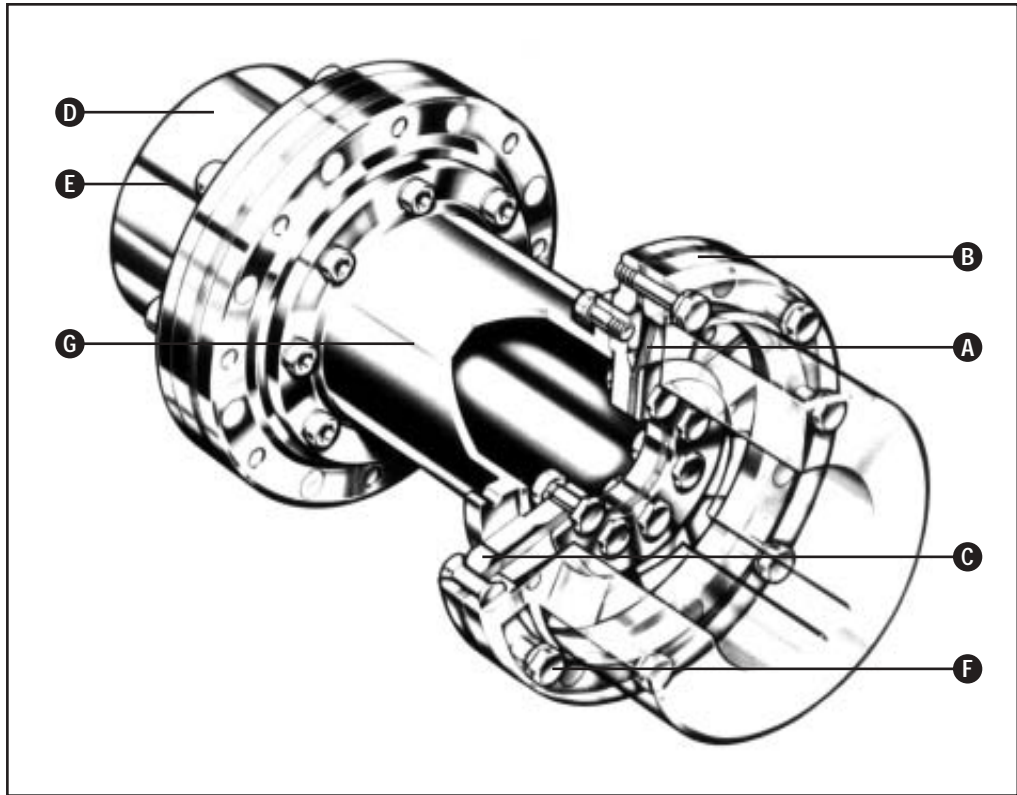


- A – Stainless Steel Flexible Membranes
- B – Cartridge Membrane Unit
- C – Anti-Fly Bearing
- D – Anti-Corrosion Treatment
- E – Hubs with Standard Puller Holes
- F – Robust Hub Bolts
- G – Removable Spacer



### Product Description

Metastream® M Series Couplings, pioneered by Flexibox®, incorporate a radial spoke, stainless steel, flexible membrane design. This design gives the most reliable and safe solution available, and has the added advantage of allowing the machines to disconnect if severe torsional overload occurs.

- Easy to fit cartridge membrane units.
- Meets API 610 8th edition. Can be supplied to meet API 671.
- Intrinsic balance meets AGMA class 9.
- 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
  - maximised bearing life.
- Stainless steel flexible membranes for maximum life.
- Cartridge membrane design reduces stock inventory. The replaceable membrane units can be fitted to any length spacer to maximise the use of inventory held.
- A bearing is fitted between the guard rings so that in the very unlikely event of membrane failure the spacer will freely rotate giving no flow indication on the pump permitting the operators to shut down the machinery safely.
- Anti-fly retention of the spacer in the unlikely event of membrane failure.
- Standard API puller holes incorporated into hubs.



