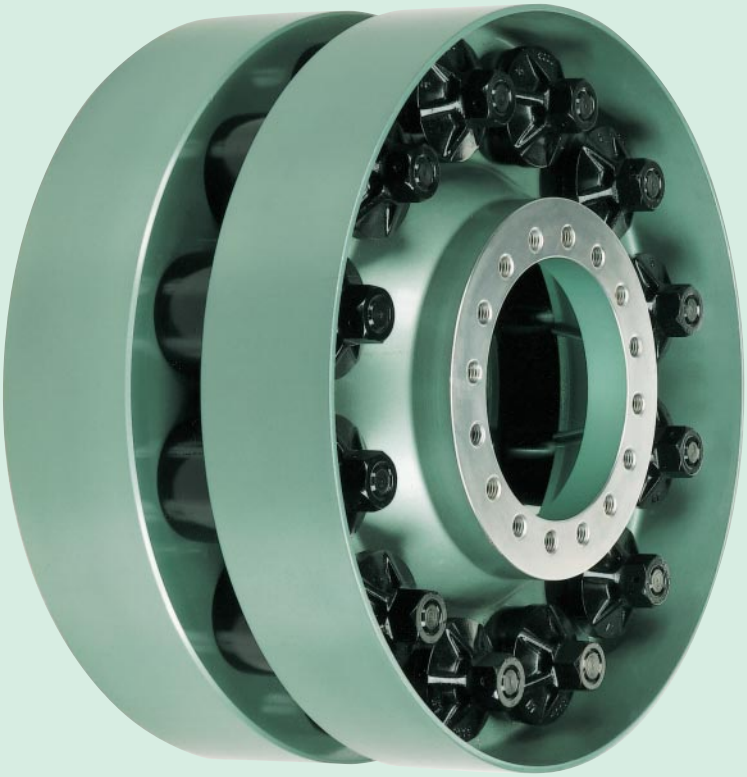
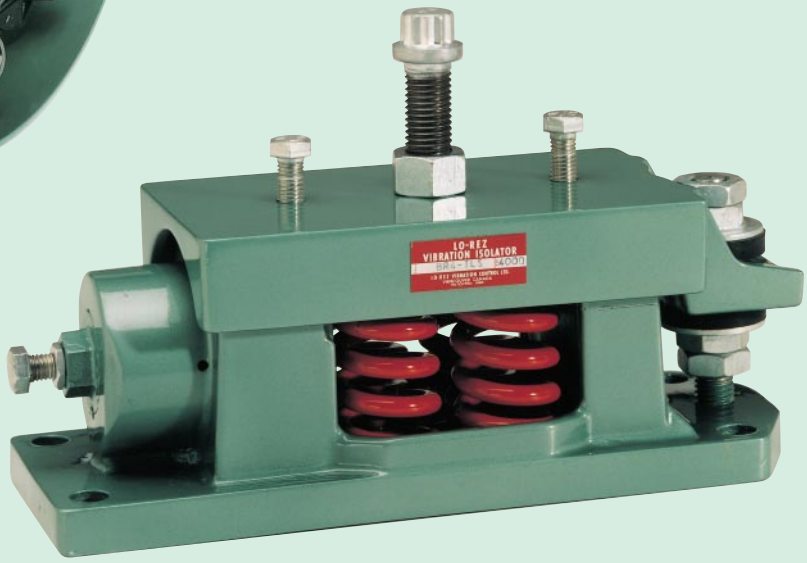
LO-REZ

THE "SOFT-MOUNT" PACKAGE

RT
FLEXIBLE COUPLING



BR-T
VIBRATION
ISOLATOR



LO-REZ VIBRATION CONTROL LTD.

