

## Precision Planetary Gears Type HTRG



The HTRG product range of precision planetary gears is the outcome of years of experience in the industry, and is the culmination of a decade-long dedication to performance enhancement. Comprising a wide range of low backlash planetary gearboxes, the units come in a range of precision classes up to 3', and are available in seven gear frame sizes, with one or more reduction stages for gearing ratios from 1:3 to 1:1000.

Double shaft, right angle shaft and right angle output shaft versions are also available.

All this, combined with tens of motor mounting adapters held in stock, mean we can quickly respond to the most diverse application requirements of our customers.

The gears can be mounted directly or by means of adaptor flanges on most of the JVL integrated servo and stepper

motors as well as on the wide range of other motors from JVL.

This datasheet shows the HTRG types of gear boxes which JVL normally has in stock for JVL motors and often delivered types.

If a special type of gear box, a special ratio, less backlash, angled types etc. is not shown in the datasheet and is needed, then contact JVL Industri Elektronik and we'll find a type or a solution.

|                    | Unit       | HTRG05xxxxx       | HTRG06xxxxx         | HTRG08xxxxx           | HTRG10xxxxx          |
|--------------------|------------|-------------------|---------------------|-----------------------|----------------------|
| Size - 1 stage     | mm (in)    | Ø55x71 (2.17x2.8) | Ø65x76 (2.56x3)     | Ø85x118 (3.35x4.65)   | -                    |
| Size - 2 stages    | mm (in)    | Ø55x85(2.17x3.35) | Ø65x93 (2.56x3.66)  | Ø85x142 (3.35x5.6)    | Ø106x168 (4.17x6.6)  |
| Shaft output       | mm (in)    | Ø12(0.47)         | Ø14 (0.55)          | Ø19 (0.75)            | Ø25 (0.98)           |
| Efficiency         | %          | 94 - 97           | 94 - 97             | 94 - 97               | 94 - 97              |
| Protection         |            | IP 65             | IP 65               | IP 65                 | IP 65                |
| Torque Nominal     | Nm (lb-in) | 12-20 (106.2-177) | 18-30 (159.3-265.5) | 40-70 (354-620)       | 100-170 (885-1504.6) |
| Torque Peak        | Nm (lb-in) | 40-60 (354-531)   | 70-100 (619.6-885)  | 180-250 (1593.1-2212) | 360-600 (3186-5310)  |
| Rated speed        | Rpm        | 3300 - 4000       | 3300 - 4000         | 2900 - 4000           | 3000 - 3500          |
| Input flange       |            | Nema23            | Nema23, 50/70       | Nema34, PAM70, 50/70  | PAM70                |
| Recommended motors |            | MAC050-141        | MAC050-141, 400     | MAC400, MAC800        | MAC800               |
|                    |            | MIS23x            | MIS23x              | SGM-04, -08           |                      |
|                    |            | MST23x            | MST23x              | MIS34x                |                      |

## Features of MP series

- Available in either standard or reduced backlash
- Bearings are rated for an average service life of 20,000 hours under nominal operating conditions. As standard, frame sizes HTRG08, HTRG06, HTRG08 and HTRG10 feature rigid ball bearings. On request,

taper roller bearings can be supplied on units HTRG08 and HTRG10 specifying option CR

- The gearbox is filled in the factory with a lubricant suitable for ambient temperatures in the 0°C to 40°C range. The lubricant does not normally require changing unless it

becomes contaminated from outside.

- The type of lubricant used (grease or synthetic oil) and the material used for the seals also vary according to duty rating and gearbox size. The table below illustrates the various combinations:

| duty | HTRG05 | HTRG06 | HTRG08 | HTRG10 |
|------|--------|--------|--------|--------|
| S1   | G/V    | G/V    | O/V    | O/V    |
| S5   | G/NBR  | G/NBR  | G/NBR  | G/NBR  |