# M SERIES

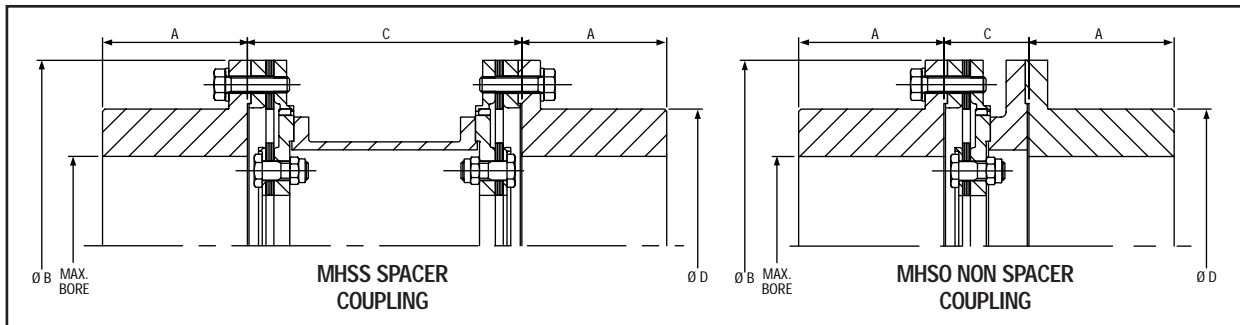
## METASTREAM™ Diaphragm Couplings

### Technical Data

Coupling Size	Weight Kg				Moment of Inertia Kgm <sup>2</sup>				Torsional Stiffness MNm/rad		
	Transmission Unit			Unbored Hub kg	Transmission Unit			Unbored Hub kg	Transmission Unit		
	Non Spacer	Spacer Min DBSE	Extra / m DBSE		Non Spacer	Spacer Min DBSE	Extra / m DBSE		Non Spacer	Spacer Min DBSE	Extra / m DBSE
0003	0.60	1.00	1.40	0.40	0.0004	0.0006	0.00018	0.0002	0.05	0.02	0.0018
0006	1.00	1.60	1.95	0.90	0.0013	0.0020	0.00048	0.0008	0.17	0.05	0.0049
0015	1.70	2.60	3.00	1.90	0.0034	0.0051	0.00190	0.0023	0.30	0.12	0.0179
0030	3.10	5.10	3.90	3.70	0.010	0.015	0.0028	0.0069	0.29	0.12	0.026
0060	4.40	7.00	5.00	6.00	0.018	0.026	0.0056	0.0145	0.64	0.26	0.054
0100	5.70	8.80	6.80	8.50	0.029	0.043	0.0105	0.0245	0.68	0.30	0.100
0200	8.60	14.0	11.3	15.5	0.060	0.092	0.029	0.062	1.40	0.63	0.280
0450	13.0	22.0	20.0	25.0	0.131	0.198	0.089	0.141	2.30	1.10	0.860
0600	16.0	26.0	25.0	28.0	0.175	0.285	0.127	0.183	3.40	1.60	1.210
0900	18.0	32.0	35.5	36.0	0.220	0.386	0.224	0.261	5.30	2.50	2.140
1200	25.0	44.0	32.5	46.0	0.360	0.597	0.218	0.387	6.40	2.90	2.090
1500	36.0	60.0	39.0	61.0	0.685	1.04	0.298	0.642	6.60	3.10	2.860
2000	55.0	84.0	48.0	75.0	1.19	1.83	0.451	0.937	11.7	5.30	4.320
3000	68.0	110	61.0	93.0	2.20	2.75	0.65	1.34	8.80	4.20	6.210
4500	105	162	81.0	155	5.56	6.77	1.49	3.61	14.3	6.80	14.27
6800	142	217	107	229	9.65	11.6	2.58	6.87	15.8	7.70	24.68
9010	200	319	131	332	16.1	20.4	3.59	11.9	23.1	11.1	34.33

For a complete coupling, weights of two hubs plus a transmission unit are required.

