



WITTENSTEIN

alpha

# Accessories Product Catalog

Precise  
Universal  
Reliable



© 2025 by WITTENSTEIN alpha GmbH

All technical specifications were correct at the time of going to print. We are continually developing our products and therefore reserve the right to make modifications. This documentation is subject to occasional errors. Please appreciate that legal claims cannot be asserted as a result of incorrect specifications, illustrations or descriptions. The text, photos, technical drawings and any other illustrations printed in this publication are protected property of WITTENSTEIN alpha GmbH.

Further use of this material in printed or electronic format requires approval from WITTENSTEIN alpha GmbH.

Any form of duplication, translation, editing, transfer to microfilm or storage on electronic systems is not permitted without express permission from WITTENSTEIN alpha GmbH.



# Contents

|                                |           |
|--------------------------------|-----------|
| Foreword by company management | 4         |
| WITTENSTEIN on all axes        | 5         |
| Accessories                    | 6         |
| Product Accessories            | 8         |
| cymex®5                        | 10        |
| <b>Couplings</b>               | <b>12</b> |
| <b>Elastomer couplings</b>     | <b>14</b> |
| Application                    | 17        |
| EL6                            | 18        |
| ELC                            | 20        |
| ELT                            | 22        |
| ECS                            | 24        |
| <b>Metal bellows couplings</b> | <b>26</b> |
| Application                    | 29        |
| BCH                            | 30        |
| BCT                            | 32        |
| BC2                            | 36        |
| BC3                            | 38        |
| BCL                            | 40        |
| <b>Torque limiters</b>         | <b>42</b> |
| Accessories for TL             | 44        |
| Application                    | 47        |
| TL1                            | 48        |
| TL2                            | 52        |
| TL3                            | 56        |
| <b>Shrink discs</b>            | <b>60</b> |
| Application                    | 62        |
| <b>Sealing plates</b>          | <b>64</b> |
| <b>WITTENSTEIN group</b>       | <b>66</b> |
| Dimensioning                   | 68        |
| Glossary                       | 70        |
| Ordering code                  | 78        |



Dear Business Associates,

While we are extremely passionate about technology and innovation, the success of our customers is our top priority. We have designed our products and services to help you achieve competitive advantages –by consistently offering high quality products, permanent availability, and the best service worldwide. Our range of accessories is continuously expanding, and as a result we have restructured our accessories portfolio to make it even easier to find the right product for each specific application .

Our accessories allow you to quickly find an ideal solution for your drive axes. All from a single source, specifically adapted to your axes. Organized by application examples, this catalog offers you quick access to the respective gearbox or actuator accessory options. Our range of products and solutions will continue to grow in the future because we never stop developing new ideas to make your work easier.

Take our word for it!

Norbert Pastoors  
Managing Director WITTENSTEIN alpha GmbH



# WITTENSTEIN on all axes

Our high standards not only apply to gearboxes, linear systems and actuators, but also to everything surrounding the core product. The WITTENSTEIN alpha accessories ensure we offer the most comprehensive portfolio for our customers. Our accessory products complement our gearboxes and actuators, offering you a broader range of design flexibility. You can save valuable time in the selection of the suitable accessories and for additional order processes since we will provide you with the entire drive solution from one source – in a precise, universal, and reliable manner.

# Accessories

**Efficient addition to  
your drive solution**



## Couplings

The couplings are perfectly adapted to our gearboxes – both in terms of geometry as well as in terms of performance. They can be used in a variety of sectors of drive technology, and contribute to the efficiency and process security of the entire drive train.



## Sealing plate

Sealing plates are used in areas in which dust, dirt and humidity cannot be avoided. They prevent the ingress of such substances in between the motor and the gearbox and thus increase the service life of the two components.



TEIN alpha  
ions:  
matched  
ngle source  
responsibility

Accessories

itation



## Shrink discs

Shrink discs are frictional hub-shaft connections.

Thanks to the compact design, machines can be designed to optimize installation space.

Used with our hollow shaft and/or slip-on shaft gearboxes, the shrink discs are suitable for the direct assembly on load shafts. The connections are designed without circumferential backlash and in a frictionally engaged manner.

# Product Accessories

## alpha Basic Line

The basic class of the servo drive products for precision requirements of 10-20 arcmin. High-quality servo gearboxes with rapid availability, at very attractive prices – best performance in class.



## alpha Value Line

The economic solution with medium requirements on service axes and linear systems. Individually configurable products in the precision range of 6-10 arcmin offer the broadest range of drive interfaces and thus utmost flexibility in this segment.



## alpha Advanced Line

Servo gearboxes, servo actuators and linear systems in the alpha Advanced Line offer solutions for applications with the highest precision requirements of 1-5 arcmin. The alpha Advanced Line delivers torsional rigidity and smooth running performance. Each series is optimized for high-precision at the highest speeds in continuous and dynamic cycle operation.



## alpha Premium Line

The absolute premium class of servo gearboxes, servo actuators and linear systems, these products deliver superior performance in smooth running, feed force and positioning accuracy at a maximum power density. The alpha Premium Line offers precision range of <math><1</math> arcmin, an industry benchmark, as well design principles that offer compactness, modularity, long life expectancy and easy assembly.







alpha Basic

| PRODUCTS          | COUPLING | SHRINK DISC |
|-------------------|----------|-------------|
| <b>Basic Line</b> |          |             |
| CP / CPK          | ELC      |             |
| CPS / CPSK        | ELC      |             |
| CVH               |          | SD          |
| CVS               | ELC      |             |

alpha Value

|                   |     |    |
|-------------------|-----|----|
| <b>Value Line</b> |     |    |
| NP / NPK          | ELC |    |
| NPL / NPLK        | ELC |    |
| NPS / NPSK        | ELC |    |
| NPT / NPTK / NTP  | ELT |    |
| NPR / NPRK        | ELC |    |
| NVH               |     | SD |
| NVS               | ELC |    |

alpha Advanced

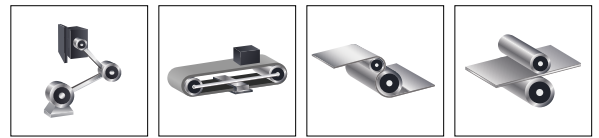
|  |     |    |
|--|-----|----|
| <b>Advanced Line</b>   |     |    |
| SP <sup>+</sup> / SPK <sup>+</sup> / SPC <sup>+</sup>                              | BC2 | SD |
| TP <sup>+</sup> / TPK <sup>+</sup> / TPC <sup>+</sup>                              | BCT |    |
| TP <sup>+</sup> / TPK <sup>+</sup> HIGH TORQUE                                     | BCT |    |
| HG <sup>+</sup>  |     | SD |
| SK <sup>+</sup>  | BC2 |    |
| TK <sup>+</sup>  | BCT | SD |
| SC <sup>+</sup>  | BC2 |    |
| VH <sup>+</sup>  |     | SD |
| VS <sup>+</sup>  | BC3 |    |
| VT <sup>+</sup>  | BCT |    |
| premo <sup>®</sup> SP Line   | BC2 |    |
| premo <sup>®</sup> TP Line   | BCT |    |
| TPM <sup>+</sup> DYNAMIC<br>TPM <sup>+</sup> HIGH TORQUE<br>TPM <sup>+</sup> POWER | BCT |    |

alpha Premium

|   |     |  |
|---|-----|--|
| <b>Premium Line</b>                                   |     |  |
| XP <sup>+</sup> / XPK <sup>+</sup> / XPC <sup>+</sup> | BC3 |  |
| premo <sup>®</sup> XP Line                            | BC3 |  |

# cymex<sup>®</sup>5 for superior drive train designs

With cymex<sup>®</sup> 5, the dimensioning and design of the entire drive train (application + transformation + drive + motor) are now quick, simple and secure. A database of pre-defined standard applications provides a foundation for fast and simple calculations. The program accounts for all major impact factors and sizing considerations to help design a drive train that optimizes mechanical efficiency and performance of your machine.



## ➤ Precise simulation of motion and load variables

The optimized software offers many options for the individual design of the drive train. These have been integrated to supplement the existing applications already in cymex<sup>®</sup> 3: the crank, conveyor, center winder and feed roll.

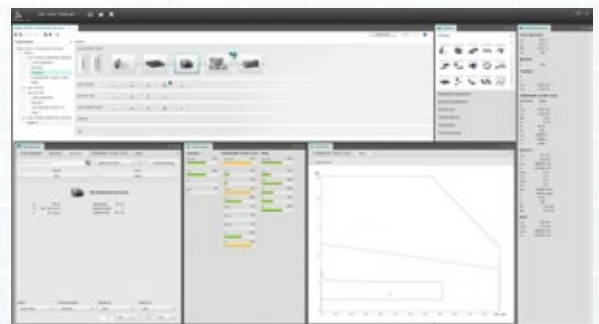
## ➤ Comprehensive documentation

Following the geometry comparison, cymex<sup>®</sup> 5 creates a calculation documentation and generates data sheets for the gearbox and motor on request. Additionally, 2D and 3D CAD data from selected components can be called up.

## ➤ Coupling selection guidance

Here, different options exist, depending on the existing knowledge of the user:

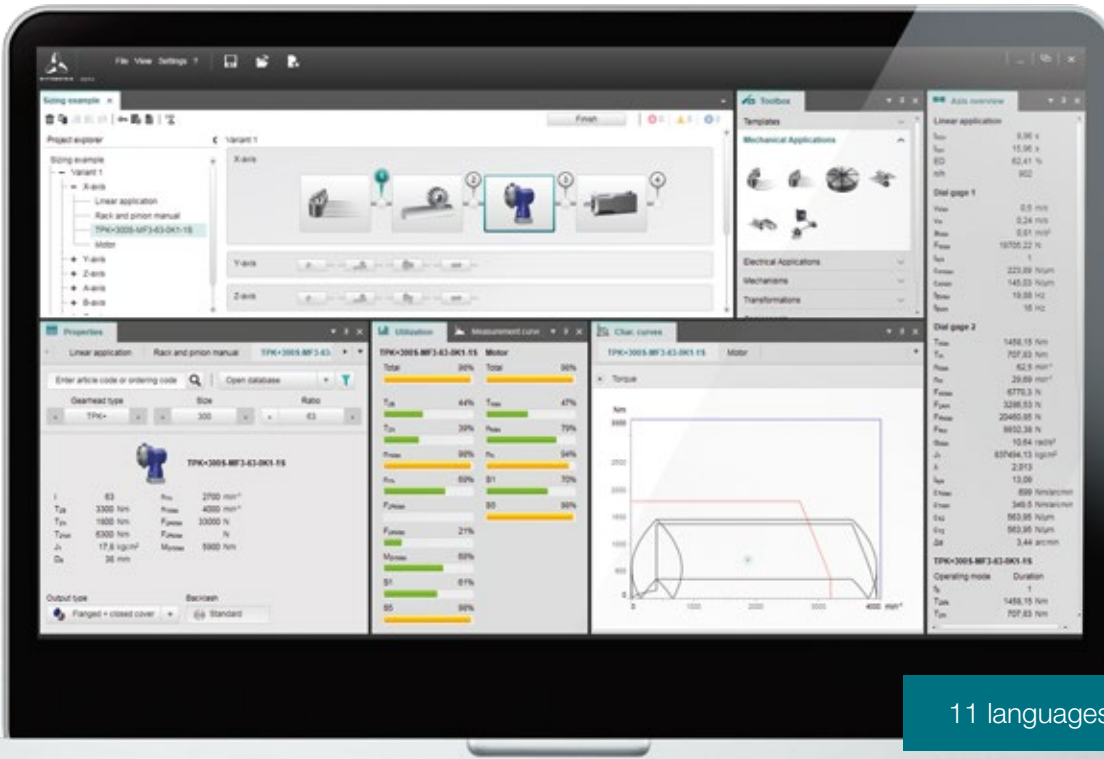
- Ordering code: The coupling is already known.
- Quick lay-out: Four steps to find the right coupling.
- In the utilization window, the technical data can be evaluated.



## ➤ Application and gearbox interface

With one simple click, the interface, e.g. of a coupling between the drive of the gearbox and the application, can be inserted.

# cymex®5



11 languages



## ✚ Define any number of axes simultaneously

In contrast to other design tools, cymex®5 can define any number of axes simultaneously. Calculations up to 60% faster, optimized sizing and stronger design results. Best of all, the program is available as a free download.

Free Download

The basic version of the cymex®5 design software is available as a free download.



[www.wittenstein-cymex.de](http://www.wittenstein-cymex.de)

# Couplings

## **Versatilely adapted to the specific requirements**

Whether used for a reliable product, harmonic continuously running system or as a monitoring unit with quick reaction, couplings are an essential part of modern drive technology. Count on our couplings for reliable and precise performance across a multitude of different requirements.

## **Perfectionist**

Metal bellows couplings have been designed to meet the greatest requirements in servo drive technology. High torsional rigidity enables accurate results and great dynamics.





### **Continuously running system**

Through high-quality manufactured hubs and attachable intermediate elements, elastomer couplings ensure a maximum true-running accuracy in the drive train. Torque shocks and vibrations are significantly absorbed and ensure very smooth running.

### **Monitoring unit**

Torque limiters with integrated mechanic switching mechanism combine a dynamic, quickly reacting transmission with torque limitation.



# Elastomer couplings

## **Plug-in, backlash free, electrically insulating**

The core element of elastomer couplings is the elastomer insert. This insert is responsible for the properties of the entire coupling and/or of the entire drive train. Through different degrees of hardness, the rigidity and the dampening behavior can be optimized. By default, they are implemented with the degree of hardness B to meet the torsional rigidity requirements. Thanks to the simple plug-in assembly of the hubs, the coupling assembly is extremely user friendly. A variety of connection options for the shaft and hub ensure that customer-specific requirements are met. Interacting with the precisely manufactured hubs and with the correct selection of elastomer inserts, the torsional oscillations, shocks and axial misalignments can be compensated. When properly applied, they are maintenance-free and fatigue enduring. Elastomer couplings are available as corrosion-resistant and ATEX versions.

### PRODUCT HIGHLIGHTS

**Vibration dampening and individually adaptable**

through freely selectable elastomer inserts.

**Durable and maintenance-free for their entire service life**

through precisely manufactured components.

**Compensation for shaft misalignment**

through the excellent damping of the elastomer inserts within the drive.

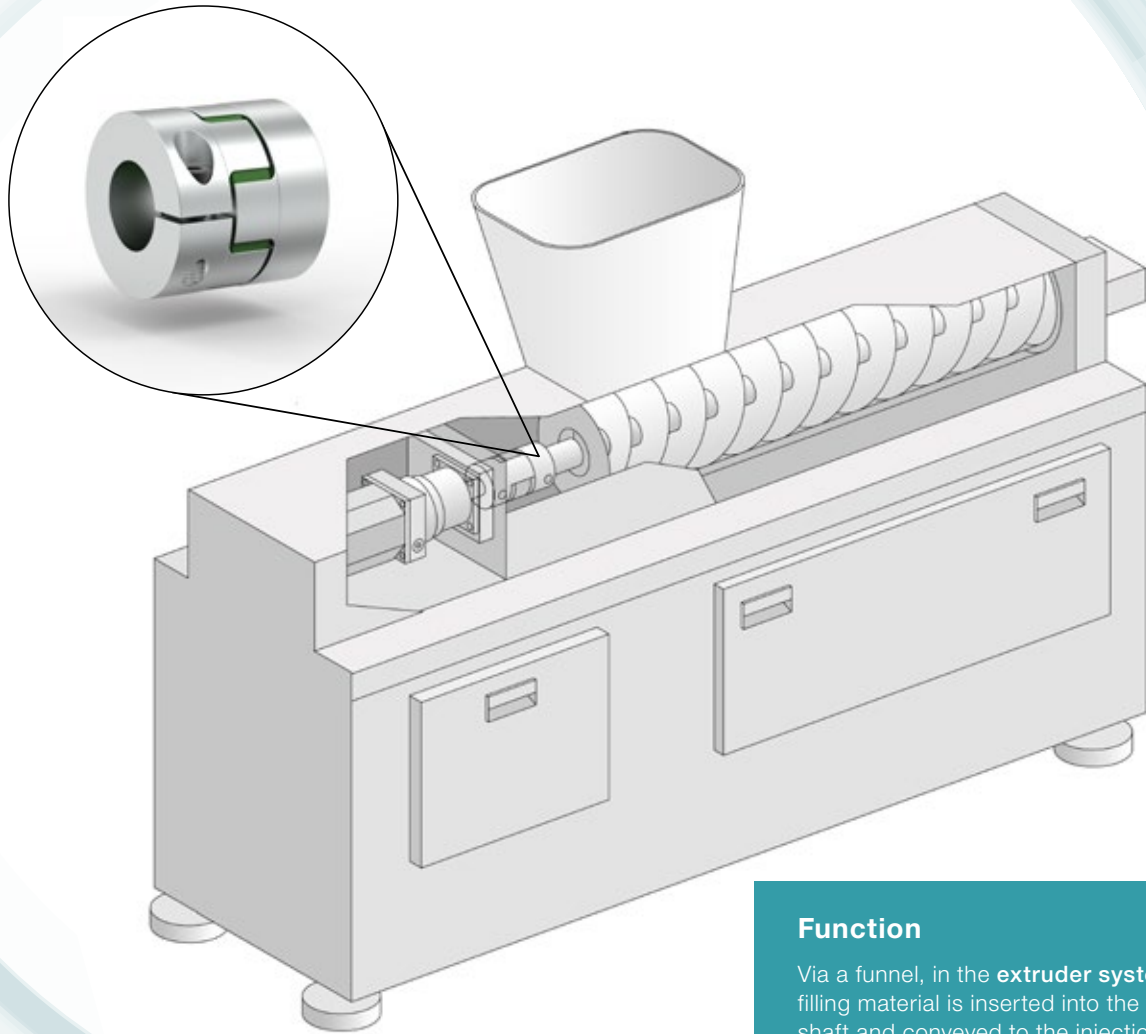


**C: Shore hardness 80 Sh A**  
Excellent damping

**A Shore hardness 98Sh A**  
Good damping

**B: Shore hardness 64Sh D**  
High torsional rigidity

|            | Elastomer material             | Hub material                                  | Permitted temperature range    |                                  |                                   |
|------------|--------------------------------|---|--------------------------------|----------------------------------|-----------------------------------|
|            |                                |   | Red: Elastomer insert A 98Sh A | Green: Elastomer insert B 64Sh D | Yellow: Elastomer insert C 80Sh A |
| <b>ELT</b> | Thermoplastic polyurethane TPU | High-strength aluminum                        | -                              | -30 to +120° C                   | -                                 |
| <b>EL6</b> | Thermoplastic polyurethane TPU | High-strength aluminum, as of size 800: Steel | -30 to +100° C                 | -30 to +120° C                   | -30 to +100° C                    |
| <b>ELC</b> | Thermoplastic polyurethane TPU | High-strength aluminum, as of size 800: Steel | -30 to +100° C                 | -30 to +120° C                   | -30 to +100° C                    |
| <b>ECS</b> | Thermoplastic polyurethane TPU | High-strength aluminum                        | -30 to +100° C                 | -30 to +120° C                   | -30 to +100° C                    |



### Function

Via a funnel, in the **extruder system**, filling material is inserted into the worm gear shaft and conveyed to the injection molding nozzle under high pressure. Here, the drive consists of an electric motor and a gearbox unit.

The intermediate elastomer coupling absorbs any occurring shocks and vibration and thus increases the service life of the drive.





# Application

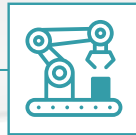
## Example applications



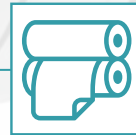
Machine tools



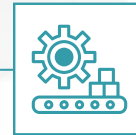
Servo drive technology



Automation



Printing presses



Packaging machines



General mechanical engineering



## Benefits

User friendly through radial assembly.

Emergency run features through positive connection, even if the elastomer fails.

Maintenance-free and fatigue endurable if the technical specifications are observed.

## Properties

Compensation of external impacts, such as temperature differences or misalignment due to the assembly.

Reduction in heavy vibrations and oscillations in the drive train.

Precise and backlash-free torque transmission through pre-tensioned elastomer inserts.

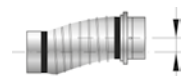
## Compensation of misalignments due to assembly



Axial



Angular



Lateral

# EL6 Elastomer coupling / tapered clamping ring, plug in

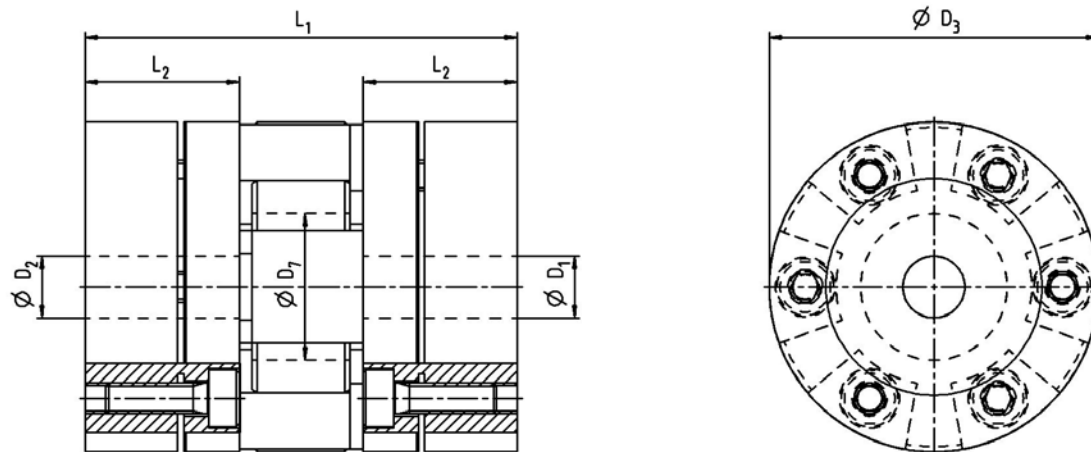
| Size   |             |                       | 10    |       |       | 20    |       |       | 60    |       |       | 150   |       |       |
|--|-------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Hardness elastomer insert  |             |                       | A     | B     | C     | A     | B     | C     | A     | B     | C     | A     | B     | C     |
| Nominal torque   | $T_N$       | Nm                    | 12.6  | 16    | 4     | 17    | 21    | 6     | 60    | 75    | 20    | 160   | 200   | 42    |
|  |             | lbf.in                | 112   | 142   | 35    | 150   | 186   | 53    | 531   | 664   | 177   | 1416  | 1770  | 372   |
| Max. acceleration torque <sup>a)</sup><br>(max. 1000 cycles per hour)                  | $T_B$       | Nm                    | 22.7  | 28.8  | 6     | 30.6  | 37.8  | 10.8  | 108   | 135   | 35    | 288   | 360   | 75.6  |
|  |             | lbf.in                | 201   | 255   | 53    | 271   | 335   | 96    | 956   | 1195  | 310   | 2549  | 3186  | 669   |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$   | Nm                    | 25    | 32    | 6     | 34    | 42    | 12    | 120   | 150   | 35    | 320   | 400   | 85    |
|  |             | lbf.in                | 221   | 283   | 53    | 301   | 372   | 106   | 1062  | 1328  | 310   | 2832  | 3540  | 752   |
| Max. speed   | $n_{Max}$   | rpm                   | 20000 |       |       | 19000 |       |       | 14000 |       |       | 13000 |       |       |
|  |             | mm                    | 1     |       |       | 2     |       |       | 2     |       |       | 2     |       |       |
| Axial misalignment   | $\pm$       | in                    | 0.039 |       |       | 0.079 |       |       | 0.079 |       |       | 0.079 |       |       |
|  |             | $^\circ$              | 1     | 0.8   | 1.2   | 1     | 0.8   | 1.2   | 1     | 0.8   | 1.2   | 1     | 0.8   | 1.2   |
| Angular misalignment   | $\pm$       | mm                    | 0.1   | 0.08  | 0.22  | 0.1   | 0.08  | 0.25  | 0.12  | 0.1   | 0.25  | 0.15  | 0.12  | 0.3   |
|  |             | in                    | 0.004 | 0.003 | 0.009 | 0.004 | 0.003 | 0.01  | 0.005 | 0.004 | 0.01  | 0.006 | 0.005 | 0.012 |
| Lateral misalignment   | $\pm$       | Nm/arcmin             | 0.076 | 0.175 | 0.026 | 0.332 | 0.728 | 0.151 | 0.957 | 2.837 | 0.407 | 1.446 | 3.085 | 0.582 |
|  |             | lbf.in/arcmin         | 0.67  | 1.5   | 0.23  | 2.9   | 6.4   | 1.3   | 8.5   | 25    | 3.6   | 13    | 27    | 5.2   |
| Static torsional rigidity<br>(at 50 % TB)  | $C_{Tstat}$ | Nm/arcmin             | 0.157 | 0.48  | 0.065 | 0.739 | 1.292 | 0.255 | 2.31  | 3.463 | 0.603 | 3.899 | 8.526 | 1.045 |
|  |             | lbf.in/arcmin         | 1.4   | 4.2   | 0.58  | 6.5   | 11    | 2.3   | 20    | 31    | 5.3   | 35    | 75    | 9.2   |
| Dynamic torsional rigidity<br>(at TB)  | $C_{Tdyn}$  | kgcm <sup>2</sup>     | 0.08  |       |       | 0.3   |       |       | 1     |       |       | 2     |       |       |
|  |             | lbf.in.s <sup>2</sup> | 0.07  |       |       | 0.27  |       |       | 0.89  |       |       | 1.8   |       |       |
| Mass moment of inertia   | J           | kg                    | 0.08  |       |       | 0.12  |       |       | 0.3   |       |       | 0.5   |       |       |
|  |             | lb                    | 0.18  |       |       | 0.26  |       |       | 0.66  |       |       | 1.1   |       |       |
| Weight   | m           | kg                    | 0.08  |       |       | 0.12  |       |       | 0.3   |       |       | 0.5   |       |       |
|  |             | lb                    | 0.18  |       |       | 0.26  |       |       | 0.66  |       |       | 1.1   |       |       |

## Dimensions

|   |       |    |             |             |            |            |
|---|-------|----|-------------|-------------|------------|------------|
| Total length  | $L_1$ | mm | 42          | 56          | 64         | 76         |
|   |       | in | 1.7         | 2.2         | 2.5        | 3          |
| Fitting length  | $L_2$ | mm | 15          | 20          | 23         | 28.5       |
|   |       | in | 0.59        | 0.79        | 0.91       | 1.1        |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 6 - 16      | 8 - 24      | 12 - 32    | 19 - 35    |
|   |       | in | 0.24 - 0.63 | 0.31 - 0.94 | 0.47 - 1.3 | 0.75 - 1.4 |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 6 - 16      | 8 - 24      | 12 - 32    | 19 - 35    |
|   |       | in | 0.24 - 0.63 | 0.31 - 0.94 | 0.47 - 1.3 | 0.75 - 1.4 |
| Outer diameter hub                                    | $D_3$ | mm | 32          | 43          | 56         | 66.5       |
|   |       | in | 1.3         | 1.7         | 2.2        | 2.6        |
| Mounting screws<br>(ISO 4762 / 12.9)                  |       |    | 3x M3       | 6x M4       | 4x M5      | 8x M5      |
| Inner diameter elastomer insert                       | $D_7$ | mm | 14.2        | 19.2        | 26.2       | 29.2       |
|   |       | in | 0.56        | 0.76        | 1          | 1.1        |

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size   |             |                       | 300   |        |       | 450    |        |       | 800    |        |       |
|--|-------------|-----------------------|-------|--------|-------|--------|--------|-------|--------|--------|-------|
| Hardness elastomer insert  |             |                       | A     | B      | C     | A      | B      | C     | A      | B      | C     |
| Nominal torque   | $T_N$       | Nm                    | 325   | 405    | 84    | 530    | 660    | 95    | 950    | 1100   | 240   |
|  |             | lbf.in                | 2877  | 3585   | 743   | 4691   | 5842   | 841   | 8408   | 9736   | 2124  |
| Max. acceleration torque <sup>a)</sup><br>(max. 1000 cycles per hour)                  | $T_B$       | Nm                    | 585   | 729    | 151.2 | 954    | 1188   | 171   | 1710   | 1980   | 400   |
|  |             | lbf.in                | 5178  | 6452   | 1338  | 8444   | 10515  | 1513  | 15135  | 17525  | 3540  |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$   | Nm                    | 650   | 810    | 170   | 1060   | 1350   | 190   | 1900   | 2150   | 400   |
|  |             | lbf.in                | 5753  | 7169   | 1505  | 9382   | 11949  | 1682  | 16817  | 19029  | 3540  |
| Max. speed   | $n_{Max}$   | rpm                   | 10000 |        |       | 9000   |        |       | 4000   |        |       |
|  |             | mm                    | 2     |        |       | 2      |        |       | 2      |        |       |
| Axial misalignment   | $\pm$       | in                    | 0.079 |        |       | 0.079  |        |       | 0.079  |        |       |
|  |             | $^\circ$              | 1     | 0.8    | 1.2   | 1      | 0.8    | 1.2   | 1      | 0.8    | 1.2   |
| Angular misalignment   | $\pm$       | mm                    | 0.18  | 0.14   | 0.35  | 0.2    | 0.18   | 0.35  | 0.25   | 0.2    | 0.4   |
|  |             | in                    | 0.007 | 0.006  | 0.014 | 0.008  | 0.007  | 0.014 | 0.01   | 0.008  | 0.016 |
| Lateral misalignment   | $\pm$       | Nm/arcmin             | 3.608 | 5.238  | 0.873 | 4.394  | 7.857  | 1.199 | 12.018 | 19.229 | 3.003 |
|  |             | lbf.in/arcmin         | 32    | 46     | 7.7   | 39     | 70     | 11    | 106    | 170    | 27    |
| Static torsional rigidity<br>(at 50 % TB)  | $C_{Tstat}$ | Nm/arcmin             | 6.897 | 11.756 | 1.772 | 16.121 | 23.629 | 3.376 | 24.037 | 52.424 | 8.323 |
|  |             | lbf.in/arcmin         | 61    | 104    | 16    | 143    | 209    | 30    | 213    | 464    | 74    |
| Dynamic torsional rigidity<br>(at TB)  | $C_{Tdyn}$  | kgcm <sup>2</sup>     | 6     |        |       | 17     |        |       | 184    |        |       |
|  |             | lbf.in.s <sup>2</sup> | 5.3   |        |       | 15     |        |       | 163    |        |       |
| Mass moment of inertia   | J           | kg                    | 0.9   |        |       | 1.5    |        |       | 9.6    |        |       |
|  |             | lb                    | 2     |        |       | 3.3    |        |       | 21     |        |       |
| Weight   | m           | kg                    | 0.9   |        |       | 1.5    |        |       | 9.6    |        |       |
|  |             | lb                    | 2     |        |       | 3.3    |        |       | 21     |        |       |

#### Dimensions

|   |       |    |            |  |  |           |  |  |           |  |  |
|---|-------|----|------------|--|--|-----------|--|--|-----------|--|--|
| Total length  | $L_1$ | mm | 96         |  |  | 110       |  |  | 138       |  |  |
|   |       | in | 3.8        |  |  | 4.3       |  |  | 5.4       |  |  |
| Fitting length  | $L_2$ | mm | 36         |  |  | 42        |  |  | 53.5      |  |  |
|   |       | in | 1.4        |  |  | 1.7       |  |  | 2.1       |  |  |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 20 - 45    |  |  | 28 - 55   |  |  | 32 - 80   |  |  |
|   |       | in | 0.79 - 1.8 |  |  | 1.1 - 2.2 |  |  | 1.3 - 3.1 |  |  |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 20 - 45    |  |  | 28 - 55   |  |  | 32 - 80   |  |  |
|   |       | in | 0.79 - 1.8 |  |  | 1.1 - 2.2 |  |  | 1.3 - 3.1 |  |  |
| Outer diameter hub                                    | $D_3$ | mm | 82         |  |  | 102       |  |  | 136.5     |  |  |
|   |       | in | 3.2        |  |  | 4         |  |  | 5.4       |  |  |
| Mounting screws<br>(ISO 4762 / 12.9)                  |       |    | 8x M6      |  |  | 8x M8     |  |  | 8x M10    |  |  |
| Inner diameter elastomer insert                       | $D_7$ | mm | 36.2       |  |  | 46.2      |  |  | 60.5      |  |  |
|   |       | in | 1.4        |  |  | 1.8       |  |  | 2.4       |  |  |

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

## Elastomer coupling EL6



For the ordering code, please refer to p 78

# ELC Elastomer coupling / compact with clamping hub

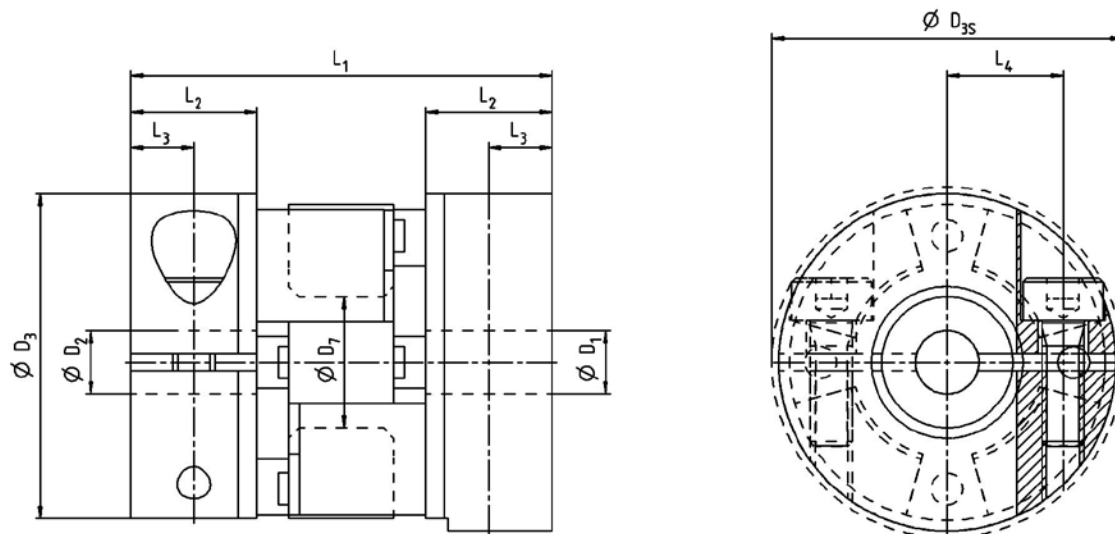
| Size   |             | 2                     |       |       | 5     |       |       | 10    |       |       | 20    |       |       | 60    |       |       |       |
|--|-------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Hardness elastomer insert  |             | A                     | B     | C     | A     | B     | C     | A     | B     | C     | A     | B     | C     | A     | B     | C     |       |
| Nominal torque   | $T_N$       | Nm                    | 2     | 2.4   | 0.5   | 9     | 12    | 2     | 12.5  | 16    | 4     | 17    | 21    | 6     | 60    | 75    | 20    |
|  |             | lbf.in                | 18    | 21    | 4.4   | 80    | 106   | 18    | 111   | 142   | 35    | 150   | 186   | 53    | 531   | 664   | 177   |
| Max. acceleration torque <sup>a)</sup><br>(max. 1000 cycles per hour)                  | $T_B$       | Nm                    | 3.6   | 4.32  | 0.9   | 16.2  | 21.6  | 3.6   | 22.5  | 28.8  | 6     | 30.6  | 37.8  | 10.8  | 108   | 135   | 35    |
|  |             | lbf.in                | 32    | 38    | 8     | 143   | 191   | 32    | 199   | 255   | 53    | 271   | 335   | 96    | 956   | 1195  | 310   |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$   | Nm                    | 4     | 4.8   | 1     | 18    | 24    | 4     | 25    | 32    | 6     | 34    | 42    | 12    | 120   | 150   | 35    |
|  |             | lbf.in                | 35    | 42    | 8.9   | 159   | 212   | 35    | 221   | 283   | 53    | 301   | 372   | 106   | 1062  | 1328  | 310   |
| Max. speed   | $n_{Max}$   | rpm                   | 15000 |       |       | 15000 |       |       | 13000 |       |       | 12500 |       |       | 11000 |       |       |
| Axial misalignment   | $\pm$       | mm                    | 1     |       |       | 1     |       |       | 1     |       |       | 2     |       |       | 2     |       |       |
|  |             | in                    | 0.039 |       |       | 0.039 |       |       | 0.039 |       |       | 0.079 |       |       | 0.079 |       |       |
| Angular misalignment   | $\pm$       | $^\circ$              | 1     | 0.8   | 1.2   | 1     | 0.8   | 1.2   | 1     | 0.8   | 1.2   | 1     | 0.8   | 1.2   | 1     | 0.8   | 1.2   |
| Lateral misalignment   | $\pm$       | mm                    | 0.08  | 0.06  | 0.2   | 0.08  | 0.06  | 0.2   | 0.1   | 0.08  | 0.22  | 0.1   | 0.08  | 0.25  | 0.12  | 0.1   | 0.25  |
|  |             | in                    | 0.003 | 0.002 | 0.008 | 0.003 | 0.002 | 0.008 | 0.004 | 0.003 | 0.009 | 0.004 | 0.003 | 0.01  | 0.005 | 0.004 | 0.01  |
| Static torsional rigidity<br>(at 50 % TB)  | $C_{Tstat}$ | Nm/arcmin             | 0.015 | 0.033 | 0.005 | 0.044 | 0.102 | 0.015 | 0.076 | 0.175 | 0.026 | 0.332 | 0.728 | 0.151 | 0.957 | 2.837 | 0.407 |
|  |             | lbf.in/arcmin         | 0.13  | 0.29  | 0.04  | 0.39  | 0.9   | 0.13  | 0.67  | 1.5   | 0.23  | 2.9   | 6.4   | 1.3   | 8.5   | 25    | 3.6   |
| Dynamic torsional rigidity<br>(at TB)  | $C_{Tdyn}$  | Nm/arcmin             | 0.029 | 0.067 | 0.01  | 0.087 | 0.204 | 0.031 | 0.157 | 0.48  | 0.065 | 0.739 | 1.292 | 0.255 | 2.31  | 3.463 | 0.603 |
|  |             | lbf.in/arcmin         | 0.26  | 0.59  | 0.09  | 0.77  | 1.8   | 0.27  | 1.4   | 4.2   | 0.58  | 6.5   | 11    | 2.3   | 20    | 31    | 5.3   |
| Mass moment of inertia   | J           | kgcm <sup>2</sup>     | 0.006 |       |       | 0.04  |       |       | 0.06  |       |       | 0.2   |       |       | 0.8   |       |       |
|  |             | lbf.in.s <sup>2</sup> | 0.01  |       |       | 0.04  |       |       | 0.05  |       |       | 0.18  |       |       | 0.71  |       |       |
| Weight   | m           | kg                    | 0.008 |       |       | 0.02  |       |       | 0.05  |       |       | 0.12  |       |       | 0.3   |       |       |
|  |             | lb                    | 0.02  |       |       | 0.04  |       |       | 0.11  |       |       | 0.26  |       |       | 0.66  |       |       |

