

# ROLLER RAMP CLUTCHES



**GMN**

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### 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

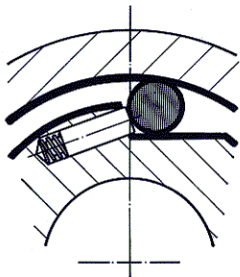
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Catalog information represents the technical standards of today – March 2000  
Changes based on technical progress reserved.

### Basic Information

Roller Ramp Clutches have 4 main components:

- The concentric and round raceway of the outer ring.
- The starlike shaped configuration of the clamping ramps at the inner ring.
- The clamping rollers.
- Separate spring loading for each roller, based at the inner ring.



Below the maximum speeds shown in the diagrams of each type, the rollers are ready for instant torque pick-up, as soon as the sense of rotation changes.

Some relative motion between inner and outer ring will be physically necessary for transmitting full torque due to the elastic deformation of all components involved. The relation between applied torque and the angle of twist will be linear and constant under constant operating conditions. The angle of twist may not be called slippage or intermittent slippage.

### General Applications

Roller Ramp Clutches may be used for the following applications:

#### Indexing

Transformation of a forward and backward movement into an intermittent rotary motion.

Used for material feeding.

#### Overrunning

Connecting or disconnecting a dual drive system.

#### Backstopping

Preventing counter rotation caused by the driven part at drive failure.

Used as a safety device.

### The Best Choice

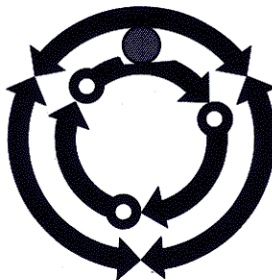
The best choice of the most effective product out of our program depends on the following parameters, significant for certain operating conditions:

- Torque to be transmitted;
- Number of load cycles per minute and in total;
- Maximum overrunning or differential speed.

### Indexing

Design efficiency is enhanced when the outer ring is the driving component, oscillating back and forth. At intermittent rotation of the inner ring, motion can be made almost continuous by mounting clutches side by side with overlapping actuation. Increased spring force can be supplied for very high indexing requirements. The use of light weight oils and the addition of a second clutch for backstopping will improve efficiency.

The above mentioned necessity of some elastic deformation, resulting in a certain angle of twist, has to be taken into consideration to find the best ratio of nominal torque to applied torque.

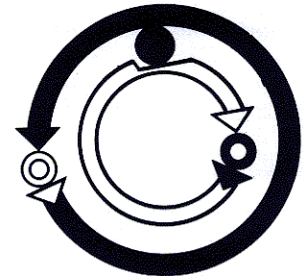


### Indexing Applications

Printing and Paperhandling;  
Textile and Sewing Machines;  
Transportsystems and Packaging;  
Agricultural Machines.

### Overrunning

Overrunning clutches achieve maximum performance when the inner ring is the slowest or stationary part.

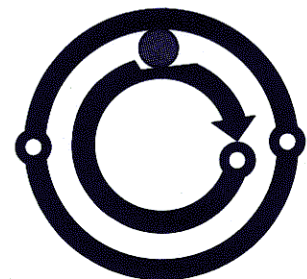


### Overrunning Applications

Starter Units – Auxiliary Drives;  
Auxiliary Power Equipment;  
Conveyers – Turbines;  
Bakery and Cutlery Equipment.

### Backstopping

Backstops operate best when the outer ring is held stationary allowing the inner ring to rotate freely in one direction. The use of low viscosity lubricants is important. For very high speeds where RPM exceeds catalog ratings we often suggest circulating oil systems. Consult GMN when in doubt.



### Backstopping Applications

Winches – Cranes – Elevators;  
Gearboxes – Pumps – Ventilators;  
Powerplant Equipment.

### The Best Choice

All clutch types shown in this catalog except VGV and VEK will fulfill any type of clutch applications such as Indexing – Overrunning – Backstopping in accordance to the limits, shown in the type-specific descriptions and diagrams, when properly installed. They all require proper lubrication with lubricants as per our recommendations shown on page 13, by either oil mist, oil sump or through oil lubrication.

### Type Series VS / VSNU / VF

These clutches are not self supporting and require outside bearing support to guarantee absolute concentric operation of inner and outer ring as a prerequisite for optimum performance. Axial misalignments and thrust loads should be avoided.

Dimensions see page 5

### Type Series VGF

This series has got its own bearing support by sleeve bushings for sizes VGF 8 to 20 and by ball bearings for sizes VGF 25 and up.

Dimensions see page 6

### Type Series VGV

Clutches of this series are supported by means of sleeve bushings. The series can be used for indexing and backstopping devices by means of the momentum lever or torque arm (lever arm). Units are double sealed by the sleeve bushings to retain lubricants and eliminate contamination. At higher operating temperatures sealing efficiency can be increased by mounting additional contact seals upon request.

Dimensions see page 7

### Type Series VGL and VGLP

Ball bearings of series 16000 are standard with this GMN series. Bearing life is in accordance to bearing manufacturers guidelines. Flexibility is the key to the success of this series since

many different combinations can be obtained with our line of standard covers and flanges or customer oriented specials. They can be used inside or outside of housings.

Inside applications do not require extra sealing, as long as the lubricant fulfills our general requirements and suggestions. Outside applications need lubricants as per our suggestions and some kind of sealing depending on the combination used.

When using the basics of our "Building Block" system, including flanges, seals, covers and bolts, almost every application requirement can be obtained. For situations where idling and/or locking direction are not specified, GMN will ship components as separate pieces to allow greater customer flexibility. GMN will also be pleased to ship assembled units provided complete part descriptions with locking and/or idling directions are specified.

How do you specify idling or locking direction properly?

Idling direction Right:  
Looking in direction to cover D . . . the inner ring will overrun clock-wise (turning to the right).

Idling direction Left:  
Just opposit.

When the clutch is used as an indexing element, please specify locking direction.

Locking direction Right:  
Just opposit to idling direction.

Please make sure, to specify your needs properly, to avoid misunderstanding and wrong supply. The best way would be to specify your needs on the base of idling direction.

The VGL type clutches can be supplied in combination with a flexible coupling, especially when used as overrunning device.

Dimensions see pages 8–10

### Type Series VEK

This series shows a force operated, mechanical indexing element. Basically designed as a single revolution clutch, its capability is not limited to single, but multiple revolutions, depending on the actuating and controlling mechanism.

The torque is transmitted by rollers, guided in a solid cage. Whenever the

pawl hits the stop, the rollers will be disengaged, thus separating the driven part at a predetermined number of revolutions from the continuously rotating driving part. When the pawl is released again, driven and driving member are connected instantaneously.

This system provides perfect performance with a 100 % repeatability of every single indexing operation.

Dimensions see page 11

### Customer Oriented Specials

GMN would be pleased to consider any application where modification of our existing line of clutches can be accomplished to fit a specific need. Often we must request detailed drawings of mating parts in order to do the best job of selection and design. In cases where we must replace a competitors clutch not providing adequate service life we may also have to ask for on site visits.

Please make sure, that we get any information, which might be of importance, even things which may be absolutely normal for you, may be of special interest for us, when designing a special.

### Type Series VS / VSNU / VF

Dimensions see page 5

#### Bearing support:

Additional bearing required

Torque transmission from the shaft to the inner ring is achieved by key and keyway connection:

**VS 8 to 12; VSNU 8 to 12; VF**  
DIN 6885 page 1

**VS 15 to 60; VSNU 15 to 80;**  
DIN 6885 page 3

Tolerances for shafts h6 or j6.

Torque transmission from the outer part to the outer ring can be arranged by press fit or key connection to the outer rings face.

*Tolerances for hubs with press fit:*  
**VS H7 or J6; VSNU K6; VF J6.**

*Tolerances for hubs with face key:*  
**VSNU H7 or F7; VF H7 or G7.**

Tolerances see page 14.

#### Diagrams:

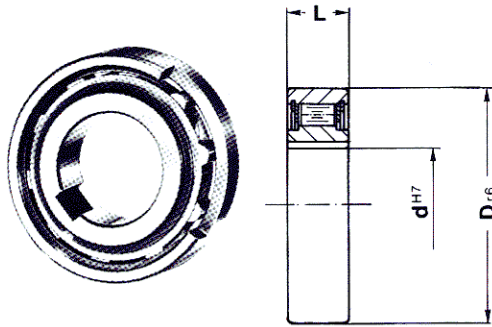
Idling Speed

Number of Load Strokes see page 8.

