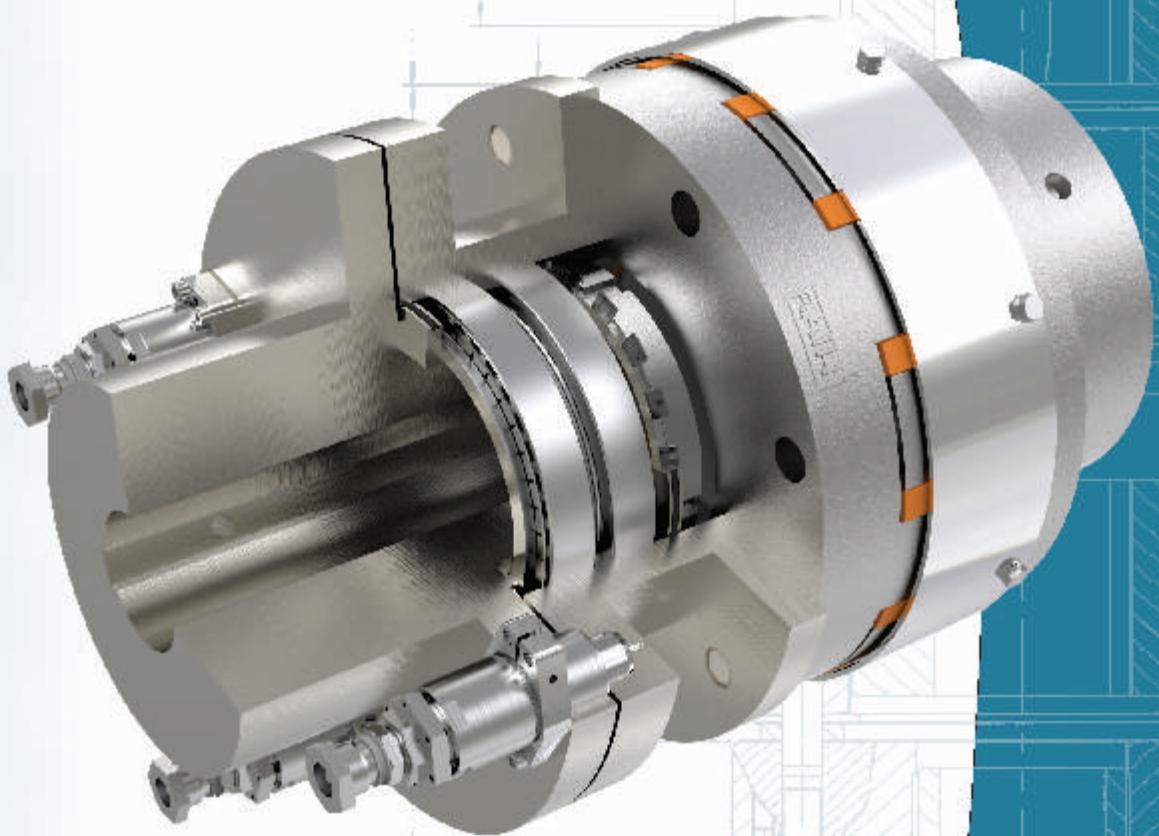


# REM

## Torque Limiter **RFM**

**RATHI**®



Rathi RFM, the ideal overload protection for machines. In case of high torque values, the torque limiter will disconnect the driver and avoid damage to machines.

## TORQUE LIMITER

Mechanical drives are designed for a certain amount of torque, which they are able to transmit. In case of overloads the design has normally some reserves to avoid immediate damage, but sometime quickly unexpected overload happens and damages the system. If a conveyor is blocked by a part, the energy in the system is so high that damage will not be avoidable.

### A torque limiter system is the solution.

The RATHI RFM limits the max. torque to a value which is not critical for the machine and in this form it avoids expensive repair and down time.

### Typical applications are:

- Mining
- Crushing
- Mixing
- Extruder
- Slurry pumps
- Gear pumps
- Fan-drives
- Conveyors
- Ship unloader
- And many more

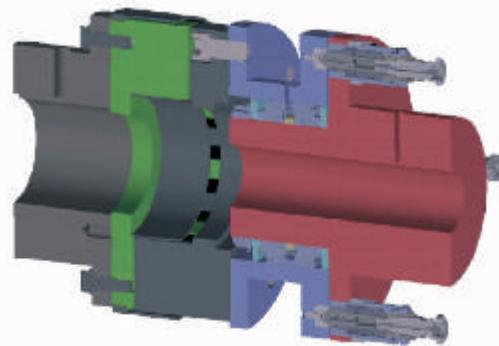
### Special features of the RATHI RFM

- Very flexible design
- Large Torque range
- Very fast reaction time
- Reliable
- Long lasting
- Adjustable
- High accurate switching
- Trip point is not temperature related
- No special tools are needed for operation
- Easy to understand and to operate
- Available in many combinations

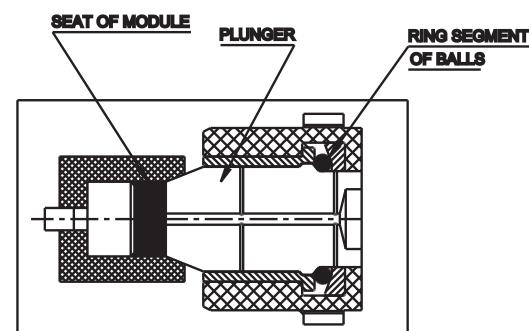
## FUNCTION

The RATHI RFM connects the motor with the gearbox, or it is put in between the output shaft of the gear box and the load, depending on available space and the specific demand of the application.