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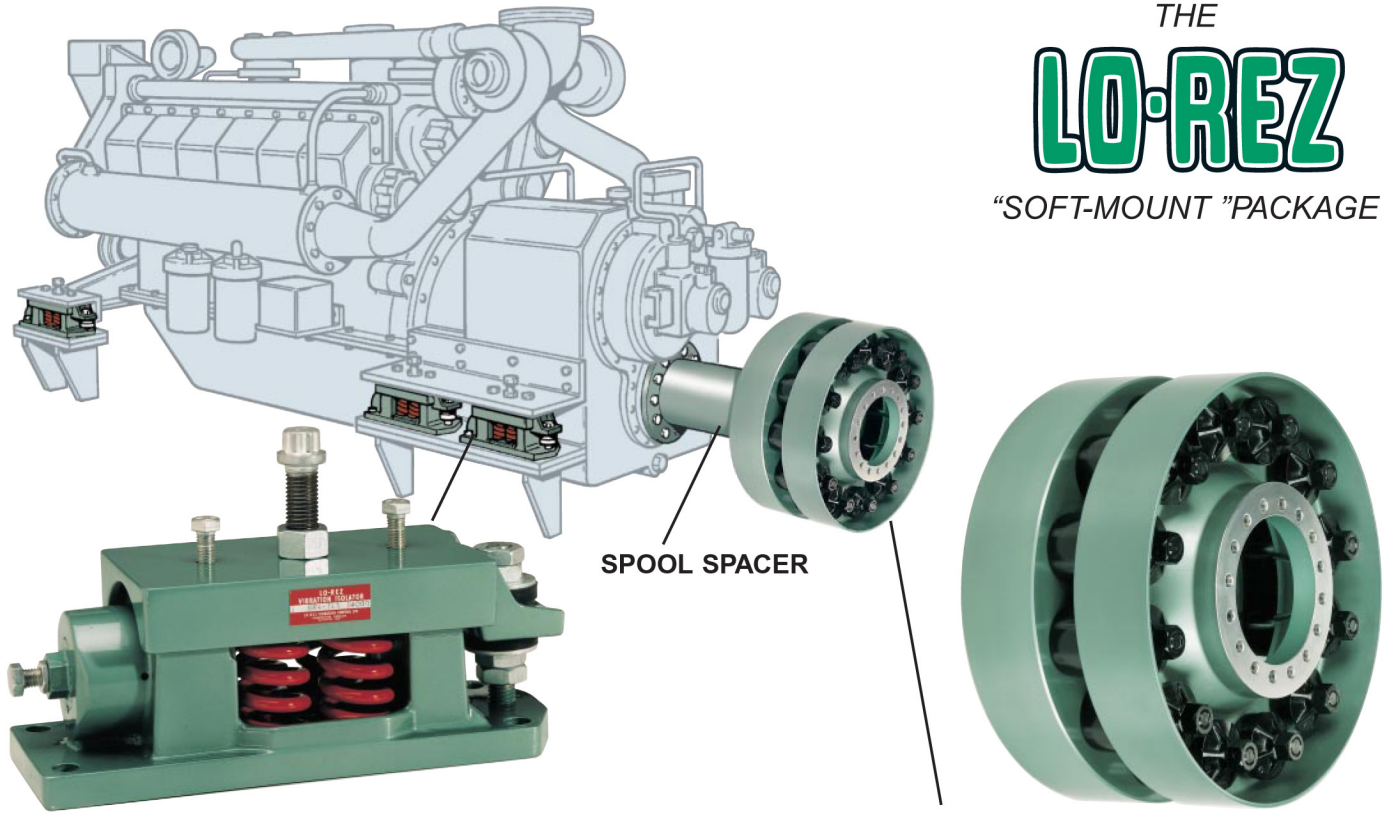
THE

LO-REZ

"SOFT-MOUNT "PACKAGE



LO-REZ BR-T ISOLATOR

— CARRIES FULL THRUST
— ISOLATES OVER ENTIRE SPEED RANGE
— PROVIDES OPTIMUM DAMPING
— CONTROLLED EXCURSION
— HEIGHT ADJUSTMENT

LO-REZ RT COUPLING

— TAKES REVERSE THRUST
— LOW STIFFNESS
— HIGH DAMPING
— NON-LUBRICATING
— NOISE ATTENUATION

FIGURE 1

Figure 1 shows a typical engine and integral reduction gear mounted on Lo-Rez type BR-T steel-spring vibration isolators and fitted with an RT coupling. In some cases it is necessary, because of hull framing and gear case protrusions, to utilize a hollow spool-spacer between the reduction gear and the coupling.

The BR-T vibration isolators have special thrust-carrying devices which permit them to carry full-load propellor thrust without 'locking up' or becoming 'bound', so that they are capable of providing effective isolation of the engine-generated vibration over the entire speed range. The lateral flexibility of the RT coupling assists in this function.

