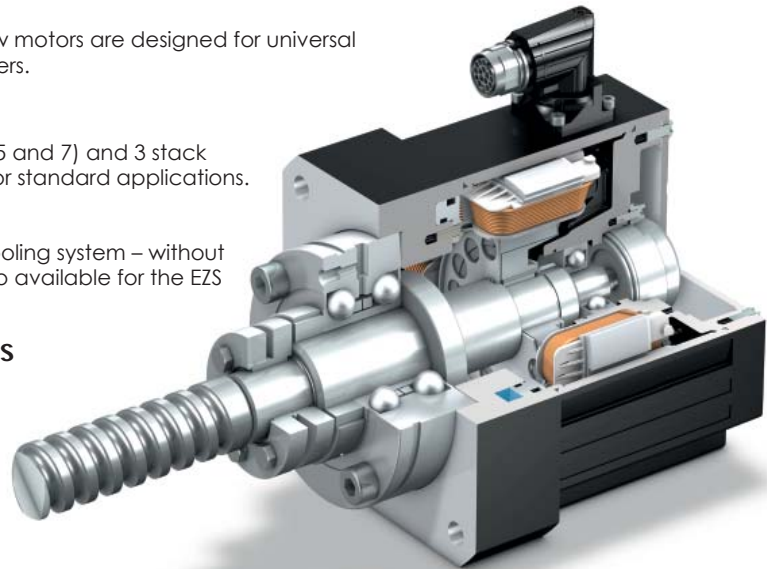
## Direct drive for rotating spindle shafts

The STOBER EZS ball screw motor has been specially developed for ball screw drives with a rotating spindle shaft.

The motor shaft is a blind hole. The spindle and motor shaft can be connected with a clamp ring.

## The motor dynamics can be modified

This new motor design provides a balance between powerful torque, high dynamics and precise synchronism. The dynamic behavior can be modified for different inertia values on the EZS 502/503 and 702/703 models if required.



*STOBER EZS 501 ball screw motor with axial angular contact ball bearings to absorb the high axial forces from the ball screw drive*

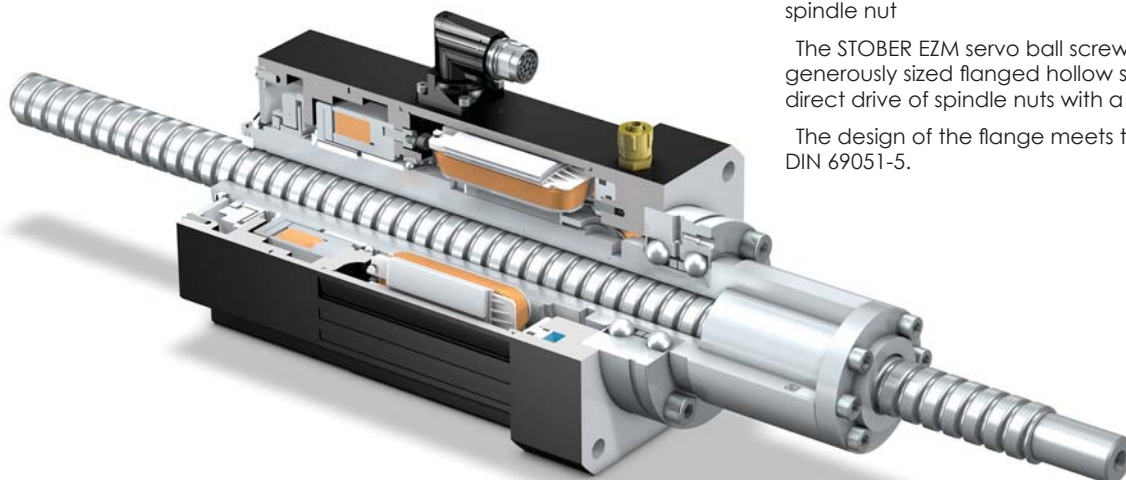


*From left: STOBER ball screw motors EZS 501, EZS 701 without clamp ring, EZS 703 with clamp ring and brake*

## EZS Ball Screw Motors

Model	Spindle Pitch		EZS501	EZS502	EZS503	EZS701	EZS702	EZS703
	Pitch (mm)	Feed Rate (v (m/s) max.)						
<b>Mountable Ball Screw Drive</b>			25/32			32/40		
<b>Standstill Feed Force</b>	10	0.5	2,953	5,027	6,974	10,430	18,096	26,138
$F_{v0}$ (N)	20	1.0	1,477	2,513	3,487	5,215	9,048	13,069
<b>Max. Feed Force</b>	25	1.25	1,181	2,011	2,790	4,172	7,238	10,455
$F_{vmax} = 2 * F_{v0}$	32	1.6	923	1,571	2,179	3,259	5,655	8,168