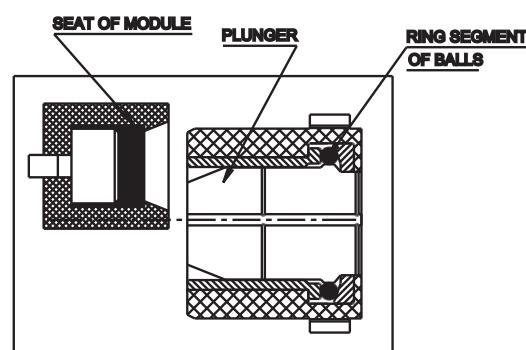
The motor power is transmitted through the torque limiter, very similar to an electric system which is protected by quick reacting fuse systems.



The core parts are two bearing mounted plates which are connected by torque limiter modules with each other. These modules are spring loaded, and set for a specific torque. When the torque is reached, the modules disconnect and the drive train is not able to feed more energy into the system. The reaction time is max few milliseconds. Input and Output side are now without any connection, free to rotate individually.



### NORMAL OPERATION



### IN CASE OF OVERLOAD

The side with the overload will come to a stop and the drive side can be switched off to be able to remove the reason for the overload.

The physical connection to the motor and the gear box is made by coupling ,hub, flange or pulley.

The RATHI RFM is in combination with a flexible coupling not only a protective system, it also compensates for misalignment.

To reset the torque limiter, it is necessary to position the two plates so, that the modules will be able to move the connection plunger into the seat on the other plate. Marking on the output helps to find this position. A light impulse with a soft hammer on the back of each module will lose the internal holding device and allow the module to disconnect



The modules are adjustable to allow increase and decrease of the trip point at the application. The Modules are supplied with trip point preset in the factory.

## TORQUE RANGE

**To reach a specific torque for the torque limiter following parameters are considered:**

- Radius on which the modules are mounted
- Number of modules
- The size of the module
- The spring pretension in the module

**The RATHI RFM is flexible in mechanical dimensions.** This makes it possible to adapt it even for existing machines which are so far missing protection.

**The RATHI RFM can be used to replace:**

- Couplings without protection
- Friction type torque limiters
- Hydraulic torque limiters
- Shear pin solutions
- Electrical current based sensors

RATHI RFM has significant advantages, against each of the above , which will help to increase the productivity of the machine.

## SIZE SELECTION

The RATHI RFM is available in standard sizes and in various types.

For applications which don't fit to the catalog, we are in most cases able to provide customized solution together with the customer. The RATHI sales team is available for consulting the customers, to find an economical and technical sufficient solution together.

The trip point is given by the weakest part of the machine. This needs to be protected to keep the machine up and running.

If the complete design of the machine is not known, it is possible to make a calculation of the theoretical trip point, by using

- 1) power (kW)
- 2) the speed at the torque limiter ( RPM ) and
- 3) application specific service factor (SF) which takes uncritical load conditions like start up, into consideration.
- 4) application details
- 5) shaft details

Calculate the nominal torque using given formula:

$$T_n (\text{Nm}) = 9550 \times P (\text{kW}) / N (\text{rpm}) \times SF$$

$T_n$  = Trip torque in Newton meter

P = Power of the motor in kW

N = speed at the torque limiter in RPM

SF = application specific Service Factor

Recommended guideline for the Service Factor:

- Smooth operation, drive by speed controlled electric motor: 1.5 to 2
- Electric motor without control: 2 to 2.5
- Rough conditions, robust components: 3

A larger factor is not recommended because the peak torque of the motor would be lower than the trip torque of the torque limiter. Then the motor will stall instead of the torque limiter opening and work still against the load.

After calculation of the  $T_n$ , compare the value with the catalogue and use the matching size, or the next size up which provides enough torque.

An often used SF is 2.

## PHYSICAL DIMENSIONS

Please check after selection of the trip torque the available dimensions against the catalogue; the max. bores against the shaft diameters, the DBSE (Distance Between Shaft Ends), the outside diameter and length.

## SPEED

The RATHI RFM is available in combination with different flexible couplings which have limitations to the max. speed. If your preferred model does not allow the speed which you need, check alternative models, or contact RATHI sales for more information.

## TEMPERATURE

The standard temperature range is:

-30° C to + 80 ° C

Other temperatures are possible, but need specific adaptation. Please consult RATHI sales..

## CHANGING OF TORQUE SETTINGS

The RATHI RFM is designed to allow changing of torque setting. However it is recommended that torque setting is to be done by Rathi.

The RFM units have each a torque setting diagram which provides the needed information for resetting. We recommend that only trained persons do this resetting.