The BR-T isolator series includes the BR4-TELS, TLS and TMS sizes. Each of these incorporates a limit stop to prevent excessive vertical motion and rocking motion. The neoprene bumpers can be easily adjusted to accommodate the actual working height of the isolator as well as to limit the random motions to any desired degree. The central levelling screw and the two additional cap screws securely fasten the engine and gear box to the top of the isolator. As with all Lo-Rez isolators there are neoprene dampers inside each end of the isolator to withstand lateral (including crash) forces — so obviating need for any external chocks. The main load-carrying springs are seated in rubber cups, so that there is no metal-to-metal path within the isolator. 'Noise' pads below the isolator are not required.

The Lo-Rez RT (Reverse Thrust) elastomer flexible coupling was designed primarily for use in the low-speed shafting of geared propulsion systems; particularly those systems in which the engines and gear boxes are mounted on highly-flexible vibration isolators, and where both vibration control and noise control are paramount requirements.

RT couplings can be provided with a variety of elastomeric elements which vary in hardness and also in damping properties. For standard elements, the dynamic magnifier for RT couplings if 6.5 and for high-damping rubber, this dynamic magnifier is 3.5.

The dynamic stiffness factors shown in Table 1 are based on the respective rated torque levels shown. For smaller values of transmitted torque, the dynamic stiffness values vary linearly with torque, reducing at zero torque to approximately 75% of the values shown for full rated torque.

As in mechanical (viscous) damping, the acoustic attenuation properties can be varied by changes in the rubber mix and by changes in the material and weight of the metal components. Tests on actual propulsion systems fitted with Lo-Rez 'soft mount' systems show noise level reductions of from 13 to 20 dB.

The RT coupling driving and driven flanges, or coupling halves, are coupled together by a set (usually 12) of 3-tiered cylindrical elastomeric elements which are pre-loaded in compression by articulating bolts and end caps. This configuration results in a combined shear and compression loading of the elements and tensile loading of the articulating bolts when the RT coupling is transmitting torque (Fig. 2).

This configuration and loading geometry provide the RT coupling with several important characteristics:

— two-directional (propellor) thrust capability
— two-directional torque capability
— low torsional, angular and radial stiffness for torsional tuning, misalignment and shock absorption
— excellent noise-attenuating properties
— good mechanical damping level
— open design, facilitating inspection and maintenance and providing for cool operation
— equal axial (longitudinal) stiffness for forward and reverse thrusts
— non lubricated
— A.B.S. approved
— shock tested to U.S. MIL spec. MIL-S 901C (MOD.)

