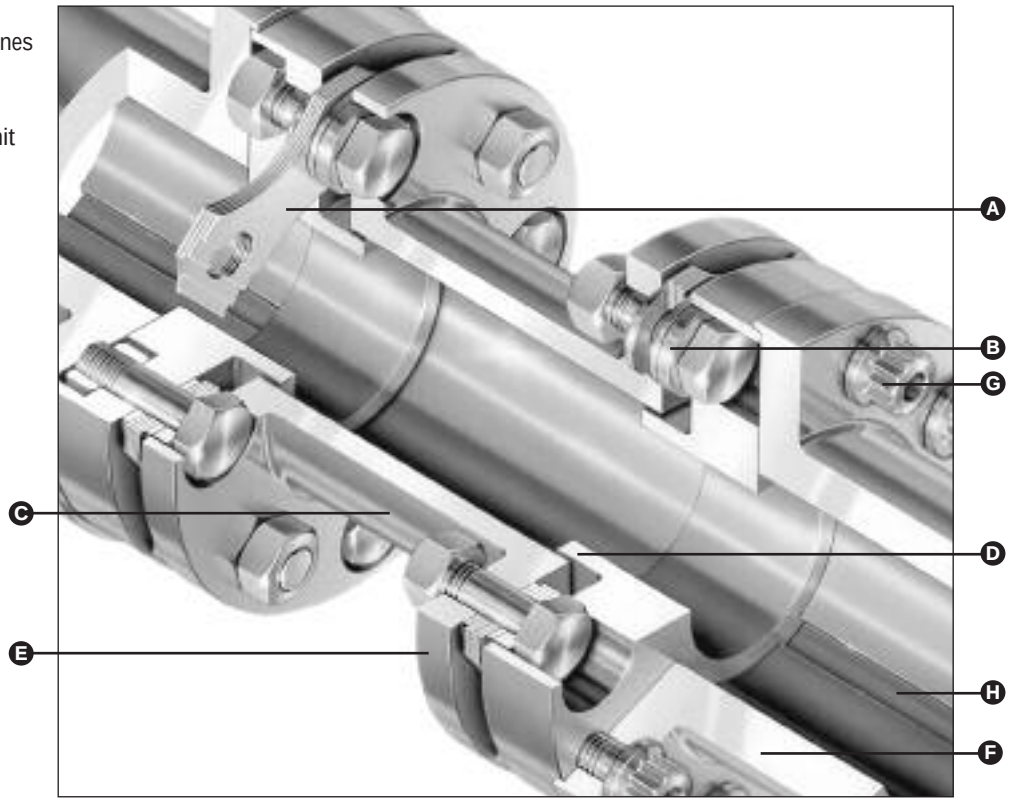
TLC

METASTREAM® T Series Couplings

A – Stainless Steel, Flexible Membranes
B – Overload Collars
C – Cartridge Transmission Unit
D – Anti-Fly Feature
E – Anti-Corrosion Treatment
F – Hubs with Puller Holes
G – Externally Wrenched Bolts
H – Large Shaft Diameter Accommodated



Product Description

Metastream® T Series Couplings, pioneered by John Crane Flexibox®, incorporate a scalloped, stainless steel, flexible membrane design. This design gives the most flexible solution for high torque and misalignment.

- Easy to fit.
- Meets API 610 8th edition. Can be supplied to meet API 671.
- Intrinsic balance meets AGMA class 9 through size 9017.
- Ideally suited for electric motors and turbine drives in critical process industry, marine, and power generation applications.

Design Features

- Excellent power-to-weight ratio.
- High misalignment capability.
- Low imposed forces on machinery leading to:
  - reduced machinery vibration
  - maximized bearing life.
- Stainless steel, flexible membranes for maximum life.
- Cartridge transmission unit eases assembly and gives repeatable balance.
- Overload collars are fitted to protect the flexible membranes in case of a more severe torsional overload.
- Anti-fly retention of the spacer in the unlikely event of membrane failure.
- Puller holes incorporated into hubs as standard.
- Unique modular design allows correctly rated coupling to be installed, even on large diameter shafts.
- Special thread form ensures hub bolts have all metal self-locking feature for security. This allows the bolts to be used repeatedly without compromising their integrity.
- Compression and jacking bolt features allow for easy installation and removal of spacer assembly as standard.