### Typical Arrangement



### Duty Limits and Dimensional Data

Coupling Size	Duty Limits				Dimensions													
	Rating Kw 1000rpm	Max. Continuous Torque kNm	Peak Overload Torque kNm	Max. Speed rpm	A	B	C - Distance Between Shaft Ends (DBSE)										D	Max Bore**
							MHSS	Minimum	Preferred Sizes				mm	mm				
mm	inch	mm	inch	mm	mm													
0003	3	0.03	0.08	24000	25	73	26.2	70	100	5	140	7	180	250	44	25		
0006	6	0.06	0.15	20000	32	98	26.2	75	100	5	140	7	180	250	55	38		
0015	15	0.14	0.35	16000	40	123	27.0	80	100	5	140	7	180	250	76	50		
0030	30	0.29	0.90	14000	40	148	35.7	110	-	5	140	7	180	250	105	70		
0060	60	0.57	1.70	12000	55	170	37.7	114	-	5	140	7	180	250	130	90		
0100	100	0.96	2.90	11000	65	189	38.5	121	-	5	140	7	180	250	144	100		
0200	200	1.90	5.70	10000	80	218	47.6	143	-	-	-	7	180	250	172	120		
0450	450	4.30	13.0	8800	92	262	52.4	170	-	-	-	7	180	250	200	140		
0600	600	5.70	17.0	8200	95	281	52.4	170	-	-	-	7	180	250	215	150		
0900	900	8.60	26.0	7800	105	297	54.8	175	-	-	-	7	180	250	228	160		
1200	1200	11.5	35.0	7500	115	316	62.7	203	-	-	-	-	-	250	242	170		
1500	1500	14.3	43.0	7300	125	354	76.2	229	-	-	-	-	-	250	260	180		
2000	2000	19.0	57.0	6600	130	392	92.0	242	-	-	-	-	-	250	280	195		
3000	3000	29.0	87.0	6000	145	431	96.8	280	-	-	-	-	-	-	320	215		
4500	4500	43.0	130	4900	160	532	108	292	-	-	-	-	-	-	370	250		
6800	6800	65.0	200	4300	190	608	111	323	-	-	-	-	-	-	420	280		
9010	10000	96.0	290	3900	200	659	127	363	-	-	-	-	-	-	470	300		

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

The standard parallel bore machining tolerance is grade IT7, to give a light interference on the shaft.

NOTES: \* These Distance Between Shaft Ends (DBSE) sizes are more readily available. Other lengths to suit specific shaft separations are available.

\*\* Maximum bores shown are based on standard ISO/BS rectangular keys. Keyways will be cut to DIN 6885, BS 4235 Pt 1 (metric) or BS46 Pt. 1 (inch).



# M SERIES

## METASTREAM™ Diaphragm Couplings

### Selection Procedure

1. Select appropriate service factor SF.
2. Calculate coupling rating R from  

$$R = \frac{kW \times 1000 \times SF}{N}$$
 where:  
 kW = driver rated power  
 N = speed (rpm)
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:**

600 kW electric motor to centrifugal pump at 1500 rpm

$$SF = 1.0$$

$$R = \frac{600 \times 1000 \times 1.0}{1500}$$

R = 400 kW per 1000 rpm

**Selection: MHSS - 0450**

Hub bore up to 140mm

Peak torque capability - 11 kNm

Max Speed Capability - 8,800 rpm

Additional dynamic balancing should not be required

Minimum DBSE 170mm

### 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

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.

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

### Available Options

- Spark-resistant couplings for hazardous zone operation.
- Special materials for low temperature applications and/or higher corrosion resistance.
- Overload protection.
- Limited end float and axially adjustable designs.
- Torsional tuning.
- Coupling type MODO is a short DBSE double bank membrane which accepts radial misalignment.
- Electrical insulation can be incorporated without changing the couplings characteristics.
- The ZMC coupling can be fitted with a composite spacer, which with the cartridge design membrane unit, makes it ideal for cooling tower fans, and long vertical shafts.