## SELECTION PROCEDURE

- 1) Select an appropriate service factor "SF".
- 2) Calculate Rating at 100 RPM = Power (kW) x SF / RPM
- 3) Select a coupling with sufficient rating (torque).
- 4) Check hub bore is capable of accommodating shafts.
- 5) Check Speed.
- 6) Specify dynamic balancing (if required).
- 7) Specify distance between shaft ends (DBSE).

While ordering please provide following information:

- 1) Type
- 2) Size
- 3) Bore dimensions
- 4) Trip Torque.

Also fill Application Data sheet.

## RFM ORDERING INFORMATION

Ordering Example :-

Eg. An electric motor is to be connected to a screw compressor.

Motor power - 600 KW at 1000 rpm.

The motor shaft diameter is 130 mm X 160 mm long.

The compressor shaft is 100 mm X 125 mm long.

The trip torque is set to 7000 Nm.

The distance between shaft ends is 300 mm.

Disc coupling is required.

- 1) Select an appropriate service factor (SF) :-

$$SF = 1.5$$

- 2) Calculate Rating :-

$$\frac{Power \times SF}{RPM} = \frac{600 \times 1.5}{1000} = 0.9 \text{ KW / RPM}$$

$$\text{KW @ 100 RPM} = 90 \text{ KW}$$

- 3) Calculate torque :-

$$\text{Torque} = \frac{9550 \times P(kw) \times SF}{RPM}$$

$$\text{Torque} = \frac{9550 \times 600 \times 1.5}{1000}$$

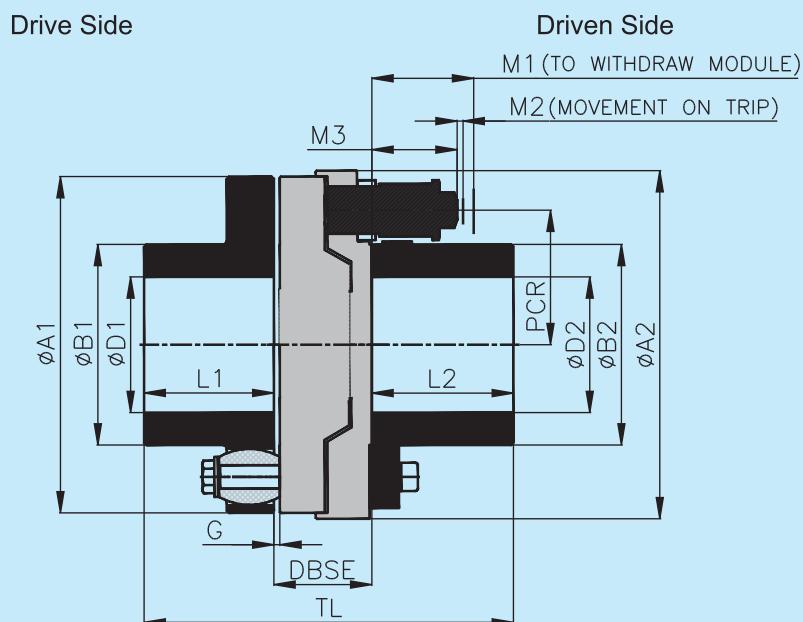
$$= 8595 \text{ Nm}$$

From the calculated data, the required selection is :

RFMD 1400 –

- i) Min trip torque = 2856 Nm.
- ii) Max trip torque = 11424 Nm.
- iii) Max bore, Drive = 172 mm, Driven = 120 mm.
- iv) Max Speed = 2150 RPM.
- v) Minimum DBSE = 257 mm.

