Torsional Couplings

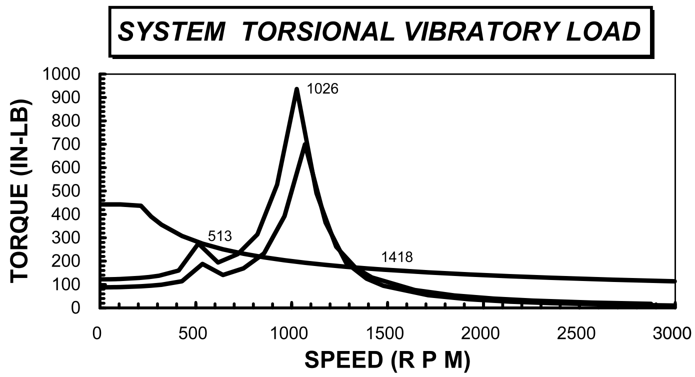
Torsional Couplings

Torsional Couplings

The Lovejoy Torsional Family of couplings solve torsional vibration problems typical of those found in diesel engine applications. The Torsional coupling dampens torsional vibrations and tunes the system to have critical speeds outside the operating range. Lovejoy application engineers can analyze the application with their computer program and determine the exact coupling needed for most any application.

The LF family is a rubber-in-compression coupling designed for a wide variety of applications such as generators, pumps, compressors, front power take-off, etc. The largest size, the LF600, can carry up to 70,800 in lb of torque. A range of stiffnesses are available to provide tuning capability for most any application. The inertia of the driver and the driven will determine the required stiffness. The LF is one of the most versatile couplings available in that it can be adapted to many configurations such as shaft-to-shaft, engine flywheel mounts, or floating shaft. It not only provides torsional protection, but also absorbs shock loads and can tolerate misalignment.

For direct-mounted, diesel-driven hydraulic pumps, the LF coupling in Hytrel® and a LK coupling are available. These are very stiff couplings designed to shift critical speeds well above the operating range. When the inertia of the driven (hydraulic pump or pumps) is small compared to that of the driver (the diesel engine), a stiff coupling such as the LF Hytrel or LK is required. Hydraulic pump drives are a fast growing segment of the market, particularly in smaller diesel engine drives. Applications include crawler tractors, manlifts, compactors, skid steer loaders, excavators, and lift trucks. Both the LF Hytrel and the LK have many thousands of hours of successful service in a wide variety of applications around the world



The Torsional couplings are designed primarily to fit standard installations such as those specified by SAE. Lovejoy has design and application engineers with many years of experience to custom design a Torsional coupling to fit special applications. We can solve torsional vibration problems. Also, if necessary, our engineers can analyze coupling failures. Fax application data to VIRTUS Engineering at 66 (0) 2468 0871 or send e-mail to info@virtus.co.th

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Torsional Couplings

The LF Torsional Coupling System Overview

The Lovejoy LF Torsional coupling system consists of six basic models or configurations. Each model is designed to satisfy user requirements in a particular area of application and is available in a wide range of torque sizes (90-70,800 in. Lbs.). Flexible elements of various materials and durometer hardness may be substituted for each other in each size without complicated and uneconomical changes in coupling hardware or design. No other coupling design has achieved this versatility and economy from common components.

The LF Torsional coupling system has readily available solutions for user requirements of misalignment, installation environmental conditions (corrosives, temperature, etc.), torsional vibration dampening, noise reduction, reliability, reaction force reduction and more.

LF Torsional couplings recognize the three essential requirements that a coupling must fulfill:

1. Reliable transmission of power
2. Quick and economical installation
3. Protection of the coupled equipment from dangerous torsional vibrations, reaction forces and misalignment

Application engineering and experienced customer service support the Lovejoy line of LF Torsional couplings. Lovejoy application engineers routinely administer computer analysis of potential torsional problems in drive systems. The considerable advantages of the LF Torsional coupling, as well as the service offered by our application engineers, has led to wide use of this coupling.

The L-Loc spline-clamping hub described in more detail in this catalog virtually eliminates spline shaft profile wear and "fretting."

The LF Torsional coupling is one of the leading couplings in the field of hydrostatic drives in rugged off-road construction equipment.

LF Torsional couplings provide:

- Extensive experience in tough power transmission applications
- Wide range of standard designs and materials
- Application engineering
- Reliable and cost effective solutions
- Worldwide service and distribution network

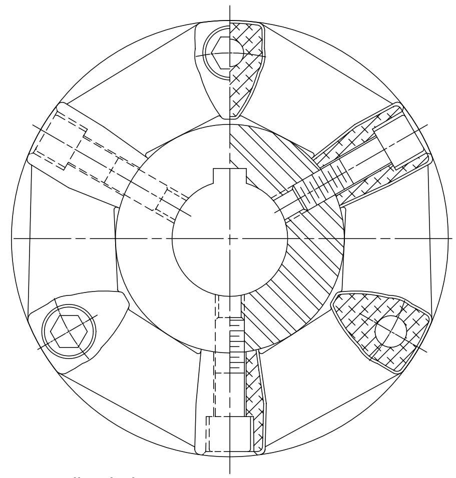
Torsional Couplings

VIRTUS
Power Transmission

LF Torsional Family Coupling System

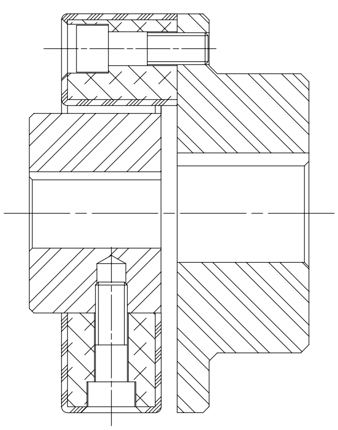
Characteristics and Benefits of Torsional Couplings

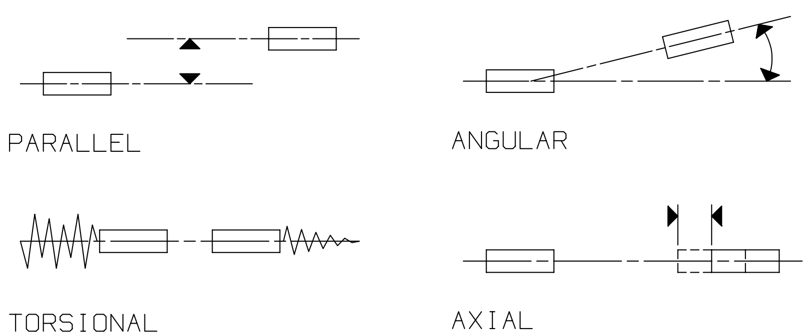
The basic component of the LF Torsional coupling is the unique and highly versatile elastomeric element. This element can be easily mounted in a number of different ways according to the application, and without special design changes or complex hardware modifications. The element, which is available in different materials for optimum performance, is connected to a cylindrical hub with radial screws and then to a flanged hub by axial screws. This unique coupling design is remarkably simple, highly effective, and gives the LF Torsional coupling unmatched performance capabilities.



Unique Features:

- Free end float (Type S)
- Substantial shock, vibration, and misalignment capabilities
- Fail-safe operation
- Coupling allows “blind” connection of equipment
- High-speed capabilities
- Economic design
- Application versatility
- Low weight, low moment of inertia
- Free from noise and electrically insulating
- No lubrication, maintenance free
- Oil, heat, and corrosion resistant elements (Hytrel®, Zytel®)
- Easy to disconnect driver and driven without moving equipment or coupling hub
- Unique “air flow” design assists in keeping components cool during operation
- Short profile for tight engine housing, or shaft-to-shaft requirements
- Easily assembled, no special bands, tools or time consuming assembly procedures
- Professional application assistance and expertise worldwide
- Torque transmission does not exert harmful reaction loads on equipment
- Various element materials for variation in torsional stiffness and environmental resistance





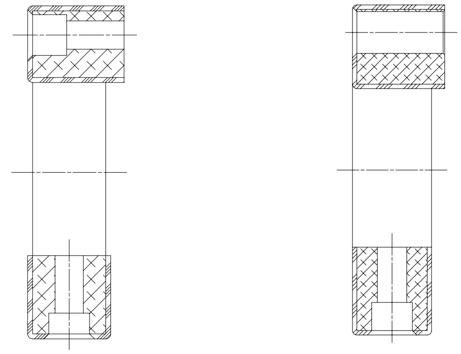
Torsional Couplings

LF Torsional Family Coupling System

Shown on this and the next page are the standard LF Torsional coupling models. The simple, unique design of the LF Torsional coupling permits this wide range of models, from common components, to meet each application requirement. From hot engine flywheel housing or the long corrosive span of a cooling tower, Lovejoy has the optimum LF Torsional coupling model available for your application.

Model O and O/S

The heart of the LF Torsional coupling is the flexible element. This model is easily mounted to the customer's application designs or customer provided shaft hubs. No bands, special tools, or contoured element clamping flanges are necessary. This model allows the customer to make his own shaft hubs from readily available steel bar stock. Ideal for quick prototype testing, retrofit and high volume applications. Model O/S permits the driver and driven equipment to be quickly “blind” assembled and allows for free end float. Available in various materials: High-Temperature Rubber (HTR), Neoprene (CR) and hardness: 50, 60, 70, and 75 shore durometer.

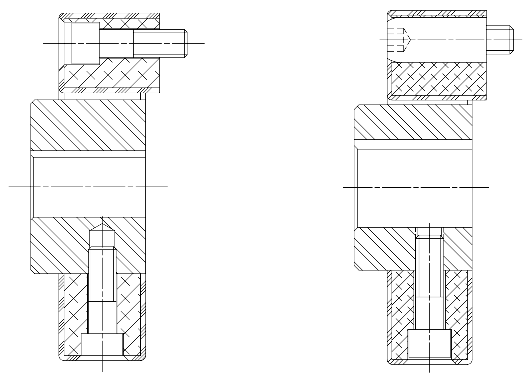


Model O and O/S

Model 1 and 1/S

Consists of the standard flexible element (Model 0) with a simple steel cylindrical hub. This satisfies the application requirements for mounting directly to engine flywheels, pulleys, brake discs, friction clutches, universal joints and gears. The cylindrical hub is available in a range of bores (Standard ANSI, DIN, JIS) fractional, decimal, metric, spline and custom.

Model 1/S is shown with the S-style axial screw (similar to a dowel) for quick blind assembly of the drive package. The same element combinations available in Model 1 are also available in the Model 1/S.

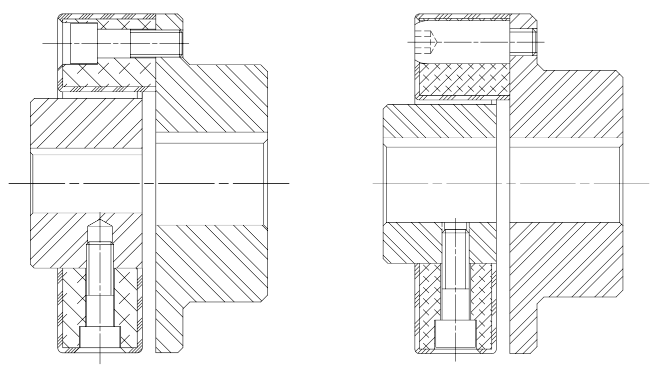


Model 1 and 1/S

Model 2 and 2/S

Provides a complete shaft-to-shaft coupling in a range of sizes for all industrial power transmission applications. It is similar to Model 1 shown above, except a flanged hub is added to make the shaft to shaft connection.

Model 2/S allows the drive package to be “blind” connected. As with all S-style models, free axial end float of equipment shafts is accomplished without harmful push-pull force.



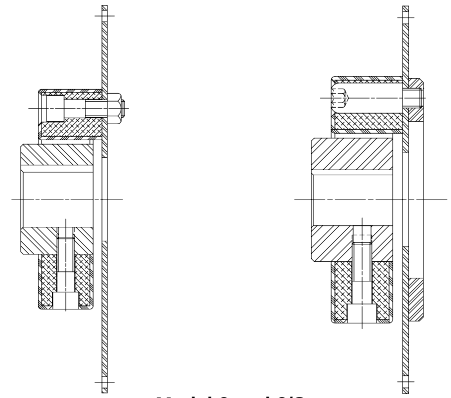
Model 2 and 2/S

Torsional Couplings

LF Torsional Family Coupling System

Model 3 and 3/S

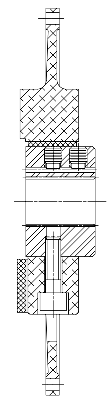
A Model 1 or 1/S, with the addition of an engine flywheel mounting plate, becomes a Model 3 or 3/S. It is available in many standard SAE flywheel sizes (see page 18) as well as made-to-order sizes. Special mounting requirements are easily and economically accomplished. The standard cylindrical hub is available in a variety of ANSI (SAE), DIN, JIS spline bores for hydraulic pumps and other applications. As with the previous models, various standard flexible element materials are ready for specific torsional, misalignment and environmental requirements.



Model 3 and 3/S

Model 4

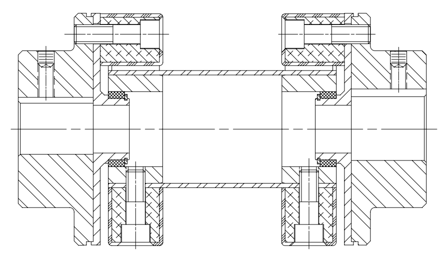
Similar to Model 3/S, this model consists of a cylindrical hub for shaft mounting and a high performance Hytrel® element, which is pilot-mounted to a cast alloy SAE flywheel adapter plate machined to SAE J620 specifications. Model 4 features a thin coupling profile for tight engine housing/pump or compressor application requirements. This is a reliable solution for problems of torsional resonance and performance in hot, oily environments.



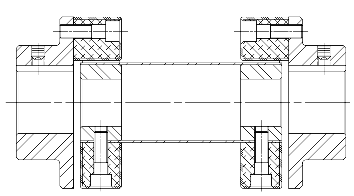
Model 4

Model 6, 6/S, 6B

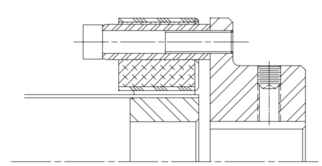
Floating shafts are available in customer specified assembly length, with special corrosion and heat resistant elements and materials. This model surpasses all other floating shaft designs in assembly, simplicity and reliability. Model 6/S accommodates free endplay without harmful push-pull reaction forces. Model 6B is a highly elastic floating shaft coupling with accurate, maintenance- free centering flanges for applications with long spans and high misalignment and/or speed requirements.



Model 6B



Model 6



Model 6S

Torsional Couplings

LF Torsional Flexible Elements

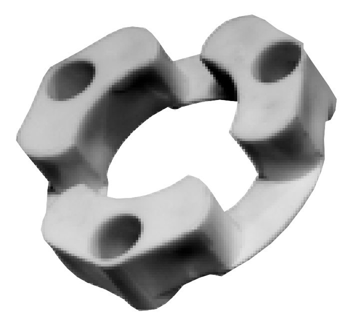
The focus of any coupling is the flexible elements; the "working component." This is the part that must effectively absorb the shock loads, misalignment forces, torsional vibrations and the abuse of environmental conditions. It must be reliable, economical and not harmful to the connected equipment. It is virtually impossible for one single element material, or coupling configuration, to satisfy all these user requirements. That's why we use different materials for our flexible elements. Optimum and reliable performance is the result of the unique LF Torsional coupling design, which permits easy adaptation and assembly to any application.

Rubber (HTR and CR)

There are two different element materials available. Both are classified under the heading of rubber elements: Natural rubber (HTR) and one synthetic rubber element of Neoprene (CR). Both are torsionally soft and are placed into compression during assembly. Rubber in compression can carry up to five times the amount of torque, as compared to non-compressed elements. The rubber LF Torsional elements effectively accommodate shock, misalignment, and vibration and do not exert harmful radial and axial forces on the connected equipment. Each rubber element material is available in various durometer hardness (Shore A Scale) of 50, 60, 70 and 75 for particular torsional vibration requirements. The synthetic rubber elements are primarily used in environments that are hostile to natural rubber and can operate in a temperature range of -40°F to +175°F. Natural rubber (HTR) elements have an operating range of -40°F to +194°F. Consult VIRTUS Engineering for higher temperature requirements.

Hytrel® Elements (HY)

LF Torsional elements made of DuPont's Hytrel® elastomer compound. These elements are torsionally much stiffer than natural rubber—about 20 times stiffer—and were developed for use primarily in combustion engine/hydraulic pump applications. These applications usually require reliable coupling performance in hot, oily environments. Hytrel® elements have 20% greater torque capacity compared to rubber elements and operate efficiently in the temperature range of -60°F to +250°F. The Torsional coupling with the Hytrel® element places the harmful vibration resonance frequency above the operating RPM range of the power package. The unique element design also reduces harmful axial reactionary forces.



Zytel® Elements (X)

This element is extremely rugged and made of Dupont's highly stressable Zytel® elastomeric compound. Zytel® has excellent resistance to most chemical attacks and corrosion. Operational temperature range is -40°F to +300 °F without derating. This element composition is torsionally about three times stiffer than the Hytrel® elements. Maximum angular misalignment is 1°. Zytel® (X) elements exhibit less than 1° wind up at nominal torque and zero backlash. With more torque carrying capacity, compared to Hytrel®, this element is particularly suited for applications where heat, moisture, high torque/high speed and corrosion resistance are important factors in coupling selection.

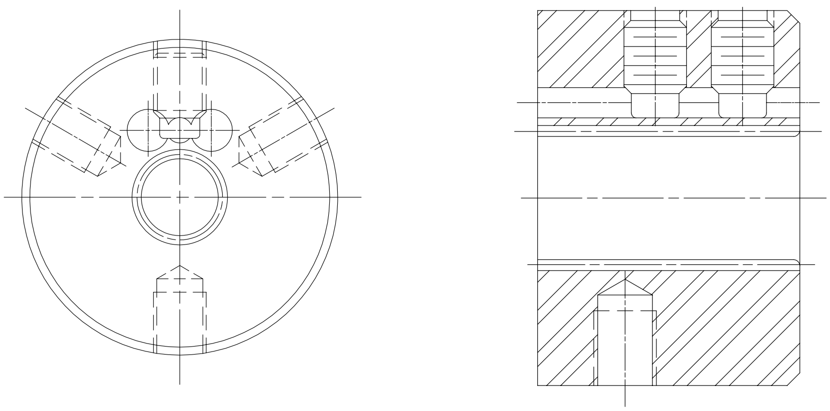
L-Loc Spline Shaft Clamping Feature

For years, spline shaft profile distortion and fretting were a major problem for hydraulic pump manufacturers. Now Lovejoy offers a simple solution: L-Loc.

It is well known that normal manufacturing tolerances between the spline shaft and its mating spline coupling hub create unavoidable play. This play permits minor movements between the components. Compounding this tolerance related movement is misalignment and the hammering forces during power transmission. Eventually, spline profile distortion occurs, even with shafts and hubs of high quality hardened steel. When spline distortion and wear occur, a decrease in pump efficiency results, and abnormal stresses are placed on seals, bearings and other engine/pump components. Equipment operation may become sluggish; horsepower and fuel is wasted. Premature maintenance or even failure of the shaft or other components may result.

It appeared that the only way to eliminate spline distortion and wear was to eliminate the backlash and clearance related to mating tolerances and assembly misalignment, however, this became expensive, time consuming, and was for the most part unsuccessful.

The Torsional coupling with the L-Loc spline-clamping hub can dampen harmful torsional vibrations, compensate for assembly misalignments and dramatically inhibit spline profile distortion.

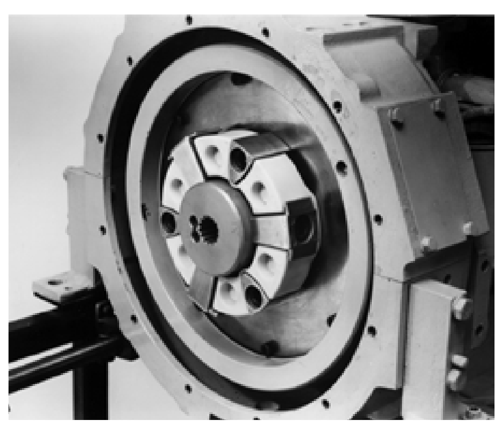


This unique design is remarkably simple and effective. The design of L-Loc consists of a unique slot that is placed slightly above and parallel to the spline bore. Two set screws are fitted perpendicularly into this slot. As the set screws are torqued, this spline shaft is "wrapped" with a clamping force around its entire profile.

The hub becomes firmly locked around the spline shaft, and the set screws never touch the spline profile. No dents, no gouges, no burrs, no hammering on and off “shrink fits” occur. The hub and shaft are absolutely free from play; a single assembly. By loosening the set screw, the clamping force is removed.

L-Loc Benefits

- Eliminates premature spline shaft maintenance or replacement
- Reduces stress on equipment components
- Quick assembly and removal
- Maintains equipment efficiency
- Reduces equipment noise



Torsional Couplings

Torsional Coupling Selection for Internal Combustion Engine Applications

When correctly sized and selected, the Lovejoy Torsional coupling will effectively dampen vibration and tune critical frequencies out of the operating range of systems driven by diesel, gasoline or natural gas reciprocating engines. But to make sure the coupling will do its job as intended, the selection should be verified with a torsional vibration analysis of the system.

Misapplication of the coupling in an engine application frequently leads to coupling failure or system damage. For these applications, we strongly urge that you let Lovejoy make the coupling selection for you.

We will insure that the correct coupling size and stiffness is selected not only for proper nominal and maximum torque, but also for the elusive factor of continuous vibratory torque which can otherwise melt or rupture an elastomeric coupling or damage other system components.

Please complete the information worksheet on page 11 and fax it to VIRTUS for selection or you may e-mail us by filling out the version of this worksheet found on VIRTUS's web site at www.virtus.co.th For those confident in their technical abilities and understanding of system torsional analysis who prefer to make their own coupling selection, we provide the following essential guidelines.

1. **Choose a model** that suits your drive arrangement using the descriptions of basic models given previously on pages 4 and 5.

   - **Model 3 , 3/S or 4**–For mounting directly to standard SAE flywheels.
   - **Model 2 or 2/S**–For shaft-to -shaft applications such as PTOs. Also, the flanged hub can be modified to adapt to front damper pulleys.
   - **Model 1 or 1/S**–For connecting a shaft to a flange or non-standard flywheel.
   - **Model 6**–Various different universal floating shaft arrangements available (see page 21)

2. **Nominal torque**

   The nominal torque transmitted though the coupling (T_{LN}) *must be no more than the nominal torque rating for the coupling* (T_{KN}) *at any given operating temperature:*

   $T_{KN} \geq T_{LN} \bullet S_t$

   where S_t is the temperature factor (Fig.1, p.14), and

   T_{LN} **(in.lb.) = (HP • 63,025)/RPM**

3. **Peak torque pulses**

   The magnitude of the maximum torque pulses that occur during operation (T_{max}) *at all operating temperatures must not exceed the maximum torque rating of the coupling* (T_{Kmax}). These are short-duration transient pulses that would result from **start-up, shock, or acceleration through a system resonance to reach operating speed.** By definition, these pulses may occur over the life of the coupling 10^5 times in one direction of rotation, or 5 x 10^4 times reversing.

   $T_{Kmax} \geq T_{max} \bullet S_t$

4. **Determine critical speeds due to resonance**

   Select coupling stiffness so that the system does not run at high resonance, or in other words, make sure normal running and idle speeds are not at or near critical speeds.

   Critical speeds are related to the system natural frequency and the number of pulses or excitations generated per revolution **i** (order). For analysis, if possible, reduce the application to a 2-mass system and apply the following equation on next page.

Torsional Selection for Internal Combustion Engine Applications

$$n_R = \frac{60}{2\pi \bullet i} \sqrt{C_{Tdyn} \bullet \frac{J_A + J_L}{J_A \bullet J_L}}$$

where

n_R = the critical resonance speed of the system (rpm),

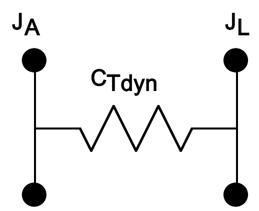
C_{Tdyn} = the dynamic torsional stiffness of the coupling (lb-in/rad),

J_A = the mass moment of inertia for the drive side (lb-in-sec^2),

and

J_L = the mass moment of inertia for the load side (lb-in-sec^2).

The coupling would be modeled as the spring controlling torsional oscillations of the engine and flywheel on one side and the driven equipment on the other:



Use the dynamic torsional stiffness values from the Performance Data table (p. 13). Mass moment of inertia values may be obtained from the respective engine and equipment manufacturers.

Generally, system steady-state operating speeds should be 1.5 to 2 times the major critical speed for safe, low-resonance operation.

5. Allowable continuous vibratory torque

*The amplitude of the continuously oscillating (vibratory) torque generated in the system **(T_W)** must not exceed the coupling's rating **(T_{KW})** at a particular steady-state frequency (rpm) and temperature. This torque is superimposed on (co-exists with) the basic load **(T_{LN})**.*

$$T_{KW} \geq T_W \bullet S_t \bullet S_f$$

where

T_{KW} = coupling rating for continuously oscillating torque at 10Hz

and

S_f = the frequency factor that relates the operating frequency to the coupling's 10Hz rating (see Fig. 3, p.15).

The magnitude of the continuously oscillating torque (TW) is dependent on an amplifying factor (V) based on the distance of the system steady-state operating speed n from the resonance speed n_R:

$$V \approx \frac{1}{\left|1-(n/n_R)^2\right|}$$ (see Fig. 4, p.15).