### Legend:

S1 = Continuous duty

O = Synthetic oil, viscosity ISO VG 220

V= Viton® seals

S5 = Intermittent duty

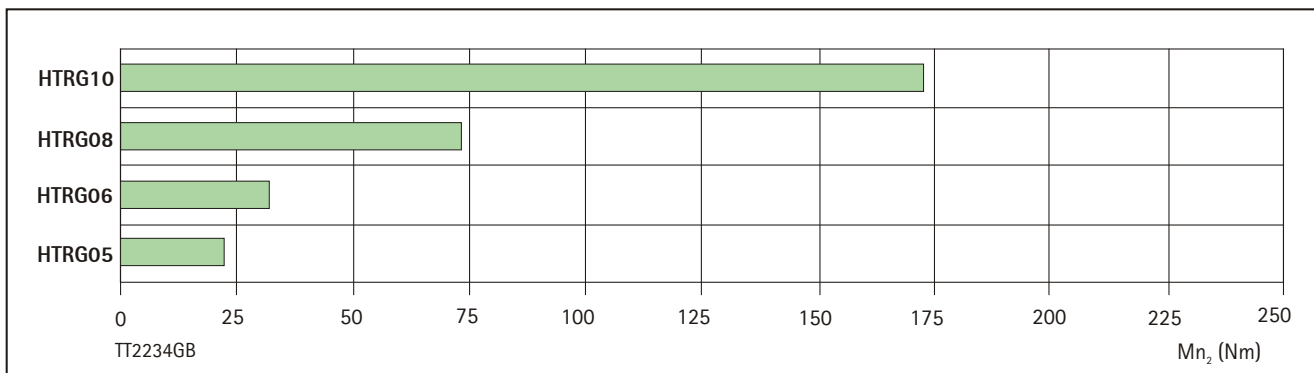
G = Grease, consistency 00

NBR = Nitrile rubber seals

### Features

- Degree of protection IP65
- Noise level  $L_p \leq 70$  dB(A)  $-n_1 = 3000$  min<sup>-1</sup>

- Numerous input options
- Ratio  $i = 10$  available for single-reduction units ( $i=9$  for frame size 053 alone)



| Gear type          | Motor                           | Shaft     |
|--------------------|---------------------------------|-----------|
| HTRGxxxxxxN23106J  | MST23x, MIS23x, MAC050-141      | Ø6,35 mm  |
| HTRGxxxxxxN23106JC | MST23x, MIS23x, MAC050-141      | Ø6,35 mm  |
| HTRGxxxxxx050114MC | SGM(-/E/AH) – 200, 300 and 400W | Ø14mm     |
| HTRGxxxxxxP70119MC | SGM(-/E/AH) – 750W, MAC800      | Ø16/19 mm |
| HTRGxxxxxxN34109J  | MST34x, SM87                    | Ø9,35 mm  |

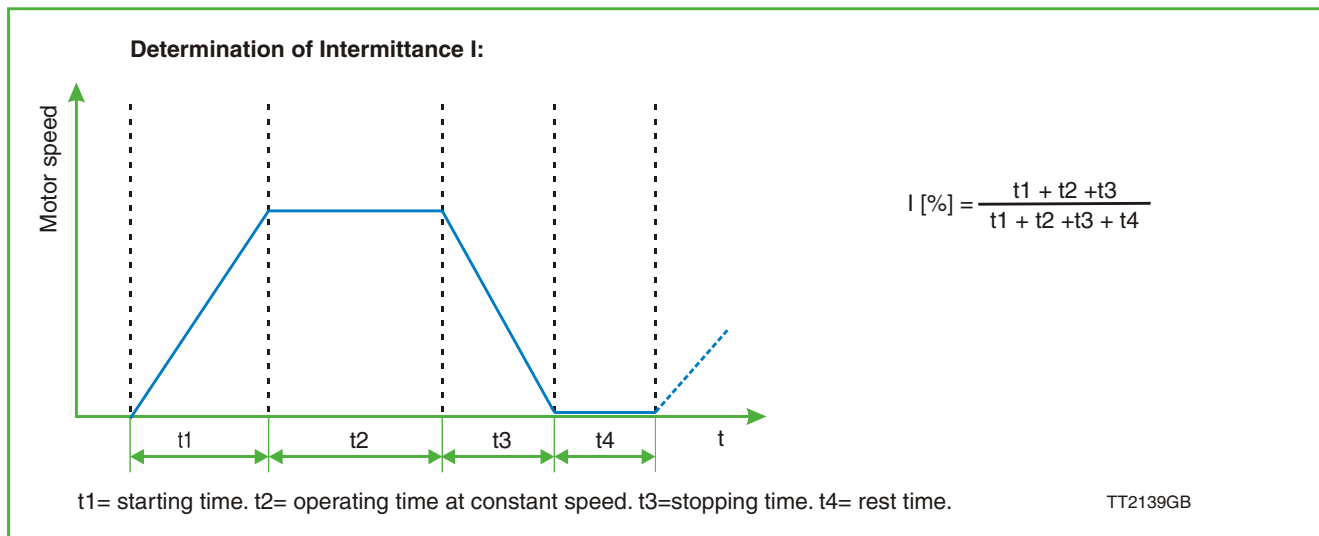
## Calculating and selecting the size of a gearbox

The following 2 pages show how to calculate and select the size of a gearbox. You can either calculate the gearbox you need yourself or send the informa-

tion about the application and the way you want the motor or mechanical parts to move to JVL and we can do the calculation and find the best solution for you.