## With Rathi Pin &amp; Bush Coupling RB



## TECHNICAL DATA

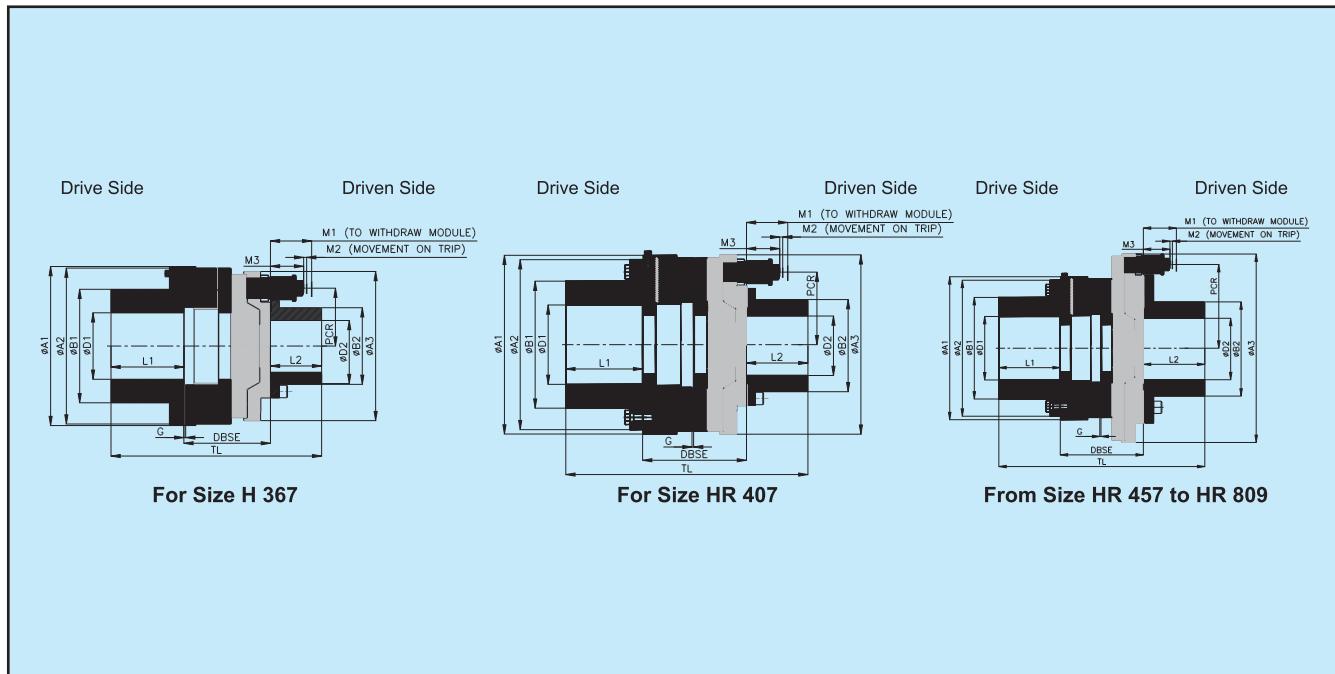
Size	Rathi Module Size-Qty	Nominal Torque (PU Bush) Nm	Min. Trip Torque Nm	Max. Trip Torque Nm	Max. Speed RPM
RFM B-285-09	1 - 3	5586	872	3488	2400
	2 - 3		1744	6977	2400
RFM B-320-12	1 - 4	9148	1428	5712	2100
	2 - 4		2856	11424	2100
RFM B-410-09	3 - 4	16268	3073	12300	1700
	4 - 4		6146	24582	1700
RFM B-500-12	5 - 3	33174	6577	26307	1200
	6 - 3		13154	52614	1200
RFM B - 710-12	7 - 3	112500	60300	120600	950

## DIMENSIONAL DATA

Size	Max. Bore		ØA1	ØA2	ØB1	ØB2	L1	L2	G	TL	DBSE	PCR	M1	M2	M3
	ØD1	ØD2													
RFM B-285-09	115	100	285	295	170	150	110	100	6	293	83	114	85	5	51
	115	100	285	295	170	150	110	100	6	293	83	114	99	5	65
RFM B-320-12	130	120	320	340	196	180	125	120	7	338	93	140	85	5	51
	130	120	320	340	196	180	125	120	7	338	93	140	99	5	65
RFM B-410-09	170	150	410	420	230	230	160	150	7	425	115	167	126	6	76
	170	150	410	420	230	230	160	150	7	425	115	167	150	6	100
RFM B-500-12	205	180	500	572	290	280	200	180	7	515	135	222	186	8	119
	205	180	500	572	290	280	200	180	7	515	135	222	218	8	151
RFM B - 710-12	260	230	710	730	385	385	260	260	7	720	200	268	*	*	*

- All dimensions are in mm.
- Balancing is optional.
- \* Consult Rathi

## With RATHI Jawflex Coupling H



## TECHNICAL DATA

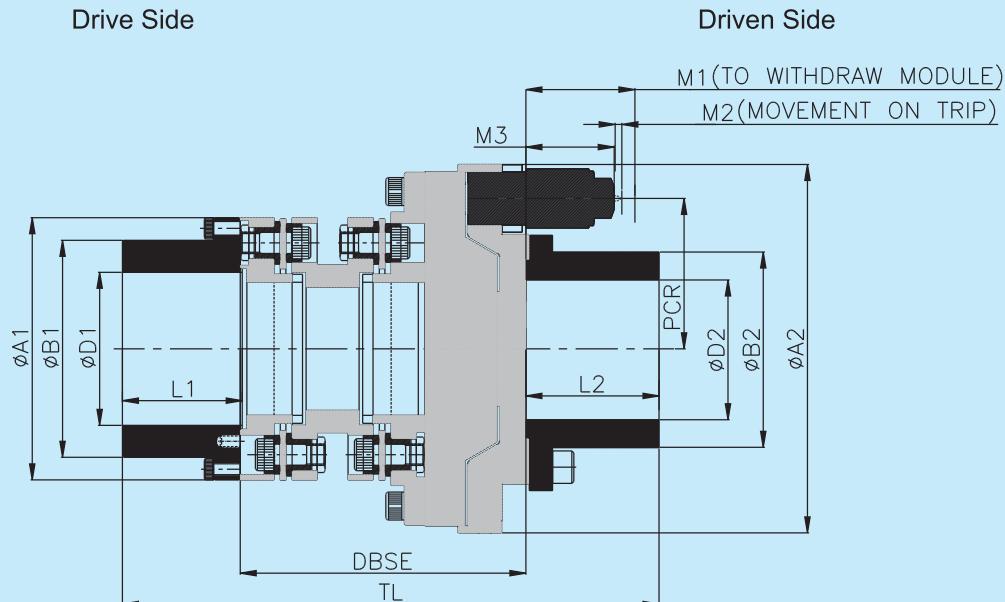
Size	Rathi Module Size-Qty	Nominal Torque Nm		Min. Trip Torque Nm	Max. Trip Torque Nm	Max. Speed RPM
		Rubber	PU			
RFM H-367	1 - 3	9931	14896	872	3488	2100
	2 - 3			1744	6977	2100
RFM H-407	1 - 4	14228	21342	1428	5712	1750
	2 - 4			2856	11424	1750
RFM H-457	3 - 4	19194	28794	3073	12300	1450
	4 - 4			6146	24582	1450
RFM H-609	5 - 3	50325	75487	6577	26307	1250
	6 - 3			13154	52614	1250
RFM H- 809	7 - 3	87663	131494	60300	120600	--

