PYI INC.

QUALITY MARINE
EQUIPMENT SINCE 1981

R & D MARINE

COMPLETE DRIVETRAIN SOLUTIONS

R&D MARINE
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R&D Marine was established in 1973. After several years of development work, R&D Marine started to manufacture a flexible shaft coupling suitable for marine use, which was both easy to fit and competitively priced. The company was started in a single garage moving to two garages after one year and then to its current location in 1976. Over the years, the factory has been completely rebuilt and now has 8000 square feet of modern factory space with all manufacturing being carried out on CNC machines. PYI has been the proud distributor of the R&D product line since 1998. Every year PYI has seen advancements in each of our products. Whether it is a new or established product line with PYI, be assured that you will experience unequaled product performance and customer service that you expect and deserve.

FLEXIBLE SHAFT COUPLINGS

- Fail safe design unlike any other product on the market
- Reduces engine noise and drivetrain vibration
- Saves money by reducing costly transmission repairs
- Compression loaded in both forward and reverse
- Quick and easy installation

SPLIT COUPLINGS

- Easy to remove shaft even after years of use!
- Better fit than a solid coupling
- Greater strength and reliability
- Easy to install and position

ENGINE MOUNTS

- 30 - 2,000 lbs capacity per mount
- Excellent vibration isolation
- Fail safe design
- Restriction on fore and aft movement to maintain alignment
- Slotted holes and height adjustment for easy installation
- Pre-loaded mounts
- Accepts propeller thrust to maintain better alignment

DAMPER PLATES

- Reduces gear noise
- Fail safe design
- Three types of elements suitable for every application
- Impervious to salt water, diesel and lubrication oils
- Quick and easy installation

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R&D MARINE

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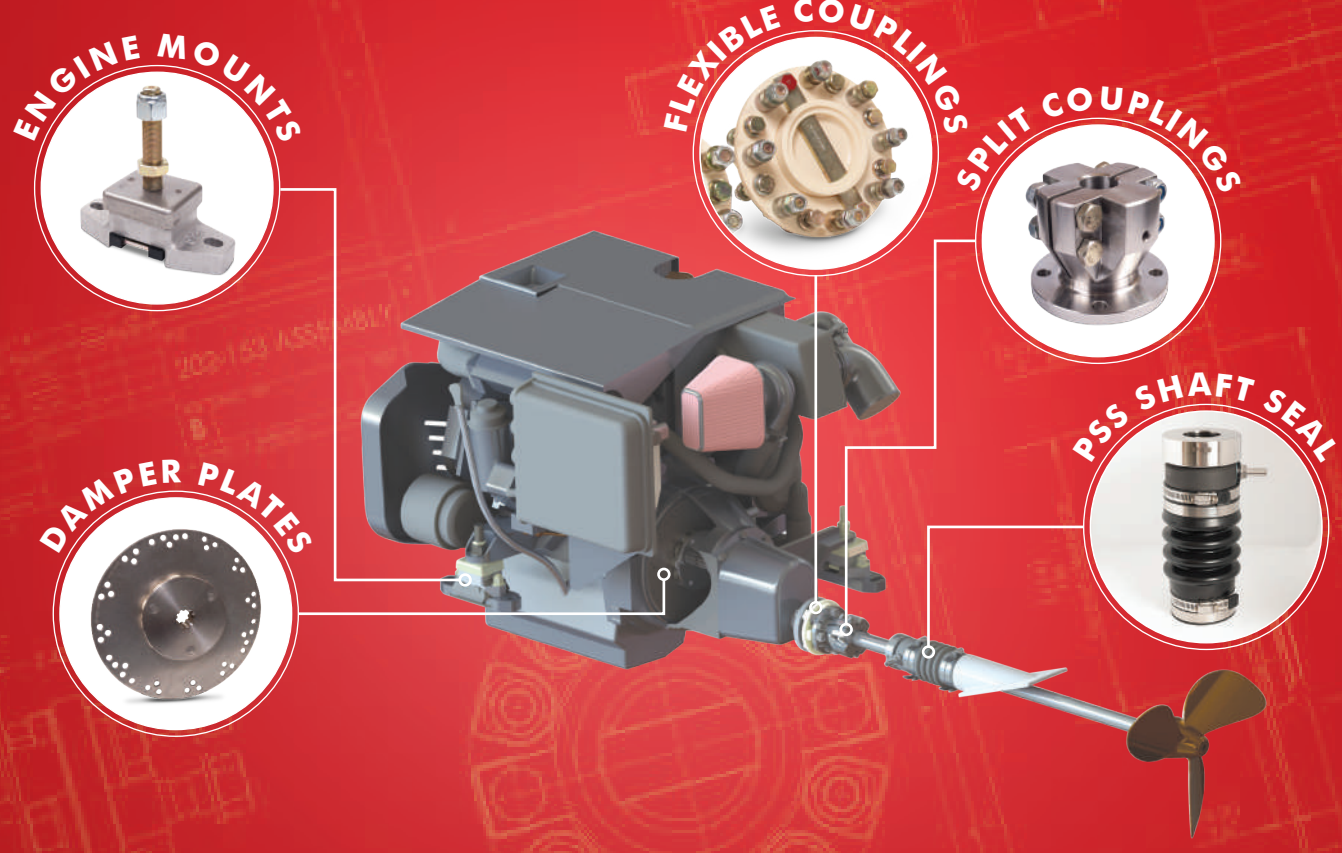
R&D MARINE HAS ALL YOUR DRIVETRAIN SOLUTIONS

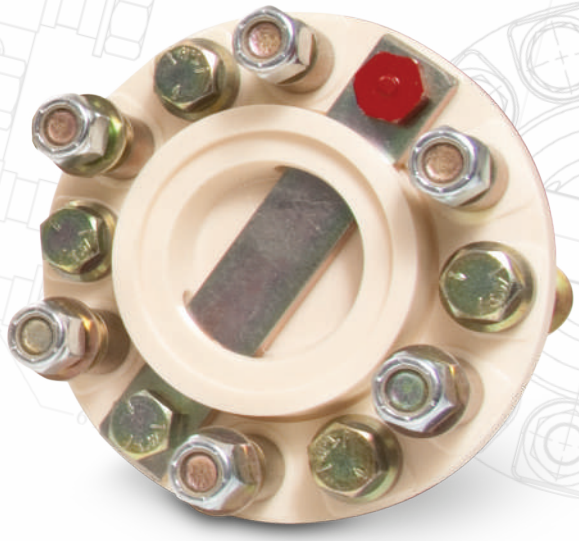


FLEXIBLE COUPLINGS
REDUCE COSTLY TRANSMISSION REPAIRS

Reduce engine noise and transmission vibration
Staggered bolts enable the polyester elastomer to isolate vibrations and compensate for some misalignment.

Reduce costly transmission repairs
Absorbs shock loads due to propeller impact or hard gear changes.

Fail safe design
Two steel straps prevent drivetrain from separating in the event of a severe impact. The aft steel strap is bolted to the transmission coupling and the forward steel strap is bolted to the shaft coupling. The aft strap will engage the forward strap and keep the drivetrain together if the elastomer is damaged.



Fits most major transmission makes & models
For engines 5 to 1,500 horsepower.

Under compression load in both forward and reverse
The aft steel strap bolted to transmission acts as a backing plate to prevent reverse thrust from pulling the element apart.

Quick & easy installation
The R&D Marine coupling requires no machining and comes supplied with bolts to connect between the two existing shaft flanges.

Periodically check alignment easily
Checking alignment on installation and during service checks is quick and easy without disassembly. Using the red bolt as a reference and checking the gap while manually rotating the shaft.

Impervious to salt water, diesel and lubrication oils
The couplings are made from a polyester elastomer which is not affected by salt water, diesel and lubrication fluids.

How To Select
1. Engine horse power and engine speed.
2. Type of gearbox and reduction ratio.
3. Gearbox flange details. Diameter of flange. Diameter of register. Pitch circle diameter of fixing holes. Size and quantity of holes. (Pitch circle diameter is the distance between the center of the hole at 12 o'clock position to the center of the hole at 6 o'clock)

Example
1. Ford 150 HP at 2,500 rpm
2. Borg Warner Velvet Drive 72C 2:1 reduction
3. 5" flange, 2,500 diameter register, 4.250 PCD, 4 off holes 0.437 diameter

To calculate power of coupling required:

$$\frac{\text{Horse Power of Engine}}{\text{Engine Speed}} \times \text{Reduction Ratio X } 100 = \text{HP/100rpm}$$

$$\frac{150}{2{,}500} \times 2 \times 100 = 12 \text{ HP/100rpm}$$

Coupling required:
910-009 Borg Warner

The R&D 910 Series couplings consist of a contoured flexible disc moulded in tough yet resilient new type of Polyester Elastomer. The contoured disc gives clearance for bolt heads, and is able to flex freely to take up any temporary misalignment of the engine and shaft, due to flexing of the boat structure or the engine moving on its rubber vibration isolation mountings. Forward thrust is taken in compression on the disc between the two half couplings and reverse thrust is taken again in compression on the disc between the two fail safe straps. In the unlikely event of a disc failure, the steel straps make the coupling fail safe and ensure drive is maintained both forward and reverse.

Couplings as standard are non-conducting but we can supply a silver impregnated rubber element to fit in the center of the coupling between the two fail safe straps to give electrical continuity if required.

