

# GMN Freewheel-Clutches Series 8000



## Introduction

The sprag-type freewheel clutches of series 8000 are based on a newly developed sprag with a nominal height of 8.33 mm ( $2^{1/64}$  in). For shaft sizes of 38 to 150 mm or corresponding inch sizes this series offers alternative options or additional solutions for our famous series FE 400. Similar to FE 400 the new 8000 series provides very high torque capacity in relation to the required mounting space due to the large quantity of sprags. The newly designed clamping curve offers smooth and reliable torque pick up, which guarantees optimum performance for any freewheel clutch application such as indexing, overrunning or backstopping. The diameter range mentioned above does not show the limits for the usage of this series. For special requirements of our customers we will be pleased to develop and offer new types below or above the existing standard programme. We offer clutches of the 8000 series in four different widths: 13, 16, 19, 25 mm. The partnumber shows this dimension. The standard does not incorporate all widths for any diameter right now, but missing combinations will be realised upon requirement. The two or three last digits of the part number show the closest full shaft diameter of the metric conversion of the basically inch size of the metric conversion of the basically inch size of the shaft. e.g. FE 8072 for 72.21 mm =  $2^{27/32}$  in. Special clutches could be designed for exact pure metric shafts **or** housings (just one of them at a time).

## Mounting Instructions

The race ways the series 8000 insert clutches should run on must be hardened and ground. When surface hardening is used, the minimum hardening depth (Eht) at full torque must be 1.3 mm. Lower torque requirements allow lower depths.

The tolerances for the mating parts of series 8000 have not to be as sophisticated as with series 400 due to the larger size of the sprags and the different shape of the clamping curve.

### Mounting fits: (only series 8000)

Shaft:	$d_L = h6$
Housing:	$D_L = H6$
Hardness:	HRC = 60+4
Hardening	
Depth:	$Eht \geq 1.3 \text{ mm}$
Surface Finish:	$R_z \leq 2.5 \mu\text{m}$
Excentricity:	$e \leq 0.09 \text{ mm}$
	(coaxiality of inner and outer race way)

Axial limitation for the insert clutch will be necessary and can be arranged by a shoulder, a washer or snapping (round edge towards the clutch). For ease of mounting we recommend chamfered shafts and housings.

## Speed Limits

When torque is transmitted the sprags are in a fixed position between inner- and outer race. Under these conditions – theoretically – there is no speed limit. In backstopping and overrunning applications the influence of centrifugal forces has to be considered.

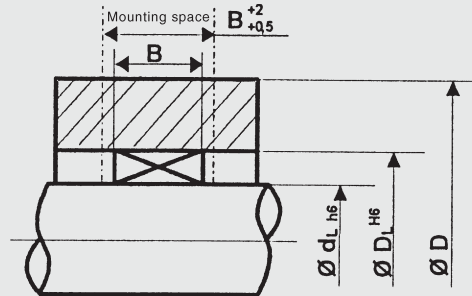
Tests showed that with oil lubrication series 8000 sprags surf on a hydrodynamic lubricating film under constant conditions ( $v = \text{const.}$ ) with rotating shaft. The clutch itself turns very slowly under these conditions and so centrifugal forces do not become effective. The same situation could be expected with grease lubrication at a slightly higher speed level.

Due to the idling behaviour of our sprags of series 8000 there would be no need for sprags lifting off by centrifugal force or for dual cages or cages fix by clips or springs.

The rotating speed of the clutch itself depends on size, viscosity and temperature. With a hydrodynamic lubricating film only minimal wear could be expected.

Please note that in indexing applications due to alternating conditions a hydrodynamic lubricating film cannot be created. Please contact our technical staff for some advise if this kind of applications should arise.