6. Other considerations

Refer to the Performance Data tables, figures, and dimension tables to make certain final coupling selection meets application constraints for envelope (O.D., length, bore dimensions, etc.), maximum speed limitations and allowable misalignment

Torsional Couplings

VIRTUS Power Transmission

Coupling Selection Worksheet for Engine Applications

For systems driven by an internal combustion engine, complete this worksheet and fax it to the VIRTUS engineering department. We will respond with the proper coupling selection.

VIRTUS Engineering Fax: 0 2476 1711

Customer Information

DATE:______________________________

NAME____ COMPANY:____

PHONE____ FAX: ____

E-MAIL ADDRESS: ____

ANTICIPATED ORDER QUANTITY/ ANNUAL USAGE: ____

BRIEF DESCRIPTION OF APPLICATION/PROBLEM: ____

____

____

____

____

ENGINE INFORMATION

Engine Manufacturer:___________________________

Model Number: ______________________________

Displacement: _______________________________

Rated Horsepower: ____________________________

@ Rated Speed: ______________________________

Operating Speed or Range:_____________________

Idle Speed:_________________________________

❒ Diesel

❒ Gasoline

❒ Natural Gas

❒ Other ___________

❒ 2-Stroke

❒ 4-Stroke

Number of Cylinders:______

Piston Configuration:

❒ In-Line

❒ Vee Vee Angle:_____

SAE Flywheel Size (J620D):_____
(Attach drawing if non-standard)

SAE Flywheel Housing Size(J617C):_____

DRIVEN EQUIPMENT

❒ Compressor

❒ Water Pump

❒ Hydraulic Pump

❒ Generator/Alternator

❒ Other _______________

Shaft Diameter or Spline Information:

____

____

Type of Equipment Mounting:

❒ Flange-Mounted to Engine Pilot

❒ Independent of Engine

Driven From:

❒ Flywheel

❒ Front PTO

❒ Other (Explain)__________________

Ambient Operating Temperature:____°F

Mass Moment Of Inertia (J or WR^2)

Provide mass-elastic diagram if available
(Please Include Units)

Engine: __________________

Flywheel:_________________

Driven Equipment:
1. ______________________
2. ______________________
3. ______________________
4. ______________________

Sketch or Remarks (Attach Additional Sheets if Necessary):

Torsional Couplings

Torsional Coupling Selection for General Industrial Applications

While the LF Torsional coupling was developed to solve the unique problems associated with torsional vibration in equipment driven by internal combustion engines, the coupling works equally well in general industrial applications. For these electric motor-powered and other **non-engine applications**, use the following simple selection procedure (Refer to page 9 for engine-driven applications).

1. **Choose a model** that suits your drive arrangement using the descriptions of basic models given previously on pages 4 and 5:
   - **Model 2**–Most common for shaft-to-shaft applications.
   - **Model 2/S**–For shaft-to-shaft applications that require free end-float or quick, blind "plug-in" assembly.
   - **Model 1 or 1/S**–or connecting a shaft to a flange or flywheel.
   - (see page 20 for Model 6 floating shaft applications)

2. **Choose element material** consistent with application requirements. Most commonly, the HTR (high-temperature rubber) element is used for virtue of its high flexibility. This feature provides the previously mentioned benefits of vibration and shock damping, noise silencing, and a high tolerance for misalignment.

   When required, the Zytel® element provides a torsionally rigid connection yet is still flexible in terms of accommodating small angular misalignments. Use of the floating-shaft Model 6 version will allow for parallel misalignment as well. The Zytel® material is also very chemical resistant.

   Please note that the optional Hytrel® element requires almost perfect alignment which is unlikely in most applications and is not recommended, except when used as intended on a flange-mounted hydraulic pump to an engine flywheel.

3. **Choose a service factor** from the chart on page 14 for your application.

   Example: Centrifugal pump fi SF=1.0

4. **Determine nominal torque requirement** for coupling from application horsepower and speed. Use the actual torque or horsepower requirement for the driven equipment if known. Otherwise, use the rated motor horsepower.

   Now, using the Performance Data table, select a coupling size with a rating equal to or greater than the application torque multiplied by the service factor:

$$T_{KN}\ (\text{in.lb.}) \geq \frac{\textbf{HP x SF x 63,025}}{\textbf{SPEED(rpm)}}$$

   Example:
   Centrifugal pump using 15 hp at 1750 rpm

   (15hp x 1.0 x 63,025)/1750rpm = 540 in.lb.

   ⇒ use Torsional size LF8

5. **Other considerations**
   Refer to the Performance Data tables, figures, and dimension tables to make certain final coupling selection meets application constraints for envelope (O.D., length, bore dimensions, etc.), and maximum speed limitations.

Torsional Couplings

LF Torsional Performance Data

COUPLING SIZE	ELEMENT MATERIAL*	NOMINAL TORQUE Tkn	MAXIMUM TORQUE T_{Kmax}	MAX SPEED (RPM) n_{max}	ALLOWABLE CONTINUOUS VIBRATORY TORQUE T_{KW}	DYNAMIC TORSIONAL STIFFNESS C_{tdyn}			
						RUBBER 60 SHORE (STANDARD)	RUBBER 50 SHORE (OPTIONAL)	HYTREL^	ZYTEL
LF1	HTR	90 in-lb *10Nm*	200in-lb *25Nm*	10,000	44in-lb *5Nm*	1240in-lb/rad *140Nm/rad*	800in-lb/rad *90Nm/rad*		
LF2	HTR	180 in-lb *20Nm*	530in-lb *60Nm*	8000	89in-lb *10Nm*	2570in-lb/rad *290Nm/rad*	1600in-lb/rad *180Nm/rad*		
	ZYTEL	265in-lb *30Nm*	530in-lb *60Nm*	10,000	n/a				55,150in-lb/ra *6230Nm/rad*
LF4	HTR	440in-lb *50Nm*	1100in-lb *125Nm*	7000	180in-lb *20Nm*	7500in-lb/rad *850Nm/rad*	4870in-lb/rad *550Nm/rad*		
	ZYTEL	530in-lb *60Nm*	1060in-lb *120Nm*	8000	n/a				186,200in-lb/rad *1650Nm/rad*
LF8	HTR	885in-lb *100Nm*	2480in-lb *280Nm*	6500	355in-lb *40Nm*	13,300in-lb/rad *1500Nm/rad*	7970in-lb/rad *900Nm/rad*		
	HYTREL	885in-lb *100Nm*	2480in-lb *280Nm*	6500	n/a			204,000in-lb/rad *23,000Nm/rad*	
	ZYTEL	1060in-lb *120Nm*	2480in-lb *280Nm*	7000	n/a				414,370in-lb/rad *46,820Nm/rad*
LF12	HTR	1240in-lb *140Nm*	3190in-lb *360Nm*	6500	440in-lb *50Nm*	38,900in-lb/rad *4400Nm/rad*	23,900in-lb/rad *2700in-lb/rad*		
LF16	HTR	1770in-lb *200Nm*	4960in-lb *560Nm*	6000	710in-lb *80Nm*	30,100in-lb/rad *3400Nm/rad*	17,700in-lb/rad *2000Nm/rad*		
	HYTREL	1770in-lb *200Nm*	4960in-lb *560Nm*	5500	n/a			320,000in-lb/rad *36,000Nm/rad*	
	ZYTEL	2120in-lb *240Nm*	4960in-lb *560Nm*	6000	n/a				654,800in-lb/rad *74,000Nm/rad*
LF22	HTR	2430in-lb *275Nm*	6640in-lb *750Nm*	6000	885in-lb *100Nm*	79,600in-lb/rad *9000Nm/rad*	54,000in-lb/rad *6100Nm/rad*		
LF25	HTR	2790in-lb *315Nm*	7740in-lb *875Nm*	5000	1100in-lb *125Nm*	39,800in-lb/rad *4500Nm/rad*	4,800in-lb/rad *2800Nm/rad*		
	HYTREL	3100in-lb *350Nm*	7740in-lb *875Nm*	5000	n/a			1,060,000in-lb/rad *120,000Nm/rad*	
	ZYTEL	3275in-lb *370Nm*	7080in-lb *800Nm*	5000	n/a				987,600in-lb/rrad *111,600Nm/rad*
LF28	HTR	3700in-lb *420Nm*	10,600in-lb *1200Nm*	5000	1330in-lb *150Nm*	106,200in-lb/rad *12,000Nm/rad*	66,400in-lb/rad *7500Nm/rad*		
LF30	HTR	4400in-lb *500Nm*	12,400in-lb *1400Nm*	4000	1770in-lb *200Nm*	69,000in-lb/rad *7800Nm/rad*	42,500in-lb/rad *4800Nm/rad*		
	HYTREL	4400in-lb *500Nm*	12,400in-lb *1400Nm*	4000	n/a			780,000in-lb/rad *88,000Nm/rad*	
	ZYTEL	4870in-lb *550Nm*	12,400in-lb *1400Nm*	4500	n/a				1,187,000in-lb/rad *134,100Nm/rad*
LF50	HTR	6200in-lb *700Nm*	18,600in-lb *2100Nm*	4000	2650in-lb *300Nm*	168,100in-lb/rad *19,000Nm/rad*	106,200in-lb/rad *12,000Nm/rad*		
	HYTREL	7100in-lb *800Nm*	17,700in-lb *2000Nm*	4000	n/a			2,300,000in-lb/rad *262,000Nm/rad*	
LF80	HTR	7960in-lb *900Nm*	18,600in-lb *2100Nm*	4000	2830in-lb *320Nm*	221,200in-lb/rad *25,000Nm/rad*	141,600in-lb/rad *16,000Nm/rad*		
LF90	HTR	9700in-lb *1100Nm*	27,900in-lb *3150Nm*	3600	3980in-lb *450Nm*	141,600in-lb/rad *16,000Nm/rad*	92,900in-lb/rad *10,500Nm/rad*		
LF140	HTR	15,000 in-lb *1700Nm*	43,400in-lb *4900Nm*	3600	6200in-lb *700Nm*	354,000in-lb/rad *40,000Nm/rad*	234,500in-lb/rad *26,500Nm/rad*		
	HYTREL	14,200in-lb *1600Nm*	35,400in-lb *4000Nm*	3600	n/a			3,900,000in-lb/rad *440,000Nm/rad*	
LF250	HTR	26,500 in-lb *3000Nm*	77,400in-lb *8750Nm*	3000	11,000in-lb *1250Nm*	592,900in-lb/rad *67,000Nm/rad*	380,500in-lb/rad *43,000Nm/rad*		
LF400	HTR	44,200in-lb *5000Nm*	110,600in-lb *12,500Nm*	2500	17,700in-lb *2000Nm*	1,062,000in-lb/rad *120,000Nm/rad*	663,700in-lb/rad *75,000Nm/rad*		

* HTR = High Temperature Natural Rubber

^ For Hytrel, dynamic torsional stiffness values are non-linear with respect to torque. Value given is for 100% of nominal torque. Please Call Lovejoy for stiffness at lower torques.

VIRTUS
Power Transmission

Torsional Couplings

Torsional LF Performance Data (continued)

		MAX. ALLOWABLE MISALIGNMENT**				WIND UP (ANGLE OF TWIST)		STATIC STIFFNESS		
CLPG SIZE	ELEMENT MATERIAL*	ANGULAR (DEGREES)	PARALLEL	AXIAL (END FLOAT) STANDARD	AXIAL (END FLOAT) S-STYLE***	@ NOMINAL TORQUE (DEGREES)	@ MAXIMUM TORQUE (DEGREES)	AXIAL Ca	RADIAL Cr	ANGULAR Cw
LF1	HTR	3	.06" *1.5mm*	+/-.08" *+/-2mm*	+.18"-.08" *+4.6mm/-2mm*	6	17	220lb/in *38N/mm*	860lb/in *150N/mm*	2.66in-lb/deg *.3Nm/grad*
LF2	HTR	3	.06" *1.5mm*	+/-.12" *+/-3mm*	+.12"/-.12" *+3mm/-3mm*	6	17	130lb/in *22N/mm*	860lb/in *150N/mm*	2.66in-lb/deg *.3Nm/grad*
	ZYTEL	1	.004" *.1mm*	+/- .02" *+/- .5mm*	+.12"/-.02" *+3mm/-.5mm*					
LF4	HTR	3	.06" *1.5mm*	+/-.12" *+/-3mm*	+.17"/-.12" *+4.3mm/-3mm*	5	12	430lb/in *75N/mm*	2860lb/in *500N/mm*	21.3in-lb/deg *2.4Nm/grad*
	ZYTEL	1	.004" *.1mm*	+/- .02" *+/- .5mm*	+.17"-.02" *+4.3mm/-.5mm*					
LF8	HTR	3	.08" *2mm*	+/-.16" *+/-4mm*	+.20"/-.16" *+5mm/-4mm*	5	14	430lb/in *75N/mm*	2860lb/in *500N/mm*	31.9in-lb/deg *3.6Nm/grad*
	HYTREL	0	0	+.12"/-.08" *+3mm/-2mm*	n/a					
	ZYTEL	1	.004" *.1mm*	+/- .02" *+/- .5mm*	+.20"/-.02" *+5mm/-.5mm*					
LF12	HTR	2	.08" *2mm*	+/-.12" *+/-3mm*	+.20"/-.16" *+5mm/-4mm*	3	7.5	1430lb/in *250N/mm*	5710lb/in *1000N/mm*	80in-lb/deg *9.0Nm/grad*
LF16	HTR	3	.08" *2mm*	+/-.20" *+/-5mm*	+.23"/-.20" *+5.8mm/-5mm*	5	14	570lb/in *100N/mm*	2860lb/in *500N/mm*	44in-lb/deg *5.0Nm/grad*
	HYTREL	0	0	+.12"/-.08" *+3mm/-2mm*	n/a					
	ZYTEL	1	.004" *.1mm*	+/- .02" *+/- .5mm*	+.23"/-.02" *+5.8mm/-.5mm*					
LF22	HTR	2	.08" *2mm*	+/-.12" *+/-3mm*	+.23"/-.20" *+5.8mm/-5mm*	3	7.5	2860lb/in *500N/mm*	7420lb/in *1300N/mm*	106in-lb/deg *12.0Nm/grad*
LF25	HTR	3	.08" *2mm*	+/-.20" *+/-5mm*	+.26"/-.20" *+6.6mm/-5mm*	5	14	800lb/in *140N/mm*	3400lb/in *600N/mm*	62.0in-lb/deg *7.0Nm/grad*
	HYTREL	0	0	+.12"/-.08" *+3mm/-2mm*	n/a					
	ZYTEL	1	.004" *.1mm*	+/- .02" *+/- .5mm*	+.26"/-.02" *+6.6mm/-.5mm*					
LF28	HTR	2	.08" *2mm*	+/-.12" *+/-3mm*	+.26"/-.20" *+6.6mm/-5mm*	3	7.5	3140lb/in *550N/mm*	8000lb/in *1400N/mm*	150in-lb/deg *17.0Nm/grad*
LF30	HTR	3	.08" *2mm*	+/-.20" *+/-5mm*	+.26"/-.20" *+6.6mm/-5mm*	5	14	1090lb/in *190N/mm*	4280lb/in *750N/mm*	80.0in-lb/deg *9.0Nm/grad*
	HYTREL	0	0	+.12"/-.08" *+3mm/-2mm*	n/a					
	ZYTEL	1	.004" *.1mm*	+/- .02" *+/- .5mm*	+.26"-.02" *+6.6mm/-.5mm*					
LF50	HTR	3	.08" *2mm*	+/-.20" *+/-5mm*	+.26"/-.20" *+6.6mm/-5mm*	3	7.5	3700lb/in *650N/mm*	12,600lb/in *2200N/mm*	230in-lb/deg *26.0Nm/grad*
	HYTREL	0	0	+.12"/-.08" *+3mm/-2mm*	n/a					
LF80	HTR	2	.06" *1.5mm*	+/-.20" *+/-5mm*	+.26"/-.12" *+6.6mm/-3mm*	3	7.5	4850lb/in *850N/mm*	16,600lb/in *2900N/mm*	300in-lb/deg *34.0Nm/grad*
LF90	HTR	3	.08" *2mm*	+/-.20" *+/-5mm*	+.34"/-.20" *+8.6mm/-5mm*	5	14	1260lb/in *220N/mm*	5700lb/in *1000N/mm*	150in-lb/deg *17.0Nm/grad*
LF140	HTR	2	.08" *2mm*	+/-.20" *+/-5mm*	+.34"/-.20" *+8.6mm/-5mm*	3	7.5	3700lb/in *650N/mm*	13,100lb/in *2300N/mm*	336in-lb/deg *38.0Nm/grad*
	HYTREL	0	0	+.12"/-.08" *+3mm/-2mm*	n/a					
LF250	HTR	2	.08" *2mm*	+/-.20" *+/-5mm*	+.40"/-.20" *+10mm/-5mm*	3	7.5	6570lb/in *1150N/mm*	23,400lb/in *4100N/mm*	600in-lb/deg *68.0Nm/grad*
LF400	HTR	2	.08" *2mm*	+/-.12" *+/-3mm*		3	7.5	7420lb/in *1300N/mm*	34,300lb/in *6000N/mm*	780in-lb/deg *88.0Nm/grad*

* HTR = High Temperature Rubber

** Angular and parallel misalignment values are dependent on speed, and for rubber elements, they should be adjusted according to figure 2. Hytrel elements are only for applications where the driven component is piloted to the driver for essentially perfect alignment (i.e. hydraulic pump flange-mounted to engine flywheel housing)

“*** The “S-Style” design is not constrained axially and thus allows the hubs to move apart without creating axial force on the connected equipment. Special length S-Style fastener sleeves can further increase the allowable end float.

Torsional Couplings

LF Torsional Technical Selection Data

Service Factor Guide

Agitators	1.0
Beaters	1.5
Blowers	1.0-1.25
Can Filling Machinery	1.0
Car Dumpers	2.5
Car Pullers	1.5
Compressors	1.0-1.25
Reciprocating	*
Conveyors	1.0-1.25
Live Roll, shaker & Reciprocating	3.0
Conveyors (Heavy Duty)	1.25-2.5
Cranes & Hoists	2.0
Crushers	3.0
Dredges	1.5-2.0
Elevators	1.5-2.0
Evaporators	1.0
Fans	1.0-1.5
Feeders	1.0
Reciprocating	2.5
Generators	
Not Welding	1.0
Welding	2.0
Hoist	1.5
Hammer Mills	2.0
Kilns	1.5
Laundry Washers	
Reversing	2.0
Line Shafting	1.5
Lumber Machinery	2.0
Machine Tools	1.5-2.0
Metal Forming Machines	1.5-2.5
Mills, Rotary Type	2.0
Mixers	1.5-1.8
Paper Mills Equipment	1.2-2.0
Pumps	
Centrifugal	1.0
Gear, Rotary or Vane	1.25
Reciprocating 1 Cyl. single or double acting	2.0
2 Cyl. single acting	2.0
2 Cyl. double acting	1.75
3 or more Cyl.	1.5
Rubber Machinery	2.0-2.5
Stokers	1.0
Textile Machinery	1.2
Windlass	2.0
Woodworking Machinery	1.0

Fig. 1

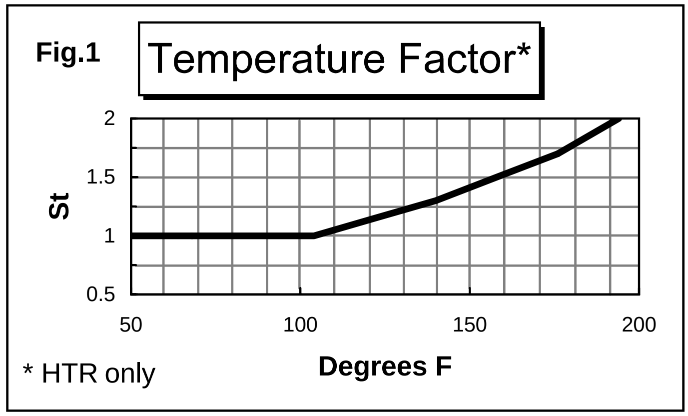


Fig. 2

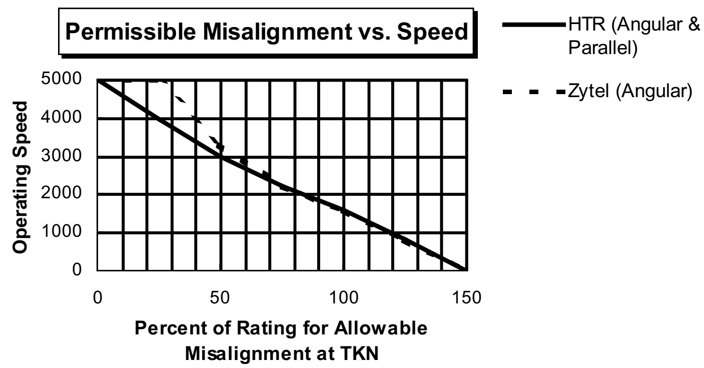


Fig. 3 Frequency Factor

Operating Frequency **f (Hz)**	≤ 10	> 10
Frequency Factor **S_f**	1	$\sqrt{f/10}$

Fig. 4 Resonance Factor V_r and Relative Damping Factor Ψ

Coupling Element	**V_r**	**Ψ**
HTR 50 Shore	10	0.6
HTR 60 Shore	8	0.78
Hytrel	—	0.5
Zytel	—	0.4

Chemical Resistance Chart

(A - Little or no effect; B - Moderate effect; C - Severe effect)

Oils & Hydraulic Fluids	**Hytrel**	**Zytel**	**Solvents & Fuels**	**Hytrel**	**Zytel**	**Acids & Bases**	**Hytrel**	**Zytel**	**Miscellaneous**	**Hytrel**	**Zytel**
Automatic Transmissions	A	A	Gasoline	A	A	Sulfuric Acid (20%)	A	C	Ethylene Glycol *	A	A,B
Fluid Type A & F	A	A	Nujol, JP4 Kerosene	A	A	Hydrochloric Acid(20%)	B	C	Steam	B	B
Hydraulic Fluid	A	A	Halocarbons, Freon	A	A	Potassium or Sodium			Liquid Ammonia		A
Phosophate Ester	A	A	Trichlorethylene	C	C	Hydroxide (20%)	A	B			
Lube Oil	A	A	Carbon Tetrachloride	B	A						

*Additives in antifreeze may attack these elastomers severely.