Flexible Coupling	Gearbox Flange Dimensions										Flexible Coupling Details							
	Manufacturer	Diameter inches	Diameter mm	# of Bolts	Ø of holes inches	Ø of holes mm	Bolt Pitch Circle inches	Bolt Pitch Circle mm	Register inches	Register mm	Diameter inches	Diameter mm	Length inches	Length mm	Bolt Ø	Cap / 100 rpm hp	Cap / 100 rpm kW	Ref
910-001	B/W, PRM, ZF-Hurth, Technodrive	4	101.6	4	0.39	10	3.25	82.55	2.5	63.5	4.5	114.3	1.28	32.5	M10	5	3.73	
910-002	Yanmar	4	101.6	4	0.39	10	3.07	78	1.97	50	4.5	114.3	1.28	32.5	M10	3	2.24	
910-003	B/W, PRM, ZF-Hurth, Twin Disc	5.75	146	6	0.5	12.7	4.75	120.6	3	76.2	6	152.4	1.87	47.5	1/2 UNF	20	14.92	X O
910-004	B/W, PRM, ZF-Hurth	4	101.6	4	0.39	10	3.25	82.55	2.5	63.5	4.5	114.3	1.4	35.6	M10	8	5.97	
910-005	Paragon	4	101.6	4	0.38	9.7	3.25	82.55	2.63	66.7	4.5	114.3	1.35	34.5	3/8 UNF	7	5.22	
910-006	Twin Disc, ZF-Hurth	5.75	146	6	0.63	16	4.75	120.6	3	76.2	6	152.4	1.87	47.5	1/2 UNF	20	14.92	O X O
910-007	Volvo	4	101.6	4	0.39	10	3.15	80	2.36	60	4.5	114.3	1.72	43.7	M10	3	2.24	
910-009	B/W, PRM, ZF-Hurth, Volvo	5	127	4	0.44	11.2	4.25	107.9	2.5	63.5	5.63	143	1.77	45	7/16 UNF	13	9.69	X O
910-012	Yanmar	5	127	4	0.39	10	3.93	100	2.56	65	5.31	135	1.77	45	M10	10	7.46	
910-013	Bukh	3.54	90	4	0.32	8.1	2.93	74.5	1.85	47	4.5	114.3	1.28	32.5	M8	3	2.24	
910-014	B/W, PRM, ZF-Hurth, Technodrive	4	101.6	4	0.39	10	3.25	82.55	2.5	63.5	4.5	114.3	1.28	32.5	M10	3	2.24	
910-015	Self Change 350HD	8.75	222.2	6	0.44	11.2	7.5	190.5	6	152.4	8.75	222.2	1.75	44.5	7/16 UNF	43	32.1	O
910-016	Self Change 700HD	10.25	260.4	6	0.63	16	9	228.6	6	152.4	10.88	276.4	2.28	58	5/8 UNF	65	48.47	X O
910-017	Twin Disc	7.25	184.2	6	0.75	19	6	152.4	3.75	190.5	7.5	190.5	2.39	60.7	5/8 UNF	40	29.84	O X O
910-018	PRM	7.25	184.2	6	0.63	16	6	152.4	3.75	190.5	7.5	190.5	2.39	60.7	5/8 UNF	40	29.84	X O
910-019	Volvo	4	101.6	4	0.39	10	3.15	80	2.36	60	4.5	114.3	1.28	32.5	M10	3	2.24	
910-020	Volvo	4	101.6	4	0.39	10	3.15	80	2.36	60	4.5	114.3	1.28	32.5	M10	5	3.73	
910-021	Enfield, Sonic	4	101.6	2	0.44	11.2	3	76	-	-	4.25	108	1.64	41.7	7/16 UNF	2.5	1.87	
910-022	Twin Disc	9	228.6	8	0.89	22.6	7.5	190.5	6	152.4	8.75	222.2	1.75	44.5	1/2 UNF	65	48.47	O X O
910-024	Twin Disc	10.5	266.7	8	1	25.4	8.75	222.2	5	127	10.88	276.4	2.23	56.7	5/8 UNF	85	63.38	O X O
910-025	B/W, PRM, ZF-Hurth, Twin Disc	5.75	146	6	0.5	12.7	4.75	120.6	3	76.2	6	152.4	1.96	49.8	1/2 UNF	28	20.88	X O
910-026	Twin Disc	5.75	146	6	0.63	16	4.75	120.6	3	76.2	6	152.4	1.96	49.8	1/2 UNF	28	20.88	O X O
910-027	ZF W320 320A	8.86	225	8	0.67	17	7.72	196	5.51	140	9	228.6	1.75	44.5	1/2 UNF	65	48.47	O
910-028	Bukh	3.54	90	4	0.32	8.1	2.93	74.5	1.85	47	4.5	114.3	1.28	32.5	M8	5	3.73	
910-029	B/W, ZF-Hurth, Volvo	5	127	4	0.44	11.2	4.25	107.9	2.5	63.5	5.63	143	2.06	52.4	7/16 UNF	20	14.92	O
910-030		11.5	292.1	8	1	25.4	9.75	247.6	6	152.4	11.5	292.1	2.3	58.4	5/8 UNF	120	89.48	O X O
910-032	B/W, PMR, ZF-Hurth, Twin Disc	5.75	146	6	0.5	12.7	4.75	120.6	3	76.2	6	152.4	2.18	55.4	1/2 UNF	37	27.6	
910-033	Twin Disc, ZF-Hurth	5.75	146	6	0.63	16	4.75	120.6	3	76.2	6	152.4	2.18	55.4	1/2 UNF	37	27.6	O
910-034	Open Center V Drive 52mm Bore	5	127	4	0.44	11.2	4.25	107.9	2.5	63.5	6.38	162	1.77	45	7/16 UNF	12	8.95	#
910-035		13.38	340	8	1	25.4	11.63	295.3	6	152.4	13.7	348	4.25	108	5/8 UNF	160	119.3	O
910-036	Twin Disc	5	127	4	0.39	10	4.13	104.8	2.5	63.5	5.63	143	1.77	45	M10	10	7.46	
910-037	Yanmar	5.12	130	4	0.48	12.3	4.25	107.9	2.5	63.5	5.63	143	2.01	51.1	7/16 UNF	13	9.69	
910-038	Taipeoungyang TK 250	7	178	6	0.56	14.3	5.98	152	3.94	100	7.5	190.5	2.49	63.3	M14	55	41	
910-039	Twin Disc	7.25	184.2	6	0.75	19	6	152.4	3.75	190.5	7.5	190.5	2.49	63.3	5/8 UNF	55	41	O
910-040	PRM	7.25	184.2	6	0.63	16	6	152.4	3.75	190.5	7.5	190.5	2.49	63.3	5/8 UNF	55	41	
910-041		11.5	292.1	8	1	25.4	9.75	247.6	6	152.4	11.5	292.1	2.3	58.4	5/8 UNF	140	104.4	O
910-042	Dong-I DMT 170HL	11.3	287.2	6	0.98	25.1	9.45	240	6.3	160	11.5	292.1	2.3	58.4	5/8 UNF	90	67	O
910-043	Yanmar	4	101.6	4	0.39	10	3.07	78	1.97	50	4.5	114.3	1.28	32.5	M10	5	3.73	
910-044	B/W, PRM, ZF-Hurth, Volvo	5	127	4	0.44	11.2	4.25	107.9	2.5	63.5	5.6	143	1.77	45	7/16 UNF	8	5.97	
910-045		13.38	340	8	1	25.4	11.63	295.3	6	152.4	13.7	348	4.25	108	3/4 UNF	230	171.5	O
910-046	Allison M25	9	228.6	8	0.75	19	7.5	190.5	6	152.4	8.75	222.2	1.75	44.5	1/2 UNF	65	48.47	O
910-047	Dong-I DMT 260H	11.5	292.1	6	0.826	21	9.45	240	5.9	150	11.5	292.1	2.3	58.4	5/8 UNF	90	67	O
910-048	Twin Disc MG 5111 SC	9	228.6	6 (8)	0.89	22.6	7.5	190.5	6	152.4	8.75	222.2	2.47	62.7	1/2 UNF	65	48.47	O X O
910-049	ZF 325-1A Volvo Flange	8.07	205	10	0.71	18	6.69	170	5.51	140	8.78	223	4.88	124	M18	75	56	
910-050	Twin Disc 510A/5114A	9	228.6	8	0.89	22.6	7.5	190.5	6	152.4	9	228.6	4	101.6	1/2 UNF	85	63.38	O
910-051	Twin Disc MG 521	11	279.4	8	0.75	19	9.5	241.3	6	152.4	11.25	260.4	2.3	58.4	5/8 UNF	120	89.48	O
910-052	Lister	4.75	120.7	6	0.44	11.2	3.88	98.5	2.5	63.5	5.94	150.9	2.75	69.9	7/16 UNF	10	7.46	
910-053	Dong-I DMT 150H	8.58	218	6	0.79	20	7.09	180	5.51	140	8.75	222.2	1.77	45	1/2 UNF	48	35.8	O
910-054	Open Center V Drive 58mm Bore	5.75	146	6	0.5	12.7	4.75	120.6	3	76.2	6.77	172	1.87	47.5	1/2 UNF	24	17.9	
910-055	Open Center V Drive 52mm Bore	5	127	4	0.44	11.2	4.25	107.9	2.5	63.5	6.38	162	1.77	45	7/16 UNF	7	5.2	#
910-057	B/W, Hurth, Volvo	5	127	4	0.44	11.2	4.25	107.9	2.5	63.5	5.63	143	2.06	52.4	7/16 UNF	25	18.64	
910-058	Dong-I DMT 70T, 90T, 100T	7	178	6	0.63	16	5.98	152	3.94	100	7.5	190.5	2.49	63.3	5/8 UNF	55	41	
910-059	Volvo	4	101.6	4	0.39	10	3.15	80	2.36	60	4.5	114.3	1.4	35.6	M10	8	5.96	
910-060	TMP	4.44	112.8	2	0.44	11.2	3.19	81	-	-	4.44	112.8	1.5	38.1	7/16 UNF	3.25	2.42	
910-061	Open Center V Drive 52mm Bore	5	127	4	0.44	11.2	4.25	107.9	2.5	63.5	6.38	162	2.07	52.6	7/16 UNF	19	14.16	
910-062	Dong-I DMT 140H	7.8	198	6	0.63	16	6.69	170	5.12	130	8.27	210	1.9	48.2	M16	63	47	
910-063	Open Center V Drive 58mm Bore	5.75	146	6	0.5	12.7	4.75	120.6	3	76.2	6.77	172	2.185	55.5	1/2 UNF	32	23.8	
910-064	Open Center V Drive 67mm Bore	7.25	184.2	6	0.63	16	6	152.4	3.75	190.5	9.06	230	2.51	63.8	5/8 UNF	50	37.3	

O - These couplings are fitted with a shouldered bush to locate in the gearbox flange.

O - These flexible couplings have been approved by Bureau Veritas.

X - These flexible couplings have been approved by Lloyds Register of Shipping.

- For the Hurth HBW 150 V Gearbox an adaptor 202-351 is required (0.875" long).

For the IRM 220A Gearbox, we can supply adaptor plate 202-384 (2.125" long) and for the Twin Disc 502 Gearbox, adaptor plate 202-148 (2.125" long) that bolt onto flexible couplings 910-003, 910-025 or 910-032 and with half coupling 202-037 or 202-054, alternatively clamp type 202-176 or 202-178

ALLISON

M25	9" Flange	910-046

BORG WARNER

4" Flange	910-001, 910-004, 910-014
70C	
71C	
500	
1000	
1500	
5" Flange	910-009(BW), 910-029, 910-044(BW), 910-057
71C	
72C	
5000	
6" Flange	910-003, 910-025, 910-032
73C	
7000	

BUKH

4" Flange	910-013, 910-028

DONG I

DMT 70T	178mm Flange	910-058
DMT 90T		
DMT 100T		
DMT 140H	198mm Flange	910-062
DMT 150H	218mm Flange	910-053
DMT 170HL	287mm Flange	90-042
DMT 260H	292mm Flange	910-047

ENFIELD AND SONIC DRIVES

2 Bolt	910-021

LISTER

4.5" Flange	910-052

NEWAGE PRM

S=Shallow Case / D=Deep Case

4" Flange	910-001, 910-004, 910-014
Delta	
80	
120	
150	
5" Flange	910-009(PR), 910-044(PR)
101	910-029
140	
160	
260	
6" Flange	910-003, 910-025, 910-032
175	
265	
301	
302	
310	
401	
402	
500	
750	
601 3:1	
1000 3:1	
7.25" Flange	910-018, 910-040
601 4:1	
1000 4:1	
1200S	
1500S	
1750S	
10.5" Flange	910-024
1200D	
1500D	
1750D	

PARAGON

4" Flange	910-005

SELF CHANGE GEARS

8.75" Flange	910-015
350HD	
10.75" Flange	910-016
700	

TAIPEOUNGYANG

178mm Flange	910-038
TK250	

TECHNODRIVE

4" Flange	910-001, 910-004, 910-014
TMC30	
TMC40	
TMC50	
TMC60	
TM260	
5" Flange	910-009(PR), 910-029
TM93	910-044(PR)
TM93A	
TM170	
TM170A	
TM345	
TM345A	
TM485A	
TM545A	
TM880A	
6" Flange	910-006, 910-026, 910-033
TM130B	
TM200B up to 1.28:1	
TM265	
TM265A	
7.25" Flange	910-018
TMC200B up to 4.48:1	
TM1200A	