# FE 8000



Dimensions [mm]			Part number	Torque M		Dimensions [in]		
d <sub>L</sub>	D <sub>L</sub>	B		[Nm]	[ft lb]	d <sub>L</sub>	D <sub>L</sub>	B
27,76	44,42	13	FE 8027 Z 13	210	155	1.0929	1.7488	0.5118
38,09	54,75	13	FE 8038 Z 13	333	245	1.4996	2.1555	0.5118
		16	FE 8038 Z 16	479	353			0.6299
		19	FE 8038 Z 19	627	462			0.7480
40,00	56,66	13	FE 8040 Z 13	361	266	1.5748	2.2307	0.5118
		16	FE 8040 Z 16	517	381			0.6299
		19	FE 8040 Z 19	677	499			0.7480
44,45	61,11	13	FE 8044 Z 13	427	315	1.7500	2.4059	0.5118
		16	FE 8044 Z 16	614	453			0.6299
		19	FE 8044 Z 19	803	592			0.7480
49,72	66,38	13	FE 8049 Z 13	515	380	1.9574	2.6134	0.5118
		16	FE 8049 Z 16	741	546			0.6299
		19	FE 8049 Z 19	970	715			0.7480
54,76	71,42	13	FE 8054 Z 13	606	447	2.1559	2.8118	0.5118
		16	FE 8054 Z 16	874	644			0.6299
		19	FE 8054 Z 19	1140	840			0.7480
		25	FE 8054 Z 25	1682	1240			0.9843
58,00	74,66	19	FE 8058 Z 19	1260	929	2.2835	2.9394	0.7480
68,00	84,66	16	FE 8068 Z 16	1266	933	2.6772	3.3331	0.6299
72,21	88,87	13	FE 8072 Z 13	977	720	2.8429	3.4988	0.5118
		16	FE 8072 Z 16	1411	1040			0.6299
		19	FE 8072 Z 19	1845	1360			0.7480
		25	FE 8072 Z 25	2715	2001			0.9843
79,69	96,36	25	FE 8079 Z 25	2619	1930	3.1374	3.7937	0.9843
83,34	100,00	25	FE 8083 Z 25	3407	2511	3.2811	3.9370	0.9843
93,34	110,00	19	FE 8093 Z 19	2907	2143	3.6748	4.3307	0.7480
103,23	119,89	16	FE 8103 Z 16	2674	1971	4.0642	4.7201	0.6299
		19	FE 8103 Z 19	3322	2449			0.7480
		25	FE 8103 Z 25	4600	3391			0.9843
123,34	140,00	25	FES 8123 Z 25	5965	4397	4.8559	5.5118	0.9843
123,88	140,54	25	FE 8123 Z 25	5990	4415	4.8772	5.5331	0.9843
126,22	142,88	25	FE 8126 Z 25	5998	4421	4.9693	5.6252	0.9843
129,39	146,05	25	FE 8129 Z 25	6244	4602	5.0941	5.7500	0.9843
140,00	156,66	25	FE 8140 Z 25	6686	4928	5.5118	6.1677	0.9843
150,00	166,66	25	FE 8150 Z 25	7448	5490	5.9055	6.5614	0.9843

\* The nominal torque is based on the conditions for torque determination on pages 7 and 8.

# GMN GMN

Proper lubrication with only qualified lubricants is the prerequisite for achievement of highest efficiency of our high quality clutches.

Only with use of oil or grease lubricants as specified in Tables 1 to 3 GMN will warrant their freewheel-clutches and their trouble free function.

GMN will supply on request, factory lubricant specifications for your specific operating temperature range.

Please consult with our technical staff if operating temperatures are in the upper or lower temperature tolerance range.

Whenever possible, use only oil or oil mist lubrication rather than grease lubrication.

For oilmist lubrication – please use oils as per table 1 e.g. HM 10 or HM 32.

**Please note:**

**The use of lubricants with additives that decrease the coefficient of friction, i.e. MoS2 or graphite is not possible.**

## Oil

Table 1	Operating Temperature Range at GMN Clutch		
	- 15 °C to + 30 °C + 5 °F to + 86 °F	15 °C to 90 °C 59 °F to 194 °F	60 °C to 120 °C 140 °F to 248 °F
Oil Type	Hydraulic Oil HM 10	Hydraulic Oil HM 32	Hydraulic Oil HM 100

Table 2	Operating Temperature Range at GMN Clutch		
	- 15 °C to + 30 °C + 5 °F to + 86 °F	15 °C to 90 °C 59 °F to 194 °F	60 °C to 120 °C 140 °F to 248 °F
Oil Type	-	HD-Motor Oil SAE 10 W ATF DEXRON II D or III	HD Motor Oil SAE 30

Oil lubricants described in Table 2 are from the automotive sector. These lubricants can easily be obtained at