If we have to make the calculations, we need the this information and also some information about the mechanical system like weight, pulley size, spindle size, etc.

## Selecting the gear unit



1) Determine the applicable duty for the application:

Z = no. of acc per hour.

S5 = Cyclic duty.

S1 = Continuous duty.

$M_{n2}$  = Continuous 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, continuous duty:

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

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

**Examples:**

**MAC140 motor + gear HM-GH05N010**

**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.)

$$M_{1max} \leq \frac{10.7}{10 \times 0.8} = 1.3375 \text{ Nm}$$

**Continuous 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.)

$$M_{1max} \leq \frac{6.76}{10 \times 0.8 \times 1.75 \times 1.2} = 0.40 \text{ Nm}$$

### Note:

If, under particular operating conditions, a housing temperature higher than usual is to be expected, it is recommended that Viton® seals are specified at the time of order through option S1.

Under no circumstances the maximum speed [ $n_{1max}$ ] permitted for the gear unit should be exceeded.

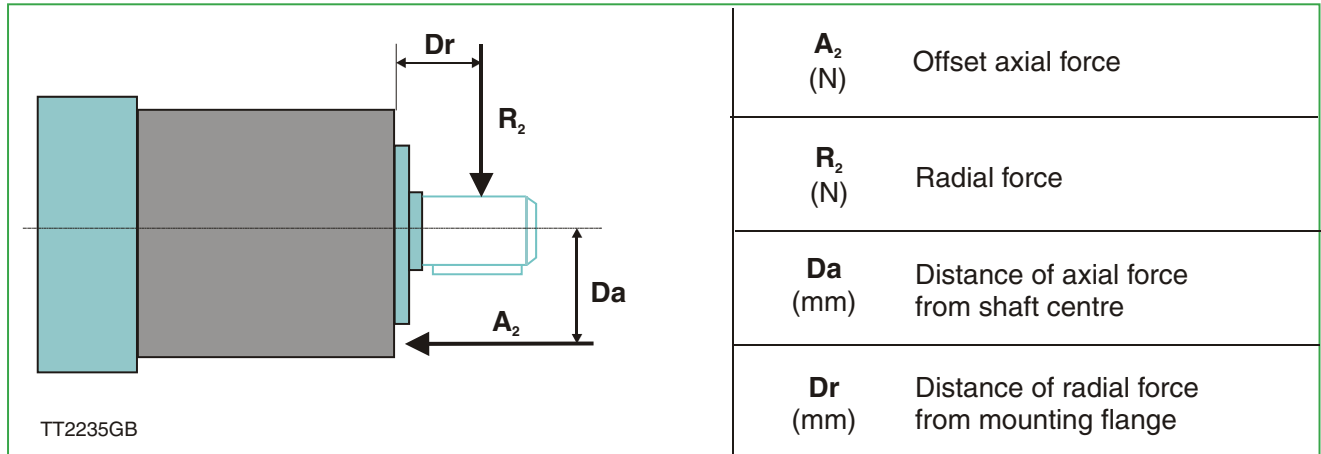
Should the surface temperature exceed 90°C it is recommended that speed is reduced, or an auxiliary cooling system is provided.

