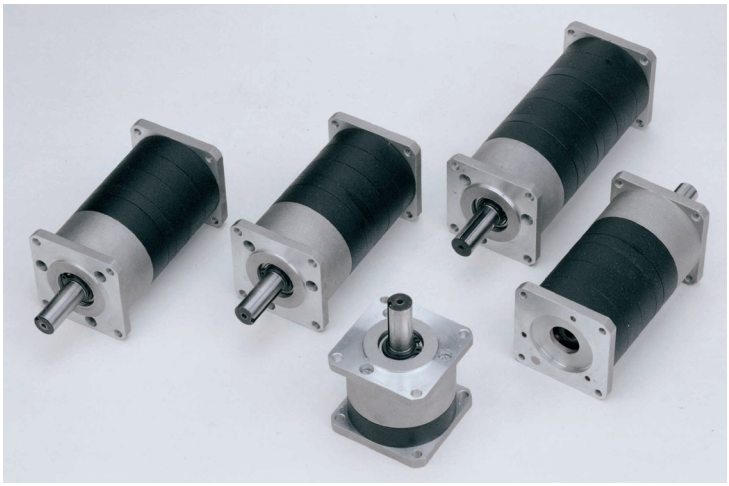
Low Cost Planetary Gears Type HMGH



The series of HMGH planetary gears are specially designed for JVL. With their NEMA23 standard flanges they can be directly mounted on the MAC 050 to 141 series of integrated motors as well as on a wide range of stepmotors. They also fit directly on the new integrated step motors, QuickStep.
Gears with other flanges can also be delivered from this series.

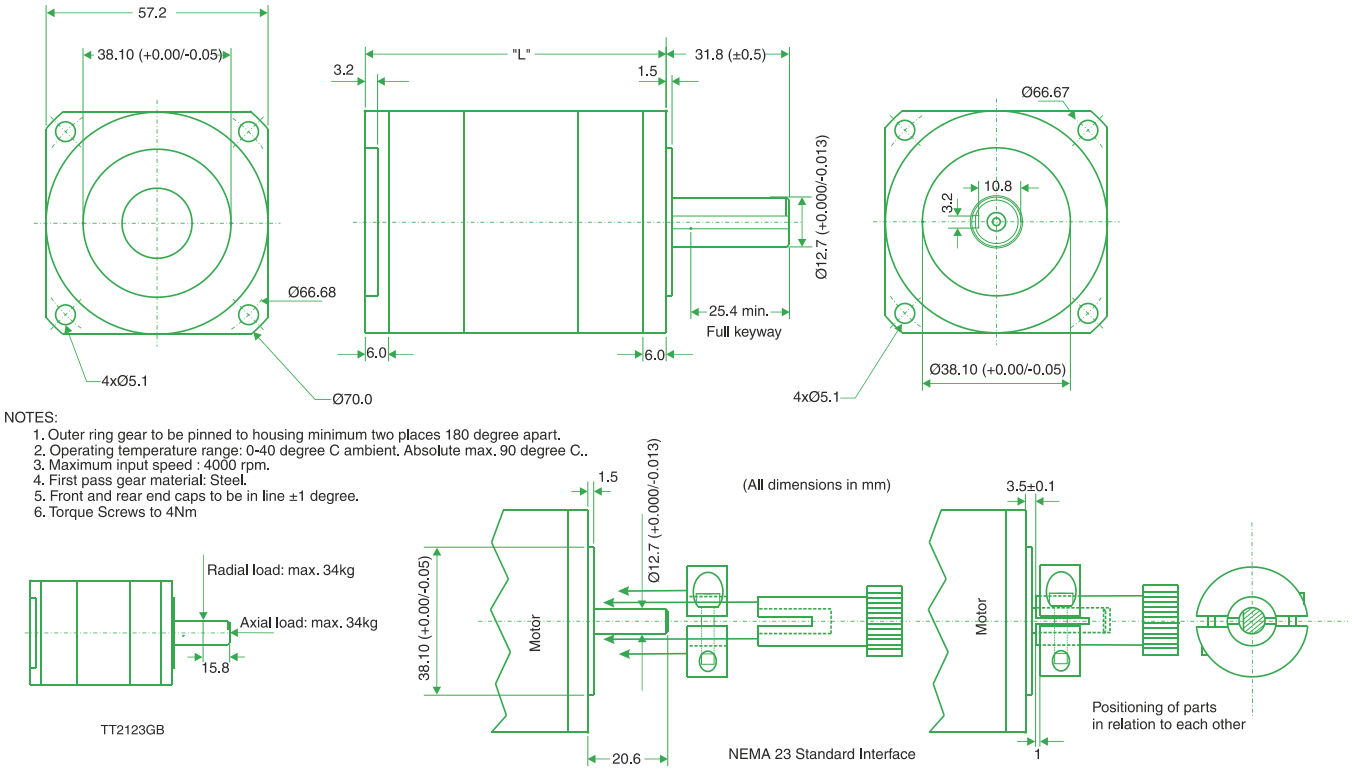
- NEMA23 standard configuration on input and output flange.
- All powder metal gears except adapter.
- Operating temperature range: 0 - 40°C ambient.
- Absolute max. 90°C.
- Maximum input speed: 4000rpm.
- Axial load 34kg max.
- Radial load 34kg max. at 15.8mm from shaft end.
- Very low losses.
- High efficiency.
- Low cost