Torsional Couplings

LF Torsional Weights and Mass Moment of Inertia

Weights & Mass Moment Of Inertia For Couplings With Rubber (HTR) Elements

Coupling Size	Weight*					Inertia*				
	Model 0 lbs *(kg)*	Model 1 lbs *(kg)*	Model 1/S lbs *(kg)*	Model 2 lbs *(kg)*	Model 2/S lbs *(kg)*	Model 0 Lb-in² *(kg-cm²)*	Model 1 Lb-in² *(kg-cm²)*	Model 1/S Lb-in² *(kg-cm²)*	Model 2 Lb-in² *(kg-cm²)*	Model 2/S Lb-in² *(kg-cm²)*
LF1	0.13 *(0.06)*	0.46 *(0.21)*	0.53 *(0.24)*	1.04 *(0.47)*	1.08 *(0.49)*	0.12 *(0.35)*	0.26 *(0.75)*	0.29 *(0.86)*	0.55 *(1.60)*	0.58 *(1.70)*
LF2	0.33 *(0.15)*	1.01 *(0.46)*	1.08 *(0.49)*	2.34 *(1.06)*	2.40 *(1.09)*	0.43 *(1.25)*	0.85 *(2.5)*	1.13 *(3.3)*	2.5 *(7.3)*	2.8 *(8.1)*
LF4	0.46 *(0.21)*	2.89 *(1.31)*	1.54 *(0.70)*	5.09 *(2.31)*	3.75 *(1.70)*	1.13 *(3.3)*	1.71 *(5.0)*	2.22 *(6.5)*	3.9 *(11.3)*	4.4 *(12.8)*
LF8	0.71 *(0.32)*	2.98 *(1.35)*	3.17 *(1.44)*	7.61 *(3.45)*	7.80 *(3.54)*	2.39 *(7.0)*	5.13 *(15.0)*	6.36 *(18.6)*	14.0 *(41.0)*	15.2 *(44.6)*
LF12	0.77 *(0.35)*	3.20 *(1.45)*	3.44 *(1.56)*	7.83 *(3.55)*	8.07 *(3.66)*	2.87 *(8.4)*	6.22 *(18.2)*	6.83 *(20.0)*	15.1 *(44.2)*	15.8 *(46.1)*
LF16	1.43 *(0.65)*	5.03 *(2.28)*	5.14 *(2.33)*	13.58 *(6.16)*	13.69 *(6.21)*	8.00 *(23.4)*	14.5 *(42.5)*	16.8 *(49.1)*	40.6 *(118.8)*	42.9 *(125.4)*
LF22	1.54 *(0.70)*	5.56 *(2.52)*	5.78 *(2.62)*	14.15 *(6.42)*	14.59 *(6.62)*	9.09 *(26.6)*	17.2 *(50.4)*	24.0 *(70.2)*	43.2 *(126.5)*	50.0 *(146.3)*
LF25	1.85 *(0.84)*	7.91 *(3.59)*	8.31 *(3.77)*	20.53 *(9.31)*	20.92 *(9.49)*	17.2 *(50.2)*	31.0 *(90.7)*	35.1 *(102.7)*	73.5 *(215.0)*	77.6 *(227.0)*
LF28	2.09 *(0.95)*	8.36 *(3.79)*	8.93 *(4.05)*	20.97 *(9.51)*	21.52 *(9.76)*	19.0 *(55.6)*	35.0 *(102.4)*	38.7 *(113.2)*	84.7 *(247.8)*	88.3 *(258.5)*
LF30	3.15 *(1.43)*	12.48 *(5.66)*	13.27 *(6.02)*	33.53 *(15.21)*	34.33 *(15.57)*	34.9 *(102.0)*	68.3 *(200.0)*	75.3 *(220.4)*	186.4 *(545.5)*	193.4 *(565.9)*
LF50	3.53 *(1.60)*	13.32 *(6.04)*	14.33 *(6.50)*	34.39 *(15.60)*	35.38 *(16.05)*	35.5 *(104.0)*	70.1 *(205.0)*	86.6 *(253.4)*	188.1 *(550.5)*	204.7 *(598.9)*
LF80	4.63 *(2.10)*	15.10 *(6.85)*	15.98 *(7.25)*	36.60 *(16.60)*	37.48 *(17.00)*	45.0 *(131.8)*	82.1 *(240.3)*	90.2 *(263.9)*	200.1 *(585.5)*	208.1 *(609.1)*
LF90	7.28 *(3.30)*	25.46 *(11.55)*	26.96 *(12.23)*	63.21 *(28.67)*	64.71 *(29.35)*	153.8 *(450.0)*	224.7 *(657.5)*	259.4 *(759.2)*	557.0 *(1630.1)*	591.8 *(1731.8)*
LF140	8.05 *(3.65)*	27.18 *(12.33)*	29.15 *(13.22)*	64.93 *(29.45)*	66.93 *(30.36)*	195.5 *(572.0)*	263.1 *(770.0)*	298.3 *(873.0)*	595.5 *(1742.6)*	630.7 *(1845.6)*
LF250	15.65 *(7.10)*	41.84 *(18.98)*	44.11 *(20.01)*	97.93 *(44.42)*	100.18 *(45.44)*	599.4 *(1754.0)*	821.5 *(2404.0)*	864.2 *(2529.0)*	1798.8 *(5264.0)*	1841.5 *(5389.0)*
LF400	24.80 *(11.25)*	58.60 *(26.58)*	64.68 *(29.34)*	126.17 *(57.23)*	132.17 *(59.95)*	1155.0 *(3380.0)*	1532.6 *(4485.0)*	1600.3 *(4683.0)*	3119.9 *(9130.0)*	3187.9 *(9329.0)*

For Couplings With Hytrel (HY) Elements

Coupling Size	Weight			Inertia		
	Model 1 lbs *(kg)*	Model 2 lbs *(kg)*	Model 4 lbs *(kg)*	Model 1 Lb-in² *(kg-cm²)*	Model 2 Lb-in² *(kg-cm²)*	Model 4 Lb-in² *(kg-cm²)*
LF8HY	2.87 *(1.30)*	6.83 *(3.10)*	—	6.57 *(76.9)*	15.46 *(181.0)*	—
LF16HY	5.07 *(2.30)*	10.58 *(4.80)*	—	17.65 *(206.6)*	43.74 *(512.0)*	—
LF30HY	11.46 *(5.20)*	29.32 *(13.30)*	14.33 *(6.50)*	68.4 *(800.7)*	186.5 *(2183.2)*	150.3 *(1759.4)* (SAE 10)
LF50HY	12.35 *(5.60)*	30.20 *(13.70)*	15.43 *(7.00)*	80.5 *(942.3)*	198.7 *(2326.0)*	197.4 *(2310.8)* (SAE 11.5)
LF110HY	17.20 *(7.80)*	—	—	—	—	—
LF140HY	26.46 *(12.00)*	63.93 *(29.00)*	31.97 *(14.50)*	287.6 *(3366.6)*	620.0 *(7257.7)*	—

For Couplings With Zytel (X) Elements

Coupling Size	Weight			Inertia		
	Model 0/0S lbs *(kg)*	Model 1/1S lbs *(kg)*	Model 2/2S lbs *(kg)*	Model 0/0S Lb-in² *(kg-cm²)*	Model 1/1S Lb-in² *(kg-cm²)*	Model 2/2S Lb-in² *(kg-cm²)*
LF2X	0.2 *(0.1)*	0.9 *(0.4)*	2.2 *(1.0)*	0.42 *(1.23)*	0.62 *(1.81)*	2.26 *(6.61)*
LF4X	0.3 *(0.1)*	2.8 *(1.3)*	5.0 *(2.3)*	0.90 *(2.63)*	1.24 *(3.63)*	3.40 *(9.95)*
LF8X	0.6 *(0.3)*	3.3 *(1.5)*	7.7 *(3.5)*	3.6 *(10.5)*	5.0 *(14.6)*	13.9 *(40.7)*
LF16X	1.0 *(0.5)*	4.6 *(2.1)*	13.1 *(5.9)*	9.4 *(27.5)*	12.5 *(36.6)*	38.6 *(113.0)*
LF25X	1.5 *(0.7)*	8.0 *(3.6)*	20.1 *(9.1)*	17.2 *(50.3)*	24.7 *(72.3)*	67.1 *(196.4)*
LF30X	2.5 *(1.1)*	11.8 *(5.4)*	32.8 *(14.9)*	41.7 *(122.0)*	60.8 *(177.9)*	178.9 *(523.5)*

SAE Flywheel Adapter Plates (3/16" thick)

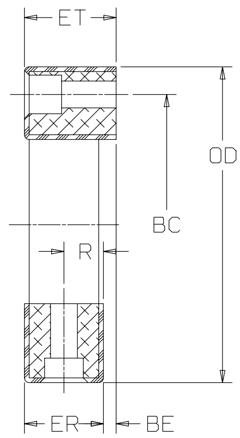
SAE Size (J620)	6.5	7.5	8	10	11.5	14
Weight lbs.	206	3.4	4.1	6	7.7	12.8
Weight (kg)	*(1.2)*	*(1.5)*	*(1.9)*	*(2.7)*	*3.5)*	*(5.8)*
Inertia Lb-in2	26	42	60	122	193	589
Inertia (kg-cm2)	*(76)*	*(123)*	*(176)*	*(357)*	*(565)*	*(1724)*

***Note: To Obtain Weight of Model-3**
1. Select weight of Flywheel Plate (from chart at left)
2. Select weight of Model-1 or 1/S Coupling (from chart above)
3. Add Flywheel Plate and Coupling Weight Together

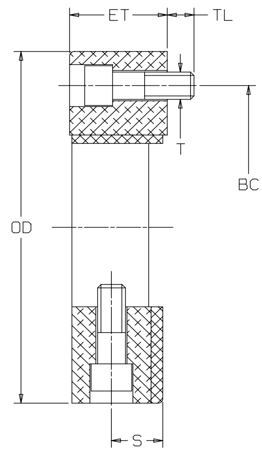
Note: To Obtain Inertia of Model-3
1. Select Inertia of Flywheel Plate (from chart at left)
2. Select Inertia of Model-1 or 1/S Coupling (from chart above)
3. Add Flywheel Plate and Coupling Inertia Together

Torsional Couplings

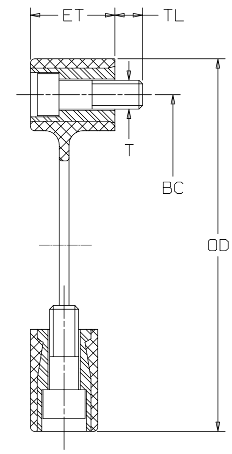
LF Torsional Dimensions



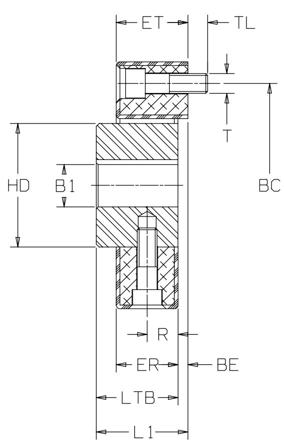
Model 0, Rubber



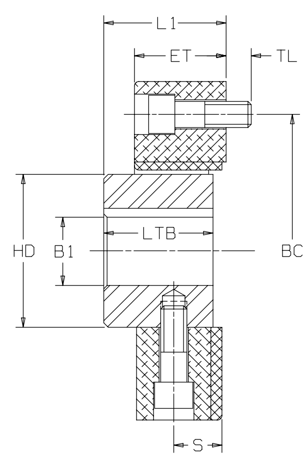
Model 0, Hytrel®



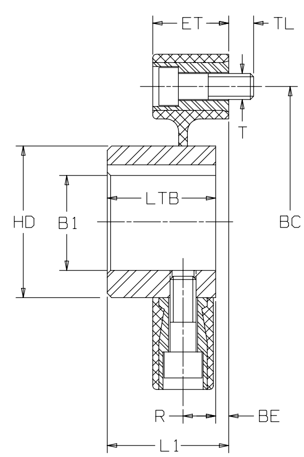
Model 0, Zytel®



Model 1, Rubber



Model 1, Hytrel®



Model 1, Zytel®

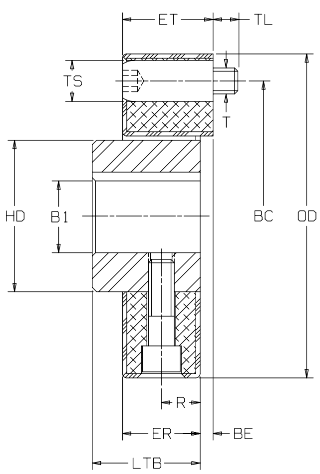
Dimensions For Basic Models (inches)

Coupling	Bore B1		Bore B2		OD			FOD	ET			OAL	L1		
Size	Min	Max	Min	Max	HTR	HY	ZY		HTR	HY	ZY		HTR	HY	ZY
LF1	0.31	0.63	0.31	0.88	2.20	—	—	2.20	0.94	—	—	1.97	1.02	—	—
LF2	0.44	0.88	0.50	1.38	3.35	—	3.48	3.35	0.94	—	0.94	2.36	1.26	—	1.26
LF4	0.47	1.00	0.63	1.75	3.94	—	3.94	3.94	1.10	—	0.98	2.52	1.34	—	1.28
LF8	0.50	1.38	0.75	2.00	4.72	4.92	4.92	4.72	1.26	1.34	1.18	3.46	1.81	1.89	1.77
LF12	0.50	1.38	0.75	2.00	4.80	—	—	4.72	1.26	—	—	3.46	1.81	—	—
LF16	0.63	1.63	0.81	3.63	5.91	6.10	6.10	5.91	1.65	1.69	1.38	4.17	2.20	2.28	2.08
LF22	0.63	1.63	0.81	3.63	5.91	—	—	5.91	1.65	—	—	4.17	2.20	—	—
LF25	0.63	2.13	0.81	2.75	6.69	7.17	6.89	6.69	1.81	1.85	1.57	4.57	2.40	2.44	2.28
LF28	0.63	2.13	0.81	2.75	6.69	—	—	6.69	1.81	—	—	4.57	2.40	—	—
LF30	0.81	2.44	1.00	3.75	7.87	8.07	8.07	7.87	2.28	2.28	1.97	5.51	2.91	2.99	2.79
LF50	0.81	2.44	1.00	3.75	7.87	8.07	—	7.87	2.28	2.28	—	5.51	2.91	2.99	—
LF80	0.81	2.44	1.00	3.75	8.07	—	—	7.87	2.56	—	—	5.51	2.97	—	—
LF90	1.19	3.13	1.19	4.25	10.24	—	—	10.24	2.76	—	—	6.61	3.46	—	—
LF140	1.19	3.13	1.19	4.25	10.24	10.63	—	10.24	2.76	2.28	—	6.61	3.46	3.46	—
LF250	1.63	4.25	1.63	5.00	13.38	10.63	—	13.38	3.34	4.06	—	8.18	4.25	4.06	—
LF400	1.63	4.75	1.63	5.50	14.57	—	—	14.57	4.13	—	—	10.24	5.31	—	—

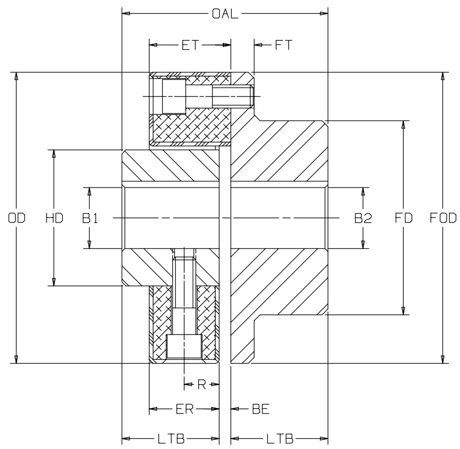
Torsional Couplings

VIRTUS Power Transmission

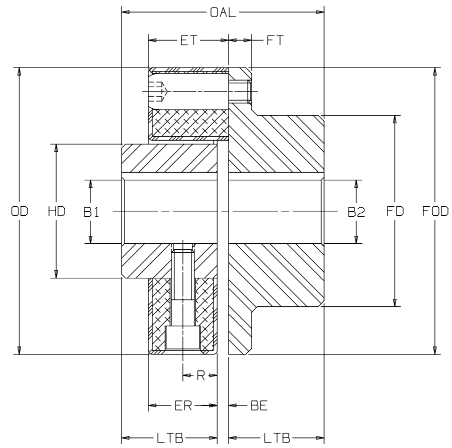
LF Torsional Dimensions



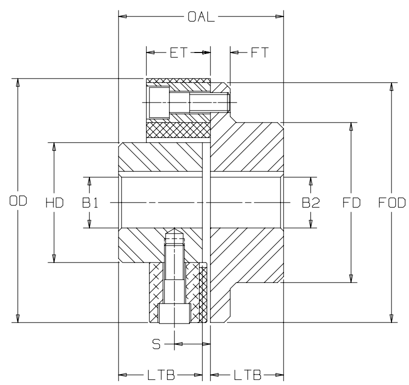
Model 1S, Rubber



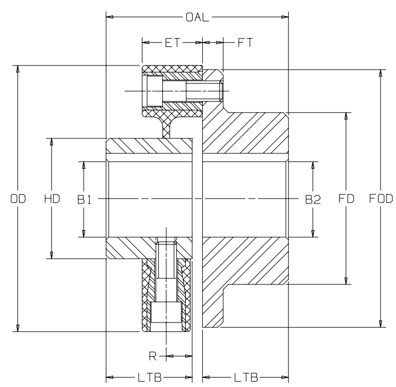
Model 2, Rubber



Model 2/S, Rubber



Model 2, Hytrel®



Model 2, Zytel®

Dimensions For Basic Models *Continued* (inches)

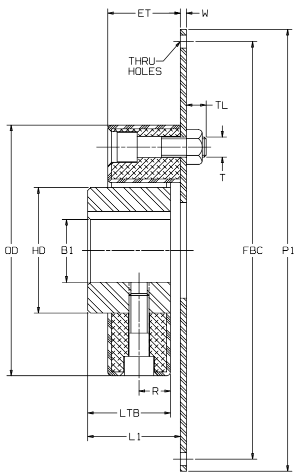
LTB	HD	FD	FT	BE	S** (+/-0.11)	ER*	R	BC/Division		T	TS			TL	Coupling Size
											HTR	HY	ZY		
0.94	1.18	1.44	0.27	0.08	—	0.87	0.43	1.73	2@180°	M6	0.39	—	-	0.28	LF1
1.10	1.57	2.17	0.31	0.16	—	0.79	0.39	2.68	2@180°	M8	0.55	—	0.59	0.31	LF2
1.18	1.77	2.56	0.31	0.16	—	0.94	0.47	3.15	3@120°	M8	0.55	—	0.59	0.31	LF4
1.65	2.36	3.15	0.39	0.16	0.79	1.10	0.55	3.94	3@120°	M10	0.67	—	0.75	0.39	LF8
1.65	2.36	3.15	0.39	0.16	—	1.10	0.55	3.94	4@90°	M11	0.67	—	—	0.39	LF12
1.97	2.76	3.94	0.47	0.24	1.02	1.42	0.71	4.92	3@120°	M12	0.75	—	0.86	0.47	LF16
1.97	2.76	3.94	0.47	0.24	—	1.42	0.71	4.92	4@90°	M12	0.75	—	—	0.47	LF22
2.16	3.35	4.53	0.55	0.24	1.06	1.57	0.79	5.51	3@120°	M14	0.86	—	0.98	0.55	LF25
2.16	3.35	4.53	0.55	0.24	—	1.57	0.79	5.51	4@90°	M14	0.86	—	—	0.55	LF28
2.60	3.94	5.51	0.63	0.31	1.38	1.97	0.98	6.50	3@120°	M16	0.98	—	1.18	0.63	LF30
2.60	3.94	5.51	0.63	0.31	1.38	1.99	0.98	6.50	4@90°	M16	0.98	—	—	0.63	LF50
2.81	3.94	5.51	0.63	0.16	—	2.40	1.20	6.50	4@90°	M16	0.98	—	—	0.63	LF80
3.15	4.92	6.30	0.75	0.31	—	2.44	1.22	8.46	3@120°	M20	1.26	—	—	0.79	LF90
3.15	4.92	6.30	0.75	0.31	1.30	2.44	1.22	8.46	4@90°	M20	1.26	—	—	0.79	LF140
3.94	6.30	7.68	0.75	0.31	—	3.03	0.89/2.15	11.02	4@90°	M20	1.26	—	—	0.79	LF250
4.92	6.69	7.87	0.98	0.39	—	3.74	1.12/2.62	11.81	4@90°	M24	1.77	—	—	0.98	LF400

*Dimension ER for HTR (rubber) only

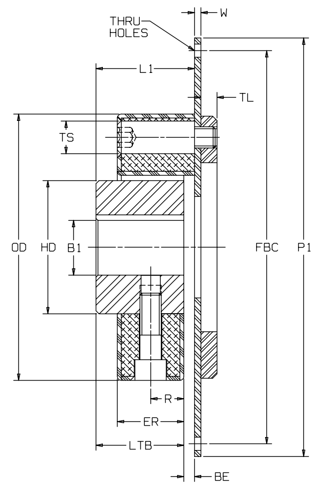
**Dimension S for Hytrel only.

Torsional Couplings

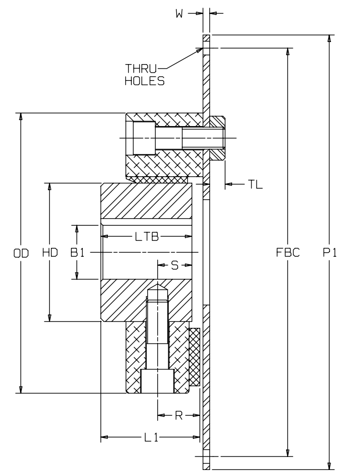
LF Torsional Flywheel Couplings



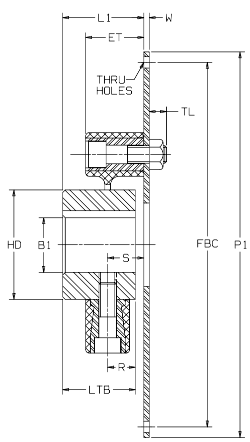
Model 3, Rubber



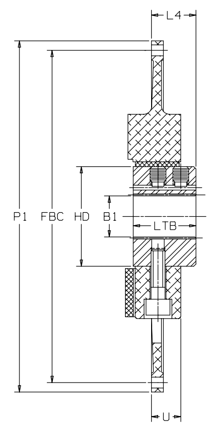
Model 3/S, Rubber



Model 3, Hytrel®



Model 3 and 3/S, Zytel®



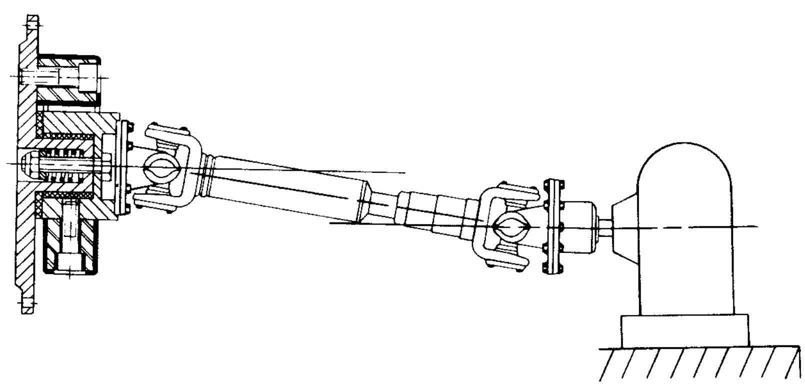
Model 4, Hytrel®

Damper Couplings

The damper coupling (sometimes referred to as the intermediate coupling) is used with U-Joint and Cardan shafts to eliminate torsional vibrations from the diesel engine being transmitted to the driven equipment.

The damper coupling assures that the drive systems are free of dangerous resonance speeds in the operating speed range and eliminates damage to gears, bearings, seals, and spline fretting the driven equipment.

Contact VIRTUS Engineering for assistance in applying a damper coupling.



VIRTUS
Power Transmission

Torsional Couplings

LF Torsional Flywheel Couplings

Flywheel Couplings Model 3, 3/S and 4 Dimensions (Inches)

Coupling	Bore B1		OD			ET			TL	L1			ER*	W	R	LTB
Size	Min	Max	HTR	HY	ZY	HTR	HY	ZY		HTR	HY	ZY				
LF1	0.31	0.63	2.20	—	—	0.94	—	—	0.28	1.02	—	—	0.87	—	0.43	0.94
LF2	0.44	0.88	3.35	—	3.48	0.94	—	0.94	0.31	1.26	—	1.26	0.79	—	0.39	1.10
LF4	0.47	1.00	3.94	—	3.94	1.10	—	0.98	0.31	1.34	—	1.28	0.94	—	0.47	1.18
LF8	0.50	1.38	4.72	4.92	4.92	1.26	1.34	1.18	0.39	1.81	1.89	1.77	1.10	0.19	0.55	1.65
LF12	0.50	1.38	4.80	—	—	1.26	—	—	0.39	1.81	—	—	1.10	0.19	0.55	1.65
LF16	0.63	1.63	5.91	6.10	6.10	1.65	1.69	1.38	0.47	2.20	2.28	2.08	1.42	0.19	0.71	1.97
LF22	0.63	1.63	5.91	—	—	1.65	—	—	0.47	2.20	—	—	1.42	0.19	0.71	1.97
LF25	0.63	2.13	6.69	7.17	6.89	1.81	1.85	1.57	0.55	2.40	2.44	2.28	1.57	0.19	0.79	2.16
LF28	0.63	2.13	6.69	—	—	1.81	—	—	0.55	2.40	—	—	1.57	0.19	0.79	2.16
LF30	0.81	2.44	7.87	8.07	8.07	2.28	2.28	1.97	0.63	2.91	2.99	2.79	1.97	0.19	0.98	2.60
LF50	0.81	2.44	7.87	8.07	—	2.28	2.28	—	0.63	2.91	2.99	—	1.99	0.19	0.98	2.60
LF80	0.81	2.44	8.07	—	—	2.56	—	—	0.63	2.97	—	—	2.40	0.19	1.20	2.81
LF90	1.19	3.13	10.24	—	—	2.76	—	—	0.79	3.46	—	—	2.44	0.19	1.22	3.15
LF140	1.19	3.13	10.24	10.63	—	2.76	2.28	—	0.79	3.46	3.46	—	2.44	0.19	1.22	3.15
LF250	1.63	4.25	13.38	10.63	—	3.34	4.06	—	0.79	4.25	4.06	—	3.03	.50/.75	0.89/2.15	3.94
LF400	1.63	4.75	14.57	—	—	4.13	—	—	0.98	5.31	—	—	3.74	0.75	1.12/2.62	4.92

*Dimension ER for HTR (rubber) only.

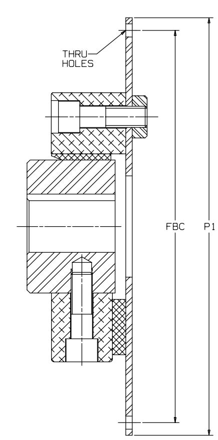
Flywheel Couplings Model 3, 3/S and 4 Dimensions Continued (Inches)

Coupling Size	BE	S* (+/-0.11)	U* (+/-0.11)	L4*	HD	BC/Division		T	TS		
									HTR	HY	ZY
LF1	0.08	—	—	—	1.18	1.73	2@180°	M6	0.39	—	—
LF2	0.16	—	—	—	1.57	2.68	2@180°	M8	0.55	—	0.59
LF4	0.16	—	—	—	1.77	3.15	3@120°	M8	0.55	—	0.59
LF8	0.16	0.79	—	—	2.36	3.94	3@120°	M10	0.67	—	0.75
LF12	0.16	—	—	—	2.36	3.94	4@90°	M10	0.67	—	—
LF16	0.24	1.02	—	—	2.76	4.92	3@120°	M12	0.75	—	0.86
LF22	0.24	—	—	—	2.76	4.92	4@90°	M12	0.75	—	—
LF25	0.24	1.06	—	—	3.35	5.51	3@120°	M14	0.86	—	0.98
LF28	0.24	—	—	—	3.35	5.51	4@90°	M14	0.86	—	—
LF30	0.31	1.38	1.73	0.44	3.94	6.50	3@120°	M16	0.98	—	1.18
LF50	0.31	1.38	1.17	0.88	3.94	6.50	4@90°	M16	0.98	—	—
LF80	0.16	—	—	—	3.94	6.50	4@90°	M16	0.98	—	—
LF90	0.31	—	—	—	4.92	8.46	3@120°	M20	1.26	—	—
LF140	0.31	1.30	1.24	0.42	4.92	8.46	4@90°	M20	1.26	—	—
LF250	0.31	—	—	—	6.30	11.02	4@90°	M20	1.26	—	—
LF400	0.39	—	—	—	6.69	11.81	4@90°	M24	1.77	—	—

*Hytrel only.