## DIMENSIONAL DATA

Size	Max. Bore		ØA1	ØA2	ØA3	ØB1	ØB2	L1	L2	G	TL	DBSE	PCR	M1	M2	M3
	ØD1	ØD2														
RFM H-367	130	100	313	305	280	222	150	143	100	3	411	168	114	85	5	51
	130	100	313	305	280	222	150	143	100	3	411	168	114	99	5	65
RFM H-407	155	120	349	332	335	248	180	120	120	3	461	221	140	85	5	51
	155	120	349	332	335	248	180	120	120	3	461	221	140	99	5	65
RFM H-457	185	150	400	384	413	294	230	130	150	3	530	250	167	125	6	76
	185	150	400	384	413	294	230	130	150	3	530	250	167	150	6	100
RFM H-609	225	180	461	437	552	360	280	170	180	6	705	355	222	186	8	119
	225	180	461	437	552	360	280	170	180	6	705	355	222	218	8	151
RFM H- 809	300	230	592	567	600	470	470	210	*	6	*	*	268	*	*	*

- All dimensions are in mm.
- Balancing is optional.
- DBSE can be reduced. Consult Rathi for details.

- Maintain gap 'G' at the time of assembly.
- \* Consult Rathi.

**With Disc-o-flex Coupling RSK / RLK**

**TECHNICAL DATA**

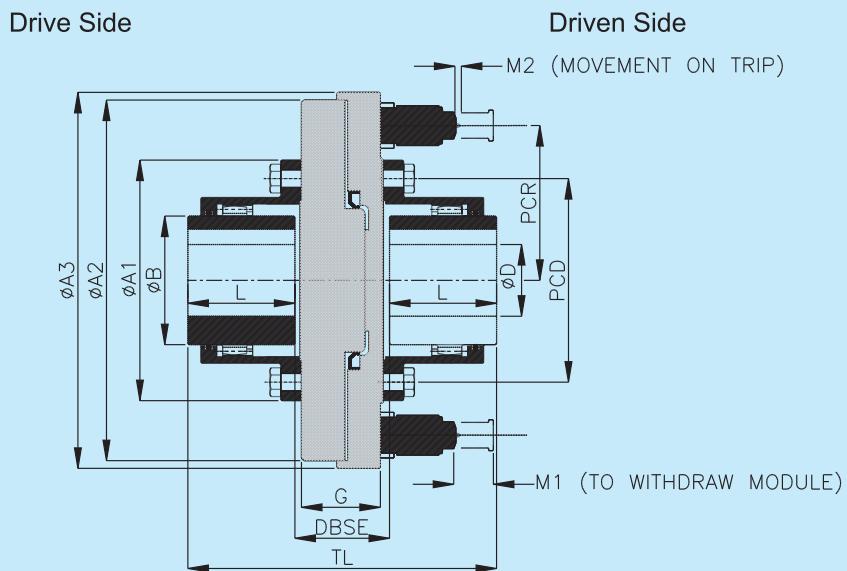
Size	Rathi Module Size-Qty	Nominal Torque Nm	Min. Trip Torque Nm	Max. Trip Torque Nm	Max. Speed RPM
RFM D-740	1 - 3	7066	872	3488	2400
	2 - 3		1744	6977	2400
RFM D-1400	1 - 4	13369	1428	5712	2150
	2 - 4		2856	11424	2150
RFM D-2000	3 - 4	19098	3073	12300	1800
	4 - 4		6146	24582	1800
RFM D-4250	5 - 3	40584	6577	26307	1800
	6 - 3		13154	52614	1800
RFM D - 8500	6 - 4	84988	47558	95116	1800

