Welcome
Your system supplier for every aspect of power transmission

We say what we mean and mean what we say.

We see things from our customers’ perspective.

We are considerate of our employees and their families as well as of our environment and society.

RINGFEDER POWER TRANSMISSION is the global market leader in the niche markets of drive technology and is well regarded for its customer-specific, application-oriented solutions that ensure excellent and failure-free operation for its clients. We offer locking devices, damping technology and couplings for OEMs but also for the final customer under our strong brand name RINGFEDER®.

We do not only provide competent advice to our customers on the basis of our 90 years of experience but also develop innovative ideas in cooperation with them. This is part of our aspiration to be a Partner for Performance.

Around the power transmission we promise

- Excellent know-how for our challenging customers
- Best cost-benefit ratio
- Short reaction times and a high product availability
We are there for you. Anytime, anywhere.

Know-how
Over 90 years of expertise.

Your expert partner
From development to the finished product.

Customer Value
Always find the right solution.

Online calculation program
We are there for you. Anytime, anywhere.

On-site worldwide
Your projects are our drive

Know-how: Over 90 years of expertise.

Rely on decades of engineering expertise from the inventor of the friction spring. As an expert in drive and damping technology, we are your reliable partner wherever forces are at work. Be it the permanent transfer of very high torques due to non-positive or positive connections or the absorption and trapping of extreme energies to protect expensive constructions.

Your expert partner:
From development to the finished product.

We accompany you through to the successful completion of your project. Beginning with the development phase of your project, we offer our know-how and professional solutions. By working together with global market leaders and as an international supplier of outstanding products and special solutions, we are a reliable partner for you.

Online calculation program:
Always find the right solution.

In response to the complex requirements involved in the correct selection and design of the required products under practical conditions, we have developed our online calculation program. Engineers and experts are able to calculate transferable torques and other important values, taking into account various parameters. Visit our website www.ringfeder.com!

On-site worldwide:
We are there for you. Anytime, anywhere.

With our locations in Germany, the Czech Republic, the USA, Brazil, China and India as well as a worldwide service and partner network, we are there for you around the clock. This ensures our support for the successful completion of your projects at any time.

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**Introduction**

The barrel couplings complement the portfolio of the well-proven RINGFEDER® couplings for crane and hoisting gear applications. The comprehensive range of RINGFEDER® drive couplings that connect the driving motor with the gearbox and which are generally equipped with brake discs, or brake drums, where required, have been offered for decades as a package solution by brake manufacturers and distributed under their own name.

The optimized barrel coupling series for connecting the gearbox output shaft with the rope drum extends the RINGFEDER® portfolio of drive components and increases the interest of manufacturers and operators in selecting RINGFEDER® as their direct and reliable supplier for crane components.

The particular feature of the barrel coupling, i.e. to transmit the torque via barrel-shaped hardened bodies being embedded in the spaces formed by the semi-circular toothings of the hub and the sleeve, ensures the safe transmission of radial forces while simultaneously compensating angular misalignments of the connected units.

The barrel coupling thus represents an articulated joint that turns a statically indeterminate system to a statically determinate one and, as a result, compensates operation-related deformations and prevents constraining forces.

The wide range of RINGFEDER® drive couplings comprises the elastomeric, shock absorbing and fail-safe claw couplings of type RINGFEDER® TNS, the RINGFEDER® TNB couplings for very high torques, the gear couplings of type RINGFEDER® TNZ, to accommodate larger shaft misalignments and the maintenance-free steel disc couplings RINGFEDER® TND which are preferably equipped with brake discs, and optionally with brake drums.
Statically indeterminate because of three-point bearing. Mis-alignment errors cause considerable undesired reaction forces.

Statically determinate situation produced by the barrel coupling (joint). Discrepancies from the alignment will be balanced out.

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All technical details and notes are non-binding and cannot be used as a basis for legal claims. The user is obligated to determine whether the represented products meet his requirements. We reserve the right to carry out modifications at any time in the interests of technical progress.

[www.ringfeder.com](http://www.ringfeder.com)
The barrels in the coupling typically dispose of an axial clearance so that axial movements between the rope drum and the gearbox are compensated. In such a configuration, the joint acts like a non-locating bearing. The barrels are axially secured to the hub by means of lock rings. The axial retention of the barrels in the SEB coupling version is even improved by additionally fitted pressure rings. In some applications, the barrel coupling has to take the role of a fixed bearing what can be realized by design modifications. The use of high-strength materials allows a considerable increase of the transmission capability without requiring any change of the design and overall dimensions. As a result, a smaller coupling size can often be selected. The lower weight and the resulting lower acceleration forces contribute significantly to the energy efficiency of the crane.