SAE J620 Flywheel Dimensions For Model 3, 3S, and 4 (Inches)

SAE Flywheel Size	Pilot P1	Bolt Circle FBC	Thru Holes		Suggested Coupling Sizes for SAE Flywheel Sizes			
			No.	Nominal Dia.	HTR Model 3 & 3S	HY Model 3	HY Model 4	ZY Model 3
6-1/2	8.499	7.875	6	.31	8, 16	8, 16	N/A	8, 16
7-1/2	9.599	8.750	8	.31	8, 16	8, 16	N/A	8, 16
8	10.374	9.625	6	.41	16, 25	6, 30	30	16, 25, 30
10	12.374	11.625	8	.41	25,30 50, 90	30, 50 140	30	25, 30
11-1/2	13.874	13.125	8	.41	30,50 90,140 250	50, 140 250	50 110 140	30
14	18.374	17.250	8	.53	90,140 250	140 250	N/A	N/A
16	20.374	19.250	8	.53	250	250	N/A	N/A

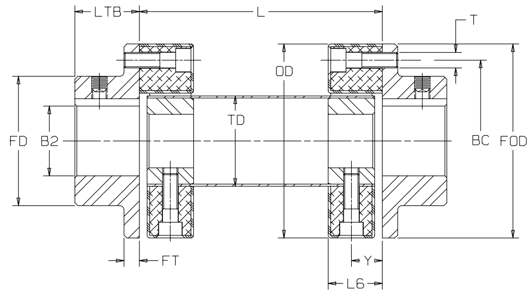


VIRTUS Power Transmission

LF Torsional Model 6 & 6B

Model 6, 6/S (Rubber Elements)

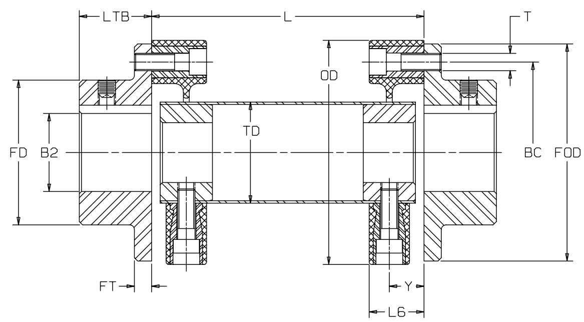
This model compensates for considerable axial, radial, and angular misalignment, and with the rubber flexible elements is torsionally very soft. Lengths are not standardized, but made according to customer requirements. S-style axial mounting screws allow the hubs to have free end float without exerting axial loads on the connected equipment, while providing quick assembly.



Model 6, Rubber

Model 6, 6/S (Zytel® Elements)

Elements made of Dupont's super-tough, corrosion resistant Zytel® are torsionally stiff without backlash, with less than 1° windup. Large spans, equal to all-metal couplings, can be accommodated without internal support bearings when lightweight Zytel® flexible elements are used. Hubs, hardware and tubes are also available in stainless steel or with plating and corrosion resistant coatings. S-style, axial mounting screws allow for free end-float without harmful reaction forces.



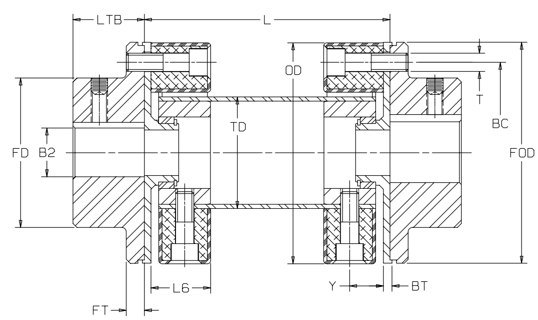
Model 6, Zytel®

Model 6B (Rubber Elements)

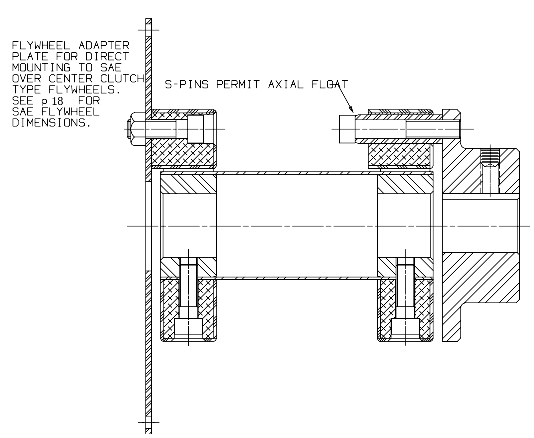
Similar to Model 6 except the center shaft is supported by internal maintenance-free bearing material. This allows for greater equipment separation and high speeds, as well as high angular misalignment, which can be obtained with rubber flexible elements.

The drawing at the lower left shows one of the many special designs available. In this case, a standard flywheel adapter plate (see Model 3) is used to couple to a diesel engine flywheel. The flanged hub on the other end is supplied with extra long S-style connecting screws. (Notice that the element is reversed from its normal direction). This arrangement permits extensive axial movement (free end float) of the drive package.

One of the many features of the Model 6 is that the center floating shaft can be radially removed without displacing the coupled machines. Flexible elements may be pre-assembled to the center segment and then final assembled to the hubs quickly, with little hardware.



Model 6B, Rubber



Model 3, 6/S Rubber

Torsional Couplings

Torsional LF Model 6 & 6B

Model 6 and 6B Dimensions (inches)

Coupling Size	Nominal Torque (in—lb) Rubber	Zytel	Bore Diameter B2 Min.	Max.	Element OD Rubber	Zytel	Flange FOD	Hub LTB	Span L	Y	BT	FT	TD**	ET Rubber	Zytel
LF1	90	—	0.313	0.875	2.20	—	2.20	0.94	*	0.51	0.20	0.28	1.18	0.94	—
LF2	180	265	0.500	1.375	3.35	3.48	3.35	1.10	*	0.55	0.20	0.31	1.62	0.94	0.94
LF4	440	530	0.625	1.750	3.94	3.94	3.94	1.18	*	0.63	0.20	0.31	1.81	1.10	0.98
LF8	885	1060	0.750	2.000	4.72	4.92	4.72	1.65	*	0.71	0.20	0.39	2.38	1.26	1.18
LF12	1240	—	0.750	2.000	4.80	—	4.80	1.65	*	0.71	0.20	0.39	2.38	1.26	
LF16	1770	2120	0.813	2.625	5.91	6.10	5.91	1.97	*	0.94	0.20	0.47	2.75	1.65	1.38
LF22	2430	—	0.813	2.625	5.91	—	5.91	1.97	*	0.94	0.20	0.47	2.75	1.65	—
LF25	2790	3275	0.813	2.750	6.69	6.89	6.69	2.16	*	1.02	0.20	0.55	3.38	1.81	1.57
LF28	3700	—	0.813	75.000	6.69	—	6.69	2.16	*	1.02	0.20	0.55	3.38	1.81	—
LF30	4425	4870	1.000	3.750	7.87	8.07	7.87	2.60	*	1.30	0.20	0.63	4.00	2.28	1.97
LF50	6195	—	1.000	3.750	7.87	—	7.87	2.60	*	1.30	0.20	0.63	4.00	2.28	—
LF80	7960	—	1.000	3.750	8.07	—	8.07	2.60	*	1.36	0.20	0.63	4.00	2.56	—
LF90	9735	—	1.188	4.250	10.24	—	10.24	3.15	*	1.54	0.20	0.75	5.00	2.76	—
LF140	15,000	—	1.188	4.250	10.24	—	10.24	3.15	*	1.54	0.20	0.75	5.00	2.76	—
LF250	26,500	—	1.625	5.000	13.38	—	13.38	3.94	*	1.81	0.39	0.75	6.25	3.35	—
LF400	44,200	—	1.625	5.500	14.57	—	14.57	4.92	*	2.24	0.39	0.98	6.69	4.13	—

* Please specify distance between shaft ends L. Refer to table below for max. and min. values.

Model 6 and 6B Maximum Speed and Length Data

Coupling Size	Max. Speed (RPM) (Short Spans Only) Rubber Model 6	Rubber Model 6B	Zytel Model 6	Minimum Span L (In.) (All Versions)	Max. Span L (In.) @ 1750RP Rubber Model 6	Rubber Model 6B	Zytel Model 6
LF1	1500	6000	—	3.10	45	52	—
LF2	1500	6000	10,000	3.10	52	58	58
LF4	2900	6000	8000	3.61	59	62	62
LF8	2900	6000	7000	4.17	64	72	72
LF12	2900	6000	—	4.17	64	72	—
LF16	2900	6000	6000	5.42	65	77	77
LF22	2900	6000	—	5.42	65	77	—
LF25	2900	5000	5000	5.98	58	84	84
LF28	2900	5000	—	5.98	58	84	—
LF30	2500	4000	4500	7.47	59	91	91
LF50	2500	4000	—	7.47	83	91	—
LF80	2500	4000	—	7.47	83	91	—
LF90	1500	3600	—	9.03	34	99	—
LF140	1500	3600	—	9.03	73	99	—
LF250	1500	3000	—	10.80	86	117	—
LF400	1500	2500	—	Consult Lovejoy			

Model 6 (Rubber) Max. Span L (Inches) At Various Speeds*

* Longer spans for given speeds are possible with Model 6B. Please consult VIRTUS. Consult VIRTUS for maximum spans at higher speeds.

Coupling Size	Speed (RPM) 500	600	720	750	900	1000	1200	1500	1800
LF1	94	86	78	76	69	65	58	51	45
LF2	109	99	89	88	79	74	66	57	52
LF4	116	106	96	94	86	81	73	64	59
LF8	134	121	110	107	97	91	81	70	64
LF12	134	121	110	107	97	91	81	70	64
LF16	144	129	117	114	103	96	85	72	65
LF22	144	129	117	114	103	96	85	72	65
LF25	154	138	123	120	106	98	83	64	58
LF28	154	138	123	120	106	98	83	64	58
LF30	168	151	134	131	115	106	90	68	59
LF50	173	157	143	139	126	119	106	92	83
LF80	173	157	143	139	126	119	106	92	83
LF90	177	155	134	130	107	94	69	38	34
LF140	187	169	151	147	130	121	104	83	73
LF250	211	190	171	167	148	137	118	94	86

Model 6 (Zytel) Max. Span L (Inches) At Various Speeds*

*Maximum span is based on tube deflection and a critical speed 1.5x above operating speed.

Coupling Size	Speed (RPM) 500	600	720	750	900	1000	1200	1500	1800
LF2X	110	101	92	90	82	78	71	64	58
LF4X	116	106	97	95	87	82	75	67	62
LF8X	136	124	113	110	101	96	87	78	72
LF16X	147	134	122	120	109	103	94	84	72
LF25X	162	148	135	132	120	114	104	93	84
LF30X	176	161	147	144	131	124	114	102	91

Torsional Couplings

LF Torsional Model 6 & 6B (continued)

These guidelines cover additional considerations unique to the floating-shaft versions of the coupling. Use them together with the selection information for general applications or engine applications found on pages 9 through 12.

1. Torque capacity

Values for nominal torque T_{kn}, maximum torque TKmax and continuous vibratory torque T_{kw} remain the same and are found in the table of Performance Data on page 12 and 13.

2. Stiffness values and wind-up

Because 2 torsional rubber elements are used together in series, values from the Performance Data table on page 12 and 13 for dynamic torsional stiffness CT_{dyn}, static angular stiffness c_w, and static axial stiffness c_a, should be multiplied by one half. Values for wind-up should be doubled.

3. Misalignment

Performance Data table values for allowable axial misalignment are doubled for the standard element design. Values for the S-Style version will be the same but can be increased by use of special-length sleeves (consult VIRTUS).

Angular misalignment will be equal at both ends and should be kept within the limits given in the Performance Data table. Allowable parallel misalignment is related to the angular misalignment and the distance between shaft ends L. It is calculated by applying one of the two following equations:

For Model 6:

r = (L-2Y)tanα

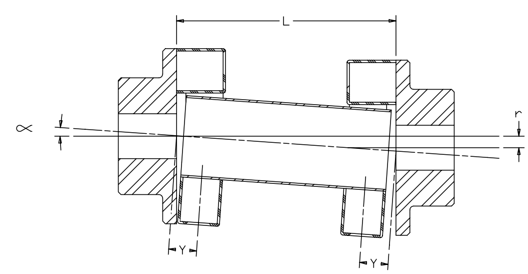
For Model 6B:

r = [L-2(Y+BT)]tanα

where

∝ = angular misalignment (degrees),
r = parallel misalignment (inches),
and L,Y and BT (inches) are from the dimension table.

Please note that angular and parallel misalignment values are dependent on speed and should be adjusted according to Fig. 2, page 14.



4. Which style, Model 6 or Model 6B? (HTR only)

In general, the basic Model 6 is suitable for most short- or medium-length spans (distance between shaft ends). Longer spans will require the bearing-supported floating shaft feature of the Model 6B. But regardless of length, some applications will still require the Model 6B design based on speed alone. Use the Maximum Speed and Length table to guide your choice, or consult VIRTUS for assistance.

LF Torsional Assembly Instructions

Assembly Notes and Instructions - Important Notes

For optimum coupling performance and longevity, the radial and axial screws connecting the element to the hubs or adapter plate must be tightened to the torque given in the table below. It is recommended that a torque wrench be used. This is particularly important with larger couplings. Tightening “by feel” is normally not sufficient.

Tightening torques which are too low will inevitably lead to slackening of the screws and consequently lead to undesirable results.

In order to reduce friction between the screw head and the metal insert in the element, it is suggested that a small amount of grease be applied to the underside of the screw head before assembly. This also reduces the possibility of twisting the element (see diagrams to the left). It is important that the element be mounted correctly and not be twisted.

Mounting Screws

Each radial and axial mounting screw is treated for corrosion resistance (minimum grade DIN 8.8, SAE Grade 8) and the threads are coated with micro-encapsulated adhesive. The adhesive is released at assembly and further enhances the performance and safety of the coupling. For adequate effect, the adhesive should be allowed to harden for 4-5 hours prior to operation.

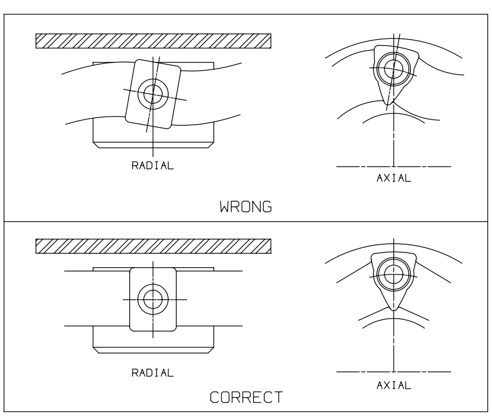
NOTE:
Anaerobic adhesives (such as Loctite™, etc) should not be used, as they have a detrimental effect on the bond between the rubber and the insert if dripped or splashed to those areas.

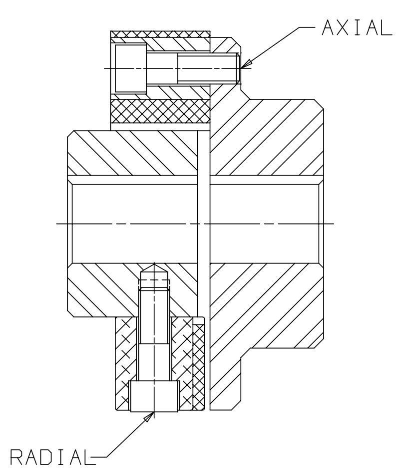
Recommended adhesives are 3M™ 2353 or Nylok Precote 80. Screws that we provide with this adhesive may be used up to 3 times.

Mounting Screw Data

Coupling Size	Radial and Axial Screws: Screw Size	Thread Pitch	Quantity	Torque (ft-lb)	L-Loc Screws: Set Screw	Torque (ft-lb)
LF1	M6	1.00	4	7	—	—
LF2	M8	1.25	4	20	—	—
LF4	M8	1.25	6	20	—	—
LF8	M10	1.50	6	40	M10	20
LF12	M10	1.50	8	40	M10	20
LF16	M12	1.75	6	65	M12	30
LF22	M12	1.75	8	65	M14	55
LF25	M14	2.00	6	105	M14	55
LF28	M14	2.00	8	105	M16	90
LF30	M16	2.00	6	150	M16	90
LF50	M16	2.00	8	150	M16	90
LF80	M16	2.00	8	150	M16	90
LF90	M20	2.50	6	330	M20	150
LF140	M20	2.50	8	330	M20	150
LF250	M20	2.50	12	370	M20	150
LF400	M20/M24	*	8/4	450/775	*	*

* Consult VIRTUS






S-Style Axial Screw


Standard Radial & Axial Screw

Torsional Couplings

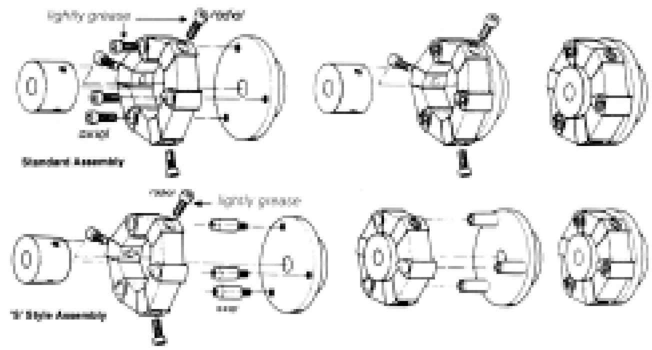
LF Torsional Assembly Instructions Continued

Models 1, 2 & 3

- Place hubs on shafts, or the adapter plate onto the flywheel. If a key is used, make sure it does not extend past the end of the shaft.
- Attach rubber element to the flanged hub (or adapter plate) with the axial screws. Hand tighten. (Be sure to place a drop of oil or grease under each screw head to reduce friction and twisting of the element at final assembly).
- Align equipment so the cylindrical hub in the other shaft is placed into the center of the element. Install the radial screws.
- Tighten all axial screws first, then all radial screws to the proper torque shown above. Tighten set screws.

Model 1S, 2/S, 3/S

- Same as above except:
- Install S-Type axial screws on flanged hub or flanged plate.
- Mount the element on the cylindrical hub and fasten with radial screws. Torque these screws to the proper value. Do not forget to place a drop of oil or grease under the screw head before fastening. Also, make sure the hub is set on the shaft with the proper shaft engagement. Normally, the end of the shaft is flush with the end of the hub. Tighten set screws.
- Pilot the hub assembly onto the flanged hub or adapter plate.



LF Torsional Alignment and Assembly Notes

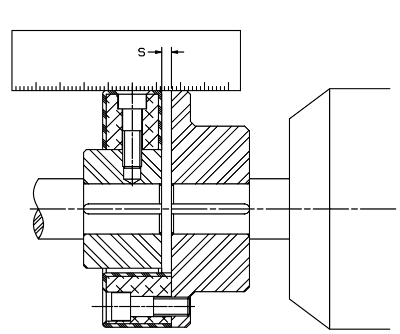
After assembly, the coupling (equipment) should be aligned carefully for long service life. Naturally, the higher the speed, the greater the care should be in alignment.

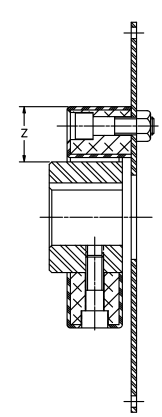
In Model 2, alignment can easily be checked with a straight edge. The outer diameter of the flanged hub must be flush with the element diameter where the radial screws are placed. Check each position for proper alignment. In Models 1 and 3 the distance must be measured at each axially bolted point of the rubber element, and should be set as accurately as possible to the value “Z” shown in the table on this page.

In models that use the S-Style screws, alignment is normally not required. The parallel and angular misalignment is small when the equipment is pilot assembled. As example of this would be a hydraulic pump mounted to an SAE engine pump mounting flange. Hytrel® Torsional couplings are pilot mounted only.

HTR Alignment Values (Inches)

Size	Dimension S	Dimension Z
1	0.08	0.51
2	0.16	0.88
4	0.16	1.08
8	0.16	1.18
12	0.16	1.22
16	0.24	1.57
22	0.24	1.57
25	0.24	1.67
28	0.24	1.67
30	0.31	1.97
50	0.31	1.97
80	0.16	2.07
90	0.31	2.66
140	0.31	2.66
250	0.31	3.54
400	0.39	3.94

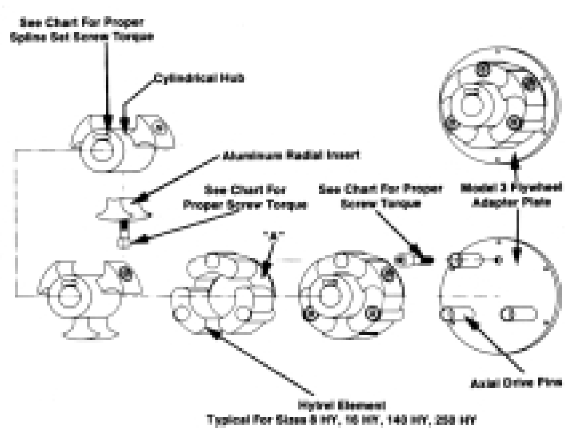


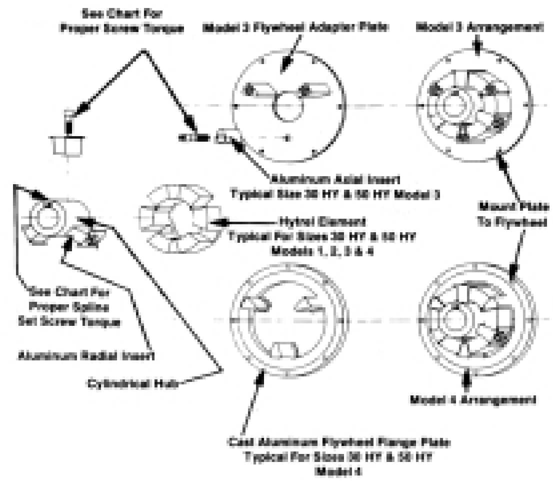


Torsional Couplings

VIRTUS
Power Transmission

LF Assembly Instructions for Torsional Hytrel® Assembly Instructions





For Sizes 8, 16, 140 and 250 (Models 1, 2 & 3)

1 Mount the cylindrical hub to the shaft and tighten set screws.
2. Mount the radial aluminum inserts to the cylindrical hub and tighten the radial screws to the proper torque. If the inserts are already mounted, do not disassemble.
3. Slide the Hytrel® element onto the cylindrical hub. The webbed part (A) must be placed toward the flanged hub or adapter plate. The size 140 consists of 4 single elastic Hytrel® cushions with shoulder "A". Size 250 has 4 cushions with shoulder "A" and 4 cushions without the shoulder. Cushions with shoulders are installed so that when they are assembled, they are nearest to the flanged hub or adapter plate.
4. Install the axial drive pins and screws to the flanged hub or adapter plate. Tighten to the specified torque.
5. Pilot the equipment together.

For Sizes 30 and 50 (Models 1, 2, 3, 4)

1. Mount the cylindrical hub to the shaft and tighten set screws.
2. Mount the radial aluminum inserts to the cylindrical hub and tighten the radial screws to the proper torque. If the inserts are already mounted, do not disassemble.
3. Mount the axial aluminum inserts to the flanged hub or adapter plate. Tighten to specified torque. Be sure that these inserts are oriented properly so that they mate with the Hytrel® element. Slide the Hytrel® element onto the axial (flanged hub or adapter plate) inserts.
4. Model 4: mount the cast aluminum flange with the Hytrel® element installed to the engine flywheel. Mount the cylindrical hub to the driven equipment shaft.
5. Pilot the equipment together.

Torsional Couplings

LK Torsional Family Coupling System

The Torsional LK coupling is a simple, robust, two-piece coupling consisting of an element or flywheel adapter together with a splined hub. It is used on applications that have a diesel, gasoline or natural gas engine driving one or more flange mounted hydraulic pumps. The couplings are torsionally very stiff (almost rigid) enabling drives of hydraulic pumps and similar equipment having low mass of inertia to operate below the critical speed. The very stiff LK raises the critical speed well above the operating range providing a drive free of any harmful torsional vibrations. The LK is an ideal choice for hydrostatic construction drives, mainly in the low to mid power ranges. Typical applications are excavators, vibratory rollers, loaders, cranes, manlifts, forklifts, tractors, etc. Virtually all engine driven hydrostatic applications in the low to mid power range can use the LK coupling.

Salient features and advantages:

- Compact, light, robust and safe in operation with long service life.
- Oil Resistant and suitable for temperatures of -40° to +300°F (-40° up to +150°C).
- High torsional stiffness-allowing operation below critical speed without resonances, provided it is correctly selected.
- Service free combination of sintered metal with highly shock resistant, temperature stabilized special polyamide.
- Short mounting length, easy assembly since it can be mounted axially.
- The hubs can be equipped with the proven patented L-Loc clamping system. With L-Loc, the coupling hub can be fit to splined shafts absolutely free of movement to eliminate fretting.
- The hubs can be modified in form and length as needed.
- Various series for standardized SAE-flywheels and non-standard flywheels.
- Low priced and normally available from stock.

Design and materials:

Modern construction to give rational and economic manufacture-good material properties-design principle proven over the years.

Hubs:

High-quality, precision powdered-metal hubs are used for all sizes of the LK. These hubs are thoroughly tested by Lovejoy and proven in many applications. These one-piece hubs (or hubstars) have "dogs" that provide the engagement with the element. The sides of the dogs are lightly crowned to avoid edge pressure at angular misalignments.

Flywheel flanges:

These flanges are molded in high quality plastic, strengthened with glass fiber to produce a heat-stabilized product displaying high impact strength. Fundamentally the flywheel flange is available in two different designs:

A) One-Piece with mounting measurements to SAE J620.
B) Two-Piece consisting of one universal plastic flange, which can be fitted with steel adapter to any flywheel.
Such steel adapters can be produced either by the customer himself or delivered by us. In the latter case, the plastic flange is mounted in our factory onto the steel adapter.