**DIMENSIONAL DATA**

Size	Max. Bore		ØA1	ØA2	ØB1	ØB2	L1	L2	*TL	DBSE	PCR	M1	M2	M3
	ØD1	ØD2												
RFM D-740	140	100	247	280	206	150	107	100	422	215	114	85	5	51
	140	100	247	280	206	150	107	100	422	215	114	99	5	65
RFM D-1400	172	120	297	335	248	180	130	120	507	257	140	85	5	51
	172	120	297	335	248	180	130	120	507	257	140	99	5	65
RFM D-2000	185	150	283	413	235	230	170	150	638	318	167	125	6	76
	185	150	283	413	235	230	170	150	638	318	167	150	6	100
RFM D-4250	215	180	360	552	300	280	215	180	773	378	222	186	8	119
	215	180	360	552	300	280	215	180	773	378	222	218	8	151
RFM D - 8500	260	230	465	710	402	*	261	*	*	*	301	218	8	151

- All dimensions are in mm.
- \* TL – Calculated for minimum DBSE. Special DBSE available on request.
- Sizes above RFMD 8500, for higher torque applications, are available on request.
- \* Consult Rathi

## With AGMA Gear Couplings RGD



## TECHNICAL DATA

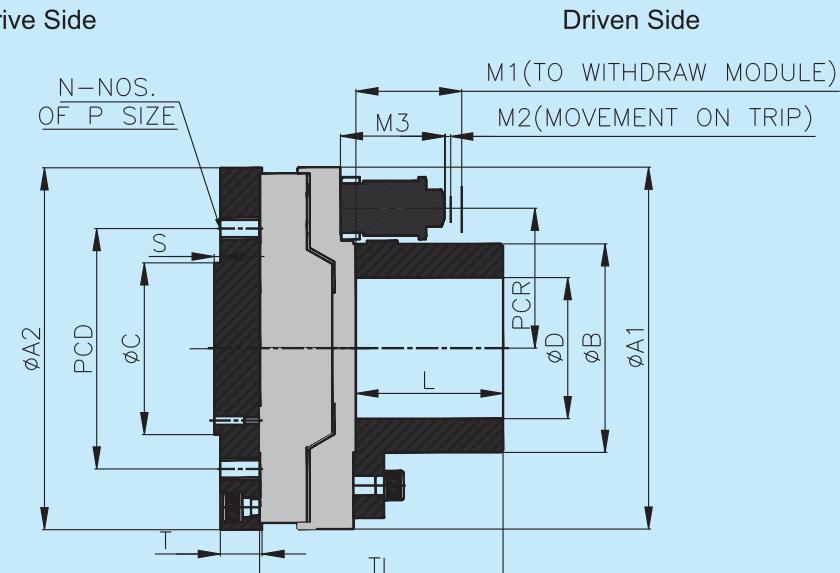
Size	Rathi Module Size-Qty	Nominal Torque Nm	Min. Trip Torque Nm	Max. Trip Torque Nm	Max. Speed RPM
RFM G-25	2 - 4	10000	2800	10900	1900
RFM G-30	2 - 4	16000	3000	12000	1700
RFM G-35	2 - 6	22100	5100	20400	1500
RFM G-40	4 - 4	32100	7400	29400	1200
RFM G-45	4 - 6	45100	11800	47200	1200
RFM G-50	4 - 8	62100	17300	69100	1200
RFM G-55	6 - 4	84000	21300	85200	1000
RFM G-60	6 - 6	115100	33800	135100	900
RFM G-70	6 - 6	174100	37900	151600	900

## DIMENSIONAL DATA

Size	Max. Bore ØD	ØA1	ØA2	ØA3	ØB	G	L	PCD	BOLT SIZE & QTY (NOS.)	TL	DBSE	PCR	M1	M2
RFM G-25	98	213	306	318	131	106	77	181	5/8" - 6	265	111	133	34	5
RFM G-30	115	240	333	345	152	106	91	206	5/8" - 8	293	111	147	34	5
RFM G-35	135	279	373	385	178	112	107	241	3/4" - 8	332	118	167	34	5
RFM G-40	160	318	461	476	210	112	121	280	3/4" - 8	360	118	200	50	6
RFM G-45	180	346	488	504	235	112	135	305	3/4" - 10	390	120	214	50	6
RFM G-50	195	389	530	546	254	117	153	343	7/8" - 8	431	125	235	50	6
RFM G-55	215	425	612	648	279	147	168	368	7/8" - 14	491	155	270	68	8
RFM G-60	235	457	643	678	305	147	188	400	7/8" - 14	531	155	285	68	8
RFM G-70	280	527	712	748	356	147	221	464	1" - 16	598	156	320	68	8

- All dimensions are in mm.
- Designed to standard full flex AGMA gear couplings.
- RFMG torque limiters can be supplied with or without the gear coupling. Please mention while ordering.