## Type Series VS – VSNU – VF

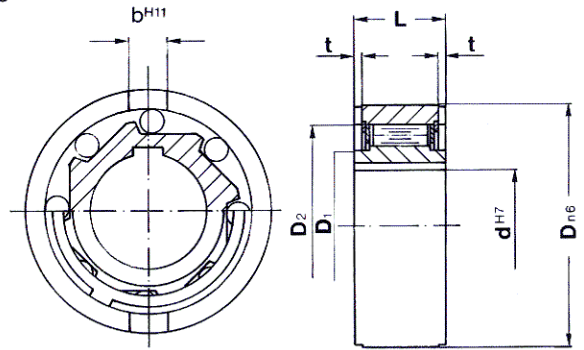
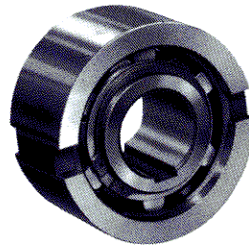
### Series VS

Connecting dimensions like ball bearings series 6200



### Series VSNU

Connecting dimensions like roller bearings series NU 2300

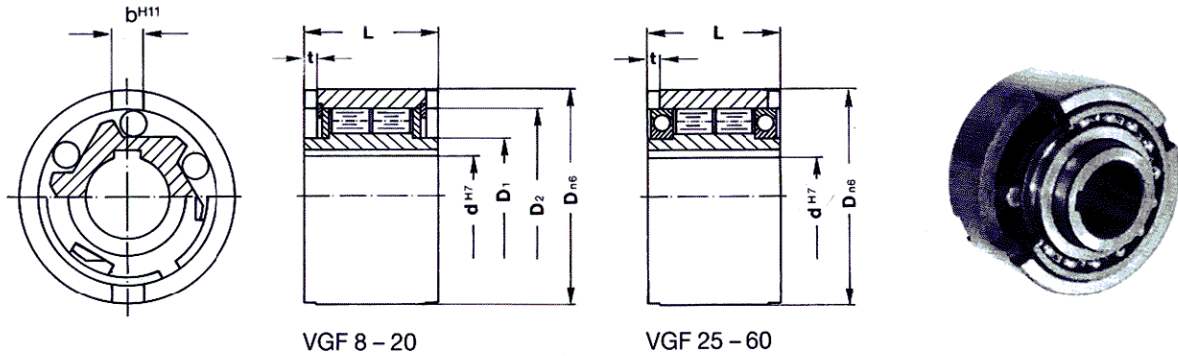


Size	Torque $T_{\text{norm}}$ Nm	Torque $T_{\text{nom}}$ ft lb	$d^{H7}$ mm	D mm	L mm	$D_1$ min mm	$D_2$ mm	Face Key $b^{H11}$ mm	t mm	Weight kg
<b>VS 8</b>	2.5	1.85	8	24	8	-	-			0.02
<b>VS 10</b>	5.8	4.25	10	30	9	-	-			0.03
<b>VS 12</b>	8.7	6.40	12	32	10	-	-			0.05
<b>VS 15</b>	9.7	7.15	15	35	11	-	-			0.08
<b>VS 20</b>	31	22.85	20	47	14	-	-			0.12
<b>VS 25</b>	40	29.50	25	52	15	-	-			0.15
<b>VS 30</b>	72	53.1	30	62	16	-	-			0.24
<b>VS 35</b>	107	78.9	35	72	17	-	-			0.32
<b>VS 40</b>	137	101	40	80	18	-	-			0.40
<b>VS 45</b>	163	120	45	85	19	-	-			0.45
<b>VS 50</b>	174	128	50	90	20	-	-			0.50
<b>VS 60</b>	330	243	60	110	22	-	-			0.60
VSNU 8	8.5	6.25	8	35	13	-	28	4	1.3	0.08
<b>VSNU 12</b>	8.5	6.25	12	35	13	-	28	4	1.3	0.06
<b>VSNU 15</b>	29	21.35	15	42	18	-	36	5	1.7	0.1
VSNU 17	45	33.15	17	47	19	-	36	5	2.0	0.15
<b>VSNU 20</b>	72	53.1	20	52	21	-	45	6	1.5	0.2
<b>VSNU 25</b>	100	73.7	25	62	24	-	52	8	2.0	0.4
<b>VSNU 30</b>	165	122	30	72	27	-	60	10	2.5	0.55
<b>VSNU 35</b>	245	180	35	80	31	-	70	12	3.5	0.75
<b>VSNU 40</b>	345	254	40	90	33	-	78	12	3.5	0.9
<b>VSNU 45</b>	545	402	45	100	36	-	85	14	3.5	1.3
<b>VSNU 50</b>	730	538	50	110	40	-	92	14	4.5	1.7
<b>VSNU 60</b>	960	707	60	130	46	-	110	18	5.5	2.8
VSNU 70	1600	1179	70	150	51	-	125	20	6.5	4.2
VSNU 80	2400	1769	80	170	58	-	140	20	7.5	6.0
<b>VF 8</b>	14.5	10.7	8	37	20	19	30	6	3.0	0.1
<b>VF 12</b>	14.5	10.7	12	37	20	19	30	6	3.0	0.1
<b>VF 15</b>	40	29.5	15	47	30	23	37	7	3.5	0.3
<b>VF 20</b>	90	66.3	20	62	36	35	50	8	3.5	0.6
<b>VF 25</b>	175	129	25	80	40	40	68	9	4.0	1.1
<b>VF 30</b>	325	239	30	90	48	45	75	12	5.0	1.6
<b>VF 35</b>	400	295	35	100	53	50	80	13	6.0	2.3
<b>VF 40</b>	600	442	40	110	63	55	90	15	7.0	3.1
<b>VF 45</b>	840	619	45	120	63	60	95	16	7.0	3.7
VF 50	1500	1105	50	130	80	70	110	17	8.5	5.3
VF 55	1560	1150	55	140	80	75	115	18	9.0	6
VF 60	2350	1732	60	150	95	80	125	18	9.0	8.4

**Bold type sizes:** stock items or short term delivery.

Mounting instructions see page 4.

## Type Series VGF



Size	Torque		Bearing Type	d <sup>H7</sup> mm	D <sub>n6</sub> mm	L mm	D <sub>1</sub> min mm	D <sub>2</sub> mm	Face Key		Weight kg
	T <sub>nom</sub> Nm	T <sub>nom</sub> fl lb							b <sup>H11</sup> mm	t mm	
<b>VGF 8</b>	14.5	10.7	Sleeve Bear.	8	37	20	19	30	6	3.0	0.1
<b>VGF 12</b>	14.5	10.7	Sleeve Bear.	12	37	20	19	30	6	3.0	0.1
<b>VGF 15</b>	40	29.5	Sleeve Bear.	15	47	30	23	37	7	3.5	0.3
<b>VGF 20</b>	90	66.3	Sleeve Bear.	20	62	36	35	50	8	3.5	0.6
<b>VGF 25</b>	175	129	16008	25	80	40	40	68	9	4.0	1.2
<b>VGF 30</b>	325	239	16009	30	90	48	45	75	12	5.0	1.8
<b>VGF 35</b>	400	295	16010	35	100	53	50	80	13	6.0	2.4
<b>VGF 40</b>	600	442	16011	40	110	63	55	90	15	7.0	3.3
<b>VGF 45</b>	840	619	16012	45	120	63	60	95	16	7.0	4.0
VGF 50	1500	1105	16014	50	130	80	70	110	17	8.5	5.7
VGF 55	1560	1150	16015	55	140	80	75	115	18	9.0	6.5
VGF 60	2350	1732	16016	60	150	95	80	125	18	9.0	8.9

**Bold type sizes** – stock items or short term delivery.

**Bearing Support:**

See table of dimensions.

**Keyway and Key:**

According to DIN 6885 p.1 – see Tolerance table page 14.

**Installation – Torque Transfer:**

From the shaft to the inner ring by keyway and key.  
From the outer ring to the housing by face key or press fit.

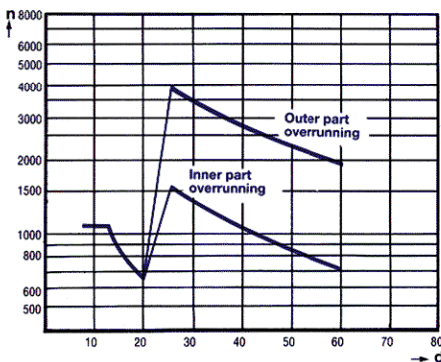
**Tolerances for customers part:**

Shaft d<sub>h6</sub> or d<sub>j6</sub>.  
Housing – face key D<sup>H7</sup> or D<sup>G7</sup>; Housing – press fit D<sup>J6</sup>.