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TLC Technical Data

Coupling Size	Rating HP/100 rpm	Max. Continuous Torque lb-in	Peak Overload Torque lb-in	Max. rpm Standard Hub	Max. rpm Large Hub	Weight, Inertia, and Stiffness of Transmission Unit: Weight @ Min. DBSE lb	Weight/ Extra DBSE lb/in	Inertia @ Min. DBSE lb-in^2	Inertia/ Extra DBSE lb-in^2/in	Stiff. @ Min. DBSE x10^6 lb-in/rad *K_{tu}	Stiff./Extra DBSE x10^6 lb-in/rad/in *K_s
0300	40	25,350	50,700	15,300	11,500	19.9	0.92	94	1.9	3.68	77.43
0500	67	42,250	84,500	12,900	10,300	30.9	1.23	212	4.1	5.93	165.9
0750	101	63,400	126,800	11,500	9,300	44.2	1.56	391	7.4	8.47	296.1
1050	141	88,750	177,500	10,300	8,200	62.3	1.93	705	11.8	13.9	473.4
1500	201	126,750	253,500	9,300	7,600	83.3	2.38	1172	18.4	28.0	741.4
2000	268	169,050	338,100	8,200	7,200	114.4	2.75	2036	26.9	36.2	1083
2600	349	219,750	439,500	7,600	6,600	149.6	3.40	3119	37.6	46.7	1513
3350	449	283,150	566,300	7,200	5,900	169.8	3.85	4080	54.4	60.8	2186
4250	570	359,250	718,500	6,600	5,900	221.9	4.55	6222	73.8	77.2	2967
6010	806	507,900	1,015,800	5,900	5,100	311.0	5.69	11195	120	109	4821
8500	1140	718,400	1,436,800	5,100	4,500	463.9	6.82	21731	170	146	6848
9013	1743	1,098,700	2,197,400	4,500	4,100	644.8	7.71	39966	255	224	10272
9017	2280	1,436,800	2,873,600	4,100	3,800	875.3	10.11	65288	400	295	16093
9021	2816	1,774,850	3,549,700	3,800	3,200	1078.9	11.49	94260	537	366	21622
9036	4828	3,042,450	6,084,900	3,200	2,900	1748.7	16.56	217192	1163	631	46765
9049	6571	4,141,300	8,282,600	2,900	—	2344.9	21.21	353232	1818	858	73147

*To calculate transmission unit torsional stiffness for other DBSEs, Torsional Stiffness (K) is: $\frac{1}{1/K_{tu} + L/K_s}$
Where L is the difference in length (inches) between minimum DBSE and actual DBSE.

Coupling Size	Standard Hubs: Unbored Hub Weight lb	Standard Hubs: Unbored Hub Inertia lb-in^2	Standard Hubs: Typical Coupling Values** Weight lb	Standard Hubs: Typical Coupling Values** Inertia lb-in^2	Standard Hubs: Typical Coupling Values** Stiffness x10^6 lb-in/rad K_h	Large Hubs: Unbored Hub Weight lb	Large Hubs: Unbored Hub Inertia lb-in^2	Large Hubs: Typical Coupling Values** Weight lb	Large Hubs: Typical Coupling Values** Inertia lb-in^2	Large Hubs: Typical Coupling Values** Stiffness x10^6 lb-in/rad K_h***
0300	12.9	39	33.4	151	3.43	41.4	270	68.2	543	3.67
0500	22.8	100	54.9	362	6.14	51.7	421	95.3	937	6.39
0750	35.7	202	80.1	687	8.53	72.3	728	132.3	1633	8.79
1050	44.9	311	111.5	1183	14.7	107.5	1370	188.8	2996	15.4
1500	62.9	541	151.4	2004	22.0	149.4	2199	257.5	4834	23.6
2000	94.1	1030	213.4	3614	29.5	176.9	2986	312.3	6864	31.1
2600	133.3	1706	288.1	5695	38.4	168.9	2715	328.1	7319	40.1
3350	163.0	2488	334.7	7745	51.9	348.2	8958	547.5	18259	54.4
4250	209.7	3736	426.6	11605	65.9	339.5	8603	579.6	19570	68.0
6010	316.1	7340	616.3	21696	95.0	484.7	15944	848.6	31108	97.3
8500	444.0	13085	920.1	34917	133	748.8	32430	1281	62076	138
9013	691.3	27126	1347	68442	205	951.5	48362	1666	98733	209
9017	895.9	41963	1785	108539	269	1288	78258	2237	158891	276
9021	1229	70217	2322	169391	337	2200	191643	3467	340995	348
9036	2023	160869	3783	389950	579	2818	288960	4723	570622	591
9049	2663	254340	5008	623857	785	—	—	—	—	—

**Typical coupling values are based upon minimum DBSE and maximum bored standard or large hubs as appropriate. Hubs will be supplied unbored unless specified. Consult your local sales office regarding standard bore and key tolerances.