## Dimensions

|   |          |    |             |  |            |  |             |  |             |  |            |  |
|---|----------|----|-------------|--|------------|--|-------------|--|-------------|--|------------|--|
| Total length  | $L_1$    | mm | 20          |  | 26         |  | 32          |  | 50          |  | 58         |  |
|   |          | in | 0.79        |  | 1          |  | 1.3         |  | 2           |  | 2.3        |  |
| Fitting length  | $L_2$    | mm | 6           |  | 8          |  | 10.3        |  | 17          |  | 20         |  |
|   |          | in | 0.24        |  | 0.31       |  | 0.41        |  | 0.67        |  | 0.79       |  |
| Distance  | $L_3$    | mm | 3           |  | 4          |  | 5           |  | 8.5         |  | 10         |  |
|   |          | in | 0.12        |  | 0.16       |  | 0.2         |  | 0.33        |  | 0.39       |  |
| Centre distance                                       | $L_4$    | mm | 5.5         |  | 8          |  | 10.5        |  | 15.5        |  | 21         |  |
|   |          | in | 0.22        |  | 0.31       |  | 0.41        |  | 0.61        |  | 0.83       |  |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$    | mm | 3 - 8       |  | 4 - 12.7   |  | 4 - 16      |  | 8 - 25      |  | 12 - 32    |  |
|   |          | in | 0.12 - 0.31 |  | 0.16 - 0.5 |  | 0.16 - 0.63 |  | 0.31 - 0.98 |  | 0.47 - 1.3 |  |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$    | mm | 3 - 8       |  | 4 - 12.7   |  | 4 - 16      |  | 8 - 25      |  | 12 - 32    |  |
|   |          | in | 0.12 - 0.31 |  | 0.16 - 0.5 |  | 0.16 - 0.63 |  | 0.31 - 0.98 |  | 0.47 - 1.3 |  |
| Outer diameter hub                                    | $D_3$    | mm | 16          |  | 25         |  | 32          |  | 42          |  | 56         |  |
|   |          | in | 0.63        |  | 0.98       |  | 1.3         |  | 1.7         |  | 2.2        |  |
| Outer diameter with screw head                        | $D_{3S}$ | mm | 17          |  | 25.5       |  | 32          |  | 44.5        |  | 57         |  |
|   |          | in | 0.67        |  | 1          |  | 1.3         |  | 1.8         |  | 2.2        |  |
| Inner diameter elastomer insert                       | $D_7$    | mm | 6.2         |  | 10.2       |  | 14.2        |  | 19.2        |  | 26.2       |  |
|   |          | in | 0.24        |  | 0.4        |  | 0.56        |  | 0.76        |  | 1          |  |

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size   |             |                       | 150   |       |       | 300   |        |       | 450    |        |       | 800    |        |       |
|--|-------------|-----------------------|-------|-------|-------|-------|--------|-------|--------|--------|-------|--------|--------|-------|
| Hardness elastomer insert  |             |                       | A     | B     | C     | A     | B      | C     | A      | B      | C     | A      | B      | C     |
| Nominal torque   | $T_N$       | Nm                    | 160   | 200   | 42    | 325   | 405    | 84    | 530    | 660    | 95    | 950    | 1100   | 240   |
|  |             | lbf.in                | 1416  | 1770  | 372   | 2877  | 3585   | 743   | 4691   | 5842   | 841   | 8408   | 9736   | 2124  |
| Max. acceleration torque <sup>a)</sup><br>(max. 1000 cycles per hour)                  | $T_B$       | Nm                    | 288   | 360   | 75.6  | 585   | 729    | 151.2 | 954    | 1188   | 171   | 1710   | 1980   | 400   |
|  |             | lbf.in                | 2549  | 3186  | 669   | 5178  | 6452   | 1338  | 8444   | 10515  | 1513  | 15135  | 17525  | 3540  |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$   | Nm                    | 320   | 400   | 85    | 650   | 810    | 170   | 1060   | 1350   | 190   | 1900   | 2150   | 400   |
|  |             | lbf.in                | 2832  | 3540  | 752   | 5753  | 7169   | 1505  | 9382   | 11949  | 1682  | 16817  | 19029  | 3540  |
| Max. speed   | $n_{Max}$   | rpm                   | 10000 |       |       | 9000  |        |       | 8000   |        |       | 4000   |        |       |
| Axial misalignment   | $\pm$       | mm                    | 2     |       |       | 2     |        |       | 2      |        |       | 2      |        |       |
|  |             | in                    | 0.079 |       |       | 0.079 |        |       | 0.079  |        |       | 0.079  |        |       |
| Angular misalignment   | $\pm$       | $^\circ$              | 1     | 0.8   | 1.2   | 1     | 0.8    | 1.2   | 1      | 0.8    | 1.2   | 1      | 0.8    | 1.2   |
| Lateral misalignment   | $\pm$       | mm                    | 0.15  | 0.12  | 0.3   | 0.18  | 0.14   | 0.35  | 0.2    | 0.18   | 0.35  | 0.25   | 0.2    | 0.4   |
|  |             | in                    | 0.006 | 0.005 | 0.012 | 0.007 | 0.006  | 0.014 | 0.008  | 0.007  | 0.014 | 0.01   | 0.008  | 0.016 |
| Static torsional rigidity<br>(at 50 % TB)  | $C_{Tstat}$ | Nm/arcmin             | 1.446 | 3.085 | 0.582 | 3.608 | 5.238  | 0.873 | 4.394  | 7.857  | 1.199 | 12.018 | 19.229 | 3.003 |
|  |             | lbf.in/arcmin         | 13    | 27    | 5.2   | 32    | 46     | 7.7   | 39     | 70     | 11    | 106    | 170    | 27    |
| Dynamic torsional rigidity<br>(at TB)  | $C_{Tdyn}$  | Nm/arcmin             | 3.899 | 8.526 | 1.045 | 6.897 | 11.756 | 1.772 | 16.121 | 23.629 | 3.376 | 24.037 | 52.424 | 8.323 |
|  |             | lbf.in/arcmin         | 35    | 75    | 9.2   | 61    | 104    | 16    | 143    | 209    | 30    | 213    | 464    | 74    |
| Mass moment of inertia   | J           | kgcm <sup>2</sup>     | 1.6   |       |       | 6     |        |       | 13.2   |        |       | 160    |        |       |
|  |             | lbf.in.s <sup>2</sup> | 1.4   |       |       | 5.3   |        |       | 12     |        |       | 142    |        |       |
| Weight   | m           | kg                    | 0.5   |       |       | 0.9   |        |       | 1.5    |        |       | 8.5    |        |       |
|  |             | lb                    | 1.1   |       |       | 2     |        |       | 3.3    |        |       | 19     |        |       |

#### Dimensions

|   |          |    |            |  |  |            |  |  |           |  |  |           |  |  |
|---|----------|----|------------|--|--|------------|--|--|-----------|--|--|-----------|--|--|
| Total length  | $L_1$    | mm | 62         |  |  | 86         |  |  | 94        |  |  | 123       |  |  |
|   |          | in | 2.4        |  |  | 3.4        |  |  | 3.7       |  |  | 4.8       |  |  |
| Fitting length  | $L_2$    | mm | 21         |  |  | 31         |  |  | 34        |  |  | 46        |  |  |
|   |          | in | 0.83       |  |  | 1.2        |  |  | 1.3       |  |  | 1.8       |  |  |
| Distance  | $L_3$    | mm | 11         |  |  | 15         |  |  | 17        |  |  | 23        |  |  |
|   |          | in | 0.43       |  |  | 0.59       |  |  | 0.67      |  |  | 0.91      |  |  |
| Centre distance                                       | $L_4$    | mm | 24         |  |  | 29         |  |  | 38        |  |  | 50.5      |  |  |
|   |          | in | 0.94       |  |  | 1.1        |  |  | 1.5       |  |  | 2         |  |  |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$    | mm | 19 - 36    |  |  | 20 - 45    |  |  | 28 - 60   |  |  | 35 - 80   |  |  |
|   |          | in | 0.75 - 1.4 |  |  | 0.79 - 1.8 |  |  | 1.1 - 2.4 |  |  | 1.4 - 3.1 |  |  |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$    | mm | 19 - 36    |  |  | 20 - 45    |  |  | 28 - 60   |  |  | 35 - 80   |  |  |
|   |          | in | 0.75 - 1.4 |  |  | 0.79 - 1.8 |  |  | 1.1 - 2.4 |  |  | 1.4 - 3.1 |  |  |
| Outer diameter hub                                    | $D_3$    | mm | 66.5       |  |  | 82         |  |  | 102       |  |  | 136.5     |  |  |
|   |          | in | 2.6        |  |  | 3.2        |  |  | 4         |  |  | 5.4       |  |  |
| Outer diameter with screw head                        | $D_{3S}$ | mm | 68         |  |  | 85         |  |  | 105       |  |  | 139.5     |  |  |
|   |          | in | 2.7        |  |  | 3.3        |  |  | 4.1       |  |  | 5.5       |  |  |
| Inner diameter elastomer insert                       | $D_7$    | mm | 29.2       |  |  | 36.2       |  |  | 46.2      |  |  | 60.5      |  |  |
|   |          | in | 1.1        |  |  | 1.4        |  |  | 1.8       |  |  | 2.4       |  |  |

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

## Elastomer coupling ELC



For the ordering code, please refer to p 78

# ELT Elastomer coupling / flange

| Size   |             |                       | 20    | 60    | 150   |
|--|-------------|-----------------------|-------|-------|-------|
| Hardness elastomer insert  |             |                       | B     | B     | B     |
| Nominal torque   | $T_N$       | Nm                    | 7.8   | 31    | 69    |
|  |             | lbf.in                | 69    | 270   | 615   |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$       | Nm                    | 14    | 55    | 125   |
|  |             | lbf.in                | 124   | 487   | 1106  |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$   | Nm                    | 26    | 75    | 190   |
|  |             | lbf.in                | 230   | 664   | 1682  |
| Max. speed   | $n_{Max}$   | rpm                   | 10000 | 10000 | 8000  |
| Axial misalignment   | $\pm$       | mm                    | 2     | 2     | 2     |
|  |             | in                    | 0.079 | 0.079 | 0.079 |
| Angular misalignment   | $\pm$       | °                     | 0.8   | 0.8   | 0.8   |
|  |             | mm                    | 0.08  | 0.1   | 0.12  |
| Lateral misalignment   | $\pm$       | in                    | 0.003 | 0.004 | 0.005 |
|  |             | Nm/arcmin             | 0.73  | 2.84  | 3.08  |
| Static torsional rigidity<br>(at 50 % TB)  | $C_{Tstat}$ | lbf.in/arcmin         | 6.5   | 25    | 27    |
|  |             | Nm/arcmin             | 1.29  | 3.46  | 8.53  |
| Dynamic torsional rigidity<br>(at TB)  | $C_{Tdyn}$  | lbf.in/arcmin         | 11    | 31    | 75    |
|  |             | kgcm <sup>2</sup>     | 0.28  | 1.1   | 2.4   |
| Mass moment of inertia   | J           | lbf.in.s <sup>2</sup> | 0.25  | 0.98  | 2.1   |
|  |             | kg                    | 0.11  | 0.24  | 0.37  |
| Weight   | m           | lb                    | 0.24  | 0.53  | 0.82  |

## Mountable to

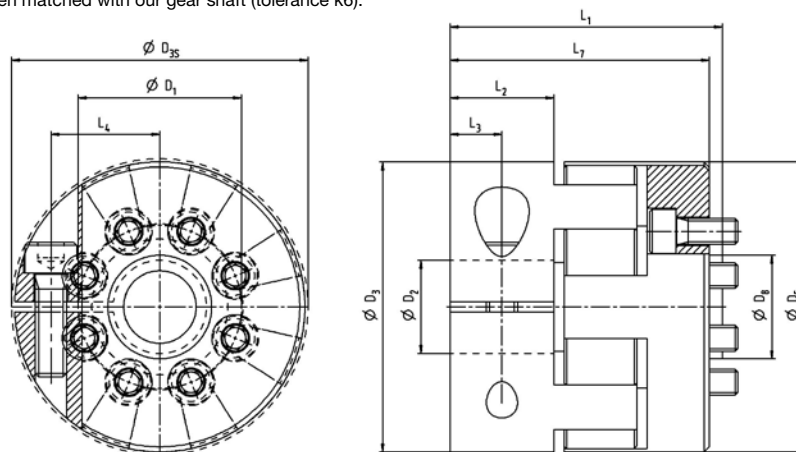
| NPT, NPTK, NTP | 005 | 015     | 025     |
|----------------|-----|---------|---------|
| Gearbox model  | MF  | MF / MA | MF / MA |

## Dimensions

|   |          |    |             |            |            |
|---|----------|----|-------------|------------|------------|
| Total length<br>(Tolerance $\pm 2$ )                  | $L_1$    | mm | 44          | 52.5       | 57         |
|   |          | in | 1.7         | 2.1        | 2.2        |
| Fitting length  | $L_2$    | mm | 17          | 20         | 21         |
|   |          | in | 0.67        | 0.79       | 0.83       |
| Distance  | $L_3$    | mm | 8.5         | 10         | 11         |
|   |          | in | 0.33        | 0.39       | 0.43       |
| Centre distance                                       | $L_4$    | mm | 15.5        | 21         | 24         |
|   |          | in | 0.61        | 0.83       | 0.94       |
| Length of mounting space<br>(Tolerance $\pm 2$ )      | $L_7$    | mm | 42          | 50         | 54         |
|   |          | in | 1.7         | 2          | 2.1        |
| Pitch circle input <sup>a)</sup>                      | $D_1$    | mm | 25          | 31.5       | 50         |
|   |          | in | 0.98        | 1.2        | 2          |
| Mounting screws (ISO 4762 / 12.9)<br>(input)          |          |    | 4 x M4      | 8 x M5     | 8 x M6     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$    | mm | 8 - 25      | 18 - 32    | 24 - 36    |
|   |          | in | 0.31 - 0.98 | 0.71 - 1.3 | 0.94 - 1.4 |
| Outer diameter hub                                    | $D_3$    | mm | 42          | 56         | 66.5       |
|   |          | in | 1.7         | 2.2        | 2.6        |
| Outer diameter with screw head                        | $D_{3S}$ | mm | 44.5        | 57         | 68         |
|   |          | in | 1.8         | 2.2        | 2.7        |
| Outer diameter flange<br>(Tolerance -0,2)             | $D_5$    | mm | 42          | 56         | 66.5       |
|   |          | in | 1.7         | 2.2        | 2.6        |
| Inner diameter elastomer insert                       | $D_7$    | mm | 19.2        | 26.2       | 29.2       |
|   |          | in | 0.76        | 1          | 1.1        |
| Centering diameter<br>(Tolerance h7)                  | $D_8$    | mm | 16          | 20         | 31.5       |
|   |          | in | 0.63        | 0.79       | 1.2        |

a) Screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size   |             |                       | 300   | 450   |
|--|-------------|-----------------------|-------|-------|
| Hardness elastomer insert  |             |                       | B     | B     |
| Nominal torque   | $T_N$       | Nm                    | 169   | 278   |
|  |             | lbf.in                | 1500  | 2459  |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$       | Nm                    | 305   | 500   |
|  |             | lbf.in                | 2699  | 4425  |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$   | Nm                    | 480   | 1000  |
|  |             | lbf.in                | 4248  | 8851  |
| Max. speed   | $n_{Max}$   | rpm                   | 7000  | 6000  |
| Axial misalignment   | $\pm$       | mm                    | 2     | 2     |
|  |             | in                    | 0.079 | 0.079 |
| Angular misalignment   | $\pm$       | °                     | 0.8   | 0.8   |
| Lateral misalignment   | $\pm$       | mm                    | 0.14  | 0.18  |
|  |             | in                    | 0.006 | 0.007 |
| Static torsional rigidity<br>(at 50 % TB)  | $C_{Tstat}$ | Nm/arcmin             | 5.24  | 7.86  |
|  |             | lbf.in/arcmin         | 46    | 70    |
| Dynamic torsional rigidity<br>(at TB)  | $C_{Tdyn}$  | Nm/arcmin             | 11.76 | 23.63 |
|  |             | lbf.in/arcmin         | 104   | 209   |
| Mass moment of inertia   | J           | kgcm <sup>2</sup>     | 6.7   | 16.3  |
|  |             | lbf.in.s <sup>2</sup> | 5.9   | 14    |
| Weight   | m           | kg                    | 0.67  | 1.15  |
|  |             | lb                    | 1.5   | 2.5   |

#### Mountable to

|                |         |     |
|----------------|---------|-----|
| NPT, NPTK, NTP | 035     | 045 |
| Gearbox model  | MF / MA | MF  |

#### Dimensions

|   |          |    |           |           |
|---|----------|----|-----------|-----------|
| Total length<br>(Tolerance $\pm 2$ )                  | $L_1$    | mm | 72        | 82        |
|   |          | in | 2.8       | 3.2       |
| Fitting length  | $L_2$    | mm | 31        | 34        |
|   |          | in | 1.2       | 1.3       |
| Distance  | $L_3$    | mm | 15        | 17.5      |
|   |          | in | 0.59      | 0.69      |
| Centre distance                                       | $L_4$    | mm | 29        | 38        |
|   |          | in | 1.1       | 1.5       |
| Length of mounting space<br>(Tolerance $\pm 2$ )      | $L_7$    | mm | 68        | 78        |
|   |          | in | 2.7       | 3.1       |
| Pitch circle input <sup>a)</sup>                      | $D_1$    | mm | 63        | 80        |
|   |          | in | 2.5       | 3.1       |
| Mounting screws (ISO 4762 / 12.9)<br>(input)          |          |    | 10 x M6   | 8 x M8    |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$    | mm | 35 - 45   | 42 - 60   |
|   |          | in | 1.4 - 1.8 | 1.7 - 2.4 |
| Outer diameter hub                                    | $D_3$    | mm | 82        | 102       |
|   |          | in | 3.2       | 4         |
| Outer diameter with screw head                        | $D_{3S}$ | mm | 85        | 105       |
|   |          | in | 3.3       | 4.1       |
| Outer diameter flange<br>(Tolerance -0,2)             | $D_5$    | mm | 82        | 102       |
|   |          | in | 3.2       | 4         |
| Inner diameter elastomer insert                       | $D_7$    | mm | 36.2      | 46.2      |
|   |          | in | 1.4       | 1.8       |
| Centering diameter<br>(Tolerance h7)                  | $D_8$    | mm | 40        | 50        |
|   |          | in | 1.6       | 2         |

a) Screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

### Elastomer coupling ELT



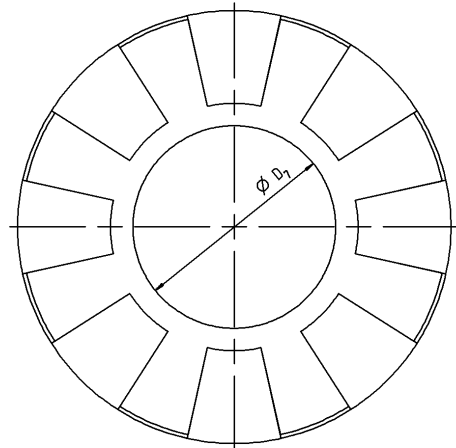
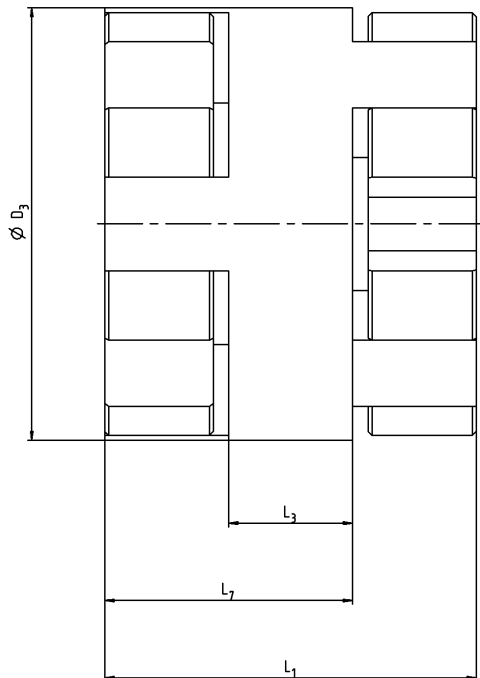
For the ordering code, please refer to p 79

# ECS Elastomer coupling / intermediate spacer

| Size  |           |                       | 2     |     |      | 5     |     |     | 10    |     |     | 20    |     |     |
|---|-----------|-----------------------|-------|-----|------|-------|-----|-----|-------|-----|-----|-------|-----|-----|
| Hardness elastomer insert                               |           |                       | A     | B   | C    | A     | B   | C   | A     | B   | C   | A     | B   | C   |
| Nominal torque  | $T_N$     | Nm                    | 2.0   | 2.4 | 0.50 | 9.0   | 12  | 2.0 | 13    | 16  | 4.0 | 17    | 21  | 6.0 |
|   |           | lbf.in                | 18    | 21  | 4.4  | 80    | 106 | 18  | 111   | 142 | 35  | 150   | 186 | 53  |
| Max. acceleration torque<br>(max. 1000 cycles per hour) | $T_B$     | Nm                    | 3.6   | 4.3 | 0.90 | 16    | 22  | 3.6 | 23    | 29  | 6.0 | 31    | 38  | 11  |
|   |           | lbf.in                | 32    | 38  | 8    | 143   | 191 | 32  | 199   | 255 | 53  | 271   | 335 | 96  |
| Max. speed  | $n_{Max}$ | rpm                   | 15000 |     |      | 15000 |     |     | 13000 |     |     | 12500 |     |     |
| Mass moment of inertia                                  | J         | kgcm <sup>2</sup>     | 0.001 |     |      | 0.005 |     |     | 0.02  |     |     | 0.08  |     |     |
|   |           | lbf.in.s <sup>2</sup> | 0     |     |      | 0     |     |     | 0.02  |     |     | 0.07  |     |     |
| Weight  | m         | kg                    | 0.007 |     |      | 0.02  |     |     | 0.04  |     |     | 0.09  |     |     |
|   |           | lb                    | 0.02  |     |      | 0.04  |     |     | 0.09  |     |     | 0.2   |     |     |

## Dimensions

|  |       |    |      |      |      |      |
|--|-------|----|------|------|------|------|
| Total length                                     | $L_1$ | mm | 20   | 26   | 30   | 39   |
|  |       | in | 0.79 | 1    | 1.2  | 1.5  |
| Distance   | $L_9$ | mm | 9    | 9    | 9    | 10   |
|  |       | in | 0.35 | 0.35 | 0.35 | 0.39 |
| Length of mounting space<br>(Tolerance $\pm 2$ ) | $L_7$ | mm | 14.5 | 17.5 | 19.5 | 24.5 |
|  |       | in | 0.57 | 0.69 | 0.77 | 0.96 |
| Outer diameter hub                               | $D_3$ | mm | 16   | 25   | 32   | 42   |
|  |       | in | 0.63 | 0.98 | 1.3  | 1.7  |
| Inner diameter elastomer insert                  | $D_7$ | mm | 6.2  | 10.2 | 14.2 | 19.2 |
|  |       | in | 0.24 | 0.4  | 0.56 | 0.76 |



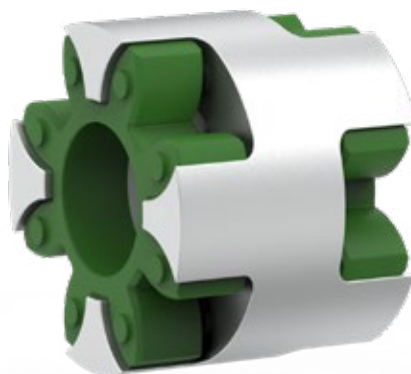


| Size  |           |                       | 60    |      |     | 150   |      |     | 300  |      |      | 450  |       |      | 800   |       |      |
|---|-----------|-----------------------|-------|------|-----|-------|------|-----|------|------|------|------|-------|------|-------|-------|------|
| Hardness elastomer insert                               |           |                       | A     | B    | C   | A     | B    | C   | A    | B    | C    | A    | B     | C    | A     | B     | C    |
| Nominal torque  | $T_N$     | Nm                    | 60    | 75   | 20  | 160   | 200  | 42  | 325  | 405  | 84   | 530  | 660   | 95   | 950   | 1100  | 240  |
|   |           | lbf.in                | 531   | 664  | 177 | 1416  | 1770 | 372 | 2877 | 3585 | 743  | 4691 | 5842  | 841  | 8408  | 9736  | 2124 |
| Max. acceleration torque<br>(max. 1000 cycles per hour) | $T_B$     | Nm                    | 108   | 135  | 35  | 288   | 360  | 76  | 585  | 729  | 151  | 954  | 1188  | 171  | 1710  | 1980  | 400  |
|   |           | lbf.in                | 956   | 1195 | 310 | 2549  | 3186 | 669 | 5178 | 6452 | 1338 | 8444 | 10515 | 1513 | 15135 | 17525 | 3540 |
| Max. speed  | $n_{Max}$ | rpm                   | 11000 |      |     | 10000 |      |     | 9000 |      |      | 8000 |       |      | 4000  |       |      |
| Mass moment of inertia                                  | J         | kgcm <sup>2</sup>     | 0.30  |      |     | 0.50  |      |     | 1.0  |      |      | 6.0  |       |      | 11    |       |      |
|   |           | lbf.in.s <sup>2</sup> | 0.27  |      |     | 0.44  |      |     | 0.89 |      |      | 5.3  |       |      | 9.8   |       |      |
| Weight  | m         | kg                    | 0.21  |      |     | 0.33  |      |     | 0.58 |      |      | 1.4  |       |      | 2.1   |       |      |
|   |           | lb                    | 0.46  |      |     | 0.73  |      |     | 1.3  |      |      | 3    |       |      | 4.6   |       |      |

#### Dimensions

|  |       |    |      |  |  |      |  |  |      |  |  |      |  |  |       |  |  |
|--|-------|----|------|--|--|------|--|--|------|--|--|------|--|--|-------|--|--|
| Total length                               | $L_1$ | mm | 48   |  |  | 53   |  |  | 62   |  |  | 86   |  |  | 81    |  |  |
|  |       | in | 1.9  |  |  | 2.1  |  |  | 2.4  |  |  | 3.4  |  |  | 3.2   |  |  |
| Distance                                   | $L_9$ | mm | 16   |  |  | 18   |  |  | 20   |  |  | 40   |  |  | 25    |  |  |
|  |       | in | 0.63 |  |  | 0.71 |  |  | 0.79 |  |  | 1.6  |  |  | 0.98  |  |  |
| Length of mounting space<br>(Tolerance ±2) | $L_7$ | mm | 32.0 |  |  | 35.5 |  |  | 41   |  |  | 63   |  |  | 53    |  |  |
|  |       | in | 1.3  |  |  | 1.4  |  |  | 1.6  |  |  | 2.5  |  |  | 2.1   |  |  |
| Outer diameter hub                         | $D_3$ | mm | 56   |  |  | 66.5 |  |  | 82   |  |  | 102  |  |  | 136.5 |  |  |
|  |       | in | 2.2  |  |  | 2.6  |  |  | 3.2  |  |  | 4    |  |  | 5.4   |  |  |
| Inner diameter elastomer insert            | $D_7$ | mm | 26.2 |  |  | 29.2 |  |  | 36.2 |  |  | 46.2 |  |  | 60.5  |  |  |
|  |       | in | 1    |  |  | 1.1  |  |  | 1.4  |  |  | 1.8  |  |  | 2.4   |  |  |

### Elastomer coupling ECS



For the ordering code, please refer to p 79

# Metal bellows couplings

## **Torsionally rigid, reliable, for dynamic applications**

Metal bellows couplings mainly consist of two components: The stainless steel metal bellows and the hubs. Depending on the application, the hubs can be designed as flange, expanding mandrel, clamping hub or as cone clamping set. Aluminum, steel or stainless steel can be used as hub material. The core element of the coupling is the metal bellows. The stainless steel metal bellows transfers the rotational motion of the coupling and compensates any design-related misalignment, such as lateral, axial and angular shaft misalignment with low restoring forces. Low-backlash, torsionally rigid metal bellows couplings guarantee an accurate positioning. However, the vibration damping is not as pronounced as it is with elastomer couplings.

### PRODUCT HIGHLIGHTS

#### **High positioning accuracy and torsional rigidity**

thanks to the thin-walled metal bellows, which also compensate smaller misalignments.

#### **Backlash-free**

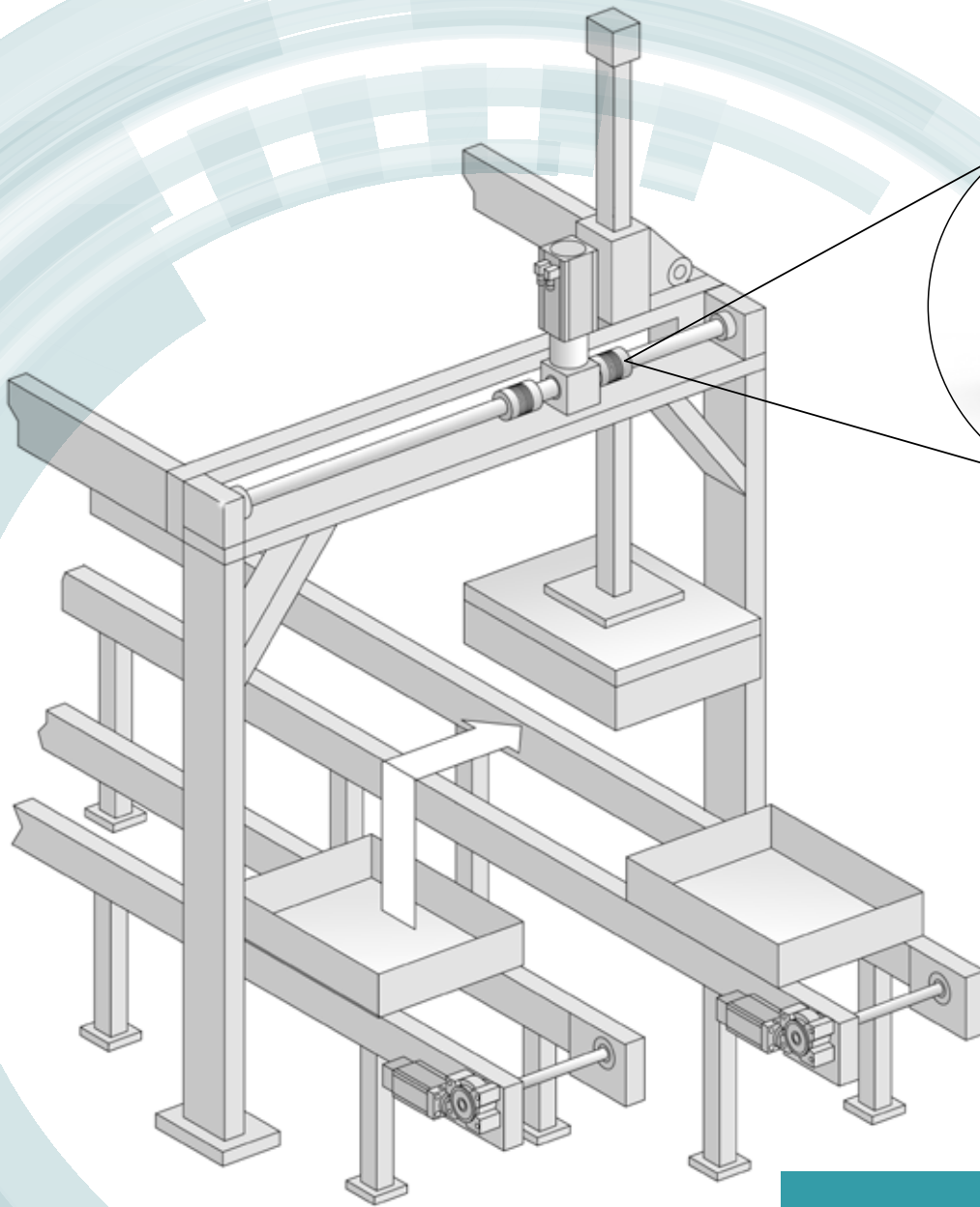
thanks to the accurately manufactured components and comprehensive testing.

#### **Durable and maintenance-free for their entire service life**

thanks to precisely manufactured components.



|               | <b>Bellows material</b>        | <b>Hub material</b>                            | <b>Permitted temperature range</b>              |
|---------------|--------------------------------|--|---|
| <b>BC2</b>    | Highly elastic stainless steel | High-strength aluminum, as of size 150: Steel  | -30 to +100° C, as of size 800: -30 to +300° C  |
| <b>BC3</b>    | Highly elastic stainless steel | Steel  | -30 to +100° C, as of size 800: -30 to +300° C  |
| <b>BCL</b>    | Highly elastic stainless steel | High-strength aluminum, as of size 150: Steel  | -30 to +100° C                                  |
| <b>BCH</b>    | Highly elastic stainless steel | High-strength aluminum, as of size 150: Steel  | -30 to +100° C, as of size 800: -30 to +300° C  |
| <b>BCT</b>    | Highly elastic stainless steel | High-strength aluminum, as of size 1500: Steel | -30 to +100° C, as of size 1500: -30 to +300° C |
| <b>BCT HT</b> | Highly elastic stainless steel | Steel  | -30 to +300° C                                  |



## Function

**Handling systems** support the placement of workpieces or products from one manufacturing step to another automatically, significantly increasing productivity and quality. To ensure the highest quality performance, it is essential that the processes are implemented precisely and consistently, to ensure torques are transmitted without any backlash.

Thanks to their great torsional rigidity, metal bellows couplings support the transmission of movements without any backlash and, if applicable, compensate production-related misalignments and light shocks. Thanks to their robust design, they are maintenance-free.



# Application

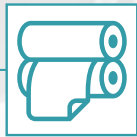
## Example applications



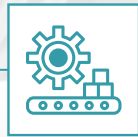
Machine tools



Automation



Printing presses



Packaging machines



General mechanical engineering



## Benefits

Transmission of torques without backlash thanks to the high torsional rigidity.

Minimal installation space required thanks to the very compact design.

High rotational speeds possible thanks to low moments of inertia.

## Properties

Dimensional accuracy thanks to the use of highly elastic stainless steel bellows.

Compensation of external impacts, such as temperature differences and misalignment due to the assembly.

Extremely smooth running thanks to the high true-running accuracy and symmetric components.

## Compensation of misalignments due to assembly



Axial



Angular



Lateral

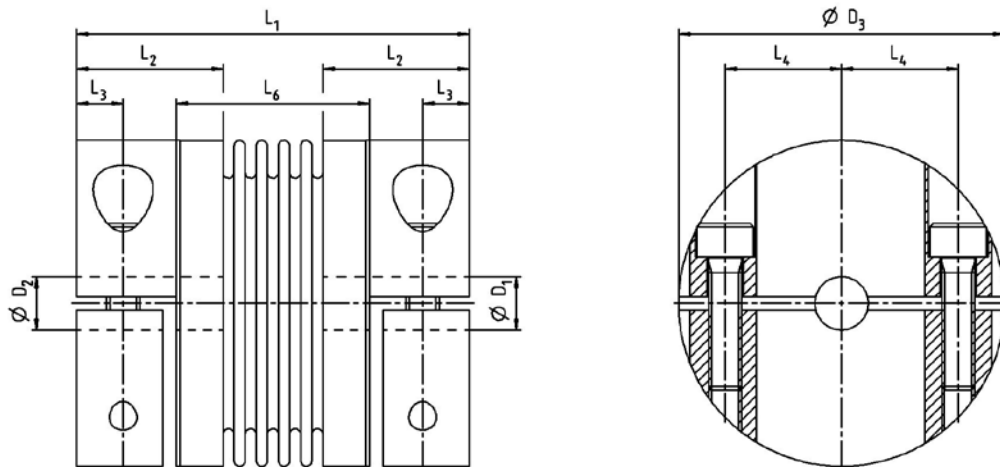
# BCH Metal bellows coupling / split clamping hub

| Size   |           |                       | 15    |       | 30    |       | 60    |       | 80    |       | 150   |       |
|--|-----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Overall length   |           |                       | A     | B     | A     | B     | A     | B     | A     | B     | A     | B     |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$     | Nm                    | 15    |       | 30    |       | 60    |       | 80    |       | 150   |       |
|  |           | lbf.in                | 133   |       | 266   |       | 531   |       | 708   |       | 1328  |       |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$ | Nm                    | 22.5  |       | 45    |       | 90    |       | 120   |       | 225   |       |
|  |           | lbf.in                | 199   |       | 398   |       | 797   |       | 1062  |       | 1991  |       |
| Max. speed   | $n_{Max}$ | rpm                   | 10000 |       |       |       |       |       |       |       |       |       |
| Axial misalignment   | $\pm$     | mm                    | 1     | 2     | 1     | 2     | 1.5   | 2     | 2     | 3     | 2     | 3     |
|  |           | in                    | 0.039 | 0.079 | 0.039 | 0.079 | 0.059 | 0.079 | 0.079 | 0.118 | 0.079 | 0.118 |
| Angular misalignment   | $\pm$     | $^\circ$              | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   |
| Lateral misalignment   | $\pm$     | mm                    | 0.15  | 0.2   | 0.2   | 0.25  | 0.2   | 0.25  | 0.2   | 0.25  | 0.2   | 0.25  |
|  |           | in                    | 0.006 | 0.008 | 0.008 | 0.01  | 0.008 | 0.01  | 0.008 | 0.01  | 0.008 | 0.01  |
| Axial spring rigidity  | $C_a$     | N/mm                  | 25    | 15    | 50    | 30    | 72    | 48    | 48    | 32    | 82    | 52    |
|  |           | lbf/in                | 143   | 86    | 286   | 171   | 411   | 274   | 274   | 183   | 468   | 297   |
| Lateral spring rigidity  | $C_l$     | N/mm                  | 475   | 137   | 900   | 270   | 1200  | 420   | 920   | 290   | 1550  | 435   |
|  |           | lbf/in                | 2712  | 782   | 5139  | 1542  | 6852  | 2398  | 5253  | 1656  | 8851  | 2484  |
| Torsional rigidity   | $C_T$     | Nm/arcmin             | 5.8   | 4.4   | 11    | 8.1   | 22    | 16    | 38    | 25    | 51    | 32    |
|  |           | lbf.in/arcmin         | 51    | 39    | 97    | 72    | 195   | 142   | 336   | 221   | 451   | 283   |
| Mass moment of inertia   | J         | kgcm <sup>2</sup>     | 0.7   | 0.8   | 1.4   | 1.5   | 2.3   | 2.6   | 6.5   | 6.7   | 25    | 32    |
|  |           | lbf.in.s <sup>2</sup> | 0.62  | 0.71  | 1.2   | 1.3   | 2     | 2.3   | 5.8   | 5.9   | 22    | 28    |
| Weight   | m         | kg                    | 0.15  |       | 0.3   |       | 0.4   |       | 0.8   |       | 1.7   |       |
|  |           | lb                    | 0.33  |       | 0.66  |       | 0.88  |       | 1.8   |       | 3.7   |       |