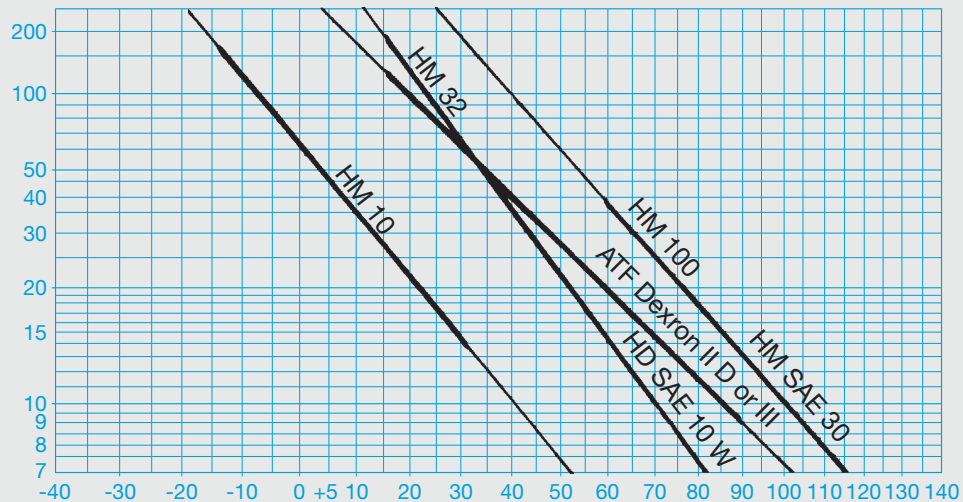
automotive supply outlets and are excellent for the lubrication of our freewheel-clutches.

Lubricant qualification: HD-Motor Oil SAE 10 W or SAE 30 is equal to "API-Service SF/CC" and "MIL-L 46152 B".

## Viscosity-Temperature Diagram for GMN Oil

Viscosity  
mm<sup>2</sup>/s (cSt)

Temperature  
°C



Important: Oils shown in table 1 and table 2 are only to be mixed with oils of the same qualification. That means ATF oil with ATF oil. HD-motor oil with HD-motor oil, hydraulic oil with hydraulic oil; but not ATF oil with motor oil or hydraulic oil etc.

If there is any change of oil from one qualification to the other it is absolutely necessary to clean the freewheel-clutch and mating parts with cleaning or test benzine. Never use trichloroethylene or perchlorethylene.

The oil level should be in relation to the size of the freewheel-clutch. In normal installation position, not operating, one half of the clutch should be submerged in oil.

At high values of indexing frequency or idling speed the amount of oil should be reduced. Just one third of the clutch should be submerged.

Our double sealed freewheel-clutches (series FND and FPD) are filled with an oil for operating temperature range 15 °C to 90 °C if not specially ordered.

For oil mist lubrication systems GMN recommends ample clean oil, free of moisture, be sprayed directly onto clutches.

Open or unsealed housings should be inspected frequently – at least daily – for proper lubrication level. The amount of the refill depends on the specific design, the clutch is installed in and on its size.

## Grease

Greases from different manufactures may not be compatible. Consult with GMN for proper lubrication recommendations

There is no universal grease for all service and operating conditions. Table 3 below lists suitable grease types and characteristics for GMN freewheel-clutches.

Table 3 shows a selection of the favoured greases and their specifications. The greases belong to the following consistence classes as per german standards DIN 51818: NLGI 2 (except Klüber Bio BM 72-501 – NLGI 1).

For regular working conditions the first two grease types are the perfect choice, as the use of Klüber Bio HB 72-102 is recommended for very special conditions.

It is very important to take care for the right amount and proper distribution of the grease. We recommend to fill about 60% of the free space inside the clutch with grease by using a detergent for getting the grease equally distributed.

Table 3

Producer	Grease	Saponification	Oilbase	Operating Temperature at GMN Freewheel Clutches	Characteristics
Klüber Lubrication	ISOFLEX LDS 18 Special A	Lithium	Ester/ Mineral	- 30 °C...+130 °C - 22 °F...+266 °F	Deep temperature and longterm grease with high resistance to aging and corrosion.
Klüber Lubrication	Klüberbio BM 72-501	Polyurea	Ester	- 20 °C...+120 °C - 4 °F...+248 °F	Biological grease especially for overrunning and backstopping.
Klüber Lubrication	Klüberbio HB 72-102	Polyurea	Ester	- 40 °C...+180 °C - 40 °F...+356 °F	Full-Synthetic grease especially for overrunning and backstopping.

GMN only uses ball and roller bearing grease which is continually monitored for maximum quality and maximum clutch life.

GMN can not endorse or guarantee the quality of lubricants, purchased by their customers to be used with GMN clutches.

Sealed ball bearing clutches “RS” and “2RS” are shipped grease lubricated with grease type Isoflex LDS 18 Special A, if not specially ordered.

## Mounting Series 400 and Series 8000

For easy and safe installation, freewheel-clutches are delivered on hard paper tubes. Only clutches of model FE 400 are surrounded with colored rubber rings, keeping the sprags in a

disengaged position, so clutches can be mounted easily. After removal of rubber ring the sprags will be engaged immediately to be ready for working.