TMP

2 Bolt	910-060
5" Flange	910-009(PR), 910-044(PR)
1200	

TWIN DISC

SC=Shallow Case / DC=Deep Case

4" Flange	910-001, 910-004, 910-014
MG 340	
MG 360	
MG5010SC	
MG5011SC	
MG5010V	
4.75" Flange	Adaptor 202-148 with
MG502-I	910-003, 910-025, 910-032
MG502-V	
5" Flange 4.125" PCD	910-036
MG5010A	
MG5011A	
5" Flange 4.25" PCD	910-009(PR), 910-044(PR)
MG5005A	910-029, 910-057
MG5012SC	
MG5015A	
MG5020SC	
MG5055A	
6" Flange	910-006, 910-026, 910-033
MG5010DC	
MG5050	
MG5050-V	
MG5050-A	
MG5061SC	
MG5061-A	
MG5061V	
MG5062V	

TWIN DISC CONTINUED

MG506-1	
MG506A-1	
MG507-1	
MG507A-1	
MG5075IV	
MG5075-A	
MG5075SC	
7.25" Flange	910-017, 910-039
MG506DC	
MG5065A	
MG507-1	
MG507-1SC	
MG507-2SC	
MG507A-2	
MG5075A needs adaptor 202-356	
MG5075SC	
MG5075IV	
MG5081SC	
MG5081A needs adaptor 202-356	
MG5082A	
MG5082SC	
MG5085SC needs adaptor 202-356	
MG5085A needs adaptor 202-356	
MG5090A	
MG509SC	
MG509U	
MG5091SC	
MG5095A	
MGX5095A	
9" Scalloped Flange	910-048
MG5111SC	
MG5114SC	
9" Flange	910-022, 910-050
MG510SC	
MG510A	
MG5111A	
MG5114A	
MG5111V	
MG5114V	
MG514CU	
MG514U	
MG5135A	
10.5 Flange	910-024
MG5091DC	
MG509DC	
MG510DC	
MG5111DC	
MG5114DC	
MG5113	
MG514	

VOLVO

4" Flange	910-007
MS	
RB	
4" Flange	910-019, 910-020, 910-059
MS 2	
MS 10	
MS 15	
MS 25	
5" Flange	910-009(VO), 910-029
MS 3	910-044(VO), 910-057
MS 4	
MS 5	
HS25A	
HS45A	
HS63A	

YANMAR (KANZAKI)

4" Flange 78mm PCD	910-002
KBW10	910-043
KM2	
KM3	
KM35	
5" Flange 100mm PCD	910-012
KBW10	
KBW21	
KM4	
KM4A	
KMH4A	
5.5" Flange 4.25 PCD	910-009, 910-029, 910-037
KM40	910-057
KM5	
6" Flange	910-006, 910-026, 910-033
KMH6	
KMH60	

ZF-HURTH

4" Flange	910-001, 910-004, 910-014
ZF	
35	35 HBW
4M	40HBW
5M	50HBW
10M	100 HBW
12	125H HSW
M12M	125HBW
15M	150HBW
15MA	150A HBW
25M	250 HBW
25	250H HSW
25A	250A HSW
25MA	
30M	
45A 1.25:1	
45C	450D HSW
4.75" Flange adaptor 202-384 with 910-003, 910-025, 910-032	
ZF	
220A	220A-1 IRM
225A	
5" Flange	910-009(PR), 910-029
	910-044(PR), 910-057
ZF	
	360 HBW
	450H2 HSW
45A	450AW HSW
45C	450D HSW
63	630H1 HSW
63A	630A1 HSW
63C	630D HSW
88C	
90TS	
90ATS	
110TS	
6" Flange 13.2mm bolt holes	910-003
	910-025, 910-032
ZF	
45	
6" Flange 13.2mm bolt holes	910-006
	910-026, 910-033
ZF	
45-1	
80A	800A2 HSW
80-1A	800A3 HSW
85A	

ZF-HURTH CONTINUED		
220	needs adaptor 202-329	
280A		
280A		
280-1A	280V-LD IRM	
280IV	280PL IRM	
285A		
285IV		
286		
286A		
286IV		
300TS		
300-1TS		
300ATS		
300-1ATS		
301C	301PL-2IRM	
301A	301A-2 IRM	
300IVTS	300VTS IRM	
110ATS		
110IVTS		
7.25" Flange		910-017
	311 IRM	
8" Flange		910-049
ZF		
311	311PL IRM	
325-1A Volvo		
350	350PL-2 IRM	
350A	350A-2 IRM	
	350PL-1 IRM	
	350A-1 IRM	
350TS		
350ATS		
350V	350 IRM	
350IV	350V-LD IRM	
8.75" Flange		910-049
ZF		
W320	320-2 IRM	
320A		
ZF-HURTH V DRIVE		
4" Flange	adapter 202-351 with 910-034, 910-055, 910-061	
ZF		
15MIV	150V HSW	
5" Flange		910-034, 910-055, 910-061
ZF		
90IVTS		
63IV		
6" Flange		910-054, 910-063
ZF		
110IVTS		
220IV	220V-2 HSW	
80IV	800V HSW	
80-1IV	800V2 HSW	
7.25" Flange	adapter 202-552 with 910-064	
ZF		
302IV		
8" Flange		910-049
ZF		
325IV		

Installation Procedure for R&D Marine Couplings

1. Roughly align engine and stern gear without flexible coupling ie. only two rigid half couplings pushed together.
2. Bolt "R&D Marine" coupling between the two rigid couplings. Tightening details as below.
3. Check alignment of engine by placing feeler gauges between RED CONE HEADED BOLT and the rigid half coupling. Repeat for the **SAME** bolt at 90° intervals by rotating the shaft.
4. If the gap is the same in all four positions, engine is accurately aligned. Recommended minimum to maximum gap difference: 0.010 inch.
5. Run installation to bring engine compartment to working temperature.
6. Re-check torque settings.

Recommended tightening torque:

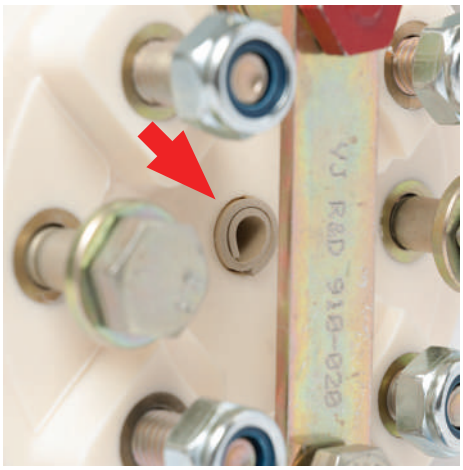
- M8 = 20 ft. lbs.
- 3/8 UNF = 30 ft. lbs.
- M10 = 45 ft. lbs
- 7/16 UNF = 60 ft. lbs.
- M12 = 80ft. lbs.
- 1/2 UNF = 75 ft. lbs.
- 5/8 UNF = 155 ft. lbs.
- M18 = 250 ft. lbs.
- 3/4 UNF = 270 ft. lbs.

EARTHING CONNECTORS

R&D Marine Earthing Connector consists of a silver impregnated rubber strip, which when fitted through the axis of the coupling between the two fail safe straps gives electrical continuity, R&D Marine have sizes to fit most 910 series couplings.

Installation Procedure for Earthing Connectors

1. While carrying out the following procedure, ensure that the connector is not contaminated by grease or dirt.
2. Before fitting the coupling into the drivetrain, remove 2 off bolts holding one of the fail safe straps.
3. Remove the fail safe strap to uncover the hole in the center of the coupling.
4. Roll up the earthing connector (lengthways) as tight as possible.
5. Push into the hole previously uncovered by removing the strap as far as possible.
6. Replace the fail safe strap ensuring that the connector is not damaged, replace 2 off bolts.
7. Check electrical continuity on installation and thereafter at three to six month intervals.



	Earthing Connector Application Guide	
Part #	**Size (mm)**	**To Suit Coupling**
103-036	9 x 57	910-021
103-037	11 x 57	910-001, 910-002, 910-007, 910-013, 910-014, 910-019, 910-020, 910-028, 910-043
103-038	15 x 57	910-004, 910-005
103-039	17 x 57	910-003, 910-006, 910-009, 910-012, 910-036, 910-037, 910-044, 910-052
103-040	19 x 57	910-017, 910-018, 910-025, 910-026
103-041	23 x 57	910-029, 910-038, 910-039, 910-040
103-042	25 x 57	910-032, 910-033
103-043	15 x 75	910-015, 910-016, 910-022, 910-024, 910-046, 910-048, 910-053
103-044	17 x 75	910-030, 910-041, 910-042, 910-047, 910-051
103-047	9 x 30	910-035, 910-045, 910-049, 910-050
103-053	19 x 75	910-062

SPLIT COUPLINGS
GREATER STRENGTH & RELIABILITY

R & D MARINE

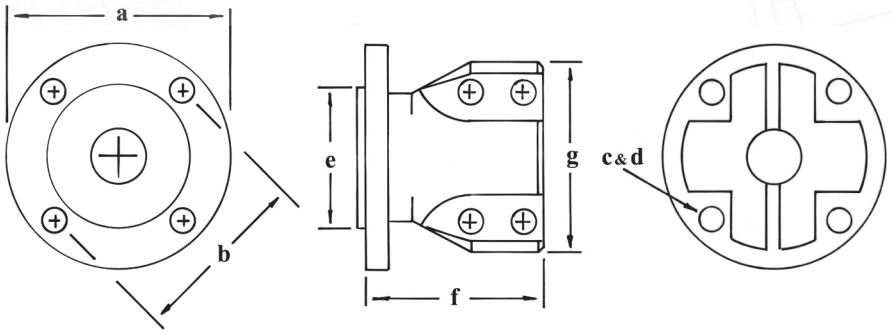
Provides a better fit than a solid coupling
Can accommodate the variations that occur with normal shaft tolerances by clamping onto shaft.

Greater strength and reliability
Machined from solid steel.

Easy to install and position
Split couplings are much easier to remove than solid couplings. Save time and money!

Adapters
Adapters are available for most gearboxes to allow the fitting of a flexible coupling.

Bobbins
Bobbins extend the shaft when necessary.



Supplied with clamp bolts and nuts:
Imperial Sizes: Keyways to BS46: Part 1 Square
Metric Sizes: Keyways to BS4235: Part 1 Rectangular

Recommended torque specs:
M10 - 45ft. lbs.
7/16 UNF - 60 ft. lbs.
1/2" UNF - 75 ft. lbs.
5/8 UNF - 155 ft. lbs.