## Dimensions

|   |       |    |            |     |            |     |            |     |            |     |            |     |
|---|-------|----|------------|-----|------------|-----|------------|-----|------------|-----|------------|-----|
| Total length<br>(Tolerance -2)                        | $L_1$ | mm | 59         | 66  | 69         | 77  | 83         | 93  | 94         | 106 | 95         | 107 |
|   |       | in | 2.3        | 2.6 | 2.7        | 3   | 3.3        | 3.7 | 3.7        | 4.2 | 3.7        | 4.2 |
| Fitting length  | $L_2$ | mm | 22         |     | 26.5       |     | 31         |     | 35.5       |     | 35.5       |     |
|   |       | in | 0.87       |     | 1          |     | 1.2        |     | 1.4        |     | 1.4        |     |
| Distance  | $L_3$ | mm | 7          |     | 7.5        |     | 9.5        |     | 12         |     | 12         |     |
|   |       | in | 0.28       |     | 0.3        |     | 0.37       |     | 0.47       |     | 0.47       |     |
| Centre distance                                       | $L_4$ | mm | 17.5       |     | 19         |     | 23         |     | 27         |     | 27         |     |
|   |       | in | 0.69       |     | 0.75       |     | 0.91       |     | 1.1        |     | 1.1        |     |
| Insert length<br>(Tolerance -2)                       | $L_6$ | mm | 29         | 36  | 35         | 43  | 41         | 51  | 47         | 59  | 48         | 60  |
|   |       | in | 1.1        | 1.4 | 1.4        | 1.7 | 1.6        | 2   | 1.9        | 2.3 | 1.9        | 2.4 |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 8 - 28     |     | 10 - 30    |     | 12 - 35    |     | 14 - 42    |     | 19 - 42    |     |
|   |       | in | 0.31 - 1.1 |     | 0.39 - 1.2 |     | 0.47 - 1.4 |     | 0.55 - 1.7 |     | 0.75 - 1.7 |     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 8 - 28     |     | 10 - 30    |     | 12 - 35    |     | 14 - 42    |     | 19 - 42    |     |
|   |       | in | 0.31 - 1.1 |     | 0.39 - 1.2 |     | 0.47 - 1.4 |     | 0.55 - 1.7 |     | 0.75 - 1.7 |     |
| Outer diameter hub                                    | $D_3$ | mm | 49         |     | 55         |     | 66         |     | 81         |     | 81         |     |
|   |       | in | 1.9        |     | 2.2        |     | 2.6        |     | 3.2        |     | 3.2        |     |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size   |           |                       | 200   |       | 300   |       | 500   |       | 800   | 1500  | 4000  |
|--|-----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Overall length   |           |                       | A     | B     | A     | B     | A     | B     | A     | A     | A     |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$     | Nm                    | 200   |       | 300   |       | 500   |       | 800   | 1500  | 4000  |
|  |           | lbf.in                | 1770  |       | 2655  |       | 4425  |       | 7081  | 13276 | 35403 |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$ | Nm                    | 300   |       | 450   |       | 750   |       | 1200  | 2250  | 6000  |
|  |           | lbf.in                | 2655  |       | 3983  |       | 6638  |       | 10621 | 19914 | 53105 |
| Max. speed   | $n_{Max}$ | rpm                   | 10000 |       |       |       |       |       |       |       |       |
| Axial misalignment   | $\pm$     | mm                    | 2     | 3     | 2.5   | 3.5   | 2.5   | 3.5   | 3.5   | 3.5   | 3.5   |
|  |           | in                    | 0.079 | 0.118 | 0.098 | 0.138 | 0.098 | 0.138 | 0.138 | 0.138 | 0.138 |
| Angular misalignment   | $\pm$     | $^\circ$              | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1.5   | 1.5   | 1.5   |
| Lateral misalignment   | $\pm$     | mm                    | 0.25  | 0.3   | 0.25  | 0.3   | 0.3   | 0.35  | 0.35  | 0.35  | 0.4   |
|  |           | in                    | 0.01  | 0.012 | 0.01  | 0.012 | 0.012 | 0.014 | 0.014 | 0.014 | 0.016 |
| Axial spring rigidity  | $C_a$     | N/mm                  | 90    | 60    | 105   | 71    | 70    | 48    | 100   | 320   | 565   |
|  |           | lbf/in                | 514   | 343   | 600   | 405   | 400   | 274   | 571   | 1827  | 3226  |
| Lateral spring rigidity  | $C_l$     | N/mm                  | 2040  | 610   | 3750  | 1050  | 2500  | 840   | 2000  | 3600  | 6070  |
|  |           | lbf/in                | 11648 | 3483  | 21413 | 5996  | 14275 | 4796  | 11420 | 20556 | 34660 |
| Torsional rigidity   | $C_T$     | Nm/arcmin             | 56    | 41    | 131   | 102   | 148   | 146   | 227   | 379   | 989   |
|  |           | lbf.in/arcmin         | 496   | 363   | 1159  | 903   | 1310  | 1292  | 2009  | 3354  | 8753  |
| Mass moment of inertia   | J         | kgcm <sup>2</sup>     | 45    | 54    | 85    | 105   | 173   | 196   | 243   | 492   | 1650  |
|  |           | lbf.in.s <sup>2</sup> | 40    | 48    | 75    | 93    | 153   | 174   | 215   | 436   | 1463  |
| Weight   | m         | kg                    | 2.5   |       | 4     |       | 7.5   |       | 7     | 12    | 28    |
|  |           | lb                    | 5.5   |       | 8.8   |       | 17    |       | 15    | 26    | 62    |

#### Dimensions

|   |       |    |            |     |            |     |           |     |         |         |         |
|---|-------|----|------------|-----|------------|-----|-----------|-----|---------|---------|---------|
| Total length<br>(Tolerance -2)                        | $L_1$ | mm | 104        | 116 | 111        | 125 | 132       | 146 | 141     | 167     | 229     |
|   |       | in | 4.1        | 4.6 | 4.4        | 4.9 | 5.2       | 5.7 | 5.6     | 6.6     | 9       |
| Fitting length  | $L_2$ | mm | 40.5       |     | 42.5       |     | 50.5      |     | 45      | 55.5    | 85      |
|   |       | in | 1.6        |     | 1.7        |     | 2         |     | 1.8     | 2.2     | 3.3     |
| Distance  | $L_3$ | mm | 12.5       |     | 14         |     | 16.5      |     | 17.5    | 22.5    | 28.5    |
|   |       | in | 0.49       |     | 0.55       |     | 0.65      |     | 0.69    | 0.89    | 1.1     |
| Centre distance                                       | $L_4$ | mm | 30.5       |     | 39         |     | 41        |     | 48      | 55      | 65      |
|   |       | in | 1.2        |     | 1.5        |     | 1.6       |     | 1.9     | 2.2     | 2.6     |
| Insert length<br>(Tolerance -2)                       | $L_6$ | mm | 51         | 62  | 55         | 69  | 61        | 75  | 66      | 71      | 109     |
|   |       | in | 2          | 2.4 | 2.2        | 2.7 | 2.4       | 3   | 2.6     | 2.8     | 4.3     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 22 - 45    |     | 24 - 60    |     | 35 - 60   |     | 40 - 75 | 50 - 80 | 50 - 90 |
|   |       | in | 0.87 - 1.8 |     | 0.94 - 2.4 |     | 1.4 - 2.4 |     | 1.6 - 3 | 2 - 3.1 | 2 - 3.5 |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 22 - 45    |     | 24 - 60    |     | 35 - 60   |     | 40 - 75 | 50 - 80 | 50 - 90 |
|   |       | in | 0.87 - 1.8 |     | 0.94 - 2.4 |     | 1.4 - 2.4 |     | 1.6 - 3 | 2 - 3.1 | 2 - 3.5 |
| Outer diameter hub                                    | $D_3$ | mm | 90         |     | 110        |     | 124       |     | 133     | 157     | 200     |
|   |       | in | 3.5        |     | 4.3        |     | 4.9       |     | 5.2     | 6.2     | 7.9     |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

## Metal bellows couplings BCH



For the ordering code, please refer to p 80

# BCT Metal bellows coupling / standard

| Size   |                  |                       | 15    | 60    | 150   |
|--|------------------|-----------------------|-------|-------|-------|
| Overall length   |                  |                       | A     | A     | A     |
| Max. acceleration torque <sup>a)</sup><br>(max. 1000 cycles per hour)                  | T <sub>B</sub>   | Nm                    | 50    | 210   | 380   |
|  |                  | lbf.in                | 443   | 1859  | 3363  |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | T <sub>Not</sub> | Nm                    | 75    | 315   | 570   |
|  |                  | lbf.in                | 664   | 2788  | 5045  |
| Max. speed   | n <sub>Max</sub> | rpm                   |       | 6000  |       |
| Axial misalignment   | ±                | mm                    | 1     | 1.5   | 2     |
|  |                  | in                    | 0.039 | 0.059 | 0.079 |
| Angular misalignment   | ±                | °                     | 1     | 1     | 1     |
| Lateral misalignment   | ±                | mm                    | 0.25  | 0.25  | 0.25  |
|  |                  | in                    | 0.01  | 0.01  | 0.01  |
| Axial spring rigidity  | C <sub>a</sub>   | N/mm                  | 29    | 77    | 87    |
|  |                  | lbf/in                | 166   | 440   | 497   |
| Lateral spring rigidity  | C <sub>l</sub>   | N/mm                  | 475   | 1410  | 1620  |
|  |                  | lbf/in                | 2712  | 8051  | 9250  |
| Torsional rigidity   | C <sub>T</sub>   | Nm/arcmin             | 6.7   | 27.1  | 51.7  |
|  |                  | lbf.in/arcmin         | 59    | 240   | 458   |
| Mass moment of inertia   | J                | kgcm <sup>2</sup>     | 1.5   | 6.5   | 13    |
|  |                  | lbf.in.s <sup>2</sup> | 1.3   | 5.8   | 12    |
| Weight   | m                | kg                    | 0.3   | 0.7   | 1     |
|  |                  | lb                    | 0.66  | 1.5   | 2.2   |

## Dimensions

|  |                |    |            |            |            |
|--|----------------|----|------------|------------|------------|
| Total length<br>(Tolerance -2)                             | L <sub>1</sub> | mm | 51.5       | 72.5       | 77.5       |
|  |                | in | 2          | 2.9        | 3.1        |
| Fitting length   | L <sub>2</sub> | mm | 16.5       | 23         | 27.5       |
|  |                | in | 0.65       | 0.91       | 1.1        |
| Distance   | L <sub>3</sub> | mm | 6.5        | 9.5        | 11         |
|  |                | in | 0.26       | 0.37       | 0.43       |
| Centre distance  | L <sub>4</sub> | mm | 1 x 17.5   | 1 x 23.5   | 1 x 27     |
|  |                | in | 1 x 0.69   | 1 x 0.93   | 1 x 1.1    |
| Length of mounting space<br>(Tolerance -2)                 | L <sub>7</sub> | mm | 48.5       | 67         | 71.5       |
|  |                | in | 1.9        | 2.6        | 2.8        |
| Pitch circle input <sup>c)</sup>                           | D <sub>1</sub> | mm | 31.5       | 50         | 63         |
|  |                | in | 1.2        | 2          | 2.5        |
| Mounting screws (ISO 4017 / 10.9)<br>(input)               |                |    | 8 x M5     | 8 x M6     | 12 x M6    |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7)      | D <sub>2</sub> | mm | 12 - 28    | 14 - 35    | 19 - 42    |
|  |                | in | 0.47 - 1.1 | 0.55 - 1.4 | 0.75 - 1.7 |
| Outer diameter hub   | D <sub>3</sub> | mm | 49         | 66         | 82         |
|  |                | in | 1.9        | 2.6        | 3.2        |
| Outer diameter flange<br>(Tolerance -0,2)                  | D <sub>5</sub> | mm | 63.5       | 86.5       | 108        |
|  |                | in | 2.5        | 3.4        | 4.3        |
| Pitch circle intermediate flange <sup>b)</sup>             | D <sub>6</sub> | mm | 56.5       | 76         | 97         |
|  |                | in | 2.2        | 3          | 3.8        |
| Mounting screws (ISO 4762 / 12.9)<br>(Intermediate flange) |                |    | 10 x M4    | 10 x M5    | 10 x M6    |

## Mountable to

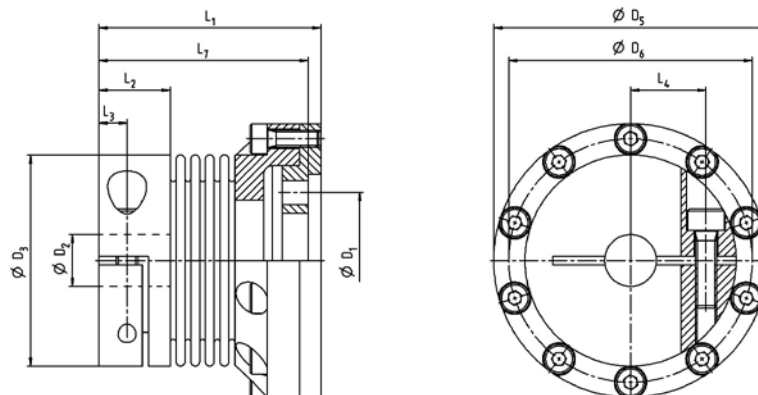
|   |     |     |     |
|---|-----|-----|-----|
| TP <sup>+</sup> , TK <sup>+</sup> , TPC <sup>+</sup> , TPM <sup>+</sup> DYNAMIC, TPM <sup>+</sup> POWER | 004 | 010 | 025 |
| TPK <sup>+</sup>  | -   | 010 | 025 |
| VT <sup>+</sup>   | -   | 050 | 063 |
| premo <sup>®</sup> TP Line  | 1   | 2   | 3   |

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

b) Intermediate flange incl. screws contained in scope of delivery

c) Screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).





| Size   |                  |                       | 300   | 1500  |
|--|------------------|-----------------------|-------|-------|
| Overall length   |                  |                       | A     | A     |
| Max. acceleration torque <sup>a)</sup><br>(max. 1000 cycles per hour)                  | T <sub>B</sub>   | Nm                    | 750   | 2600  |
|  |                  | lbf.in                | 6638  | 23012 |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | T <sub>Not</sub> | Nm                    | 1125  | 3900  |
|  |                  | lbf.in                | 9957  | 34518 |
| Max. speed   | n <sub>Max</sub> | rpm                   | 6000  |       |
| Axial misalignment   | ±                | mm                    | 2.5   | 3     |
|  |                  | in                    | 0.098 | 0.118 |
| Angular misalignment   | ±                | °                     | 1     | 1     |
| Lateral misalignment   | ±                | mm                    | 0.25  | 0.25  |
|  |                  | in                    | 0.01  | 0.01  |
| Axial spring rigidity  | C <sub>a</sub>   | N/mm                  | 112   | 322   |
|  |                  | lbf/in                | 640   | 1839  |
| Lateral spring rigidity  | C <sub>l</sub>   | N/mm                  | 3960  | 5890  |
|  |                  | lbf/in                | 22612 | 33632 |
| Torsional rigidity   | C <sub>T</sub>   | Nm/arcmin             | 105   | 353.9 |
|  |                  | lbf.in/arcmin         | 929   | 3132  |
| Mass moment of inertia   | J                | kgcm <sup>2</sup>     | 55    | 450   |
|  |                  | lbf.in.s <sup>2</sup> | 49    | 399   |
| Weight   | m                | kg                    | 2.8   | 10    |
|  |                  | lb                    | 6.2   | 22    |

#### Dimensions

|  |                |    |            |          |
|--|----------------|----|------------|----------|
| Total length<br>(Tolerance -2)                             | L <sub>1</sub> | mm | 95.5       | 148.5    |
|  |                | in | 3.8        | 5.8      |
| Fitting length   | L <sub>2</sub> | mm | 34         | 55.5     |
|  |                | in | 1.3        | 2.2      |
| Distance   | L <sub>3</sub> | mm | 12.5       | 22.5     |
|  |                | in | 0.49       | 0.89     |
| Centre distance  | L <sub>4</sub> | mm | 1 x 39     | 2 x 55   |
|  |                | in | 1 x 1.5    | 2 x 2.2  |
| Length of mounting space<br>(Tolerance -2)                 | L <sub>7</sub> | mm | 89         | 141      |
|  |                | in | 3.5        | 5.6      |
| Pitch circle input <sup>c)</sup>                           | D <sub>1</sub> | mm | 80         | 125      |
|  |                | in | 3.1        | 4.9      |
| Mounting screws (ISO 4017 / 10.9)<br>(input)               |                |    | 12 x M8    | 12 x M10 |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7)      | D <sub>2</sub> | mm | 24 - 60    | 50 - 80  |
|  |                | in | 0.94 - 2.4 | 2 - 3.1  |
| Outer diameter hub   | D <sub>3</sub> | mm | 110        | 157      |
|  |                | in | 4.3        | 6.2      |
| Outer diameter flange<br>(Tolerance -0,2)                  | D <sub>5</sub> | mm | 132        | 188.5    |
|  |                | in | 5.2        | 7.4      |
| Pitch circle intermediate flange <sup>b)</sup>             | D <sub>6</sub> | mm | 120        | 170.5    |
|  |                | in | 4.7        | 6.7      |
| Mounting screws (ISO 4762 / 12.9)<br>(Intermediate flange) |                |    | 12 x M6    | 16 x M8  |

#### Mountable to

|  |     |     |
|--|-----|-----|
| TP*, TK*, TPC*, TPM* DYNAMIC, TPM* POWER | 050 | 110 |
| TPK*                                     | 050 | 110 |
| VT*                                      | 080 | 100 |
| premo® TP Line                           | -   | -   |

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

b) Intermediate flange incl. screws contained in scope of delivery

c) Screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

### Metal bellows coupling BCT



For the ordering code, please refer to p 80

# BCT Metal bellows coupling / HIGH TORQUE

| Size   |           |                       | 150   | 300   |       | 1500   |
|--|-----------|-----------------------|-------|-------|-------|--------|
| Overall length   |           |                       | A     | A     | A     | A      |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$     | Nm                    | 230   | 530   | 1000  | 3100   |
|  |           | lbf.in                | 2036  | 4691  | 8851  | 27437  |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$ | Nm                    | 345   | 795   | 1500  | 4650   |
|  |           | lbf.in                | 3054  | 7036  | 13276 | 41156  |
| Max. speed   | $n_{Max}$ | rpm                   | 6000  | 6000  | 5000  | 4500   |
| Axial misalignment   | $\pm$     | mm                    | 2     | 2.5   | 2.5   | 1.5    |
|  |           | in                    | 0.079 | 0.098 | 0.098 | 0.059  |
| Angular misalignment   | $\pm$     | °                     | 1     | 1     | 1     | 0.7    |
|  |           | mm                    | 0.25  | 0.25  | 0.25  | 0.15   |
| Lateral misalignment   | $\pm$     | in                    | 0.01  | 0.01  | 0.01  | 0.006  |
|  |           | N/mm                  | 85    | 110   | 240   | 1000   |
| Axial spring rigidity  | $C_a$     | lbf/in                | 485   | 628   | 1370  | 5710   |
|  |           | N/mm                  | 1620  | 3860  | 6600  | 21000  |
| Lateral spring rigidity  | $C_l$     | lbf/in                | 9250  | 22041 | 37686 | 119910 |
|  |           | Nm/arcmin             | 49.5  | 101.9 | 139.7 | 815    |
| Torsional rigidity   | $C_T$     | lbf.in/arcmin         | 438   | 902   | 1236  | 7213   |
|  |           | kgcm <sup>2</sup>     | 22    | 71    | 74    | 370    |
| Mass moment of inertia   | J         | lbf.in.s <sup>2</sup> | 20    | 63    | 66    | 328    |
|  |           | kg                    | 1.8   | 3.6   | 3.6   | 8.7    |
| Weight   | m         | lb                    | 4     | 7.9   | 7.9   | 19     |

## Dimensions

|  |       |    |            |           |           |           |
|--|-------|----|------------|-----------|-----------|-----------|
| Total length<br>(without LS / Tolerance -2)                | $L_1$ | mm | 75         | 93        | 95        | 135       |
|  |       | in | 3          | 3.7       | 3.7       | 5.3       |
| Fitting length   | $L_2$ | mm | 32         | 41        | 41        | 61        |
|  |       | in | 1.3        | 1.6       | 1.6       | 2.4       |
| Length of mounting space<br>(without LS / Tolerance -2)    | $L_7$ | mm | 69         | 87        | 88.5      | 127.5     |
|  |       | in | 2.7        | 3.4       | 3.5       | 5         |
| Screw head length  | $L_S$ | mm | 4          | 5.3       | 5.3       | 7.5       |
|  |       | in | 0.16       | 0.21      | 0.21      | 0.3       |
| Pitch circle input <sup>b)</sup>                           | $D_1$ | mm | 50         | 63        | 80        | 125       |
|  |       | in | 2          | 2.5       | 3.1       | 4.9       |
| Mounting screws (ISO 4017 / 10.9)<br>(input)               |       |    | 12 x M6    | 12 x M8   | 12 x M10  | 12 x M12  |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7)      | $D_2$ | mm | 16 - 38    | 30 - 56   | 45 - 56   | 55 - 70   |
|  |       | in | 0.63 - 1.5 | 1.2 - 2.2 | 1.8 - 2.2 | 2.2 - 2.8 |
| Outer diameter bellows                                     | $D_4$ | mm | 81         | 110       | 110       | 157       |
|  |       | in | 3.2        | 4.3       | 4.3       | 6.2       |
| Outer diameter flange<br>(Tolerance -0,2)                  | $D_5$ | mm | 108        | 132       | 132       | 188.5     |
|  |       | in | 4.3        | 5.2       | 5.2       | 7.4       |
| Pitch circle intermediate flange <sup>a)</sup>             | $D_6$ | mm | 97         | 120       | 120       | 170.5     |
|  |       | in | 3.8        | 4.7       | 4.7       | 6.7       |
| Mounting screws (ISO 4762 / 12.9)<br>(intermediate flange) |       |    | 10 x M6    | 12 x M6   | 12 x M6   | 16 x M8   |

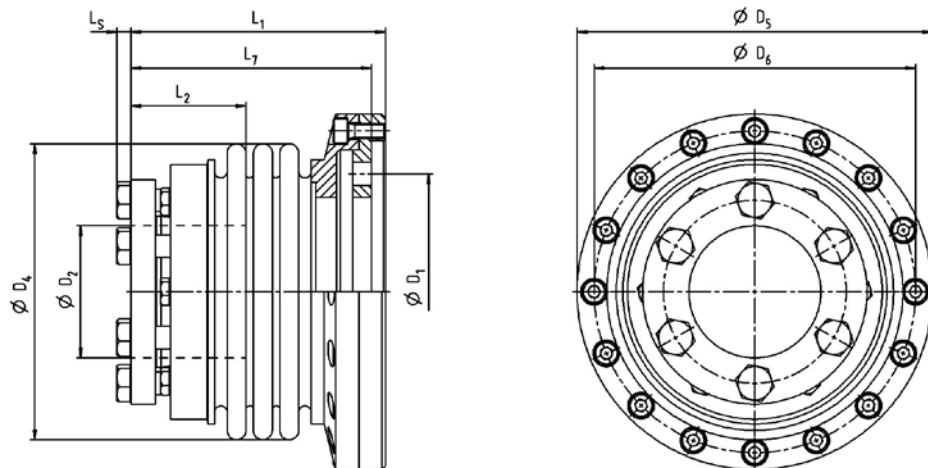
## Mountable to

|                              |     |     |     |     |
|------------------------------|-----|-----|-----|-----|
| TP <sup>+</sup>              | 010 | 025 | 050 | 110 |
| TPK <sup>+</sup>             | 010 | 025 | 050 | 110 |
| TPM <sup>+</sup> HIGH TORQUE | 010 | 025 | 050 | 110 |

a) Screws contained in scope of delivery

b) Intermediate flange incl. screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size   |           |                       | 4000  | 6000   | 10000  |
|--|-----------|-----------------------|-------|--------|--------|
| Overall length   |           |                       | A     | A      | A      |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$     | Nm                    | 6000  | 9000   | 12000  |
|  |           | lbf.in                | 53105 | 79657  | 106210 |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$ | Nm                    | 9000  | 13500  | 18000  |
|  |           | lbf.in                | 79657 | 119486 | 159314 |
| Max. speed   | $n_{Max}$ | rpm                   | 3500  | 3500   | 3500   |
| Axial misalignment   | $\pm$     | mm                    | 3.5   | 3      | 3      |
|  |           | in                    | 0.138 | 0.118  | 0.118  |
| Angular misalignment   | $\pm$     | °                     | 1.5   | 1.5    | 1.5    |
| Lateral misalignment   | $\pm$     | mm                    | 0.4   | 0.4    | 0.4    |
|  |           | in                    | 0.016 | 0.016  | 0.016  |
| Axial spring rigidity  | $C_a$     | N/mm                  | 1100  | 1050   | 980    |
|  |           | lbf/in                | 6281  | 5996   | 5596   |
| Lateral spring rigidity  | $C_l$     | N/mm                  | 7750  | 19200  | 21800  |
|  |           | lbf/in                | 44253 | 109632 | 124478 |
| Torsional rigidity   | $C_T$     | Nm/arcmin             | 1484  | 2735   | 3172   |
|  |           | lbf.in/arcmin         | 13135 | 24207  | 28075  |
| Mass moment of inertia   | J         | kgcm <sup>2</sup>     | 1680  | 4330   | 7000   |
|  |           | lbf.in.s <sup>2</sup> | 1489  | 3839   | 6206   |
| Weight   | m         | kg                    | 22.5  | 41     | 55     |
|  |           | lb                    | 50    | 90     | 121    |

#### Dimensions

|  |       |    |           |           |           |
|--|-------|----|-----------|-----------|-----------|
| Total length<br>(without LS / Tolerance -2)                | $L_1$ | mm | 209       | 214       | 211       |
|  |       | in | 8.2       | 8.4       | 8.3       |
| Fitting length   | $L_2$ | mm | 80        | 85        | 92        |
|  |       | in | 3.1       | 3.3       | 3.6       |
| Length of mounting space<br>(without LS / Tolerance -2)    | $L_7$ | mm | 197       | 201       | 198       |
|  |       | in | 7.8       | 7.9       | 7.8       |
| Screw head length  | $L_S$ | mm | 10        | 10        | 10        |
|  |       | in | 0.39      | 0.39      | 0.39      |
| Pitch circle input <sup>b)</sup>                           | $D_1$ | mm | 145       | 166       | 166       |
|  |       | in | 5.7       | 6.5       | 6.5       |
| Mounting screws (ISO 4762 / 12.9)<br>(input)               |       |    | 12 x M20  | 12 x M24  | 12 x M24  |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7)      | $D_2$ | mm | 70 - 100  | 95 - 140  | 80 - 180  |
|  |       | in | 2.8 - 3.9 | 3.7 - 5.5 | 3.1 - 7.1 |
| Outer diameter bellows                                     | $D_4$ | mm | 200       | 253       | 303       |
|  |       | in | 7.9       | 10        | 12        |
| Outer diameter flange<br>(Tolerance -0,2)                  | $D_5$ | mm | 244       | 299       | 345       |
|  |       | in | 9.6       | 12        | 14        |
| Pitch circle intermediate flange <sup>a)</sup>             | $D_6$ | mm | 221       | 276       | 322       |
|  |       | in | 8.7       | 11        | 13        |
| Mounting screws (ISO 4762 / 12.9)<br>(Intermediate flange) |       |    | 20 x M12  | 20 x M12  | 24 x M12  |

#### Mountable to

|                  |     |     |     |
|------------------|-----|-----|-----|
| TP*              | 300 | 500 | 500 |
| TPK*             | 300 | 500 | 500 |
| TPM* HIGH TORQUE | -   | -   | -   |

a) Screws contained in scope of delivery

b) Intermediate flange incl. screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

### Metal bellows coupling BCT



For the ordering code, please refer to p 80

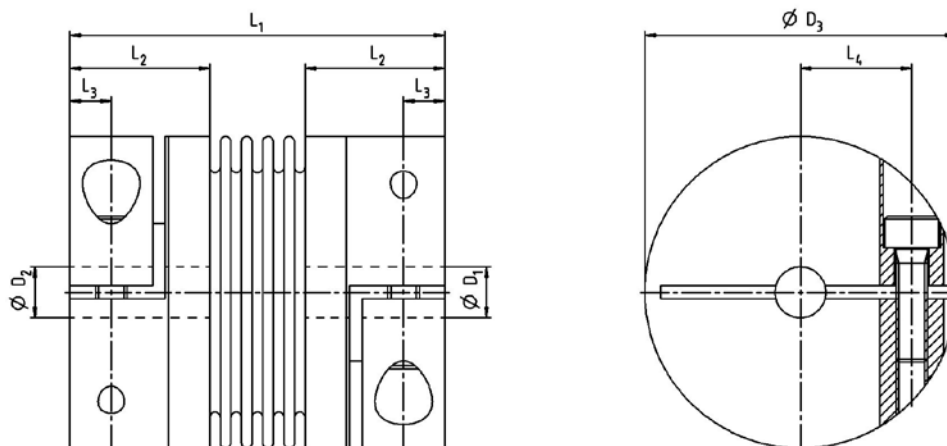
# BC2 Metal bellows coupling / clamping hub

| Size   |           |                       | 15    |       | 30    |       | 60    |       | 80    |       | 150   |       | 200   |       | 300   |       |
|--|-----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Overall length   |           |                       | A     | B     | A     | B     | A     | B     | A     | B     | A     | B     | A     | B     | A     | B     |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$     | Nm                    | 15    |       | 30    |       | 60    |       | 80    |       | 150   |       | 200   |       | 300   |       |
|  |           | lbf.in                | 133   |       | 266   |       | 531   |       | 708   |       | 1328  |       | 1770  |       | 2655  |       |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$ | Nm                    | 22.5  |       | 45    |       | 90    |       | 120   |       | 225   |       | 300   |       | 450   |       |
|  |           | lbf.in                | 199   |       | 398   |       | 797   |       | 1062  |       | 1991  |       | 2655  |       | 3983  |       |
| Max. speed   | $n_{Max}$ | rpm                   | 10000 |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Axial misalignment   | $\pm$     | mm                    | 1     | 2     | 1     | 2     | 1.5   | 2     | 2     | 3     | 2     | 3     | 2     | 3     | 2.5   | 3.5   |
|  |           | in                    | 0.039 | 0.079 | 0.039 | 0.079 | 0.059 | 0.079 | 0.079 | 0.118 | 0.079 | 0.118 | 0.079 | 0.118 | 0.098 | 0.138 |
| Angular misalignment   | $\pm$     | $^\circ$              | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   |
| Lateral misalignment   | $\pm$     | mm                    | 0.15  | 0.2   | 0.2   | 0.25  | 0.2   | 0.25  | 0.2   | 0.25  | 0.2   | 0.25  | 0.25  | 0.3   | 0.25  | 0.3   |
|  |           | in                    | 0.006 | 0.008 | 0.008 | 0.01  | 0.008 | 0.01  | 0.008 | 0.01  | 0.008 | 0.01  | 0.01  | 0.012 | 0.01  | 0.012 |
| Axial spring rigidity  | $C_a$     | N/mm                  | 25    | 15    | 50    | 30    | 72    | 48    | 48    | 32    | 82    | 52    | 90    | 60    | 105   | 71    |
|  |           | lbf/in                | 143   | 86    | 286   | 171   | 411   | 274   | 274   | 183   | 468   | 297   | 514   | 343   | 600   | 405   |
| Lateral spring rigidity  | $C_l$     | N/mm                  | 475   | 137   | 900   | 270   | 1200  | 420   | 920   | 290   | 1550  | 435   | 2040  | 610   | 3750  | 1050  |
|  |           | lbf/in                | 2712  | 782   | 5139  | 1542  | 6852  | 2398  | 5253  | 1656  | 8851  | 2484  | 11648 | 3483  | 21413 | 5996  |
| Torsional rigidity   | $C_T$     | Nm/arcmin             | 5.8   | 4.4   | 11.3  | 8.1   | 22.1  | 16    | 37.5  | 24.7  | 50.9  | 32    | 55.6  | 40.7  | 131   | 102   |
|  |           | lbf.in/arcmin         | 51    | 39    | 100   | 72    | 196   | 142   | 332   | 219   | 451   | 283   | 492   | 360   | 1159  | 903   |
| Mass moment of inertia   | J         | kgcm <sup>2</sup>     | 0.6   | 0.7   | 1.2   | 1.3   | 3.2   | 3.5   | 8     | 8.5   | 19    | 20    | 32    | 34    | 76    | 79    |
|  |           | lbf.in.s <sup>2</sup> | 0.53  | 0.62  | 1.1   | 1.2   | 2.8   | 3.1   | 7.1   | 7.5   | 17    | 18    | 28    | 30    | 67    | 70    |
| Weight   | m         | kg                    | 0.16  |       | 0.26  |       | 0.48  |       | 0.8   |       | 1.85  |       | 2.65  |       | 4     |       |
|  |           | lb                    | 0.35  |       | 0.57  |       | 1.1   |       | 1.8   |       | 4.1   |       | 5.8   |       | 8.8   |       |

## Dimensions

|   |       |    |            |     |            |    |            |     |            |     |            |     |            |     |            |     |
|---|-------|----|------------|-----|------------|----|------------|-----|------------|-----|------------|-----|------------|-----|------------|-----|
| Total length<br>(Tolerance -2)                        | $L_1$ | mm | 59         | 66  | 69         | 77 | 83         | 93  | 94         | 106 | 95         | 107 | 104        | 116 | 111        | 125 |
|   |       | in | 2.3        | 2.6 | 2.7        | 3  | 3.3        | 3.7 | 3.7        | 4.2 | 3.7        | 4.2 | 4.1        | 4.6 | 4.4        | 4.9 |
| Fitting length  | $L_2$ | mm | 22         |     | 26.5       |    | 31         |     | 35.5       |     | 35.5       |     | 40.5       |     | 42.5       |     |
|   |       | in | 0.87       |     | 1          |    | 1.2        |     | 1.4        |     | 1.4        |     | 1.6        |     | 1.7        |     |
| Distance  | $L_3$ | mm | 6.5        |     | 7.5        |    | 9.5        |     | 11         |     | 11         |     | 12.5       |     | 13         |     |
|   |       | in | 0.26       |     | 0.3        |    | 0.37       |     | 0.43       |     | 0.43       |     | 0.49       |     | 0.51       |     |
| Centre distance <sup>a</sup>                          | $L_4$ | mm | 17.5       |     | 19         |    | 23         |     | 27         |     | 27         |     | 30.5       |     | 39         |     |
|   |       | in | 0.69       |     | 0.75       |    | 0.91       |     | 1.1        |     | 1.1        |     | 1.2        |     | 1.5        |     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 8 - 28     |     | 10 - 30    |    | 12 - 35    |     | 14 - 42    |     | 19 - 42    |     | 22 - 45    |     | 24 - 60    |     |
|   |       | in | 0.31 - 1.1 |     | 0.39 - 1.2 |    | 0.47 - 1.4 |     | 0.55 - 1.7 |     | 0.75 - 1.7 |     | 0.87 - 1.8 |     | 0.94 - 2.4 |     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 8 - 28     |     | 10 - 30    |    | 12 - 35    |     | 14 - 42    |     | 19 - 42    |     | 22 - 45    |     | 24 - 60    |     |
|   |       | in | 0.31 - 1.1 |     | 0.39 - 1.2 |    | 0.47 - 1.4 |     | 0.55 - 1.7 |     | 0.75 - 1.7 |     | 0.87 - 1.8 |     | 0.94 - 2.4 |     |
| Outer diameter hub                                    | $D_3$ | mm | 49         |     | 55         |    | 66         |     | 81         |     | 81         |     | 90         |     | 110        |     |
|   |       | in | 1.9        |     | 2.2        |    | 2.6        |     | 3.2        |     | 3.2        |     | 3.5        |     | 4.3        |     |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size   |           | 500                   |       | 800   |       | 1500  |       | 4000   | 6000  | 10000  |        |
|--|-----------|-----------------------|-------|-------|-------|-------|-------|--------|-------|--------|--------|
| Overall length   |           | A                     | B     | A     | B     | A     | B     | A      | A     | A      |        |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$     | Nm                    | 500   | 800   | 1500  | 4000  | 6000  | 10000  |       |        |        |
|  |           | lbf.in                | 4425  | 7081  | 13276 | 35403 | 53105 | 88508  |       |        |        |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$ | Nm                    | 750   | 1200  | 2250  | 6000  | 9000  | 15000  |       |        |        |
|  |           | lbf.in                | 6638  | 10621 | 19914 | 53105 | 79657 | 132762 |       |        |        |
| Max. speed   | $n_{Max}$ | rpm                   | 10000 |       |       |       |       |        |       |        |        |
| Axial misalignment   | $\pm$     | mm                    | 2.5   | 3.5   | 3.5   | 4.5   | 3.5   | 4.5    | 3.5   | 3      | 3      |
|  |           | in                    | 0.098 | 0.138 | 0.138 | 0.177 | 0.138 | 0.177  | 0.138 | 0.118  | 0.118  |
| Angular misalignment   | $\pm$     | $^\circ$              | 1     | 1.5   | 1.5   | 2     | 1.5   | 2      | 1.5   | 1.5    | 1.5    |
| Lateral misalignment   | $\pm$     | mm                    | 0.3   | 0.35  | 0.35  | 1     | 0.35  | 1      | 0.4   | 0.4    | 0.4    |
|  |           | in                    | 0.012 | 0.014 | 0.014 | 0.039 | 0.014 | 0.039  | 0.016 | 0.016  | 0.016  |
| Axial spring rigidity  | $C_a$     | N/mm                  | 70    | 48    | 100   | 285   | 320   | 440    | 565   | 1030   | 985    |
|  |           | lbf/in                | 400   | 274   | 571   | 1627  | 1827  | 2512   | 3226  | 5881   | 5624   |
| Lateral spring rigidity  | $C_l$     | N/mm                  | 2500  | 840   | 2000  | 1490  | 3600  | 1700   | 6070  | 19200  | 21800  |
|  |           | lbf/in                | 14275 | 4796  | 11420 | 8508  | 20556 | 9707   | 34660 | 109632 | 124478 |
| Torsional rigidity   | $C_T$     | Nm/arcmin             | 148   | 145.5 | 227   | 207   | 379   | 343    | 989   | 1659   | 3186   |
|  |           | lbf.in/arcmin         | 1310  | 1288  | 2009  | 1832  | 3354  | 3036   | 8753  | 14683  | 28199  |
| Mass moment of inertia   | J         | kgcm <sup>2</sup>     | 143   | 146   | 162   | 170   | 430   | 450    | 1650  | 4950   | 12140  |
|  |           | lbf.in.s <sup>2</sup> | 127   | 129   | 144   | 151   | 381   | 399    | 1463  | 4388   | 10762  |
| Weight   | m         | kg                    | 6.3   |       | 5.7   |       | 11.5  |        | 28.8  | 49.4   | 80.9   |
|  |           | lb                    | 14    |       | 13    |       | 25    |        | 64    | 109    | 178    |

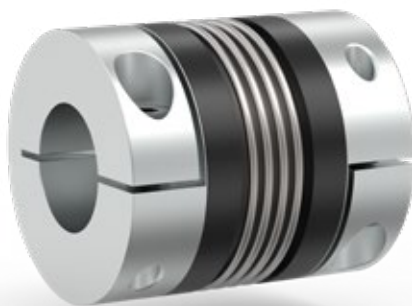
### Dimensions

|   |       |    |           |     |         |     |         |     |         |           |           |
|---|-------|----|-----------|-----|---------|-----|---------|-----|---------|-----------|-----------|
| Total length<br>(Tolerance -2)                        | $L_1$ | mm | 132       | 146 | 140     | 178 | 167     | 231 | 229     | 252       | 288       |
|   |       | in | 5.2       | 5.7 | 5.5     | 7   | 6.6     | 9.1 | 9       | 9.9       | 11        |
| Fitting length  | $L_2$ | mm | 50.5      |     | 45      |     | 55.5    |     | 85      | 107       | 129       |
|   |       | in | 2         |     | 1.8     |     | 2.2     |     | 3.3     | 4.2       | 5.1       |
| Distance  | $L_3$ | mm | 16.5      |     | 17.5    |     | 22.5    |     | 28.5    | 35.5      | 42        |
|   |       | in | 0.65      |     | 0.69    |     | 0.89    |     | 1.1     | 1.4       | 1.7       |
| Centre distance <sup>a)</sup>                         | $L_4$ | mm | 41        |     | 2 x 48  |     | 2 x 55  |     | 2 x 65  | 2 x 90    | 2 x 117   |
|   |       | in | 1.6       |     | 2 x 1.9 |     | 2 x 2.2 |     | 2 x 2.6 | 2 x 3.5   | 2 x 4.6   |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 35 - 60   |     | 40 - 75 |     | 50 - 80 |     | 50 - 90 | 60 - 140  | 70 - 180  |
|   |       | in | 1.4 - 2.4 |     | 1.6 - 3 |     | 2 - 3.1 |     | 2 - 3.5 | 2.4 - 5.5 | 2.8 - 7.1 |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 35 - 60   |     | 40 - 75 |     | 50 - 80 |     | 50 - 90 | 60 - 140  | 70 - 180  |
|   |       | in | 1.4 - 2.4 |     | 1.6 - 3 |     | 2 - 3.1 |     | 2 - 3.5 | 2.4 - 5.5 | 2.8 - 7.1 |
| Outer diameter hub                                    | $D_3$ | mm | 124       |     | 134     |     | 157     |     | 200     | 253       | 303       |
|   |       | in | 4.9       |     | 5.3     |     | 6.2     |     | 7.9     | 10        | 12        |

a) Starting at size 800, two screws per clamping hub offset by 180°.