**Lubrication:**

See our recommendations page 13.

### Idling Speed



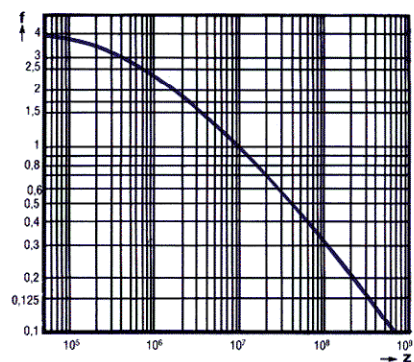
Speed limit

Oil Lubrication  
 $n \hat{=} f(d)$

Grease Lubrication  
 $n \hat{=} 0.5 f(d)$

The nominal torque, shown in the table of dimensions refers to 10<sup>7</sup> cycles. If you require a different number of cycles (z) you calculate admissible clutch torque by multiplying "T" by the factor "f" taken from the diagram or vice versa, if different torque is required.

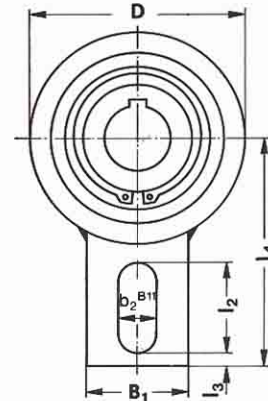
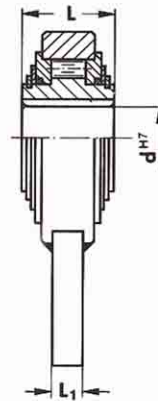
### Number of Load Strokes



# GMN Freewheel-Clutch

## Type Series VGV

# The Roller Ramp Line



Size	Torque $T_{\text{nom}}$ Nm	Torque $T_{\text{nom}}$ fl lb	$d^{H7}$ mm	D mm	L mm	$B_1$ mm	$L_1$ mm	$b_2$ mm	$l_2$ mm	$l_3$ mm	$l_4$ mm	Weight kg
<b>VGV 20</b>	440	324	20	83	35	40	12	15	35	5	90	1.3
<b>VGV 25</b>	440	324	25	83	35	40	12	15	35	5	90	1.3
<b>VGV 30</b>	2050	1510	30	118	54	40	15	15	35	8	110	3.5
<b>VGV 35</b>	2050	1510	35	118	54	40	15	15	35	8	110	3.4
<b>VGV 40</b>	2050	1510	40	118	54	40	15	15	35	8	110	3.3
<b>VGV 45</b>	3200	2358	45	155	54	80	20	18	35	10	140	5.5
<b>VGV 50</b>	3200	2358	50	155	54	80	20	18	35	10	140	5.4
<b>VGV 55</b>	3200	2358	55	155	54	80	20	18	35	10	140	5.3
<b>VGV 60</b>	3200	2358	60	155	54	80	20	18	35	10	140	5.2
<b>VGV 70</b>	3200	2358	70	155	54	80	20	18	35	10	140	5.0
<b>VGV 80</b>	5000	3685	80	190	64	80	20	20	40	10	155	9.0

**Bold type sizes:** stock items or short term delivery.

**Bearing Support:** Sleeve bearing.

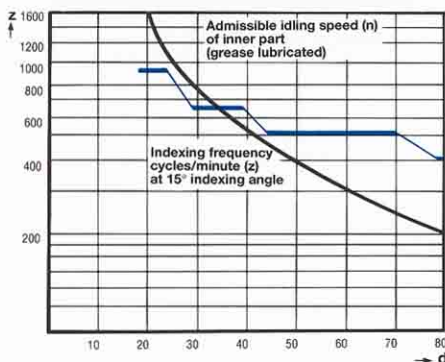
**Keyway and Key:** According to DIN 6885 p.1 – see Tolerance table page 14.

**Installation – Torque Transfer:** From the shaft to the inner ring by keyway and key – shaft tolerance  $d_{H6}$ . The momentum lever or torque arm requires free motion in axial direction, to avoid tilting forces to the bearings. Depending on the application we suggest different ways of mounting the momentum lever. Applied as a backstop, the torque arm should be fixed by two pieces of angle steel. Used as an indexing device, the actuating part (e. g. cylinder) might be attached at the slotted hole.

**Lubrication:** Grease packed for lifetime of service.

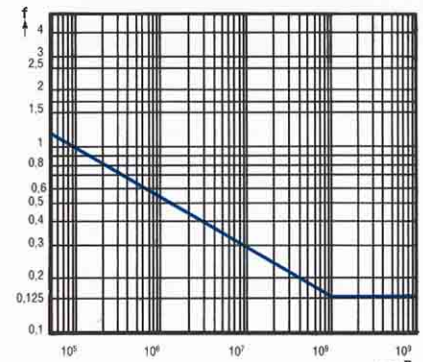
### Idling Speeds

### Indexing Frequency

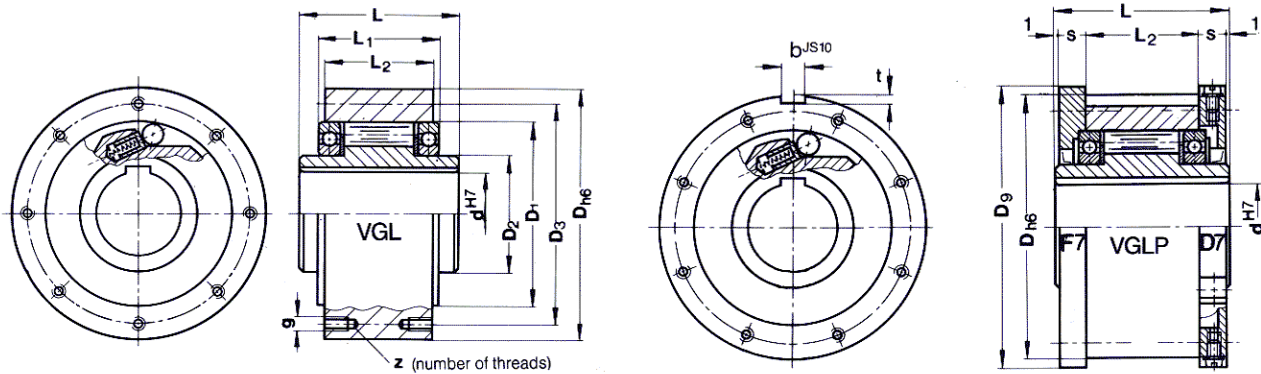


The nominal torque, shown in the table of dimensions refers to  $10^5$  cycles. If you require a different number of cycles (z) you calculate admissible clutch torque by multiplying "T" by the factor "f" taken from the diagram or vice versa, if different torque is required.

### Number of Load Strokes



## Type Series VGL – VGLP-F7-D7



Size	Torque		Bearing Type	d <sup>H7</sup>	D <sub>he</sub>	L	L <sub>1</sub>	L <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	g <sup>(2)</sup>	z	s	D <sub>9</sub>	b <sup>JS10</sup>	t	Weight	
	T <sub>nom</sub>	T <sub>enn</sub>																VGL	VGLP-F7-D7
<b>VGL 12/VGLP 12 · F7 - D7</b>	37	27	16004	12	62	42	27	20	42	20	51	Ø5.5	3	10	70	4	2.5	0.5	1
<b>VGL 15/VGLP 15 · F7 - D7</b>	58	43	16005	15	68	52	32	28	47	25	56	M 5	3	11	76	5	3	0.8	1.4
<b>VGL 20/VGLP 20 · F7 - D7</b>	140	103	16006	20	75	57	39	34	55	30	64	M 5	4	10.5	84	6	3.5	1.0	1.9
<b>VGL 25/VGLP 25 · F7 - D7</b>	175	129	16008	25	90	60	40	35	68	40	78	M 6	4	11.5	99	8	4	1.5	2.8
<b>VGL 30/VGLP 30 · F7 - D7</b>	325	240	16009	30	100	68	48	43	75	45	87	M 6	6	11.5	109	8	4	2.2	3.7
<b>VGL 35/VGLP 35 · F7 - D7</b>	400	295	16010	35	110	74	51	45	80	50	96	M 6	6	13.5	119	10	5	3.0	4.7
<b>VGL 40/VGLP 40 · F7 - D7</b>	600	442	16011	40	125	86	59	53	90	55	108	M 8	6	15.5	135	12	5	4.6	7.1
<b>VGL 45/VGLP 45 · F7 - D7</b>	840	619	16012	45	130	86	59	53	95	60	112	M 8	8	15.5	140	14	5.5	4.7	7.4
<b>VGL 50/VGLP 50 · F7 - D7</b>	1500	1105	16014	50	150	94	72	64	110	70	132	M 8	8	14	160	14	5.5	7.2	10.4
<b>VGL 55/VGLP 55 · F7 - D7</b>	1560	1150	16015	55	160	104	72	66	115	75	138	M 10	8	18	170	16	6	8.6	13.4
<b>VGL 60/VGLP 60 · F7 - D7</b>	2350	1732	16016	60	170	114	89	78	125	80	150	M 10	10	17	182	18	7	10.5	15.9
<b>VGL 70/VGLP 70 · F7 - D7</b>	3400	2506	16018	70	190	134	108	95	140	90	165	M 10	10	18.5	202	20	7.5	13.4	20.8
<b>VGL 80/VGLP 80 · F7 - D7</b>	4900	3611	16021	80	210	144	108	100	160	105	185	M 10	10	21	222	22	9	18.2	27