NOTE: For the complete coupling, weights and inertia of two appropriate hubs plus a transmission unit are required.

***To calculate coupling torsional stiffness, Torsional Stiffness (KT) is: $\frac{1}{1/K + 1/K_h + 1/K_h}$
Where K_h is the torsional stiffness of each hub.

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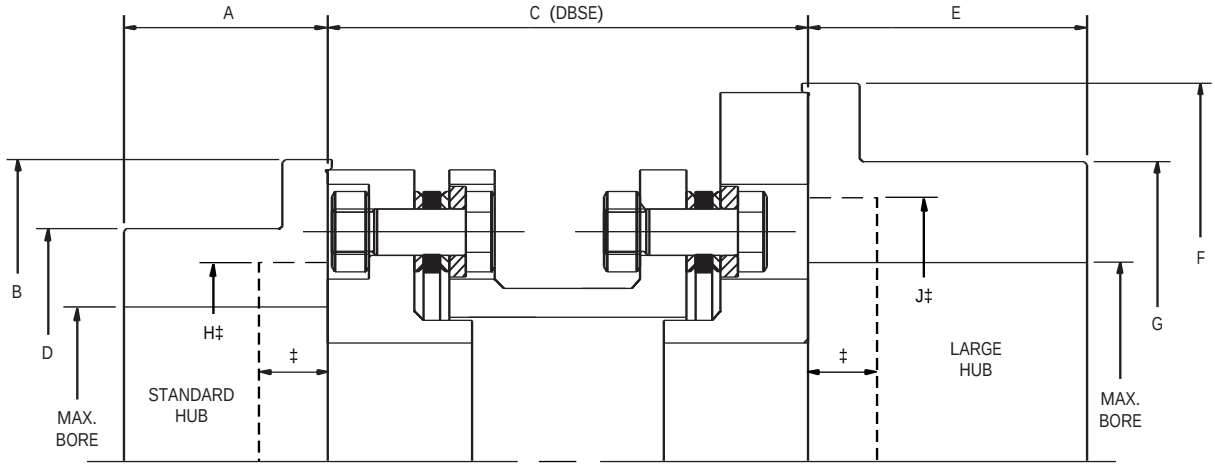
TLC Typical Arrangement



‡ To suit applications such as taper shafts.

TLC Dimensional Data (inches)

Coupling Size	A	B	Distance Between Shaft Ends C Min.	C Standard* in.	D	E	F	G	H	J	Max. Bores** Standard Hub	Max. Bores** Large Hub
0300	2.63	6.08	4.06	7	4.58	3.63	8.05	6.39	4.25	6.01	3.00	4.31
0500	3.00	7.18	4.69	7	5.58	3.75	9.03	6.99	5.25	6.55	3.69	4.50
0750	3.63	8.05	5.44	8	6.39	4.25	10.02	7.74	6.01	7.22	4.31	5.00
1050	3.75	9.03	5.94	9	6.99	4.94	11.25	8.87	6.55	8.35	4.50	5.88
1500	4.38	10.02	6.69	9	7.74	6.00	12.25	9.56	7.22	8.98	5.00	6.63
2000	4.94	11.25	7.13	10	8.87	6.00	12.85	10.80	8.35	10.22	5.88	7.50
2600	6.00	12.25	7.88	11	9.56	6.00	12.85	10.80	8.98	10.22	6.63	7.50
3350	6.00	12.85	7.94	11	10.80	7.63	15.65	13.37	10.22	12.69	7.50	9.50
4250	6.63	13.92	8.88	12	11.62	7.63	15.65	13.37	10.98	12.69	8.25	9.50
6010	7.63	15.65	9.81	13	13.37	8.50	18.10	14.93	12.69	14.16	9.50	10.63
8500	8.50	18.10	11.38	15	14.93	9.88	20.56	17.37	14.16	16.50	10.63	12.38
9013	9.88	20.56	12.50	—	17.37	10.75	22.54	18.93	16.50	17.97	12.38	13.50
9017	10.75	22.54	13.94	—	18.93	12.00	24.27	21.12	17.97	20.18	13.50	15.00
9021	12.00	24.27	15.00	—	21.12	14.19	28.54	24.93	20.18	23.77	15.00	17.75
9036	14.19	28.54	17.88	—	24.93	15.56	31.34	27.30	23.77	25.98	17.75	19.50
9049	15.56	31.34	19.81	—	27.30	—	—	—	25.98	—	19.50	—

All dimensions in inches unless otherwise stated, and should not be used for construction. Certified dimensions furnished upon request.