# EZM – For direct drive of a spindle nut

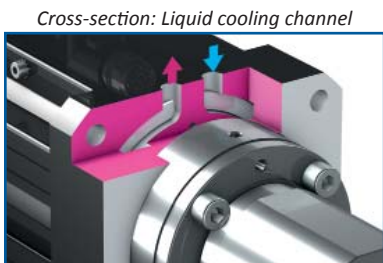


STOBER EZM ball screw motor for drive via the spindle nut

The STOBER EZM servo ball screw motors with its generously sized flanged hollow shaft is suitable for direct drive of spindle nuts with a flange.

The design of the flange meets the requirements of DIN 69051-5.

*STOBER EZM 502 ball screw motor with liquid cooling, Brake and EnDat® single turn absolute encoder feedback system  
With axial angular contact ball bearing to absorb the high axial forces from the ball screw drive.  
Flanged hollow shafts for different nut designs on request*



From left:  
STOBER ball screw motors EZM 501, EZM 501 rear view, EZM 502 with brake, EZM 701 with brake.



## EZS Ball Screw Motors

Model	Spindle Pitch		EZS501	EZS502	EZS503	EZS701	EZS702	EZS703
	Pitch (mm)	Feed Rate (v (m/s) max.)						
<b>Mountable Ball Screw Drive</b>			25/32			32/40		
<b>Standstill Feed Force</b> $F_{v0}$ (N)	10	0.5	2,953	5,027	6,974	10,430	18,096	26,138
<b>Max. Feed Force</b> $F_{vmax} = 2 * F_{v0}$	20	1.0	1,477	2,513	3,487	5,215	9,048	13,069
	25	1.25	1,181	2,011	2,790	4,172	7,238	10,455
	32	1.6	923	1,571	2,179	3,259	5,655	8,168

## EZM Ball Screw Motors

Model	Spindle Pitch		EZM501	EZM502	EZM503	EZM701	EZM702	EZM703
	Pitch (mm)	Feed Rate (v (m/s) max.)						
<b>Mountable Ball Screw Drive</b>			25			32		
<b>Center Hole Dia./Bolt Circle</b>			40/51			56/71		
<b>Standstill Feed Force</b> $F_{v0}$ (N)	10	0.5	2,953	5,027	6,974	10,430	18,096	26,138
<b>Max. Feed Force</b> $F_{vmax} = 2 * F_{v0}$	20	1.0	1,477	2,513	3,487	5,215	9,048	13,069
	25	1.25	1,181	2,011	2,790	4,172	7,238	10,455
	32	1.6	923	1,571	2,179	3,259	5,655	8,168

# ServoFit® Gearheads

## P(A) Series

- **P** – Backlash –  $\leq 3$  arc/mins
- **PA** – Backlash –  $\leq 1$  arc/mins
- Ratios – 3:1 to 100:1
- Input RPM – up to 8,000
- Noise Level – as low as 61 dB(A)\*\*
- **P** – Output Torque up to 3,000 Nm
- **PA** – Output Torque up to 1,600 Nm
- Available: Washdown Food Duty



## PKX Series

- Backlash –  $\leq 4$  arc/mins
- Ratios – 3:1 to 300:1
- Input RPM – up to 6,000
- Noise Level – as low as 70 dB(A)\*\*
- Output Torque up to 3,000 Nm
- Available: Washdown Food Duty



## PK Series

- Backlash –  $\leq 3.5$  arc/mins
- Ratios – 12:1 to 561:1
- Input RPM – up to 6,000
- Noise Level – as low as 63 dB(A)\*\*
- Output Torque up to 2,700 Nm
- Available: Washdown Food Duty



## PH(A) Series

- **PH** – Backlash –  $\leq 3$  arc/mins
- **PHA** – Backlash –  $\leq 1$  arc/mins
- Ratios – 4:1 to 121.0:1
- Input RPM – up to 8,000
- Noise Level – as low as 61 dB(A)\*\*
- Output Torque up to 7,500 Nm



## PHQ(A) Series

- **PHQ** – Backlash –  $\leq 3$  arc/mins
- **PHQA** – Backlash –  $\leq 1$  arc/mins
- Ratios – 18:1 to 600:1
- Input RPM – up to 7,000
- Noise Level – as low as 62 dB(A)\*\*
- **PHQ** – Output Torque up to 22,000 Nm
- **PHQA** – Output Torque up to 10,000 Nm