**Bold type sizes:** stock items or short term delivery.

(2) size VGL12 has 3 through holes 5.5 mm

**Bearing Support:** These series use 2 ball bearings series 16000.

**Keyway and Key:** According to DIN 6885 p.1 – see Tolerance table page 14.

**Installation – Torque Transfer:** From the shaft to the inner ring by keyway and key.  
From the outer ring to the mating part by high strength bolts (class 8)  
Tolerances: shaft d<sub>h6</sub> or d<sub>j6</sub> – mating part D<sup>H7</sup>.

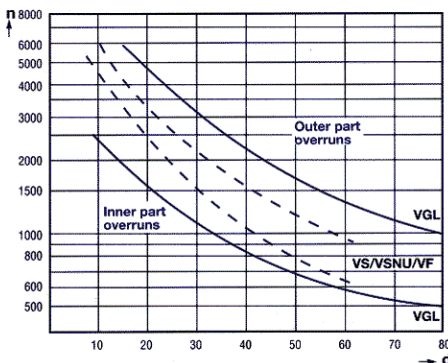
**Installation of complete units with covers, flanges or momentum lever: F2-F4-D2-D3:**

Please assemble all parts in accordance to the required idling or indexing direction. Make sure, that the inner ring is sealed on the shaft when using type D3, to avoid leakage by the keyway.

When using flange F5 please make sure to insert the torque bolt into the radially oriented slotted hole of the housing and be aware, that torque bolt is allowed to move freely in axial and radial direction to prevent bearing failure.

**Lubrication:** See our recommendations page 13.

### Idling Speed



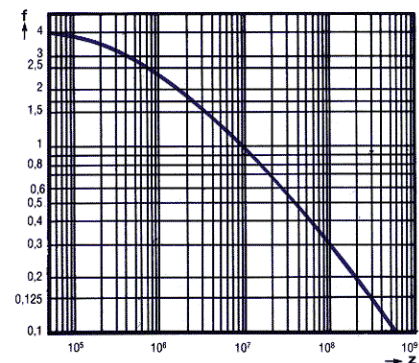
Speed limit

Oil Lubrication  
 $n \hat{=} f(d)$

Grease Lubrication  
 $n \hat{=} 0.5 f(d)$

The nominal torque, shown in the table of dimensions refers to  $10^7$  cycles. If you require a different number of cycles (z) you calculate admissible clutch torque by multiplying "T" by the factor "f" taken from the diagram or vice versa, if different torque is required.

### Number of Load Strokes



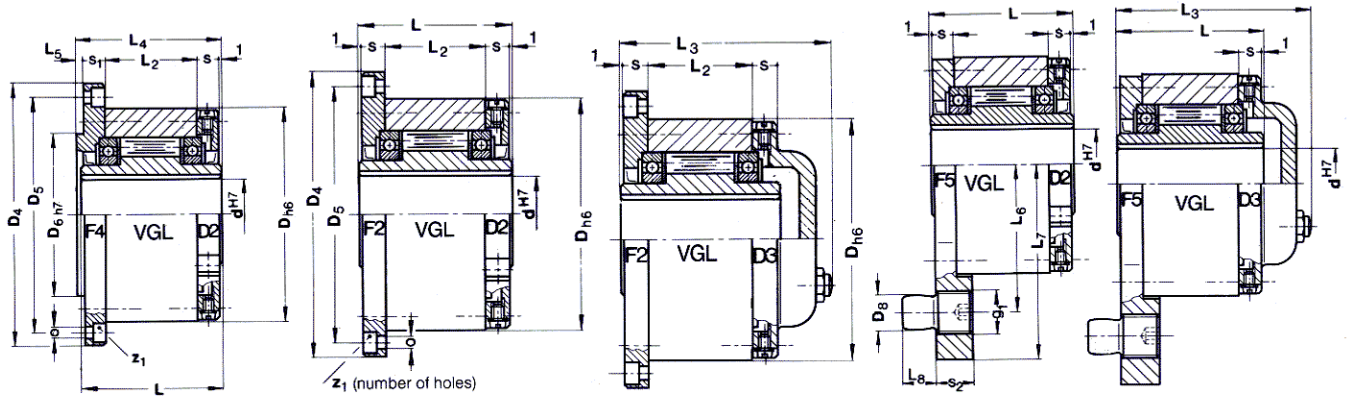


# GMN Freewheel-Clutch

# The Roller Ramp Line

## Type Series VGL - F2 (F4) - D2 (D3)

## VGL - F5 - D2 (D3)

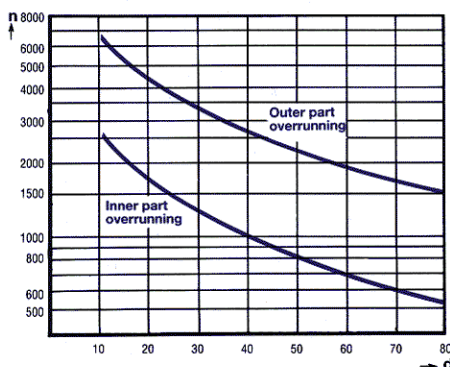


Size	Torque											Weight						
	T <sub>neff</sub> Nm	T <sub>nom</sub> ft lb	d <sup>H7</sup> mm	D <sub>h6</sub> mm	L mm	L <sub>2</sub> mm	L <sub>3</sub> mm	L <sub>4</sub> mm	L <sub>5</sub> mm	S mm	S <sub>1</sub> mm	D <sub>4</sub> mm	D <sub>5</sub> mm	D <sub>6 h7</sub> mm	o mm	z <sub>1</sub>	... D2 kg	... D3 kg
<b>VGL 12 · F2 (F4) - D2 (D3)</b>	37	27	12	62	42	20	64	44	3	10	10	85	72	42	5.5	3	0.9	1.2
<b>VGL 15 · F2 (F4) - D2 (D3)</b>	58	43	15	68	52	28	78	54	3	11	11	92	78	47	5.5	3	1.3	1.6
<b>VGL 20 · F2 (F4) - D2 (D3)</b>	140	103	20	75	57	34	82	59	3	10.5	10.5	98	85	55	5.5	4	1.7	1.9
<b>VGL 25 · F2 (F4) - D2 (D3)</b>	175	129	25	90	60	35	85	62	3	11.5	10.5	118	104	68	6.6	4	2.6	2.9
<b>VGL 30 · F2 (F4) - D2 (D3)</b>	325	240	30	100	68	43	95	70	3	11.5	11.5	128	114	75	6.6	6	3.5	3.9
<b>VGL 35 · F2 (F4) - D2 (D3)</b>	400	295	35	110	74	45	102	76	3.5	13.5	13	140	124	80	6.6	6	4.5	5.1
<b>VGL 40 · F2 (F4) - D2 (D3)</b>	600	442	40	125	86	53	115	88	3.5	15.5	15	160	142	90	9	6	6.9	7.7
<b>VGL 45 · F2 (F4) - D2 (D3)</b>	840	619	45	130	86	53	115	88	3.5	15.5	15	165	146	95	9	8	7.1	8.0
<b>VGL 50 · F2 (F4) - D2 (D3)</b>	1500	1105	50	150	94	64	123	96	4	14	13	185	166	110	9	8	10.1	11.2
<b>VGL 55 · F2 (F4) - D2 (D3)</b>	1560	1150	55	160	104	66	138	106	4	18	17	204	182	115	11	8	13.1	14.5
<b>VGL 60 · F2 (F4) - D2 (D3)</b>	2350	1732	60	170	114	78	147	116	4	17	16	214	192	125	11	10	15.6	17.5
<b>VGL 70 · F2 (F4) - D2 (D3)</b>	3400	2506	70	190	134	95	168	136	4	18.5	17.5	234	212	140	11	10	20.4	22.4
<b>VGL 80 · F2 (F4) - D2 (D3)</b>	4900	3611	80	210	144	100	178	146	4	21	20	254	232	160	11	10	26.7	28.0