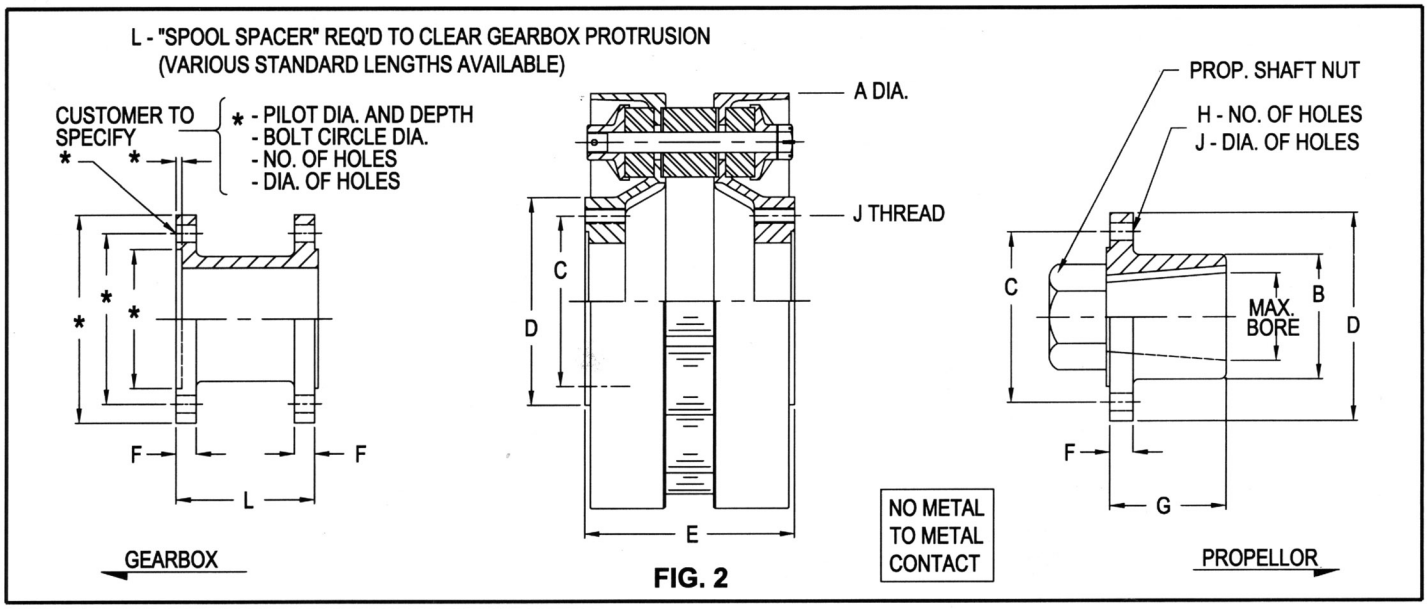


FIG. 2

TABLE 1

COUPLING SIZE	RATED TORQUE	DYNAMIC TORSIONAL STIFFNESS (1)	TOTAL COUPLING WEIGHT (2)	TOTAL WR^2	MISALIGNMENT (3)			THRUST CAPACITY	DYNAMIC STIFFNESS			MAX. SPEED
					RADIAL	AXIAL	ANGULAR		RADIAL	AXIAL	ANGULAR	
'A' DIA. IN.	LB. IN.	LB. IN./RAD. / 10^6	APPROX. LB.	LB. IN. SEC^2	IN.	IN.	DEG.	LB.	LB./IN. / 10^6	LB./IN. / 10^6	LB.IN./RAD. / 10^6	RPM
12 RT	15 000	.850	20	1.5	.020	.012	1.5	7 000	.020	.16	.75	1800
13½	25 000	1.00	35	3	.020	.013	1.5	9 000	.024	.20	2.0	1500
15	40 000	1.35	55	5	.030	.015	1.5	11 000	.030	.26	4.3	1300
18	70 000	2.80	80	14	.034	.018	1.5	18 000	.042	.31	7.5	1100
20	95 000	4.00	130	17	.040	.020	1.5	23 000	.050	.35	10	950
22½	130 000	6.10	190	36	.045	.022	1.5	32 000	.065	.40	18	850
25	165 000	8.70	230	60	.050	.025	1.5	32 000	.065	.40	20	750
27½	250 000	14.0	310	100	.055	.027	1.5	52 000	.110	.53	30	680
30	330 000	21.0	380	140	.060	.030	1.5	52 000	.110	.53	38	625
32½	430 000	28.0	480	220	.065	.033	1.5	62 000	.130	.57	50	580
35	525 000	40.0	600	290	.070	.035	1.5	72 000	.150	.60	60	540
38	650 000	52.0	1250	700	.075	.038	1.5	85 000	.180	.67	75	505
40	780 000	65.0	1520	780	.080	.040	1.5	93 000	.200	.70	90	470

(1) DYNAMIC TORSIONAL STIFFNESS AT RATED TORQUE.
OTHER TORSIONAL STIFFNESSES FOR EACH SIZE AVAILABLE - CONSULT LO-REZ
ABOVE RATINGS ARE FOR ±30% VIBRATORY RATING.

(2) NOT INCLUDING HUBS.
(3) VALUES SHOWN ARE MAXIMUM FOR OPERATIONAL LIMITS, RECOMMEND 20% OR LESS AT TIME OF ORIGINAL INSTALLATION.