## Service life of bearings

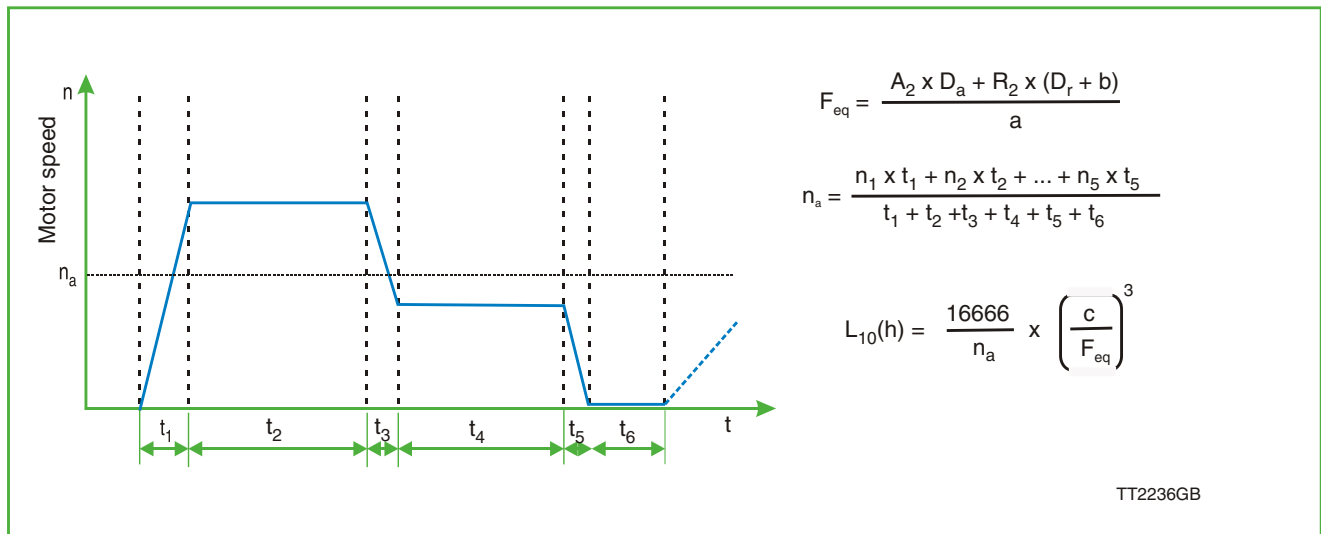
Whether bearings are ball type (CS) or taper roller type (CR), their service life can be calculated through the equations where actual radial and axial forces are accounted for.

| HTRG05 | HTRG06 | HTRG08 | HTRG10 |
|--------|--------|--------|--------|
| CS     | CS     | CS*    | CS*    |

(\* Option CR available)



## Service life - calculation for rigid ball bearings (CS)



| Load location factor | HTRG05 | HTRG06 | HTRG08 | HTRG10 |
|----------------------|--------|--------|--------|--------|
| a                    | 15.5   | 14.4   | 21.5   | 24.5   |
| b                    | 17     | 17.4   | 32.3   | 36     |
| c                    | 5600   | 9550   | 14000  | 25700  |

$F_{eq}$  [N] = Equivalent force resulting from radial and axial forces applying simultaneously.

$n_a$  [min<sup>-1</sup>] = Mean output speed.

$L_{10}(h)$  = Theoretical service life of bearings.

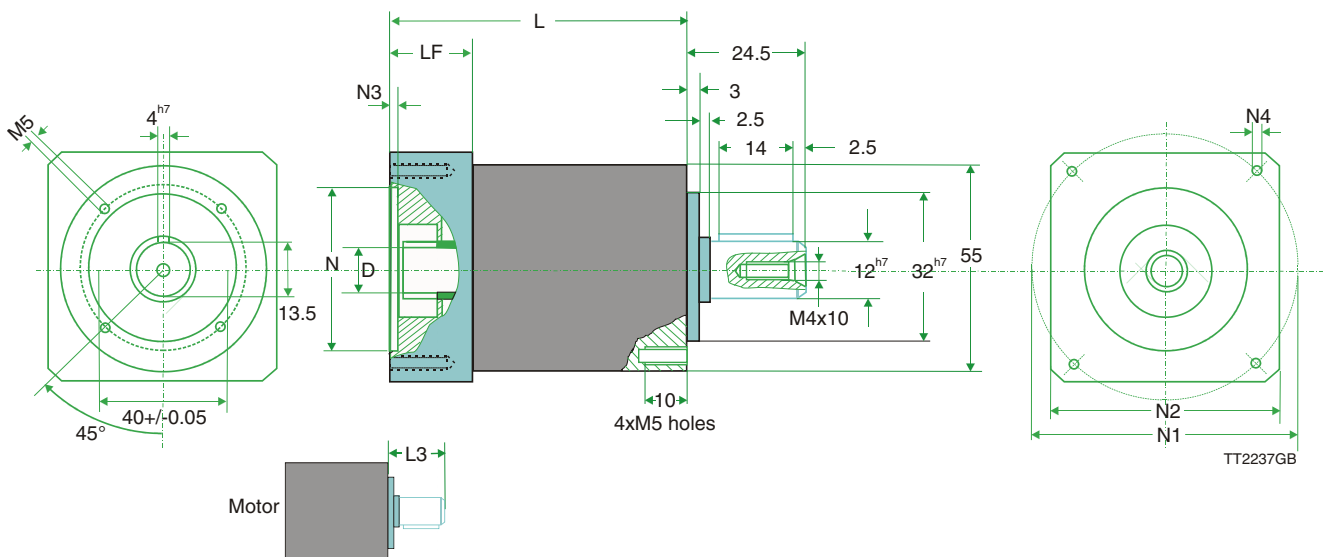
Calculate  $e = A_2/F_{eq}$  and check that condition  $e \leq 0.19$  is verified.