Size	Torque											Weight		
	T <sub>neff</sub> Nm	T <sub>nom</sub> ft lb	d <sup>H7</sup> mm	L mm	L <sub>3</sub> mm	S mm	S <sub>2</sub> mm	L <sub>6</sub> mm	L <sub>7</sub> mm	L <sub>8</sub> mm	D <sub>8</sub> mm	g <sub>1</sub>	... D2 kg	... D3 kg
<b>VGL 12 · F5 - D2 (D3)</b>	37	27	12	42	64	10	13	44	59	10	10	M14	1.1	1.4
<b>VGL 15 · F5 - D2 (D3)</b>	58	43	15	52	78	11	13	47	62	10	10	M14	1.5	1.8
<b>VGL 20 · F5 - D2 (D3)</b>	140	103	20	57	82	10.5	15	54	72	11	12	M16	2.1	2.3
<b>VGL 25 · F5 - D2 (D3)</b>	175	129	25	60	85	11.5	18	62	84	14	16	M20x2	3.1	3.4
<b>VGL 30 · F5 - D2 (D3)</b>	325	240	30	68	95	11.5	18	68	92	14	16	M20x2	4.1	4.5
<b>VGL 35 · F5 - D2 (D3)</b>	400	295	35	74	102	13.5	22	76	102	18	20	M24x2	5.2	5.8
<b>VGL 40 · F5 - D2 (D3)</b>	600	442	40	86	115	15.5	22	85	112	18	20	M24x2	7.9	8.7
<b>VGL 45 · F5 - D2 (D3)</b>	840	619	45	86	115	15.5	26	90	120	22	25	M30x2	8.1	9
<b>VGL 50 · F5 - D2 (D3)</b>	1500	1105	50	94	123	14	26	102	135	22	25	M30x2	12.1	13.2
<b>VGL 55 · F5 - D2 (D3)</b>	1560	1150	55	104	138	18	30	108	142	25	32	M36x2	15.3	16.7
<b>VGL 60 · F5 - D2 (D3)</b>	2350	1732	60	114	147	17	30	112	145	25	32	M36x2	18	19
<b>VGL 70 · F5 - D2 (D3)</b>	3400	2506	70	134	168	18.5	35	135	175	30	38	M42x2	23	23.5
<b>VGL 80 · F5 - D2 (D3)</b>	4900	3611	80	144	178	21	35	145	185	30	38	M42x2	31.5	33

**Bold type sizes** – stock items or short term delivery.

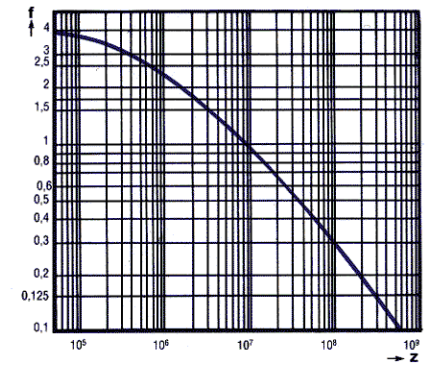
### Idling Speed



Speed limit  
Oil Lubrication  
 $n \hat{=} f(d)$   
Grease Lubrication  
 $n \hat{=} 0.5 f(d)$

The nominal torque, shown in the table of dimensions refers to  $10^7$  cycles. If you require a different number of cycles (z) you calculate admissible clutch torque by multiplying "T" by the factor "f" taken from the diagram or vice versa, if different torque is required.

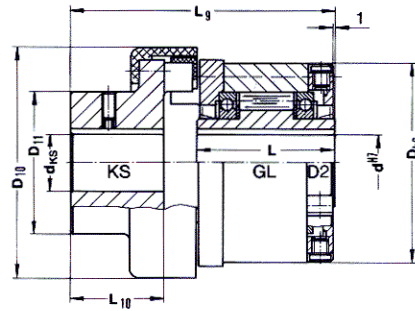
### Number of Load Strokes



# GMN Freewheel-Clutch

## Type Series VGL · KS - D2

# The Roller Ramp Line



Size	Torque		d <sup>H7</sup> mm	d <sub>KS</sub> <sup>H7 1)</sup> mm	D <sub>h6</sub> mm	L mm	L <sub>g</sub> mm	D <sub>10</sub> mm	D <sub>11</sub> mm	L <sub>10</sub> mm
	T <sub>KS</sub> Nm	T <sub>KS</sub> ft lb								
VGL 15.KS 4-D2	63	46.5	15	10 ... 35	68	52	110	78	55	40
VGL 15.KS 6.3-D2	58	42.8	15	12 ... 40	68	52	115	90	65	45
VGL 20.KS 6.3-D2	63	46.5	20	12 ... 40	75	57	120.5	90	65	45
VGL 20.KS 10-D2	100	73.7	20	12 ... 45	75	57	123.5	114	72	48
VGL 25.KS 6.3-D2	100	73.7	25	12 ... 38	90	60	122.5	90	65	45
VGL 25.KS 10-D2	100	73.7	25	12 ... 42	90	60	126.5	114	72	48
VGL 30.KS 10-D2	160	118	30	12 ... 42	100	68	133.5	114	72	48
VGL 30.KS 16-D2	160	118	30	12 ... 48	100	68	140	127	78	52
VGL 35.KS 16-D2	250	184	35	12 ... 48	110	74	143.5	127	78	52
VGL 35.KS 25-D2	250	184	35	14 ... 52	110	74	155	143	88	57
VGL 40.KS 25-D2	400	295	40	14 ... 52	125	86	163.5	143	88	57
VGL 40.KS 40-D2	400	295	40	18 ... 55	125	86	173	158	96	61
VGL 45.KS 40-D2	630	464	45	18 ... 55	130	86	171.5	158	96	61
VGL 45.KS 63-D2	630	464	45	20 ... 65	130	86	186	181	110	67
VGL 50.KS 63-D2	630	464	50	20 ... 65	150	94	194	181	110	67
VGL 50.KS 100-D2	1000	737	50	28 ... 70	150	94	208.5	202	120	75
VGL 55.KS 100-D2	1000	737	55	28 ... 75	160	104	216	202	120	75
VGL 60.KS 100-D2	1000	737	60	28 ... 75	170	114	227	202	120	75
VGL 60.KS 160-D2	1600	1179	60	32 ... 80	170	114	243	230	130	82

1) Bore size range for flexible coupling. If not specified we will supply d<sub>KS</sub><sup>H7</sup> = d<sup>H7</sup>

This series is a combination of a standard GMN VGL-D2 freewheel-clutch and a flexible KS coupling to connect two shafts, especially when shock loads and some vibrations have to be absorbed or if small radial or axial misalignment may occur.

**Keyway and Key:** According to DIN 6885 p.1 – see Tolerance table page 14.

**Installation:** This combination will provide maximum service life when the clutch outer ring is the overrunning member.