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

## Metal bellows coupling BC2



For the ordering code, please refer to p 80

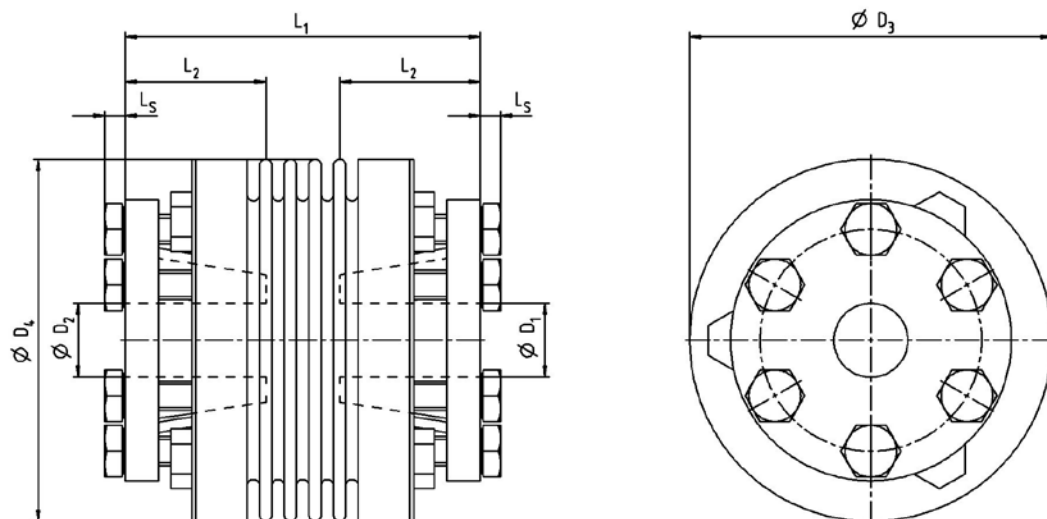
# BC3 Metal bellows coupling / tapered clamping hub

| Size   |           | 15                    |       | 30    |       | 60    |       | 150   |       | 200   |       | 300   |       |       |
|--|-----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Overall length   |           | A                     | B     | A     | B     | A     | B     | A     | B     | A     | B     | A     | B     |       |
| Max. acceleration torque **<br>(max. 1000 cycles per hour)                             | $T_B$     | Nm                    | 15    | 30    | 60    | 150   | 200   | 300   |       |       |       |       |       |       |
|  |           | lbf.in                | 133   | 266   | 531   | 1328  | 1770  | 2655  |       |       |       |       |       |       |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$ | Nm                    | 22.5  | 45    | 90    | 225   | 300   | 450   |       |       |       |       |       |       |
|  |           | lbf.in                | 199   | 398   | 797   | 1991  | 2655  | 3983  |       |       |       |       |       |       |
| Max. speed   | $n_{Max}$ | rpm 10000             |       |       |       |       |       |       |       |       |       |       |       |       |
| Axial misalignment   | $\pm$     | mm                    | 1     | 2     | 1     | 2     | 1.5   | 2     | 2     | 3     | 2     | 3     | 2.5   | 3.5   |
|  |           | in                    | 0.039 | 0.079 | 0.039 | 0.079 | 0.059 | 0.079 | 0.079 | 0.118 | 0.079 | 0.118 | 0.098 | 0.138 |
| Angular misalignment   | $\pm$     | $^\circ$              | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   | 1     | 1.5   |
| Lateral misalignment   | $\pm$     | mm                    | 0.15  | 0.2   | 0.2   | 0.25  | 0.2   | 0.25  | 0.2   | 0.25  | 0.25  | 0.3   | 0.25  | 0.3   |
|  |           | in                    | 0.006 | 0.008 | 0.008 | 0.01  | 0.008 | 0.01  | 0.008 | 0.01  | 0.01  | 0.012 | 0.01  | 0.012 |
| Axial spring rigidity  | $C_a$     | N/mm                  | 25    | 15    | 50    | 30    | 72    | 48    | 82    | 52    | 90    | 60    | 105   | 71    |
|  |           | lbf/in                | 143   | 86    | 286   | 171   | 411   | 274   | 468   | 297   | 514   | 343   | 600   | 405   |
| Lateral spring rigidity  | $C_l$     | N/mm                  | 475   | 137   | 900   | 270   | 1200  | 420   | 1500  | 435   | 2040  | 610   | 3750  | 1050  |
|  |           | lbf/in                | 2712  | 782   | 5139  | 1542  | 6852  | 2398  | 8565  | 2484  | 11648 | 3483  | 21413 | 5996  |
| Torsional rigidity   | $C_T$     | Nm/arcmin             | 5.8   | 4.4   | 11.3  | 8.1   | 22.1  | 16    | 50.9  | 32    | 55.6  | 40.7  | 131   | 101.9 |
|  |           | lbf.in/arcmin         | 51    | 39    | 100   | 72    | 196   | 142   | 451   | 283   | 492   | 360   | 1159  | 902   |
| Mass moment of inertia   | J         | kgcm <sup>2</sup>     | 0.7   | 0.8   | 1.5   | 1.6   | 3.9   | 4.1   | 12    | 16    | 17    | 25    | 51    | 59    |
|  |           | lbf.in.s <sup>2</sup> | 0.62  | 0.71  | 1.3   | 1.4   | 3.5   | 3.6   | 11    | 14    | 15    | 22    | 45    | 52    |
| Weight   | m         | kg                    | 0.25  |       | 0.4   |       | 0.7   |       | 1.2   |       | 1.8   |       | 3     |       |
|  |           | lb                    | 0.55  |       | 0.88  |       | 1.5   |       | 2.6   |       | 4     |       | 6.6   |       |

## Dimensions

| Total length<br>(without LS / Tolerance -2)           | $L_1$ | mm | 48          | 55  | 55          | 63  | 66         | 76 | 73         | 85  | 76         | 88  | 89         | 103 |
|---|-------|----|-------------|-----|-------------|-----|------------|----|------------|-----|------------|-----|------------|-----|
|   |       | in | 1.9         | 2.2 | 2.2         | 2.5 | 2.6        | 3  | 2.9        | 3.3 | 3          | 3.5 | 3.5        | 4.1 |
| Fitting length  | $L_2$ | mm | 19          |     | 21.5        |     | 27.5       |    | 32         |     | 32         |     | 41.5       |     |
|   |       | in | 0.75        |     | 0.85        |     | 1.1        |    | 1.3        |     | 1.3        |     | 1.6        |     |
| Screw head length                                     | $L_S$ | mm | 2.8         |     | 3.5         |     | 3.5        |    | 4          |     | 4          |     | 5.3        |     |
|   |       | in | 0.11        |     | 0.14        |     | 0.14       |    | 0.16       |     | 0.16       |     | 0.21       |     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 10 - 22     |     | 12 - 23     |     | 12 - 29    |    | 15 - 38    |     | 15 - 44    |     | 24 - 56    |     |
|   |       | in | 0.39 - 0.87 |     | 0.47 - 0.91 |     | 0.47 - 1.1 |    | 0.59 - 1.5 |     | 0.59 - 1.7 |     | 0.94 - 2.2 |     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 10 - 22     |     | 12 - 23     |     | 12 - 29    |    | 15 - 38    |     | 15 - 44    |     | 24 - 56    |     |
|   |       | in | 0.39 - 0.87 |     | 0.47 - 0.91 |     | 0.47 - 1.1 |    | 0.59 - 1.5 |     | 0.59 - 1.7 |     | 0.94 - 2.2 |     |
| Outer diameter hub                                    | $D_3$ | mm | 49          |     | 55          |     | 66         |    | 81         |     | 90         |     | 110        |     |
|   |       | in | 1.9         |     | 2.2         |     | 2.6        |    | 3.2        |     | 3.5        |     | 4.3        |     |
| Outer diameter bellows                                | $D_4$ | mm | 49          |     | 55          |     | 66         |    | 81         |     | 90         |     | 110        |     |
|   |       | in | 1.9         |     | 2.2         |     | 2.6        |    | 3.2        |     | 3.5        |     | 4.3        |     |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size   |                  | 500                   |       | 800   | 1500  | 4000  | 6000  | 10000  |
|--|------------------|-----------------------|-------|-------|-------|-------|-------|--------|
| Overall length   |                  | A                     | B     | A     | A     | A     | A     | A      |
| Max. acceleration torque <sup>a)</sup><br>(max. 1000 cycles per hour)                  | T <sub>B</sub>   | Nm                    | 500   | 800   | 1500  | 4000  | 6000  | 10000  |
|  |                  | lbf.in                | 4425  | 7081  | 13276 | 35403 | 53105 | 88508  |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | T <sub>Not</sub> | Nm                    | 750   | 1200  | 2250  | 6000  | 9000  | 15000  |
|  |                  | lbf.in                | 6638  | 10621 | 19914 | 53105 | 79657 | 132762 |
| Max. speed   | n <sub>Max</sub> | rpm 10000             |       |       |       |       |       |        |
| Axial misalignment   | ±                | mm                    | 2.5   | 3.5   | 3.5   | 3.5   | 3     | 3      |
|  |                  | in                    | 0.098 | 0.138 | 0.138 | 0.138 | 0.118 | 0.118  |
| Angular misalignment   | ±                | °                     | 1     | 1.5   | 1.5   | 1.5   | 1.5   | 1.5    |
| Lateral misalignment   | ±                | mm                    | 0.3   | 0.35  | 0.35  | 0.35  | 0.4   | 0.4    |
|  |                  | in                    | 0.012 | 0.014 | 0.014 | 0.014 | 0.016 | 0.016  |
| Axial spring rigidity  | C <sub>a</sub>   | N/mm                  | 70    | 48    | 100   | 320   | 565   | 1030   |
|  |                  | lbf/in                | 400   | 274   | 571   | 1827  | 3226  | 5881   |
| Lateral spring rigidity  | C <sub>l</sub>   | N/mm                  | 2500  | 840   | 2000  | 3600  | 6070  | 19200  |
|  |                  | lbf/in                | 14275 | 4796  | 11420 | 20556 | 34660 | 109632 |
| Torsional rigidity   | C <sub>T</sub>   | Nm/arcmin             | 148   | 145.5 | 227   | 379   | 989   | 1659   |
|  |                  | lbf.in/arcmin         | 1310  | 1288  | 2009  | 3354  | 8753  | 14683  |
| Mass moment of inertia   | J                | kgcm <sup>2</sup>     | 91    | 99    | 132   | 349   | 855   | 2540   |
|  |                  | lbf.in.s <sup>2</sup> | 81    | 88    | 117   | 309   | 758   | 2252   |
| Weight   | m                | kg                    | 4.2   | 5.6   | 8.2   | 23    | 32.6  | 45.5   |
|  |                  | lb                    | 9.3   | 12    | 18    | 51    | 72    | 100    |

### Dimensions

|   |                |    |            |           |           |          |           |           |     |
|---|----------------|----|------------|-----------|-----------|----------|-----------|-----------|-----|
| Total length<br>(without LS / Tolerance -2)           | L <sub>1</sub> | mm | 96         | 110       | 115       | 140      | 198       | 210       | 217 |
|   |                | in | 3.8        | 4.3       | 4.5       | 5.5      | 7.8       | 8.3       | 8.5 |
| Fitting length  | L <sub>2</sub> | mm | 41.5       | 50        | 61        | 80.5     | 85        | 93.5      |     |
|   |                | in | 1.6        | 2         | 2.4       | 3.2      | 3.3       | 3.7       |     |
| Screw head length                                     | L <sub>S</sub> | mm | 5.3        | 6.4       | 7.5       | 10       | 10        | 10        |     |
|   |                | in | 0.21       | 0.25      | 0.3       | 0.39     | 0.39      | 0.39      |     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | D <sub>1</sub> | mm | 24 - 56    | 30 - 60   | 35 - 70   | 50 - 100 | 60 - 140  | 70 - 180  |     |
|   |                | in | 0.94 - 2.2 | 1.2 - 2.4 | 1.4 - 2.8 | 2 - 3.9  | 2.4 - 5.5 | 2.8 - 7.1 |     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | D <sub>2</sub> | mm | 24 - 56    | 30 - 60   | 35 - 70   | 50 - 100 | 60 - 140  | 70 - 180  |     |
|   |                | in | 0.94 - 2.2 | 1.2 - 2.4 | 1.4 - 2.8 | 2 - 3.9  | 2.4 - 5.5 | 2.8 - 7.1 |     |
| Outer diameter hub                                    | D <sub>3</sub> | mm | 122        | 116       | 135       | 180      | 246       | 295       |     |
|   |                | in | 4.8        | 4.6       | 5.3       | 7.1      | 9.7       | 12        |     |
| Outer diameter bellows                                | D <sub>4</sub> | mm | 124        | 133       | 157       | 200      | 253       | 303       |     |
|   |                | in | 4.9        | 5.2       | 6.2       | 7.9      | 10        | 12        |     |

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

## Metal bellows coupling BC3



For the ordering code, please refer to p 80

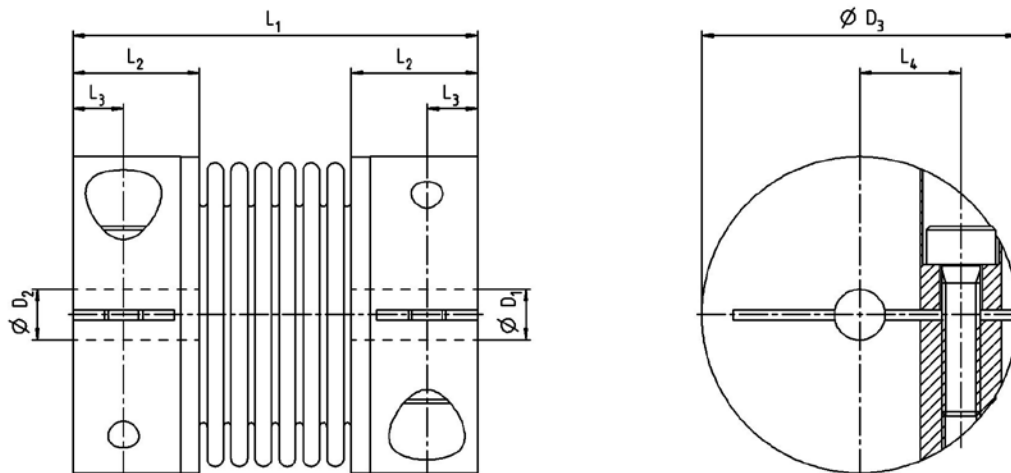
# BCL Metal bellows coupling / Economy

| Size   |           |                       | 2     | 4.5   | 10    | 15    | 30    |
|--|-----------|-----------------------|-------|-------|-------|-------|-------|
| Overall length   |           |                       | A     | A     | A     | A     | A     |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$     | Nm                    | 2     | 4.5   | 10    | 15    | 30    |
|  |           | lbf.in                | 18    | 40    | 89    | 133   | 266   |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$ | Nm                    | 3     | 6.75  | 15    | 22.5  | 45    |
|  |           | lbf.in                | 27    | 60    | 133   | 199   | 398   |
| Max. speed   | $n_{Max}$ | rpm                   | 10000 |       |       |       |       |
| Axial misalignment   | $\pm$     | mm                    | 0.5   | 1     | 1     | 1     | 1     |
|  |           | in                    | 0.02  | 0.039 | 0.039 | 0.039 | 0.039 |
| Angular misalignment   | $\pm$     | $^\circ$              | 1     | 1     | 1     | 1     | 1     |
| Lateral misalignment   | $\pm$     | mm                    | 0.2   | 0.2   | 0.2   | 0.2   | 0.2   |
|  |           | in                    | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 |
| Axial spring rigidity  | $C_a$     | N/mm                  | 8     | 35    | 30    | 30    | 50    |
|  |           | lbf/in                | 46    | 200   | 171   | 171   | 286   |
| Lateral spring rigidity  | $C_l$     | N/mm                  | 50    | 350   | 320   | 315   | 366   |
|  |           | lbf/in                | 286   | 1999  | 1827  | 1799  | 2090  |
| Torsional rigidity   | $C_T$     | Nm/arcmin             | 0.44  | 2     | 2.6   | 6.7   | 9     |
|  |           | lbf.in/arcmin         | 3.9   | 18    | 23    | 59    | 80    |
| Mass moment of inertia   | J         | kgcm <sup>2</sup>     | 0.02  | 0.07  | 0.16  | 0.65  | 1.2   |
|  |           | lbf.in.s <sup>2</sup> | 0.02  | 0.06  | 0.14  | 0.58  | 1.1   |
| Weight   | m         | kg                    | 0.02  | 0.05  | 0.06  | 0.16  | 0.25  |
|  |           | lb                    | 0.04  | 0.11  | 0.13  | 0.35  | 0.55  |

## Dimensions

|   |       |    |            |             |             |            |            |
|---|-------|----|------------|-------------|-------------|------------|------------|
| Total length<br>(Tolerance -2)                        | $L_1$ | mm | 32         | 40          | 44          | 58         | 68         |
|   |       | in | 1.3        | 1.6         | 1.7         | 2.3        | 2.7        |
| Fitting length  | $L_2$ | mm | 10         | 13          | 13          | 21.5       | 26         |
|   |       | in | 0.39       | 0.51        | 0.51        | 0.85       | 1          |
| Distance  | $L_3$ | mm | 4          | 5           | 5           | 6.5        | 7.5        |
|   |       | in | 0.16       | 0.2         | 0.2         | 0.26       | 0.3        |
| Centre distance                                       | $L_4$ | mm | 8          | 11          | 14.5        | 17.5       | 20         |
|   |       | in | 0.31       | 0.43        | 0.57        | 0.69       | 0.79       |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 4 - 12.7   | 6 - 16      | 6 - 24      | 8 - 28     | 10 - 32    |
|   |       | in | 0.16 - 0.5 | 0.24 - 0.63 | 0.24 - 0.94 | 0.31 - 1.1 | 0.39 - 1.3 |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 4 - 12.7   | 6 - 16      | 6 - 24      | 8 - 28     | 10 - 32    |
|   |       | in | 0.16 - 0.5 | 0.24 - 0.63 | 0.24 - 0.94 | 0.31 - 1.1 | 0.39 - 1.3 |
| Outer diameter hub                                    | $D_3$ | mm | 25         | 32          | 40          | 49         | 56         |
|   |       | in | 0.98       | 1.3         | 1.6         | 1.9        | 2.2        |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).





| Size   |           |                       | 60    | 80    | 150   | 300   | 500   |
|--|-----------|-----------------------|-------|-------|-------|-------|-------|
| Overall length   |           |                       | A     | A     | A     | A     | A     |
| Max. acceleration torque<br>(max. 1000 cycles per hour)                                | $T_B$     | Nm                    | 60    | 80    | 150   | 300   | 500   |
|  |           | lbf.in                | 531   | 708   | 1328  | 2655  | 4425  |
| Emergency stop torque<br>(permitted 1000 times during the service life of the gearbox) | $T_{Not}$ | Nm                    | 90    | 120   | 225   | 450   | 750   |
|  |           | lbf.in                | 797   | 1062  | 1991  | 3983  | 6638  |
| Max. speed   | $n_{Max}$ | rpm                   | 10000 |       |       |       |       |
| Axial misalignment   | $\pm$     | mm                    | 1.5   | 2     | 2     | 2     | 2.5   |
|  |           | in                    | 0.059 | 0.079 | 0.079 | 0.079 | 0.098 |
| Angular misalignment   | $\pm$     | $^\circ$              | 1     | 1     | 1     | 1     | 1     |
| Lateral misalignment   | $\pm$     | mm                    | 0.2   | 0.2   | 0.2   | 0.2   | 0.2   |
|  |           | in                    | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 |
| Axial spring rigidity  | $C_a$     | N/mm                  | 67    | 44    | 77    | 112   | 72    |
|  |           | lbf/in                | 383   | 251   | 440   | 640   | 411   |
| Lateral spring rigidity  | $C_l$     | N/mm                  | 679   | 590   | 960   | 2940  | 1450  |
|  |           | lbf/in                | 3877  | 3369  | 5482  | 16787 | 8280  |
| Torsional rigidity   | $C_T$     | Nm/arcmin             | 21    | 23.3  | 41    | 45.7  | 84.4  |
|  |           | lbf.in/arcmin         | 186   | 206   | 363   | 404   | 747   |
| Mass moment of inertia   | J         | kgcm <sup>2</sup>     | 3     | 7.5   | 18    | 75    | 117   |
|  |           | lbf.in.s <sup>2</sup> | 2.7   | 6.6   | 16    | 66    | 104   |
| Weight   | m         | kg                    | 0.4   | 0.7   | 1.7   | 3.8   | 4.9   |
|  |           | lb                    | 0.88  | 1.5   | 3.7   | 8.4   | 11    |

#### Dimensions

|   |       |    |            |            |            |            |           |
|---|-------|----|------------|------------|------------|------------|-----------|
| Total length<br>(Tolerance -2)                        | $L_1$ | mm | 79         | 92         | 92         | 108        | 114       |
|   |       | in | 3.1        | 3.6        | 3.6        | 4.3        | 4.5       |
| Fitting length  | $L_2$ | mm | 28         | 32.5       | 32.5       | 41         | 41.5      |
|   |       | in | 1.1        | 1.3        | 1.3        | 1.6        | 1.6       |
| Distance  | $L_3$ | mm | 9.5        | 11         | 11         | 13.5       | 17        |
|   |       | in | 0.37       | 0.43       | 0.43       | 0.53       | 0.67      |
| Centre distance                                       | $L_4$ | mm | 23         | 27         | 27         | 39         | 41        |
|   |       | in | 0.91       | 1.1        | 1.1        | 1.5        | 1.6       |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 14 - 35    | 16 - 42    | 19 - 42    | 24 - 60    | 35 - 62   |
|   |       | in | 0.55 - 1.4 | 0.63 - 1.7 | 0.75 - 1.7 | 0.94 - 2.4 | 1.4 - 2.4 |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 14 - 35    | 16 - 42    | 19 - 42    | 24 - 60    | 35 - 62   |
|   |       | in | 0.55 - 1.4 | 0.63 - 1.7 | 0.75 - 1.7 | 0.94 - 2.4 | 1.4 - 2.4 |
| Outer diameter hub                                    | $D_3$ | mm | 66         | 82         | 82         | 110        | 123       |
|   |       | in | 2.6        | 3.2        | 3.2        | 4.3        | 4.8       |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

## Metal bellows coupling BCL



For the ordering code, please refer to p 80

# Torque limiters

## **Torque limiters with integrated switching mechanism combine the dynamic and precise transmission with torque limitation.**

Torque limiters are mainly backlash-, wear- and maintenance-free. They are positioned directly in the interface between the drive and output side. In the event of overload, they react quickly to separate the interfaces and protect the machines against damage.

Depending on the requirements, different re-engagement designs are used for torque limiters. Please note, the functional systems presented below only re-engage during a standstill or with very low rotational speeds and after a reduction in the overload. Variable shaft connections are available as special versions.

### PRODUCT HIGHLIGHTS

#### **Compact and completely backlash-free**

thanks to accurately manufactured components.

#### **Ideal utilization of the entire system**

thanks to the maintenance-free and accurate torque limitation.

#### **Fast shut-off within milliseconds**

due to the use of high-performance positioning springs.



|     | Bellows material               | Hub material                                     | Permitted temperature range                    |
|-----|--------------------------------|--|--|
| TL1 | -                              | Size 1.5 to 10: Aluminum; size 15 to 2500: Steel | -30 to +120° C                                 |
| TL2 | Highly elastic stainless steel | High-strength aluminum, as of size 150: Steel    | -30 to +100° C, as of size 800: -30 to +300° C |
| TL3 | Highly elastic stainless steel | Steel  | -30 to +100° C, as of size 800: -30 to +300° C |

## Selectable functions – re-engagement after overload has been secured

### Single position re-engagement (W) (standard)



- Re-engagement after exactly 360°
- Guaranteed synchrony
- Switch signal in the event of overload\*

#### Application:

- Packaging machines
- Machine tools
- Automation systems

### Multi-position (D)



- Re-engagement after exactly 60° (standard)
- Optionally after 30, 45, 60, 90, 120°
- System is immediately available again
- Switch signal in the event of overload\*

#### Application:

- Packaging machines
- Machine tools
- Automation systems

### Full disengagement (F)



- Permanent separation of drive and output
- Free deceleration of centrifugal masses
- Manual re-engagement (every 60°)
- Switch signal in the event of overload\*

#### Application:

- Applications with extremely high speeds and kinetic energy

### Blocked version (G)



- None and/or limited separation of drive and output
- Only slow rotation possible during overload
- Re-engagement after torque drop
- Guaranteed load safety
- Switch signal in the event of overload\*

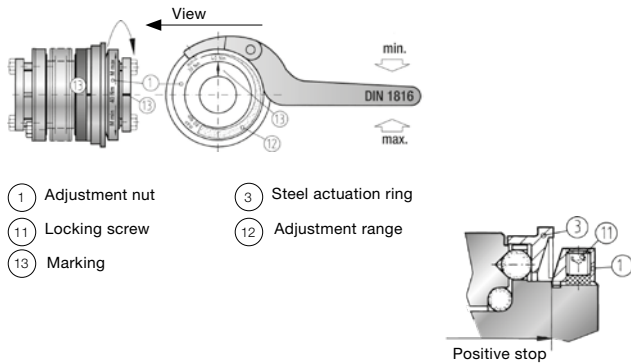
#### Application:

- Ideal for vertical axles, such as presses or load lifting equipment

\* For suitable switches, see 44

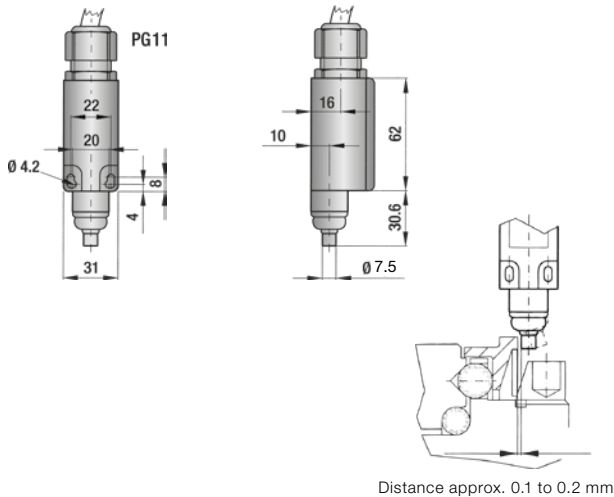
# Accessories for TL – torque limiters

WITTENSTEIN alpha torque limiters are factory adjusted to your specified disengagement torque. Thanks to the installed disc springs with special degressive spring characteristics, it is also possible to adjust the preset disengagement torque using a cant dog key.



## Torque adjusting wrench for DIN 1816 nuts

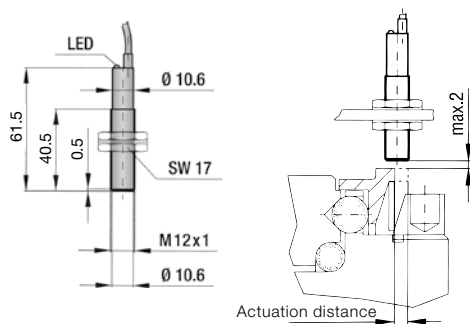
Smaller coupling sizes do not require the use of a cant dog key. The adjusting nut for the 1.5/2/4.5/10 series can be adjusted with a stud or pin.



## Mechanical end switch (EMERGENCY STOP function)

Caution:  
The switch function must always be checked 100% after the assembly in every instance.

The actuation tappet should be positioned as close as possible to the actuation ring of the torque limiter (approx. 0.1 – 0.2 mm).

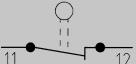


## Proximity switch (EMERGENCY STOP function)

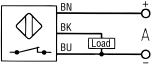
Caution:  
The switch function must always be checked by 100% after the assembly in any case.

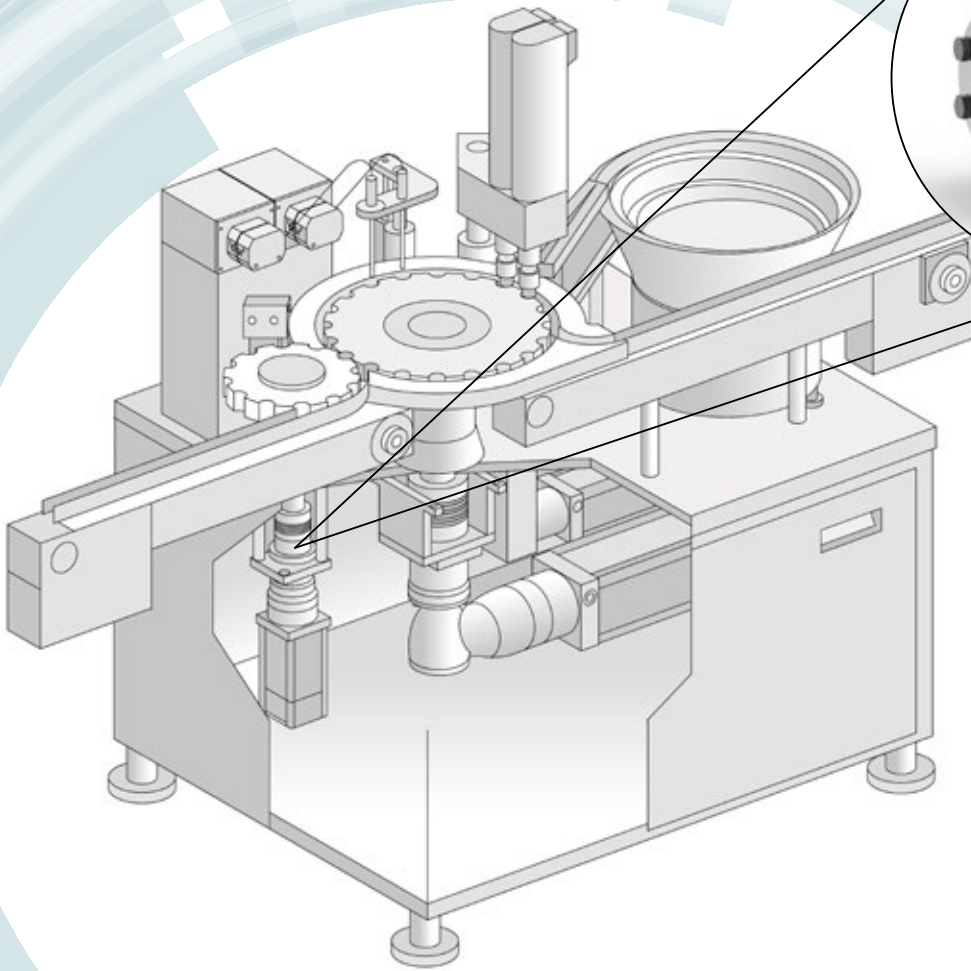
| Torque adjusting wrench |             |   |          |
|-------------------------|-------------|---|----------|
| Size                    | Designation | Material number according to the function systems |          |
|                         |             | W, D, G*  | F*       |
| 15                      | GHS 15      | 20047730  | 20047730 |
| 30                      | GHS 30      | 20047731  | 20047731 |
| 60                      | GHS 60      | 20047732  | 20047732 |
| 80                      | GHS 80      | 20047733  | 20047733 |
| 150                     | GHS 150     | 20047733  | 20047733 |
| 200                     | GHS 200     | 20047734  | 20047750 |
| 300                     | GHS 300     | 20047735  | 20047735 |
| 500                     | GHS 500     | 20047736  | 20047736 |
| 800                     | GHS 800     | 20047737  | 20047751 |
| 1500                    | GHS 1500    | 20047738  | 20047738 |
| 2500                    | GHS 2500    | 20047739  | 20047752 |

\* Function systems: Single position (W), re-engaging (D), blocked (G), full disengagement (F)

| Technical data        | ME TL<br>Material number: 20022999  |
|-----------------------|---|
| Max. voltage          | 500 V AC  |
| Max. constant current | 10 A  |
| Protection class      | IP 65   |
| Contact type          | NC contact (positive opening)   |
| Ambient temperature   | -30 °C to +80 °C  |
| Actuation             | Tappet (metal)  |
| Circuit symbol        |  |

The mechanical limit switch is suitable for size 30 and above.

| Technical data           | NAS TL<br>Material number: 20022998   |
|--------------------------|---|
| Voltage range            | 10 to 30 V DC   |
| Max. output current      | 200 mA  |
| Max. switching frequency | 800 Hz  |
| Temperature range        | -25 °C to +70 °C  |
| Protection class         | IP 67   |
| Switch type              | PNP NC contact  |
| Detection gap            | max. 2 mm   |
| Circuit symbol           |  |



## Function

The **filling and closing machine** is used for quick and automatic filling of e.g. liquid pharmaceutical products and the subsequent secure closure of the containers.

Torque limiters protect the system against major damage in the event of malfunctions since they can be placed directly at the axis and are triggered within milliseconds. Therefore, more complex monitoring systems are obsolete.

The torque limiter can transmit the error message directly to the control unit by means of a sensor. They fulfill their tasks in a backlash-, wear- and maintenance-free manner and are thus a cost-efficient alternative to more complex control concepts.



# Application

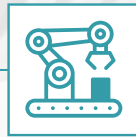
## Example applications



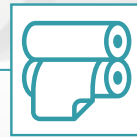
Machine tools



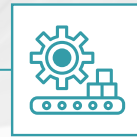
Servo drive technology



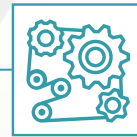
Automation



Printing presses



Packaging machines



General mechanical engineering



## Benefits

Extremely high machine availability and dynamics thanks to the quickly reacting feedback in the event of error messages.

Low maintenance effort thanks to maintenance-free torque limiters.

Protection against machine damage due to overload.

## Properties

Torsional rigidity and backlash-free design analogously to the metal bellows couplings.

Fast shut-off within milliseconds through the use of high-performance positioning springs.

Accurate torque limitation through simple re-adjustment of the setting ring at the application axis.

## Compensation of misalignments due to assembly



Axial



Angular



Lateral

# TL1 - Torque limiter / for belt pulley

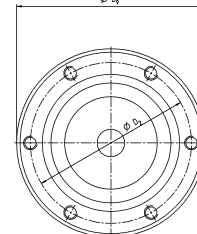
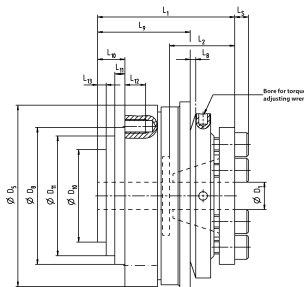
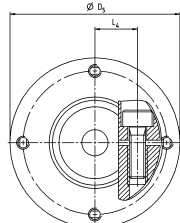
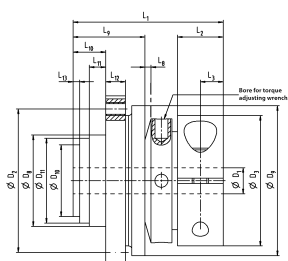
| Size  |                  |                       | 1.5         | 2          | 4.5        | 10          | 15          | 30          | 60          | 150         |            |
|---|------------------|-----------------------|-------------|------------|------------|-------------|-------------|-------------|-------------|-------------|------------|
| Overall length  |                  |                       | A           | A          | A          | A           | A           | A           | A           | A           |            |
| Release torque<br>(Adjustable)                        | A                | T <sub>Dis</sub>      | Nm          | 0.1 - 0.6  | 0.2 - 1.5  | 1 - 3       | 2 - 6       | 5 - 15      | 5 - 20      | 10 - 30     | 20 - 70    |
|   |                  |                       | lbf.in      | 0.89 - 5.3 | 1.8 - 13   | 8.9 - 27    | 18 - 53     | 44 - 133    | 44 - 177    | 89 - 266    | 177 - 620  |
|   |                  |                       | Nm          | 0.4 - 1    | 0.5 - 2.2  | 2 - 4.5     | 4 - 12      | 12 - 25     | 10 - 30     | 25 - 80     | 45 - 150   |
|   |                  |                       | lbf.in      | 3.5 - 8.9  | 4.4 - 19   | 18 - 40     | 35 - 106    | 106 - 221   | 89 - 266    | 221 - 708   | 398 - 1328 |
|   | B                |                       | Nm          | 0.8 - 2    | 1.5 - 3.5  | 3 - 7       | 7 - 18      | 20 - 40     | 20 - 60     | 50 - 115    | 80 - 225   |
|   |                  |                       | lbf.in      | 7.1 - 18   | 13 - 31    | 27 - 62     | 62 - 159    | 177 - 354   | 177 - 531   | 443 - 1018  | 708 - 1991 |
|   |                  |                       | Nm          | -          | -          | -           | -           | 35 - 70     | 50 - 100    | -           | -          |
|   |                  |                       | lbf.in      | -          | -          | -           | -           | 310 - 620   | 443 - 885   | -           | -          |
| Max. speed  | n <sub>Max</sub> | rpm                   | 3000        |            |            |             |             |             |             | 2000        |            |
|   |                  | N                     | 50          | 100        | 200        | 600         | 1400        | 1800        | 2200        | 3000        |            |
| Max. lateral force<br>(Belt pretension)               | F <sub>R</sub>   | lbf                   | 11          | 22         | 45         | 135         | 315         | 405         | 495         | 674         |            |
|   |                  | mm                    | 3 - 6       | 5 - 8      | 5 - 11     | 6 - 14      | 7 - 17      | 10 - 24     | 10 - 24     | 12 - 24     |            |
| Distance<br>(Relating to the force application point) | S                | mm                    | 0.12 - 0.24 | 0.2 - 0.31 | 0.2 - 0.43 | 0.24 - 0.55 | 0.28 - 0.67 | 0.39 - 0.94 | 0.39 - 0.94 | 0.47 - 0.94 |            |
|   |                  | in                    | 0.12 - 0.24 | 0.2 - 0.31 | 0.2 - 0.43 | 0.24 - 0.55 | 0.28 - 0.67 | 0.39 - 0.94 | 0.39 - 0.94 | 0.47 - 0.94 |            |
| Mass moment of inertia                                | J                | kgcm <sup>2</sup>     | 0.1         | 0.2        | 0.5        | 0.7         | 1.5         | 2.5         | 5           | 16          |            |
|   |                  | lbf.in.s <sup>2</sup> | 0.09        | 0.18       | 0.44       | 0.62        | 1.3         | 2.2         | 4.4         | 14          |            |
| Weight  | m                | kg                    | 0.03        | 0.065      | 0.12       | 0.22        | 0.4         | 0.7         | 1           | 1.3         |            |
|   |                  | lb                    | 0.07        | 0.14       | 0.26       | 0.49        | 0.88        | 1.5         | 2.2         | 2.9         |            |