Part #	Coupling Dimensions													
	Flange Ø (a) inches / mm		Hole Pitch Circle (b) inches / mm		# of Holes (c)	Hole Size (d) inches / mm		Register Ø (e) M = Male F = Female inches / mm			Length (f) inches / mm		Boss Ø (g) inches / mm	
202-153	4	102	3.25	82.55	4	0.394	10	2.5	63.5	M	3.19	81	3.38	85.9
202-254	4	102	3.07	78	4	0.394	10	1.97	50	M	3.19	81	3.38	85.9
202-255	4	102	3.15	80	4	0.394	10	2.36	60	F	3.28	85.8	3.38	85.9
202-489	3.54	90	2.93	74.5	4	0.32	8.1	1.85	47	F	3.28	85.8	3.38	85.9
202-168	5	127	4.25	107.94	4	0.44	11.2	2.5	63.5	M	3.75	95.3	4.06	103.2
202-316	4.72	119.9	3.94	100	4	0.394	10	2.56	65	M	3.75	95.3	4.06	103.2
202-176	5.75	146	4.75	120.6	6	0.5	12.7	3	76.2	M	5.5	139.7	5.38	136.7
202-188	5.75	146	4.75	120.6	6	0.63	16	3	76.2	F	5.5	139.7	5.38	136.7
202-313	5	127	3.88	98.6	6	0.47	12	2.5	63.5	F	5.63	143	4.06	103.2
202-381	7.45	189.2	6	152.4	6	0.63	16	3.75	95.25	M	7.5	190.5	6.63	168.4
202-468	7.45	189.2	6	152.4	6	0.63	16	3.75	95.25	F	7.5	190.5	6.63	168.4
202-469	7.45	189.2	6	152.4	6	0.75	19	3.75	95.25	F	7.5	190.5	6.63	168.4
202-470	7.45	189.2	6	152.4	8	0.63	16	3.75	95.25	F	7.5	190.5	6.63	168.4

Part #	Type of Gearbox	Bore Diameters (Inches) 0.75"	21mm	1"	1.25"	1.5"	1.75"	2"	2.25"	2.5"	2.75"
202-153	4" BW, PRM, Hurth Max Bore: 1.5"	B		B	B	B					
202-254	4" Yanmar Max Bore" 1.5"	B		B	B						
202-255	4" Volvo Max Bore: 1.5"	B									
202-489	4" Bukh Max Bore: 1.5"	B									
202-168	5" BW, PRM, Hurth, Volvo Max Bore: 2"		P	B	BK	BK	BK	BK			
202-316	5" Yanmar Max Bore: 2"		P		BK						
202-176	6" PRM Max Bore: 2.5"		P		BK	BK	BK	BK	BK	BK	
202-188	6" Twin Disc Max Bore: 2.5"		P								
202-313	5" IRM 220, MG 502, Lister Max Bore 2"		P								
202-381	7.25" PRM 601, 1000 4:1 Max Bore: 2.75"					P					
202-468	7.25" PRM 1500 Max Bore: 2.75"					P					
202-469	7.25" Twin Disc Max Bore: 2.75"					P					
202-470	7.25" ZF 311A Max Bore: 2.75"					P					

Part #	Type of Gearbox	Bore Diameters (mm) 22mm	25mm	30mm	35mm	40mm	45mm	50mm	55mm	60mm	70mm
202-153	4" BW, PRM, Hurth Max Bore: 1.5"	B	B	B	B						
202-254	4" Yanmar Max Bore" 1.5"	B	B	B							
202-255	4" Volvo Max Bore: 1.5"	B	B	B							
202-489	4" Bukh Max Bore: 1.5"										
202-168	5" BW, PRM, Hurth, Volvo Max Bore: 2"			BK	BK	BK	BK	BK			
202-316	5" Yanmar Max Bore: 2"			BK	BK						
202-176	6" PRM Max Bore: 2.5"					BK	BK	BK	BK	BK	
202-188	6" Twin Disc Max Bore: 2.5"							BK		BK	
202-313	5" IRM 220, MG 502, Lister Max Bore 2"										
202-381	7.25" PRM 601, 1000 4:1 Max Bore: 2.75"										
202-468	7.25" PRM 1500 Max Bore: 2.75"										
202-469	7.25" Twin Disc Max Bore: 2.75"										
202-470	7.25" ZF 311A Max Bore: 2.75"										

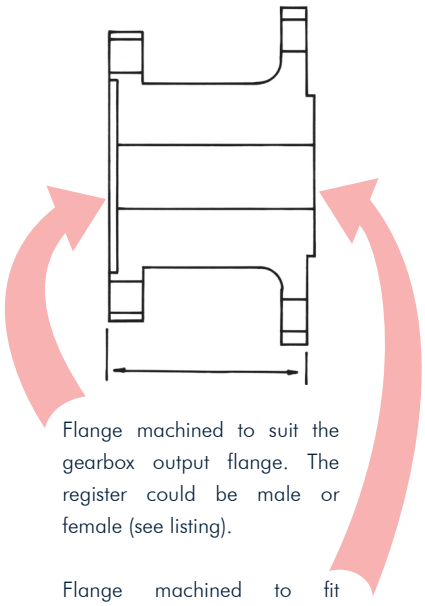
Shaded area designates range of bores covered.

P - Pilot drilled open tolerance
B - Bored Only
BK - Bored and keyed

FLANGE ADAPTORS
INCREASE TRANSMISSION FLANGE DIAMETER

R&D MARINE

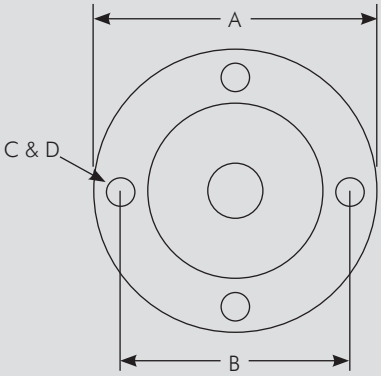
R&D Marine can provide an adaptor for most gearboxes to allow the fitting of a flexible coupling from their extensive range. If the gearbox fitting require is not listed please contact PYI Inc.

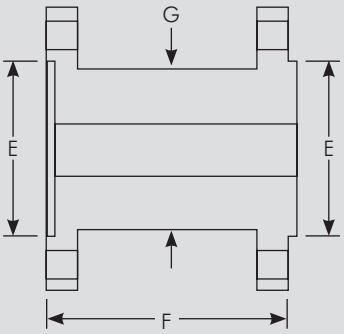


Flange machined to suit the gearbox output flange. The register could be male or female (see listing).

Flange machined to fit the selected R&D Flexible Coupling. The register could be male or female.

BOBBINS
TO EXTEND THE SHAFT





R&D Marine can provide a Bobbin to extend the shaft. If the gearbox fitting you require is not listed please contact PYI Inc.

	Bobbin Dimensions														
Part #	**Type of Gearbox**	**Flange Ø (a)** inches	mm	**Hole Pitch Circle (b)** inches	mm	**# of Holes (c)**	**Hole Size (d)** inches	mm	**Register Ø** M = Male F = Female **(e)** inches	mm		**Length (f)** inches	mm	**Neck Ø (g)** inches	mm
202-169	4" BW, PRM, Hurth	4	102	3.25	82.55	4	0.394	10	2.5	63.5	M/F	3.44	87.4	2.25	57.2
202-251	5" BW, PRM, Hurth, Volvo	5	127	4.25	109.95	4	0.44	11.2	2.5	63.5	M/F	4.9	124.5	3.38	85.9
202-250	6" PRM	5.75	146	4.75	120.6	6	0.5	12.7	3	76.2	M/F	5.86	148.9	3.65	92.7
EXP 225	7¼" Twin Disc	7.25	184.2	6	152.4	6	0.75	19	3.75	95.25	M/F	6	152.4	4.25	108

R&D MARINE FLANGE ADAPTOR FITTING GUIDE:

Gearbox	Gearbox Register	Coupling	Maximum HP of Coupling		Effective Length of Coupling		R&D Marine Reference	Effective Length of Adaptor	
			kW	HP	mm	Inch		mm	inch
BW, PRM, ZF-Hurth, Twin Disc, Volvo									
4" - 5"	Female	910-029	14.92	20	52.4	2.06	202-351	22.3	0.88
5" - 6"	Female	910-032	27.6	37	55.4	2.18	202-411	74.7	2.94
Twin Disc									
MG 502	Male	910-032	27.6	37	55.4	2.18	202-148	54	2.13
MG 5075A	Male	910-039	41	55	63.3	2.49	EXP 249	69.9	2.75
MG 5090A	Male	910-024	63.1	85	56.7	2.23	EXP 244	193.7	7.63
MG 5111 SC	Male	910-022	44	65	44.5	1.75	EXP 147	17.8	0.70
MG 5111	Male	910-022	44	65	44.5	1.75	EXP 193	115.9	4.56
MG 5114	Male	910-025	20.9	28	49.8	1.96	EXP 184-2	45	1.75
MG 5114A	Male	910-024	63.1	85	56.7	2.23	EXP 205	155.7	6.13
MG 5114A	Male	910-030	89.52	120	58.4	2.30	EXP 238	155.7	6.13
MG 5135A	Male	910-024	67.5	85	56.7	2.23	202-477	62.5	2.5
MGX 5145 SC	Male	910-025	20.9	28	49.8	1.96	EXP 251	45	1.75
MGX 5145 SC	Male	910-030	89.4	120	58.5	2.30	EXP 253	135	5.32
MGX 5145 SC	Male	910-030	89.4	120	58.5	2.30	EXP 260	159	6.25
MG 6449	Male	910-030	89.4	120	58.5	2.30	EXP 208	46	1.81
ZF-HURTH									
BW 61	Male	910-018	29.84	40	60.7	2.39	EXP 221	122.0	4.81
BW 120	Male	910-025	20.9	28	49.8	1.96	EXP 182	76	3.00
BW 195VP, 1950A, 2000, 2050, 2050A	Male	910-035	215	160	108.0	4.25	EXP 242	241.3	9.50
BW 250A, 255A, 255AP	Male	910-030	89.52	120	58.4	2.30	EXP 239	155.8	6.13
BW 255 VP	Male	910-045	171.4	230	108.0	4.25	EXP 246	181	7.13
HSW 630 A1	Female	910-025	20.9	28	49.8	1.96	EXP 240	75	2.96
ZF 2000	Male	910-030	89.52	120	58.4	2.30	EXP 247	241	9.50
ZF 2500A	Male	910-030	89.52	120	58.4	2.30	202-412	156	6.13
ZF 2500A	Male	910-035	215	160	108.0	4.25	EXP 266	150	4.25
ZF 550A	Male	910-030	89.52	120	58.4	2.30	EXP 245	124	4.88
IRM 220A	Male	910-032	27.6	37	55.4	2.18	202-384	54	2.13
IRM 280A	Male	910-039	41	55	63.5	2.49	202-382	97	3.82
IRM 280A	Male	910-039	41	55	63.5	2.49	EXP 224 R1	25.4	1.00
IRM 280A	Male	910-039	41	55	63.5	2.49	202-387	50.8	2.00
IRM 305A	Male	910-033	27.6	37	55.4	2.18	EXP 234	115	4.53
IRM 311A	Male	910-039	41	55	63.5	2.49	EXP 230	108	4.25
IRM 311A	Male	910-024	63.1	85	56.7	2.23	EXP 259	266.7	10.50
IRM 311A	Male	910-040	41	55	63.5	2.49	EXP 243	117.6	4.65
IRM 305A	Male	910-040	41	55	63.5	2.49	EXP 261	130.0	5.12
IRM 311-PL	Male	910-024	63.1	85	56.7	2.23	EXP 227	135	5.32
IRM 320A	Male	910-018	29.84	40	60.7	2.39	EXP 130	165.1	6.50
IRM 320AL	Male	910-022	44	65	44.5	1.75	EXP 170	106	4.18
IRM 320A-1	Male	910-024	63.1	85	56.7	2.23	EXP 200	106	4.18
IRM 325A ZF 12 Bolt	Male	910-024	63.1	85	56.7	2.23	202-392	178	7.00
IRM 325 IV	Male	910-039	41	55	63.5	2.49	202-467	111	4.38
IRM 325 IV	Male	910-040	41	55	63.5	2.49	202-474	50.8	2.00
IRM 325A Volvo 10 Bolt	Male	910-024	63.1	85	56.7	2.23	EXP 232	178	7.00
IRM 350A	Male	910-024	63.1	85	56.7	2.23	EXP 177	152.4	6.00
IRM 350A	Male	910-018	63.1	40	60.7	2.39	EXP 207	125	4.92
W350A	Male	910-024	63.1	85	56.7	2.23	202-443	130	5.13