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



# M SERIES

## METASTREAM™ Diaphragm Couplings

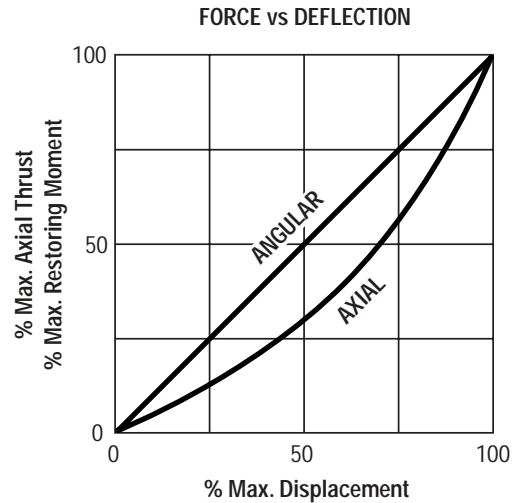
### Coupling Alignment

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.

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

MHSS MISALIGNMENT*				
Coupling Size	Max. Axial Misalignment**		Max. Parallel Misalignment***	
	± mm	Equivalent Thrust kN	mm	Restoring Moment Nm
0003	0.8	0.3	0.5	5
0006	1.2	0.5	0.5	7
0015	1.2	0.8	0.6	23
0030	2.0	0.7	0.8	16
0060	2.2	1.0	0.8	26
0100	2.2	1.3	0.9	30
0200	2.2	1.7	1.0	37
0450	2.6	2.5	1.2	86
0600	2.6	3.5	1.2	100
0900	2.6	4.7	1.2	220
1200	2.8	5.0	1.4	225
1500	3.6	6.0	1.6	240
2000	4.0	6.8	1.6	280
3000	4.8	7.5	1.9	250
4500	5.6	12.0	2.0	410
6800	6.6	12.5	2.3	580
9010	6.8	18.0	2.5	780



NOTES: \* Misalignment data provided is given for an MHSS spacer coupling. The MHSO non spacer coupling will have half the axial displacement shown, and no parallel misalignment capability.

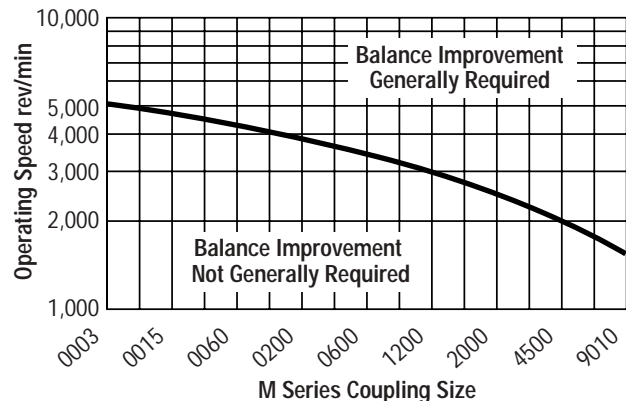
\*\* Meets NEMA end float specification without modification.

\*\*\* Values based on angular deflection of 1/2° per end and minimum DBSE. Greater misalignment accommodation is possible by increasing dimension C.

### Balance Recommendations

The inherent balance of the M Series range meets AGMA standard 9000-C90 class 9. The adjacent chart relates the M Series 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.



Europe  
Slough, UK

Tel: 44-1753-224000  
Fax: 44-1753-224224

Latin America  
São Paulo, Brazil

Tel: 55-11-3371-2500  
Fax: 55-11-3371-2599

Middle East, Africa, Asia  
Dubai, United Arab Emirates

Tel: 971-4-3438940  
Fax: 971-4-3438970

North America  
Morton Grove, Illinois USA

1-800-SEALING  
Tel: 1-847-967-2400  
Fax: 1-847-967-3915

smiths  
A part of Smiths Group plc

For your nearest John Crane facility, please contact one of the locations above.

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. In the interest of continuous development, John Crane Companies reserve the right to alter designs and specifications without prior notice. It is dangerous to smoke while handling products made from PTFE. Old and new PTFE products must not be incinerated.