The torque that is induced via the gearbox output shaft is transferred over the hub and the barrel rollers into the housing. The housing transmits the torque into the drum over the bolting and two carrier faces provided on the rope drum.

The internal and external covers, each of which is equipped with a lip seal, effectively prevent foreign matter from entering and lubricant from escaping. An indicator that is attached to the external cover (part no. 5 in Fig. 1) allows to check the wear and the axial position (axial alignment marking, part no. 11 in Fig. 1) of the coupling housing relative to the coupling hub. If the barrel coupling has to be dismounted, assembly markings ensure easy re-assembly at a later point of time.
Coupling size selection

Considering the group classification according to FEM or DIN, the coupling size is determined on basis of:

1. the torque to be transmitted
2. the applied radial load
3. verification of the geometric dimension

1. Selection on basis of the torque to be transmitted

For the coupling size selection applies:

\[ T_{\text{Kmax}} > T_K \]

\( T_{\text{Kmax}} \) = the type-dependent maximum torque of the barrel coupling (see Tables & Values)

It can be calculated on basis of:

a) maximum motor power or installed power
b) required motor power

a) Calculating the torque on basis of the maximum motor power \( P_i \)

In this approach, the power reserve of the motor is included in the calculation of the torque:

\[ T_K = \frac{9550 \times P_i}{n \times k_1} \] [Nm]

\( T_K \) = Coupling torque at the rope drum [Nm]
\( P_i \) = Installed motor power [kW]
\( n \) = Rotary speed of the rope drum [rpm]
\( k_1 \) = Service factor [-]

Service factor \( k_1 \) to the group classification acc. to (*)

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(*) Service factor according to standardized calculation method, version (year)
b) Calculating the torque on basis of the required power \( P_N \)

In this approach, the torque required to lift the load is calculated taking into account the system-related additional forces:

\[
\begin{align*}
P_N &= FR \times v_T / 60000 \quad [kW] \\
T_K &= 9550 \times P_N / n \times k_1 \quad [Nm] \\
\text{or} \\
T_K &= FR \times D / 2 \times k_1 \quad [Nm] \\
PN &= \text{Required power} \quad [kW] \\
FR &= \text{Entire tackle at the drum, including he lifting gear paying regard to the efficiencies and drum bearings} \quad [N]
\end{align*}
\]

(see 2. selection on basis of the radial load)

\[
\begin{align*}
v_T &= \text{Rope velocity at the drum} \quad [m/min] \\
D &= \text{Effective winding diameter at the drum} \quad [m]
\end{align*}
\]

2. Selection on basis of the radial load acting on the barrel coupling

a) Determination of the radial load acting on the barrel coupling

The radial force \( F_S \) acting on the barrel coupling is composed of the pull on account of the working load and weight of the lifting device and of the impact of the rope sheave and the efficiency of the bearings.

\[
F_S = (Q + G) / (ir \times \eta) \quad [N]
\]

\[
\begin{align*}
Q &= \text{Max. force of the working load} \quad [N] \\
G &= \text{Weight force of the lifting device and the rope} \quad (m \times g) \quad [N] \\
m &= \text{Mass} \quad [kg] \\
g &= 9.81 \text{ (gravity acceleration)} \quad [m/s^2] \\
\eta &= \text{Efficiency of the support bearing and lifting device bearing}
\end{align*}
\]

The transmission ratio \( ir \) is determined as a function of rope fastening, number of pulley and tackles:

\[
ir = \frac{\text{Transmission ratio}}{\text{Total number of rope lines in the lifting device}} \times \frac{\text{Number of rope lines to the drum}}{[-]}
\]

b) Calculation of the radial load acting on the barrel coupling

In this approach, the impact of an inclined rope guide by the tackles and pulleys and the drum diameter is neglected because these effects, calculated by the equation below, reduce the radial force \( F_T \) acting on the barrel coupling.