## Dimensions

|  |                 |    |             |             |            |             |             |             |            |            |
|--|-----------------|----|-------------|-------------|------------|-------------|-------------|-------------|------------|------------|
| Total length<br>(without LS)                         | L <sub>1</sub>  | mm | 23          | 28          | 32         | 39          | 40          | 50          | 54         | 58         |
|  |                 | in | 0.91        | 1.1         | 1.3        | 1.5         | 1.6         | 2           | 2.1        | 2.3        |
| Fitting length                                       | L <sub>2</sub>  | mm | 7           | 8           | 10         | 10.5        | 19          | 21.5        | 27.5       | 32         |
|  |                 | in | 0.28        | 0.31        | 0.39       | 0.41        | 0.75        | 0.85        | 1.1        | 1.3        |
| Distance   | L <sub>3</sub>  | mm | 3.5         | 4           | 5          | 5           | -           | -           | -          | -          |
|  |                 | in | 0.14        | 0.16        | 0.2        | 0.2         | -           | -           | -          | -          |
| Centre distance                                      | L <sub>4</sub>  | mm | 6.5         | 8.5         | 11.5       | 15          | -           | -           | -          | -          |
|  |                 | in | 0.26        | 0.33        | 0.45       | 0.59        | -           | -           | -          | -          |
| Actuation distance                                   | L <sub>8</sub>  | mm | 0.7         | 0.8         | 0.8        | 1.2         | 1.5         | 1.7         | 1.7        | 1.9        |
|  |                 | in | 0.03        | 0.03        | 0.03       | 0.05        | 0.06        | 0.07        | 0.07       | 0.07       |
| Distance   | L <sub>9</sub>  | mm | 11          | 15          | 17         | 22          | 27          | 35          | 37         | 39         |
|  |                 | in | 0.43        | 0.59        | 0.67       | 0.87        | 1.1         | 1.4         | 1.5        | 1.5        |
| Distance   | L <sub>10</sub> | mm | 5           | 6           | 8          | 11          | 8           | 11          | 11         | 12         |
|  |                 | in | 0.2         | 0.24        | 0.31       | 0.43        | 0.31        | 0.43        | 0.43       | 0.47       |
| Centering length<br>(Tolerance ±0,2)                 | L <sub>11</sub> | mm | 2.5         | 3.5         | 5          | 8           | 3           | 5           | 5          | 5          |
|  |                 | in | 0.1         | 0.14        | 0.2        | 0.31        | 0.12        | 0.2         | 0.2        | 0.2        |
| Thread   |                 |    | 4xM2        | 4xM2.5      | 6xM2.5     | 6xM3        | 6xM4        | 6xM5        | 6xM5       | 6xM6       |
| Thread length  | L <sub>12</sub> | mm | 3           | 4           | 4          | 5           | 6           | 8           | 9          | 10         |
|  |                 | in | 0.12        | 0.16        | 0.16       | 0.2         | 0.24        | 0.31        | 0.35       | 0.39       |
| Distance   | L <sub>13</sub> | mm | 1           | 1.3         | 1.5        | 1.5         | 2.5         | 2.5         | 2.5        | 2.5        |
|  |                 | in | 0.04        | 0.05        | 0.06       | 0.06        | 0.1         | 0.1         | 0.1        | 0.1        |
| Screw head length                                    | L <sub>S</sub>  | mm | -           | -           | -          | -           | 4           | 5           | 5          | 6          |
|  |                 | in | 0           | 0           | 0          | 0           | 0.16        | 0.2         | 0.2        | 0.24       |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7) | D <sub>1</sub>  | mm | 4 - 8       | 4 - 12      | 5 - 14     | 6 - 17      | 8 - 22      | 12 - 22     | 12 - 29    | 15 - 37    |
|  |                 | in | 0.16 - 0.31 | 0.16 - 0.47 | 0.2 - 0.55 | 0.24 - 0.68 | 0.31 - 0.87 | 0.47 - 0.87 | 0.47 - 1.1 | 0.59 - 1.5 |
| Pitch circle belt pulley<br>(Tolerance ±0,2)         | D <sub>2</sub>  | mm | 22          | 28          | 35         | 43          | 47          | 54          | 63         | 78         |
|  |                 | in | 0.87        | 1.1         | 1.4        | 1.7         | 1.9         | 2.1         | 2.5        | 3.1        |
| Outer diameter hub                                   | D <sub>3</sub>  | mm | 20          | 25          | 32         | 40          | -           | -           | -          | -          |
|  |                 | in | 0.79        | 0.98        | 1.3        | 1.6         | 0           | 0           | 0          | 0          |
| Outer diameter flange<br>(Tolerance -0,2)            | D <sub>5</sub>  | mm | 26          | 32          | 40         | 50          | 53          | 63          | 72         | 87         |
|  |                 | in | 1           | 1.3         | 1.6        | 2           | 2.1         | 2.5         | 2.8        | 3.4        |
| Centering diameter<br>(Tolerance h7)                 | D <sub>8</sub>  | mm | 14          | 22          | 25         | 34          | 40          | 47          | 55         | 68         |
|  |                 | in | 0.55        | 0.87        | 0.98       | 1.3         | 1.6         | 1.9         | 2.2        | 2.7        |
| Outer diameter actuation ring                        | D <sub>9</sub>  | mm | 23          | 29          | 35         | 45          | 55          | 65          | 73.5       | 92         |
|  |                 | in | 0.91        | 1.1         | 1.4        | 1.8         | 2.2         | 2.6         | 2.9        | 3.6        |
| Diameter<br>(Tolerance h7)                           | D <sub>10</sub> | mm | 11          | 14          | 17         | 24          | 27          | 32          | 39         | 50         |
|  |                 | in | 0.43        | 0.55        | 0.67       | 0.94        | 1.1         | 1.3         | 1.5        | 2          |
| Diameter   | D <sub>11</sub> | mm | 13          | 18          | 21         | 30          | 35          | 42          | 49         | 62         |
|  |                 | in | 0.51        | 0.71        | 0.83       | 1.2         | 1.4         | 1.7         | 1.9        | 2.4        |

TL 1 miniature version (1.5 - 10 series)  
with standard clamping hub

TL 1 standard version (15 - 2500 series)  
with tapered clamping hub



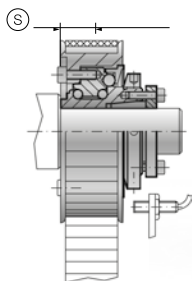


| Size  |   |                  | 200                   | 300         | 500         | 800         | 1500        | 2500         |               |
|---|---|------------------|-----------------------|-------------|-------------|-------------|-------------|--------------|---------------|
| Overall length  |   |                  | A                     | A           | A           | A           | A           | A            |               |
| Release torque<br>(Adjustable)                        | A | T <sub>Dis</sub> | Nm                    | 30 - 90     | 100 - 200   | 80 - 200    | 400 - 650   | 600 - 800    | 1500 - 2000   |
|   |   |                  | lbf.in                | 266 - 797   | 885 - 1770  | 708 - 1770  | 3540 - 5753 | 5310 - 7081  | 13276 - 17702 |
|   | B |                  | Nm                    | 60 - 160    | 150 - 240   | 200 - 350   | 500 - 800   | 700 - 1200   | 2000 - 2500   |
|   |   |                  | lbf.in                | 531 - 1416  | 1328 - 2124 | 1770 - 3098 | 4425 - 7081 | 6196 - 10621 | 17702 - 22127 |
|   | C |                  | Nm                    | 140 - 280   | 220 - 440   | 320 - 650   | 650 - 950   | 1000 - 1800  | 2300 - 2800   |
|   |   |                  | lbf.in                | 1239 - 2478 | 1947 - 3894 | 2832 - 5753 | 5753 - 8408 | 8851 - 15931 | 20357 - 24782 |
|   | D |                  | Nm                    | -           | -           | -           | -           | -            | -             |
|   |   |                  | lbf.in                | -           | -           | -           | -           | -            | -             |
| Max. speed  |   | n <sub>Max</sub> | rpm                   |             |             | 2000        |             |              |               |
| Max. lateral force<br>(Belt pretension)               |   | F <sub>R</sub>   | N                     | 3400        | 4400        | 5600        | 8000        | 10000        | 14000         |
|   |   |                  | lbf                   | 764         | 989         | 1259        | 1798        | 2248         | 3147          |
| Distance<br>(Relating to the force application point) |   | S                | mm                    | 12 - 26     | 12 - 28     | 16 - 38     | 16 - 42     | 20 - 50      | 28 - 60       |
|   |   |                  | in                    | 0.47 - 1    | 0.47 - 1.1  | 0.63 - 1.5  | 0.63 - 1.7  | 0.79 - 2     | 1.1 - 2.4     |
| Mass moment of inertia                                |   | J                | kgcm <sup>2</sup>     | 27          | 52          | 86          | 200         | 315          | 2100          |
|   |   |                  | lbf.in.s <sup>2</sup> | 24          | 46          | 76          | 177         | 279          | 1862          |
| Weight  |   | m                | kg                    | 2           | 3           | 4           | 5.5         | 10           | 28            |
|   |   |                  | lb                    | 4.4         | 6.6         | 8.8         | 12          | 22           | 62            |

**Dimensions**

|  |                 |    |            |            |            |           |           |          |
|--|-----------------|----|------------|------------|------------|-----------|-----------|----------|
| Total length<br>(without LS)                         | L <sub>1</sub>  | mm | 63         | 70         | 84         | 95        | 109       | 146      |
|  |                 | in | 2.5        | 2.8        | 3.3        | 3.7       | 4.3       | 5.7      |
| Fitting length                                       | L <sub>2</sub>  | mm | 32         | 41.5       | 41.5       | 49        | 61        | 80.5     |
|  |                 | in | 1.3        | 1.6        | 1.6        | 1.9       | 2.4       | 3.2      |
| Distance   | L <sub>3</sub>  | mm | -          | -          | -          | -         | -         | -        |
|  |                 | in | -          | -          | -          | -         | -         | -        |
| Centre distance                                      | L <sub>4</sub>  | mm | -          | -          | -          | -         | -         | -        |
|  |                 | in | -          | -          | -          | -         | -         | -        |
| Actuation distance                                   | L <sub>8</sub>  | mm | 2.2        | 2.2        | 2.2        | 2.2       | 3         | 3        |
|  |                 | in | 0.09       | 0.09       | 0.09       | 0.09      | 0.12      | 0.12     |
| Distance   | L <sub>9</sub>  | mm | 44         | 47         | 59         | 67        | 82        | 112      |
|  |                 | in | 1.7        | 1.9        | 2.3        | 2.6       | 3.2       | 4.4      |
| Distance   | L <sub>10</sub> | mm | 12         | 15         | 21         | 19        | 25        | 34       |
|  |                 | in | 0.47       | 0.59       | 0.83       | 0.75      | 0.98      | 1.3      |
| Centering length<br>(Tolerance -0,2)                 | L <sub>11</sub> | mm | 5          | 6          | 9          | 10        | 13.5      | 20       |
|  |                 | in | 0.2        | 0.24       | 0.35       | 0.39      | 0.53      | 0.79     |
| Thread   |                 |    | 6xM6       | 6xM8       | 6xM8       | 6xM10     | 6xM12     | 6xM16    |
| Thread length  | L <sub>12</sub> | mm | 10         | 10         | 12         | 15        | 16        | 24       |
|  |                 | in | 0.39       | 0.39       | 0.47       | 0.59      | 0.63      | 0.94     |
| Distance   | L <sub>13</sub> | mm | 3          | 3          | 4          | 4         | 4.5       | 6        |
|  |                 | in | 0.12       | 0.12       | 0.16       | 0.16      | 0.18      | 0.24     |
| Screw head length                                    | L <sub>S</sub>  | mm | 6          | 8          | 8          | 10        | 12        | 16       |
|  |                 | in | 0.24       | 0.31       | 0.31       | 0.39      | 0.47      | 0.63     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7) | D <sub>1</sub>  | mm | 20 - 44    | 25 - 56    | 25 - 56    | 30 - 60   | 35 - 70   | 50 - 100 |
|  |                 | in | 0.79 - 1.7 | 0.98 - 2.2 | 0.98 - 2.2 | 1.2 - 2.4 | 1.4 - 2.8 | 2 - 3.9  |
| Pitch circle belt pulley<br>(Tolerance ±0,2)         | D <sub>2</sub>  | mm | 85         | 98         | 110        | 120       | 148       | 202      |
|  |                 | in | 3.3        | 3.9        | 4.3        | 4.7       | 5.8       | 8        |
| Outer diameter hub                                   | D <sub>3</sub>  | mm | -          | -          | -          | -         | -         | -        |
|  |                 | in | 0          | 0          | 0          | 0         | 0         | 0        |
| Outer diameter flange<br>(Tolerance -0,2)            | D <sub>5</sub>  | mm | 98         | 112        | 128        | 140       | 165       | 240      |
|  |                 | in | 3.9        | 4.4        | 5          | 5.5       | 6.5       | 9.4      |
| Centering diameter<br>(Tolerance h7)                 | D <sub>8</sub>  | mm | 75         | 82         | 90         | 100       | 125       | 168      |
|  |                 | in | 3          | 3.2        | 3.5        | 3.9       | 4.9       | 6.6      |
| Outer diameter actuation ring                        | D <sub>9</sub>  | mm | 99         | 120.5      | 135        | 152.5     | 174       | 243      |
|  |                 | in | 3.9        | 4.7        | 5.3        | 6         | 6.9       | 9.6      |
| Diameter<br>(Tolerance h7)                           | D <sub>10</sub> | mm | 55         | 65         | 72         | 75        | 92        | 128      |
|  |                 | in | 2.2        | 2.6        | 2.8        | 3         | 3.6       | 5        |
| Diameter   | D <sub>11</sub> | mm | 67         | 75         | 84         | 91        | 112       | 152      |
|  |                 | in | 2.6        | 3          | 3.3        | 3.6       | 4.4       | 6        |

**Torque limiter TL1**



d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

For the ordering code, please refer to p 81

# TL1 - Torque limiter / for belt pulley

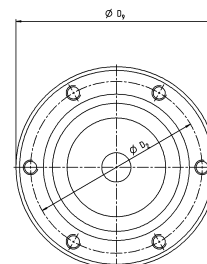
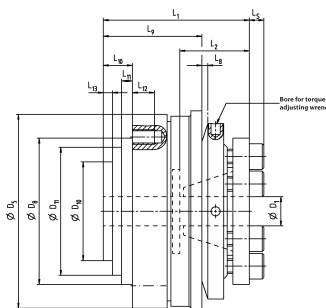
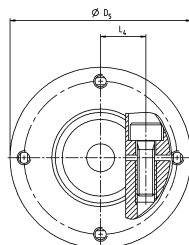
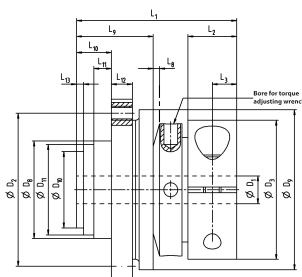
| Size  |        |                  | 1.5              | 2                     | 4.5         | 10         | 15         | 30          | 60          | 150         |             |             |
|---|--------|------------------|------------------|-----------------------|-------------|------------|------------|-------------|-------------|-------------|-------------|-------------|
| Overall length  |        |                  | A                | A                     | A           | A          | A          | A           | A           | A           |             |             |
| Release torque<br>(Adjustable)                        | A      | T <sub>Dis</sub> | Nm               | 0.3 - 0.8             | 0.2 - 1     | 2.5 - 4.5  | 2 - 5      | 7 - 15      | 8 - 20      | 10 - 30     | 20 - 60     |             |
|   |        |                  | lbf.in           | 2.7 - 7.1             | 1.8 - 8.9   | 22 - 40    | 18 - 44    | 62 - 133    | 71 - 177    | 89 - 266    | 177 - 531   |             |
|   | B      |                  | Nm               | 0.6 - 1.3             | 0.7 - 2     | -          | 4 - 10     | -           | 16 - 30     | 20 - 40     | 40 - 80     |             |
|   |        |                  | lbf.in           | 5.3 - 12              | 6.2 - 18    | 0 - 0      | 35 - 89    | 0 - 0       | 142 - 266   | 177 - 354   | 354 - 708   |             |
| C   | Nm     | -                | -                | -                     | 8 - 15      | -          | -          | 30 - 60     | 80 - 150    |             |             |             |
|   | lbf.in | -                | -                | -                     | 71 - 133    | -          | -          | 266 - 531   | 708 - 1328  |             |             |             |
| Max. speed  |        |                  | n <sub>Max</sub> | 3000                  |             |            |            |             |             |             | 2000        |             |
| Max. lateral force<br>(Belt pretension)               |        |                  | F <sub>R</sub>   | N                     | 50          | 100        | 200        | 600         | 1400        | 1800        | 2200        | 3000        |
|   |        |                  |                  | lbf                   | 11          | 22         | 45         | 135         | 315         | 405         | 495         | 674         |
| Distance<br>(Relating to the force application point) |        |                  | S                | mm                    | 3 - 6       | 5 - 8      | 5 - 11     | 6 - 14      | 7 - 17      | 10 - 24     | 10 - 24     | 12 - 24     |
|   |        |                  |                  | in                    | 0.12 - 0.24 | 0.2 - 0.31 | 0.2 - 0.43 | 0.24 - 0.55 | 0.28 - 0.67 | 0.39 - 0.94 | 0.39 - 0.94 | 0.47 - 0.94 |
| Mass moment of inertia                                |        |                  | J                | kgcm <sup>2</sup>     | 0.1         | 0.2        | 0.5        | 0.7         | 1.5         | 2.5         | 5           | 16          |
|   |        |                  |                  | lbf.in.s <sup>2</sup> | 0.09        | 0.18       | 0.44       | 0.62        | 1.3         | 2.2         | 4.4         | 14          |
| Weight  |        |                  | m                | kg                    | 0.03        | 0.065      | 0.12       | 0.22        | 0.4         | 0.7         | 1           | 1.3         |
|   |        |                  |                  | lb                    | 0.07        | 0.14       | 0.26       | 0.49        | 0.88        | 1.5         | 2.2         | 2.9         |

## Dimensions

|  |                 |    |             |             |            |             |             |             |            |            |
|--|-----------------|----|-------------|-------------|------------|-------------|-------------|-------------|------------|------------|
| Total length<br>(Tolerance -2)                       | L <sub>1</sub>  | mm | 23          | 28          | 32         | 39          | 40          | 50          | 54         | 58         |
|  |                 | in | 0.91        | 1.1         | 1.3        | 1.5         | 1.6         | 2           | 2.1        | 2.3        |
| Fitting length                                       | L <sub>2</sub>  | mm | 7           | 8           | 10         | 10.5        | 19          | 21.5        | 27.5       | 32         |
|  |                 | in | 0.28        | 0.31        | 0.39       | 0.41        | 0.75        | 0.85        | 1.1        | 1.3        |
| Distance   | L <sub>3</sub>  | mm | 3.5         | 4           | 5          | 5           | -           | -           | -          | -          |
|  |                 | in | 0.14        | 0.16        | 0.2        | 0.2         | -           | -           | -          | -          |
| Centre distance                                      | L <sub>4</sub>  | mm | 6.5         | 8.5         | 11.5       | 15          | -           | -           | -          | -          |
|  |                 | in | 0.26        | 0.33        | 0.45       | 0.59        | -           | -           | -          | -          |
| Actuation distance                                   | L <sub>8</sub>  | mm | 0.7         | 0.8         | 0.8        | 1.2         | 1.5         | 1.7         | 1.7        | 1.9        |
|  |                 | in | 0.03        | 0.03        | 0.03       | 0.05        | 0.06        | 0.07        | 0.07       | 0.07       |
| Distance   | L <sub>9</sub>  | mm | 11.5        | 16          | 18         | 24          | 27          | 37          | 39         | 41.5       |
|  |                 | in | 0.45        | 0.63        | 0.71       | 0.94        | 1.1         | 1.5         | 1.5        | 1.6        |
| Distance   | L <sub>10</sub> | mm | 5           | 6           | 8          | 11          | 8           | 11          | 11         | 12         |
|  |                 | in | 0.2         | 0.24        | 0.31       | 0.43        | 0.31        | 0.43        | 0.43       | 0.47       |
| Centering length<br>(Tolerance -0,2)                 | L <sub>11</sub> | mm | 2.5         | 3.5         | 5          | 8           | 3           | 5           | 5          | 5          |
|  |                 | in | 0.1         | 0.14        | 0.2        | 0.31        | 0.12        | 0.2         | 0.2        | 0.2        |
| Thread   |                 |    | 4xM2        | 4xM2.5      | 6xM2.5     | 6xM3        | 6xM4        | 6xM5        | 6xM5       | 6xM6       |
| Thread length  | L <sub>12</sub> | mm | 3           | 4           | 4          | 5           | 6           | 8           | 9          | 10         |
|  |                 | in | 0.12        | 0.16        | 0.16       | 0.2         | 0.24        | 0.31        | 0.35       | 0.39       |
| Distance   | L <sub>13</sub> | mm | 1           | 1.3         | 1.5        | 1.5         | 2.5         | 2.5         | 2.5        | 2.5        |
|  |                 | in | 0.04        | 0.05        | 0.06       | 0.06        | 0.1         | 0.1         | 0.1        | 0.1        |
| Screw head length                                    | L <sub>S</sub>  | mm | -           | -           | -          | -           | 4           | 5           | 5          | 6          |
|  |                 | in | 0           | 0           | 0          | 0           | 0.16        | 0.2         | 0.2        | 0.24       |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7) | D <sub>1</sub>  | mm | 4 - 8       | 4 - 12      | 5 - 14     | 6 - 17      | 8 - 22      | 12 - 22     | 12 - 29    | 15 - 37    |
|  |                 | in | 0.16 - 0.31 | 0.16 - 0.47 | 0.2 - 0.55 | 0.24 - 0.68 | 0.31 - 0.87 | 0.47 - 0.87 | 0.47 - 1.1 | 0.59 - 1.5 |
| Pitch circle belt pulley<br>(Tolerance ±0,2)         | D <sub>2</sub>  | mm | 22          | 28          | 35         | 43          | 47          | 54          | 63         | 78         |
|  |                 | in | 0.87        | 1.1         | 1.4        | 1.7         | 1.9         | 2.1         | 2.5        | 3.1        |
| Outer diameter hub                                   | D <sub>3</sub>  | mm | 20          | 25          | 32         | 40          | -           | -           | -          | -          |
|  |                 | in | 0.79        | 0.98        | 1.3        | 1.6         | -           | -           | -          | -          |
| Outer diameter flange<br>(Tolerance -0,2)            | D <sub>5</sub>  | mm | 26          | 32          | 40         | 50          | 53          | 63          | 72         | 87         |
|  |                 | in | 1           | 1.3         | 1.6        | 2           | 2.1         | 2.5         | 2.8        | 3.4        |
| Centering diameter<br>(Tolerance h7)                 | D <sub>8</sub>  | mm | 14          | 22          | 25         | 34          | 40          | 47          | 55         | 68         |
|  |                 | in | 0.55        | 0.87        | 0.98       | 1.3         | 1.6         | 1.9         | 2.2        | 2.7        |
| Outer diameter actuation ring                        | D <sub>9</sub>  | mm | 24          | 32          | 42         | 51.5        | 61.5        | 70          | 83         | 98         |
|  |                 | in | 0.94        | 1.3         | 1.7        | 2           | 2.4         | 2.8         | 3.3        | 3.9        |
| Diameter<br>(Tolerance h7)                           | D <sub>10</sub> | mm | 11          | 14          | 17         | 24          | 27          | 32          | 39         | 50         |
|  |                 | in | 0.43        | 0.55        | 0.67       | 0.94        | 1.1         | 1.3         | 1.5        | 2          |
| Diameter   | D <sub>11</sub> | mm | 13          | 18          | 21         | 30          | 35          | 42          | 49         | 62         |
|  |                 | in | 0.51        | 0.71        | 0.83       | 1.2         | 1.4         | 1.7         | 1.9        | 2.4        |

TL 1 miniature version (1.5 - 10 series)  
with standard clamping hub

TL 1 standard version (15 - 2500 series)  
with tapered clamping hub

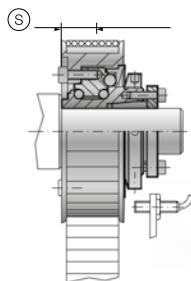


| Size  |   |                  | 200                   | 300         | 500         | 800         | 1500        | 2500          |               |
|---|---|------------------|-----------------------|-------------|-------------|-------------|-------------|---------------|---------------|
| Overall length  |   |                  | A                     | A           | A           | A           | A           | A             |               |
| Release torque<br>(Adjustable)                        | A | T <sub>Dis</sub> | Nm                    | 80 - 140    | 120 - 180   | 50 - 150    | 200 - 400   | 1000 - 1250   | 1400 - 2200   |
|   |   |                  | lbf.in                | 708 - 1239  | 1062 - 1593 | 443 - 1328  | 1770 - 3540 | 8851 - 11064  | 12391 - 19472 |
|   | B |                  | Nm                    | 130 - 200   | 160 - 300   | 100 - 300   | 450 - 850   | 1250 - 1500   | 1800 - 2700   |
|   |   |                  | lbf.in                | 1151 - 1770 | 1416 - 2655 | 885 - 2655  | 3983 - 7523 | 11063 - 13276 | 15931 - 23897 |
|   | C |                  | Nm                    | -           | 300 - 450   | 250 - 500   | -           | -             | -             |
|   |   |                  | lbf.in                | -           | 2655 - 3983 | 2213 - 4425 | -           | -             | -             |
| Max. speed  |   | n <sub>Max</sub> | 2000                  |             |             | 1000        |             |               |               |
| Max. lateral force<br>(Belt pretension)               |   | F <sub>R</sub>   | N                     | 3400        | 4400        | 5600        | 8000        | 10000         | 14000         |
|   |   |                  | lbf                   | 764         | 989         | 1259        | 1798        | 2248          | 3147          |
| Distance<br>(Relating to the force application point) |   | S                | mm                    | 12 - 26     | 12 - 28     | 16 - 38     | 16 - 42     | 20 - 50       | 28 - 60       |
|   |   |                  | in                    | 0.47 - 1    | 0.47 - 1.1  | 0.63 - 1.5  | 0.63 - 1.7  | 0.79 - 2      | 1.1 - 2.4     |
| Mass moment of inertia                                |   | J                | kgcm <sup>2</sup>     | 27          | 52          | 86          | 200         | 315           | 2100          |
|   |   |                  | lbf.in.s <sup>2</sup> | 24          | 46          | 76          | 177         | 279           | 1862          |
| Weight  |   | m                | kg                    | 2           | 3           | 4           | 5.5         | 10            | 28            |
|   |   |                  | lb                    | 4.4         | 6.6         | 8.8         | 12          | 22            | 62            |

## Dimensions

|  |                 |    |            |            |            |           |           |          |
|--|-----------------|----|------------|------------|------------|-----------|-----------|----------|
| Total length<br>(Tolerance -0.2)                     | L <sub>1</sub>  | mm | 66         | 73         | 88         | 95        | 117       | 152      |
|  |                 | in | 2.6        | 2.9        | 3.5        | 3.7       | 4.6       | 6        |
| Fitting length                                       | L <sub>2</sub>  | mm | 32         | 41.5       | 41.5       | 49        | 61        | 80.5     |
|  |                 | in | 1.3        | 1.6        | 1.6        | 1.9       | 2.4       | 3.2      |
| Distance   | L <sub>3</sub>  | mm | -          | -          | -          | -         | -         | -        |
|  |                 | in | -          | -          | -          | -         | -         | -        |
| Centre distance                                      | L <sub>4</sub>  | mm | -          | -          | -          | -         | -         | -        |
|  |                 | in | -          | -          | -          | -         | -         | -        |
| Actuation distance                                   | L <sub>8</sub>  | mm | 2.2        | 2.2        | 2.2        | 2.2       | 3         | 3        |
|  |                 | in | 0.09       | 0.09       | 0.09       | 0.09      | 0.12      | 0.12     |
| Distance   | L <sub>9</sub>  | mm | 47         | 51.5       | 62         | 75        | 94        | 120      |
|  |                 | in | 1.9        | 2          | 2.4        | 3         | 3.7       | 4.7      |
| Distance   | L <sub>10</sub> | mm | 12         | 15         | 21         | 19        | 25        | 34       |
|  |                 | in | 0.47       | 0.59       | 0.83       | 0.75      | 0.98      | 1.3      |
| Centering length<br>(Tolerance -0.2)                 | L <sub>11</sub> | mm | 5          | 6          | 9          | 10        | 13.5      | 20       |
|  |                 | in | 0.2        | 0.24       | 0.35       | 0.39      | 0.53      | 0.79     |
| Thread   |                 |    | 6xM6       | 6xM8       | 6xM8       | 6xM10     | 6xM12     | 6xM16    |
| Thread length  | L <sub>12</sub> | mm | 10         | 10         | 12         | 15        | 16        | 24       |
|  |                 | in | 0.39       | 0.39       | 0.47       | 0.59      | 0.63      | 0.94     |
| Distance   | L <sub>13</sub> | mm | 3          | 3          | 4          | 4         | 4.5       | 6        |
|  |                 | in | 0.12       | 0.12       | 0.16       | 0.16      | 0.18      | 0.24     |
| Screw head length                                    | L <sub>S</sub>  | mm | 6          | 8          | 8          | 10        | 12        | 16       |
|  |                 | in | 0.24       | 0.31       | 0.31       | 0.39      | 0.47      | 0.63     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7) | D <sub>1</sub>  | mm | 20 - 44    | 25 - 56    | 25 - 56    | 30 - 60   | 35 - 70   | 50 - 100 |
|  |                 | in | 0.79 - 1.7 | 0.98 - 2.2 | 0.98 - 2.2 | 1.2 - 2.4 | 1.4 - 2.8 | 2 - 3.9  |
| Pitch circle belt pulley<br>(Tolerance ±0.2)         | D <sub>2</sub>  | mm | 85         | 98         | 110        | 120       | 148       | 202      |
|  |                 | in | 3.3        | 3.9        | 4.3        | 4.7       | 5.8       | 8        |
| Outer diameter hub                                   | D <sub>3</sub>  | mm | -          | -          | -          | -         | -         | -        |
|  |                 | in | -          | -          | -          | -         | -         | -        |
| Outer diameter flange<br>(Tolerance -0.2)            | D <sub>5</sub>  | mm | 98         | 112        | 128        | 140       | 165       | 240      |
|  |                 | in | 3.9        | 4.4        | 5          | 5.5       | 6.5       | 9.4      |
| Centering diameter<br>(Tolerance h7)                 | D <sub>8</sub>  | mm | 75         | 82         | 90         | 100       | 125       | 168      |
|  |                 | in | 3          | 3.2        | 3.5        | 3.9       | 4.9       | 6.6      |
| Outer diameter actuation ring                        | D <sub>9</sub>  | mm | 117        | 132        | 155        | 176       | 187       | 258      |
|  |                 | in | 4.6        | 5.2        | 6.1        | 6.9       | 7.4       | 10       |
| Diameter<br>(Tolerance h7)                           | D <sub>10</sub> | mm | 55         | 65         | 72         | 75        | 92        | 128      |
|  |                 | in | 2.2        | 2.6        | 2.8        | 3         | 3.6       | 5        |
| Diameter   | D <sub>11</sub> | mm | 67         | 75         | 84         | 91        | 112       | 152      |
|  |                 | in | 2.6        | 3          | 3.3        | 3.6       | 4.4       | 6        |

## Torque limiter TL1



For the ordering code, please refer to p 81

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

# TL2 Torque limiter / clamping hub

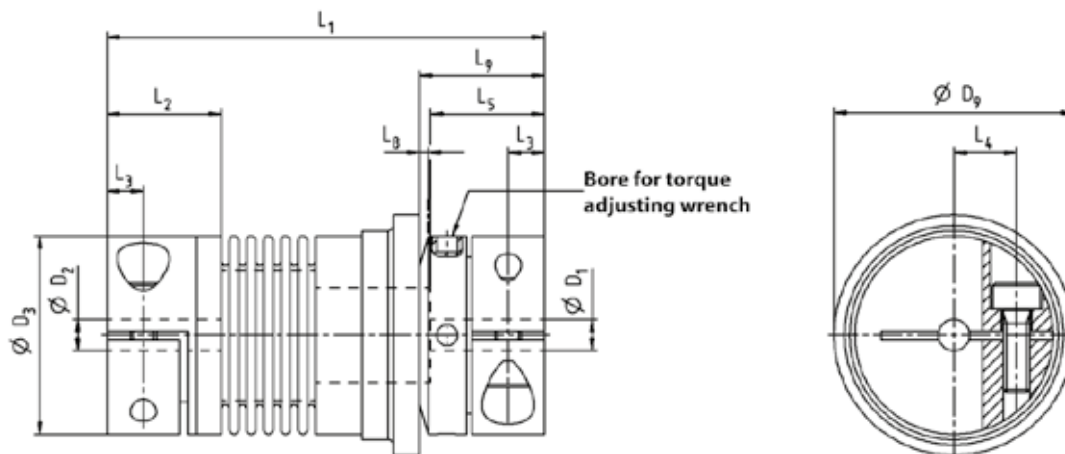
| Size                           |   |           | 1.5                   |            | 2     |           | 4.5   |          | 10    |          | 15    |          | 30    |           | 60    |           |     |
|--------------------------------|---|-----------|-----------------------|------------|-------|-----------|-------|----------|-------|----------|-------|----------|-------|-----------|-------|-----------|-----|
| Overall length                 |   |           | A                     |            | A     | B         | A     | B        | A     | B        | A     | B        | A     | B         | A     | B         |     |
| Release torque<br>(Adjustable) | A | $T_{Dis}$ | Nm                    | 0.1 - 0.6  |       | 0.2 - 1.5 |       | 1 - 3    |       | 2 - 6    |       | 5 - 10   |       | 10 - 25   |       | 10 - 30   |     |
|                                |   |           | lbf.in                | 0.89 - 5.3 |       | 1.8 - 13  |       | 8.9 - 27 |       | 18 - 53  |       | 44 - 89  |       | 89 - 221  |       | 89 - 266  |     |
|                                | B |           | Nm                    | 0.4 - 1    |       | 0.5 - 2   |       | 3 - 6    |       | 4 - 12   |       | 8 - 20   |       | 20 - 40   |       | 25 - 80   |     |
|                                |   |           | lbf.in                | 3.5 - 8.9  |       | 4.4 - 18  |       | 27 - 53  |       | 35 - 106 |       | 71 - 177 |       | 177 - 354 |       | 221 - 708 |     |
|                                | C |           | Nm                    | 0.8 - 1.5  |       | -         |       | -        |       | -        |       | -        |       | -         |       | -         |     |
|                                |   |           | lbf.in                | 7.1 - 13   |       | -         |       | -        |       | -        |       | -        |       | -         |       | -         |     |
| Max. speed                     |   | $n_{Max}$ | rpm                   |            | 3000  |           |       |          |       |          |       |          |       |           |       |           |     |
| Angular misalignment           |   | $\pm$     | °                     |            | 1     | 1         | 1.5   | 1.5      | 2     | 1.5      | 2     | 1        | 1.5   | 1         | 1.5   | 1         | 1.5 |
| Lateral misalignment           |   | $\pm$     | mm                    | 0.15       | 0.15  | 0.2       | 0.2   | 0.25     | 0.2   | 0.3      | 0.15  | 0.2      | 0.2   | 0.25      | 0.2   | 0.25      |     |
|                                |   |           | in                    | 0.006      | 0.006 | 0.008     | 0.008 | 0.01     | 0.008 | 0.012    | 0.006 | 0.008    | 0.008 | 0.01      | 0.008 | 0.01      |     |
| Lateral spring rigidity        |   | $C_l$     | N/mm                  | 70         | 40    | 30        | 290   | 45       | 280   | 145      | 475   | 137      | 900   | 270       | 1200  | 420       |     |
|                                |   |           | lbf/in                | 400        | 228   | 171       | 1656  | 257      | 1599  | 828      | 2712  | 782      | 5139  | 1542      | 6852  | 2398      |     |
| Torsional rigidity             |   | $C_T$     | Nm/arcmin             | 0.2        | 0.35  | 0.38      | 2     | 1.5      | 2.6   | 2.3      | 5.8   | 4.4      | 11.3  | 8.1       | 22.1  | 16        |     |
|                                |   |           | lbf.in/arcmin         | 1.8        | 3.1   | 3.4       | 18    | 13       | 23    | 20       | 51    | 39       | 100   | 72        | 196   | 142       |     |
| Mass moment of inertia         |   | J         | kgcm <sup>2</sup>     | 0.1        | 0.1   | 0.1       | 0.2   | 0.2      | 0.6   | 0.7      | 1     | 1.5      | 2.7   | 3.2       | 7.5   | 8         |     |
|                                |   |           | lbf.in.s <sup>2</sup> | 0.09       | 0.09  | 0.09      | 0.18  | 0.18     | 0.53  | 0.62     | 0.89  | 1.3      | 2.4   | 2.8       | 6.6   | 7.1       |     |
| Weight                         |   | m         | kg                    | 0.047      | 0.07  | 0.2       | 0.3   | 0.4      | 0.6   | 1        | 1.5   | 2.7      | 3.2   | 7.5       | 8     |           |     |
|                                |   |           | lb                    | 0.1        | 0.15  | 0.44      | 0.66  | 0.88     | 1.3   | 2.2      | 3.3   | 4.4      | 7.5   | 8.8       |       |           |     |

## Dimensions

|   |       |    |             |             |             |             |             |             |             |             |            |            |             |             |             |
|---|-------|----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|-------------|-------------|-------------|
| Total length<br>(Tolerance -2)                        | $L_1$ | mm | 42          | 46          | 51          | 57          | 65          | 65          | 75          | 75          | 82         | 87         | 95          | 102         | 112         |
|   |       | in | 1.7         | 1.8         | 2           | 2.2         | 2.6         | 2.6         | 3           | 3           | 3.2        | 3.4        | 3.7         | 4           | 4.4         |
| Fitting length  | $L_2$ | mm | 11          | 13          | 16          | 16          | 16          | 16          | 16          | 22          | 26.5       | 26.5       | 31          | 31          | 31          |
|   |       | in | 0.43        | 0.51        | 0.63        | 0.63        | 0.63        | 0.63        | 0.63        | 0.87        | 1          | 1          | 1.2         | 1.2         | 1.2         |
| Distance  | $L_3$ | mm | 3.5         | 4           | 5           | 5           | 5           | 5           | 5           | 6.5         | 7.5        | 7.5        | 9.5         | 9.5         | 9.5         |
|   |       | in | 0.14        | 0.16        | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.26        | 0.3        | 0.3        | 0.37        | 0.37        | 0.37        |
| Centre distance <sup>b)</sup>                         | $L_4$ | mm | 6.7 / 6     | 8 / 8.5     | 10.3 / 11.5 | 15          | 15          | 15          | 15          | 17.5        | 19         | 19         | 23          | 23          | 23          |
|   |       | in | 0.26 / 0.24 | 0.31 / 0.33 | 0.41 / 0.45 | 0.59        | 0.59        | 0.59        | 0.59        | 0.69        | 0.75       | 0.75       | 0.91        | 0.91        | 0.91        |
| Fitting length  | $L_5$ | mm | 11          | 13          | 16          | 16          | 16          | 16          | 16          | 21.5        | 26.5       | 26.5       | 31.5        | 31.5        | 31.5        |
|   |       | in | 0.43        | 0.51        | 0.63        | 0.63        | 0.63        | 0.63        | 0.63        | 0.85        | 1          | 1          | 1.2         | 1.2         | 1.2         |
| Actuation distance                                    | $L_8$ | mm | 0.7         | 0.8         | 0.8         | 1.2         | 1.2         | 1.2         | 1.2         | 1.5         | 1.5        | 1.5        | 1.7         | 1.7         | 1.7         |
|   |       | in | 0.03        | 0.03        | 0.03        | 0.05        | 0.05        | 0.05        | 0.05        | 0.06        | 0.06       | 0.06       | 0.07        | 0.07        | 0.07        |
| Distance  | $L_9$ | mm | 12          | 13          | 15          | 15          | 15          | 17          | 17          | 19          | 24         | 24         | 28          | 28          | 28          |
|   |       | in | 0.47        | 0.51        | 0.59        | 0.59        | 0.59        | 0.67        | 0.67        | 0.75        | 0.94       | 0.94       | 1.1         | 1.1         | 1.1         |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 3 - 8       | 4 - 12      | 5 - 14      | 6 - 17      | 6 - 17      | 6 - 17      | 6 - 17      | 10 - 26     | 12 - 30    | 12 - 30    | 15 - 32     | 15 - 32     | 15 - 32     |
|   |       | in | 0.12 - 0.31 | 0.16 - 0.47 | 0.2 - 0.55  | 0.24 - 0.68 | 0.24 - 0.68 | 0.24 - 0.68 | 0.24 - 0.68 | 0.39 - 1    | 0.47 - 1.2 | 0.47 - 1.2 | 0.59 - 1.3  | 0.59 - 1.3  | 0.59 - 1.3  |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 3 - 8       | 4 - 12.7    | 5 - 16      | 6 - 24      | 6 - 24      | 6 - 24      | 6 - 24      | 10 - 28     | 12 - 30    | 12 - 30    | 15 - 35     | 15 - 35     | 15 - 35     |
|   |       | in | 0.12 - 0.31 | 0.16 - 0.5  | 0.2 - 0.63  | 0.24 - 0.94 | 0.24 - 0.94 | 0.24 - 0.94 | 0.24 - 0.94 | 0.39 - 1.08 | 0.47 - 1.2 | 0.47 - 1.2 | 0.59 - 1.42 | 0.59 - 1.42 | 0.59 - 1.42 |
| Outer diameter hub                                    | $D_3$ | mm | 19          | 25          | 32          | 40          | 40          | 40          | 40          | 49          | 55         | 55         | 66          | 66          | 66          |
|   |       | in | 0.75        | 0.98        | 1.3         | 1.6         | 1.6         | 1.6         | 1.6         | 1.9         | 2.2        | 2.2        | 2.6         | 2.6         | 2.6         |
| Outer diameter actuation ring                         | $D_9$ | mm | 23          | 29          | 35          | 45          | 45          | 45          | 45          | 55          | 65         | 65         | 73          | 73          | 73          |
|   |       | in | 0.91        | 1.1         | 1.4         | 1.8         | 1.8         | 1.8         | 1.8         | 2.2         | 2.6        | 2.6        | 2.9         | 2.9         | 2.9         |

b) Valid up to size 4.5, two different values for output/input.