ENGINE MOUNTS
FLEXIBLE ENGINE MOUNTINGS

R&D MARINE

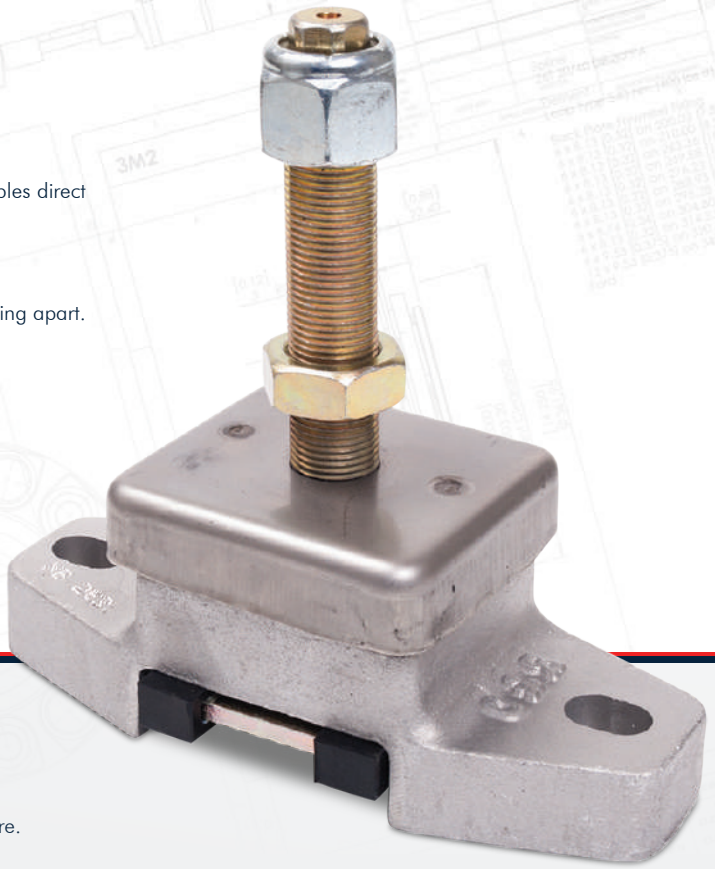
Designed for any type of engine
- 2 & 3 cylinder long stroke
- 1, 2 & 3 cylinder short stroke
- High speed 4 cylinder, 6 cylinder and more

Wide range in stock
Standard sizes offer different weight capacity, footprint, stud size and height. This enables direct plug-in replacement for most installations. Capacity from 30 - 2,000 lbs per mount.

Fail safe design
The vertical stud is secured to a horizontal metal plate, to prevent the mount from pulling apart. R&D Marine engine mounts will withstand a roll over test.

Fast installation time
Slotted holes and height adjustment to simplify alignment.

Good vibration isolation
Shear loaded mounts provide superior isolation and restrict fore and aft movement to maintain alignment. Compression mounts are available where there is a restriction on the available space.

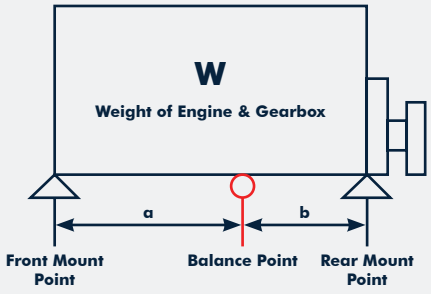


How To Select The Right Engine Mount

1. Engine type and number of cylinders.
2. Type of gearbox and reduction ratio.
3. Weight of engine and gearbox combined by weighing or manufacturers literature.
4. Is the flywheel in conventional place between the engine and gearbox.
5. Position of the engine mounting points.
6. Find the center of gravity by balancing on a roller. *(if possible)*

Weight on each front mount = $\dfrac{W \times b}{2 \times (a + b)}$

Weight on each rear mount = $\dfrac{W \times a}{2 \times (a + b)}$



Example:

Total weight of engine and gearbox = 1,200 lbs

Distance **a** (balance point to front mount) = 17"

Distance **b** (balance point to rear mount) 14"

Front Mount

$\dfrac{1{,}200 \times 14}{2 \times (17 + 14)}$ = 270 lbs per front mount

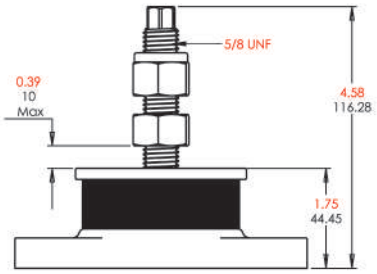
Rear Mount

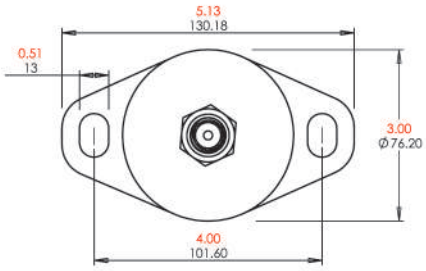
$\dfrac{1{,}200 \times 17}{2 \times (17 + 14)}$ = 329 lbs per rear mount

7. If the center of gravity cannot be found, assume weight distribution of 60% on rear mounts, with 40% on front mounts (if rear mount is in line with flywheel).

Recommended Mounting Type					
Type of Engine	**Double Act**	**Small Compression**	**Compression**	**Small Shear**	**Medium & Large Shear**
2 & 3 Cylinder Long Stroke	800-032 800-034 800-042	800-036	800-003 800-004 800-005		
1, 2 & 3 Cylinder Short Stroke High Speed		800-033 800-036		800-038 800-039 800-040 800-041	800-010 800-011
4 Cylinder		800-033 800-036	800-003 800-004 800-005		Super Mounts Page 11-13
6 Cylinder & more			800-003 800-004 800-005		Super Mounts Page 11-13 800-015 800-016 800-017

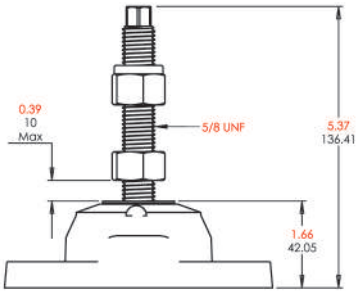
COMPRESSION MOUNTS

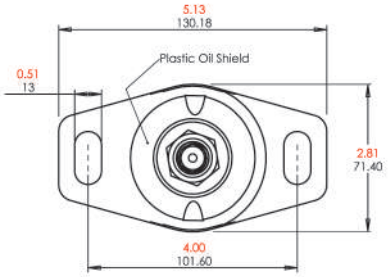




	5/8" Stud			
	Capacity per mount	Mount Pre-Loaded	Deflection	Height adjusting nut thickness
800-003	100 - 180 lbs	0.06"	0.09"	0.55"
800-004	160 - 370 lbs	0.06"	0.09"	0.55"
800-005	320 - 500 lbs	0.06"	0.09"	0.55"

This is a low height mount with minimum deflection.





	5/8" Stud		
	Capacity per mount	Deflection	Height adjusting nut thickness
800-033	190 lbs	0.065"	0.55"
800-036	300 lbs	0.065"	0.55"

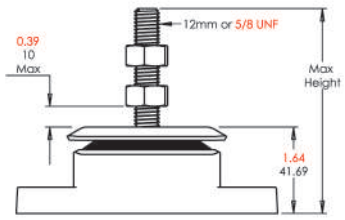
This mounting is a competitive, low height medium capacity mount giving good engine control.

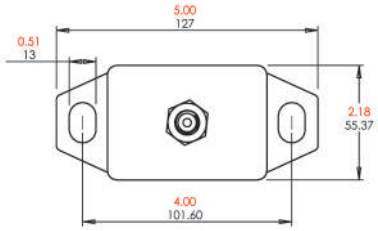
RECTANGULAR SHEAR MOUNTS

The R&D Marine Rectangular Shear Mountings offer low height with the best combination of stiffness. Soft vertically and at aright angles to the crankshaft to isolate vibration, stiff fore and aft to take the propeller thrust.

Small Shear Loaded Mount

This mounting has a low height giving good vibration isolation.

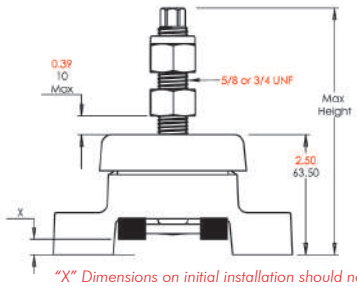


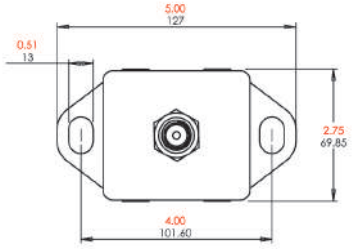


	12mm Stud				
	Capacity per mount	Mount Pre-Loaded	Deflection	Height adjusting nut thickness	Max height
800-038	30 - 90 lbs	0.07"	0.07" - 0.14"	0.39"	3.9"
800-039	70 - 170 lbs	0.07"	0.07" - 0.14"	0.39"	3.9"
	5/8" Stud				
800-040	30 - 91 lbs	0.07"	0.07" - 0.14"	0.55"	3.9"
800-041	70 - 171 lbs	0.07"	0.07" - 0.14"	0.55"	3.9"

Shear Loaded "Super Mounts"

Fitted with an oil shield to protect the rubber





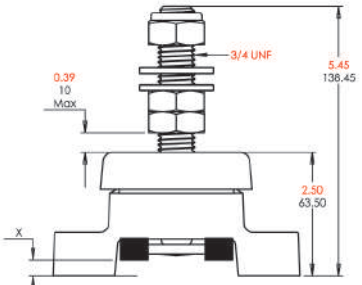
"X" Dimensions on initial installation should not be less than 3.8mm (0.15").

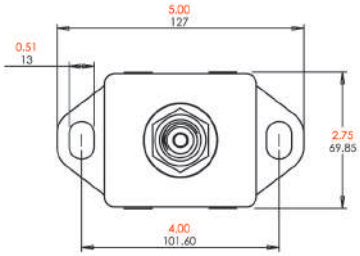
	5/8" Stud				
	Capacity per mount	Mount Pre-Loaded	Deflection	Height adjusting nut thickness	Max height
800-037	50 - 175 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
800-010	80 - 230 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
800-011	120 - 410 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
800-012	250 - 560 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
800-014	300 - 680 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
	3/4" Stud				
800-020	80 - 231 lbs	0.09"	0.09" - 0.21"	0.43"	6.5"
800-021	120 - 411 lbs	0.09"	0.09" - 0.21"	0.43"	6.5"
800-022	250 - 561 lbs	0.09"	0.09" - 0.21"	0.43"	6.5"
800-023	300 - 681 lbs	0.09"	0.09" - 0.21"	0.43"	6.5"

RECTANGULAR SHEAR MOUNTS CONT...

Shear Loaded "Super Mounts"

Fitted with an oil shield to protect the rubber



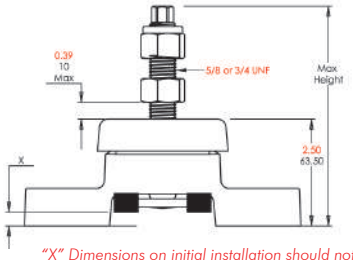


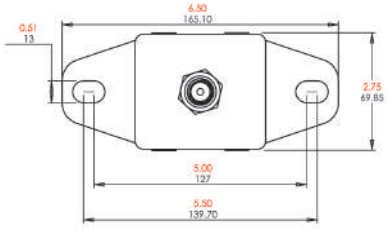
"X" Dimensions on initial installation should not be less than 3.8mm (0.15").