TABLE 2

All dimensions are in inches

'A' DIA. COUPLING SIZE	B DIA.	C DIA.	D DIA.	E	F	G	H (1)	J (NC)	MATERIAL MAIN CASTINGS (3)	STD. HUB WEIGHT APPROX. LB.	MAX. HUB BORE (2)
12 RT	4⅛	5	6	6	½	4	8	⅜	ALUM.	16	2½
13½	4¾	5¾	6¾	6¾	⅝	4	12	½	ALUM.	18	3
15	5¼	6½	7½	7½	¾	4½	16	½	ALUM.	20	3¼
18	6	7⅜	9	9	¾	6	16	⅝	ALUM.	32	3¾
20	6 9/16	8	10	10	⅞	6	16	⅝	ALUM.	35	4⅛
22½	7⅜	9	11	11¼	1	7	16	¾	ALUM.	63	4⅝
25	9⅜	11	13	12½	1¼	7	16	¾	ALUM.	90	5⅞
27½	10¼	12	13½	13¾	1¼	8	16	⅞	ALUM.	120	6⅜
30	10¼	12	15	14¾	1½	8	16	1	ALUM.	150	6⅜
32½	11⅞	14	16¼	16¼	1⅝	8	16	1⅛	ALUM.	200	7½
35	13⅜	15½	17½	17½	1¾	9	16	1⅛	ALUM.	250	8⅜
38	14	16½	19	19	1¾	10	16	1¼	D.I.	300	9¼
40	14½	17	20	20	1⅞	12	16	1½	D.I.	340	9⅞

(1) The quantity of bolts will change if the coupling is used below 50% of its maximum rating.
(2) Maximum standard bore may be exceeded if special Muff hub is used.
(3) Material of main coupling castings: - ALUM. - heat treated aluminum - D.I. - ductile iron - non-magnetic materials available on request