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size                           |   |                  | 80               |           | 150                   |             | 200         |             | 300         |              | 500   |   | 800   | 1500 |
|--------------------------------|---|------------------|------------------|-----------|-----------------------|-------------|-------------|-------------|-------------|--------------|-------|---|-------|------|
| Overall length                 |   |                  | A                | B         | A                     | B           | A           | B           | A           | B            | A     | B | A     | A    |
| Release torque<br>(Adjustable) | A | T <sub>Dis</sub> | Nm               | 20 - 70   | 20 - 70               | 30 - 90     | 100 - 200   | 80 - 200    | 400 - 650   | 650 - 800    |       |   |       |      |
|                                |   |                  | lbf.in           | 177 - 620 | 177 - 620             | 266 - 797   | 885 - 1770  | 708 - 1770  | 3540 - 5753 | 5753 - 7081  |       |   |       |      |
|                                | B |                  | Nm               | 30 - 90   | 45 - 150              | 60 - 160    | 150 - 240   | 200 - 350   | 500 - 800   | 700 - 1200   |       |   |       |      |
|                                |   |                  | lbf.in           | 266 - 797 | 398 - 1328            | 531 - 1416  | 1328 - 2124 | 1770 - 3098 | 4425 - 7081 | 6196 - 10621 |       |   |       |      |
|                                | C |                  | Nm               | -         | 80 - 180              | 120 - 240   | 200 - 320   | 300 - 500   | 650 - 850   | 1000 - 1800  |       |   |       |      |
|                                |   |                  | lbf.in           | -         | 708 - 1593            | 1062 - 2124 | 1770 - 2832 | 2655 - 4425 | 5753 - 7523 | 8851 - 15931 |       |   |       |      |
| Max. speed                     |   |                  | n <sub>Max</sub> |           | rpm                   |             |             |             |             |              | 2000  |   | 1000  |      |
| Angular misalignment           |   |                  | ±                |           | °                     |             | 1           |             | 1.5         |              | 2     |   | 2.5   |      |
| Lateral misalignment           |   |                  | ±                |           | mm                    |             | 0.2         |             | 0.25        |              | 0.3   |   | 0.35  |      |
|                                |   |                  |                  |           | in                    |             | 0.008       |             | 0.01        |              | 0.012 |   | 0.014 |      |
| Lateral spring rigidity        |   |                  | C <sub>I</sub>   |           | N/mm                  |             | 920         |             | 255         |              | 1550  |   | 435   |      |
|                                |   |                  |                  |           | lbf/in                |             | 5253        |             | 1456        |              | 8851  |   | 2484  |      |
| Torsional rigidity             |   |                  | C <sub>T</sub>   |           | Nm/arcmin             |             | 37.5        |             | 24.7        |              | 50.9  |   | 32    |      |
|                                |   |                  |                  |           | lbf.in/arcmin         |             | 332         |             | 219         |              | 451   |   | 283   |      |
| Mass moment of inertia         |   |                  | J                |           | kgcm <sup>2</sup>     |             | 18          |             | 19          |              | 25    |   | 28    |      |
|                                |   |                  |                  |           | lbf.in.s <sup>2</sup> |             | 16          |             | 17          |              | 22    |   | 25    |      |
| Weight                         |   |                  | m                |           | kg                    |             | 2           |             | 2.4         |              | 4     |   | 5.9   |      |
|                                |   |                  |                  |           | lb                    |             | 4.4         |             | 5.3         |              | 8.8   |   | 13    |      |

**Dimensions**

|   |                |    |            |            |            |           |           |         |         |     |     |     |     |     |
|---|----------------|----|------------|------------|------------|-----------|-----------|---------|---------|-----|-----|-----|-----|-----|
| Total length<br>(Tolerance -2)                        | L <sub>1</sub> | mm | 115        | 127        | 116        | 128       | 128       | 140     | 139     | 153 | 163 | 177 | 190 | 223 |
|   |                | in | 4.5        | 5          | 4.6        | 5         | 5         | 5.5     | 5.5     | 6   | 6.4 | 7   | 7.5 | 8.8 |
| Fitting length  | L <sub>2</sub> | mm | 35.5       | 35.5       | 40.5       | 42.5      | 50.5      | 48      | 55.5    |     |     |     |     |     |
|   |                | in | 1.4        | 1.4        | 1.6        | 1.7       | 2         | 1.9     | 2.2     |     |     |     |     |     |
| Distance  | L <sub>3</sub> | mm | 11         | 11         | 12.5       | 13        | 16.5      | 17.5    | 22.5    |     |     |     |     |     |
|   |                | in | 0.43       | 0.43       | 0.49       | 0.51      | 0.65      | 0.69    | 0.89    |     |     |     |     |     |
| Centre distance <sup>d)</sup>                         | L <sub>4</sub> | mm | 27         | 27         | 30.5       | 39        | 41        | 2 x 48  | 2 x 55  |     |     |     |     |     |
|   |                | in | 1.1        | 1.1        | 1.2        | 1.5       | 1.6       | 2 x 1.9 | 2 x 2.2 |     |     |     |     |     |
| Fitting length  | L <sub>5</sub> | mm | 35         | 35         | 42         | 42        | 52.5      | 48      | 67      |     |     |     |     |     |
|   |                | in | 1.4        | 1.4        | 1.7        | 1.7       | 2.1       | 1.9     | 2.6     |     |     |     |     |     |
| Actuation distance                                    | L <sub>8</sub> | mm | 1.9        | 1.9        | 2.2        | 2.2       | 2.2       | 2.2     | 3       |     |     |     |     |     |
|   |                | in | 0.07       | 0.07       | 0.09       | 0.09      | 0.09      | 0.09    | 0.12    |     |     |     |     |     |
| Distance  | L <sub>9</sub> | mm | 31         | 31         | 35         | 35        | 45        | 50      | 63      |     |     |     |     |     |
|   |                | in | 1.2        | 1.2        | 1.4        | 1.4       | 1.8       | 2       | 2.5     |     |     |     |     |     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | D <sub>1</sub> | mm | 19 - 42    | 19 - 42    | 24 - 45    | 30 - 60   | 35 - 60   | 40 - 75 | 50 - 80 |     |     |     |     |     |
|   |                | in | 0.75 - 1.7 | 0.75 - 1.7 | 0.94 - 1.8 | 1.2 - 2.4 | 1.4 - 2.4 | 1.6 - 3 | 2 - 3.1 |     |     |     |     |     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | D <sub>2</sub> | mm | 19 - 42    | 19 - 42    | 24 - 45    | 30 - 60   | 35 - 60   | 40 - 75 | 50 - 80 |     |     |     |     |     |
|   |                | in | 0.75 - 1.7 | 0.75 - 1.7 | 0.94 - 1.8 | 1.2 - 2.4 | 1.4 - 2.4 | 1.6 - 3 | 2 - 3.1 |     |     |     |     |     |
| Outer diameter hub                                    | D <sub>3</sub> | mm | 81         | 81         | 90         | 110       | 123       | 134     | 157     |     |     |     |     |     |
|   |                | in | 3.2        | 3.2        | 3.5        | 4.3       | 4.8       | 5.3     | 6.2     |     |     |     |     |     |
| Outer diameter actuation ring                         | D <sub>9</sub> | mm | 92         | 92         | 99         | 120.5     | 135       | 152.5   | 174     |     |     |     |     |     |
|   |                | in | 3.6        | 3.6        | 3.9        | 4.7       | 5.3       | 6       | 6.9     |     |     |     |     |     |

- a) Starting at size 800, two screws per clamping hub offset by 180°.
- d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

**Torque limiter TL2**



For the ordering code, please refer to p 81

# TL2 Torque limiter / clamping hub

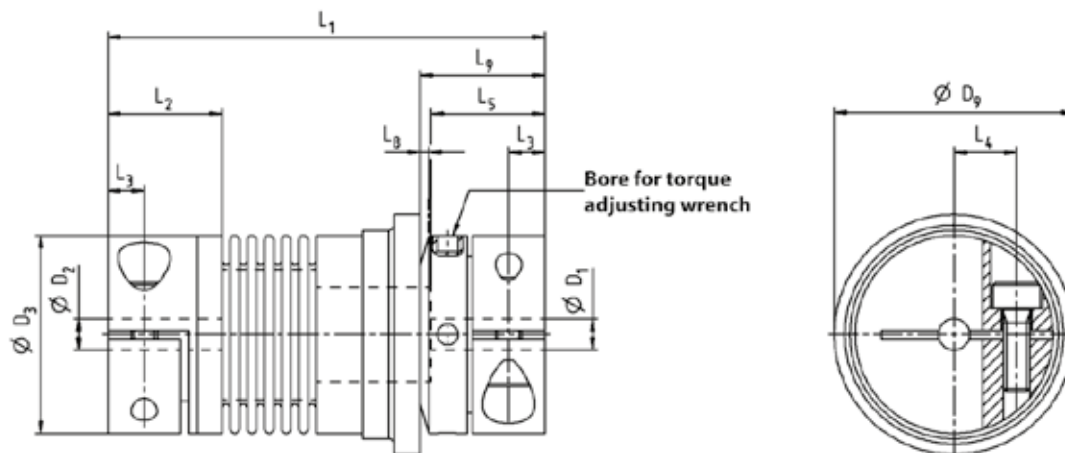
| Size                           |   |           | 1.5       |           | 2                     |           | 4.5   |           | 10   |         | 15   |          | 30   |           | 60   |           |      |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |
|--------------------------------|---|-----------|-----------|-----------|-----------------------|-----------|-------|-----------|------|---------|------|----------|------|-----------|------|-----------|------|--|------|--|------|--|------|--|------|--|------|--|------|--|------|--|
| Overall length                 |   |           | A         |           | A                     | B         | A     | B         | A    | B       | A    | B        | A    | B         | A    | B         |      |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |
| Release torque<br>(Adjustable) | A | $T_{Dis}$ | Nm        | 0.3 - 0.8 |                       | 0.2 - 1   |       | 2.5 - 4.5 |      | 2 - 5   |      | 7 - 15   |      | 8 - 20    |      | 20 - 40   |      |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |
|                                |   |           | lbf.in    | 2.7 - 7.1 |                       | 1.8 - 8.9 |       | 22 - 40   |      | 18 - 44 |      | 62 - 133 |      | 71 - 177  |      | 177 - 354 |      |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |
|                                | B |           | Nm        | 0.6 - 1.3 |                       | 0.7 - 2   |       | -         |      | 5 - 10  |      | -        |      | 16 - 30   |      | 30 - 60   |      |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |
|                                |   |           | lbf.in    | 5.3 - 12  |                       | 6.2 - 18  |       | -         |      | 44 - 89 |      | -        |      | 142 - 266 |      | 266 - 531 |      |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |
|                                | C |           | Nm        | -         |                       | -         |       | -         |      | -       |      | -        |      | -         |      | -         |      |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |
|                                |   |           | lbf.in    | -         |                       | -         |       | -         |      | -       |      | -        |      | -         |      | -         |      |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |
| Max. speed                     |   |           | $n_{Max}$ |           | rpm                   |           | 3000  |           |      |         |      |          |      |           |      |           |      |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |
| Angular misalignment           |   |           | $\pm$     |           | °                     |           | 1     |           | 1    |         | 1.5  |          | 1.5  |           | 2    |           | 1    |  | 1.5  |  | 1    |  | 1.5  |  |      |  |      |  |      |  |      |  |
| Lateral misalignment           |   |           | $\pm$     |           | mm                    |           | 0.15  |           | 0.15 |         | 0.2  |          | 0.2  |           | 0.25 |           | 0.2  |  | 0.25 |  | 0.2  |  | 0.25 |  |      |  |      |  |      |  |      |  |
| Lateral spring rigidity        |   |           | $C_l$     |           | N/mm                  |           | 70    |           | 40   |         | 30   |          | 290  |           | 45   |           | 280  |  | 145  |  | 475  |  | 137  |  | 900  |  | 270  |  | 1200 |  | 420  |  |
|                                |   |           |           |           | lbf/in                |           | 400   |           | 228  |         | 171  |          | 1656 |           | 257  |           | 1599 |  | 828  |  | 2712 |  | 782  |  | 5139 |  | 1542 |  | 6852 |  | 2398 |  |
| Torsional rigidity             |   |           | $C_T$     |           | Nm/arcmin             |           | 0.2   |           | 0.35 |         | 0.38 |          | 2    |           | 1.5  |           | 2.6  |  | 2.3  |  | 5.8  |  | 4.4  |  | 11.3 |  | 8.1  |  | 22.1 |  | 16   |  |
|                                |   |           |           |           | lbf.in/arcmin         |           | 1.8   |           | 3.1  |         | 3.4  |          | 18   |           | 13   |           | 23   |  | 20   |  | 51   |  | 39   |  | 100  |  | 72   |  | 196  |  | 142  |  |
| Mass moment of inertia         |   |           | J         |           | kgcm <sup>2</sup>     |           | 0.1   |           | 0.1  |         | 0.1  |          | 0.2  |           | 0.2  |           | 0.6  |  | 0.7  |  | 1    |  | 1.5  |  | 2.7  |  | 3.2  |  | 7.5  |  | 8    |  |
|                                |   |           |           |           | lbf.in.s <sup>2</sup> |           | 0.09  |           | 0.09 |         | 0.09 |          | 0.18 |           | 0.18 |           | 0.53 |  | 0.62 |  | 0.89 |  | 1.3  |  | 2.4  |  | 2.8  |  | 6.6  |  | 7.1  |  |
| Weight                         |   |           | m         |           | kg                    |           | 0.047 |           | 0.07 |         | 0.2  |          | 0.3  |           | 0.4  |           | 0.6  |  | 1    |  |      |  |      |  |      |  |      |  |      |  |      |  |
|                                |   |           |           |           | lb                    |           | 0.1   |           | 0.15 |         | 0.44 |          | 0.66 |           | 0.88 |           | 1.3  |  | 2.2  |  |      |  |      |  |      |  |      |  |      |  |      |  |

## Dimensions

|   |       |    |             |             |             |             |             |             |             |             |             |            |             |     |     |
|---|-------|----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|-----|-----|
| Total length<br>(Tolerance -2)                        | $L_1$ | mm | 42          | 46          | 51          | 57          | 65          | 65          | 75          | 75          | 82          | 87         | 95          | 102 | 112 |
|   |       | in | 1.7         | 1.8         | 2           | 2.2         | 2.6         | 2.6         | 3           | 3           | 3.2         | 3.4        | 3.7         | 4   | 4.4 |
| Fitting length  | $L_2$ | mm | 11          | 13          | 16          | 16          | 16          | 16          | 16          | 16          | 22          | 26.5       | 31          |     |     |
|   |       | in | 0.43        | 0.51        | 0.63        | 0.63        | 0.63        | 0.63        | 0.63        | 0.63        | 0.87        | 1          | 1.2         |     |     |
| Distance  | $L_3$ | mm | 3.5         | 4           | 5           | 5           | 5           | 5           | 5           | 5           | 6.5         | 7.5        | 9.5         |     |     |
|   |       | in | 0.14        | 0.16        | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.26        | 0.3        | 0.37        |     |     |
| Centre distance <sup>b)</sup>                         | $L_4$ | mm | 6.7 / 6     | 8 / 8.5     | 10.3 / 11.5 | 15          | 15          | 15          | 15          | 15          | 17.5        | 19         | 23          |     |     |
|   |       | in | 0.26 / 0.24 | 0.31 / 0.33 | 0.41 / 0.45 | 0.59        | 0.59        | 0.59        | 0.59        | 0.59        | 0.69        | 0.75       | 0.91        |     |     |
| Fitting length  | $L_5$ | mm | 11          | 13          | 16          | 16          | 16          | 16          | 16          | 16          | 21.5        | 26.5       | 31.5        |     |     |
|   |       | in | 0.43        | 0.51        | 0.63        | 0.63        | 0.63        | 0.63        | 0.63        | 0.63        | 0.85        | 1          | 1.2         |     |     |
| Actuation distance                                    | $L_8$ | mm | 0.7         | 0.8         | 0.8         | 1.2         | 1.2         | 1.2         | 1.2         | 1.2         | 1.5         | 1.5        | 1.7         |     |     |
|   |       | in | 0.03        | 0.03        | 0.03        | 0.05        | 0.05        | 0.05        | 0.05        | 0.05        | 0.06        | 0.06       | 0.07        |     |     |
| Distance  | $L_9$ | mm | 11.5        | 12          | 14          | 16          | 16          | 16          | 16          | 16          | 19          | 22         | 29          |     |     |
|   |       | in | 0.45        | 0.47        | 0.55        | 0.63        | 0.63        | 0.63        | 0.63        | 0.63        | 0.75        | 0.87       | 1.1         |     |     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 3 - 8       | 4 - 12      | 5 - 14      | 6 - 17      | 6 - 17      | 6 - 17      | 6 - 17      | 6 - 17      | 10 - 26     | 12 - 30    | 15 - 32     |     |     |
|   |       | in | 0.12 - 0.31 | 0.16 - 0.47 | 0.2 - 0.55  | 0.24 - 0.68 | 0.24 - 0.68 | 0.24 - 0.68 | 0.24 - 0.68 | 0.24 - 0.68 | 0.39 - 1    | 0.47 - 1.2 | 0.59 - 1.3  |     |     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 3 - 8       | 4 - 12.7    | 5 - 16      | 6 - 24      | 6 - 24      | 6 - 24      | 6 - 24      | 6 - 24      | 10 - 28     | 12 - 30    | 15 - 35     |     |     |
|   |       | in | 0.12 - 0.31 | 0.16 - 0.5  | 0.2 - 0.63  | 0.24 - 0.94 | 0.24 - 0.94 | 0.24 - 0.94 | 0.24 - 0.94 | 0.24 - 0.94 | 0.39 - 1.08 | 0.47 - 1.2 | 0.59 - 1.42 |     |     |
| Outer diameter hub                                    | $D_3$ | mm | 19          | 25          | 32          | 40          | 40          | 40          | 40          | 40          | 49          | 55         | 66          |     |     |
|   |       | in | 0.75        | 0.98        | 1.3         | 1.6         | 1.6         | 1.6         | 1.6         | 1.6         | 1.9         | 2.2        | 2.6         |     |     |
| Outer diameter actuation ring                         | $D_9$ | mm | 24          | 32          | 42          | 51.5        | 51.5        | 51.5        | 51.5        | 51.5        | 61.5        | 70         | 83          |     |     |
|   |       | in | 0.94        | 1.3         | 1.7         | 2           | 2           | 2           | 2           | 2           | 2.4         | 2.8        | 3.3         |     |     |

b) Valid up to size 4.5, two different values for output/input.

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size                           |   |           | 80        |   | 150                   |            | 200         |             | 300         |             | 500         |       | 800   | 1500  |       |       |
|--------------------------------|---|-----------|-----------|---|-----------------------|------------|-------------|-------------|-------------|-------------|-------------|-------|-------|-------|-------|-------|
| Overall length                 |   |           | A         | B | A                     | B          | A           | B           | A           | B           | A           | B     | A     | A     |       |       |
| Release torque<br>(Adjustable) | A | $T_{Dis}$ | Nm        |   | 20 - 60               | 20 - 60    | 80 - 140    | 120 - 180   | 60 - 150    | 200 - 400   | 1000-1250   |       |       |       |       |       |
|                                |   |           | lbf.in    |   | 177 - 531             | 177 - 531  | 708 - 1239  | 1062 - 1593 | 531 - 1328  | 1770 - 3540 | 8851-11064  |       |       |       |       |       |
|                                | B |           | Nm        |   | 40 - 80               | 40 - 80    | 130 - 200   | 160 - 300   | 100 - 300   | 450 - 800   | 1250-1500   |       |       |       |       |       |
|                                |   |           | lbf.in    |   | 354 - 708             | 354 - 708  | 1151 - 1770 | 1416 - 2655 | 885 - 2655  | 3983 - 7081 | 11064-13276 |       |       |       |       |       |
|                                | C |           | Nm        |   | -                     | 80 - 150   | -           | -           | 250 - 500   | -           | -           |       |       |       |       |       |
|                                |   |           | lbf.in    |   | -                     | 708 - 1328 | -           | -           | 2213 - 4425 | -           | -           |       |       |       |       |       |
| Max. speed                     |   |           | $n_{Max}$ |   | rpm                   |            |             |             |             |             | 2000        |       | 1000  |       |       |       |
| Angular misalignment           |   |           | $\pm$     |   | °                     |            | 1           | 1.5         | 1           | 1.5         | 2           | 1.5   | 2     | 2     | 2.5   | 2.5   |
| Lateral misalignment           |   |           | $\pm$     |   | mm                    |            | 0.2         | 0.25        | 0.2         | 0.25        | 0.25        | 0.3   | 0.25  | 0.3   | 0.3   | 0.35  |
|                                |   |           |           |   | in                    |            | 0.008       | 0.01        | 0.008       | 0.01        | 0.01        | 0.012 | 0.01  | 0.012 | 0.012 | 0.014 |
| Lateral spring rigidity        |   |           | $C_l$     |   | N/mm                  |            | 920         | 255         | 1550        | 435         | 2040        | 610   | 3750  | 1050  | 2500  | 840   |
|                                |   |           |           |   | lbf/in                |            | 5253        | 1456        | 8851        | 2484        | 11648       | 3483  | 21413 | 5996  | 14275 | 4796  |
| Torsional rigidity             |   |           | $C_T$     |   | Nm/arcmin             |            | 37.5        | 24.7        | 50.9        | 32          | 55.6        | 40.7  | 122   | 102   | 148   | 146   |
|                                |   |           |           |   | lbf.in/arcmin         |            | 332         | 219         | 451         | 283         | 492         | 360   | 1080  | 903   | 1310  | 1292  |
| Mass moment of inertia         |   |           | $J$       |   | kgcm <sup>2</sup>     |            | 18          | 19          | 25          | 28          | 51          | 53    | 115   | 118   | 228   | 230   |
|                                |   |           |           |   | lbf.in.s <sup>2</sup> |            | 16          | 17          | 22          | 25          | 45          | 47    | 102   | 105   | 202   | 204   |
| Weight                         |   |           | $m$       |   | kg                    |            | 2           | 2.4         | 4           | 5.9         | 9.6         | 14    | 21    | 31    | 46    |       |
|                                |   |           |           |   | lb                    |            | 4.4         | 5.3         | 8.8         | 13          | 21          | 31    | 46    |       |       |       |

## Dimensions

|   |       |    |            |            |            |           |           |         |         |     |     |     |     |     |
|---|-------|----|------------|------------|------------|-----------|-----------|---------|---------|-----|-----|-----|-----|-----|
| Total length<br>(Tolerance -2)                        | $L_1$ | mm | 117        | 129        | 118        | 130       | 131       | 143     | 142     | 156 | 167 | 181 | 201 | 232 |
|   |       | in | 4.6        | 5.1        | 4.6        | 5.1       | 5.2       | 5.6     | 5.6     | 6.1 | 6.6 | 7.1 | 7.9 | 9.1 |
| Fitting length  | $L_2$ | mm | 35.5       | 35.5       | 40.5       | 42.5      | 50.5      | 48      | 55.5    |     |     |     |     |     |
|   |       | in | 1.4        | 1.4        | 1.6        | 1.7       | 2         | 1.9     | 2.2     |     |     |     |     |     |
| Distance  | $L_3$ | mm | 11         | 11         | 12.5       | 13        | 16.5      | 17.5    | 22.5    |     |     |     |     |     |
|   |       | in | 0.43       | 0.43       | 0.49       | 0.51      | 0.65      | 0.69    | 0.89    |     |     |     |     |     |
| Centre distance <sup>a)</sup>                         | $L_4$ | mm | 27         | 27         | 30.5       | 39        | 41        | 2 x 48  | 2 x 55  |     |     |     |     |     |
|   |       | in | 1.1        | 1.1        | 1.2        | 1.5       | 1.6       | 2 x 1.9 | 2 x 2.2 |     |     |     |     |     |
| Fitting length  | $L_5$ | mm | 35         | 35         | 42         | 42        | 52.5      | 48      | 67      |     |     |     |     |     |
|   |       | in | 1.4        | 1.4        | 1.7        | 1.7       | 2.1       | 1.9     | 2.6     |     |     |     |     |     |
| Actuation distance                                    | $L_8$ | mm | 1.9        | 1.9        | 2.2        | 2.2       | 2.2       | 2.2     | 3       |     |     |     |     |     |
|   |       | in | 0.07       | 0.07       | 0.09       | 0.09      | 0.09      | 0.09    | 0.12    |     |     |     |     |     |
| Distance  | $L_9$ | mm | 31         | 30         | 33         | 35        | 43        | 54      | 61      |     |     |     |     |     |
|   |       | in | 1.2        | 1.2        | 1.3        | 1.4       | 1.7       | 2.1     | 2.4     |     |     |     |     |     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 19 - 42    | 19 - 42    | 24 - 45    | 30 - 60   | 35 - 60   | 40 - 75 | 50 - 80 |     |     |     |     |     |
|   |       | in | 0.75 - 1.7 | 0.75 - 1.7 | 0.94 - 1.8 | 1.2 - 2.4 | 1.4 - 2.4 | 1.6 - 3 | 2 - 3.1 |     |     |     |     |     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 19 - 42    | 19 - 42    | 24 - 45    | 30 - 60   | 35 - 60   | 40 - 75 | 50 - 80 |     |     |     |     |     |
|   |       | in | 0.75 - 1.7 | 0.75 - 1.7 | 0.94 - 1.8 | 1.2 - 2.4 | 1.4 - 2.4 | 1.6 - 3 | 2 - 3.1 |     |     |     |     |     |
| Outer diameter hub                                    | $D_3$ | mm | 81         | 81         | 90         | 110       | 123       | 134     | 157     |     |     |     |     |     |
|   |       | in | 3.2        | 3.2        | 3.5        | 4.3       | 4.8       | 5.3     | 6.2     |     |     |     |     |     |
| Outer diameter actuation ring                         | $D_9$ | mm | 98         | 98         | 117        | 132       | 155       | 177     | 187     |     |     |     |     |     |
|   |       | in | 3.9        | 3.9        | 4.6        | 5.2       | 6.1       | 7       | 7.4     |     |     |     |     |     |

a) Starting at size 800, two screws per clamping hub offset by 180°.

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

## Torque limiter TL2



For the ordering code, please refer to p 81

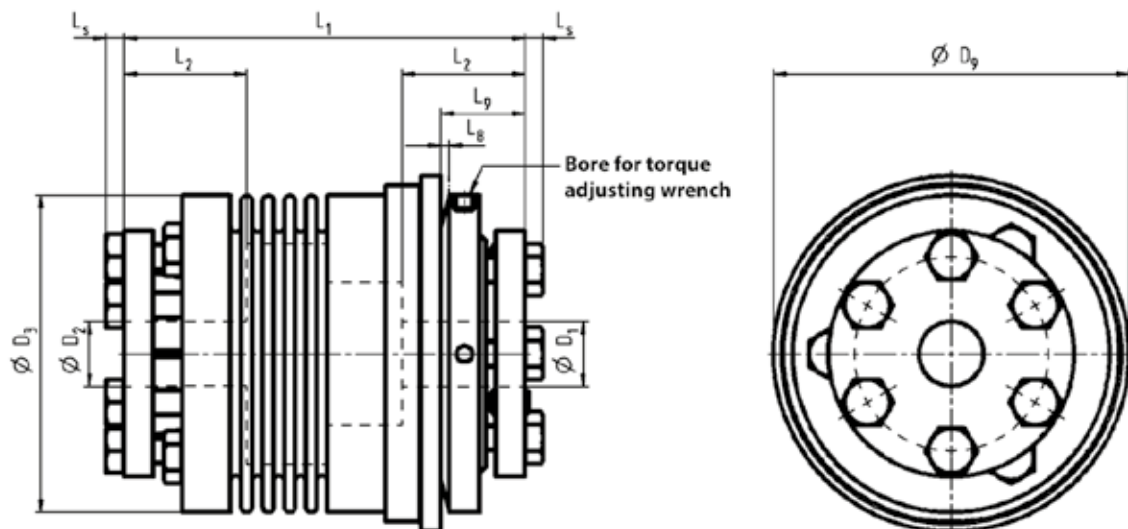
# TL3 Torque limiter / tapered clamping hub

| Size                           |   |           | 15                    |          | 30        |           | 60         |             | 150   |      | 200  |       |      |
|--------------------------------|---|-----------|-----------------------|----------|-----------|-----------|------------|-------------|-------|------|------|-------|------|
| Overall length                 |   |           | A                     | B        | A         | B         | A          | B           | A     | B    | A    | B     |      |
| Release torque<br>(Adjustable) | A | $T_{Dis}$ | Nm                    | 5 - 10   | 10 - 25   | 10 - 30   | 20 - 70    | 30 - 90     |       |      |      |       |      |
|                                |   |           | lbf.in                | 44 - 89  | 89 - 221  | 89 - 266  | 177 - 620  | 266 - 797   |       |      |      |       |      |
|                                | B |           | Nm                    | 8 - 20   | 20 - 40   | 25 - 80   | 45 - 150   | 60 - 160    |       |      |      |       |      |
|                                |   |           | lbf.in                | 71 - 177 | 177 - 354 | 221 - 708 | 398 - 1328 | 531 - 1416  |       |      |      |       |      |
|                                | C |           | Nm                    | -        | -         | -         | 80 - 200   | 140 - 280   |       |      |      |       |      |
|                                |   |           | lbf.in                | -        | -         | -         | 708 - 1770 | 1239 - 2478 |       |      |      |       |      |
| Max. speed                     |   | $n_{Max}$ | rpm                   |          |           |           |            |             | 3000  |      |      |       |      |
| Angular misalignment           |   | $\pm$     | °                     |          | 1         |           | 1.5        |             | 1     |      | 1.5  |       |      |
| Lateral misalignment           |   | $\pm$     | mm                    |          | 0.15      |           | 0.2        |             | 0.2   |      | 0.25 |       |      |
|                                |   |           | in                    |          | 0.006     |           | 0.008      |             | 0.008 |      | 0.01 |       |      |
| Lateral spring rigidity        |   | $C_l$     | N/mm                  | 475      | 137       | 900       | 270        | 1200        | 380   | 1550 | 435  | 2040  | 610  |
|                                |   |           | lbf/in                | 2712     | 782       | 5139      | 1542       | 6852        | 2170  | 8851 | 2484 | 11648 | 3483 |
| Torsional rigidity             |   | $C_T$     | Nm/arcmin             | 5.8      | 4.4       | 11.3      | 8.1        | 22.1        | 16    | 50.9 | 32   | 55.6  | 40.7 |
|                                |   |           | lbf.in/arcmin         | 51       | 39        | 100       | 72         | 196         | 142   | 451  | 283  | 492   | 360  |
| Mass moment of inertia         |   | J         | kgcm <sup>2</sup>     | 1        | 1.5       | 2.8       | 3          | 7.5         | 8     | 19   | 20   | 28    | 30   |
|                                |   |           | lbf.in.s <sup>2</sup> | 0.89     | 1.3       | 2.5       | 2.7        | 6.6         | 7.1   | 17   | 18   | 25    | 27   |
| Weight                         |   | m         | kg                    | 0.3      |           | 0.4       |            | 1.2         |       | 2.3  |      | 3     |      |
|                                |   |           | lb                    | 0.66     |           | 0.88      |            | 2.6         |       | 5.1  |      | 6.6   |      |

## Dimensions

|   |       |    |             |     |             |     |            |     |            |     |            |     |
|---|-------|----|-------------|-----|-------------|-----|------------|-----|------------|-----|------------|-----|
| Total length<br>(without LS)                          | $L_1$ | mm | 62          | 69  | 72          | 80  | 84         | 94  | 93         | 105 | 99         | 111 |
|   |       | in | 2.4         | 2.7 | 2.8         | 3.1 | 3.3        | 3.7 | 3.7        | 4.1 | 3.9        | 4.4 |
| Fitting length  | $L_2$ | mm | 19          |     | 21.5        |     | 27.5       |     | 32         |     | 32         |     |
|   |       | in | 0.75        |     | 0.85        |     | 1.1        |     | 1.3        |     | 1.3        |     |
| Actuation distance                                    | $L_8$ | mm | 1.5         |     | 1.5         |     | 1.7        |     | 1.9        |     | 2.2        |     |
|   |       | in | 0.06        |     | 0.06        |     | 0.07       |     | 0.07       |     | 0.09       |     |
| Distance  | $L_9$ | mm | 13          |     | 16          |     | 18         |     | 19         |     | 19         |     |
|   |       | in | 0.51        |     | 0.63        |     | 0.71       |     | 0.75       |     | 0.75       |     |
| Screw head length                                     | $L_s$ | mm | 2.8         |     | 3.5         |     | 3.5        |     | 4          |     | 4          |     |
|   |       | in | 0.11        |     | 0.14        |     | 0.14       |     | 0.16       |     | 0.16       |     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 10 - 22     |     | 12 - 23     |     | 12 - 29    |     | 15 - 37    |     | 20 - 44    |     |
|   |       | in | 0.39 - 0.87 |     | 0.47 - 0.91 |     | 0.47 - 1.1 |     | 0.59 - 1.5 |     | 0.79 - 1.7 |     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 10 - 22     |     | 12 - 23     |     | 12 - 29    |     | 15 - 37    |     | 20 - 44    |     |
|   |       | in | 0.39 - 0.87 |     | 0.47 - 0.91 |     | 0.47 - 1.1 |     | 0.59 - 1.5 |     | 0.79 - 1.7 |     |
| Outer diameter hub                                    | $D_3$ | mm | 49          |     | 55          |     | 66         |     | 81         |     | 90         |     |
|   |       | in | 1.9         |     | 2.2         |     | 2.6        |     | 3.2        |     | 3.5        |     |
| Outer diameter actuation ring                         | $D_9$ | mm | 55          |     | 65          |     | 73.5       |     | 92         |     | 99         |     |
|   |       | in | 2.2         |     | 2.6         |     | 2.9        |     | 3.6        |     | 3.9        |     |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).





| Size                           |   |           | 300       |                       | 500         |       | 800         | 1500         | 2500          |
|--------------------------------|---|-----------|-----------|-----------------------|-------------|-------|-------------|--------------|---------------|
| Overall length                 |   |           | A         | B                     | A           | B     | A           | A            | A             |
| Release torque<br>(Adjustable) | A | $T_{Dis}$ | Nm        | 100 - 200             | 80 - 200    |       | 400 - 650   | 650 - 850    | 1500 - 2000   |
|                                |   |           | lbf.in    | 885 - 1770            | 708 - 1770  |       | 3540 - 5753 | 5753 - 7523  | 13276 - 17702 |
|                                | B |           | Nm        | 150 - 240             | 200 - 350   |       | 500 - 800   | 700 - 1200   | 2000 - 2500   |
|                                |   |           | lbf.in    | 1328 - 2124           | 1770 - 3098 |       | 4425 - 7081 | 6196 - 10621 | 17702 - 22127 |
|                                | C |           | Nm        | 220 - 400             | 300 - 500   |       | 600 - 900   | 1000 - 1800  | 2300 - 2800   |
|                                |   |           | lbf.in    | 1947 - 3540           | 2655 - 4425 |       | 5310 - 7966 | 8851 - 15931 | 20357 - 24782 |
| Max. speed                     |   |           | $n_{Max}$ | rpm                   |             | 2000  |             |              |               |
| Angular misalignment           |   |           | $\pm$     | $^{\circ}$            |             | 1000  |             |              |               |
| Lateral misalignment           |   |           | $\pm$     | mm                    |             | 2.5   |             |              |               |
| Lateral spring rigidity        |   |           | $C_l$     | N/mm                  |             | 0.35  |             |              |               |
|                                |   |           |           | lbf/in                |             | 0.35  |             |              |               |
| Torsional rigidity             |   |           | $C_T$     | Nm/arcmin             |             | 0.014 |             |              |               |
|                                |   |           |           | lbf.in/arcmin         |             | 0.014 |             |              |               |
| Mass moment of inertia         |   |           | J         | kgcm <sup>2</sup>     |             | 2000  |             |              |               |
|                                |   |           |           | lbf.in.s <sup>2</sup> |             | 3600  |             |              |               |
| Weight                         |   |           | m         | kg                    |             | 20556 |             |              |               |
|                                |   |           |           | lb                    |             | 34660 |             |              |               |

**Dimensions**

|   |       |    |            |     |            |     |           |           |          |
|---|-------|----|------------|-----|------------|-----|-----------|-----------|----------|
| Total length<br>(without LS)                          | $L_1$ | mm | 114        | 128 | 123        | 137 | 151       | 175       | 246      |
|   |       | in | 4.5        | 5   | 4.8        | 5.4 | 5.9       | 6.9       | 9.7      |
| Fitting length  | $L_2$ | mm | 41.5       |     | 41.5       |     | 49        | 61        | 80.5     |
|   |       | in | 1.6        |     | 1.6        |     | 1.9       | 2.4       | 3.2      |
| Actuation distance                                    | $L_8$ | mm | 2.2        |     | 2.2        |     | 2.2       | 3         | 3        |
|   |       | in | 0.09       |     | 0.09       |     | 0.09      | 0.12      | 0.12     |
| Distance  | $L_9$ | mm | 23         |     | 25         |     | 31        | 30        | 34       |
|   |       | in | 0.91       |     | 0.98       |     | 1.2       | 1.2       | 1.3      |
| Screw head length                                     | $L_s$ | mm | 5.3        |     | 5.3        |     | 6.4       | 7.5       | 10       |
|   |       | in | 0.21       |     | 0.21       |     | 0.25      | 0.3       | 0.39     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 25 - 56    |     | 25 - 60    |     | 30 - 60   | 35 - 70   | 50 - 100 |
|   |       | in | 0.98 - 2.2 |     | 0.98 - 2.4 |     | 1.2 - 2.4 | 1.4 - 2.8 | 2 - 3.9  |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 25 - 56    |     | 25 - 60    |     | 30 - 60   | 35 - 70   | 50 - 100 |
|   |       | in | 0.98 - 2.2 |     | 0.98 - 2.4 |     | 1.2 - 2.4 | 1.4 - 2.8 | 2 - 3.9  |
| Outer diameter hub                                    | $D_3$ | mm | 110        |     | 123        |     | 133       | 157       | 200      |
|   |       | in | 4.3        |     | 4.8        |     | 5.2       | 6.2       | 7.9      |
| Outer diameter actuation ring                         | $D_9$ | mm | 120.5      |     | 135        |     | 152.5     | 174       | 243      |
|   |       | in | 4.7        |     | 5.3        |     | 6         | 6.9       | 9.6      |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