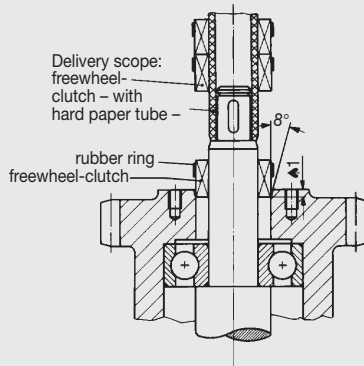
Color of rubber ring for engagement direction:

right = red

left = light green or transparent

## Mounting

### FE 400

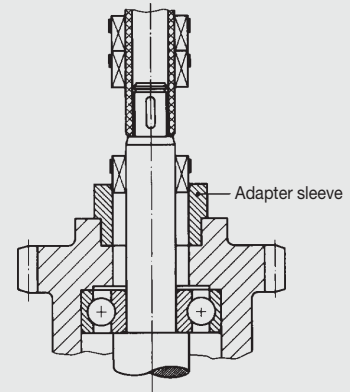


**FE 400** installation recommendations for large quantities.

◀◀ Push freewheel-clutch off of the paper tube over the shaft, into the housing. After removal of the rubber ring, push freewheel-clutch into final position.

In the event that the insertion of the freewheel-clutch from the paper tube is difficult due to larger depth, use an adapter sleeve for ease of mounting. ▶▶

### FE 400



Place freewheel-clutch in the housing and secure (retainer). Insert shaft with a turning and pushing motion.

### FE 400 Z/Z2 / FE 8000



In the event that the shaft and outer part can not be chamfered, place freewheel-clutch halfway on the shaft. This causes the sprags to tilt and reduces the diameter in relation to the size of the clutch frame. Now push shaft with the freewheel-clutch in place. This installation method is only possible with model FE 400 Z and FE 8000.

### FE 400 Z / FE 8000



Freewheel-clutches "FE 400 Z/Z2" and "FE 8000" can be installed for left or right engagement. When ordering, specification for left or right engagement is not necessary.

Freewheel-clutches model FE 400 S with drag cage should have side support washers, sleeve, or shoulder flange. There should be no recess for a retaining ring on the mounting side.

### FE 400 S



With this catalog we showed to you the most important facts about design, function and application of GMN Sprag-Type Freewheel-Clutches Series 400 and 8000.

It was our intention to give to you some guidelines for the right choice and the correct use of our clutches.

If you are in doubt, whether you have chosen the right clutch element or if you have some additional questions for solving your clutch problem, please do not hesitate to contact our technical staff. We will answer your questions and will discuss your problems with you without any obligation and free of any charges.

Please trust in our experience, because we are offering solutions for clutch problems for many, many years and our philosophy is not only to sell clutches but to satisfy our customers by offering the best solution from the technical side as well as pricewise.

If you have a certain clutch problem, please send as much information as possible, to enable us to find the best product for your application.

## Roller-Ramp-Clutches

In addition to our Sprag-Type-Clutches of series 400 and 8000 GMN offers a large variety of Roller-Ramp-Clutches. Below you will find a list of interchanges with other brands.

For more detailed information ask for catalog 9082 E.



GMN	Other brands		
VS	NSS	AS	BSS
VSNU	NFS	ASNU	BFS
VF	NF	AE	BNF
VGf	NFR	ANG/ANR	BNFR
VGv	RS/BW	AV	RS/BF
VGL (P)	GFR N	AL (P)	GFRS (N)
VGL...F2-D2	GFR...F1-F2	AL...F2-D2	GFRS..D1-D2
VGL...F4-D2	GFR...F2-F7	AL...F4-D2	GFRS..D2-D7
VGL...F5-D2	GFR...F2-F3	AL...F5-D2	GFRS..D2-D3
VGL...F5-D3	GFR...F3-F4	AL...F5-D3	GFRS..D3-D4
VGL...KS-D2	GFR...ES-F2	AL..KMS-D2	
VGL...F7-D7	GFRN..F5-F6	ALP..F7-D7	GFRSN.D5-D6

## Conversion Factors

1 mm = 0.1 cm	1 g = 0.001 kg	1 Nm = 0.1019 kpm
1 mm = 0.00328 ft	1 g = 0.03527 oz	1 Nm = 0.737 ft lb
1 mm = 0.03937 in	1 g = 0.002205 lb	1 Nm = 141.5 oz in
1 in = 25.4 mm	1 oz = 28.35 g	1 oz in = 0.00707 Nm
1 ft = 304.8 mm	1 lb = 453.6 g	1 ft lb = 1.3567 Nm
1 ft = 12 in	1 lb = 16 oz	1 ft lb = 192 oz in
	1 kW = 1.34 hp	1 hp = 0.746 kW

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# GMN

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# GMN

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