The one-piece flanges can be mounted to the flywheel in two different positions, resulting in two different axial mounting lengths. The two-piece flanges with adapter can be arranged in four different positions, resulting in four different axial mounting lengths. By using the different positions of the flanges and different lengths of the hubs, the ideal overall length for the coupling can be reached. It is important that the flange is mounted in the correct position. We have numerous application drawings for the various combinations of engines and pumps, gears etc. which include all important details such as position of the flange, length of the hub, spline of the hub, flange between pump and flywheel housing etc. Therefore, please ask for the correct drawing for your specific application. Should we not have the drawing already available, we will gladly make your specific drawing on our CAD system.

Torsional Couplings

LK Torsional System

LK Performance Data

Coupling Size	Nominal Torque T_{KN}	Maximum Torque TK_{max}	Maximum Speed (RPM)	Dynamic Torsional Stiffness C_{Tdyn} 10^3lb-in/rad *(kNm/rad)*				Relative Damping Ψ
				0.25 T_{KN}	0.50 T_{KN}	0.75 T_{KN}	1.00 T_{KN}	
LK80	90 ft-lb *125 Nm*	240 ft-lb *330 Nm*	6000	Consult Lovejoy				
LK100	295 ft-lb *400 Nm*	590 ft-lb *800 Nm*	5000	490 *(55)*	550 *(62)*	800 *(90)*	1060 *(120)*	
LK125	590 ft-lb *800 Nm*	1180 ft-lb *1600 Nm*	4500	1370 *(155)*	1590 *(180)*	2800 *(315)*	4070 *(460)*	0.4
LK150	885 ft-lb *1200 Nm*	2200 ft-lb *3000 Nm*	4000	2300 *(260)*	2480 *(280)*	3700 *(420)*	7950 *(900)*	
LK150D	1770 ft-lb *2400 Nm*	4400 ft-lb *6000 Nm*	4000	4600 *(520)*	4960 *(560)*	7400 *(840)*	15900 *(1800)*	

Misalignment:

As the coupling is torsionally very stiff, it is also very stiff in the radial direction. It is suitable for accurately aligned drives, (flange mounted). The coupling is able to compensate for the small radial and angular misalignments that must normally be expected on flange mounted drives. In the axial direction, the hub can move freely and be located a few millimeters from the ideal axial position, even to the point of protruding out of the flange. However, for highly loaded couplings, it is recommended that the dogs be completely engaged at all times.

Mounting:

In most cases, the diameter of the hubstar is smaller than the center locating diameter of the pump flange (the hubstar passes through bore in the flange which connects the pump with the flywheel housing). The diameter of the hubstar is always a little smaller than the normal size of the coupling (the rotation diameter of the hubstar for LF-K-100 is <100mm; it will pass through the bore in the pump mounting plate provided it is 100 mm or 4 inches diameter or greater). In this case the installation can be carried out as follows: (See bottom left picture)

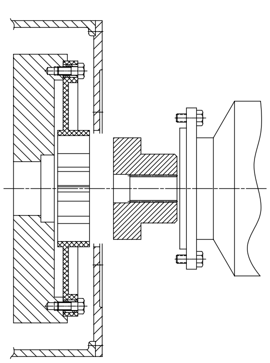
1. Bolt the coupling flange onto the flywheel.
2. Bolt the pump mounting plate onto the flywheel housing.
3. Fit coupling onto the pump shaft and secure.
4. Offer up pump to engage coupling and pump in the pump mounting plate.

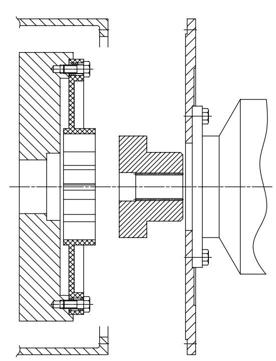
For the occasional case where the hubstar diameter is larger than the bore in the pump mounting plate, the installation should be carried out as follows: (See bottom center picture)

1. Bolt the coupling flange onto the flywheel.
2. Bolt pump mounting plate to pump.
3. Fit coupling hub onto the pump shaft and secure.
4. Offer up pump and mounting plate so coupling engages and locate the pump mount plate in the flywheel housing. Bolt complete assembly to flywheel housing.

Axial Securing Of Hub

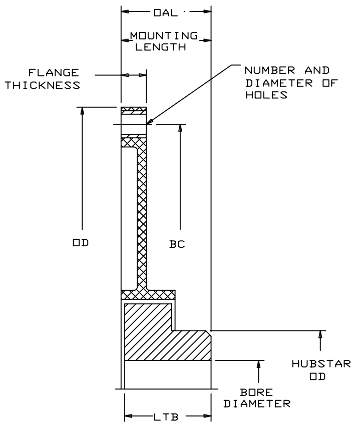
The hub can adjust its axial position freely as there is no axial stop. Therefore, the hub has to be secured onto the pump shaft axially. For best results use our proven L-Loc clamping system. For light drives where the pump shaft has a shoulder it can be sufficient to clamp the hub against the shoulder using a bolt and washer fastened onto the end of the pump shaft, provided it has a tapped hole.



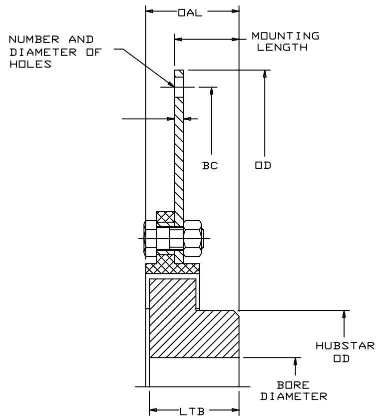


VIRTUS Power Transmission

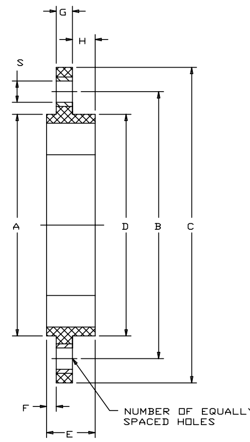
LK Torsional System



1-Piece Flange



2-Piece Flange



Universal Element

LK Dimensions for SAE J620 flywheel applications

Coupling Size	Nominal Torque Rating	Bore Diameter Min.	Bore Diameter Max.	Flange Dimmensions: SAE Flywheel Size	Flange Style	OD	BC	Number & Diameter Of Holes	Flange Thickness	Hubstar Dimensions: Hubstar OD	LTB*	Assembly Dimensions: OAL	Mounting Length
LK100	295 ft.lb. *400 Nm*	9/16"" *15mm*	1-9/16" *40mm*	6.5	1-PIECE	8.500" *215.9mm*	7.875" *200mm*	6 x .33" *6 x 8.5mm*	0.55" *14mm*	2.56" *65mm*	1.26" *32mm*	1.34" *34mm*	0.79/1.03" *23mm+/-3mm*
				7.5	1-PIECE	9.500" *241.3mm*	8.750" *222.3mm*	8 x .33"" *8 x 8.5mm*	0.55" *14mm*		1.26" *32mm*	1.34" *34mm*	0.79/1.03" *23mm+/-3mm*
				8	1-PIECE	10.375" *263.5mm*	9.625" *244.5mm*	6 x .41" *6 x 10.5mm*	0.55" *14mm*		2.20" *56MM*	2.28" *58MM*	2.16/2.40" *58mm+/-3mm*
				10	1-PIECE	12.375" *314.3mm*	11.625" *295.3mm*	8 x .41" *8 x 10.5mm*	0.55" *14mm*		1.89" *48mm*	1.97" *50mm*	1.85/2.09" *50mm+/-3mm*
LK125	590 ft.lb. *800 Nm*	13/16" *20mm*	2-1/8" *55mm*	10	1-PIECE	12.375" *314.3mm*	11.625" *295.3mm*	8 x .41" *8 x 10.5mm*	0.79" *20mm*	3.35" *85mm*	1.89" *48mm*	1.97" *50mm*	1.85/2.09" *50mm+/-3mm*
				11.5	2-PIECE	13.875" *352.4mm*	13.125" *333.4mm*	8 x .41" *8 x 10.5mm*	0.19" *5mm*		1.97" *50mm*	2.05" *52mm*	1.30/1.54" *36mm+/-3mm*
LK150	885 ft.lb. *1200 Nm*	1" *25mm*	2-3/4" *70mm*	11.5	1-PIECE	13.875" *352.4mm*	3.125" *333.4mm*	8 x .41" *8 x 10.5mm*	0.79" *20mm*	4.33" *110mm*	2.09" *53mm*	2.09" *53mm*	1.26/1.34" *33mm+/-1mm*
				14	2-PIECE	18.375" *466.7mm*	17.250" *438.2mm*	8 x .50" *8 x 12.7mm*	0.19" *5mm*		2.09" *53mm*	2.09" *53mm*	0.94/1.02" *25mm+/-1mm*
LK150D	1770 ft.lb. *2400 Nm*	1-3/16" *30mm*	2-3/4" *70mm*	14	**	18.375 *466.7mm*	17.250" *438.2mm*	8 x .50" *8 x 12.7mm*	0.13" *3.4mm*	4.33" *110mm*	2.05" *52mm*	2.13" *54mm*	0.94/1.02" *25mm+/-1mm*

*Other shorter or longer hub lengths available for special requirements.

** LK150D uses 2 Zytel elements in parallel with 1 steel plate.

Dimensions for universal elements (for non-SAE flywheels, etc.)

ELEMENT SIZE	PILOT A	B.C. B	NUMBER OF HOLES	HOLE DIAMETER S	O.D. C	D	E	F	G	H
LK80-6-106	4.173 in. *106 mm*	5.118 in. *130 mm*	5	0.33 in. *8.4 mm*	5.91 in. *150 mm*	3.60 in. *91.4 mm*	1.12 in. *28.4 mm*	0.19 in. *4.8 mm*	0.55 in. *14.0 mm*	0.38 in. *9.7 mm*
LK80-6-135	5.315 in. 135 mm	3.937 in. 100 mm	3	0.41 in. 10.4 mm	5.315 in. 135 mm	3.63 in. 92.2 mm	1.00 in. 25.4 mm	*	0.39 in. 9.9 mm	0.61 in. 15.5 mm
LK100-165	4.921 in. *125 mm*	5.591 in. *142 mm*	3	0.49 in. *12.5 mm*	6.85 in. *174 mm*	4.921 in. *125 mm*	1.34 in. *34 mm*	0.16 in. *4 mm*	0.39 in. *10 mm*	0.79 in. *20 mm*
LK100-072	2.835 in. *72 mm*	6.496 in. *165 mm*	3	0.65 in. *16.5 mm*	7.87 in. *200 mm*	4.33 in. *110 mm*	1.34 in. *34 mm*	0.16 in. *4 mm*	0.39 in. *10 mm*	0.79 in. *20 mm*
LK125-195	5.315 in. *135 mm*	6.496 in. *165 mm*	6	0.49 in. *12.5 mm*	7.68 in. *195 mm*	5.315 in. *135 mm*	1.18 in. *30 mm*	0.24 in. *6 mm*	0.39 in. *10 mm*	0.55 in. *14 mm*
LK150-230	6.496 in. *165 mm*	7.874 in. *200 mm*	8	0.49 in. *12.5 mm*	9.06 in. *230 mm*	6.500 in. *165 mm*	1.06 in. *27 mm*	0.20 in. *5 mm*	0.39 in. *10 mm*	0.47 in. *12 mm*

*Size LK80-6-135 pilots on the O.D.

SAE Pump Splines*

SAE CODE	NUMBER OF TEETH	SPLINE PITCH	MAJOR DIAMETER
A-A	9	20/40	0.500"
A	9	16/32	0.625"
B	13	16/32	0.875"
B-B	15	16/32	1.000"
C	14	12/24	1.250"
C-C	17	12/24	1.500"
D	13	8/16	1.750"
E	13	8/16	1.750"
F	15	8/16	2.000"

*SAE J744

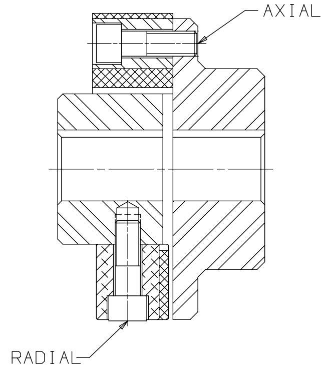
Torsional Couplings

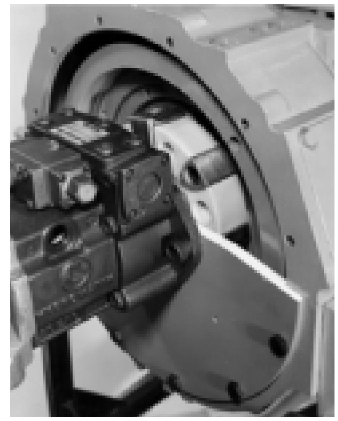
Lovejoy Pump Mounting Plates

Lovejoy pump mounting plates complete your engine, coupling, and hydraulic pump package. These plates provide easy mounting of pumps to the engine flywheel housing.

Pump mounting plates are available in two standard types: flat and spacer types. Stock plates are available for all SAE housings size 1 to 6 and all types of SAE A to D hydraulic pumps. DIN hydraulic pump pilot and bolt patterns also available.

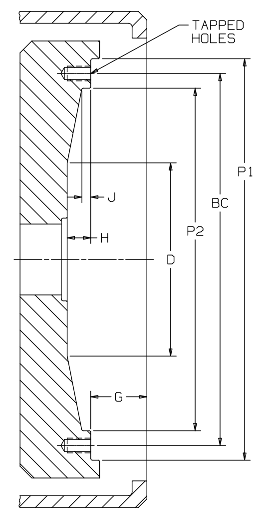
NOTE: Pump mounting plate is cut away in photo to right, for clarity.





SAE J620 Flywheel Dimension Reference (inches)

Nominal Clutch Size	Pilot P1	Bolt Circle BC	G	H	J	P2	D	Tapped Holes No.	Tapped Holes Size
6-1/2	8.500	7.875	1.19	0.50	0.38	7.25	5.00	6	5/16-18
7-1/2	9.500	8.750	1.19	0.50	0.50	8.13	—	8	5/16-18
8	10.375	9.625	2.44	0.50	0.50	8.88	—	6	3/8-16
10	12.375	11.625	2.12	0.62	0.50	10.88	7.75	8	3/8-16
11-1/2	13.875	13.125	1.56	1.12	0.88	12.38	8.00	8	3/8-16
14	18.375	17.250	1.00	1.12	0.88	16.13	8.00	8	1/2-13
16	20.375	19.250	0.62	1.12	0.88	18.13	75.00	8	1/2-13
18	22.500	21.375	0.62	1.25	1.25	19.63	10.00	6	5/8-11
21	26.500	25.250	0.00	1.25	1.15	23.00	—	12	5/8-11
24	28.875	27.250	0.00	1.25	1.25	25.38	—	12	3/4-10



Typical Flywheel Housing Combinations

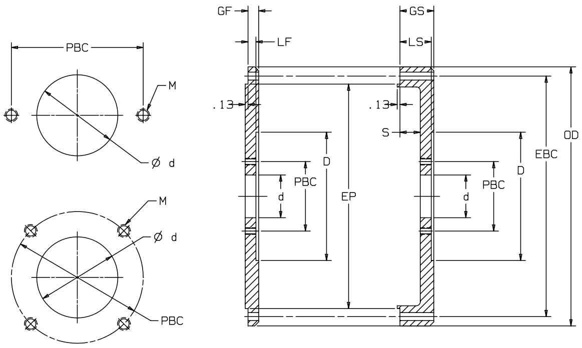
SAE Clutch Size	Coupling Sizes	SAE Flywheel Housing 6	5	4	3	2	1
6.5	8, 16, 25	■	■				
7.5	8, 16, 25	●	●				
8	16, 25, 30			■			
10	25, 30, 50			●	■	■	
11.5	30, 50, 90, 140				●	●	■
14	90, 140, 250						●

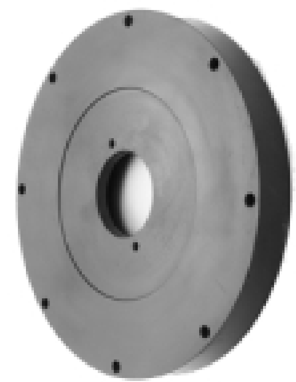
■ Preferred
● Other Sizes Available

Torsional Couplings

VIRTUS
Power Transmission

Lovejoy Pump Mounting Plates



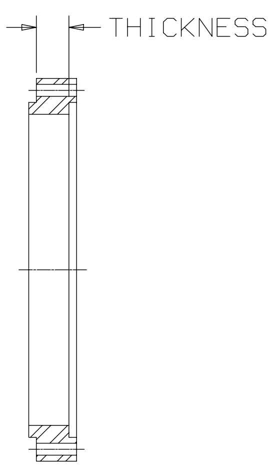


Pump Mounting Plates

For Use With Hydraulic Pumps Having Standard SAE Mountings And Spline Shafts

Flywheel Housing Size (SAE J617)	Pilot Diameter EP	Bolt Circle EBC	Outside Diameter OD	Flat Plate		Spacer Plate*		
				GF	LF	GS	LS	S
1	20.125 in.	20.875 in.	21.75 in.	0.88 in.	0.75 in.	2.64 in.	2.58 in.	1.89 in.
						3.75 in.	3.69 in.	3.00 in.
2	17.625 in.	18.375 in.	19.25 in.	0.88 in.	0.75 in.	2.08 in.	2.02 in.	1.31 in.
3	16.125 in.	16.875 in.	17.75 in.	0.50 in.	0.44 in.	2.31 in.	2.25 in.	1.68 in.
						1.04 in.	0.98 in.	0.44 in.
4	14.250 in.	15.000 in.	15.88 in.	0.50 in.	0.44 in.	1.74 in.	1.68 in.	1.11 in.
						1.43 in.	1.37 in.	0.80 in.
						0.77 in.	0.71 in.	0.14 in.
5	12.375 in.	13.125 in.	14.00 in.	0.50 in.	0.44 in.	1.93 in.	1.87 in.	1.30 in.
6	10.500 in.	11.250 in.	12.13 in.	0.50 in.	0.44 in.	1.58 in.	1.52 in.	0.95 in.

*Custom sizes available. Please ask VIRTUS.

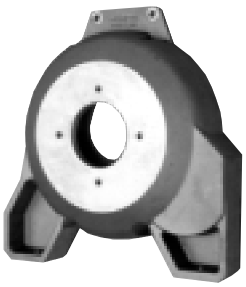
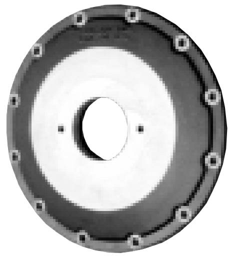
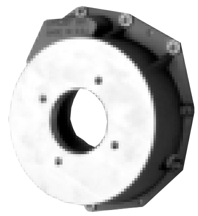


Spacer Rings

Spacer rings are available for all SAE bell housing sizes (1,2,3,4,5,6). These rings will provide additional space standoff from the engine flywheel housing and the pump mounting spacer plate. In most cases, the standard pump mounting spacer plate will provide the necessary area between the flywheel and the pump for the proper Torsional coupling. When ordering spacer rings, simply specify the SAE bell housing size and required thickness, T. *Example:* Spacer Ring, SAE 3/.50 (min. thickness is .50", use increments of 1/8").

Torsional Couplings

Lovejoy Pump Mounting Housings


Typical Housings

For hydraulic pumps mounting to engines that do not have an SAE flywheel housing, Lovejoy offers pump mounting housings for the following engines:

- Cummins B3.3
- Ford LRG425
- Ford VSG413
- Kubota Super Mini
- Kubota Super 03
- Kubota Super 05
- Deutz FL1011
- GM 3.0
- Perkins 103-10
- Perkins 104-22

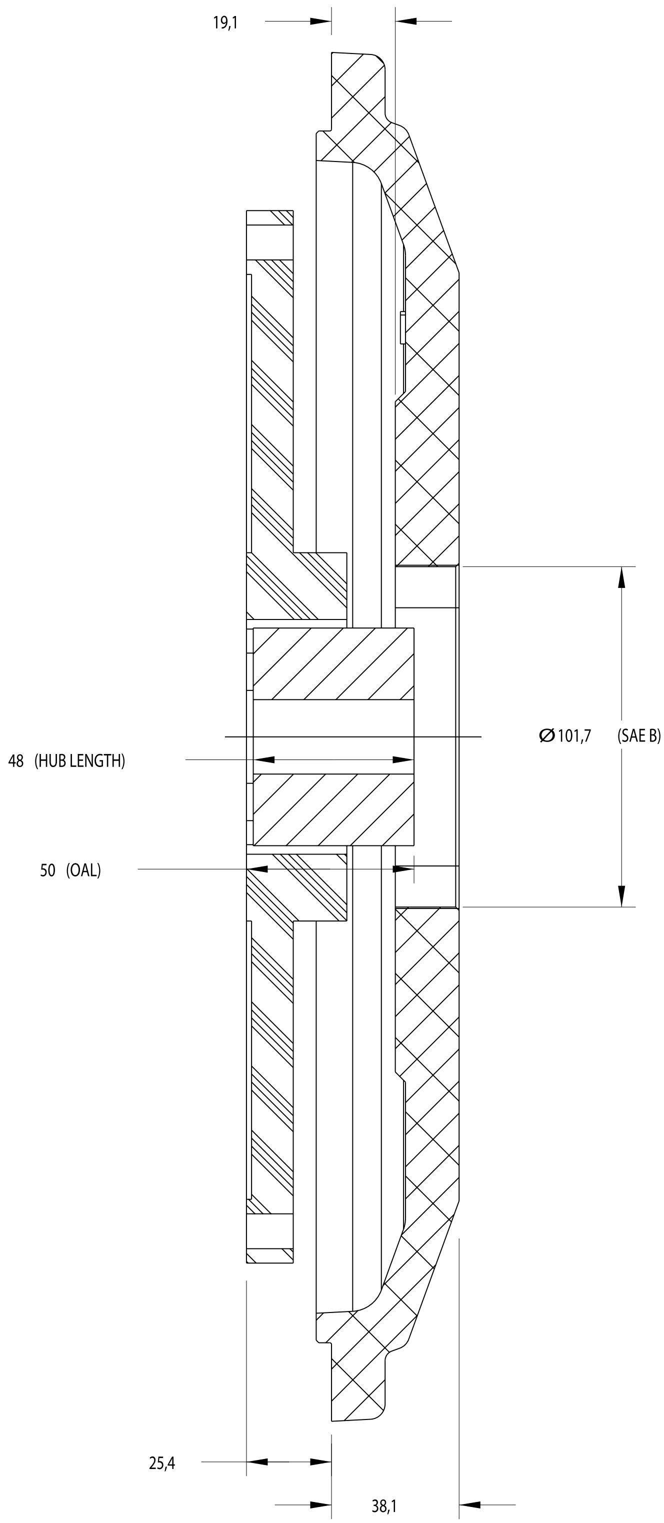
All are available with SAE pump mounting pilots and bolt pattern or can be custom made to your requirements.

Housings are high-strength aluminum, designed to support the weight of hydraulic pumps without the need for a rear support bracket while reducing the overall length of engine/pump package.

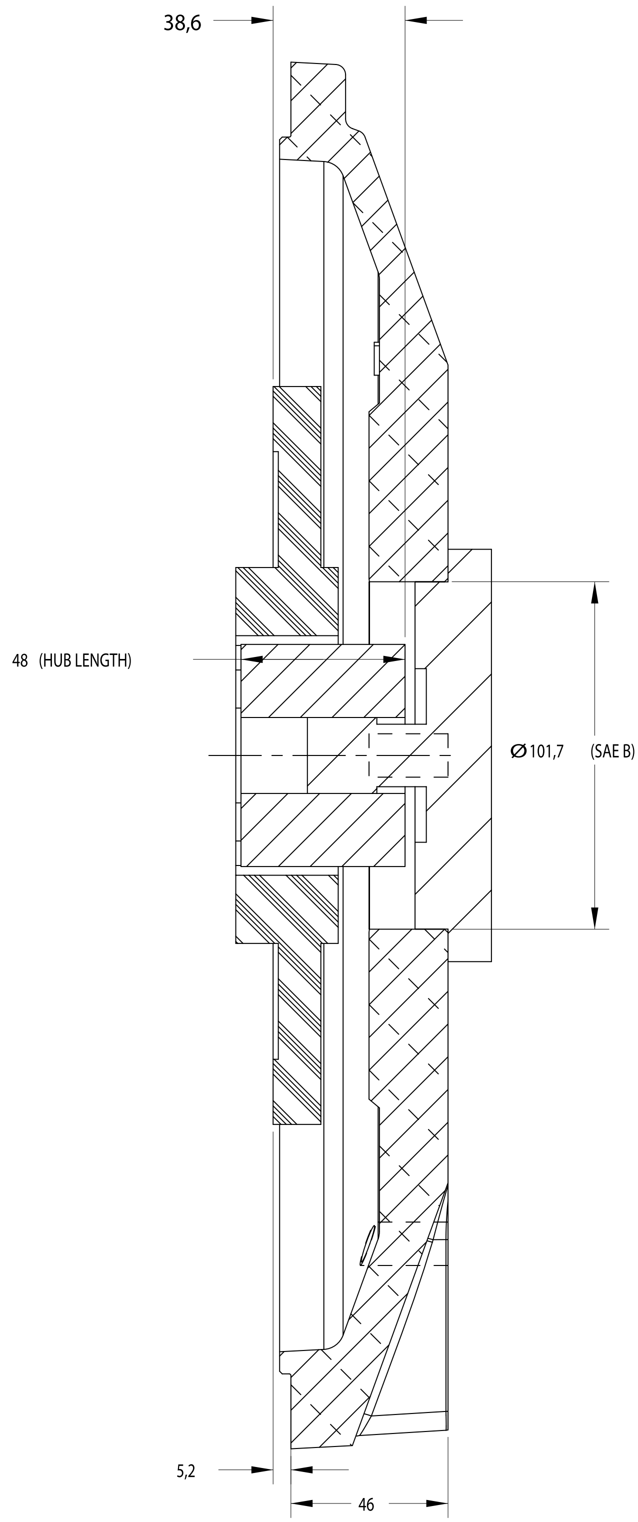
The LK80 and/or LK100 are available to match flywheel options for the various engines and can be paired with the appropriate housing to provide a complete kit.