**Torque limiter TL3**


For the ordering code, please refer to p 81

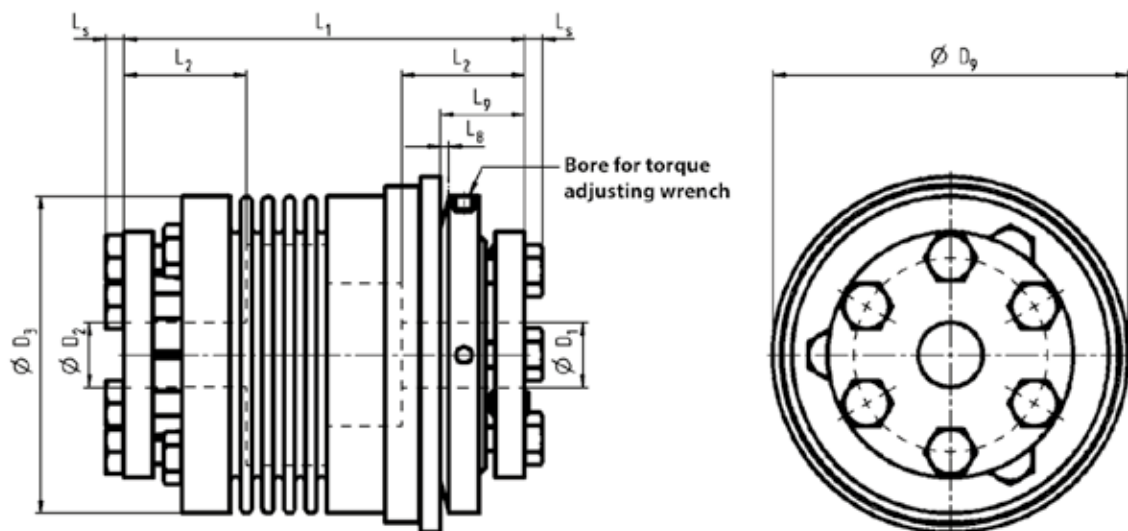
# TL3 Torque limiter / tapered clamping hub

| Size                           |   |           | 15                    |          | 30        |           | 60         |             | 150   |      | 200  |       |      |
|--------------------------------|---|-----------|-----------------------|----------|-----------|-----------|------------|-------------|-------|------|------|-------|------|
| Overall length                 |   |           | A                     | B        | A         | B         | A          | B           | A     | B    | A    | B     |      |
| Release torque<br>(Adjustable) | A | $T_{Dis}$ | Nm                    | 7 - 15   | 8 - 20    | 20 - 40   | 20 - 60    | 80 - 140    |       |      |      |       |      |
|                                |   |           | lbf.in                | 62 - 133 | 71 - 177  | 177 - 354 | 177 - 531  | 708 - 1239  |       |      |      |       |      |
|                                | B |           | Nm                    | -        | 16 - 30   | 30 - 60   | 40 - 80    | 130 - 200   |       |      |      |       |      |
|                                |   |           | lbf.in                | -        | 142 - 266 | 266 - 531 | 354 - 708  | 1151 - 1770 |       |      |      |       |      |
|                                | C |           | Nm                    | -        | -         | -         | 80 - 150   | -           |       |      |      |       |      |
|                                |   |           | lbf.in                | -        | -         | -         | 708 - 1328 | -           |       |      |      |       |      |
| Max. speed                     |   | $n_{Max}$ | rpm                   |          |           |           |            |             | 3000  |      | 2000 |       |      |
| Angular misalignment           |   | $\pm$     | °                     |          | 1         | 1.5       | 1          | 1.5         | 1     | 1.5  | 1    | 2     |      |
| Lateral misalignment           |   | $\pm$     | mm                    |          | 0.15      | 0.2       | 0.2        | 0.25        | 0.2   | 0.25 | 0.25 | 0.3   |      |
|                                |   |           | in                    |          | 0.006     | 0.008     | 0.008      | 0.01        | 0.008 | 0.01 | 0.01 | 0.012 |      |
| Lateral spring rigidity        |   | $C_l$     | N/mm                  | 475      | 137       | 900       | 270        | 1200        | 380   | 1550 | 435  | 2040  | 610  |
|                                |   |           | lbf/in                | 2712     | 782       | 5139      | 1542       | 6852        | 2170  | 8851 | 2484 | 11648 | 3483 |
| Torsional rigidity             |   | $C_T$     | Nm/arcmin             | 5.8      | 4.4       | 11.3      | 8.1        | 22.1        | 16    | 50.9 | 32   | 55.6  | 40.7 |
|                                |   |           | lbf.in/arcmin         | 51       | 39        | 100       | 72         | 196         | 142   | 451  | 283  | 492   | 360  |
| Mass moment of inertia         |   | J         | kgcm <sup>2</sup>     | 1        | 1.5       | 2.8       | 3          | 7.5         | 8     | 19   | 20   | 28    | 30   |
|                                |   |           | lbf.in.s <sup>2</sup> | 0.89     | 1.3       | 2.5       | 2.7        | 6.6         | 7.1   | 17   | 18   | 25    | 27   |
| Weight                         |   | m         | kg                    | 0.3      |           | 0.4       |            | 1.2         |       | 2.3  |      | 3     |      |
|                                |   |           | lb                    | 0.66     |           | 0.88      |            | 2.6         |       | 5.1  |      | 6.6   |      |

## Dimensions

|   |       |    |             |     |             |     |            |     |            |     |            |     |
|---|-------|----|-------------|-----|-------------|-----|------------|-----|------------|-----|------------|-----|
| Total length<br>(without LS)                          | $L_1$ | mm | 62          | 69  | 72          | 80  | 84         | 94  | 93         | 105 | 102        | 114 |
|   |       | in | 2.4         | 2.7 | 2.8         | 3.1 | 3.3        | 3.7 | 3.7        | 4.1 | 4          | 4.5 |
| Fitting length  | $L_2$ | mm | 19          |     | 21.5        |     | 27.5       |     | 32         |     | 32         |     |
|   |       | in | 0.75        |     | 0.85        |     | 1.1        |     | 1.3        |     | 1.3        |     |
| Actuation distance                                    | $L_8$ | mm | 1.5         |     | 1.5         |     | 1.7        |     | 1.9        |     | 2.2        |     |
|   |       | in | 0.06        |     | 0.06        |     | 0.07       |     | 0.07       |     | 0.09       |     |
| Distance  | $L_9$ | mm | 13          |     | 16          |     | 17         |     | 18         |     | 17         |     |
|   |       | in | 0.51        |     | 0.63        |     | 0.67       |     | 0.71       |     | 0.67       |     |
| Screw head length                                     | $L_s$ | mm | 2.8         |     | 3.5         |     | 3.5        |     | 4          |     | 4          |     |
|   |       | in | 0.11        |     | 0.14        |     | 0.14       |     | 0.16       |     | 0.16       |     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 10 - 22     |     | 12 - 23     |     | 12 - 29    |     | 15 - 37    |     | 20 - 44    |     |
|   |       | in | 0.39 - 0.87 |     | 0.47 - 0.91 |     | 0.47 - 1.1 |     | 0.59 - 1.5 |     | 0.79 - 1.7 |     |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 10 - 22     |     | 12 - 23     |     | 12 - 29    |     | 15 - 37    |     | 20 - 44    |     |
|   |       | in | 0.39 - 0.87 |     | 0.47 - 0.91 |     | 0.47 - 1.1 |     | 0.59 - 1.5 |     | 0.79 - 1.7 |     |
| Outer diameter hub                                    | $D_3$ | mm | 49          |     | 55          |     | 66         |     | 81         |     | 90         |     |
|   |       | in | 1.9         |     | 2.2         |     | 2.6        |     | 3.2        |     | 3.5        |     |
| Outer diameter actuation ring                         | $D_9$ | mm | 61.5        |     | 70          |     | 83         |     | 98         |     | 117        |     |
|   |       | in | 2.4         |     | 2.8         |     | 3.3        |     | 3.9        |     | 4.6        |     |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



| Size                           |        |           | 300                   |             | 500        |       | 800         | 1500          | 2500          |       |
|--------------------------------|--------|-----------|-----------------------|-------------|------------|-------|-------------|---------------|---------------|-------|
| Overall length                 |        |           | A                     | B           | A          | B     | A           | A             | A             |       |
| Release torque<br>(Adjustable) | A      | $T_{Dis}$ | Nm                    | 120 - 180   | 60 - 150   |       | 200 - 400   | 1000 - 1250   | 1400 - 2200   |       |
|                                |        |           | lbf.in                | 1062 - 1593 | 531 - 1328 |       | 1770 - 3540 | 8851 - 11064  | 12391 - 19472 |       |
|                                | B      |           | Nm                    | 160 - 300   | 100 - 300  |       | 450 - 800   | 1250 - 1500   | 1800 - 2700   |       |
|                                |        |           | lbf.in                | 1416 - 2655 | 885 - 2655 |       | 3983 - 7081 | 11064 - 13276 | 15931 - 23897 |       |
|                                |        |           | Nm                    | -           | 250 - 500  |       | -           | -             | -             |       |
| C                              | lbf.in | -         | 2213 - 4425           |             | -          | -     | -           |               |               |       |
| Max. speed                     |        | $n_{Max}$ | rpm                   |             | 2000       |       | 1000        |               |               |       |
| Angular misalignment           |        | $\pm$     | $^{\circ}$            |             | 1.5        | 2     | 2           | 2.5           | 2.5           |       |
| Lateral misalignment           |        | $\pm$     | mm                    |             | 0.25       | 0.3   | 0.3         | 0.35          | 0.35          |       |
|                                |        |           | in                    |             | 0.01       | 0.012 | 0.012       | 0.014         | 0.014         |       |
| Lateral spring rigidity        |        | $C_l$     | N/mm                  | 3750        | 1050       | 2500  | 840         | 2000          | 3600          | 6070  |
|                                |        |           | lbf/in                | 21413       | 5996       | 14275 | 4796        | 11420         | 20556         | 34660 |
| Torsional rigidity             |        | $C_T$     | Nm/arcmin             | 122         | 102        | 148   | 146         | 227           | 379           | 989   |
|                                |        |           | lbf.in/arcmin         | 1080        | 903        | 1310  | 1292        | 2009          | 3354          | 8753  |
| Mass moment of inertia         |        | J         | kgcm <sup>2</sup>     | 55          | 60         | 110   | 128         | 200           | 420           | 2570  |
|                                |        |           | lbf.in.s <sup>2</sup> | 49          | 53         | 98    | 113         | 177           | 372           | 2278  |
| Weight                         |        | m         | kg                    | 5           |            | 6.5   |             | 9             | 16.3          | 35    |
|                                |        |           | lb                    | 11          |            | 14    |             | 20            | 36            | 77    |

### Dimensions

|   |       |    |            |     |            |     |           |           |          |
|---|-------|----|------------|-----|------------|-----|-----------|-----------|----------|
| Total length<br>(without LS)                          | $L_1$ | mm | 117        | 131 | 127        | 141 | 151       | 184       | 252      |
|   |       | in | 4.6        | 5.2 | 5          | 5.6 | 5.9       | 7.2       | 9.9      |
| Fitting length  | $L_2$ | mm | 41.5       |     | 41.5       |     | 49        | 61        | 80.5     |
|   |       | in | 1.6        |     | 1.6        |     | 1.9       | 2.4       | 3.2      |
| Actuation distance                                    | $L_8$ | mm | 2.2        |     | 2.2        |     | 2.2       | 3         | 3        |
|   |       | in | 0.09       |     | 0.09       |     | 0.09      | 0.12      | 0.12     |
| Distance  | $L_9$ | mm | 20         |     | 22         |     | 20        | 26        | 31       |
|   |       | in | 0.79       |     | 0.87       |     | 0.79      | 1         | 1.2      |
| Screw head length                                     | $L_s$ | mm | 5.3        |     | 5.3        |     | 6.4       | 7.5       | 10       |
|   |       | in | 0.21       |     | 0.21       |     | 0.25      | 0.3       | 0.39     |
| Inner diameter input <sup>d)</sup><br>(Tolerance H7)  | $D_1$ | mm | 25 - 56    |     | 25 - 60    |     | 30 - 60   | 35 - 70   | 50 - 100 |
|   |       | in | 0.98 - 2.2 |     | 0.98 - 2.4 |     | 1.2 - 2.4 | 1.4 - 2.8 | 2 - 3.9  |
| Inner diameter output <sup>d)</sup><br>(Tolerance H7) | $D_2$ | mm | 25 - 56    |     | 25 - 60    |     | 30 - 60   | 35 - 70   | 50 - 100 |
|   |       | in | 0.98 - 2.2 |     | 0.98 - 2.4 |     | 1.2 - 2.4 | 1.4 - 2.8 | 2 - 3.9  |
| Outer diameter hub                                    | $D_3$ | mm | 110        |     | 123        |     | 133       | 157       | 200      |
|   |       | in | 4.3        |     | 4.8        |     | 5.2       | 6.2       | 7.9      |
| Outer diameter actuation ring                         | $D_9$ | mm | 132        |     | 155        |     | 176       | 187       | 258      |
|   |       | in | 5.2        |     | 6.1        |     | 6.9       | 7.4       | 10       |

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

## Torque limiter TL3



For the ordering code, please refer to p 81

# Shrink discs

## **Shrink discs are mainly used in hollow-shaft connections**

With our hollow shaft or blind hollow shaft gearboxes for the direct assembly on load shafts, machines can be designed for minimal installation space. Technically adjusted to the gearbox, these shrink discs offer safety even in the event of an emergency stop. Thanks to the simple assembly and/or disassembly, they can be re-used several times without compromising on their performance.



### PRODUCT HIGHLIGHTS

**Reliable and secure torque transmission**

thanks to the backlash-free frictional connection.

**Huge installation space reduction**

due to the omission of constructive intermediate elements.

**Reusable multiple times**

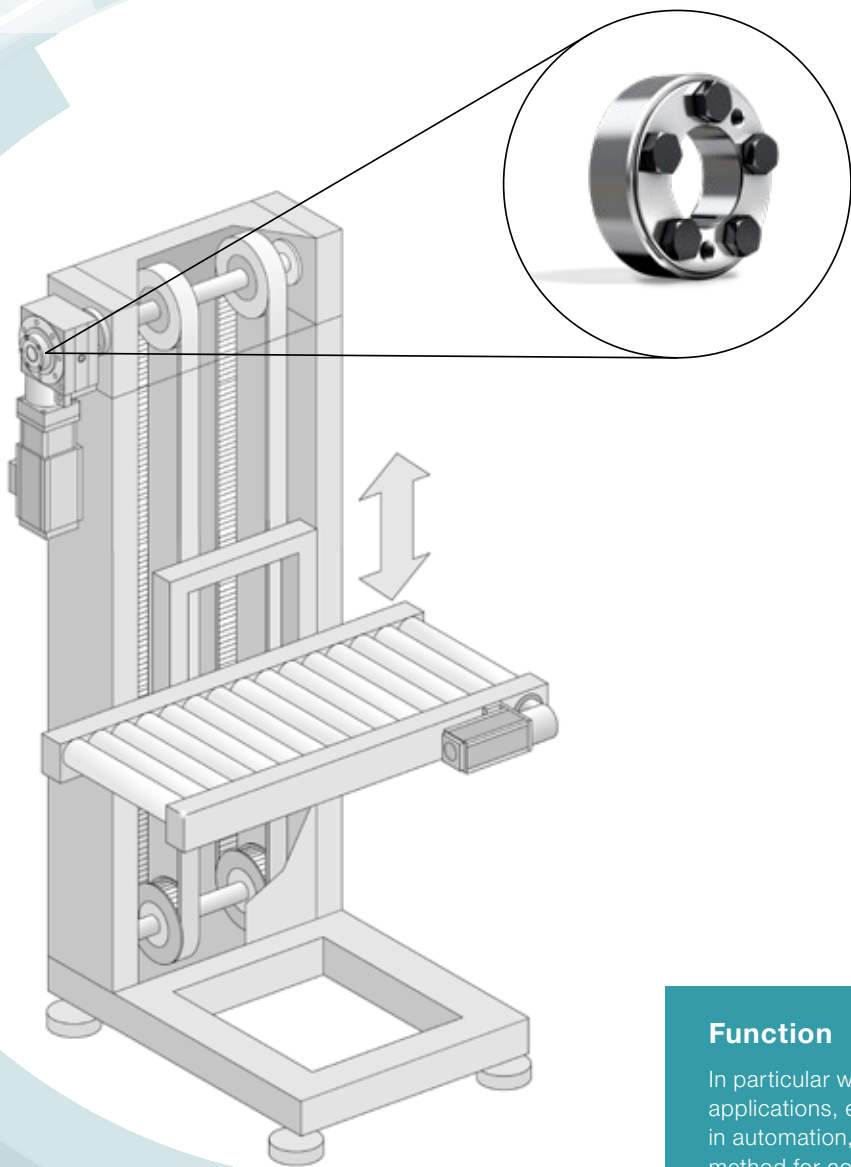
thanks to almost no wear.

**High dynamics and smooth running**

thanks to the excellent true-running accuracy.

**Versatile application options**

thanks to corrosion-resistant materials, also in food-grade applications.



## Function

In particular with installation-space critical applications, e.g. **belt and lifting conveyors** in automation, shrink discs are a proven method for connecting drive units.

Shrink discs are inserted above the hollow shaft of the drive, producing a completely backlash-free friction-type connection between the shaft and the hub. The assembly is very easy and is implemented with high-strength screws and defined torque.



# Application

## Example applications



Machine tools



Drive technology



Wood industry



Food industry



General mechanical engineering



## Benefits

Reliable transmission of torques through validated calculations.

Great reduction of installation space thanks to the direct connection to the hollow shaft gearbox.

Reusable multiple times due to the simple screw system.

High true-running accuracy thanks to the precise, symmetrically structured components.

## Properties

Transmission of torques without backlash thanks to the high power transmission.

Easy assembly and disassembly thanks to the screw system.

Equal distribution of the applied forces around the scope thanks to a positive connection.

Non-destructive removal through relieving the tension of the screws.

# Quick shrink disc selection

| Gearbox   |                        | Version        |                |                 | Geometry |     |    |    |      |                        |
|---|------------------------|----------------|----------------|-----------------|----------|-----|----|----|------|------------------------|
|   |                        | Standard       | Nickel-plated  | Stainless steel | d        | D   | A  | H* | H2*  | J [kgcm <sup>2</sup> ] |
| HG <sup>+</sup> / SP <sup>+</sup> / SPC <sup>+</sup> 060                    | Ordering code          | SD 018x044 S2S | SD 018x044 N2S | SD 018x044 E2S  | 18       | 44  | 30 | 15 | 19   | 0.252                  |
|   | Material number        | 20000744       | 20048496       | 20048491        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 100            | 51             | 51              |          |     |    |    |      |                        |
| HG <sup>+</sup> / SP <sup>+</sup> / SPK <sup>+</sup> / SPC <sup>+</sup> 075 | Ordering code          | SD 024x050 S2S | SD 024x050 N2S | SD 024x050 E2S  | 24       | 50  | 36 | 18 | 22   | 0.729                  |
|   | Material number        | 20001389       | 20047957       | 20043198        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 250            | 136            | 136             |          |     |    |    |      |                        |
| HG <sup>+</sup> / SP <sup>+</sup> / SPK <sup>+</sup> / SPC <sup>+</sup> 100 | Ordering code          | SD 036x072 S2S | SD 036x072 N2S | SD 036x072 E2S  | 36       | 72  | 52 | 22 | 27.5 | 3.94                   |
|   | Material number        | 20001391       | 20048497       | 20035055        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 650            | 575            | 450             |          |     |    |    |      |                        |
| HG <sup>+</sup> / SP <sup>+</sup> / SPK <sup>+</sup> / SPC <sup>+</sup> 140 | Ordering code          | SD 050x090 S2S | SD 050x090 N2S | SD 050x090 E2S  | 50       | 90  | 68 | 26 | 31.5 | 11.1                   |
|   | Material number        | 20001394       | 20048498       | 20047937        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 1320           | 1015           | 770             |          |     |    |    |      |                        |
| HG <sup>+</sup> / SP <sup>+</sup> / SPK <sup>+</sup> / SPC <sup>+</sup> 180 | Ordering code          | SD 068x115 S2S | SD 068x115 N2S | SD 068x115 E2S  | 68       | 115 | 86 | 29 | 34.5 | 31.1                   |
|   | Material number        | 20001396       | 20048499       | 20048492        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 2450           | 1820           | 1500            |          |     |    |    |      |                        |
| VH <sup>+</sup> / NVH / CVH 040   | Ordering code          | SD 024x050 S2S | SD 024x050 N2S | SD 024x050 E2S  | 24       | 50  | 36 | 18 | 22   | 0.729                  |
|   | Material number        | 20001389       | 20047957       | 20043198        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 250            | 136            | 136             |          |     |    |    |      |                        |
| VH <sup>+</sup> / NVH / CVH 050   | Ordering code          | SD 030x060 S2V | SD 030x060 N2S | SD 030x060 E2S  | 30       | 60  | 44 | 20 | 24   | 1.82                   |
|   | Material number        | 20020687       | 20047934       | 20047885        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 550            | 375            | 230             |          |     |    |    |      |                        |
| VH <sup>+</sup> / NVH / CVH 063   | Ordering code          | SD 036x072 S2V | SD 036x072 N2V | SD 036x072 E2S  | 36       | 72  | 52 | 22 | 27.5 | 3.94                   |
|   | Material number        | 20020688       | 20047530       | 20035055        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 640            | 560            | 450             |          |     |    |    |      |                        |
| VH <sup>+</sup> 080   | Ordering code          | SD 050x090 S2V | SD 050x090 N2V | SD 050x090 E2S  | 50       | 90  | 68 | 26 | 31.5 | 11.1                   |
|   | Material number        | 20020689       | 20047935       | 20047937        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 1400           | 950            | 900             |          |     |    |    |      |                        |
| VH <sup>+</sup> 100   | Ordering code          | SD 062x110 S2V | SD 062x110 N2S | SD 062x110 E2S  | 62       | 110 | 80 | 29 | 34.5 | 27                     |
|   | Material number        | 20020690       | 20047927       | 20047860        |          |     |    |    |      |                        |
|   | T <sub>2Max</sub> [Nm] | 2300           | 1540           | 1000            |          |     |    |    |      |                        |

\*Applicable to the unclamped condition. \*\* Maximum torque without axial forces. Shrink discs suitable for XP<sup>+</sup> and PKF gearboxes upon request

One shrink disk per gearhead is sufficient.  
Refer to the operating manual for information on correct shrink disc installation and additional cleaning instructions, particularly for stainless steel shrink disks.  
The instructions are enclosed with the order.

Mounting/operating manual at [www.wittenstein-alpha.de/en/](http://www.wittenstein-alpha.de/en/)

Recommendation for the load shaft:

Tolerance h6

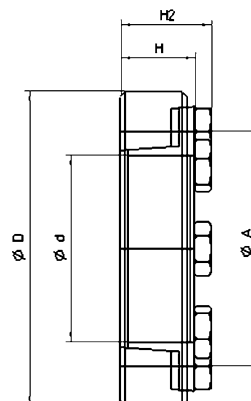
Surface roughness ≤ Rz 16

Minimum yield strength (standard) Rp 0.2 ≥ 385 N/mm<sup>2</sup>

Minimum yield strength (nickel-plated) Rp 0.2 ≥ 260 N/mm<sup>2</sup>

Minimum yield strength (stainless steel) Rp 0.2 ≥ 260 N/mm<sup>2</sup>

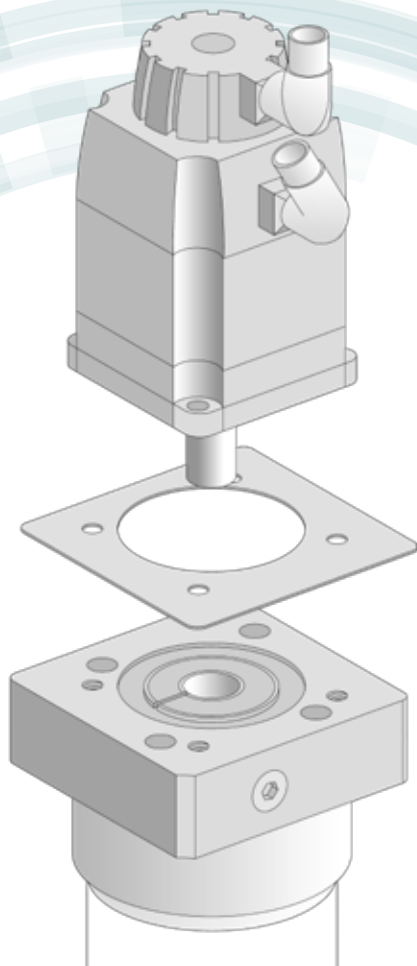
The shrink disc is not included in the scope of delivery of the gearhead. Therefore, it must be ordered separately.



# Sealing plate

## Use for applications in environments with increased volumes of dust and pollutants

The sealing plate is installed between the adapter plate and the motor. It is used if the motor flange of the motor does not fully cover the adapter plate, leaving gaps where fluids or contamination may accumulate.



## PRODUCT HIGHLIGHTS

### Universally adaptable

for the motor and the related adapter plate.

| Plate thickness | SQ               | With overlap of > 10 mm/side |
|-----------------|------------------|------------------------------|
| 1.0 mm          | 0 - 120 mm       | 1.5 mm plate thickness       |
| 1.5 mm          | >120 mm - 300 mm |                              |

Standard material: 1.4310 / X10CrNi18-8,  
non-corrosive spring steel, DIN EN 10088

## Function

Sealing plates are used in environments in which an increased level of contamination, such as dust and moisture, is expected.







### Benefits

Protection against damage of high-quality components such as gearboxes and motors due to the wear of the critical contact surfaces.

### Properties

Corrosion-free thanks to the use of non-corrosive spring steel according to DIN EN 10088.

# The WITTENSTEIN group – The company and its fields of business



**WITTENSTEIN**

With approximately 2,800 employees worldwide, the WITTENSTEIN group stands for innovation, precision and excellence in the world of mechatronic drive technology, both nationally and internationally. The group is active in six innovative fields of business. Furthermore, WITTENSTEIN group is represented by some 60 subsidiaries in around 40 countries in all important technology and sales markets worldwide.



## Our fields of expertise

### **We provide know-how for a host of different sectors:**

- Machine and plant construction
- Software development
- Aerospace
- Automotive & E-mobility
- Energy
- Oil & Gas Exploration and Production
- Medical technology
- Measurement and testing technology
- Nanotechnology
- Simulation

# The WITTENSTEIN Group



WITTENSTEIN alpha GmbH  
High-precision servo drives and linear systems



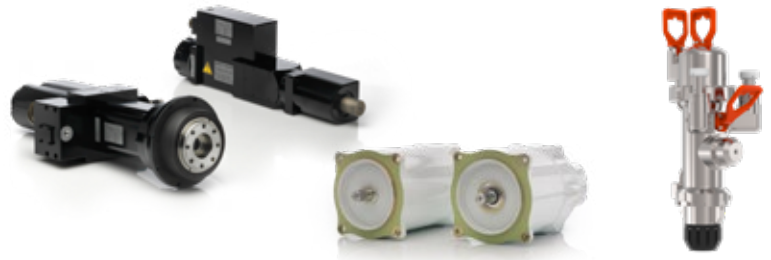
WITTENSTEIN cyber motor GmbH  
Highly dynamic servo motors and drive electronics



WITTENSTEIN galaxie GmbH  
Superior gearboxes and drive systems



WITTENSTEIN motion control GmbH  
Drive systems for the most extreme environmental requirements



attocube systems AG  
Nanoprecision drive and measurement technology solutions

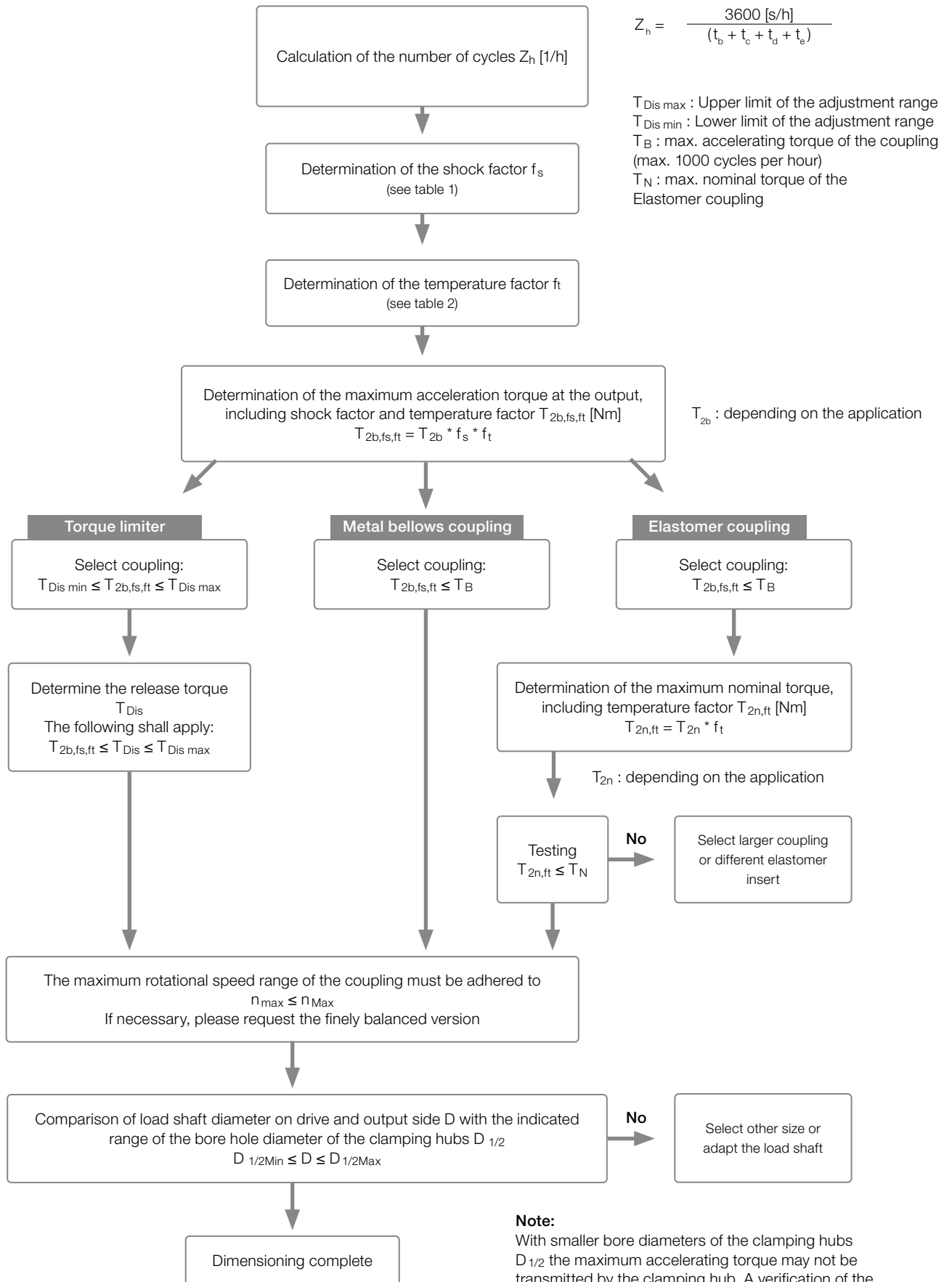


baramundi software GmbH  
Secure management of the IT infrastructure in offices and production



**WITTENSTEIN – one with the future**

# Detailed design - coupling



$$Z_h = \frac{3600 \text{ [s/h]}}{(t_b + t_c + t_d + t_e)}$$

$T_{Dis \text{ max}}$  : Upper limit of the adjustment range  
 $T_{Dis \text{ min}}$  : Lower limit of the adjustment range  
 $T_B$  : max. accelerating torque of the coupling (max. 1000 cycles per hour)  
 $T_N$  : max. nominal torque of the Elastomer coupling

$T_{2b}$  : depending on the application

$T_{2n}$  : depending on the application

**Note:**  
 With smaller bore diameters of the clamping hubs  $D_{1/2}$  the maximum accelerating torque may not be transmitted by the clamping hub. A verification of the maximum transmittable torques is possible with cymex®. If necessary, please use a key.

### Shock factor $f_s$

| Number of cycles<br>$Z_h$ [1/h] | Metal bellow couplings and torque limiters | Elastomer couplings |
|---------------------------------|--|---------------------|
| < 1000                          | 1.0  | 1.0                 |
| < 2000                          | 1.1  | 1.2                 |
| < 3000                          | 1.2  | 1.4                 |
| < 4000                          | 1.8  | 1.8                 |
| > 4000                          | 2.0  | 2.0                 |

Table 1: Shock factor

### Temperature factor $f_t$

| Temperature [°C] | Elastomer insert |     |     | Metal bellows |
|------------------|------------------|-----|-----|---------------|
|                  | A                | B   | C   |               |
| > -30 to -10     | 1.5              | 1.3 | 1.4 | 1.0           |
| > -10 to +30     | 1.0              | 1.0 | 1.0 | 1.0           |
| > +30 to +40     | 1.2              | 1.1 | 1.3 | 1.0           |
| > +40 to +60     | 1.4              | 1.3 | 1.5 | 1.0           |
| > +60 to +80     | 1.7              | 1.5 | 1.8 | 1.0           |
| > +80 to +100    | 2.0              | 1.8 | 2.1 | 1.0           |
| > +100 to +120   | -                | 2.4 | -   | 1.0           |

Table 2: Temperature factor

## Notes

### Resonance frequency

Couplings reduce the rigidity of the drive train. Therefore, the drive train with cymex® should be checked for its natural frequency and thus resonance-resulting overloads should be avoided. If you have any further questions, please consult the technical support of WITTENSTEIN alpha.

### Maximum misalignments:

Admissible misalignments (axial, angular, lateral) for shaft extensions must be complied with since, otherwise, an overload of the coupling and adjacent components may occur.

### Emergency stop torque:

If there is a need for the transmission of EMERGENCY STOP situations, it is recommended using torque limiters (TL1, TL2 and TL3) to protect the other drive components and thereby increase the service life.

The models BCL, BC2, BC3 and BCH can briefly transmit the 1.5 fold of  $T_B$  of the coupling (corresponds to  $T_{Emer}$ ). In this respect, please observe the notes of the corresponding catalog page.

With TL1 with the function system "Blocked", a 2-fold load securing is guaranteed. The models TL2 and TL3 are to be dimensioned sufficiently: The blocking load may not exceed the nominal torque of the coupling.

### Shaft - hub fitting clearance:

0.01 - 0.05 mm

In order to reach this fitting tolerance between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft k6.

# Glossary – alphabetical

## Acceleration torque ( $T_{2B}$ )

The acceleration torque  $T_{2B}$  is the torque that the gearbox toothings can permanently transmit. To calculate the acceleration torque, an  $\rightarrow$  **coefficient of impact** which is appropriate for the application must also be taken into account.

## Adapter plate

WITTENSTEIN alpha uses a system of standardized adapter plates for connecting the motor and gearbox. This makes it as simple as possible to attach motors from any manufacturer to WITTENSTEIN alpha gearboxes.

## Angle of rotation

Angle by which the connection element of the coupling rotates under the torque load. The admissible angle of rotation for torsionally rigid couplings is  $< 0.05^\circ$  and for vibration-damping couplings  $< 5^\circ$ .

## Angular minute

A degree is subdivided into 60 angular minutes (= 60 arcmin =  $60'$ ).

Example:

If the backlash is  $j_t = 1$  arcmin, the output may rotate by  $1/60^\circ$ . The impacts on the application are determined by the arc length:  $b = 2 \cdot \pi \cdot r \cdot \alpha^\circ / 360^\circ$ .

Example:

A pinion with a radius  $r = 50$  mm mounted on a gearbox with a backlash of  $j_t = 3$  arcmin can be rotated by  $b = 0.04$  mm.

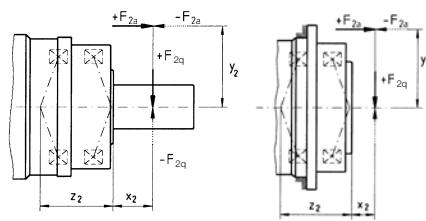
## Angular misalignment

Angular misalignment of drive and output shaft. In most cases due to assembly. Causes an increased strain on the coupling.

## Axial force ( $F_{2AMax}$ )

An axial force on a gearbox runs parallel to its output shaft or perpendicular to its output flange. Under certain circumstances, it acts offset from the axis with a lever arm  $y_2$ . In this case, it also creates a bending moment. If the axial force exceeds the permissible catalog values (max. axial force  $F_{2AMax}$ ), an additional component (e.g. axial bearing) must be provided to absorb these forces.

Example with output shaft and flange:



## Axial misalignment

Length variation along the longitudinal axes of the drive and output shaft. Generally caused by thermal expansion.

## Axial spring rigidity ( $C_a$ )

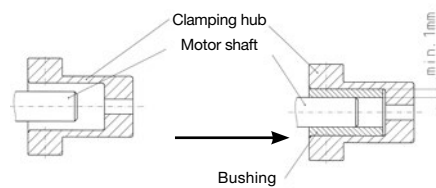
Counter-force of the coupling in the event of axial misalignment [N/mm]. This additional force should be taken into consideration in the sizing of the drive train and bearings.

## Backlash-free

Changes in the rotational speed, direction of rotation or torque do not cause any backlash and thus no shocks in the coupling. However, it should be noted that an  $\rightarrow$  **angle of rotation** still occurs.

## Bushing

If the diameter of the motor shaft is smaller than the  $\rightarrow$  **clamping hub**, a bushing is used to compensate for the difference in diameter. A minimum wall thickness of 1 mm and a motor shaft diameter of 2 mm difference are required.



## CAD POINT

Performance data, dimension sheets and CAD data for all gearboxes can be found online in our CAD POINT, including clear documentation of the selection. ([www.wittenstein-cad-point.com](http://www.wittenstein-cad-point.com))

## Clamping hub (couplings)

The clamping hub ensures a friction contact connection between the coupling and the gearbox shaft as well as with the application. Clamping hubs are available in all motor shaft diameters; therefore, a bushing as connection piece is not required and also not recommended. Optionally, a form fit connection via a key is also possible.

## Clamping hub (gearbox)

The clamping hub ensures a friction contact connection between the motor shaft and gearbox. If the diameter of the motor shaft is smaller than the diameter of the clamping hub, a  $\rightarrow$  **bushing** is used as a connection piece.

For gearboxes in the alpha Advanced Line and the alpha Premium Line, a form fit connection via a key is also possible.

## Connection between the clamping hub and the metal bellows

For metal bellows couplings which transmit torques of up to 500 Nm, the stainless steel bellow is bonded onto the clamping hub. In the event of higher torques, the connection is welded.

## Continuous operation (S1)

In continuous operation, it is particularly important to ensure that the maximum gearbox temperature is maintained (see temperature behavior). For optimum drive behavior in continuous operation, we recommend our HIGH SPEED gearbox model.

## Cyclic operation (S5)

The cyclic operation is defined via the  $\rightarrow$  **duty cycle**. If the duty cycle is less than 60% and shorter than 20 minutes, it qualifies as cyclic operation ( $\rightarrow$  **operating modes**).

## cymex®

cymex® is the calculation software developed by our company for dimensioning complete drive trains. The software enables the precise simulation of motion and load variables. The software is available to download from our website ([www.wittenstein-cymex.de](http://www.wittenstein-cymex.de)). We can also provide training to enable you to make full use of all the possibilities provided by the software.

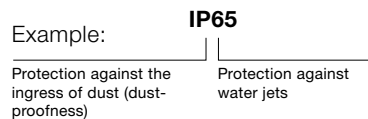
## cymex® select

The cymex® select quick layout tool from WITTENSTEIN alpha allows for efficient and innovative product selection in seconds and is available online.

You get suitable recommendations for your application and your motor in no time based on technical and economic suitability. ([cymex-select.wittenstein-group.com](http://cymex-select.wittenstein-group.com))

## Degrees of protection (IP)

The various degrees of protection are defined in DIN EN 60529 “Degrees of protection offered by enclosures (IP code)”. The IP degree of protection (International Protection) is represented by two digits. The first digit indicates the protection against the ingress of impurities and the second is the protection against the ingress of water.



## Disengagement torque ( $T_{Dis}$ )

Adjustable torque of torque limiters with which the coupling separates the drive and output side of the system.

## Duty cycle (DC)

The cycle determines the duty cycle (DC). The times for acceleration ( $t_a$ ), constant travel if applicable ( $t_c$ ) and deceleration ( $t_d$ ) combined yield the duty cycle in minutes.

The duty cycle is expressed as a percentage with inclusion of the dwell time  $t_e$ .

$$DC [\%] = \frac{\left[ \frac{t_b + t_c + t_d}{t_b + t_c + t_d + t_e} \right] \cdot 100}{\frac{\text{Motion duration}}{\text{Cycle time}}}$$

$$DC [\text{min}] = t_b + t_c + t_d$$

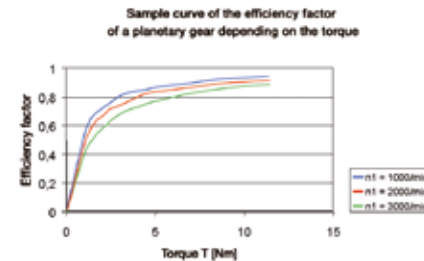
## Dynamic torsional rigidity ( $C_{Tdyn}$ )

Torsional rigidity with  $T_N$

## Efficiency ( $\eta$ )

The efficiency [%]  $\eta$  is the ratio of output power to input power. Power lost through friction reduces efficiency to less than 1 or 100%.

$$\eta = P_{\text{off}} / P_{\text{on}} = (P_{\text{on}} - P_{\text{loss}}) / P_{\text{on}}$$



WITTENSTEIN alpha always indicates the efficiency of a gearbox during operation at full load. If the input power or torque is lower, the efficiency rating is also lower due to the constant no-load torque. Power losses do not increase as a result. A lower efficiency is also to be expected at high speeds (see figure).