*These Distance Between Shaft End (DBSE) sizes are standard. Other lengths to suit specific shaft separations are available.

**Maximum bores shown are based on standard AGMA square keys dimensions.

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Selection Procedure

1. Select appropriate service factor SF.
2. Calculate coupling rating R from
   $R = \frac{HP \times 100 \times SF}{N}$
   where:
   HP = driver rated power
   N = speed (rev./min.)
3. Select a coupling with the same or higher rating.
4. Check that the hub bore capacity is suitable.
5. Check peak torque capability is suitable for application.
6. Check speed capability.
7. Check whether additional dynamic balancing is required.
8. Specify Distance Between Shaft Ends (DBSE).

Example: 1500 HP electric motor to centrifugal pump at 1800 rpm

$R = \frac{1500 \times 100 \times 1}{1800}$

R = 83.3 HP per 100 rpm

Selection: TLCS - 0750

Standard hub bore up to ...4.31"
Large hub bore up to .....5.00"
Peak torque capability .....126,800 lb.-in.

Additional dynamic balancing should not be required.

Service Factor SF

Suggested service factors for electric motor, steam turbine, and gas turbine drivers are given below.

Torque Variation		Service Factor
Constant Torque	Centrifugal Pump Centrifugal Compressor Axial Compressor Centrifugal Blower	1.0*
Slight Torque Fluctuation	Screw Compressor Gear, Lobe, and Vane Pumps Forced Draft Fan Medium-Duty Mixer Lobe Blower	1.5
Substantial Torque Fluctuations	Reciprocating Pumps Heavy-Duty Mixers Induced Draft Fans	2.0

*Use a minimum service factor of 1.25 on electric motor drives through a gearbox.

The examples given are for typical machines and are empirically based guidelines. Knowledge of actual torque characteristics may indicate a different service factor. For example, variable-speed electric motors may exhibit a fluctuating torque characteristic. Consult John Crane for advice.

Available Options

- Spark-resistant couplings for hazardous zone operation.
- Special materials for low temperature applications and/or higher corrosion resistance.
- Electrical insulation.
- Torque limiting and shear pin designs.
- Torsional tuning.
- Axial adjustment shims for field correction of minor DBSE differences.

Consult John Crane for any other special requirements. Metastream couplings can be adapted to suit virtually all power transmission coupling needs.

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Coupling Alignment

Correct installation and alignment of couplings is essential for reliable machinery performance.

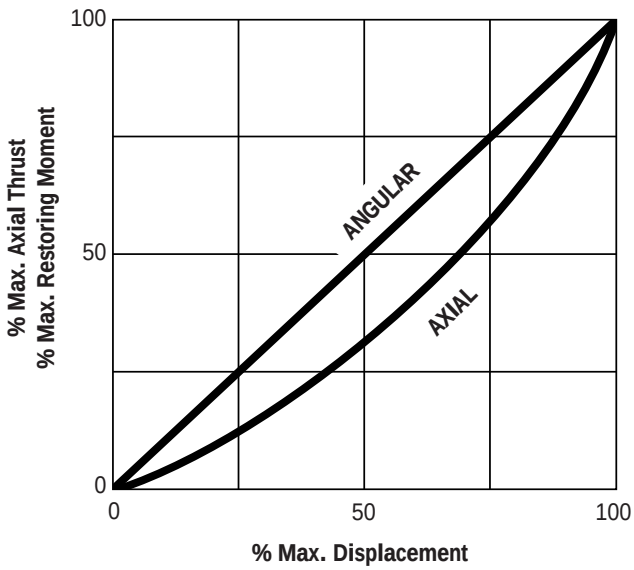
John Crane supplies a variety of shaft alignment equipment and offers alignment training courses.