Specifications

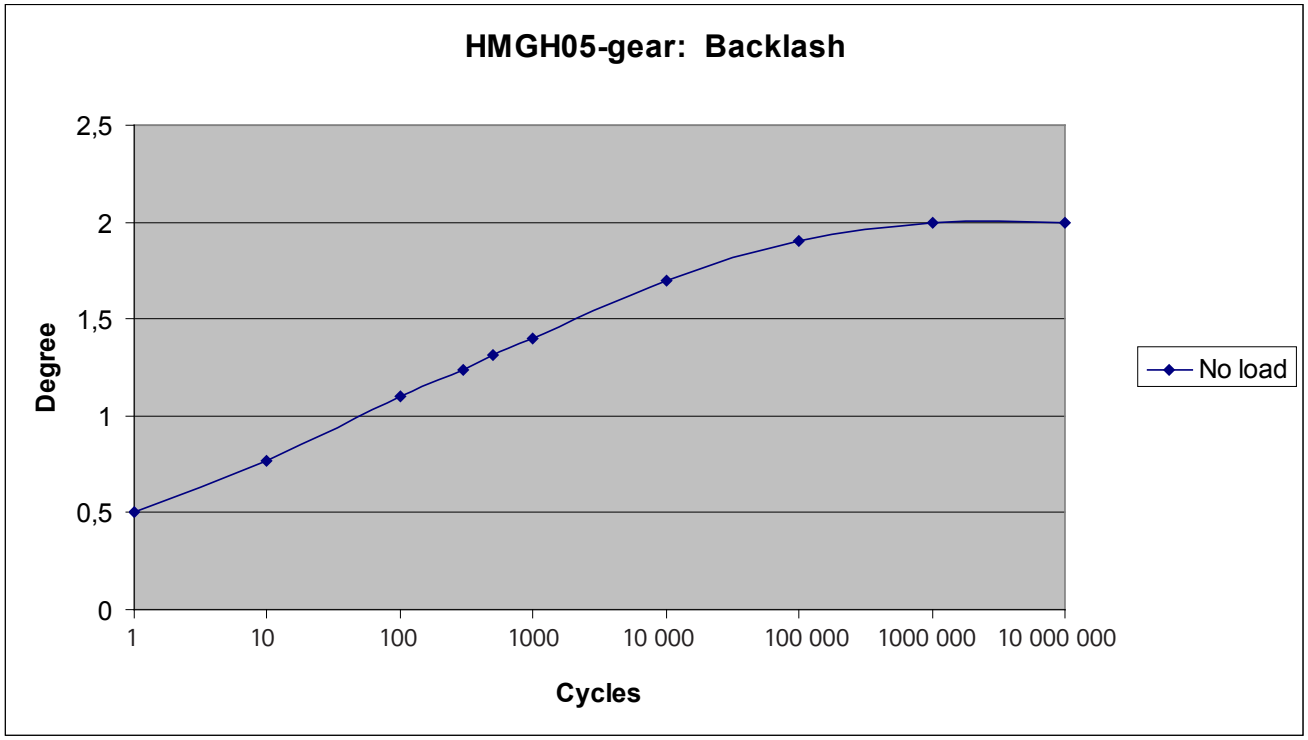
Part Number	Ratio	Cont. Torque Nm (lb-in)	Back-lash-de-gree °	Peak Torque Nm (lb-in)	Effici-ency %	# of stages	Noload torque @ 4000rpm Nm (lb-in)	Weight kg (lbs.)	Length "L" Max. mm (in)	J kgcm² (oz-in-s²)	Pinion mm (in)
HMGH05N003K1N23106J	3:1	6.76 (60)	2	10.7 (94.7)	90	1	0.02 (0.18)	0.66(1.45)	73.8 (2.90)	0.06 (0.00085)	MP50Ø16 (0.63),14teeth
HMGH05N005K1N23106J	5:1	6.76 (60)	2	10.7 (94.7)	90	1	0.02 (0.18)	0.66(1.45)	73.0 (2.87)	0.04 (0.00057)	MP52Ø10 (0.4),18teeth
HMGH05N010K1N23106J	10:1	6.76 (60)	2	10.7 (94.7)	80	2	0.02 (0.18)	0.87(1.92)	88.5 (3.48)	0.06 (0.00085)	MP51Ø16 (0.63),18teeth
HMGH05N015K1N23106J	15:1	6.76 (60)	2	10.7 (94.7)	80	2	0.02 (0.18)	0.87(1.92)	98.2 (3.87)	0.05 (0.00071)	MP50Ø16 (0.63),14teeth
HMGH05N025K1N23106J	25:1	6.76 (60)	2	10.7 (94.7)	80	2,5	0.02 (0.18)	0.95(2.09)	95.6 (3.76)	0.04 (0.00057)	MP52Ø10 (0.4),18teeth
HMGH05N030K1N23106J	30:1	6.76 (60)	2	10.7 (94.7)	70	3	0.02 (0.18)	1.18(2.60)	113 (4.45)	0.05 (0.00071)	MP51Ø16 (0.63),18teeth
HMGH05N050K1N23106J	50:1	6.76 (60)	2	10.7 (94.7)	70	3,5	0.02 (0.18)	1.18(2.60)	110.8 (4.36)	0.05 (0.00071)	MP51Ø16 (0.63),18teeth
HMGH05N100K1N23106J	100:1	6.76 (60)	2	10.7 (94.7)	60	4,5	0.02 (0.18)	1.42(3.13)	126.2 (4.97)	0.05 (0.00071)	MP51Ø16 (0.63),18teeth