## Emergency stop torque ( $T_{2Emer}$ )

The emergency stop torque  $T_{2Emer}$  is the maximum permissible torque at the gearbox output. It must not be reached more than 1000 times during the service life of the gearbox. It must never be exceeded! The following cases in particular should be checked: controlled emergency stop, power failure, brake application, and crash.



## Ex symbol

Devices bearing the Ex symbol comply with EU Directive 94 / 9 / EC (ATEX) and are approved for use in defined explosion-hazardous zones.

Detailed information on the explosion group and category, as well as further information on the respective gearbox, is available upon request.

## Food-grade lubrication (F)

These products are designed with food-grade lubrication and can therefore be used in the food industry. It is important to note the reduction in torque compared to the standard. (V-Drive excluded). See cymex® 5 or the CAD POINT for the exact torques.

## HIGH SPEED (MC)

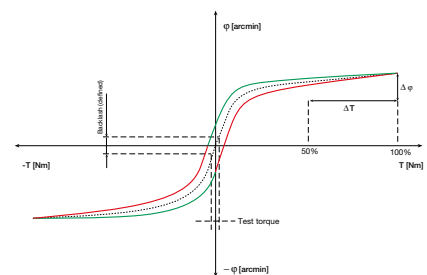
The HIGH SPEED version of our gearbox has been specifically developed for applications in continuous operation at high input speeds. It is used, for example, in the printing and the packaging industry.

## HIGH TORQUE (MA)

WITTENSTEIN alpha gearboxes are also available in a HIGH TORQUE version. These gearboxes are particularly suitable for applications requiring extremely high torques and maximum rigidity.

## Hysteresis curve

The hysteresis is measured to determine the torsional rigidity of a gearbox. The result of this measurement is known as the hysteresis curve.



If the input shaft is locked, the gearbox is continuously loaded and relieved at the output in both directions of rotation up to a defined torque. The angle of rotation is plotted against the torque. This yields a closed curve from which the **→ backlash** and **→ torsional rigidity** can be calculated.

## Jerk ( $j$ )

The jerk is the derivative of the acceleration with respect to time, that is, the change in acceleration in a unit of time. It is referred to as a shock if the acceleration curve shows a jump, i.e. the jerk is infinitely large.

## Lateral force ( $F_{2QMax}$ )

The maximum lateral force  $F_{2QMax}$  [N] is the force component that acts perpendicular to the output shaft or parallel to the output flange. It acts perpendicular to the **→ axial force** and can have an axial distance  $x_2$  to the shaft shoulder or to the shaft flange that acts as a lever arm. The lateral force creates a side load (also see **→ axial force**).

# Glossary – alphabetical

## Lateral misalignment

Parallel misalignment of the drive and output shaft. Causes an additional strain on the bearings and other components of the drive train.

## Lateral spring rigidity (C)

Counter-force of the coupling in the event of lateral misalignment [N/mm]. This additional force should be taken into consideration in the sizing of the drive train and bearings.

## Mass moment of inertia (J)

The mass moment of inertia J [kg/cm<sup>2</sup>] is a measurement of the effort applied by an object to maintain its momentary condition (at rest or moving).

## Maximum torque (T<sub>2α</sub>)

T<sub>2α</sub> represents the maximum torque that can be transmitted by the gearbox. Depending on application-specific boundary conditions and the precise evaluation of the motion profile, the gearbox may be operated with a maximum torque T<sub>2b,fs</sub> above the specified maximum acceleration torque T<sub>2B</sub> (See diagram 3.) For detailed sizing, please use cymex cymex®

$$T_{2\alpha} \geq T_{2b,fs} \geq T_{2B}$$

## No-load running torque (T<sub>012</sub>)

The no-load running torque T<sub>012</sub> is the torque which must be applied to a gearbox in order to overcome the internal friction; it is therefore considered lost torque. The WITTENSTEIN alpha catalog values are determined at a speed n<sub>1</sub>=3.000 min<sup>-1</sup> and an ambient temperature of 20°C.

$$T_{012}: \begin{array}{cc} 0 & 1 \rightarrow 2 \\ \text{no load} & \text{from input side toward} \\ & \text{output side} \end{array}$$

No-load running torques decrease during operation.

## NSF

Lubricants certified as grade H1 by the NSF (National Sanitation Foundation) can be used in the food sector where occasional unavoidable contact with food cannot be excluded.

## Operating modes (continuous operation S1 and cyclic operation S5)

Gearboxes are selected depending on whether the motion profile is characterized by frequent acceleration and deceleration phases in → **cyclic operation** (S5) as well as dwell times, or whether it is designed for → **continuous operation** (S1), i.e. with long phases of constant motion.

## Operating noise (L<sub>PA</sub>)

The gear ratio and speed influence the operating noise. As a general rule, the higher the speed, the higher the operating noise and the higher the gear ratio, the lower the operating noise. Our catalog specifications refer to a reference gear ratio and speed. The reference speed is n<sub>1</sub> = 3000 rpm or n<sub>1</sub> = 2000 rpm, depending on the size of the gearbox Ratio-specific values can be found in cymex® - [www.wittenstein-cymex.com](http://www.wittenstein-cymex.com)

## Output shaft revolution (f<sub>α</sub>)

The factor f<sub>α</sub> determines the number of service life cycles for the required service life of the gearbox. It describes the number of revolutions at the output to assess the permissible torque at the output.

## Positioning accuracy

The positioning accuracy is determined by the angular deviation from the setpoint and is the sum of the load-dependent → **(torsional rigidity and torsional backlash)** and kinematic → **(synchronization)** angles of rotation that occur simultaneously in practice.

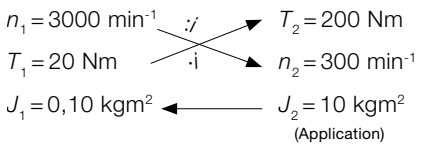
## Quality control

All Premium and Advanced gearboxes at WITTENSTEIN alpha are subjected to an outgoing inspection before they leave the factory. This ensures that every gearbox is delivered within specification.

## Ratio (i)

The ratio i indicates the factor by which the gearbox transforms the three relevant parameters of motion (speed, torque and mass moment of inertia).

The factor is a result of the geometry of the toothing elements (example.: i=10).



## Ratio of mass moment of inertia (λ = lambda)

The ratio of mass moment of inertia λ is the ratio of external inertia (application side) to internal inertia (motor and gearbox side). It is an important parameter determining the controllability of an application. Accurate control of dynamic processes becomes more difficult with increased differing mass moments of inertia and as λ becomes greater. WITTENSTEIN alpha recommends that a guideline value of λ < 5 is maintained. A gearbox reduces the external mass moment of inertia by a factor of 1/i<sup>2</sup>.

$$\lambda = \frac{J_{external}}{J_{internal}}$$

J<sub>external</sub> reduced to input:

$$J'_{external} = J_{external} / i^2$$

Simple applications ≤ 10  
Dynamic applications ≤ 5  
Highly dynamic applications ≤ 1

## Safety instruction

For applications with special safety requirements (e.g. vertical axes, distorted gear inputs) we recommend exclusively employing our Premium and Advanced products (V-Drive excluded).



## Servo actuators

In addition to a high-precision planetary gearbox, the servo actuator is equipped with a powerful, permanent magnet synchronous servo motor, which ensures high power density and a high speed stability thanks to the distributed winding. This enables even more compact and powerful linear drives to be realized. The investment costs for the drive train and the ongoing operating costs can be positively influenced by downsizing. The goal is to achieve a smaller input and therefore a smaller servo controller and lower energy consumption with the same productivity. A low mass moment of inertia combined with higher rigidity is the way to achieve this.

## Shaft misalignment

One main function of the coupling is the compensation of the shaft misalignment which occurs in almost all applications between the drive and the output side. A distinction is made between →axial, →lateral- and →angular misalignment. When complying with the indicated maximum misalignment, the couplings are safe for the duration of their service life.

## Shock factor ( $f_s$ ) (gearbox)

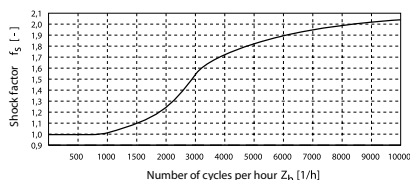
The maximum admissible acceleration torque ( $T_{2B}$ ) indicated in the catalog in cyclic operation applies to less than 1000 cycles/h. Greater numbers of cycles in connection with shorter acceleration times can lead to oscillations in the drive train. The resulting excessive torque increases are taken into consideration with the shock factor  $f_s$ .

WITTENSTEIN alpha suggests taking these unknown overloads into account using the following curve.

This determined value is multiplied by the actual acceleration torque  $T_{2b}$  before it is compared with the maximum permissible acceleration torque  $T_{2B}$ .

$$(T_{2b} \cdot f_s = T_{2b}', f_s < T_{2B})$$

The following applies to gearboxes:



The following applies to couplings:

| Number of cycles $Z_n$ [1/h] | Metal bellow couplings and torque limiters | Elastomer couplings |
|------------------------------|--|---------------------|
| < 1000                       | 1.0  | 1.0                 |
| < 2000                       | 1.1  | 1.2                 |
| < 3000                       | 1.2  | 1.4                 |
| < 4000                       | 1.8  | 1.8                 |
| > 4000                       | 2.0  | 2.0                 |

## Slipping torque

With a smaller clamping hub diameter, it is possible that the transmittable torque of the shaft-hub connection is lower than the maximum accelerating torque  $T_B$  of the coupling. In particular, this is applicable to the series BC3, BCT Standard, EL6 and ELC. More detailed information is available on request.

## Speed ( $n$ )

The permitted maximum speed  $n_{1max}$  must be compared with the maximum speed  $n_{1max}$  during operation. The maximum permissible speed  $n_{1max}$  must not be exceeded at any time.

The average speed  $n_{1m}$  is determined as the arithmetic mean of the speeds in the cycle or over a maximum of 20 minutes. It must be below the permitted nominal speed  $n_{1N}$  at all times. This applies to both cyclic and continuous operation.

$$n_{1m} = \frac{|n_{1,0}| \cdot t_0 + \dots + |n_{1,n}| \cdot t_n}{t_0 + \dots + t_n} \text{ with } \sum_0^n t_n \leq 20 \text{ min incl. pause time}$$

WITTENSTEIN alpha determines the thermal speed limit or thermal limit of the nominal speed in the laboratory at an ambient temperature of 20°C while maintaining a gearbox temperature of 90°C.

## speedline® delivery

If required, standard series can be delivered within 24 or 48 hours ex works. Fast deliveries at short notice thanks to a high level of flexibility

## Spring rigidity (C)

Counter-force of the coupling in the event of axial or lateral misalignment [N/mm]. A distinction is made between →axial and →lateral spring rigidity.

## Static torsional rigidity ( $C_{Tstat}$ )

Torsional rigidity at 50 %  $T_N$

## Synchronous run

The synchronous run refers to the measurable variation in speed between the input and output during one revolution of the output shaft. It is caused by manufacturing tolerances and results in ratio fluctuations within one revolution.

## Technical data

Further technical data for our complete product portfolio is available to download from our website.

## Temperature factor ( $f_t$ )

With elastomer couplings, the ambient temperature impacts the maximum admissible accelerating torque of the coupling. This is taken into consideration in the coupling design by means of the temperature factor  $f_t$ . The temperature factor depending on the elastomer insert used can be determined by means of the table.

| Temperature °C | Elastomer insert |     |     | Metal bellows |
|----------------|------------------|-----|-----|---------------|
|                | A                | B   | C   |               |
| > -30 to -10   | 1.5              | 1.3 | 1.4 | 1.0           |
| > -10 to +30   | 1.0              | 1.0 | 1.0 | 1.0           |
| > +30 to +40   | 1.2              | 1.1 | 1.3 | 1.0           |
| > +40 to +60   | 1.4              | 1.3 | 1.5 | 1.0           |
| > +60 to +80   | 1.7              | 1.5 | 1.8 | 1.0           |
| > +80 to +100  | 2.0              | 1.8 | 2.1 | 1.0           |
| > +100 to +120 | -                | 2.4 | -   | 1.0           |

# Glossary – alphabetical

## Thermal behavior - temperature

It is necessary to measure the maximum temperature of the gearbox in the application.

The gearbox temperature is significantly influenced by the following application-specific factors:

- Load spectrum with nominal torque and nominal speed
- Motor temperature (e.g. heat input from the motor)
- Heat dissipation to the machine interface (e.g. mounting on a stainless steel structure or very thin mounting plates)
- Convection (e.g. convection prevented by installation location)
- Ambient temperature (e.g. excessively high ambient temperature of the air and the mechanical interface parts)

If the permissible gearbox temperature is exceeded, the service life of the gearbox is reduced considerably.

## Tilting moment ( $M_{2k}$ )

The tilting moment  $M_{2k}$  is a result of the → **axial and lateral forces** applied and their respective force application points in relation to the inner radial bearing on the output side.

## Tilting rigidity

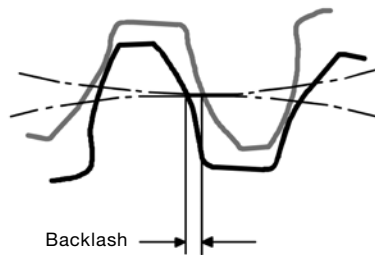
The tilting rigidity  $C_{2k}$  of the gearbox is made up of the bending rigidity of the output or pinion shaft and the bearing stiffness of the output bearing. It is defined as a quotient of the tilting moment  $M_{2k}$  [Nm] and tilting angle  $\Phi$  [arcmin] ( $C_{2k} = M_{2k} / \Phi$ ).

## Tooth engagement frequency ( $f_z$ )

In certain circumstances, the tooth engagement frequency can lead to vibration problems in the application, specifically if the excitation frequency corresponds to a natural frequency of the applications. For planetary gearboxes from WITTENSTEIN alpha (exception: gearboxes with ratio  $i = 8$ ) the tooth engagement frequency can be calculated using the formula  $f_z = 1,8 \cdot n_2$  [min<sup>-1</sup>]. It is independent of the ratio in planetary gearboxes from Wittenstein alpha. If it does prove problematic, either the natural frequency of the system can be changed or a different gearbox (e.g. hypoid gearbox) with a different tooth engagement frequency can be chosen.

## Torsional backlash ( $j_t$ )

Torsional backlash  $j_t$  [arcmin] describes the maximum angle of rotation of the output shaft in relation to the input. In simple terms, the torsional backlash describes the distance between two tooth flanks.

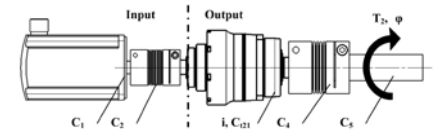


The measurement is taken with the input shaft blocked.

The output is then loaded with a defined test torque in order to overcome the internal gearbox friction. The main influence of the backlash is the flank backlash between the teeth. The low torsional backlash of the WITTENSTEIN alpha gearbox is achieved through high manufacturing precision and selective combination of the toothed wheels.

## Torsional rigidity ( $C_{t21}$ ) (gearbox)

The torsional rigidity [Nm/arcmin]  $C_{t21}$  is defined as the quotient of applied torque and resulting angle of rotation ( $C_{t21} = \Delta T / \Delta \Phi$ ). It indicates the torque required to turn the output shaft by one angular minute. The torsional rigidity can be determined using the → **hysteresis curve** Torsional rigidity  $C$ , angle of rotation  $\Phi$



Reduce all torsional rigidity to the output:

$$C_{(n),ab} = C_{(n),an} \cdot i^2$$

with  $i$  = gearbox ratio [ - ]

$C_{(n)}$  = Individual rigidities [Nm/arcmin]

Note: The torsional rigidity  $C_{t21}$  for the gearbox always relates to the output.

Series connection of torsional rigidities

$$1/C_{ges} = 1/C_{1,ab} + 1/C_{2,ab} + \dots + 1/C_{(n)}$$

Angle of rotation  $\Phi$  [arcmin]

$$\Phi = T_2 \cdot 1/C_{ges}$$

with  $T_2$  = output torque [Nm]

## Torsional rigidity ( $C_T$ ) (couplings)

The torsional rigidity [Nm/arcmin]  $C_T$  is defined as the quotient of applied torque and resulting angle of rotation. It shows the torque required to turn the two clamping hubs against each other by one angular minute. If the maximum value is exceeded, the coupling can no longer transmit the applied torque since the → **angle of rotation** of the coupling becomes too large. A distinction is made between → **static** and → **dynamic torsional rigidity**.

## Torque ( $T_{2\alpha}$ )

$T_{2\alpha}$  represents the maximum torque that can be transmitted by the gearbox. This value may be reduced depending on application-specific boundary conditions and the precise evaluation of the motion profile.



# Glossary – Formulae

## Formulae

|   |  |   |
|---|--|---|
| <b>Torque [Nm]</b>                            | $T = J \cdot \alpha$                             | $J$ = Mass moment of inertia [kgm <sup>2</sup> ]<br>$\alpha$ = Angular acceleration [1/s <sup>2</sup> ] |
| <b>Torque [Nm]</b>                            | $T = F \cdot l$                                  | $F$ = Force [N]<br>$l$ = Lever, length [m]  |
| <b>Acceleration force [N]</b>                 | $F_b = m \cdot a$                                | $m$ = Mass [kg]<br>$a$ = Linear acceleration [m/s <sup>2</sup> ]  |
| <b>Frictional force [N]</b>                   | $F_{\text{Reib}} = m \cdot g \cdot \mu$          | $g$ = Acceleration due to gravity 9.81 m/s <sup>2</sup><br>$\mu$ = Coefficient of friction              |
| <b>Angular speed [1/s]</b>                    | $\omega = 2 \cdot \pi \cdot n / 60$              | $n$ = Speed [rpm]<br>$\pi$ = PI = 3.14...   |
| <b>Linear speed [m/s]</b>                     | $v = \omega \cdot r$                             | $v$ = Linear speed [m/s]<br>$r$ = Radius [m]  |
| <b>Linear speed [m/s] (spindle)</b>           | $v_{\text{sp}} = \omega \cdot h / (2 \cdot \pi)$ | $h$ = Screw pitch [m]   |
| <b>Linear acceleration [m/s<sup>2</sup>]</b>  | $a = v / t_b$                                    | $t_b$ = Acceleration time [s]   |
| <b>Angular acceleration [1/s<sup>2</sup>]</b> | $\alpha = \omega / t_b$                          |   |
| <b>Pinion path [mm]</b>                       | $s = m_n \cdot z \cdot \pi / \cos \beta$         | $m_n$ = Normal module [mm]<br>$z$ = Number of teeth [-]<br>$\beta$ = Helix angle [°]                    |

## Conversion table

|                           |  |
|---------------------------|--|
| <b>1 mm</b>               | = 0.039 in                                     |
| <b>1 Nm</b>               | = 8.85 in.lb                                   |
| <b>1 kgcm<sup>2</sup></b> | = 8.85 x 10 <sup>-4</sup> in.lb.s <sup>2</sup> |
| <b>1 N</b>                | = 0.225 lb <sub>f</sub>                        |
| <b>1 kg</b>               | = 2.21 lb <sub>m</sub>                         |

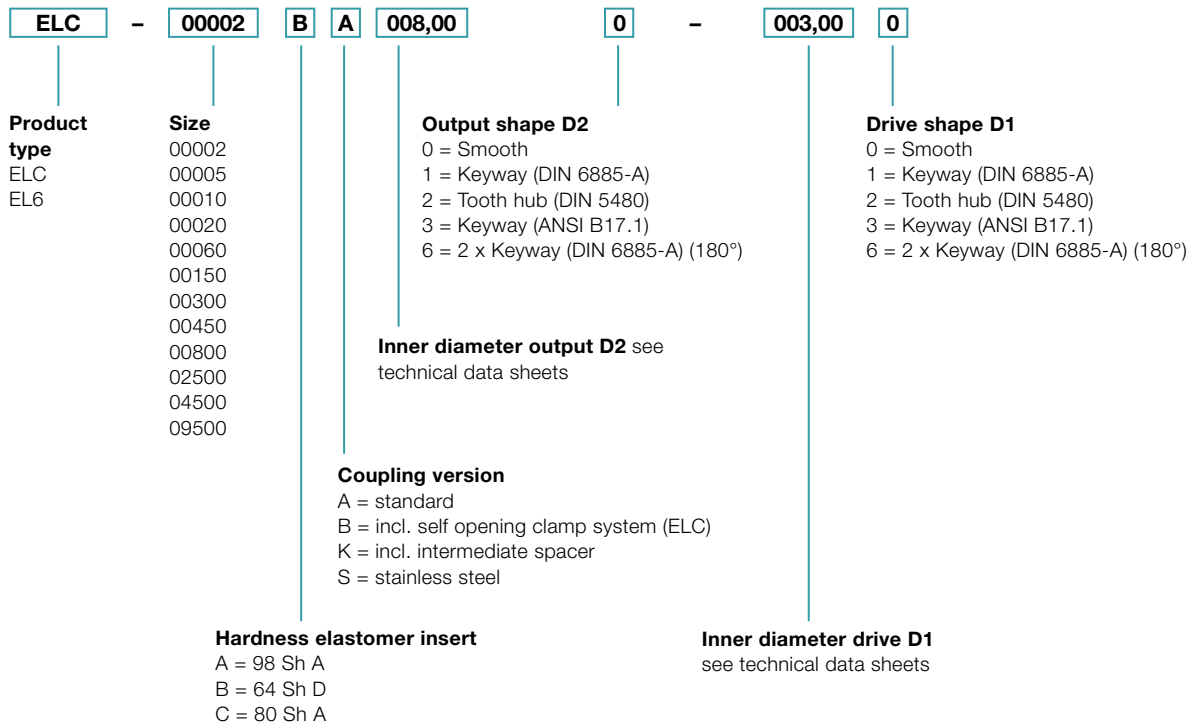
## Symbol

| Symbol   | Unit             | Designation                      |
|----------|------------------|----------------------------------|
| $C$      | Nm/arcmin        | Stiffness                        |
| $ED$     | %, min           | Duty cycle                       |
| $F$      | N                | Force                            |
| $f_s$    | –                | Shock factor                     |
| $f_e$    | –                | Factor for duty cycle            |
| $i$      | –                | Ratio                            |
| $j$      | arcmin           | Backlash                         |
| $J$      | kgm <sup>2</sup> | Mass moment of inertia           |
| $K1$     | Nm               | Factor for bearing calculation   |
| $L$      | h                | Service life                     |
| $L_{PA}$ | dB(A)            | Operating noise                  |
| $m$      | kg               | Mass                             |
| $M$      | Nm               | Torque                           |
| $n$      | rpm              | Speed                            |
| $p$      | –                | Exponent for bearing calculation |
| $\eta$   | %                | Efficiency                       |
| $t$      | s                | Time                             |
| $T$      | Nm               | Torque                           |
| $v$      | m/min            | Linear speed                     |
| $z$      | 1/h              | Number of cycles                 |

## Index

| Index          | Designation        |
|----------------|--------------------|
| Capital letter | Permissible values |
| Small letter   | Actual values      |
| 1              | Input              |
| 2              | Output             |
| A/a            | Axial              |
| B/b            | Acceleration       |
| c              | Constant           |
| d              | Deceleration       |
| e              | Pause              |
| h              | Hours              |
| K/k            | Tilting            |
| m              | Mean               |
| Max/max        | Maximum            |
| Mot            | Motor              |
| N              | Nominal            |
| Not/not        | Emergency stop     |
| 0              | No load            |
| Q/q            | Lateral            |
| t              | Torsional          |
| T              | Tangential         |

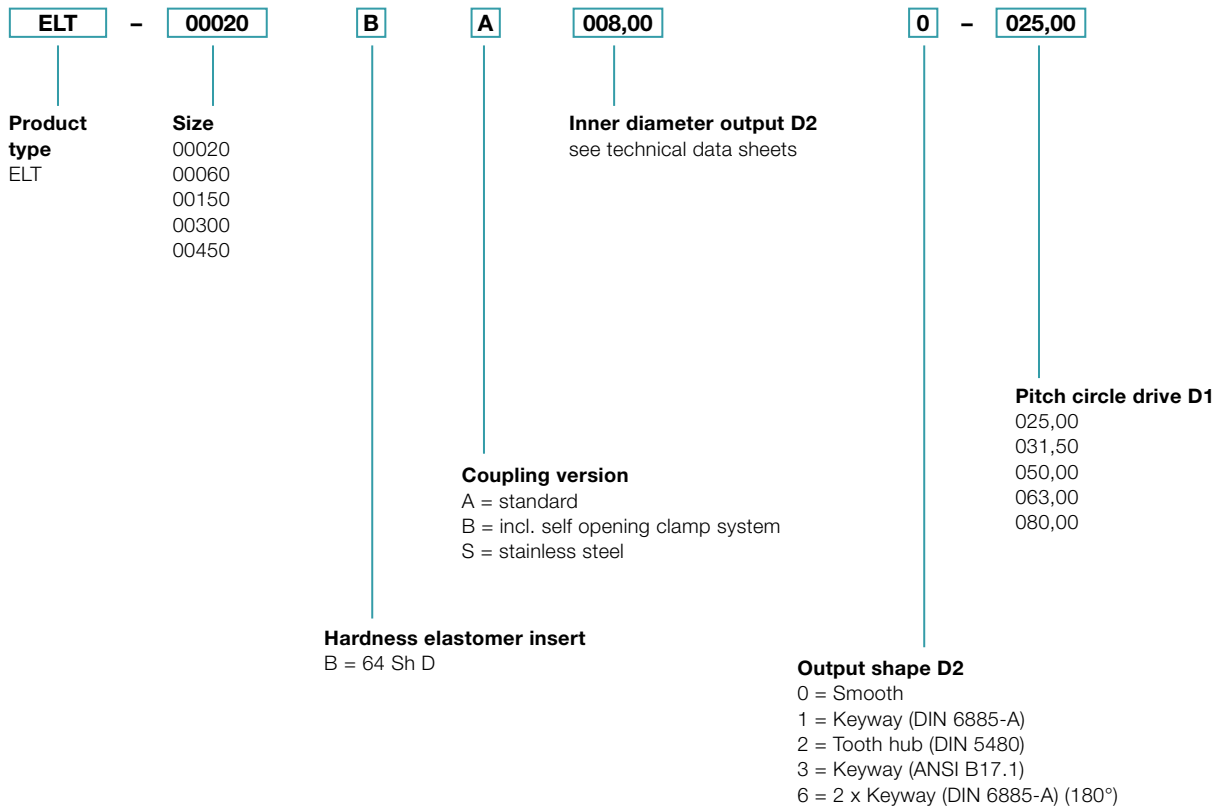
# Ordering codes – Elastomer couplings



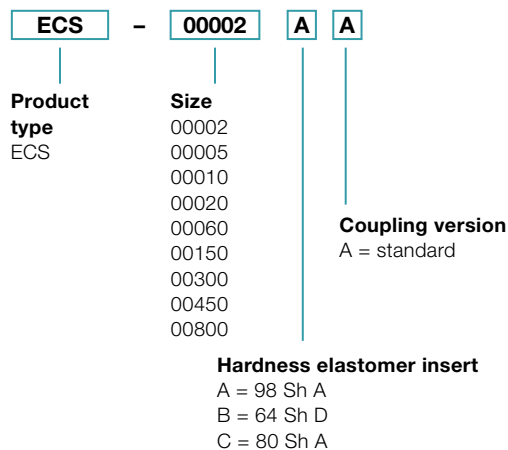
**Note:**  
 In case of different inner diameters of the clamping hubs, the respective larger one is to be defined as output D 2

For information purposes only – not required when placing orders!  
 Please contact WITTENSTEIN alpha for deviating mounting positions.

# Ordering codes – Elastomer couplings ELT

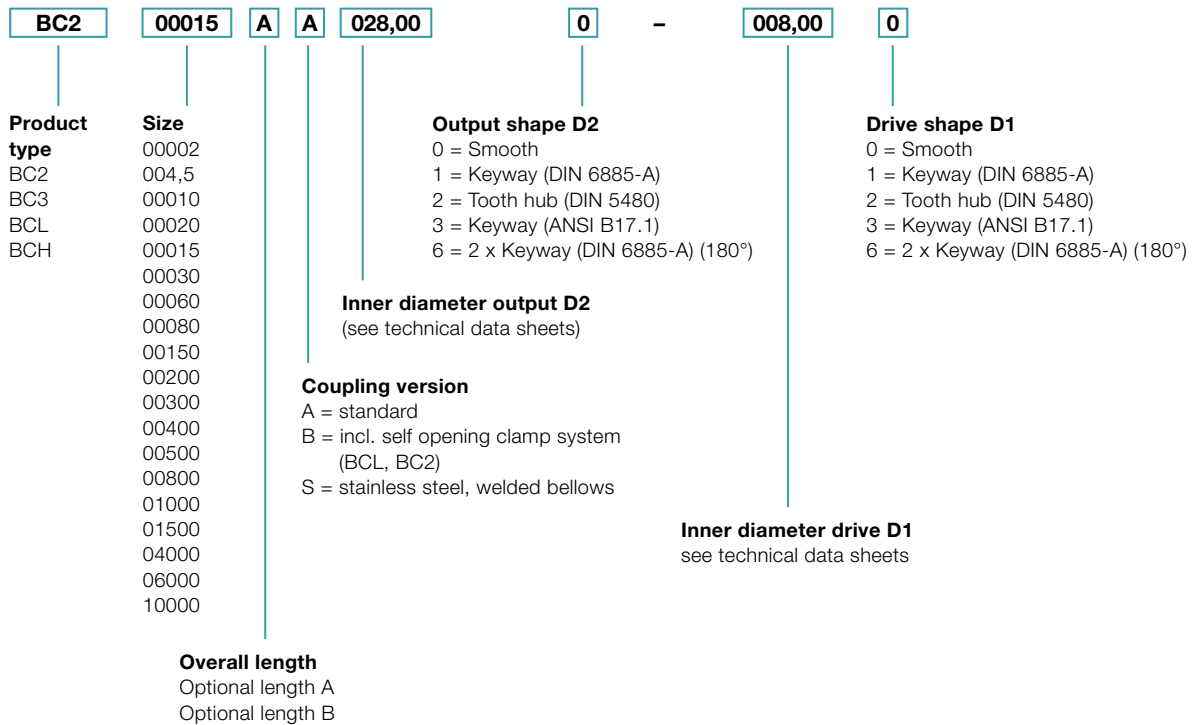


# Ordering codes – Intermediate spacer



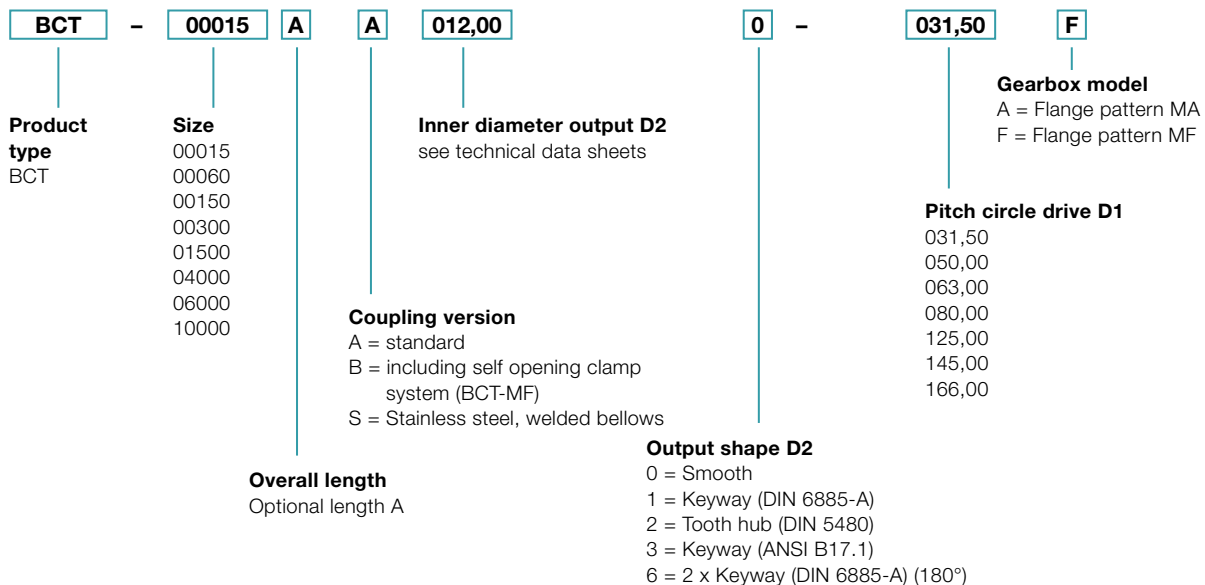
For information purposes only – not required when placing orders!  
Please contact WITTENSTEIN alpha for deviating mounting positions.

# Ordering codes – Metal bellows couplings



**Note:**  
 In case of different inner diameters of the clamping hubs, the respective larger one is to be defined as output D 2

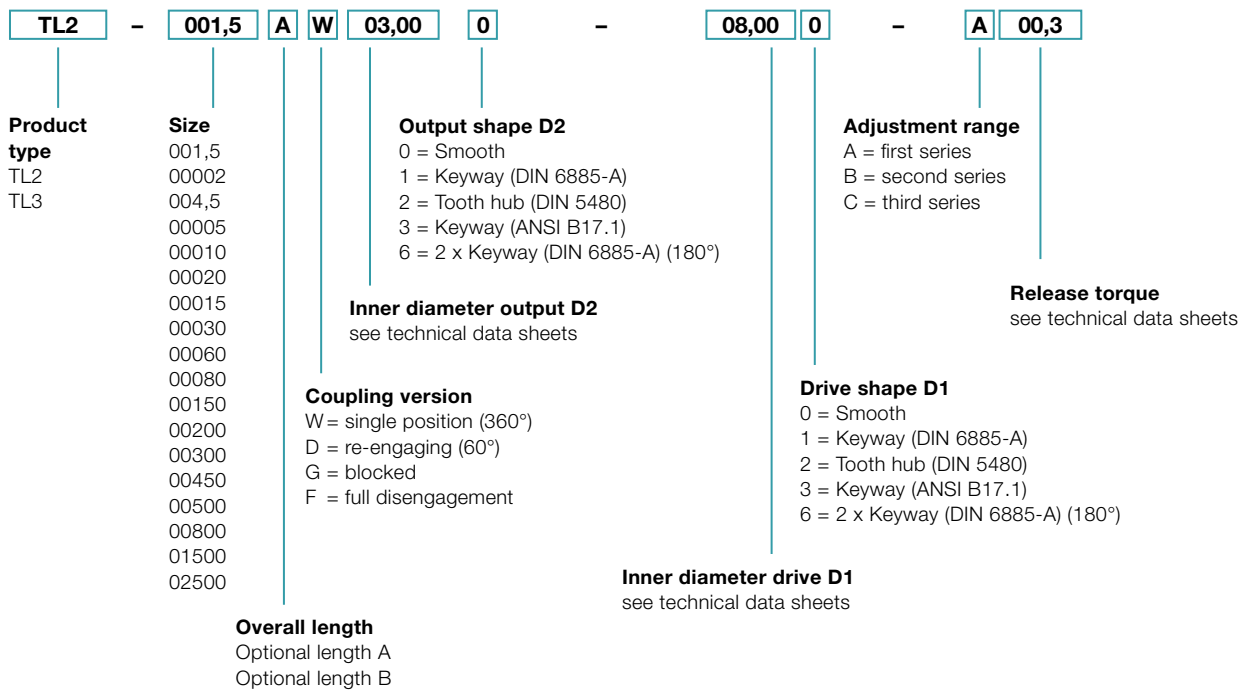
# Ordering codes – Metal bellows couplings BCT



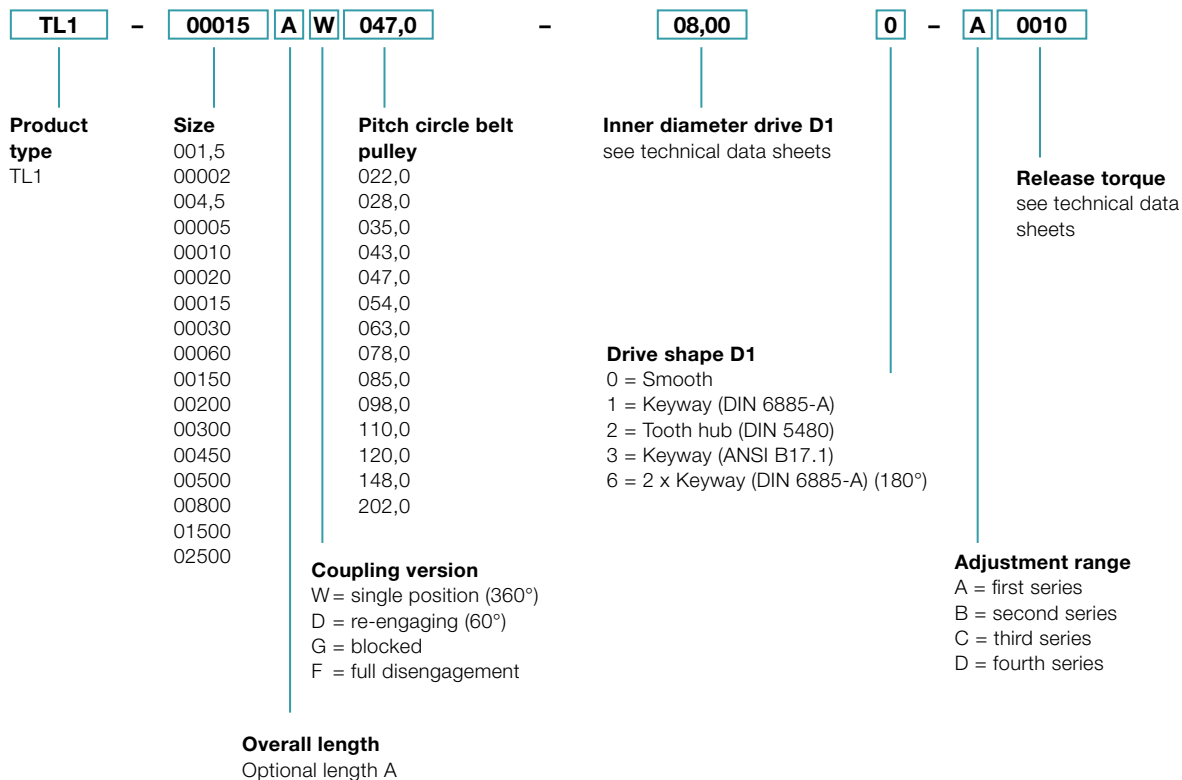
For information purposes only – not required when placing orders!  
 Please contact WITTENSTEIN alpha for deviating mounting positions.



# Ordering codes – Torque limiters



# Ordering codes – Torque limiters TL1



For information purposes only – not required when placing orders!  
Please contact WITTENSTEIN alpha for deviating mounting positions.



alpha

WITTENSTEIN alpha GmbH  
Walter-Wittenstein-Straße 1  
97999 Igersheim  
Germany

Main: Tel. +49 7931 493-0  
24h service hotline: Tel. +49 7931 493-12900  
speedline®: Tel.: +49 7931 493-10444  
info@wittenstein-alpha.de

Technical changes reserved. alpha accessories

## WITTENSTEIN alpha – Intelligent drive systems

[www.wittenstein-alpha.com](http://www.wittenstein-alpha.com)

The entire world of drive technology – Catalogs available on request or online at [www.wittenstein-alpha.de/download/](http://www.wittenstein-alpha.de/download/).



**alpha Premium Line.** Unique, individual solutions that offer unparalleled power density.



**alpha Advanced Line.** Maximum power density and outstanding positioning accuracy for complex applications.



**alpha Basic Line & alpha Value Line.** Reliable, flexible and economical solutions for a wide range of applications.



**alpha Linear Systems.** Precise, dynamic system solutions for every requirement.



**alpha Mechatronic Systems.** Energy-efficient, versatile and flexible mechatronic drive systems.



**alpha Accessories.** Optimally designed and adapted for gearboxes and actuators.