TLC MISALIGNMENT				
	Max. Axial Misalignment*		Max. Parallel Misalignment**	
Coupling Size	±inch	Equivalent Thrust lb.	inch	Restoring Moment lb.-in.
0300	0.055	270	0.011	220
0500	0.066	500	0.013	360
0750	0.075	630	0.015	580
1050	0.087	900	0.016	890
1500	0.094	1130	0.018	1330
2000	0.106	1350	0.019	1950
2600	0.118	1600	0.021	2480
3350	0.126	1870	0.022	3100
4250	0.138	2140	0.023	3980
6010	0.154	2570	0.026	5670
8500	0.182	3040	0.030	7940
9013	0.218	3800	0.033	11900
9017	0.242	4390	0.036	15500
9021	0.268	5040	0.039	19500
9036	0.343	6570	0.047	34200
9049	0.391	7650	0.052	46400

NOTES: * Meets NEMA end float specification without modification.
** Values based on angular deflection of 1/3° per end and minimum DBSE.
Greater misalignment accommodation is possible by increasing dimension C.

The angular and axial restoring forces in the table above are given at maximum deflections. The graph below can be used to determine forces across the full deflection range. The nonlinear characteristics can detune a system to prevent high amplitude axial vibration.

FORCE VS. DEFLECTION



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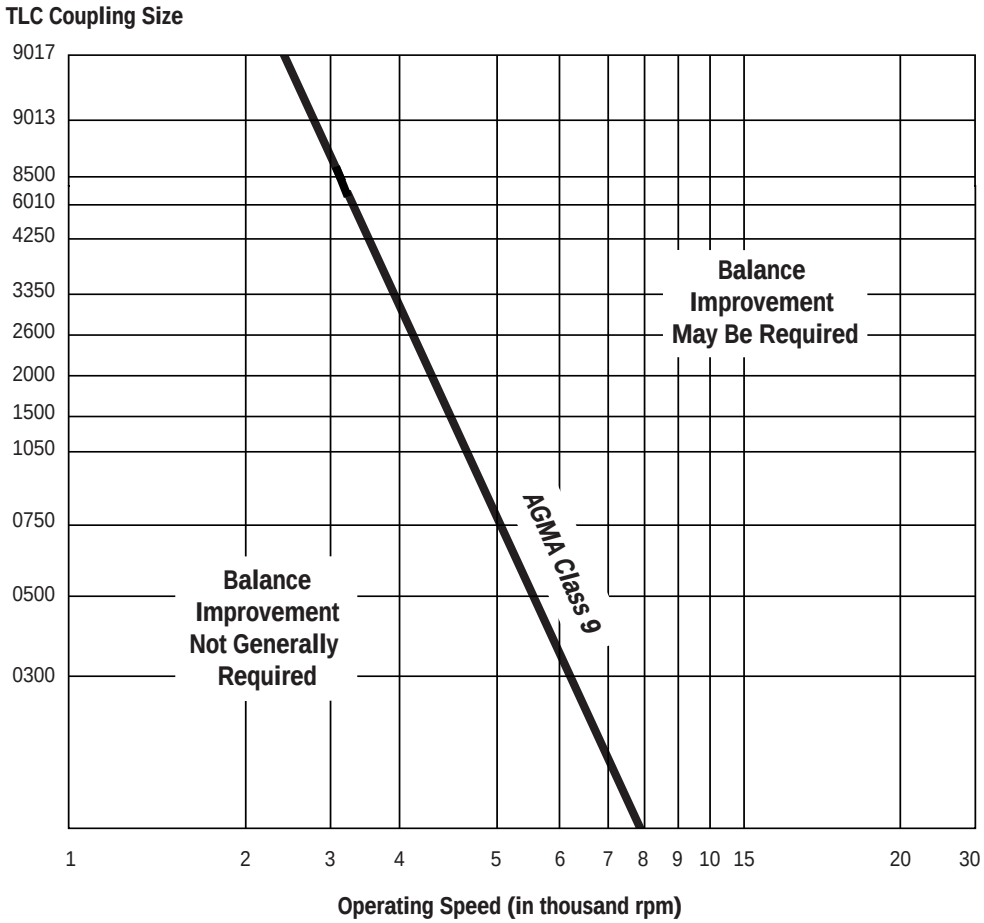
Balance Recommendations

The inherent balance of the TLC range meets AGMA standard 9000-C90 class 9. The adjacent chart relates the TLC sizes to operating speeds on the basis of this AGMA class 9 characteristic to provide a general guide to determine if dynamic balance improvement is necessary.

When balancing improvement is requested, John Crane will dynamically balance the transmission unit. Hubs may also be dynamically balanced, and this will usually be carried out after machining the bore but before cutting single keyways.



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If the products featured will be used in a potentially dangerous and/or hazardous process, your John Crane representative should be consulted prior to their selection and use.
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