For systems with two ropes at the drum, see fig. 2 & 3

\[
F_T = F_S / 2 + W / 2
\]

For systems with only one rope at the drum, see fig. 4 & 5

\[
F_T = F_S (1 - b / L) + W / 2
\]

\[
\begin{align*}
W &= \text{Weight of the drum including rope and the connected parts of the barrel coupling} \quad [N] \\
b &= \text{Minimal distance between rope and joint of the barrel coupling} \quad [m] \\
L &= \text{Distance between the bearing locations of the rope drum} \quad [m]
\end{align*}
\]
According to the design rules of FEM 1.001, version 1998 and BS466, version 1984, the safety factor $k_2$ has to be considered for the radial load:

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The value $F_R$ which is to be calculated for the selected coupling must be lower than the permissible radial load $F_{R\text{max}}$ indicated in the tables.

$$F_R = F_T \cdot k_2 < F_{R\text{max}} \quad [\text{Nm}]$$

**c) Size optimization on account of permissible correction of the calculation**

The loads due to torque and radial force correlate, so that in case one of the maximum values is not fully used up, the other value can be corrected. This may in some cases allow the use of a smaller coupling size.

Case 1: Radial load correction -> $F_C$ [Nm]

The torque capability of the selected size is not yet fully used and the calculated radial force $F_R$ is above the permissible value. It is:

$$F_C = F_{R\text{max}} + (T_{\text{max}} - T_K) \cdot C > F_R \quad \text{and} \quad F_C < 1.5 \cdot F_{R\text{max}}$$

Case 2: Torque correction -> $T_C$ [Nm]

The calculated torque is just above the permissible torque of the coupling, however, the permissible radial load $F_{R\text{max}}$ is not yet fully used up. It is:

$$T_C = T_{\text{max}} + (F_{R\text{max}} - F_T) / (C \cdot k_1) \quad \text{and} \quad T_C < 1.08 \cdot T_{\text{max}}$$

| Correction factor $C$ for $T_{\text{max}}/F_{R\text{max}}$ |
|---------------------------------|-----------------|-----------------|-----------------|
| Coupling size                  | C               | Coupling size   | C               |
| 25                             | 14,8            | 1000            | 4,4             |
| 50                             | 13,7            | 1500            | 3,7             |
| 75                             | 11,4            | 2100            | 3,6             |
| 100                            | 10,8            | 2600            | 3,3             |
| 130                            | 9,0             | 3400            | 3,3             |
| 160                            | 8,7             | 4200            | 2,9             |
| 200                            | 7,4             | 6200            | 2,6             |
| 300                            | 7,2             | 8200            | 2,4             |
| 400                            | 6,1             | 9200            | 2,2             |
| 500                            | 5,3             | 10200           | 1,9             |
| 600                            | 4,8             | ---             | ---             |

**3. Checking the connection geometry**

As a standard, the hubs of the barrel couplings are equipped with 2 keyways offset by 120° according to DIN 6885-1. The position of the keyways is always specified in viewing direction of the rope drum. Other hub-shaft connections can also be provided. The transmission capability of the hub-shaft connection has to be checked for each type of connection. If an interference fit is used as a hub-shaft connection, the influence of the interference on the functionally required clearance of the barrel coupling has to be checked by us.

The installation of a hub with interference fit is often done in warm condition of the hub. This requires the prior removal of the barrel coupling. While assembling the individual components, the position marking must always be observed. This marking can be found on a tooth opposite to the wear marking.

The position of the keyways is always defined in viewing direction of the rope drum.

The flange is included in the rope drum through the face S (h9/F8) to secure the torque transmission capacity, as is standard for rope drums. The connecting screws must have at least strength category 10.9.

The position of the keyways is always defined in viewing direction of the rope drum.
Further information on RINGFEDER® TNK TKV on www.ringfeder.com

Power improved series

RINGFEDER® TNK TKV of reinforced-material
Power improved series

Proven design, hub and housing of reinforced material to transmit higher torque and higher radial load by same designed space.

Characteristics

- Torsionally rigid, compensate for angular and axial shaft misalignment
- Torque transmission by hardened steel rollers
- With standardised connection to rope drums in crane lifting gear
- Outer diameters up to 850 mm
- With wear indicator for easier monitoring of the situation
- Bores up to 425 mm
- Torques up to $T_{K\text{max}} = 815,000$ Nm
- Maximum radial load $F_R = 490,000$ N
Power improved SEB series

RINGFEDER® TNK TKVSG (SEB-design)
Series acc. to operation sheet of German Steel Iron Industry SEB 666212.