	3/4" Stud			
	Capacity per mount	**Mount Pre-Loaded**	**Deflection**	**Height adjusting nut thickness**
800-051	80 - 235 lbs	0.09"	0.09" - 0.21"	0.97"
800-052	120 - 415 lbs	0.09"	0.09" - 0.21"	0.97"
800-053	250 - 565 lbs	0.09"	0.09" - 0.21"	0.97"
800-054	300 - 685 lbs	0.09"	0.09" - 0.21"	0.97"

Shear Loaded "Super Mounts"

Fitted with an oil shield to protect the rubber



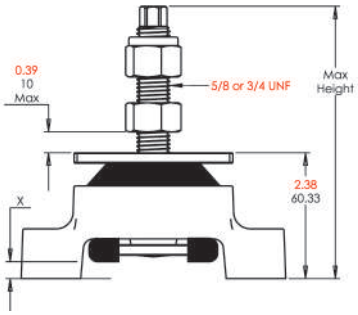


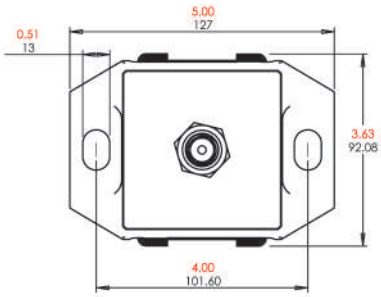
"X" Dimensions on initial installation should not be less than 3.8mm (0.15").

	5/8" Stud				
	Capacity per mount	**Mount Pre-Loaded**	**Deflection**	**Height adjusting nut thickness**	**Max height**
800-062	50 - 176 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
800-024	80 - 232 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
800-025	120 - 412 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
800-026	250 - 562 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
800-027	300 - 682 lbs	0.09"	0.09" - 0.21"	0.55"	5.38"
	3/4" Stud				
800-028	80 - 233 lbs	0.09"	0.09" - 0.21"	0.43"	6.5"
800-029	120 - 413 lbs	0.09"	0.09" - 0.21"	0.43"	6.5"
800-030	250 - 563 lbs	0.09"	0.09" - 0.21"	0.43"	6.5"
800-031	300 - 683 lbs	0.09"	0.09" - 0.21"	0.43"	6.5"

Shear Loaded "Super Mounts"

Fitted with an oil shield to protect the rubber





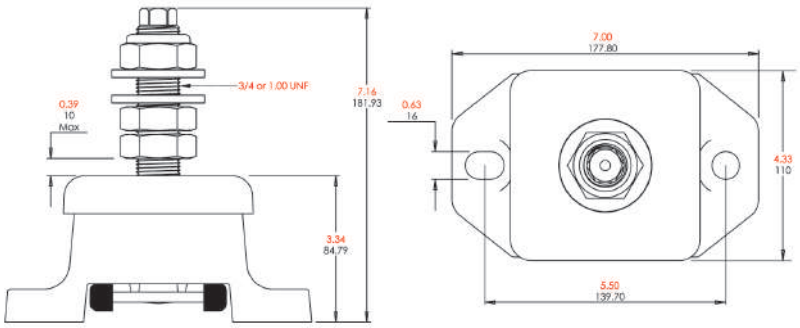
"X" Dimensions on initial installation should not be less than 3.8mm (0.15").

	5/8" Stud				
	Capacity per mount	**Mount Pre-Loaded**	**Deflection**	**Height adjusting nut thickness**	**Max height**
800-013	340 - 760 lbs	0.09"	0.09" - 0.19"	0.55"	5.38"
	3/4" Stud				
800-035	340 - 761 lbs	0.09"	0.09" - 0.19"	0.43"	6"

RECTANGULAR SHEAR MOUNTS CONT...

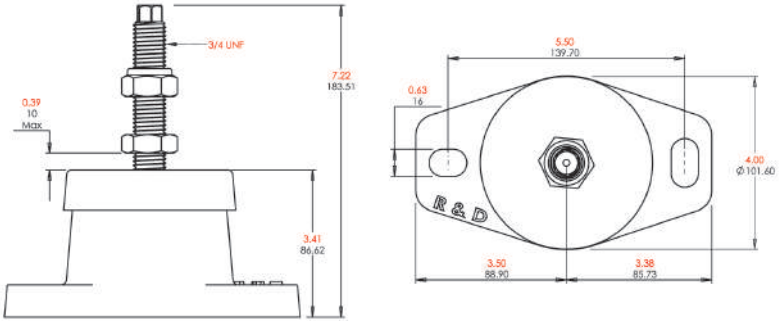
Shear Loaded High Capacity "Super Mounts"

Fitted with an oil shield to protect the rubber

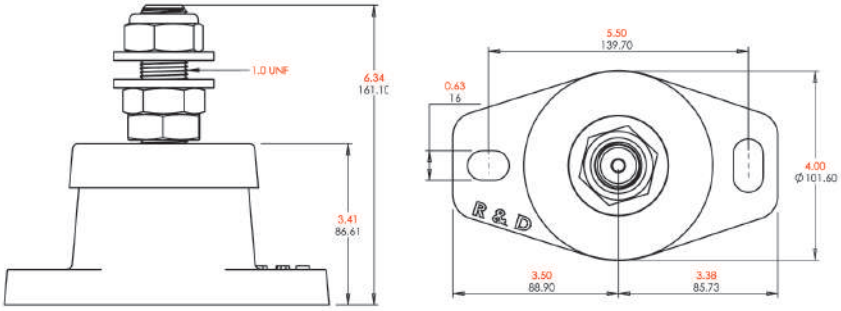


	3/4" Stud			
	Capacity per mount	Mount Pre-Loaded	Deflection	Height adjusting nut thickness
800-063	500 - 1,300 lbs	0.12"	0.12" - 0.25"	0.63"
800-064	650 - 1,700 lbs	0.12"	0.12" - 0.25"	0.63"
800-065	1,100 - 2,100 lbs	0.12"	0.12" - 0.25"	0.63"
	1" Stud			
800-066	500 - 1,301 lbs	0.12"	0.12" - 0.25"	1.25"
800-067	650 - 1,701 lbs	0.12"	0.12" - 0.25"	1.25"
800-068	1,100 - 2,101 lbs	0.12"	0.12" - 0.25"	1.25"

CIRCULAR SHEAR MOUNTS



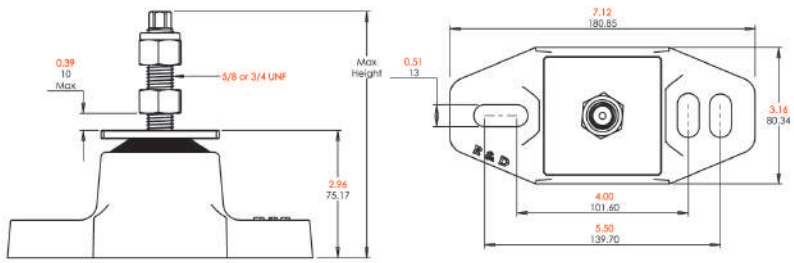
	3/4" Stud			
	Capacity per mount	Mount Pre-Loaded	Deflection	Height adjusting nut thickness
800-015	500 - 1,200 lbs	0.12"	0.12" - 0.25"	0.63"
800-016	650 - 1,500 lbs	0.12"	0.12" - 0.25"	0.63"
800-017	880 - 2,000 lbs	0.12"	0.12" - 0.25"	0.63"



	1" Stud			
	Capacity per mount	Mount Pre-Loaded	Deflection	Height adjusting nut thickness
800-055	500 - 1,201 lbs	0.12"	0.12" - 0.25"	1.25"
800-056	650 - 1,501 lbs	0.12"	0.12" - 0.25"	1.25"
800-057	880 - 2,001 lbs	0.12"	0.12" - 0.25"	1.25"

DOUBLE ACTING MOUNT

The Double Acting Shear Mount is a unique mount incorporating 2 rubber elements which are pre-loaded against each other, giving excellent isolation together with good control on problem installations.



	5/8" Stud				
	Capacity per mount	Mount Pre-Loaded	Deflection	Height adjusting nut thickness	Max height
800-032	100 - 420 lbs	0.19"	0.19" - 0.30"	0.55"	6"
	3/4" Stud				
800-034	160 - 670 lbs	0.19"	0.19" - 0.30"	0.43"	6"

DAMPER PLATES
REDUCE GEAR NOISE

R&D MARINE

Reduces gear noise
The R&D Marine Damper Drive Plates reduce gear noise and allow the engine to run at lower speeds.

Wide range of stock
Damper Drive Plates to fit most engine/gearbox combinations for engines up to 800 horsepower and torque range from 60 - 1,400 ft/lbs.

Three types of elements suitable for every application
With varying degrees of deflection:
Loop (Linear stiffness up to 3° of deflection).
Hammer Head (Three stage stiffness with up to 9° of deflection).
High Deflection (Up to 30° maximum deflection).

Fail safe design
If the flexible element fails, the metal stops on the spline plate will engage the metal stops on the backing plate.

Impervious to salt water, diesel and lubrication oils
No springs to rust or fret. The flexible elements have good heat qualities and are not affected by salt water, diesel and lubrication oils.

Quick and easy installation
The R&D Marine Damper Drive Plate requires no machining and is ready to bolt to the flywheel.

Element Selection
Consider the following criteria when making a decision on the element design.

Loop Type: General purpose robust element which can be mounted either way round on the flywheel and can rotate in either direction. Linear stiffness up to 3° of deflection.

Hammer Head: More torsionally flexible than the loop type, usually has smaller diameter element than our other designs but still retains the ability to be mounted either way round on the flywheel and rotate in either direction. Three stage stiffness with up to 9° of deflection.

High Deflection (H/D): Softer than our other designs with a maximum deflection up to 30°, slightly larger diameter element than other designs and can easily be fitted to rotate in the standard direction of rotation (anti-clockwise looking at the flywheel). With the element facing the gearbox. Suitable for work boats with slow speed applications and pleasure boats.

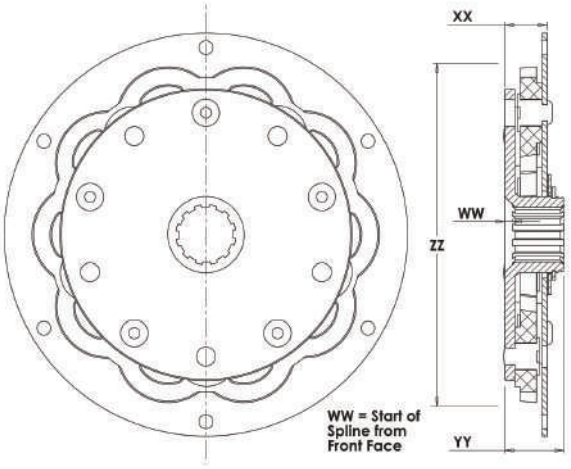
Details required for Damper selection
1. Manufacturer of engine, engine horse power, engine speed, and number of cylinders.
2. Manufacturer of gearbox, model number, and input spline details.
3. Back plate diameter, number of holes, size of holes, pitch circle diameter of holes. Does the plate fit on the face of the flywheel or locate in a register?
4. Will the element of the Drive Plate fit on the outside of the flywheel or be reversed and fit inside of a flywheel recess?
5. Type of application. Pleasure or work boat? Does it spend long periods at low engine speeds?