**With Cardan/Drive Shaft.**



#### TECHNICAL DATA

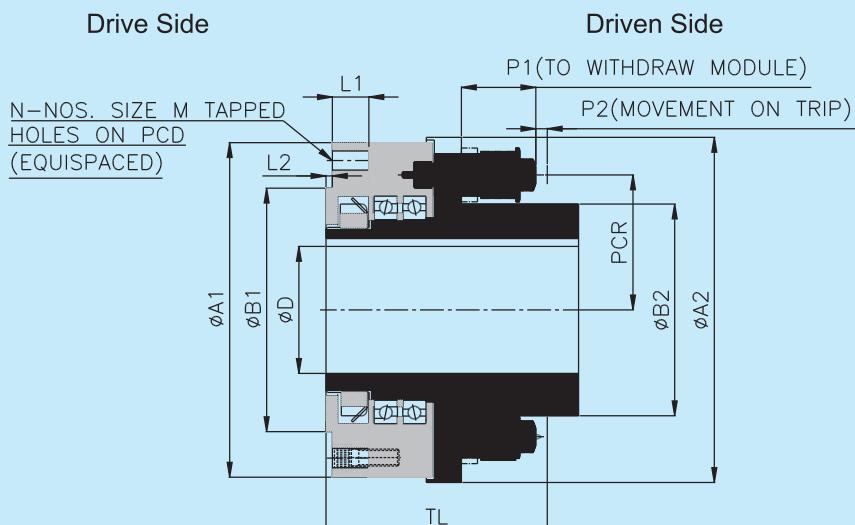
Size	Rathi Module Size-Qty	Min. Trip Torque Nm	Max. Trip Torque Nm	Max. Speed RPM
RFM M-11	2 - 3	1744	6977	1800
RFM M-12	2 - 4	2856	11424	1800
RFM M-13	4 - 4	6146	24582	1800
RFM M-14	6 - 3	13154	52614	1800

#### DIMENSIONAL DATA

Size	Max. Bore ØD	ØA1	ØB	L	Flange Size ØA2	T	PCD	Hole		Step Dimension		TL	PCR	M1	M2	M3
								P*	N	S	ØC g6					
RFM M-11	100	279	150	100	180	33	155.5	M14	8	3	110	177	114	99	5	65
	100	279	150	100	225	33	196	M16	8	5	140	177	114	99	5	65
RFM M-12	120	331	180	120	225	40	196	M16	8	5	140	206	140	99	5	65
	120	331	180	120	285	40	245	M20	8	6	175	206	140	99	5	65
RFM M-13	150	411	230	150	285	44	245	M20	8	6	175	258	167	150	6	100
	150	411	230	150	315	44	280	M22	8	6	175	258	167	150	6	100
RFM M-14	180	552	280	180	350	*	310	M22	10	7	220	308	222	218	8	151
	180	552	280	180	390	*	345	M24	10	7	220	308	222	218	8	151

- All dimensions are in mm.
- \* Consult Rathi.
- P\* - with standard coarse pitch.
- Mounting dimensions (C, S, PCD, T, P, N) are to be specified by customer, if not catalogue values will be considered.

## With Cardan/Drive Shaft (Increased Bore Capacity)



## TECHNICAL DATA

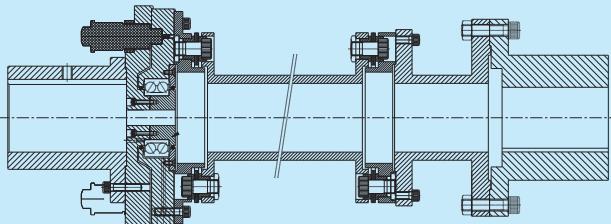
Size	Module Size-Qty	Min. Trip Torque Nm	Max. Trip Torque Nm	Module Size-Qty	Min. Trip Torque Nm	Max. Trip Torque Nm	Module Size-Qty	Min. Trip Torque Nm	Max. Trip Torque Nm	Max. Speed RPM
RFMM - 21	2 - 3	1951	7803	2 - 6	3901	15606	2 - 9	5852	23409	1800
RFMM - 22	2 - 3	2295	9180	2 - 6	4590	18360	2 - 9	6885	27540	1800
RFMM - 23	4 - 3	5934	23736	4 - 6	11868	47472	4 - 9	17802	71208	1800
RFMM - 24	6 - 3	18367	73470	6 - 6	36735	146940	6 - 9	55102	220410	1400

## DIMENSIONAL DATA

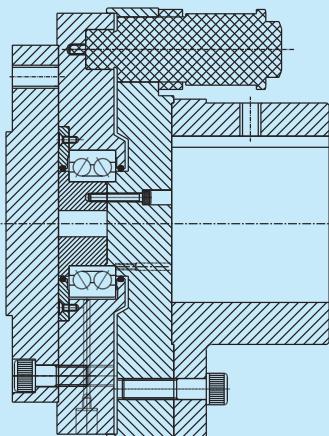
Size	Max. Bore ØD	ØA1	ØB1 g6	PCD	ØA2	ØB2	PCR	TL	L1	L2	M	N	P1	P2
RFM M-21	120	316	230	282	326	200	127.5	209	34.5	6	M12 x 1.75	9	99	5
RFM M-22	150	360	246	310	380	245	150	230	45	6	M16 x 2	9	99	5
RFM M-23	200	511	350	414	531	344	215	330	54	20	M20 x 2.5	9	150	6
RFM M-24	290	728	476	634	748	496	310	465	62.5	15	M20 x 2.5	9	218	8

- All dimensions are in mm.
- Mounting dimensions (B1, PCD, L1, L2, M, N) are to be specified by customer, if not catalogue values will be considered.