Torsional Couplings

Lovejoy Pump Mounting Housings

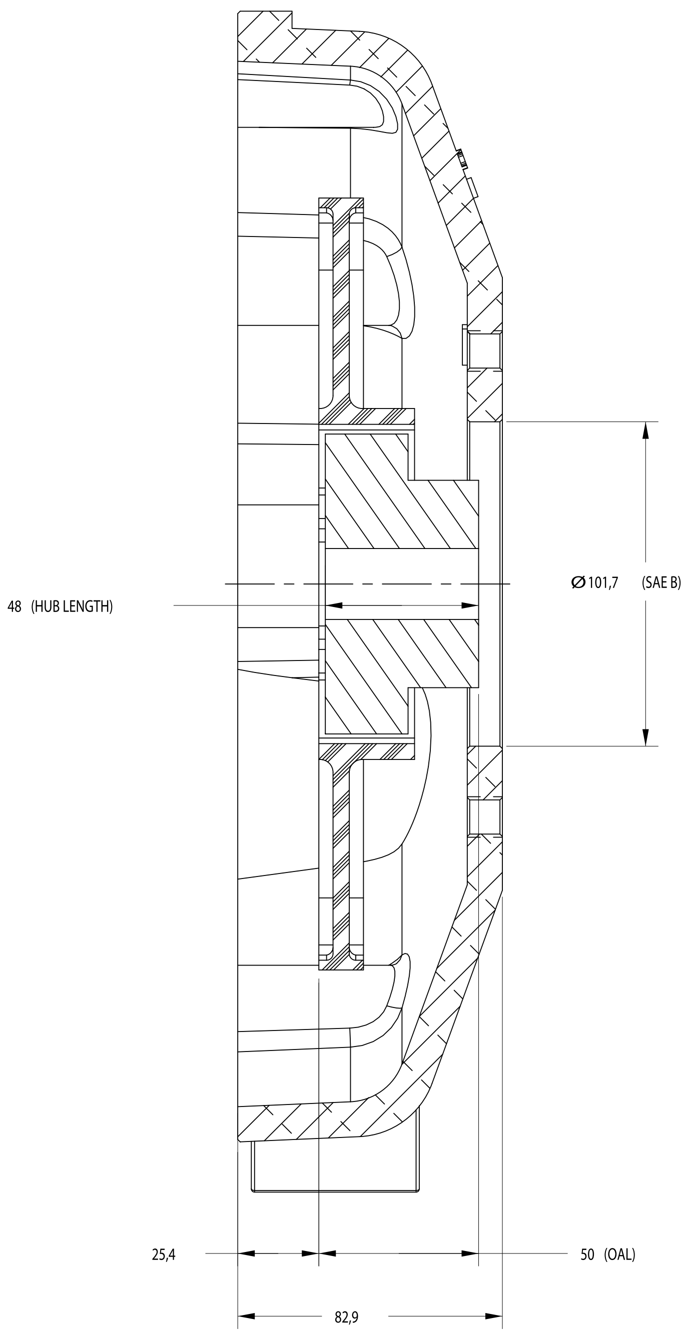


Cummins® B3.3
Shown with LK 100.

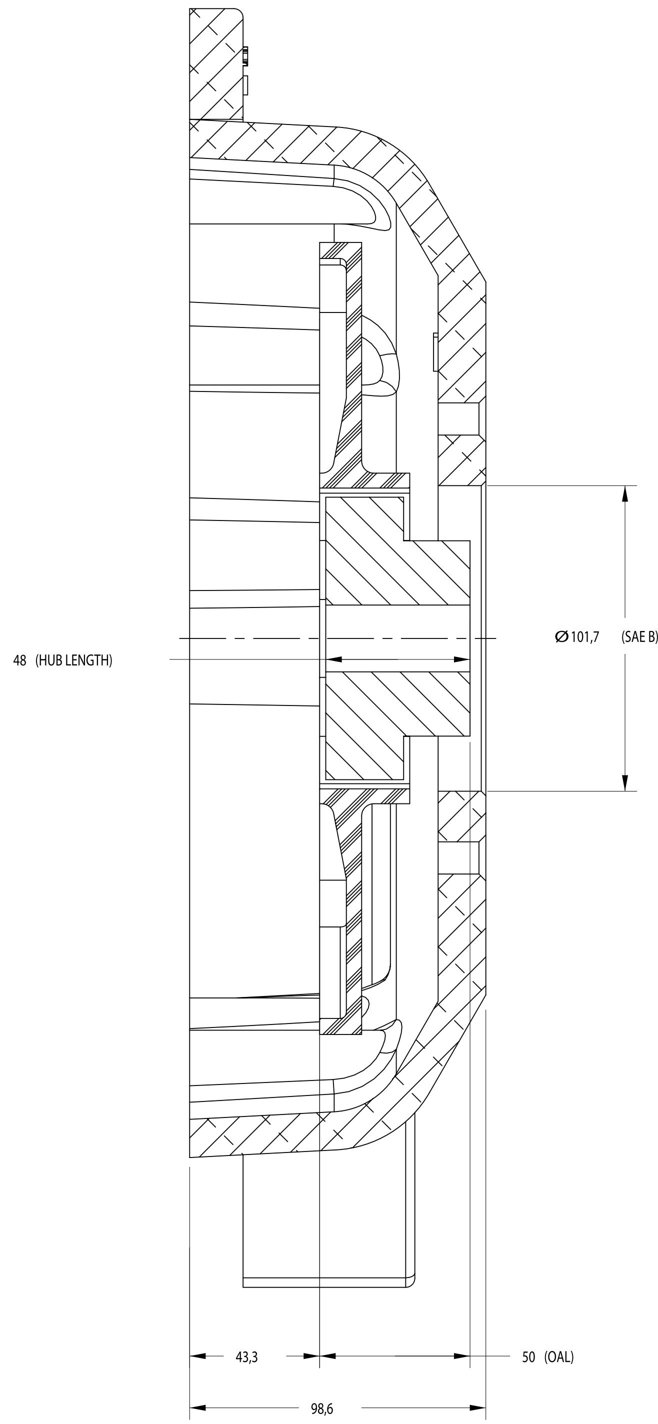


Deutz® FL 1011
Shown with LK 100.

Lovejoy Pump Mounting Housings

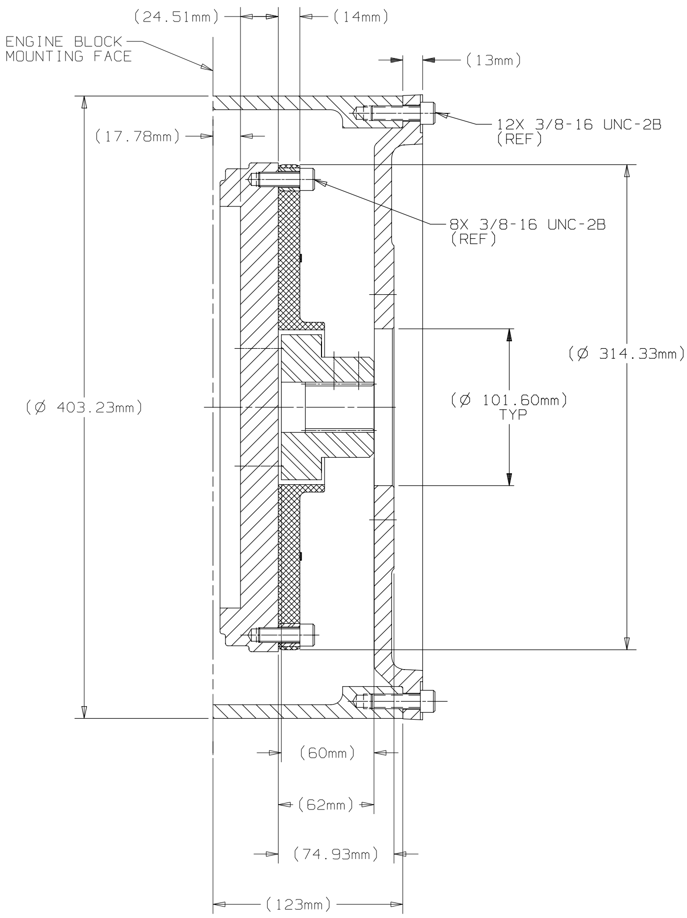


Ford VSG 413
Shown with LK 100.

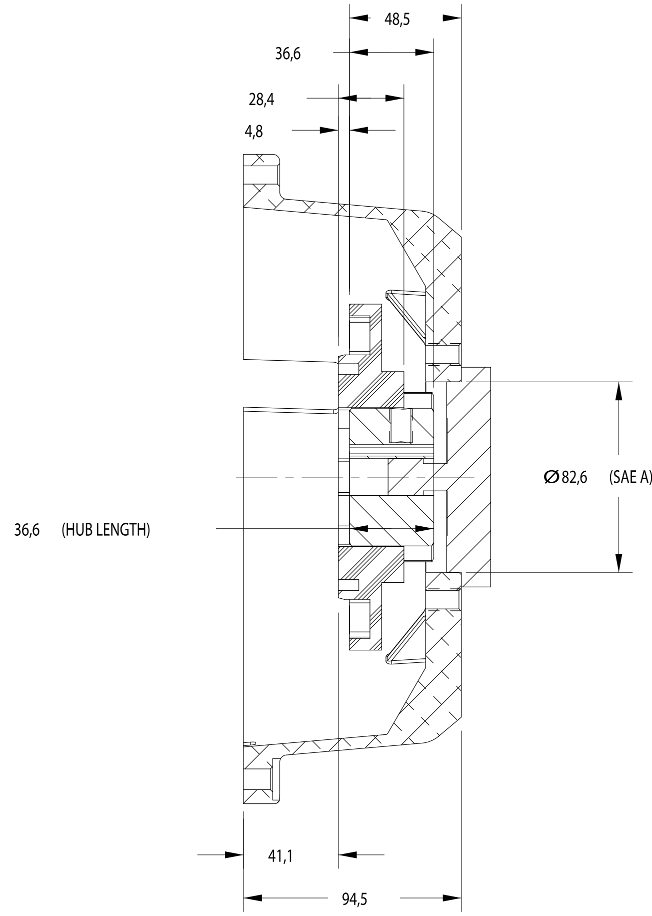


Ford LRG 425
Shown with LK 100.

Lovejoy Pump Mounting Housings

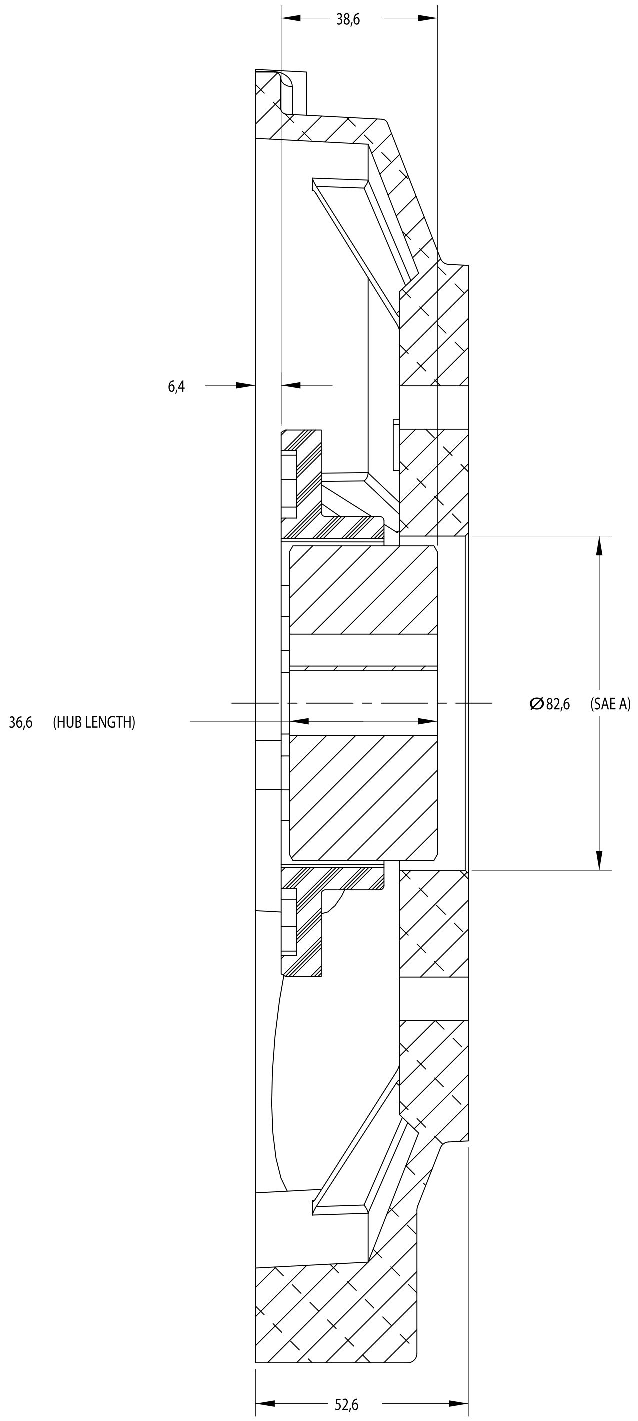


GM 3l
Shown with LK 100.

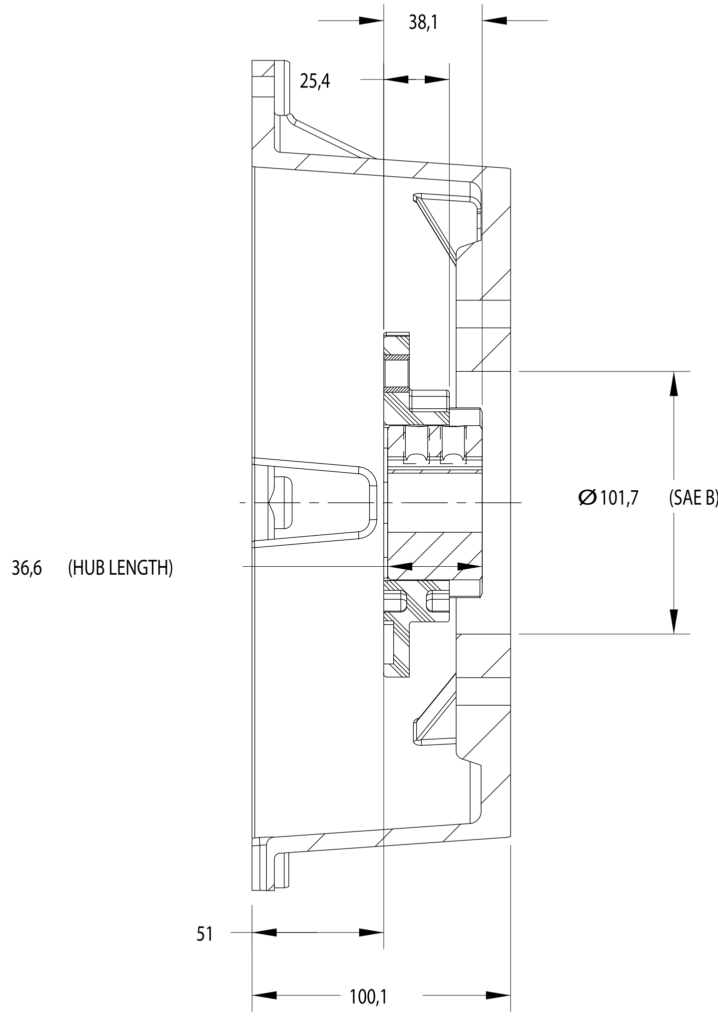


Kubota Super Mini
Shown with LK 80.

Lovejoy Pump Mounting Housings



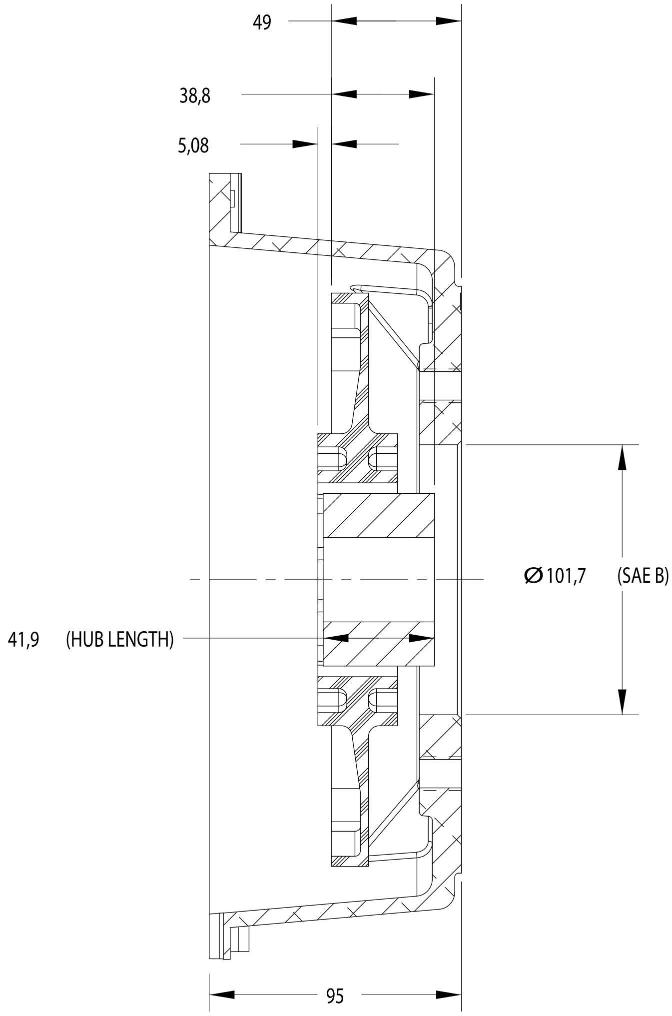
Kubota Super 03
Shown with LK 80.



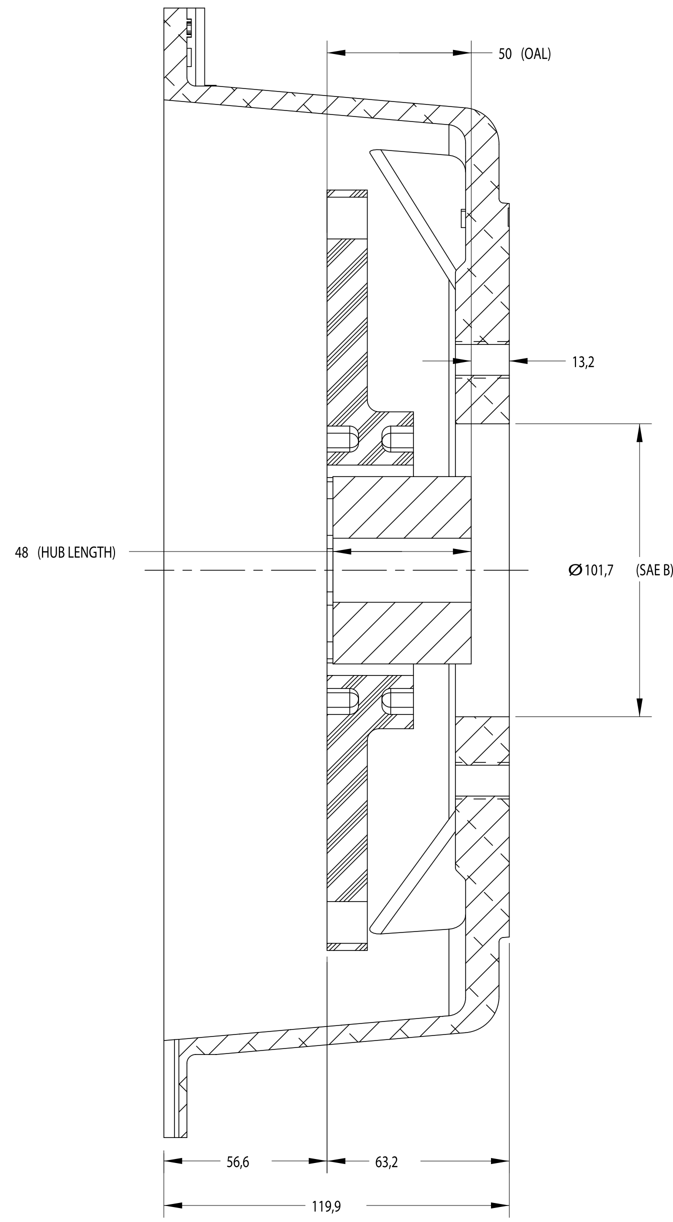
Kubota Super 05
Shown with LK 80.

Torsional Couplings

Lovejoy Pump Mounting Housings



Perkins® 103-10
Shown with LK 100.



Perkins® 104-22
Shown with LK 100.

Torsional Couplings

LM Torsional Coupling System

LM Couplings
The Lovejoy LM torsional couplings, like our other torsional couplings, are made especially for diesel engine drives. In particular, the LM couplings are highly elastic torsionally, allowing the engine to drive a relatively small inertia load safely free from damaging torsional resonance over a wide speed range from low idle RPM to full engine speed. They accomplish this task by shifting the critical speeds far enough below the idle speed to allow full use of the entire working speed range of the engine without limitation. In essence, these sophisticated couplings effect an attenuated level of stress throughout the whole drive train by reducing vibratory torque to a very low level.

How They Work
A compact, disc-shaped elastomeric element lies at the heart of the LM coupling that gives it its high torsional elasticity. This element has molded cogs or teeth around its outside diameter. These cogs make a backlash-free engagement with internal cogs on an aluminum ring which drives it from the engine flywheel. This arrangement pre-loads the elastomer to increase its damping and load carrying capacity, and gives the coupling the ability to slip together and "blind assemble" inside the engine's flywheel housing. It also gives the coupling some torque limiting ability to further protect the drive train, as the cogs are able to slip position during rare transient torque spikes (5 to 6 times rated torque) without damage to the coupling. If these spikes were to occur frequently, only harmless bits of rubber would shed from the coupling causing no further damage.

The clever shape of the elastomeric element distributes operating stresses equally over its working section, allowing for a large angle of twist (6 to 12° at nominal torque load depending on size) while minimizing stress. This feature places the CM coupling amongst the highest torsional elasticities of all couplings available on the market. And at the thick center portion near the hub, as well as at the cogs, stresses are further reduced to a very low level, providing a very reliable and robust drive.

We bond a steel ring to the center of the elastomeric element that assembles to a steel hub. The center of this hub is machined to fit the customer's driven shaft and is clamped solidly to the shaft at assembly by a tapered split hub, set screws or our unique L-Loc clamping system.

Range Of Sizes
LM couplings come in 8 different sizes covering a range of nominal torques from 2200 to 33,600 in-lbs (250 to 3800 Nm). This wide range of sizes make these couplings capable of handling applications driven from small singe-cylinder engines on up to large multi-cylinder engines producing in excess of 900 HP.

Maritime Classification
We can supply LM couplings to meet the requirements of most leading classification societies. Please specify when ordering.

Materials
- **Elastomeric Element**
  Temperature-resistant natural rubber available in a variety of Shore hardnesses to suite individual application requirements. Our natural rubber is good for -110°F to +200°F (-45°C to +90°C).

  For unusually high ambient temperatures, especially in non-ventilated flywheel housings, we recommend using our special silicone version, rated for -110°F to +250°F (-45°C to +120°C).

- **Outer Ring**
  High-grade cast aluminum alloy.

- **Inner Hub**
  Steel with minimum tensile strength of 85,000 psi (600 N/mm^2)

LM Elastomeric Element

Torsional Couplings

VIRTUS
Power Transmission

LM Torsional System

Typical Applications

- Splitter-gear multiple pump drives
- Generator sets (2-bearing)
- Locomotives
- Hydraulic pumps
- Centrifugal pumps
- Compressors
- Ship propulsion

Features and Benefits of the LM Coupling

Design Features	Benefits
Torsionally very soft. Backlash-free, even after long service hours. No moving parts to wear out or make noise. No wearing parts and no lubrication needed.	• Protects equipment from vibration and shock load damage • Noise silencing for quieter equipment running • Maintenance-free • Reliable service • Long life
Simple "plug-in" assembly designed for blind fitting inside a flywheel housing. No mounting bolts to access through holes. Special tapered hub grips firmly yet removes without special tools or pullers.	• Installation is easy and fast
No axial forces generated by transmission of torque. Compensates for axial, parallel and angular misalignment. Permits free axial float.	• Extends life of bearings and seals on coupled equipment
Wide range of toque sizes. Suitable for high engine speeds. Standard input flanges for SAE flywheels. Large bore capacity hubs. Slim profile, compact design.	• Versatile solutions for small, medium or large horsepower applications
Unique torque limiting feature provides fast, automatic disconnect of the engine should the driven machinery lock up or a gen-set experience incorrect synchronization or short circuit.	• Protects engine and equipment from extreme overload damage
Coupling torsional stiffness is adjustable by simply changing the elastomeric elements, which are available in several Shore hardness ratings and torque values.	• Simple frequency tuning of the power train
Special high-temperature rubber compound. Holes in hub and adapter flange promote flow-through air cooling.	• Good intrinsic heat dissipation for extended life
Linear torsional stiffness characteristic (rubber) means resonance frequencies are not shifted by the load.	• Allows gen-sets to perform even when engines misfire
Elastomeric working element.	• Electrically isolates engine from driven equipment

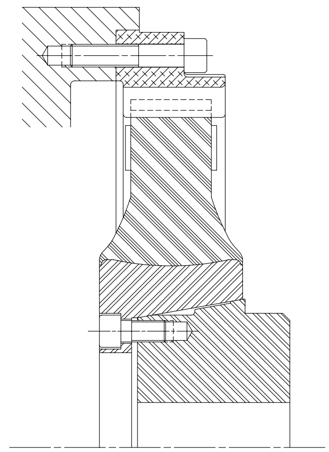
Torsional Couplings

LM Torsional Coupling Design Types

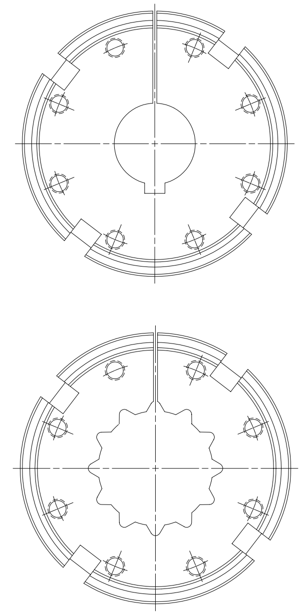
1. Type SB
Sizes 240 to 2400

The driven inner hub consists of two pieces: the vulcanized steel ring and the inner tapered hub. These two parts are bolted together and the torque is transmitted by the friction force created by the axial bolts, drawing the tapered hub into a mating taper in the element.