If an existing installation with a failed part

6. Type and part number of Damper that has failed.
7. What has failed, spline or element / springs?

GEARBOX SPLINE DETAILS

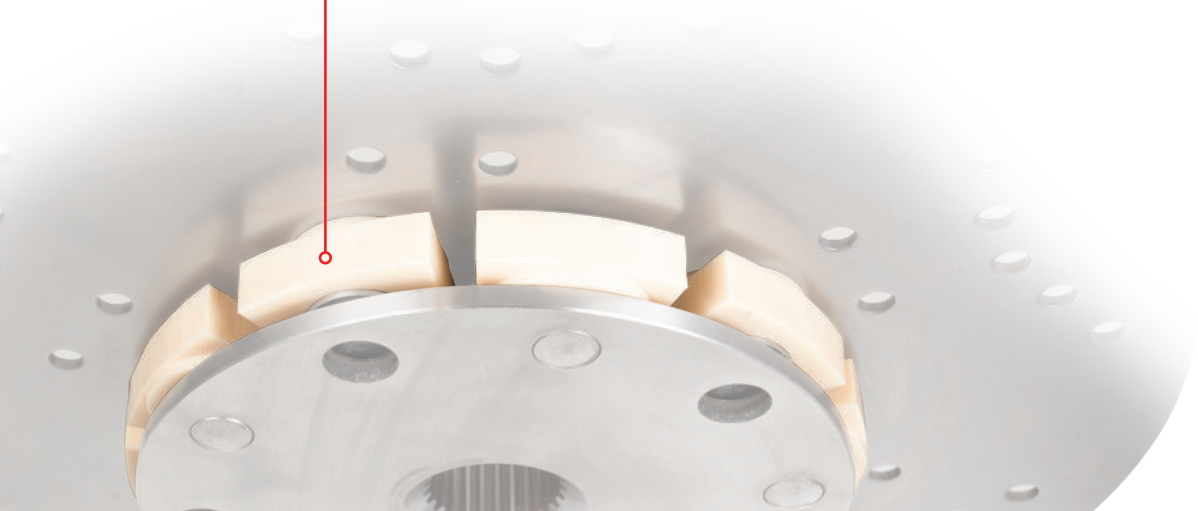
Gearbox	Spline	Spline Ø mm / inch	
Borg Warner			
71, 72, 73, 5000	26T 20/40 DP	35.4	1.394
1000, 1500	22T PA 30	18.5	0.729
500	10T B10 x 23 x 29 DIN 5464	29	1.142
7000	SAE 1.5" x 10T	38.1	1.5
Newage PRM			
Delta	17T 24/48 DP	19.7	0.776
80, 120, 150	10T B10 x 23 x 29 DIN 5464	29	1.142
100, 101, 140, 160, 260	SAE 1" x 10T	25.4	1
175, 250, 265, 310	SAE 1.125" x 10T	28.6	1.125
301, 302, 401, 402, 500, 750	17T 16/32 DP	28.84	1.135
In-Line 301, 302, 401, 402, 500, 750	26T 20/40 DP	35.4	1.394
601, 1000	18T 12/24 DP	40.5	1.595
1200, 1500	20T 12/24 DP	44.8	1.761
Paragon			
P Series	26T 20/40 DP	35.4	1.394
Self Change Gear			
MRF 350HD	32T 16/32 DP	52.3	2.060
MRF 350	SAE 1.625" x 10T	41.3	1.625
Technodrive			
TMC 30, 40, 50, 60	10T B10 x 23 x 29 DIN 5464	29	1.142
TM 93, 170, 260, 345, 485, 545, 880	26T 20/40 DP	35.4	1.394
TMP			
1200, 1500	26T 20/40 DP	35.4	1.394
Twin Disc			
501, 502	26T 20/40 DP	35.4	1.394
Volvo			
140 Leg Old 270-280 Leg	SAE 1" x 10T	25.4	1
MS3, 4, 5 HS1 Sail Drive 110 New 270-280 Leg	26T 20/40 DP	35.4	1.394
120 Leg, MS	20T 30PA 24/48 DP	22.6	0.89
Yanmar			
Kanzaki	20T 30PA 24/48 DP	22.6	0.89
ZF-Hurth			
HBW 35, 40, 50, 100, 125, 150	10T B10 x 23 x 29 DIN 5464	29	1.142
HSW 125, HBW 250, 360	26T 20/40 DP	35.4	1.394
HSW 450, 630, 800, IRM 220A	26T 20/40 DP	35.4	1.394



Torque Nm	Torque ft lb	Design	Code	Element Fixing	Rotation
High Deflection					
135	100	H/D	AM	3 x 3/8 (4.00)	Anti-Clockwise
270	200	H/D	AN	4 x 3/8 (6.00)	Anti-Clockwise
405	300	H/D	AL	4 x 3/8 (6.50)	Anti-Clockwise
640	500	H/D	AD	4 x 1/2 (8.00)	Anti-Clockwise
940	700	H/D	AE	4 x 1/2 (8.00)	Anti-Clockwise
Hammer Head					
135	100	Hammer	W	3 x 3/8 (4.00)	Either
215	160	Hammer	D	5 x 3/8 (5.59)	Either
340	250	Hammer	Y	5 x 1/2 (5.59)	Either
405	300	Hammer	AJ	3 x 1/2 (4.50)	Either
420	310	Hammer	L	5 x 3/8 (5.59)	Either
475	350	Hammer	U	5 x 1/2 (5.59)	Either
745	550	Hammer	R	5 x 1/2 (5.59)	Either
Loop Type					
80	60	Loop	A	3 x 3/8 (4.0)	Either
135	100	Loop	B	3 x 3/8 (4.0)	Either
245	180	Loop	E	5 x 3/8 (5.59)	Either
270	200	Loop	F	3 x 1/2 (4.50)	Either
340	250	Loop	G	5 x 3/8 (5.59)	Either
360	270	Loop	H	4 x 1/2 (4.50)	Either
405	300	Loop	J	3 x 1/2 (4.50)	Either
445	330	Loop	K	5 x 1/2 (5.59)	Either
540	400	Loop	M	5 x 3/8 (5.59)	Either
610	450	Loop	N	4 x 1/2 (4.50)	Either
610	450	Loop	V	5 x 1/2 (5.59)	Either
745	550	Loop	P	5 x 1/2 (5.59)	Either
1015	750	Loop	S	5 x 1/2 (5.59)	Either
1630	1200	Loop	Z	6 x 5/8 (10.2)	Anti-Clockwise
1630	1200	Loop	AF	6 x 5/8 (10.2)	Clockwise
1901	1200	Loop	AH	6 x 5/8 (10.2)	Anti-Clockwise

Fail Safe Design

If the flexible element fails, the rivits on the spline plate will engage the rivits on the backing plate.



Damper Plate Selection Procedure

R & D MARINE

Example

1. Ford 150 horsepower at 2,500 rpm 6 cylinder
2. Borg Warner Velvet Drive 72C Spline 26 teeth 20/40 DP 1.394 diameter
3. Back plate diameter 14.250, fixing holes 6 x 0.375 diameter on 13.500 pcd spaced 3 group of 2. No register
4. Element fits on outside of flywheel
5. Work Boat with a lot oslow speed work

The R&D Marine Damper Plate comprises of 3 main components, Spline Plate, Element, and Back Plate. These 3 components are given a code which make up the finished part number. The following procedure will lead you through the selection process.

1. Select the correct power and style of element for the application. Use the manufacturers maximum torque figure for the engine or calculate from the known data of maximum horsepower rating at what rpm. Using the example installation above we get 315 ft. lb. or 427 Nm.

To calculate output torque of engine:

$$\frac{\text{Horse Power of Engine x 5250}}{\text{Engine Speed}} = \text{Torque lbft} \qquad \frac{150}{2{,}500} \times 5250 = 315 \text{ lbft}$$

$$\frac{\text{Horse Power of Engine x 7123}}{\text{Engine Speed}} = \text{Torque Nm} \qquad \frac{150}{2{,}500} \times 7123 = 427 \text{ Nm}$$

From the Element selection chart we see the most suitable element has a code of AD and a fixing of 4 x 1/2 (8.00)

2. Select the correct Spline Plate to suit the gearbox input shaft. Using the example, go to the gearbox details to find the Borg Warner 72 has a 26 Tooth 20/40 DP input spline, in the next column is the correct code of 48 for the spline plate. The furthest column to the right gives the list number of the Back Plates available for this Element fixing, in this case List 7.
3. Select the correct Back Plate to suit the Flywheel. Using the example, go to Back Plate List 7. Looking down the list find the matching bolt pattern, in this case Back Plate 2. Damper required for this example: Spline Plate: 48 | Element: AD | Back Plate:2

DAMPER PLATE SELECTION

Spline	Spline Plate Number	Element Code		Element Fixing	Damper Dimensions										Back Plate Ref
		Group 1 (ZZ1)	Group 2 (ZZ2)		WW (mm / inch)		XX (mm / inch)		YY (mm / inch)		Group 1 ZZ1 (mm / inch)		Group 2 ZZ2 (mm / inch)		
22T PA 30	1				0	0	25.4	1.00	32	1.25	127	5.00			
26T 20/40 DP	2				2.3	0.09	25.4	1.00	32	1.25	127	5.00			
17T 24/48 DP	12	AM, W, A, B		3 x 3/8 (4.00)	0	0	25.4	1.00	32	1.25	127	5.00			4, 8, 37, 43, 49, 60, 91, 95
1" x 10 SAE	13				0	0	25.4	1.00	32	1.25	127	5.00			
10T DIN 5464	22				0	0	25.4	1.00	32	1.25	127	5.00			
20T 30PA 24/48 DP	66				0	0	25.4	1.00	32	1.25	127	5.00			
26T 20/40 DP	42				5	0.20	25.4	1.00	35	1.38	182	7.13	214	8.43	
10T DIN 5464	43				0	0	25.4	1.00	35	1.38	182	7.13	214	8.43	
17T 24/48 DP	44	AN		4 x 3/8 (6.00)	0	0	25.4	1.00	35	1.38	182	7.13	214	8.43	8, 37, 49, 60, 91, 94
17T 16/32 DP	46				1.8	0.07	25.4	1.00	35	1.38	182	7.13	214	8.43	
1" 10 SAE	45				2.3	0.09	25.4	1.00	35	1.38	182	7.13	214	8.43	
20T 30PA 24/48 DP	65				0	0	25.4	1.00	35	1.38	182	7.13	214	8.43	
26T 20/40 DP	71				12.5	0.49	26.4	1.04	34	1.34	194	7.64			
26T 20/40 DP	76				5	0.20	26.4	1.04	34	1.34	194	7.64			
10T DIN 5464	72	AL		4 x 3/8 (6.50)	0	0	26.4	1.04	34	1.34	194	7.64			145, 146, 147, 148, 149
17T 16/32 DP	73				2.4	0.09	26.4	1.04	34	1.34	194	7.64			
1" x 10 SAE	74				2.6	0.10	26.4	1.04	34	1.34	194	7.64			
20T 30PA 24/48 DP	75				1	0.04	26.4	1.04	34	1.34	194	7.64			
26T 20/40 DP	3				5	0.20	25.4	1.00	35	1.38	175	6.90	207	8.13	
26T 20/40 DP	5				5	0.20	25.4	1.00	35	1.38	175	6.90	207	8.13	
1" x 10 SAE	14				2.3	0.09	25.4	1.00	35	1.38	175	6.90	207	8.13	
1-1/8" x 10 SAE	16	D, L	E, G, M	5 x 3/8 (5.593)	2.3	0.09	25.4	1.00	35	1.38	175	6.90	207	8.13	1, 2, 3, 5, 17, 25, 35, 36, 40
17T 16/32 DP	18				1.8	0.07	25.4	1.00	35	1.38	175	6.90	207	8.13	
10T DIN 5464	23				0	0	25.4	1.00	35	1.38	175	6.90	207	8.13	
17T 24/48 DP	32				0	0	25.4	1.00	35	1.38	175	6.90	207	8.13	
26T 20/40 DP	4				5	0.20	28.7	1.13	35	1.38	182	7.13	207	8.13	
26T 20/40 DP Long	9				0	0	28.7	1.13	43	1.69	182	7.13	207	8.13	
18T 12/24 DP	21				0	0	28.7	1.13	38.1	1.50	182	7.13	207	8.13	
17T 16/32 DP	31				1.8	0.07	28.7	1.13	35	1.38	182	7.13	207	8.13	
32T 16/32 DP	26	Y, U, R	K, V, P	5 x 1/2 (5.593)	0	0	38.5	1.52	57.2	2.25			207	8.13	1, 2, 3, 5, 17, 25, 35, 36, 40
1-5/8" x 10	27				0	0	28.7	1.13	38.1	1.50			207	8.13	
1-5/8" x 10	27				0	0	28.7	1.13	38.1	1.50			207	8.13	
1-1/2" x 10	11				0	0	28.7	1.13	38.1	1.50	182	7.13	207	8.13	
PR 1500	54				0	0	63.2	2.49	79.3	3.12			207	8.13	