**Tolerances:** Shafts Ø d<sub>h6</sub> or Ø d<sub>j6</sub> – Ø d<sub>KS</sub><sub>h6</sub> or d<sub>KS</sub><sub>j6</sub>

**Lubrication:** See our recommendations page 13.

### Service Factors

Service Factors shown are valid for room temperature and if there are no shock loads. Use the following tables to determine the proper service factor.

$$T_{zul} = 9550 \cdot \frac{P}{n} \cdot k_A \cdot k_Z \cdot k_T \cdot k_M \leq T_{KS} \text{ (Nm)}$$

with P= power (kW) and n= speed (RPM)

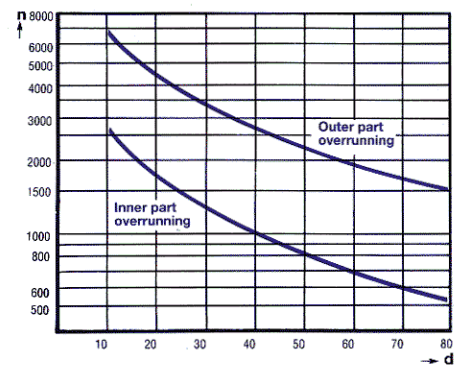
$$T_{adm} = 5252 \cdot \frac{P}{n} \cdot k_A \cdot k_Z \cdot k_T \cdot k_M \leq T_{KS} \text{ (ft lb)}$$

with P= power (hp) and n= speed (RPM)

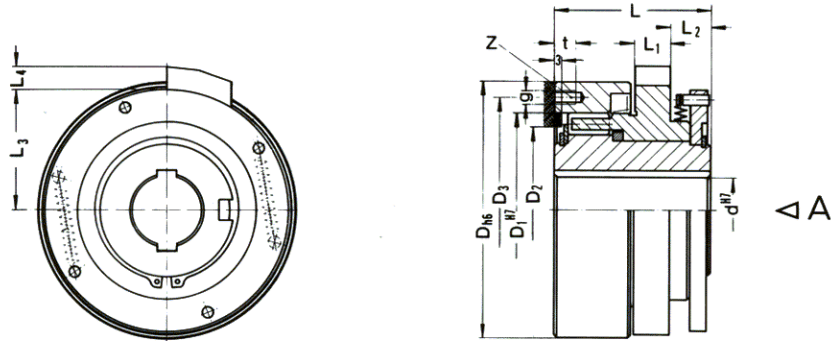
Suggested Service Factors:

Drive	Electric Motor Turbine	Combustion engine					
		> 4 cylinders	3 cylinders	1-2 cylinders			
k <sub>A</sub> Drive Factor	1.0	1.2	1.5	3.0			
Starts per Hour	up to 30	30-60	60-120	120-240	240-480		
k <sub>Z</sub> Start Factor	1.0	1.1	1.2	1.3	1.6		
Temperature (room)	C°	-30 to +30	40	50	60	70	80
	F°	-22 to 86	104	122	140	158	176
k <sub>T</sub> Temperature factor	1.0	1.1	1.2	1.3	1.5	1.6	
Load applied at driven equipment		smooth	variable	shock			
k <sub>M</sub> Mass Factor		1.0 to 2.0	2.1 to 3.0	3.1 to 4.4			

### Idling Speed



## Type Series VEK



Size	Torque		Inertia kgm <sup>2</sup>	d <sup>H7</sup> mm	D <sub>h6</sub> mm	L mm	L <sub>1</sub> mm	L <sub>2</sub> mm	L <sub>3</sub> mm	min. L <sub>4</sub> mm	D <sub>1</sub> <sup>H7</sup> mm	D <sub>2</sub> mm	D <sub>3</sub> mm	g	t mm	z No
	T <sub>nom</sub> Nm	T <sub>nom</sub> ft lb														
<b>VEK 10</b>	15	11	0.00025	10	55	43	12	12	26	7	35	28	45	M 4	7	4
VEK 15	25	18.40	0.0005	15	62	43	12	11	31.5	7	42	37	52	M 5	8	5
<b>VEK 20</b>	60	44.20	0.0012	20	75	62	13	15	36	7	52	42	64	M 5	9	6
<b>VEK 30</b>	160	118	0.011	30	120	80	17	18	58	10	85	72	102	M 6	11	6
VEK 40	420	309	0.042	40	155	108	26	24	74	14	120	100	136	M 8	13	8
VEK 50	650	479	0.089	50	185	113	26	30	90	14	140	120	162	M 10	15	8

**Bold type sizes:** stock items or short term delivery.

### Bearing Support:

This series does not carry bearing support. It requires exact guidance at the driving flange which has to be bearing supported as well.

There are two options for guidance: D<sub>h6</sub> combined with D<sup>J6</sup>; or D<sub>1</sub><sup>H7</sup> combined with D<sub>1</sub><sup>J6</sup>.

### Keyway and Key:

According to DIN 6885 p.1 – see Tolerance table page 14.

### Installation – Torque Transfer:

From the driving flange to the VEK outer ring by high strength bolts (class 8).

From the VEK inner ring to the driven shaft by keyway and key.

Shaft tolerance – d<sub>h6</sub> or d<sub>j6</sub>.

For proper disengagement a minimum of driven mass will be required depending on the speed. Within the limits, shown in the diagram “driving speed” below, the inertia of the VEK clutch itself will be sufficient for proper disengagement.

It is recommended that the driven shaft also includes a backstop clutch to prevent counter rotation at disengagement.

### Lubrication:

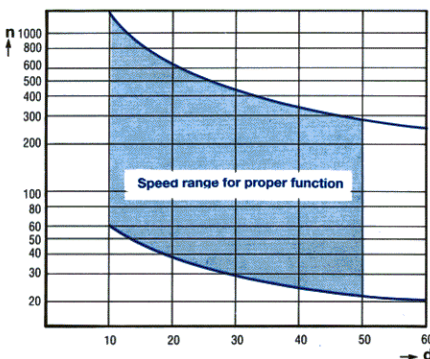
See our recommendations – page 13.

## Sense of Rotation

Please make sure to order the right sense of rotation by following the determination below:

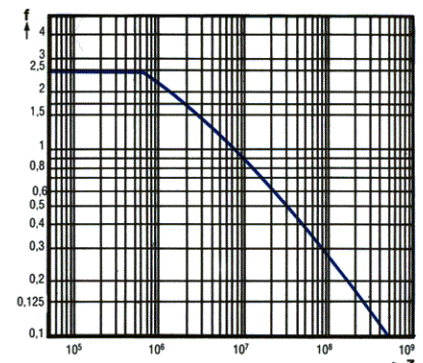
Sense of rotation Right: View from A – Torque will be transferred clockwise. Left: Just opposit.

## Driving Speed



The nominal torque, shown in the table of dimensions refers to 10<sup>7</sup> cycles. If you require a different number of cycles (z) you calculate admissible clutch torque by multiplying “T” by the factor “f” taken from the diagram or vice versa, if different torque is required.

## Number of Load Strokes



### Torque Calculation

Nominal torque of drive

$$T_{AN} = 9550 \frac{P}{n} \quad (\text{Nm})$$

$$T_{AN} = 5252 \frac{P}{n} \quad (\text{ft lb})$$

Nominal torque of driven part

$$T_{LN} = F \cdot l$$

Accelerating torque of load side

$$T_a = \frac{J_{LK} \cdot \Delta n}{9.55 \cdot t_a} \quad [\text{Nm}]$$

Inertia in general

$$J = m \cdot r^2 \quad [\text{kg m}^2]$$

Inertia of a ring shaped part

$$J = 98,175 (D_a^4 - D_i^4) B \cdot \rho \cdot 10^{-3} \quad [\text{kg m}^2]$$

P = Power of driving unit

n = Speed of clutch at torque transfer

(kW)

(RPM)

P = Power of driving unit

n = Speed of clutch at torque transfer

(hp)

(RPM)

F = Peripheral force of driven side at the clutch

l = Torque arm of peripheral force

(N) (lb)

(m) (ft)

J<sub>LK</sub> = Inertia of load side reduced to the clutch shaft

(kgm<sup>2</sup>)

$$J_{LK} = J_x \left( \frac{n_x}{n_k} \right)^2$$

J<sub>x</sub> = Inertia reduced to the shaft x

(kgm<sup>2</sup>)

n<sub>x</sub> = Speed of shaft x

(RPM)

n<sub>k</sub> = Speed of clutch shaft

(RPM)

Δn = Differential speed between beginning and finish

(RPM)

t<sub>a</sub> = Time of acceleration

m = Mass

(kg)

r = Radius

(m)

D<sub>a</sub> = Outer diameter

(m)

D<sub>i</sub> = Inner diameter

(m)

B = Width

(m)

ρ = Specific weight

(kg/m<sup>3</sup>)

Conversion factors see page 2

### List of Interchanges

Our Roller Ramp Clutches shown in this catalog may be used as interchanges to the following sizes of other brands.