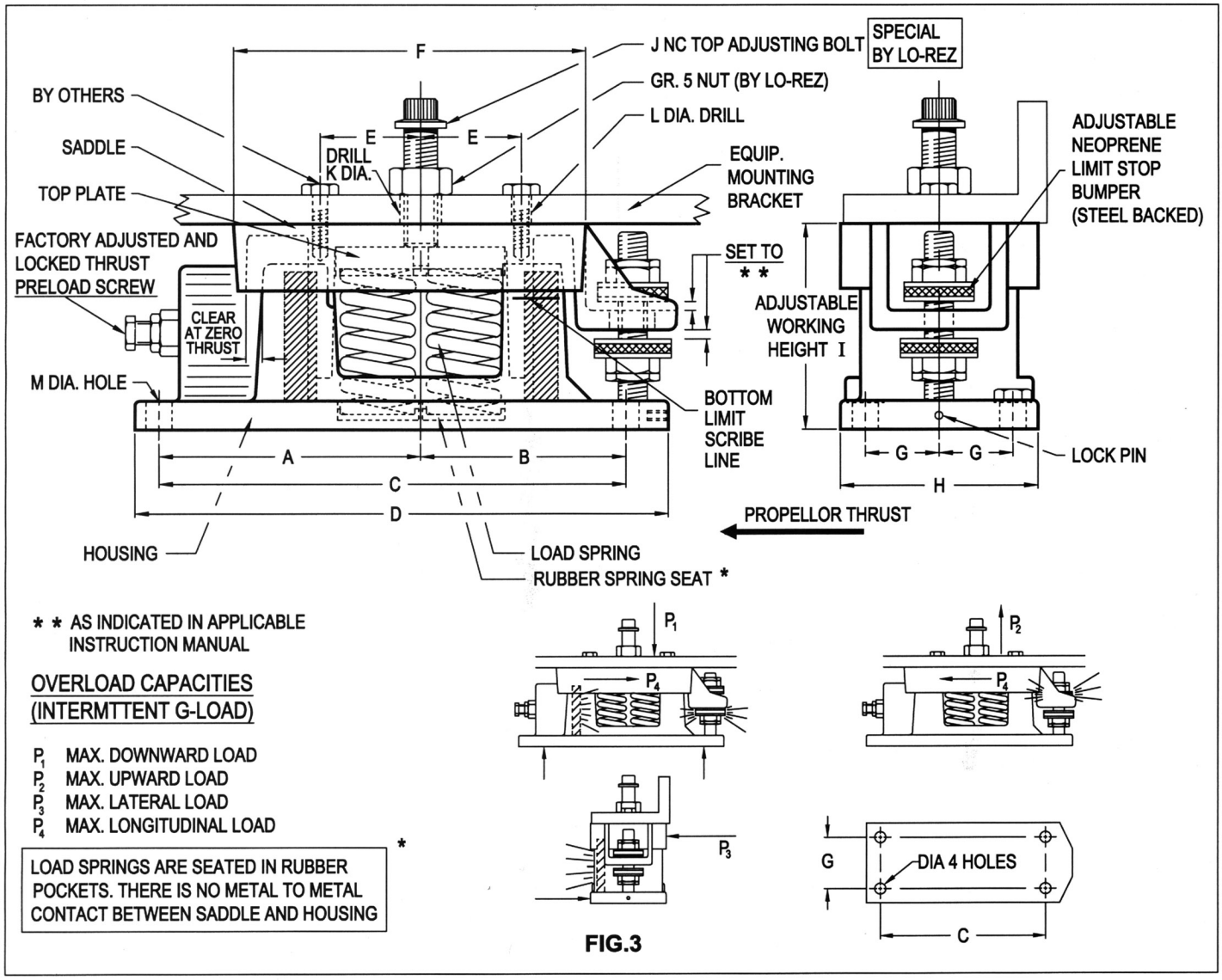


FIG.3

TABLE 3

All dimensions are in inches

	A	B	C	D	E	F	G	H	I	J	K	L	M
BR4 - TELS	5 5/8	3 7/8	9 1/2	11 1/2	2	7 5/8	1 5/8	4 1/8	3 3/8 - 3 3/4	5/8	11/16	7/16	1/2
BR4 - TLS	6 3/4	5 1/4	12	13 7/8	2 5/8	9 5/8	1 7/8	5 1/8	5 - 5 3/4	7/8	15/16	9/16	11/16
BR4 - TMS	9 3/8	6 3/4	16 1/8	19	3 3/8	12	2 1/8	6	6 5/8 - 7 1/2	1	1 1/16	11/16	13/16

TABLE 4

ISOLATOR VERTICAL LOAD CAPACITY. HOUSINGS HAVE 10 TO 12 DIFFERENT SPRING DESIGNS		STATIC DEFL'N AT RATED LOAD (INCHES)	VERTICAL NATURAL FREQUENCY (CPM) (Nominal)	P_1 LBS.	P_2 LBS.	P_3 LBS.	P_4 LBS.
BR4 - TELS	12 LOAD RATINGS 800 - 3200 LBS.	.60	243	3 000	3 000	4 000	4 000
BR4 - TLS	9 LOAD RATINGS 1000 - 4800 LBS.	.60	243	10 000	10 000	8 000	8 000
BR4 - TMS	9 LOAD RATINGS 4000 - 10000 LBS.	1.00	243	15 000	15 000	12 000	12 000

LO-REZ APPLICATIONS

T.S.R.V. TORPEDO & SHIP RESEARCH VESSELS

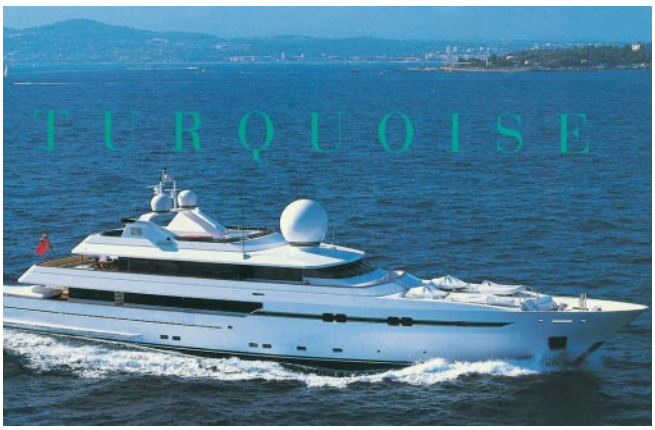
TRUMP PRINCESS CASINO BOAT

CV-9 (DELTA MARINE)

30,000 ISLAND CRUISES

ODYSSEY III GLASS BOTTOM BOAT

GRANDE CARIBE CRUISE (BLOUNT INDUSTRIES)



TURQUOISE

ROXANA (ADMIRAL MARINE WORKS)

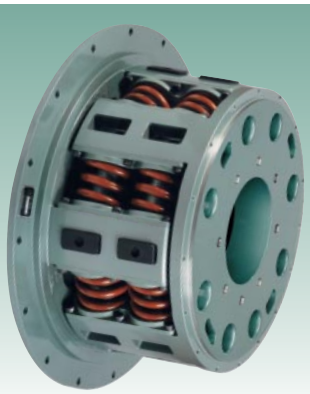
LO-REZ VIBRATION CONTROL LTD. has been dedicated to the design and manufacture of vibration control equipment since the 1950's. Our commitment to research and design as well as high quality and exacting standards in manufacture, means we are meeting the challenge of new technology with systems that are state of the art in the 1990's.
For example the LO-REZ SOFT-MOUNT® SYSTEM, in place in over 350 marine propulsion applications around the world, produces typical vibration isolation efficiency of 97% with noise levels of 62-70dBA.
Committed to system performance LO-REZ provides extensive services and test facilities, providing certification prior and subsequent to overhaul when required.
Comprehensive technical specifications and performance data is available upon request on all LO-REZ systems and components.