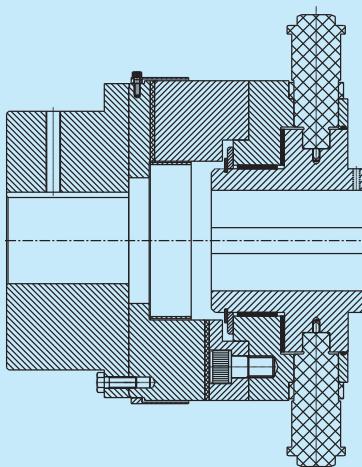
## SPECIAL DESIGNS

**RFM D930**

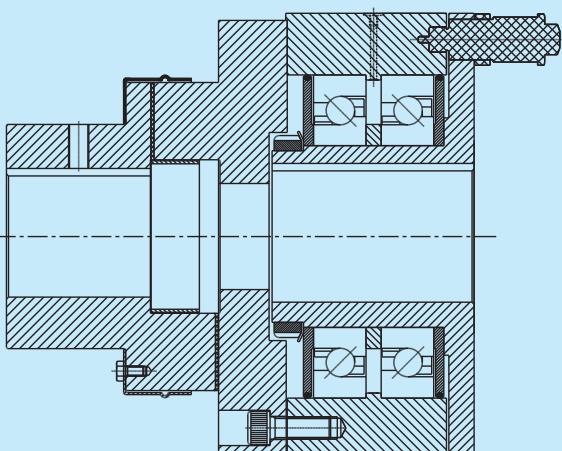
With long spacer (1850mm)

**RFM M23**

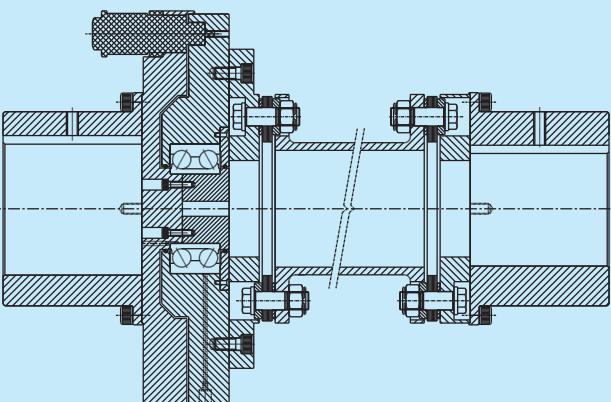
With drive shaft for high torque (24582 Nm)

**RFM H509**

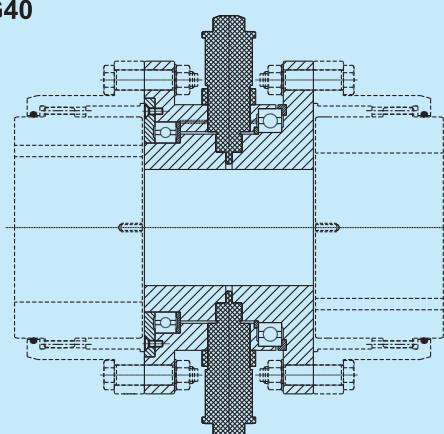
Radially mounted modules for low space and high torque (14000 Nm) applications

**RFM H407**

Coupling with high torque (21294 Nm)

**RFM D6010**

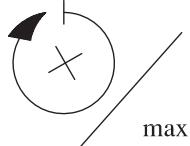
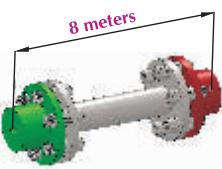
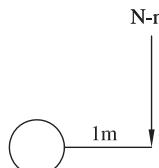
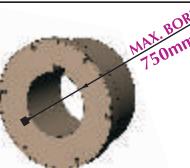
For high torque (53360 Nm) with long spacer (2018 mm)

**RFM G40**

Radially mounted modules for low space and high torque (10000 Nm) applications

# Rathi Couplings-Our Capacity

FOR TURNKEY SOLUTIONS, THE INDUSTRY TURNS TO US

 Coupling Dia - Up to <b>2 meters</b>	 Coupling Speed - Up to <b>45000 rpm</b>	 Coupling Length - Up to <b>8 meters</b>	 Weight of Coupling - Up to <b>7000 kg</b>
 Coupling Rating - Up to <b>60 MW</b>	 Coupling Bore / Keyway – BS, DIN, AGMA, ANSI – Imperial / Metric / Splines	 Horizontal      Vertical Coupling Application	 <ul style="list-style-type: none"> <li>• ATEX Certification</li> <li>• Compliance to <b>API 610 &amp; 671</b></li> <li>• Compliance to <b>ISO 14691 &amp; ISO 10441</b></li> </ul>
 All types Elastomeric / Metallic wide range.	 Availability All over the world through our network of distributors.	 In-house Elastomeric Parts manufacturing.	 ISO9001 BUREAU VERITAS Certification  UKAS QUALITY MANAGEMENT 008 ISO9001 / 2008 First Power Transmission company in India to get certification, 1993.



In view of constant endeavour to improve the quality of our products, we reserve the right to alter or change specifications without prior notice.

INDIA	EUROPE	AUSTRALIA	
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