GMN	Other brands			Remarks
<b>VS</b>	NSS	AS	BSS	Insert Clutch. Totally interchangeable.
<b>VSNU</b>	NFS	ASNU	BFS	Insert Clutch. Interchangeable. ASNU might have larger axial clearance than others.
<b>VF</b>	NF	AE	BNF	Insert Clutch. Interchangeable, with the exception, that AE sizes 20 and up are narrower than all other brands, which are identical.
<b>VGf</b>	NFR	ANG/ANR	BNFR	Insert Clutch. Totally interchangeable.
<b>VGv</b>	RS/BW	AV	RS/BF	Backstop or Indexing Device to be mounted outside housing. VGv and AV are interchangeable roller-ramp-clutches, which do not exactly match with the sprag-type-clutches RS/BW and RS/BF.
<b>VGL (P)</b>	GFR (N)	AL (P)	GFRS (N)	Building Block System Outer dimensions almost identical. But AL sizes 15 and up have through holes instead of threaded holes. Size 25 shows different configurations at different brands. AL 25 : 6 mounting holes / 5.5 mm. VGL / GFR / GFRS 25 2 x 4 mounting threads M6. All other sizes of any brand show identical patterns.
<b>VGL...F2-D2</b> <b>VGL...F4-D2</b> <b>VGL...F5-D2</b> <b>VGL...F5-D3</b> <b>VGL...KS-D2</b> <b>VGL...F7-D7</b>	GFR...F1-F2 GFR...F2-F7 GFR...F2-F3 GFR...F3-F4 GFR...ES-F2 GFRN...F5-F6	AL...F2-D2 AL...F4-D2 AL...F5-D2 AL...F5-D3 AL...KMS-D2 ALP...F7-D7	GFRS...D1-D2 GFRS...D2-D7 GFRS...D2-D3 GFRS...D3-D4  GFRSN...D5-D6	Standard Cover Combinations. Most of the complete assemblies are absolutely interchangeable. With single flanges and covers the situation may be different – see above.

These remarks are supposed to offer some information which products of other brands can be substituted by our clutches without any intention to point out GMN quality performance characteristics.

## Lubrication

### Lubrication

Freewheel-Clutches transmit torque by friction. For optimum life and performance use oil types CL as per DIN 51517 part 2 or CLP as per DIN 51517 part 3. There are no molybdenedisulfite or graphite additives allowed.

Before use, GMN clutches should be cleaned with a stoddard solvent; do not use trichloroethylene or similar products. After cleaning, clutches should be filled with lubricants as recommended below up to 1/3 of outer raceway diameter when used in horizontal position.

Changing of oil on a regular basis will increase the life and performance of the clutch operation. We recommend a first changing of oil after 10 hours of use and then in intervals of 2000 hours when clutches are used with maximum over-running speed.

At high speeds it is absolutely necessary to use oil or oilmist lubrication.

Operating temperature	Oil -20° C... +30° C - 4° F to +86° F	Oil +10° C... + 50° C +50° F... +122° F	Oil + 40° C... + 80° C +104° F... +176° F	Grease
Lubricant	CL 10 CLP 10	CL 22 CLP 22	CL 46 CLP 46	Grease K Grease KT
Viscosity at 40° C (104° F) ISO-VG DIN 51519	10 mm <sup>2</sup> /s (cSt)	22 mm <sup>2</sup> /s (cSt)	46 mm <sup>2</sup> /s (cSt)	
ESSO	NUTO H 10	NUTO H 22	NUTO H 46	BEACON 2
CASTROL	HYSPIV VHG 10	HYSPIV VG 22	HYSPIV VG 46	CASTROL LZV
KLÜBER LUBRICATION	CRUCOLAN 10	CRUCOLAN 22	CRUCOLAN 46	ISOFLEX LDS 18 SPECIAL A
OPTIMOL	ULTRA 10	ULTRA 22	ULTRA 46	LONGTIME PD1
SHELL	TELLUS OEL 10	TELLUS OEL 22	TELLUS OEL 46	ALVANIA Grease R2

### Tolerance Table

Normal size in mm; Tolerance in 0.001 mm = .000039 inch

Housing														
Extract of DIN 7161														
Housing Diameter	Above	3	6	10	18	30	50	80	120	180	250			
	To	6	10	18	30	50	80	120	180	250	315			
Tolerance Zone	F 7	+22	+28	+34	+41	+50	+60	+71	+83	+96	+108			
		+10	+13	+16	+20	+25	+30	+36	+43	+50	+ 56			
	G 7	+16	+20	+24	+28	+34	+40	+47	+54	+61	+ 69			
		+ 4	+ 5	+ 6	+ 7	+ 9	+10	+12	+14	+15	+ 17			
	H 7	+12	+15	+18	+21	+25	+30	+35	+40	+46	+ 52			
		0	0	0	0	0	0	0	0	0	0			
H 11		+75	+90	+110	+130	+160	+190	+220	+250	+290	+320			
		0	0	0	0	0	0	0	0	0	0			
J 6		+ 5	+ 5	+ 6	+ 8	+10	+13	+16	+18	+22	+ 25			
		- 3	- 4	- 5	- 5	- 6	- 6	- 6	- 7	- 7	- 7			
K 6		+ 2	+ 2	+ 2	+ 2	+ 3	+ 4	+ 4	+ 4	+ 5	+ 5			
		- 6	- 7	- 9	-11	-13	-15	-18	-21	-24	- 27			

Shaft														
Extract of DIN 7160														
Shaft Diameter	Above	3	6	10	18	30	50	80	120	180	250			
	To	6	10	18	30	50	80	120	180	250	315			
Tolerance Zone	h 6	0	0	0	0	0	0	0	0	0	0			
		-8	-9	-11	-13	-16	-19	-22	-25	-29	-32			
j 6		+6	+7	+ 8	+ 9	+11	+12	+13	+14	+16	+16			
		-2	-2	- 3	- 4	- 5	- 7	- 9	-11	-13	-16			

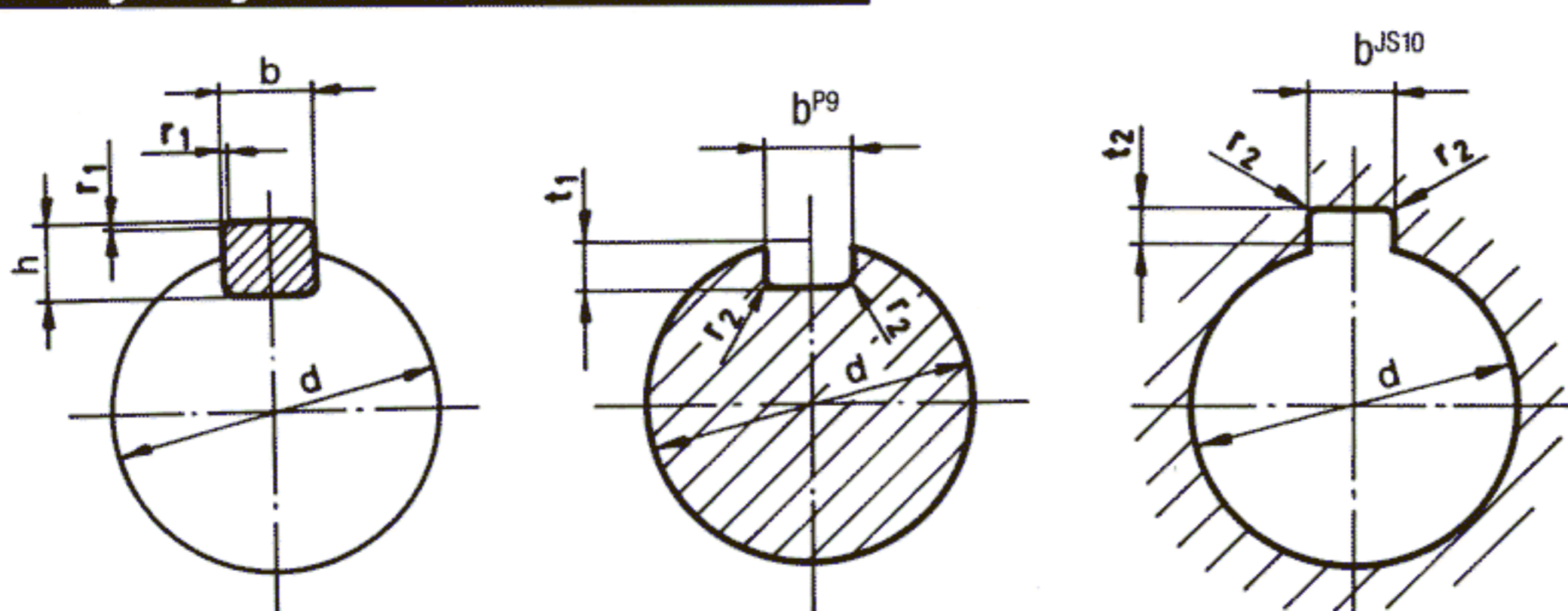
  

Keyway																
Extract of DIN 6885 Bl. 1																
Shaft Size	Above	8	10	12	17	22	30	38	44	50	58	65	75	85	95	110
	To	10	12	17	22	30	38	44	50	58	65	75	85	95	110	130
Key Size (width x height) b x h		3x3	4x4	5x5	6x6	8x7	10x8	12x8	14x9	16x10	18x11	20x12	22x14	25x14	28x16	32x18
Tolerance Zone JS 10		±20	±24			±29		±35				±42			±50	
Tolerance Zone P 9		- 6	-12			-15		-18				-22			-26	
		-31	-42			-51		-61				-74			-88	
Depth of keyway (shaft) t <sub>1</sub>		1.8	2.5	3	3.5	4	5	5	5.5	6	7	7.5	9	9	10	11
Depth of keyway (hub) t <sub>2</sub>		1.4	1.8	2.3	2.8	3.3	3.3	3.3	3.8	4.3	4.4	4.9	5.4	5.4	6.4	7.4
Tolerance		+ 100					+ 200									