Spline	Spline Plate Number	Element Code		Element Fixing	Damper Dimensions										Back Plate Ref
		Group 1 (ZZ1)	Group 2 (ZZ2)		WW (mm / inch)		XX (mm / inch)		YY (mm / inch)		Group 1 ZZ1 (mm / inch)		Group 2 ZZ2 (mm / inch)		
26T 20/40 DP	4	S		5 x 1/2 (5.593)	5	0.20	31.8	1.25	35	1.38	207	8.13			14, 15, 52
26T 20/40 DP Long	9				0	0	31.8	1.25	43	1.69	207	8.13			
18T 12/24 DP	21				0	0	31.8	1.25	38.1	1.50	207	8.13			
32T 16/32 DP	26				0	0	41.7	1.64	57.2	2.25	207	8.13			
1-5/8" x 10	27				0	0	31.8	1.25	38.1	1.50	207	8.13			
1-1/2" x 10	11				0	0	31.8	1.25	38.1	1.50	207	8.13			
PR 1500	54				0	0	66.3	2.61	79.3	3.12	207	8.13			
26T 20/40 DP	6	H, N		4 x 1/2 (4.50)	5	0.20	29.5	1.16	36	1.41	183	7.19			6, 13
26T 20/40 DP HT	8				5	0.20	29.5	1.16	36	1.41	183	7.19			
1-1/2" x 10	10				0	0	29.5	1.16	36	1.41	183	7.19			
1-1/8" x 10 SAE	17				2.3	0.09	29.5	1.16	36	1.41	183	7.19			
17T 16/32 DP	19				1.8	0.07	29.5	1.16	36	1.41	183	7.19			
1-5/8" x 10	28				0	0	29.5	1.16	38.1	1.50	183	7.19			
26T 20/40 DP	7	AJ, F, J		3 x 1/2 (4.50)	8.1	0.32	29.5	1.16	36	1.41	158	6.19			7
1" x 10 SAE	15				2.3	0.09	29.5	1.16	36	1.41	158	6.19			
17T 16/32 DP	20				1.8	0.07	29.5	1.16	36	1.41	158	6.19			
17T 24/48 DP	41				1.8	0.07	29.5	1.16	36	1.41	158	6.19			
26T 20/40 DP	48	AD		4 x 1/2 (8.00)	6	0.24	29	1.14	36	1.41	235	9.25			1, 2, 3, 5, 17, 25, 34
17T 16/32 DP	49				1.8	0.07	29	1.14	36	1.41	235	9.25			
26T 20/40 DP	57				0	0	29	1.14	36	1.41	235	9.25			
32T 16/32 DP	40	Z, AF		6 x 5/8 (8.00)	0	0	44.2	1.74	57.2	2.25	330	13.00			78, 79
PR 1500	55				0	0	68.6	2.70	79.3	3.12	330	13.00			
26T 20/40 DP	56				0	0	44.2	1.74	51.6	2.03	330	13.00			
32T 16/32 DP	40	AH		6 x 5/8 (8.00)	0	0	47.3	1.86	57.2	2.25	330	13.00			78, 79
PR1500	55				0	0	71.9	2.83	79.3	3.12	330	13.00			
26T 20/40 DP	56				0	0	47.3	1.86	51.6	2.03	330	13.00			
26T 20840 DP	50	AE		4 x 1/2 (10.25)	0	0	31.8	1.25	39	1.53	302	11.88			101, 103
18T 12/24 DP	51				0	0	31.8	1.25	39	1.53	302	11.88			
17T 16/32 DP	52				0	0	31.8	1.25	39	1.53	302	11.88			

BACK PLATE DETAILS

Ref	O/D mm	O/D inch	Flywheel Fixing mm	Flywheel Fixing inch	Remarks
1	298.5	11.75	6 x 8.1 on 200 6 x 8.1 on 250 6 x 8.1 on 269.9 6 x 8.1 on 273	6 x 0.32 on 7.875 6 x 0.32 on 9.843 6 x 0.32 on 10.625 6 x 0.32 on 10.75	
2	362	14.25	6 x 8.1 on 200 6 x 8.1 on 210 6 x 8.1 on 263 6 x 8.1 on 269.9 6 x 8.1 on 276.3 6 x 8.1 on 289 6 x 8.1 on 295.3 6 x 8.8 on 304.8 6 x 8.1 on 314.4 6 x 8.1 on 320.7 12 x 9.5 on 343 Ford	6 x 0.32 on 7.875 6 x 0.32 on 8.268 6 x 0.32 on 10.375 6 x 0.32 on 10.625 6 x 0.32 on 10.875 6 x 0.32 on 11.375 6 x 0.32 on 11.625 6 x 0.32 on 12.00 6 x 0.32 on 12.375 6 x 0.32 on 12.625 6 x 0.375 on 13.5 Ford	
3	336.5	13.24	6 x 8.1 on 200 6 x 8.1 on 210 6 x 8.1 on 263 6 x 8.1 on 269.9 6 x 8.1 on 276.3 6 x 8.1 on 289 6 x 8.1 on 295.3 6 x 8.8 on 304.8 6 x 8.1 on 314.4 6 x 9.5 on 320.7	6 x 0.32 on 7.875 6 x 0.32 on 8.268 6 x 0.32 on 10.375 6 x 0.32 on 10.625 6 x 0.32 on 10.875 6 x 0.32 on 11.375 6 x 0.32 on 11.625 6 x 0.344 on 12.00 6 x 0.32 on 12.375 6 x 0.375 on 12.625	
4	155.45	6.12	5 x 6.35 on 142	5 x 0.25 on 5.593	
5	352.5	13.875	8 x 10.6 on 142	8 x 0.416 on 13.125	SAE 11-1/2
6	202.6	7.978	8 x 8.1 on 181	8 x 0.32 on 7.125	
7	180.8	7.12	9 x 6.35 on 167.4	9 x 0.25 on 6.589	
8	298.5	11.75	6 x 8.1 on 200 6 x 8.1 on 250 6 x 8.1 on 269.9 6 x 8.1 on 273	6 x 0.32 on 7.875 6 x 0.32 on 6.843 6 x 0.32 on 10.625 6 x 0.32 on 10.75	
13	234	9.212	6 x 13.1 on 210	6 x 0.515 on 8.267	
14	352.5	13.875	8 x 10.6 on 333.4	8 x 0.416 on 13.125	SAE 11-1/2
15	362	14.25	12 x 9.5 on 342.9	12 x 0.375 on 13.50	Ford
17	314.3	12.375	6 x 8.1 on 200 6 x 8.1 on 250 6 x 8.1 on 269.9	6 x 0.32 on 7.875 6 x 0.32 on 9.843 6 x 0.32 on 10.625	SAE 10

Ref	O/D mm	O/D inch	Flywheel Fixing mm	Flywheel Fixing inch	Remarks
17	314.3	12.375	6 x 8.1 on 273 8 x 10.6 on 296	6 x 0.32 on 10.750 8 x 0.416 on 11.625	SAE 10
25	287.4	11.312	6 x 9.1 on 269.96 6 x 6.3 on 269.96	6 x 0.356 on 10.625 3 x 0.25 on 10.625	TAMD 40
34	466.7	18.375	8 x 13.5 on 438.15	8 x 0.53 on 17.250	SAE 14
35	263.5	10.375	6 x 9.5 on 244.5	6 x 0.375 on 9.625	SAE 8
36	266.7	10.5	12 x 8.1 on 222.3 6 x 8.1 on 244.5 Spaced 3 groups of 2 apart 23°59'07 12 x 8.1 on 246 12 x 8.1 on 242	12 x 0.32 on 8.750 6 x 0.32 on 9.625 Spaced 3 groups of 2 apart 23°59'07 12 x 0.32 on 9.685 12 x 0.32 on 9.527	Suit Ford XLD and Mitsubishi
37	266.7	10.5	12 x 8.1 on 222.3 6 x 8.1 on 244.5 Spaced 3 groups of 2 apart 23°59'07 12 x 8.1 on 246 12 x 8.1 on 242	12 x 0.32 on 8.750 6 x 0.32 on 9.625 Spaced 3 groups of 2 apart 23°59'07 12 x 0.32 on 9.685 12 x 0.32 on 9.527	Suit Ford XLD and Mitsubishi
40	241.3	9.5	8 x 8.5 on 222.25	8 x 0.334 on 8.750	SAE 7-1/2
43	263.5	10.375	6 x 9.5 on 244.5	6 x 0.375 on 9.625	SAE 7-1/2
49	241.3	9.5	8 x 8.5 on 222.25	8 x 0.334 on 8.750	Beta
60	215.9	8.5	6 x 8.1 on 200	6 x 0.32 on 7.875	SAE 6-1/2
78	352.5	13.875	8 x 10.6 on 333.4	8 x 0.416 on 13.125	SAE 11-1/2
79	466.7	18.375	8 x 13.5 on 438.15	8 x 0.53 on 17.250	SAE 14
88	189.9	7.48	6 x 8.1 on 170	6 x 0.31 on 6.693	Nanni, Yanmar
91	314.3 -0.05 -0.13	12.375 -0.002 -0.005 SAE 10	6 x 8.1 on 200 6 x 8.1 on 250 6 x 8.1 on 269.9 6 x 8.1 on 273 8 x 10.6 on 296	6 x 0.32 on 7.875 6 x 0.32 on 9.843 6 x 0.32 on 10.625 6 x 0.32 on 10.750 8 x 0.416 on 11.625	SAE 10
94	287.4	11.312	6 x 9.1 on 269.96 6 x 6.3 on 269.96	6 x 0.356 on 10.625 3 x 0.25 on 10.625	Trans Auto TAMD 40
95	235	9.250	6 x 8.1 on 222.25	6 x 0.32 on 8.750	Beta
101	352.5	13.875	8 x 10.6 on 333.4	8 x 0.416 on 13.125	SAE 11-1/2
103	466.7	18.375	8 x 13.5 on 438.15	8 x 0.53 on 17.250	SAE 14
118	170	6.693	6 x 8.1 on 150	6 x 0.32 on 5.91	Yanmar 3GM
145	215.9	8.5	6 x 8.1 on 200	6 x 0.32 on 7.875	SAE 6-1/2
146	241.3	9.5	8 x 8.5 on 222.25	8 x 0.334 on 8.750	SAE 7-1/2
147	263.5	10.375	6 x 9.5 on 244.5	6 x 0.375 on 9..625	SAE 8
148	314.3	12.375	8 x 10.6 on 296	8 x 0.416 on 11.625	SAE 10
149	352.5	13.875	8 x 10.6 on 333.4	8 x 0.416 on 13.125	SAE 11-1/2