Axial play: 0.9mm ± 0.1

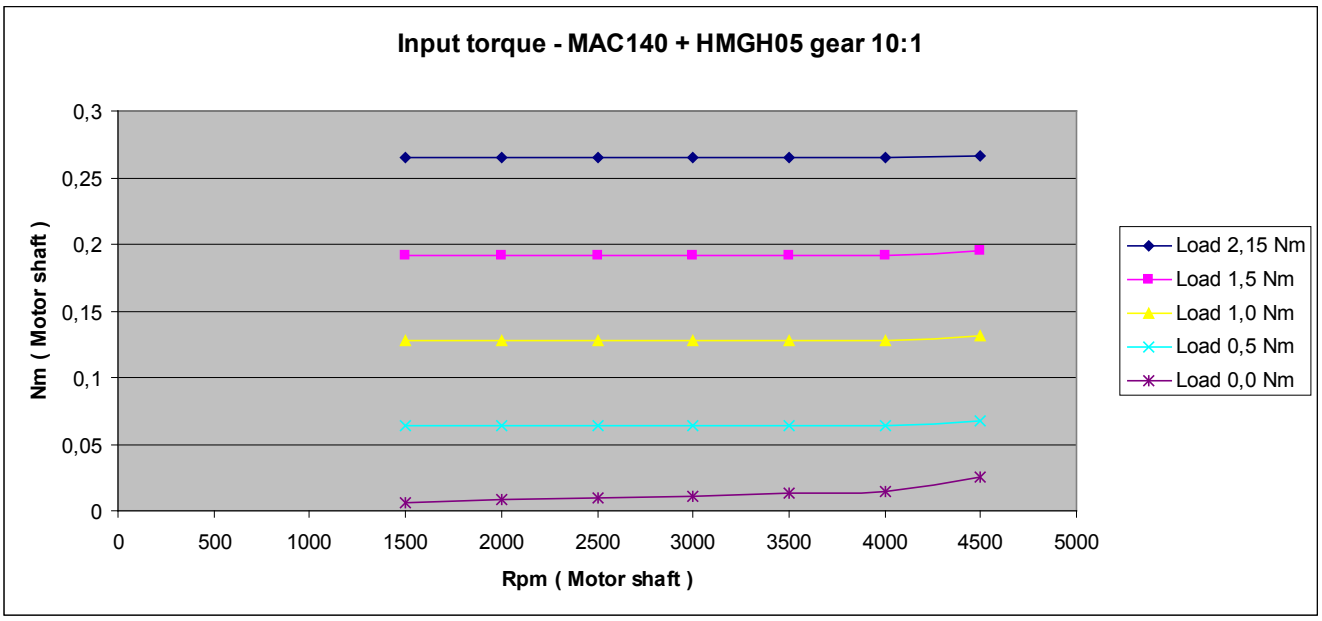
Dimensions



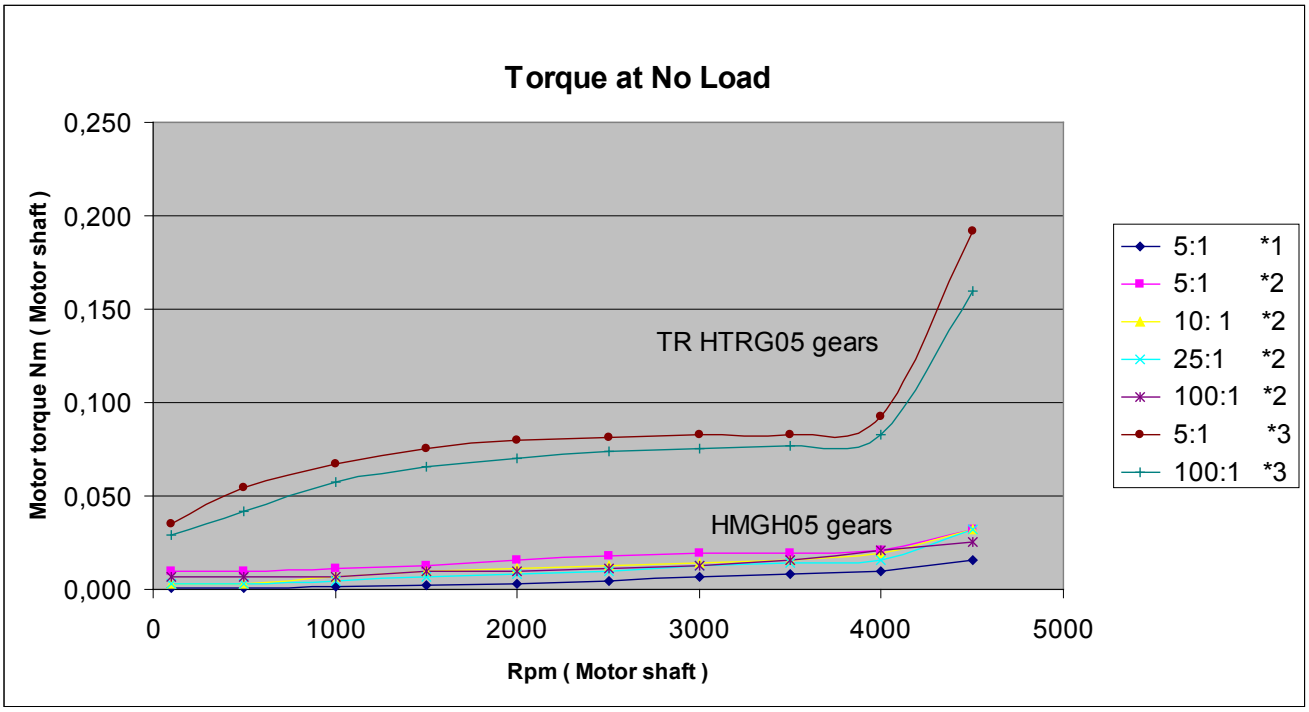
Lubrication: Grease specifications: Working temperature: -27 - 189°C. Base oil: Synthesization. N.L.G.I. Working penetration: 285. Oil Viscosity: SUS@100°C: 4100. SUS@210°F: 280. Timken OK load, Lbs:60.