Hub and housing of reinforced material - Additional retainer rings improve axial fixing of the barrel by created axial rope forces.

Characteristics

- Torsionally rigid, compensate for angular and axial shaft misalignment
- Torque transmission by hardened steel rollers
- With standardised connection to rope drums in crane lifting gear
- Outer diameters up to 1120 mm
- With wear indicator for easier monitoring of the situation
- Bores up to 550 mm
- Torques up to $T_{\text{Kmax}} = 1.390.000 \text{ Nm}$
- Maximum radial load $F_R = 670.000\text{N}$
Barrel Couplings
RINGFEDER® TNK

Tables & Values

The equations and recommendations from the chapter ‘Coupling size selection’ must be taken into account in order to determine coupling size.
Barrel Couplings
RINGFEDER® TNK TKV
Power improved series

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Barrel Couplings RINGFEDER® TNK TKV

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Explanations

\( T_{K\text{max}} \) = Max. transmissible torque of the coupling  
\( F_{rad} \) = Admissible force radial  
\( d_{k\text{min}} \) = Min. bore diameter \( d_1 \) with keyway acc. to DIN 6885-1  
\( d_{k\text{max}} \) = Max. bore diameter \( d_1 \) with keyway acc. to DIN 6885-1  
\( D \) = Outer diameter  
\( L \) = Total length  
\( L_{\text{min}} \) = Minimum length  
\( D_1 \) = Outer diameter  
\( D_6 \) = Diameter  
\( D_8 \) = Outer diameter  
\( H_1 \) = Length  
\( R \) = Radius  
\( H_2 \) = Distance  
\( H_3 \) = Distance  
\( YL \) = Distance  
\( C \) = Pitch circle diameter  
\( n_{b7} \) = Quantity of bore \( d_7 \)  
\( D_6 \) = Bore diameter  
\( S \) (h9/F8) = Distance of the flattening  
\( S_0 \) = Disassembly Space  
\( G_G \) = Whitworth thread  
\( L_{\text{DD}} \) = Distance dimension  
\( X_a \) = Axial gap max.  
\( J_{ab} \) = Moment of inertia at smallest bore diameter  
\( G_{wsb} \) = Weight at smallest bore diameter

Ordering example

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Further information on RINGFEDER® TNK TKV on www.ringfeder.com

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All technical details and notes are non-binding and cannot be used as a basis for legal claims. The user is obligated to determine whether the represented products meet his requirements. We reserve the right to carry out modifications at any time in the interests of technical progress.
# Barrel Couplings

## RINGFEDER® TNK TKVSG

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*Construction and design acc. to operation sheet of German Steel Iron Industry SEB 666212

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*Construction and design acc. to operation sheet of German Steel Iron Industry SEB 666212

### Explanations

- \(T_{K\text{max}}\) = Max. transmissible torque of the coupling
- \(F_{\text{rad}}\) = Admissible force radial
- \(d_{1\text{min}}\) = Min. bore diameter \(d_1\) with keyway acc. to DIN 6885-1
- \(d_{1\text{max}}\) = Max. bore diameter \(d_1\) with keyway acc. to DIN 6885-1
- \(D\) = Outer diameter
- \(L\) = Total length
- \(L_{\text{min}}\) = Minimum length
- \(D_1\) = Outer diameter
- \(D_6\) = Diameter
- \(D_9\) = Outer diameter
- \(H_1\) = Length
- \(R\) = Radius
- \(H_2\) = Distance
- \(F_K\) = Flange thickness
- \(H_5\) = Distance
- \(Y_L\) = Distance
- \(C\) = Pitch circle diameter
- \(n_7\) = Quantity of bore \(d_7\)
- \(d_7\) = Bore diameter
- \(S\ (h9/F8)\) = Distance of the flattening
- \(S_D\) = Disassembly Space
- \(G_D\) = Whitworth thread
- \(L_{\text{D}}\) = Distance dimension
- \(X_a\) = Axial gap max.
- \(J_{ab}\) = Moment of inertia at smallest bore diameter
- \(G_{Wab}\) = Weight at smallest bore diameter

### Ordering example

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<th>Identifier</th>
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Further information on RINGFEDER® TNK TKVSG on www.ringfeder.com