This is a long tapered fit, but can easily disassembled if the coupling has to be removed. The vulcanized steel ring creates a very high inward pressure acting on the inner driven tapered hub. To utilize this pressure, the driven hub is slotted in an axial direction. This compresses the driven hub to provide a very strong backlash-free connection between the driven hub and driven shaft. This clamping effect can be used equally well on cylindrical shafts with keys or splined shafts.



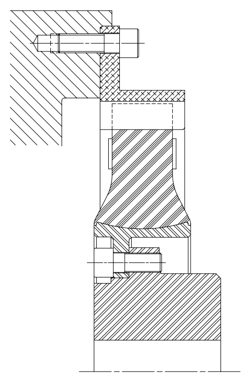
Type SB



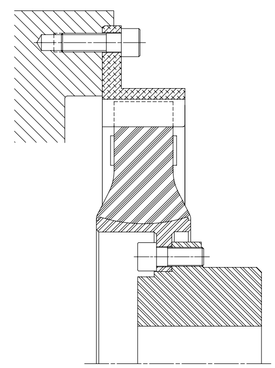
L-Loc

2. Type SC
Sizes 2800 to 3500

An inner ring made of spheroidal cast iron is vulcanized into the elastomeric element. This flange is bolted to the inner tapered hub. Depending upon the arrangement of the elastomeric element, two different lengths are possible utilizing the same components.
Short Version: SCA
Long Version: SCB



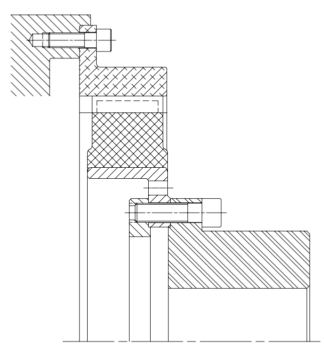
Type SCA



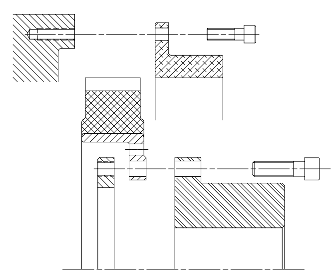
Type SCB

3. Types SBE and SCE
Special Radial Assembly/Disassembly Types (Drop-Out Types) All Sizes

The elastomeric element can be changed quickly and easily without disturbing the coupling shaft, provided the flywheel housing does not protrude too much. These versions can be particularly advantageous on larger sizes, especially if the hub is interference fit.



Type SCE (Assembled)



Type SCE (Disassembled)

4. Special Types

In addition to the standard types shown here, many special types have been developed. Please contact VIRTUS for more information.

Torsional Couplings

LM Torsional Coupling Selection

Use the following 3 steps in conjunction with the technical data and dimension tables contained in the following sections to make the preliminary coupling selection:

1. Application Torque

Select a coupling size with a nominal torque rating (Tkn) greater or equal to the application torque (T) calculated with the equation:

T = HP*63025/RPM

provided

T < Tkn*St1

where S_{t1} is the temperature factor for nominal torque found from the chart. This number will typically be at least .6 or .7 (for typical ambient temperature of at least 140 to 160°F inside the flywheel housing).

2. SAE Flywheel Size

Select the appropriate SAE J620 flange size to match your flywheel.

3. Shaft Dimensions

Make sure maximum bore capacity of coupling will accommodate the dimensions of your driven shaft. Coupling hub length can usually be shortened if necessary to fit into tight space envelopes.

IMPORTANT:

Final selection of coupling size requires verification by torsional vibration analysis. This analysis will identify the location of critical speeds and confirm the absence of excessive steady-state and peak resonance conditions over the normal operating cycle of the equipment.

LM couplings are robust, reliable and unique in their ability to solve torsional vibration problems in certain applications. But as with all torsional couplings, inappropriate coupling selection can lead to unstable conditions that place the coupling as well as the rest of the drive train at danger. Lovejoy can perform the torsional vibration analysis for you if necessary. Simply complete the worksheet found on page 10 and fax it to us.

You can find more details regarding coupling selection based on this analysis on pages 9 and 10.

Torsional Couplings

VIRTUS Power Transmission

LM Torsional Coupling Technical Data—Natural Rubber

Coupling Size	Shore Hardness (Durometer) Shore A	Nominal Torque Rating T_{kn}	Max. Torque Rating T_{kmax}	*Continuous Vibratory Torque T_{kw}	Allowable Power Loss P_{kv}	**Dynamic Torsional Stiffness Ctdyn	Flange Size SAE J 620 Flywheel	Max. Speed n_{max}	Mass Moment of Inertia: ***Primary J	Mass Moment of Inertia: Secondary J	Coupling Size
LM240	50	2210 in-lb *(250 Nm)*	4430 in-lb *(500 Nm)*	885 in-lb *(100 Nm)*	37 W	8190 in-lb/rad *(925 Nm/rad)*	8	4000 RPM	17.77 lb-in^2 *(0.0208 kgm^2)*	3.246 lb-in^2 *(0.0038 kgm^2)*	LM240
	60	2660 in-lb *(300 Nm)*	5310 in-lb *(600 Nm)*	1060 in-lb *(120 Nm)*		12400 in-lb/rad *(1400 Nm/rad)*					
	70	3100 in-lb *(350 Nm)*	6640 in-lb *(750 Nm)*	1240 in-lb *(140 Nm)*		19900 in-lb/rad *(2250 Nm/rad)*	10	3600 RPM	26.74 lb-in^2 *(0.0313 kgm^2)*	3.246 lb-in^2 *(0.0038 kgm^2)*	
LM400	50	3540 in-lb *(400 Nm)*	7080 in-lb *(800 Nm)*	1420 in-lb *(160 Nm)*	62 W	14200 in-lb/rad *(1600 Nm/rad)*	10	3600 RPM	0.0373 lb-in^2 *(0.0373 kgm^2)*	0.0114 lb-in^2 *(0.0114 kgm^2)*	LM400
	60	4430 in-lb *(500 Nm)*	8850 in-lb *(1000 Nm)*	1770 in-lb *(200 Nm)*		22100 in-lb/rad *(2500 Nm/rad)*					
	70	4870 in-lb *(550 Nm)*	9740 in-lb *(1100 Nm)*	1950 in-lb *(220 Nm)*		35400 in-lb/rad *(4000 Nm/rad)*					
LM800	50	6200 in-lb *(700 Nm)*	12400 in-lb *(1400 Nm)*	2480 in-lb *(280 Nm)*	105 W	24800 in-lb/rad *(2800 Nm/rad)*	10	3600 RPM	51.17 lb-in^2 *(0.0599 kgm^2)*	25.29 lb-in^2 *(0.0296 kgm^2)*	LM800
	60	7520 in-lb *(850 Nm)*	15000 in-lb *(1700 Nm)*	3000 in-lb *(340 Nm)*		37200 in-lb/rad *(4200 Nm/rad)*	11 1/2	3500 RPM	62.53 lb-in^2 *(0.0732 kgm^2)*	25.29 lb-in^2 *(0.0296 kgm^2)*	
	70	8400 in-lb *(950 Nm)*	17700 in-lb *(2000 Nm)*	3360 in-lb *(380 Nm)*		60200 in-lb/rad *(6800 Nm/rad)*	14	3000 RPM	117.7 lb-in^2 *(0.1378 kgm^2)*	25.2 lb-in^2 *(0.0295 kgm^2)*	
LM1200	50	8850 in-lb *(1000 Nm)*	17700 in-lb *(2000 Nm)*	3540 in-lb *(400 Nm)*	150 W	39800 in-lb/rad *(4500 Nm/rad)*	11 1/2	3500 RPM	65.61 lb-in^2 *(0.0768 kgm^2)*	38.95 lb-in^2 *(0.0456 kgm^2)*	*LM1200*
	60	10600 in-lb *(1200 Nm)*	21200 in-lb *(2400 Nm)*	4250 in-lb *(480 Nm)*		61900 in-lb/rad *(7000 Nm/rad)*					
	70	11500 in-lb (1300 Nm)	26600 in-lb (3000 Nm)	4600 in-lb (520 Nm)		104000 in-lb/rad (11700 Nm/rad)	14	3000 RPM	12.23 lb-in^2 *(0.0143 kgm^2)*	38.95 lb-in^2 *(0.0456 kgm^2)*	
LM1600	50	12800 in-lb *(1450 Nm)*	26700 in-lb *(2900 Nm)*	5130 in-lb *(580 Nm)*	220 W	53100 in-lb/rad *(6000 Nm/rad)*	11 1/2	3200 RPM	191.4 lb-in^2 *(0.2240 kgm^2)*	66.63 lb-in^2 *(0.0780 kgm^2)*	LM1600
	60	15900 in-lb *(1800 Nm)*	31900 in-lb *(3600 Nm)*	6370 in-lb *(720 Nm)*		79600 in-lb/rad *(9000 Nm/rad)*	14	3000 RPM	168.3 lb-in^2 *(0.1970 kgm^2)*	66.63 lb-in^2 *(0.0780 kgm^2)*	
							16	2500 RPM	234.1 lb-in^2 *(0.2740 kgm^2)*	66.63 lb-in^2 *(0.0780 kgm^2)*	
	70	17700 in-lb *(2000 Nm)*	35400 in-lb *(4000 Nm)*	7080 in-lb *(800 Nm)*		133000 in-lb/rad *(15000 Nm/rad)*	18	2300 RPM	329.3 lb-in^2 *(0.3855 kgm^2)*	66.63 lb-in^2 *(0.0780 kgm^2)*	
LM2400	50	17700 in-lb *(2000 Nm)*	35400 in-lb *(4000 Nm)*	7080 in-lb *(800 Nm)*	300 W	88500 in-lb/rad *(10000 Nm/rad)*	14	3000 RPM	182.0 lb-in^2 *(0.2130 kgm^2)*	130.7 lb-in^2 *(0.1530 kgm^2)*	LM2400
	60	22100 in-lb *(2500 Nm)*	44300 in-lb *(5000 Nm)*	8850 in-lb *(1000 Nm)*		133000 in-lb/rad *(15000 Nm/rad)*	16	2500 RPM	247.7 lb-in^2 *(0.2900 kgm^2)*	130.7 lb-in^2 *(0.1530 kgm^2)*	
	70	24800 in-lb *(2800 Nm)*	53100 in-lb *(6000 Nm)*	9910 in-lb *(1120 Nm)*		221000 in-lb/rad *(25000 Nm/rad)*	18	2300 RPM	343 lb-in^2 *(0.4015 kgm^2)*	130.7 lb-in^2 *(0.1530 kgm^2)*	
LM2800	50	24800 in-lb *(2800 Nm)*	53100 in-lb *(6000 Nm)*	9910 in-lb *(1120 Nm)*	360 W	221000 in-lb/rad *(25000 Nm/rad)*	14	3000 RPM	242.3 lb-in^2 *(0.2836 kgm^2)*	192.8lb-in^2 *(0.2257 kgm^2)*	LM2800
	60	26600 in-lb *(3000 Nm)*	66400 in-lb *(7500 Nm)*	10600 in-lb *(1200 Nm)*		332000 in-lb/rad *(37500 Nm/rad)*	16	2500 RPM	269.8 lb-in^2 *(0.3158 kgm^2)*	19.28 lb-in^2 *(0.0226 kgm^2)*	
	70	28300 in-lb *(3200 Nm)*	70800 in-lb *(8000 Nm)*	11300 in-lb *(1280 Nm)*		558000 in-lb/rad *(63000 Nm/rad)*	18	2300 RPM	364.9 lb-in^2 *(0.4271 kgm^2)*	192.8 lb-in^2 *(0.2257 kgm^2)*	
LM3500	50	28300 in-lb *(3200 Nm)*	57500 in-lb *(6500 Nm)*	11300 in-lb *(1280 Nm)*	450 W	142000 in-lb/rad *(16000 Nm/rad)*	14	3000 RPM	242.3 lb-in^2 *(0.2836 kgm^2)*	196.1 lb-in^2 *(0.2295 kgm^2)*	LM3500
	60	31000 in-lb *(3500 Nm)*	70800 in-lb *(8000 Nm)*	12400 in-lb *(1400 Nm)*		212000 in-lb/rad *(24000 Nm/rad)*	16	2500 RPM	374.9 lb-in^2 *(0.4388 kgm^2)*	196.1 lb-in^2 *(0.2295 kgm^2)*	
	70	33600 in-lb *(3800 Nm)*	75200 in-lb *(8500 Nm)*	13500 in-lb *(1520 Nm)*		336000 in-lb/rad *(38000 Nm/rad)*	18	2300 RPM	501.7 lb-in^2 *(0.5873 kgm^2)*	196.1 lb-in^2 *(0.2295 kgm^2)*	

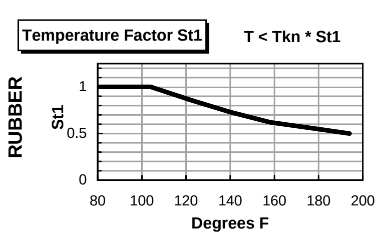
*At 10 Hz.
**Constant value for natural rubber because of linear characteristic
***Primary means the flywheel side of the coupling

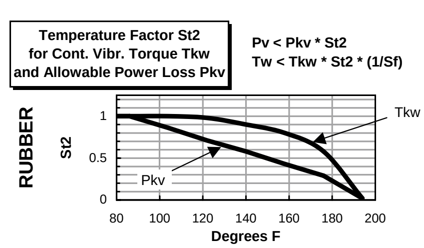
Frequency Factor S_f

f in H_z	≤10	>10
Sf	1	$\sqrt{f/10}$

Resonance Factor V_R
Relative Damping Factor Ψ

Natural Rubber (NR)		
f in Hz	V_r	Ψ
35-40	12	0.52
50	6.0	1.05
60	5.7	1.10
70	5.5	1.15





Torsional Couplings

VIRTUS Power Transmission

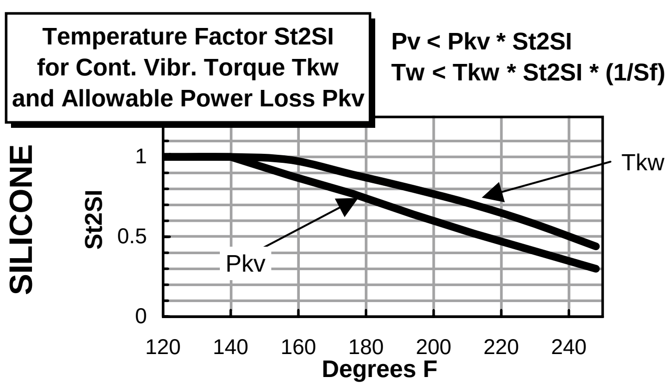
LM Torsional Series Technical Data—Silicone (50 Shore A)

Coupling Size	Nominal Torque Rating T_{kn}	*Max. Torque$_1$ T_{kmax1}	**Max. Torque$_2$ T_{kmax2}	Continuous Vibratory Torque T_{kw}	Allowable Power Loss P_{kv}	Dynamic Torsional Stiffness Ctdyn					Relative Damping Ψ
						10% Tkn	25% Tkn	50% Tkn	75% Tkn	100% Tkn	
LM800	6200 in-lb *(700 Nm)*	9290 in-lb *(1050 Nm)*	12400 in-lb *(1400 Nm)*	2480 in-lb *(280 Nm)*	105 W	19500 in-lb/rad *(2200 Nm/rad)*	21200 in-lb/rad *(2400 Nm/rad)*	24800 in-lb/rad *(2800 Nm/rad)*	31000 in-lb/rad *(3500 Nm/rad)*	40700 in-lb/rad *(4600 Nm/rad)*	1.15
LM1200	8850 in-lb *(1000 Nm)*	13300 in-lb *(1500 Nm)*	17700 in-lb *(2000 Nm)*	3540 in-lb *(400 Nm)*	150 W	31900 in-lb/rad *(3600 Nm/rad)*	34500 in-lb/rad *(3900 Nm/rad)*	39800 in-lb/rad *(4500 Nm/rad)*	49600 in-lb/rad *(5600 Nm/rad)*	65500 in-lb/rad *(7400 Nm/rad)*	
LM1600	12800 in-lb *(1450 Nm)*	19500 in-lb *(2200 Nm)*	25700 in-lb *(2900 Nm)*	5100 in-lb *(580 Nm)*	220 W	42500 in-lb/rad *(4800 Nm/rad)*	46000 in-lb/rad *(5200 Nm/rad)*	53100 in-lb/rad *(6000 Nm/rad)*	66400 in-lb/rad *(7500 Nm/rad)*	87600 in-lb/rad *(9900 Nm/rad)*	
LM2400	17700 in-lb *(2000 Nm)*	26600 in-lb *(3000 Nm)*	35400 in-lb *(4000 Nm)*	7080 in-lb *(800 Nm)*	300 W	70800 in-lb/rad *(8000 Nm/rad)*	77000 in-lb/rad *(8700 Nm/rad)*	88500 in-lb/rad *(10000 Nm/rad)*	111000 in-lb/rad *(12500 Nm/rad)*	146000 in-lb/rad *(16500 Nm/rad)*	
LM2800	24800 in-lb *(2800 Nm)*	37200 in-lb *(4200 Nm)*	49600 in-lb *(5600 Nm)*	9910 in-lb *(1120 Nm)*	360 W	186000 in-lb/rad *(21000 Nm/rad)*	20400 in-lb/rad *(2300 Nm/rad)*	221000 in-lb/rad *(25000 Nm/rad)*	288000 in-lb/rad *(32500 Nm/rad)*	376000 in-lb/rad *(42500 Nm/rad)*	
LM3500	28300 in-lb *(3200 Nm)*	42500 in-lb *(4800 Nm)*	56600 in-lb *(6400 Nm)*	11300 in-lb *(1280 Nm)*	450 W	113000 in-lb/rad *(12800 Nm/rad)*	123000 in-lb/rad *(13900 Nm/rad)*	142000 in-lb/rad *(16000 Nm/rad)*	177000 in-lb/rad *(20000 Nm/rad)*	235000 in-lb/rad *(26500 Nm/rad)*	

*Tmax1 indicates the maximum allowable value for transient torque spikes during the normal work cycle, for example from accelerating through a resonance during starting and stopping or clutching.

**Tmax2 represents the absolute maximum peak torque allowable during rare occasions such as during a short circuit of a gen-set or incorrect synchronization.

***The silicone material creates a progressive stiffness characteristic dependant on load. These values have tolerance of + or - 15%.



LM Torsional Coupling Dimensions

SAE Flywheel Dimensions*

SAE Size	Pilot D_A (in.)	Bolt Circle D_T (in.)	Thru Holes Number Z	Thru Holes Size S (in.)
6-1/2	8.500	7.875	6 x 60°	0.35
7-1/2	9.500	8.750	8 x 45°	0.35
8	10.375	9.625	6 x 60°	0.43
10	12.375	11.625	8 x 45°	0.43
11-1/2	13.875	13.125	8 x 45°	0.43
14	18.375	17.250	8 x 45°	0.51
16	20.375	19.250	8 x 45°	0.51
18	22.500	21.375	6 x 60°	0.67
21	36.500	25.250	12 x 30°	0.67
24	38.875	27.250	12 x 30°	0.75

*SAE J620

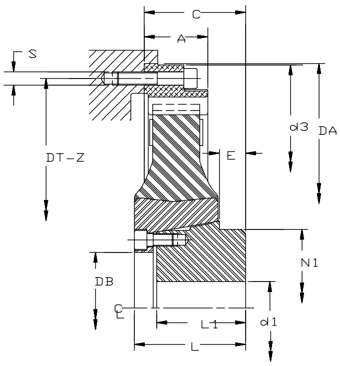
SAE Pump Splines*

SAE CODE	NUMBER OF TEETH	SPLINE PITCH	MAJOR DIAMETER
A-A	9	20/40	0.500"
A	9	16/32	0.625"
B	13	16/32	0.875"
B-B	15	16/32	1.000"
C	14	12/24	1.250"
C-C	17	12/24	1.500""
D	13	8/16	1.750"
E	13	8/16	1.750"
F	15	8/16	2.000"