BR-T STEEL-SPRING VIBRATION ISOLATORS

High-efficiency control of vibration produced by diesel propulsion engines in ships, trains and industrial equipment. A number of models and sizes, as well as a non-propulsion series are available to accommodate specific load requirements. An integral part of the Lo-Rez Soft-Mount® System.

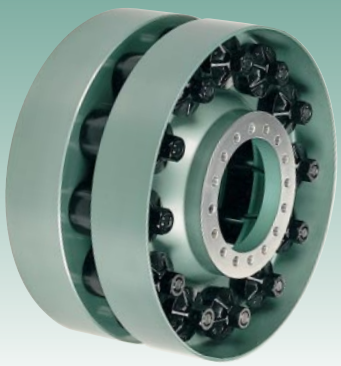
SS STEEL-SPRING FLEXIBLE COUPLINGS

Providing low, constant and accurate torsional stiffness (±8%) for precise tuning control in geared propulsion, reciprocating compressor and other critical systems. Features include; no lubrication, easy inspection of internal working parts and easily adjustable damping.
A number of models (including a single row series) and sizes are available to suit specific system requirements.
(Shown with cover removed.)



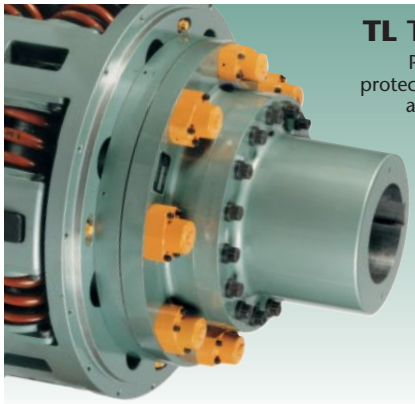
RT STEEL BOLTED RUBBER COUPLINGS

Torsionally flexible and capable of accommodating axial load, these couplings are ideal for any propulsion application. Featuring; reverse thrust capability, noise attenuation, no thrust bearing requirement, low stiffness, non-lubricated and high damping.
Available in various sizes and an integral part of the Lo-Rez Soft-Mount® System.



HLF LAMINATED DISC COUPLINGS

These High Lateral Flexibility disc couplings significantly impede a propulsion engine's linear/torsional vibration and noise from entering any hard mounted gear box.
*(Shown here attached to a Lo-Rez **RT** coupling and its integral spool spacer).*

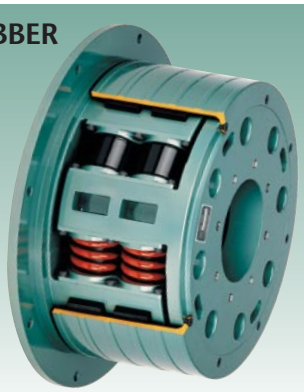


TL TORQUE LIMITERS

Providing optimum overload protection. With low maintenance and easily reset, these torque limiters keep downtime to a very minimum.
A number of models and sizes are available to suit any system requirement.
(Shown here attached to a Lo-Rez Steel-Spring Flexible coupling/cover removed).

SS-R STEEL-SPRING/RUBBER FLEXIBLE COUPLINGS

A variation of the steel-spring coupling, incorporating a high damping ability while retaining some torsional stiffness accuracy (±15-20%) for tuning control. Features include; no lubrication, easy inspection of internal working parts and easily adjustable damping.
A number of models (including a single-row series) and sizes are available to suit specific system requirements.



VTD VISCOUS TORSIONAL VIBRATION DAMPERS

Tuned, double tuned and non-tuned patented Viscous Dampers. Available in a wide range of sizes, providing optimum damping coefficients, custom designed particularly to suit custom requirements. A vital part of crankshaft, gear train and bearing protection.

Designed & Manufactured By:
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