## PHKX Series

- Backlash –  $\leq 3.5$  arc/mins
- Ratios – 4:1 to 300:1
- Input RPM – up to 6,000
- Noise Level – as low as 70 dB(A)\*\*
- Output Torque up to 7,500 Nm



## PHK Series

- Backlash –  $\leq 3.5$  arc/mins
- Ratios – 16:1 to 561:1
- Input RPM – up to 6,000
- Noise Level – as low as 63 dB(A)\*\*
- Output Torque up to 7,500 Nm



## PHQK Series

- Backlash:  $\leq 3.5$  arc/mins
- Ratios – 22:1 to 591:1\*
- Input RPM – up to 5,500
- Noise Level – as low as 63 dB(A)\*\*
- Output Torque up to 13,000 Nm



## KS Series

- Backlash –  $\leq 4$  arc/mins
- Ratios – 6:1 to 200:1
- Input RPM – up to 6,000
- Noise Level – as low as 62 dB(A)\*\*
- Output Torque up to 400 Nm



## PE Series

- Backlash –  $\leq 15$  arc/mins
- Ratios – 5:1 to 100:1
- Input RPM – up to 8,000
- Noise Level – as low as 60 dB(A)\*\*
- Output Torque up to 210 Nm



## C Series

- Backlash –  $\leq 20$  arc/mins
- Ratios – 2:1 to 276:1\*
- Input RPM – up to 4,500
- Noise Level – as low as 53 dB(A)\*\*
- Output Torque up to 7,200 Nm
- Available: Inch or Metric Output  
Beverage and Food Duty



## F Series

- Standard Backlash:  $\leq 11$  arc/mins
- Reduced Backlash:  $\leq 7$  arc/mins
- Ratios – 4:1 to 540:1\*
- Input RPM – up to 4,500
- Noise Level – as low as 53 dB(A)\*\*
- Output Torque up to 1,100 Nm
- Available: Inch or Metric Output  
Solid, Hollow, Single, and Double Bushing  
Beverage and Food Duty



## K Series

- Standard Backlash:  $\leq 12$  arc/mins
- Reduced Backlash:  $\leq 6$  arc/mins
- Ratios – 4:1 to 381:1\*
- Input RPM – up to 4,500
- Noise Level – as low as 53 dB(A)\*\*
- Output Torque up to 13,200 Nm
- Available: Inch or Metric Output  
Solid, Hollow, Single, and Double Bushing  
Beverage and Food Duty  
Stainless Steel



## Rack and Pinion Drives

- **ZR** – up to 12.3kN feed force  
up to 6.8 m/s linear speed  
 $\leq 10\text{-}31 \mu$  linear backlash  
Helical tooth ONLY
- **ZTR** – up to 57kN feed force  
up to 4.7 m/s linear speed  
 $\leq 4\text{-}50 \mu$  linear backlash  
Helical and straight tooth
- **ZTRS** – up to 124kN feed force  
up to 4.7 m/s linear speed  
 $\leq 7\text{-}72 \mu$  linear backlash  
Helical and straight tooth



## ServoStop

- 3 Case Sizes fit P, PH, C, F, and K Series
- Up to 100 Nm
- Manual hand release
- Digital I/O for release monitoring
- 24 V DC electric brake



\* Ratios standard in one housing. Higher ratios available in compound units.  
\*\*dB(A) rating measured at 1 meter distance with 3000 RPM input.

# "MGS" – Modular Gear System – Industrial Products



## Series "C" – Concentric/Helical Speed Reducers

- 1/6 to 165 HP
- Output torques to 62,000 in. lbs.
- Output speeds from 875 to 6.3 RPM
- Ratios from 2:1 to 276:1
- NEMA C-face or shaft input
- Foot or flange mounting



## Series "F" – Offset/Helical Speed Reducers

- 1/6 to 33 HP
- Output torques to 9,743 in. lbs.
- Output speeds from 406 to 3 RPM
- Ratios from 4.3:1 to 552:1
- NEMA C-face or shaft input
- Output flange
- Solid, hollow, and wobble free bushing output



## Series "K" – Right Angle Helical/Bevel Speed Reducers

- 1/6 to 165 HP
- Output torques to 106,296 in. lbs.
- Output speeds from 437 to 4.5 RPM
- Ratios from 4:1 to 381:1
- NEMA C-face or shaft input
- Foot mount and output flange
- Solid (single or double), hollow, and wobble free bushing (single or double side) output