Keyway																
Extract of DIN 6885 Bl. 3																
Shaft Size	Above			12	17	22	30	38	44	50	58	65	75	85	95	110
	To			17	22	30	38	44	50	58	65	75	85	95	110	130
Key Size (width x height) b x h				5x3	6x4	8x5	10x6	12x6	14x6	16x7	18x7	20x8	22x9	25x9	28x10	32x11
Tolerance Zone JS 10				±24	±29		±35				±42			±50		
Tolerance Zone P 9				-12	-15		-18				-22			-26		
				-42	-51		-61				-74			-88		
Depth of keyway (shaft) t <sub>1</sub>				1.9	2.5	3.1	3.7	3.9	4	4.7	4.8	5.4	6	6.2	6.9	7.6
Depth of keyway (hub) t <sub>2</sub>				1.2	1.6	2	2.4	2.2	2.1	2.4	2.3	2.7	3.1	2.9	3.2	3.5
Tolerance				+ 200												

### Keyway Information



### Bolts – Torque indicating wrench

Bolts	Class 8	Class 9	series	series
Type	tightening torque [Nm]		VGL, VGLP	VEK
M 4	3.5	4		10
M 5	7	8.5	12, 15	15, 20
M 6	12.5	14.5	20, 25, 30, 35	30
M 8	30	35	40, 45, 50	40
M10	60	70	55, 60, 70, 80	50
M12	105	120		

Thread length in outer ring: 1.5 x Bolt Type

# GMN Freewheel-Clutch

## The Basic Sprag-Type Freewheel-Clutch Series

With this catalog we have shown to you the GMN Freewheel-Clutch Roller Ramp Line.

The basic GMN Freewheel-Clutch program is based on a large variety of Sprag-Type Freewheel-Clutches which have proven their reliability over decades, worldwide.

Below we want to give you a short first impression of this program which is built by two type ranges based on two sprag sizes (4 mm, 8.33 mm) which create Series 400 – Series 8000.

### Series 400

Sprags height 4 mm  
Catalog 9013 E or 9050 E

Insert elements: **FE 400 (M, Z, Z2)**  
Clutch bearing support: **RL 400**



**FE 400 FE 400Z FE 400Z2 RL 400**

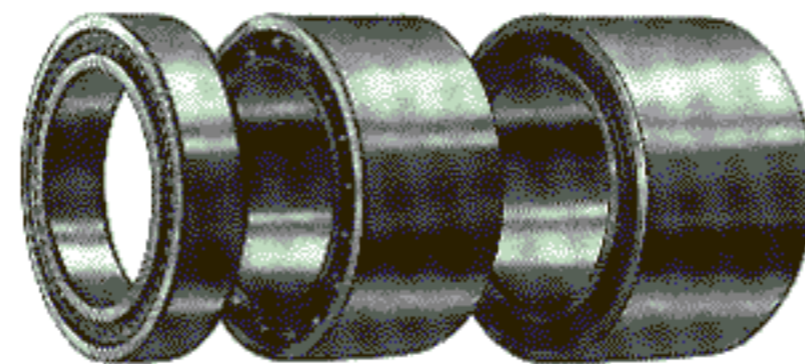
The mating parts must be hardened and ground.

*Diameter range (shaft):*

FE 400	Ø14 to 80 mm
FE 400 Z	Ø 4 to 80 mm
FE 400 Z2	Ø 2 to 60 mm
RL 400	Ø 4 to 80 mm

Freewheels with pressfit at inner and outer ring:

**FR 400 (M, Z)**  
With race rings – unsupported  
**FP 400 (M, Z)**  
With race rings – supported  
**FPD 400 (M, Z)**  
With race rings – supported  
Sealed on both sides



**FR 400 FP 400 FPD 400**

*Diameter range (shaft):*

FR 400	Ø10 to 60 mm
FP 400	Ø10 to 60 mm
FPD 400	Ø30 + 40 mm

**Backstop with torquearm:  
RA 400**

Sealed on both sides



**RA 400**

*Diameter range (shaft):*  
Ø15 to 40 mm

**Freewheels in bearing dimensions,  
pressfit at inner and outer ring:**

**FK 62..**

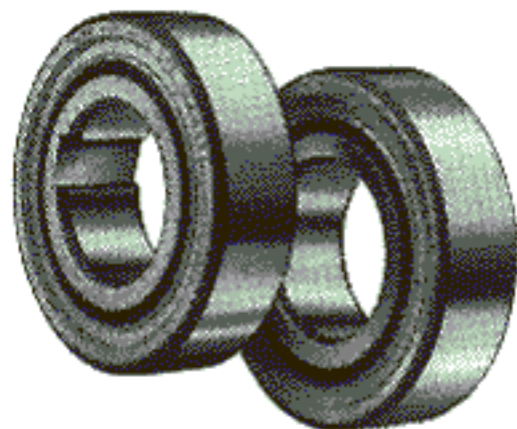
Also available with keyway at inner ring:

**FKN 62..**

Open

Sealed on one side – RS

Sealed on both sides – 2RS



**FKN 62.. FK 62..**

*Diameter range (shaft):*

6203 open –RS	Ø 17 mm
6204 open –RS –2RS	Ø 20 mm
6205 open –RS –2RS	Ø 25 mm
6206 open –RS –2RS	Ø 30 mm
6207 open –RS –2RS	Ø 35 mm

**Freewheels with keyway at inner and  
pressfit at outer ring:**

**FRN 400 (M, Z)**

With race rings – unsupported

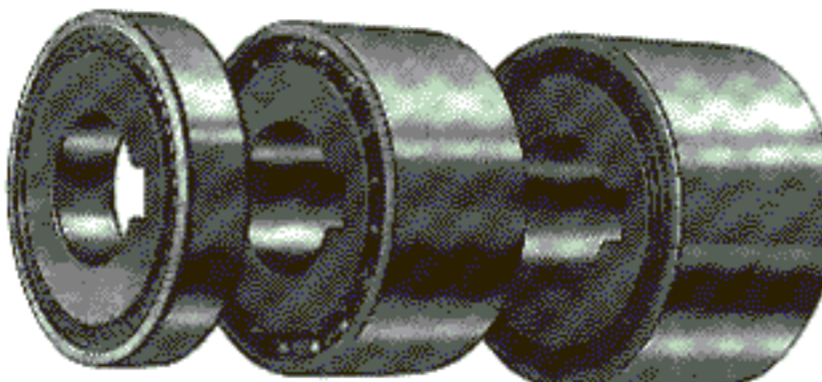
**FN 400 (M, Z)**

With race rings – supported

**FND 400 (M, Z)**

With race rings – supported

Sealed on both sides



**FRN 400 FN 400 FND 400**

*Diameter range (shaft):*

FRN 400	Ø10 to 45 mm
FN 400	Ø15 to 40 mm
FND 400	Ø15 to 40 mm

### Series 8000

Sprags height 8.33 mm  
Please ask for detailed information

**Insert Elements:**

**FE 8000**

**Freewheels with race rings:**

**FR 8000**

Dimensions on request.



**FE 8000 Z13  
FE 8000 Z16  
FE 8000 Z19  
FE 8000 Z25**

*Diameter range (shaft):*

FE 8000 Ø38 to 150 mm  
New designs – standard elements as well as customer oriented specials are developed permanently to support the market with solutions for any freewheel clutch problem.

### Please contact:

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### Our local representative

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