Backlash of the gears after several cycles of running with low acceleration.
Measured at: VM = 3500 rpm. AC = 10000 rpm/s. Load: 7kgcm²



Curves showing needed motor torque with different loads and at different speeds.

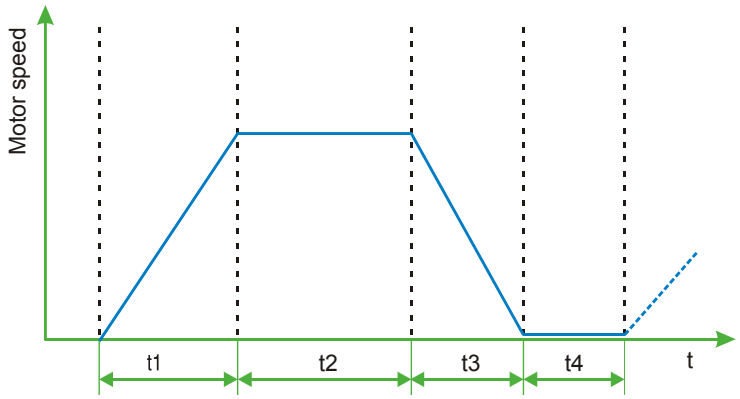


*1: Has been running for 10 000 000 cycles. *2: has been running for 0 cycles. *3 Has been running for 0 cycles.

Curves showing no load torque of HMGH gears compared with TR gears. Because the TR gear has low backlash and high precision, the friction is relatively high. HMGH05 gears have up to 2 degrees backlash and therefore very low losses and high efficiency over the entire speed range.

Selecting the gear

Determination of Intermittance I:



$$I\,[\%] = \frac{t1 + t2 + t3}{t1 + t2 + t3 + t4}$$

t1= starting time. t2= operating time at constant speed. t3=stopping time. t4= rest time.

TT2139GB

1) Determine the applicable duty for the application:
Z = no. of acc per hour.
S5 = Cyclic duty.
S1 = Continous duty.
M_{n2} = Continous torque.
M_{a2} = Peak torque.
M_{1max} = Max. motor torque.

	Z≤1000	Z>1000
I<60%	S5	S1
I>60%	S1	S1

2) Determine service factor f_z

Z	f_z
Z≤1000	1.00
1000<Z≤1500	1.25
1500<Z≤2000	1.50
2000<Z≤2500	1.75
2500<Z≤3000	2.00
Z>3000	contact us

3) determine cycle factor f_c

I	20%-60%	80%	100%
f_c	1.00	1.20	1,40

4) search for the gear unit for which the condition is verified:
At S1, cyclic duty:

$$M_{n2} \geq M_{1max} \times i \times \eta \times f_z \times f_c$$

$$M_{1max} \leq \frac{M_{n2}}{i \times \eta \times f_z \times f_c}$$

At S5, continous duty:

$$M_{a2} \geq M_{1max} \times i \times \eta$$

$$M_{1max} \leq \frac{M_{a2}}{i \times \eta}$$

Examples:
MAC140 motor + gear
HMGH05N010
Cycle duty (S5)
t1 0.5 sec.
t2 3.0 sec.
t3 0.5 sec.
t4 8.0 sec.
12.0 sec.
When t1+t2+t3+t4=12.0 sec. then:
Z=600 (2 acc. per 12 sec.)

$$M_{1max} \leq \frac{10.7}{10x0.8} = 1.3375 \text{ Nm}$$

Continous duty (S1)
t1 0.1 sec.
t2 2.2 sec.
t3 0.1 sec.
t4 0.6 sec.
3.0 sec.
When t1+t2+t3+t4=3.0 sec. then:
Z=2400 (2 acc. per 3 sec.)

$$M_{1max} \leq \frac{6.76}{10x0.8x1.75x1.2} = 0.40 \text{ Nm}$$

JVL Industri Elektronik A/S
Bregnerødvej 127
DK-3460 Birkerød, Denmark
Tel: +45 4582 4440
Fax: +45 4582 5550
E-mail: jvl@jvl.dk www.jvl.dk