## Also Available as "KSS" Stainless Steel Reducer

- 1/2 to 9.8 HP
- Output torques to 3,100 in. lbs.
- Output speeds from 437 to 10 RPM
- Ratios from 4:1 to 178:1
- NEMA C-face input
- Foot mount and output flange
- Solid, hollow, and wobble free bushing output



## Series "S" – Right Angle Helical/Worm Speed Reducers

- 1/6 to 8 HP
- Output torques to 7,086 in. lbs.
- Output speeds from 318 to 2.5 RPM
- Ratios from 9.2:1 to 683:1
- NEMA C-face or shaft input
- Foot mount and output flange
- Solid (single or double) and hollow output

## Additional Product Offering

- ComTrac® Adjustable Speed Drives
- Food and Beverage Duty Speed Reducers

## Application Options

- Stainless steel hardware
  - Output shafts
  - Hollow output
  - Single or double side bushings
- Coatings
  - Standard severe duty gray paint
  - White (BISC approved)
  - Stainless steel (FDA/USDA approved)

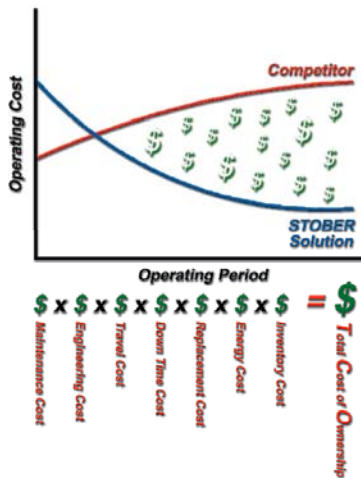
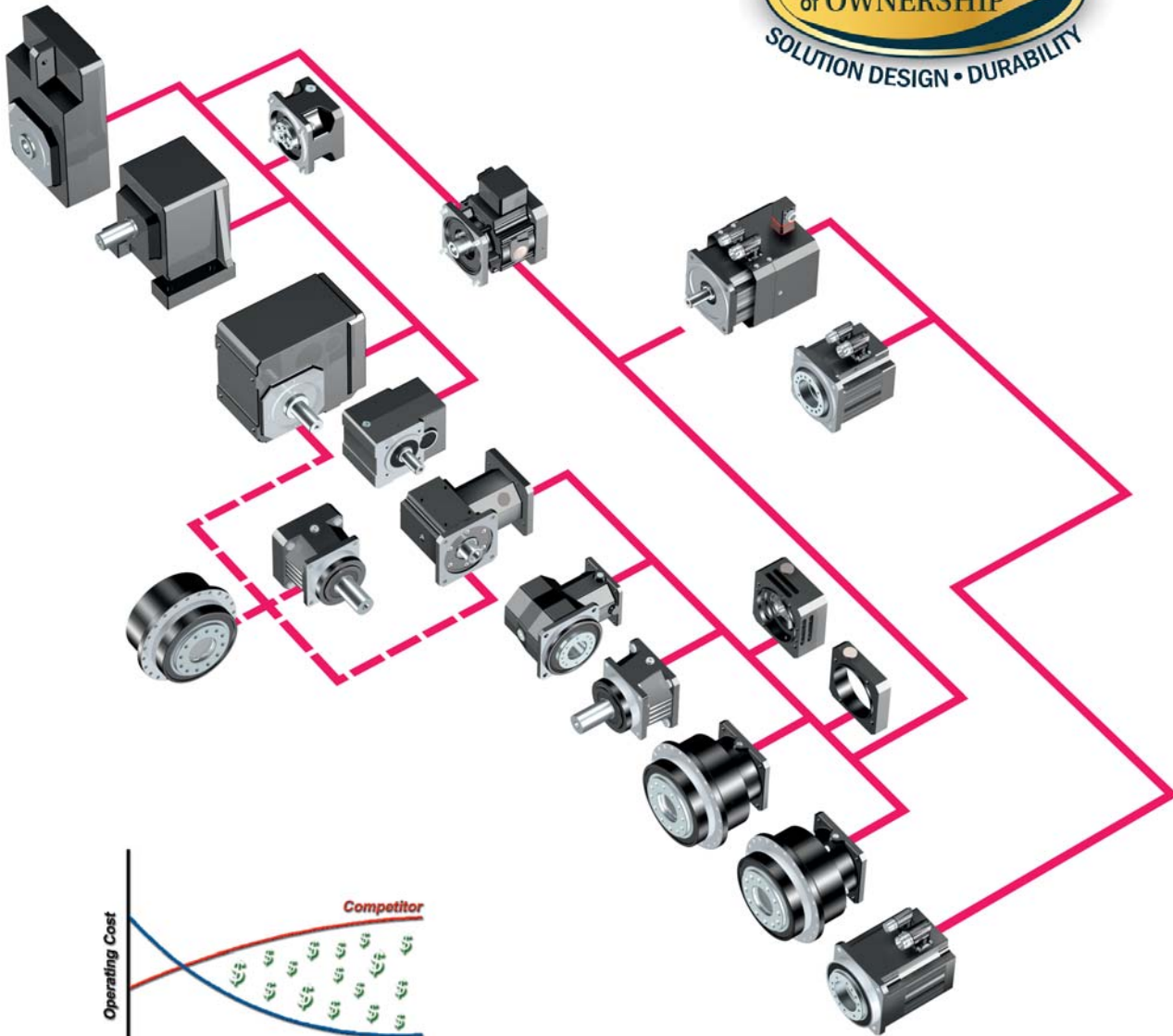
5 YEAR WARRANTY