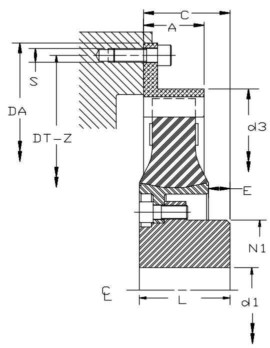
*SAE J744

Torsional Couplings

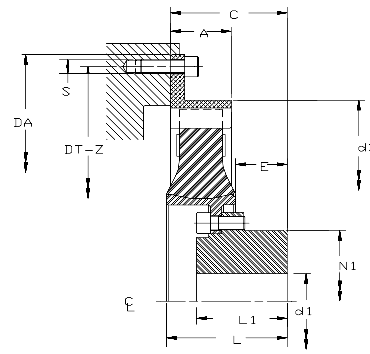
LM Torsional Coupling Dimensions



240 – 2400 SB



2800 – 3500 SCA



2800 – 3500 SCB

Standard Types

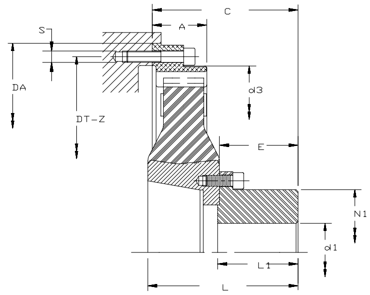
Coupling Size	SAE J620	Dimensions A	C*	d1 (bore) min.	d1 (bore) max.	d3	D8	E	L	L1	N1	Weight	Order Code
240 SB1	8	1.81 in. *(46 mm)*	2.95 in. ± 0.35 in. *(75 mm ± 9 mm)*	0.59 in. *(15 mm)*	1.97 in. *(50 mm)*	10.31 in. *(262 mm)*	1.97 in. *(50 mm)*	1.06 in. *(27 mm)*	2.95 in. *(75 mm)*	2.36 in. *(60 mm)*	2.87 in. *(73 mm)*	2.77 lb *(6.1 kg)*	LM - 240 - SB1 - ** - 8
	10	1.81 in. *(46 mm)*	2.95 in. ± 0.35 in. *(75 mm ± 9 mm)*	0.59 in. *(15 mm)*	1.97 in. *(50 mm)*	8.86 in. *(225 mm)*	1.97 in. *(50 mm)*	1.06 in. *(27 mm)*	2.95 in. *(75 mm)*	2.36 in. *(60 mm)*	2.87 in. *(73 mm)*	2.95 lb *(6.5 kg)*	LM - 240 - SB1 - ** - 10
400 SB1	10	1.77 in. *(45 mm)*	2.95 in. ± 0.28 in. *(75 mm ± 7 mm)*	0.79 in. *(20 mm)*	2.36 in. *(60 mm)*	12.32 in. *(313 mm)*	2.40 in. *(61 mm)*	0.98 in. *(25 mm)*	3.15 in. *(80 mm)*	2.56 in. *(65 mm)*	3.54 in. *(90 mm)*	3.90 lb *(8.6 kg)*	LM - 400 - SB1 - ** - 10
800 SB1	10	1.97 in. *(50 mm)*	3.22 in. ± 0.08 in. *(82 mm ± 2 mm)*	0.79 in. *(20 mm)*	2.76 in. *(70 mm)*	12.44 in. *(316 mm)*	2.80 in. *(71 mm)*	0.71 in. *(18 mm)*	3.31 in. *(84 mm)*	2.60 in. *(66 mm)*	4.21 in. *(107 mm)*	5.03 lb *(11.1 kg)*	LM - 800 - SB1 - ** - 10
	11½	1.54 in. *(39 mm)*	2.80 in. ± 0.12 in. *(71 mm ± 3 mm)*	0.79 in. *(20 mm)*	2.76 in. *(70 mm)*	13.82 in. *(351 mm)*	2.80 in. *(71 mm)*	0.71 in. *(18 mm)*	3.31 in. *(84 mm)*	2.60 in. *(66 mm)*	4.21 in. *(107 mm)*	4.58 lb *(10.1 kg)*	LM - 800 - SB1 - ** - 11
	14	1.81 in. *(46 mm)*	2.91 in. ± 0.24 in. *(74 mm ± 6 mm)*	0.79 in. *(20 mm)*	2.76 in. *(70 mm)*	12.52 in. *(318 mm)*	2.80 in. *(71 mm)*	0.71 in. *(18 mm)*	3.31 in. *(84 mm)*	2.60 in. *(66 mm)*	4.21 in. *(107 mm)*	5.22 lb *(11.5 kg)*	LM - 800 - SB1 - ** - 14
1200 SB1	11½	1.54 in. *(39 mm)*	2.56 in. ± 0.16 in. *(65 mm ± 4 mm)*	0.79 in. *(20 mm)*	2.76 in. *(70 mm)*	13.82 in. *(351 mm)*	2.80 in. *(71 mm)*	0.71 in. *(18 mm)*	3.31 in. *(84 mm)*	2.60 in. *(66 mm)*	4.21 in. *(107 mm)*	6.58 lb *(14.5 kg)*	LM - 1200 - SB1 - ** - 11L
	14	1.81 in. *(46 mm)*	2.91 in. ± 0.24 in. *(74 mm ± 6 mm)*	0.79 in. *(20 mm)*	2.76 in. *(70 mm)*	13.82 in. *(351 mm)*	2.80 in. *(71 mm)*	0.71 in. *(18 mm)*	3.31 in. *(84 mm)*	2.60 in. *(66 mm)*	4.21 in. *(107 mm)*	7.44 lb *(16.4 kg)*	LM - 1200 - SB1 - ** - 14
1600 SB1	14	2.40 in. *(61 mm)*	3.82 in. ± 0.43 in. *(97 mm ± 11 mm)*	1.18 in. *(30 mm)*	4.13 in. *(105 mm)*	18.31 in. *(465 mm)*	4.17 in. *(106 mm)*	1.02 in. *(26 mm)*	4.17 in. *(106 mm)*	3.35 in. *(85 mm)*	5.91 in. *(150 mm)*	10.21 lb *(22.5 kg)*	LM - 1600 - SB1 - ** - 14
	16	2.40 in. *(61 mm)*	3.82 in. ± 0.43 in. *(97 mm ± 11 mm)*	1.18 in. *(30 mm)*	4.13 in. *(105 mm)*	16.42 in. *(417 mm)*	4.17 in. *(106 mm)*	1.02 in. *(26 mm)*	4.17 in. *(106 mm)*	3.35 in. *(85 mm)*	5.91 in. *(150 mm)*	10.80 lb *(23.8 kg)*	LM - 1600 - SB1 - ** - 16
	18	2.40 in. *(61 mm)*	3.82 in. ± 0.43 in. *(97 mm ± 11 mm)*	1.18 in. *(30 mm)*	4.13 in. *(105 mm)*	16.42 in. *(417 mm)*	4.17 in. *(106 mm)*	1.02 in. *(26 mm)*	4.17 in. *(106 mm)*	3.35 in. *(85 mm)*	5.91 in. *(150 mm)*	11.48 lb *(25.3 kg)*	LM - 1600 - SB1 - ** - 18
2400 SB1	14	2.40 in. *(61 mm)*	3.82 in. ± 0.24 in. *(97 mm ± 6 mm)*	1.18 in. *(30 mm)*	4.13 in. *(105 mm)*	18.31 in. *(465 mm)*	4.17 in. *(106 mm)*	1.02 in. *(26 mm)*	4.17 in. *(106 mm)*	3.35 in. *(85 mm)*	5.91 in. *(150 mm)*	14.11 lb *(31.1 kg)*	LM - 2400 - SB1 - ** - 14
	16	2.40 in. *(61 mm)*	3.82 in. ± 0.24 in. *(97 mm ± 6 mm)*	1.18 in. *(30 mm)*	4.13 in. *(105 mm)*	16.42 in. *(417 mm)*	4.17 in. *(106 mm)*	1.02 in. *(26 mm)*	4.17 in. *(106 mm)*	3.35 in. *(85 mm)*	5.91 in. *(150 mm)*	14.70 lb *(32.4 kg)*	LM - 2400 - SB1 - ** - 16
	18	2.40 in. *(61 mm)*	3.82 in. ± 0.24 in. *(97 mm ± 6 mm)*	1.18 in. *(30 mm)*	4.13 in. *(105 mm)*	16.42 in. *(417 mm)*	4.17 in. *(106 mm)*	1.02 in. *(26 mm)*	4.17 in. *(106 mm)*	3.35 in. *(85 mm)*	5.91 in. *(150 mm)*	15.38 lb *(33.9 kg)*	LM - 2400 - SB1 - ** - 18
2800 SCA 1	14	2.40 in. *(61 mm)*	3.66 in. ± 0.16 in. *(93 mm ± 4 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	18.31 in. *(465 mm)*	— —	1.34 in. *(34 mm)*	— —	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	14.29 lb *(31.5 kg)*	LM - 2800 - SCA1 - ** - 14
	16	2.40 in. *(61 mm)*	3.66 in. ± 0.16 in. *(93 mm ± 4 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	16.42 in. *(417 mm)*	— —	1.34 in. *(34 mm)*	— —	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	14.88 lb *(32.8 kg)*	LM - 2800 - SCA1 - ** - 16
	18	2.40 in. *(61 mm)*	3.66 in. ± 0.16 in. *(93 mm ± 4 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	16.42 in. *(417 mm)*	— —	1.34 in. *(34 mm)*	— —	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	15.56 lb *(34.3 kg)*	LM - 2800 - SCA1 - ** - 18
2800 SCB 1	14	2.40 in. *(61 mm)*	5.31 in. ± 0.16 in. *(135 mm ± 4 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	18.31 in. *(465 mm)*	— —	2.99 in. *(76 mm)*	5.16 in. *(131 mm)*	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	14.29 lb *(31.5 kg)*	LM - 2800 - SCB1 - ** - 14
	16	2.40 in. *(61 mm)*	5.31 in. ± 0.16 in. *(135 mm ± 4 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	16.42 in. *(417 mm)*	— —	2.99 in. *(76 mm)*	5.16 in. *(131 mm)*	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	14.88 lb *(32.8 kg)*	LM - 2800 - SCB1 - ** - 16
	18	2.40 in. *(61 mm)*	5.31 in. ± 0.16 in. *(135 mm ± 4 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	16.42 in. *(417 mm)*	— —	2.99 in. *(76 mm)*	4.96 in. *(126 mm)*	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	15.56 lb *(34.3 kg)*	LM - 2800 - SCB1 - ** - 18
3500 SCA 1	14	2.76 in. *(70 mm)*	3.94 in. ± 0.31 in. *(100 mm ± 8 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	18.31 in. *(465 mm)*	— —	0.98 in. *(25 mm)*	— —	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	15.38 lb *(33.9 kg)*	LM - 3500 - SCA1 - ** - 14
	16	2.76 in. *(70 mm)*	3.94 in. ± 0.31 in. *(100 mm ± 8 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	18.31 in. *(465 mm)*	— —	0.98 in. *(25 mm)*	— —	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	16.60 lb *(36.6 kg)*	LM - 3500 - SCA1 - ** - 16
	18	2.76 in. *(70 mm)*	3.94 in. ± 0.31 in. *(100 mm ± 8 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	18.31 in. *(465 mm)*	— —	0.98 in. *(25 mm)*	— —	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	17.46 lb *(38.5 kg)*	LM - 3500 - SCA1 - ** - 18
3500 SCB 1	14	2.76 in. *(70 mm)*	5.31 in. ± 0.31 in. *(135 mm ± 8 mm)*	0.24 in. *(6 mm)*	4.33 in. *(110 mm)*	18.31 in. *(465 mm)*	— —	2.36 in. *(60 mm)*	5.51 in. *(140 mm)*	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	15.38 lb *(33.9 kg)*	LM - 3500 - SCB1 - ** - 14
	16	2.76 in. *(70 mm)*	5.31 in. ± 0.31 in. *(135 mm ± 8 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	18.31 in. *(465 mm)*	— —	2.36 in. *(60 mm)*	5.51 in. *(140 mm)*	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	16.60 lb *(36.6 kg)*	LM - 3500 - SCB1 - ** - 16
	18	2.76 in. *(70 mm)*	5.31 in. ± 0.31 in. *(135 mm ± 8 mm)*	1.38 in. *(35 mm)*	4.33 in. *(110 mm)*	18.31 in. *(465 mm)*	— —	2.36 in. *(60 mm)*	5.51 in. *(140 mm)*	4.13 in. *(105 mm)*	6.38 in. *(162 mm)*	17.46 lb *(38.5 kg)*	LM - 3500 - SCB1 - ** - 18

"* The LM coupling is very adaptable with regard to axial length. The rubber element can be positioned closer to or farther from the flywheel within the limits shown for this dimension, while maintaining full engagement with the outer drive ring. Hub length L1 is adjustable as well with corresponding changes to mounting length dimension C.

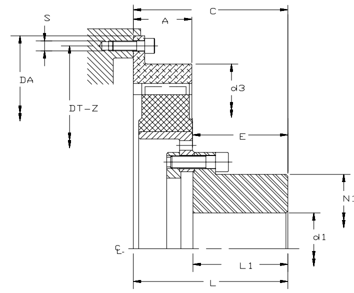
**Indicate Shore hardness for rubber element here.

Torsional Couplings

LM Torsional Series Dimensions–Continued



2800 – 3500 SBE



2800 – 3500 SCE

Special Types for Radial Change of Element

Coupling Size	SAE J620	A	C*	d1 (bore) min.	d1 (bore) max.	d3	E	L	L1	N1	Weight	Order Code
240 SBE	8	1.81 in. (46 mm)	4.45 in. ± 0.08 in. (113 mm ± 2 mm)	0.59 in. (15 mm)	1.77 in. (45 mm)	10.31 in. (262 mm)	2.28 in. (58 mm)	4.17 in. (106 mm)	2.36 in. (60 mm)	2.60 in. (66 mm)	2.18 lb (4.8 kg)	LM - 240 - SBE - ** - 8 - 113 - ***
	10	1.81 in. (46 mm)	4.45 in. ± 0.08 in. (113 mm ± 2 mm)	0.59 in. (15 mm)	1.77 in. (45 mm)	8.86 in. (225 mm)	2.28 in. (58 mm)	4.17 in. (106 mm)	2.36 in. (60 mm)	2.60 in. (66 mm)	2.36 lb (5.2 kg)	LM - 240 - SBE - ** - 10 - 113 - ***
400 SBE	10	1.77 in. (45 mm)	4.61 in. ± 0.08 in. (117 mm ± 2 mm)	0.79 in. (20 mm)	2.17 in. (55 mm)	12.32 in. (313 mm)	2.48 in. (63 mm)	4.65 in. (118 mm)	2.56 in. (65 mm)	3.35 in. (85 mm)	3.45 lb (7.6 kg)	LM - 400 - SBE - ** - 10 - 117 - ***
800 SBE	11 1/2	1.54 in. (39 mm)	4.61 in. ± 0.08 in. (117 mm ± 2 mm)	0.79 in. (20 mm)	2.56 in. (65 mm)	13.82 in. (351 mm)	2.52 in. (64 mm)	5.12 in. (130 mm)	2.60 in. (66 mm)	3.94 in. (100 mm)	5.03 lb (11.1 kg)	LM - 800 - SBE - ** - 11 - 117 - ***
	14	1.81 in. (46 mm)	4.69 in. ± 0.08 in. (119 mm ± 2 mm)	0.79 in. (20 mm)	2.56 in. (65 mm)	12.52 in. (318 mm)	2.52 in. (64 mm)	5.12 in. (130 mm)	2.60 in. (66 mm)	3.94 in. (100 mm)	6.35 lb (14.0 kg)	LM - 800 - SBE - ** - 14 - 119 - ***
1200 SBE	11 1/2	1.54 in. (39 mm)	4.45 in. ± 0.08 in. (113 mm ± 2 mm)	0.79 in. (20 mm)	2.56 in. (65 mm)	13.82 in. (351 mm)	2.52 in. (64 mm)	5.12 in. (130 mm)	2.60 in. (66 mm)	3.94 in. (100 mm)	6.89 lb (15.2 kg)	LM - 1200 - SBE - ** - 11L - 113 - ***
	14	1.81 in. (46 mm)	4.72 in. ± 0.08 in. (120 mm ± 2 mm)	0.79 in. (20 mm)	2.56 in. (65 mm)	13.82 in. (351 mm)	2.52 in. (64 mm)	5.12 in. (130 mm)	2.60 in. (66 mm)	3.94 in. (100 mm)	8.30 lb (18.3 kg)	LM - 1200 - SBE - ** - 14 - 120 - ***
1600 SBE	14	2.40 in. (61 mm)	6.61 in. ± 0.08 in. (168 mm ± 2 mm)	1.18 in. (30 mm)	3.94 in. (100 mm)	18.31 in. (465 mm)	3.46 in. (88 mm)	6.61 in. (168 mm)	3.54 in. (90 mm)	5.51 in. (140 mm)	11.43 lb (25.2 kg)	LM - 1600 - SBE - ** - 14 - 168 - ***
	16	2.40 in. (61 mm)	6.61 in. ± 0.08 in. (168 mm ± 2 mm)	1.18 in. (30 mm)	3.94 in. (100 mm)	16.42 in. (417 mm)	3.46 in. (88 mm)	6.61 in. (168 mm)	3.54 in. (90 mm)	5.51 in. (140 mm)	12.02 lb (26.5 kg)	LM - 1600 - SBE - ** - 16 - 168 - ***
	18	2.40 in. (61 mm)	6.61 in. ± 0.08 in. (168 mm ± 2 mm)	1.18 in. (30 mm)	3.94 in. (100 mm)	16.42 in. (417 mm)	3.46 in. (88 mm)	6.61 in. (168 mm)	3.54 in. (90 mm)	5.51 in. (140 mm)	12.70 lb (28.0 kg)	LM - 1600 - SBE - ** - 18 - 168 - ***
2400 SBE	14	2.40 in. (61 mm)	6.42 in. ± 0.08 in. (163 mm ± 2 mm)	1.18 in. (30 mm)	3.94 in. (100 mm)	18.31 in. (465 mm)	3.46 in. (88 mm)	6.61 in. (168 mm)	3.54 in. (90 mm)	5.51 in. (140 mm)	14.83 lb (32.7 kg)	LM - 2400 - SBE - ** - 14 - 163 - ***
	16	2.40 in. (61 mm)	6.42 in. ± 0.08 in. (163 mm ± 2 mm)	1.18 in. (30 mm)	3.94 in. (100 mm)	16.42 in. (417 mm)	3.46 in. (88 mm)	6.61 in. (168 mm)	3.54 in. (90 mm)	5.51 in. (140 mm)	15.42 lb (34.0 kg)	LM - 2400 - SBE - ** - 16 - 163 - ***
	18	2.40 in. (61 mm)	6.42 in. ± 0.08 in. (163 mm ± 2 mm)	1.18 in. (30 mm)	3.94 in. (100 mm)	16.42 in. (417 mm)	3.46 in. (88 mm)	6.61 in. (168 mm)	3.54 in. (90 mm)	5.51 in. (140 mm)	16.10 lb (35.5 kg)	LM - 2400 - SBE - ** - 18 - 163 - ***
2800 SCE	14	2.40 in. (61 mm)	6.46 in. ± 0.08 in. (164 mm ± 2 mm)	1.38 in. (35 mm)	4.13 in. (105 mm)	18.31 in. (465 mm)	4.06 in. (103 mm)	6.22 in. (158 mm)	4.13 in. (105 mm)	6.06 in. (154 mm)	14.65 lb (32.3 kg)	LM - 2800 - SCE - ** - 14 - 164 - ***
	16	2.40 in. (61 mm)	6.46 in. ± 0.08 in. (164 mm ± 2 mm)	1.38 in. (35 mm)	4.13 in. (105 mm)	16.42 in. (417 mm)	4.06 in. (103 mm)	6.22 in. (158 mm)	4.13 in. (105 mm)	6.06 in. (154 mm)	15.24 lb (33.6 kg)	LM - 2800 - SCE - ** - 16 - 164 - ***
	18	2.40 in. (61 mm)	6.46 in. ± 0.08 in. (164 mm ± 2 mm)	1.38 in. (35 mm)	4.13 in. (105 mm)	16.42 in. (417 mm)	4.06 in. (103 mm)	6.22 in. (158 mm)	4.13 in. (105 mm)	6.06 in. (154 mm)	15.92 lb (35.1 kg)	LM - 2800 - SCE - ** - 18 - 164 - ***
3500 SCE	14	2.76 in. (70 mm)	7.28 in. ± 0.08 in. (185 mm ± 2 mm)	0.24 in. (6 mm)	4.13 in. (105 mm)	18.31 in. (465 mm)	4.06 in. (103 mm)	7.20 in. (183 mm)	4.13 in. (105 mm)	6.06 in. (154 mm)	16.92 lb (37.3 kg)	LM - 3500 - SCE - ** - 14 - 185 - ***
	16	2.76 in. (70 mm)	7.28 in. ± 0.08 in. (185 mm ± 2 mm)	1.38 in. (35 mm)	4.13 in. (105 mm)	18.31 in. (465 mm)	4.06 in. (103 mm)	7.20 in. (183 mm)	4.13 in. (105 mm)	6.06 in. (154 mm)	18.14 lb (40.0 kg)	LM - 3500 - SCE - ** - 16 - 185 - ***
	18	2.76 in. (70 mm)	7.28 in. ± 0.08 in. (185 mm ± 2 mm)	1.38 in. (35 mm)	4.13 in. (105 mm)	18.31 in. (465 mm)	4.06 in. (103 mm)	7.20 in. (183 mm)	4.13 in. (105 mm)	6.06 in. (154 mm)	19.01 lb (41.9 kg)	LM - 3500 - SCE - ** - 18 - 185 - ***

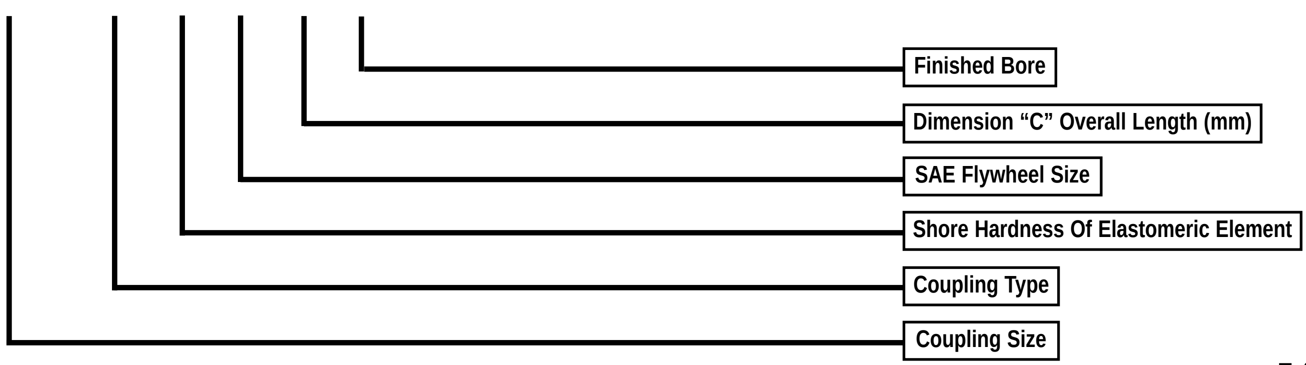
"* The LM coupling is very adaptable with regard to axial length. The rubber element can be positioned closer to or farther from the flywheel within the limits shown for this dimension, while maintaining full engagement with the outer drive ring. Hub length L1 is adjustable as well with corresponding changes to mounting length dimension C.

** Indicate Shore hardness for rubber element here.

***Indicate finished bore here.

Order Code Example

LM3500 – SCAI – 50 – 14 – 100 – **



Torsional Couplings

LM Coupling Installation Instructions

Installation Instructions

The outer aluminum ring is bolted to the engine flywheel with tightening torque TA2. The driven hub is mounted onto the driven shaft. The rubber disc with the vulcanized ring is then assembled to the hub with screws, which must be tightened to the correct torque TA1 (SB, SC) or TA3 (SBE, SCE) as stated in the tables.

Should Loctite or other anaerobic adhesives be used, apply a minimum only.

The rubber – metal connection may not be wetted.

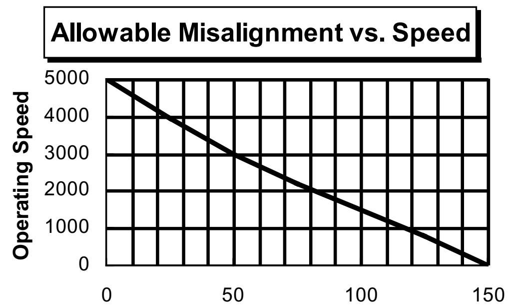
For types SB with conical hub: The screws must be tightened alternately in several steps until they have all reached the correct tightening torque. The tightening torque of all screws must then be checked all around. Secure axial fixing of the inner hub on the shaft has to be ensured.

Allowable Misalignment

The couplings can accommodate the following maximum misalignment:

Axial:	Several mm (as stated in dimension tables)
Angular:	0.5 degrees
Parallel:	0.5 mm

These values for angular and radial misalignment are based on 1500 rpm. For other speeds convert according to the diagram at right.



Since radial and angular misalignment cause relative movement, that mans wear between the rubber elements and the outer aluminum ring, it is advisable to keep the misalignment as low as possible - better than above values - in order to ensure long coupling life and smooth running. For non-flanged drives, we recommend the following effective range of maximum misalignment:

Angular:	0.1 degree
Parallel:	0.2 mm

Above values are for continuous duty.. For short periods (i.e. during starting and stopping the engine, at heave sea, etc.) up to five times higher values for radial and angular misalignment are allowable.

Alignment of Coupling

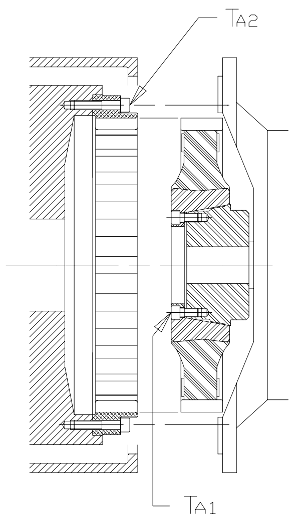
The alignment of free mounted, non-flanged drives should be checked in the usual way, by checking the radial and angular misalignment between driving and driven side with a dial indicator. As a reference surface, the inner hub should be used on the driven and the other a flywheel or flywheel housing. If the engine is placed on flexible mounts, then the alignment should be checked at the earliest, 2 days after the engine has been put on its flexible mounts, because only then will these mounts have taken most of their permanent set. In addition, the rigidly mount driven unit should be placed about 0.3 mm lower than the flexibly mounted engine. In this way, upon further setting of the engine a misalignment improvement can be achieved and the engine's position, after some running time, will not be essentially lower than the driven unit. Further setting of the engine is thus anticipated and compensated if necessary.

Ventilation

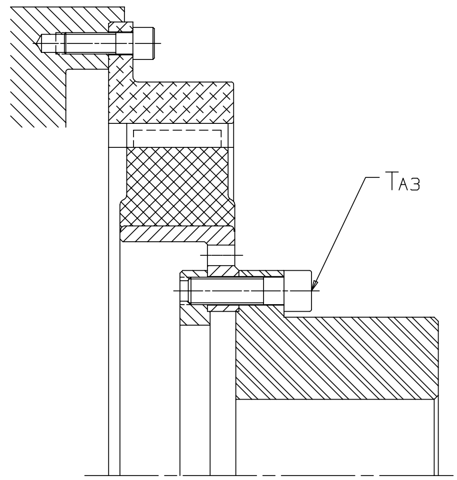
The LM Torsional Couplings are produced of special rubber which has a higher temperature resistance than normal rubber. However, it is a fact, that every rubber becomes harder with time under the influence of high temperature, and its mechanical properties are reduced. Therefore, it is always advantageous to ensure that the flange and flywheel housing have many rather large ventilation holes in order to provide adequate air flow. The temperature will then be reduced and the life of the coupling element considerably increased.

Torsional Couplings

LM Coupling Installation Instructions—Continued



Standard Types SB, SCA, SCB



Drop Out Types SBE, SCE

Tightening Torque—Inner Hub Screws (TA[3])

For special types SBE, SCE

Coupling Size	LM240	LM400	LM800 LM1200	LM1600 LM2400	LM2800	LM3500
Screw Size DIN 912 Class	M8X25mm 10.9	M8X25mm 10.9	M10X30mm 10.9	M12X30mm 10.9	M16X40mm 10.9	M16X50mm 10.9
Tightening Torque TA1 (in-lbs)	26	26	52	89	230	230
Quantity	12	16	16	16	8	8

Tightening Torque—Inner Hub Screws (TA[1])

For special types SB, SCA, SCB

Coupling Size	LM240	LM400	LM800 LM1200	LM1600 LM2400	LM2800 LM3500
Screw Size DIN 912 Class	M8X20mm 8.8	M8X20mm 8.8	M10X20mm 8.8	M12X25mm .8.	M16X40mm 10.9
Tightening Torque TA1 (in-lbs)	19	19	37	63	230
Quantity	8	8	8	8	8

Tightening Torque—Flywheel Adapter Flange Screws* (TA[2])

For all LM types

SAE Size	6½	7½	8	10	11½	14	16	18	21	24
Inch screws SAE grade 5 (ft-lb)	5/16-18 19	5/16-18 19	3/8-16 30	3/8-16 30	3/8-16 30	1/2-13 80	1/2-13 80	5/8-11 150	5/8-11 150	3/4-10 275
Metric screws DIN 912 class 8.8 (ft-lb) (Nm)	M 8 19 25	M 8 19 25	M 10 37 50	M 10 37 50	M 10 37 50	M 12 66 90	M 12 66 90	M 16 160 220	M 16 160 220	M 18 220 290

*Lovejoy does not furnish these screws.

Product Warranty

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