# Total Cost of Ownership

The total cost of owning any product is more than the original price that is paid.

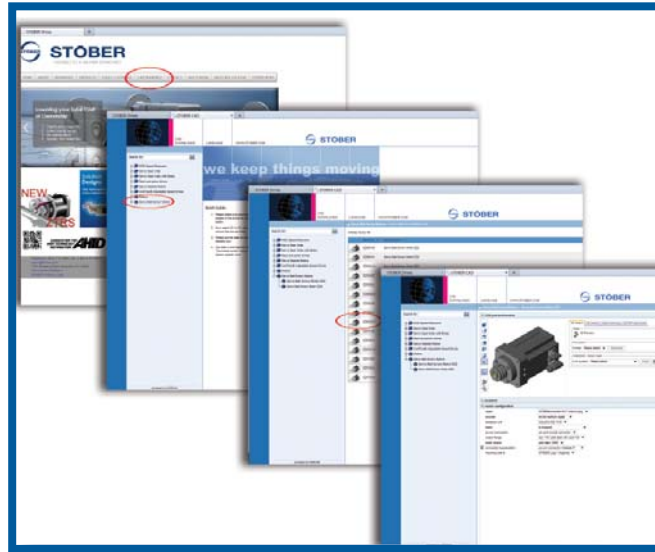
In the event of a breakdown or other catastrophe, many factors will add to the price of using a product that is less reliable or of lower quality than a drive from STÖBER.

The versatility and interchangeability of our components allow most products to be shipped in 1 day.



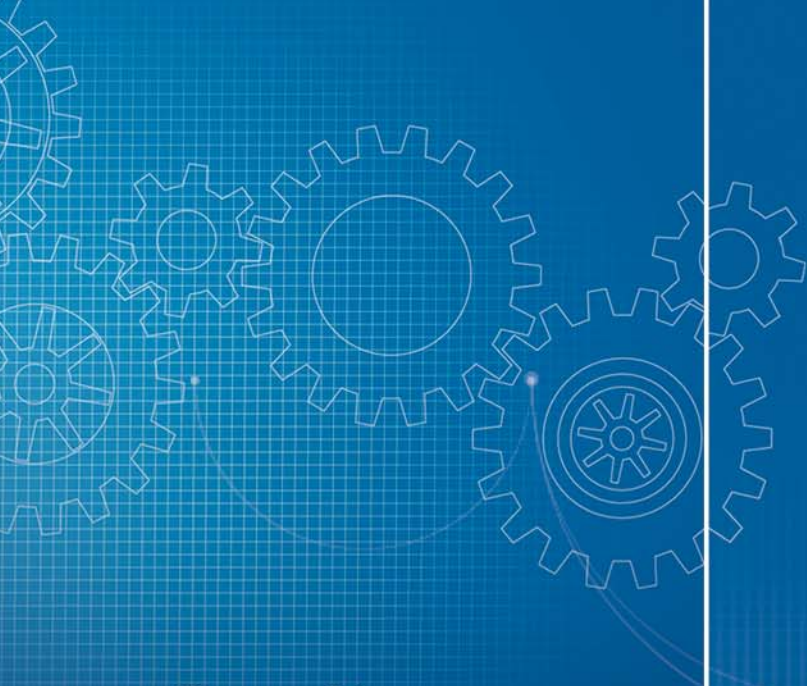
## Application Support

- ServoSoft Application Sizing Software
- CAD Drawings from the Web
- 24 Hour Service Hotline
- Over 75 years gearing experience – 30 years motor and electronic experience
- See web site ([www.stober.com](http://www.stober.com)) for full information



## STÖBER Subsidiaries





Geared to  
a higher standard™



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