If  $e > 0.19$  contact our Technical Service.

## Symbols and units of measurement

|          |          |   |
|----------|----------|---|
| Mn2      | [Nm]     | <b>Nominal output torque</b>  |
| Ma2      | [Nm]     | <b>Maximum acceleration torque</b> , acceptable for a duty with I<60%   |
| Mp2      | [Nm]     | <b>Emergency stop torque</b> . The value can not apply more than 1000 times over the entire life of the gear unit and should not recur in normal operating conditions                               |
| n1       | [rpm]    | <b>Nominal input speed</b> (continuous duty S1). It is the reference speed for duties with intermittance I>60% and or operating time > 20 min.  |
| n1max    | [rpm]    | <b>Maximum momentary input speed</b> . The speed the unit can be driven occasionally and in non-repetitive conditions. For cyclic duty it can not be applied continuously for more than 30 seconds. |
| φ        | [arcmin] | <b>Standard backlash</b> is calculated in static conditions and with the application of a torque equal to 2% of the nominal torque for the gear unit,   |
| Rn1, Rn2 | [N]      | The <b>admissible radial force</b> must be equal to, or greater than, the radial force actually applying onto the shaft. Catalogue value is based on output speed n2 = 100 rpm                      |
| An2      | [N]      | The <b>admissible thrust force</b> can be applied axially to the shaft under study along. The given value is calculated for an output speed n2 = 100 rpm.   |
| η        | [%]      | <b>Dynamic efficiency</b> is calculated through the relationship of output torque to torque applied to the input shaft under nominal conditions. $\eta_d = (M_2/M_{1xi}) \times 100$                |

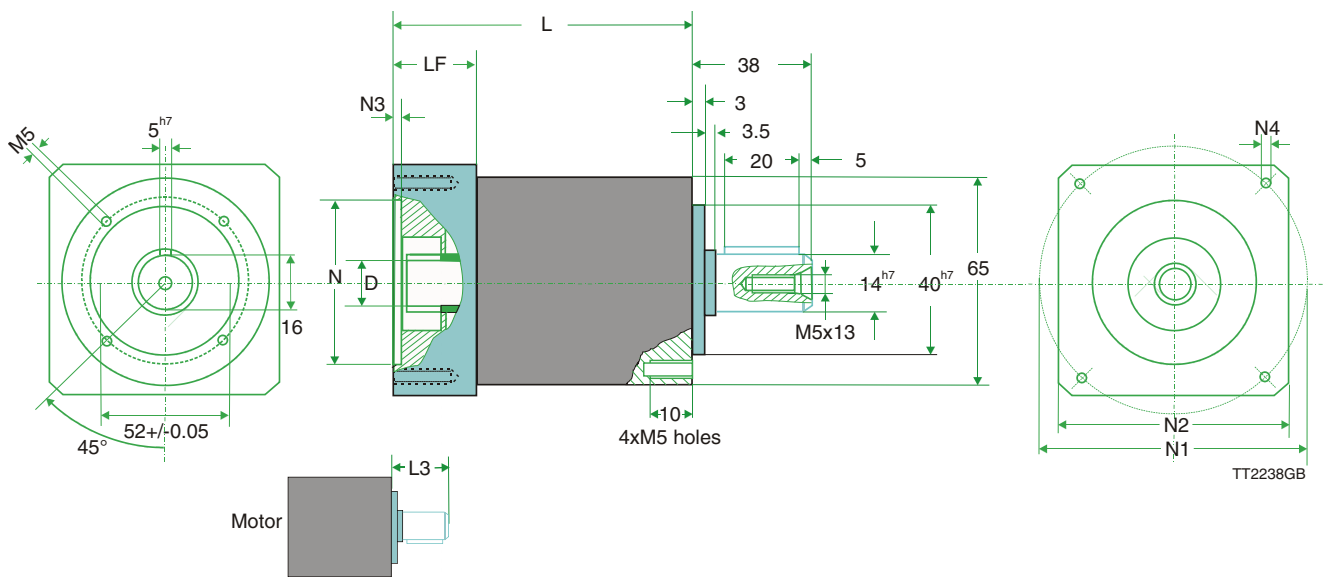
## Dimensions HTRG05



| Type                | D    | N    | N1   | N2   | N3   | N4    | LF   | L3   | L    | m    |
|---------------------|------|------|------|------|------|-------|------|------|------|------|
|                     | [mm] | [mm] | [mm] | [mm] | [mm] | [mm]  | [mm] | [mm] | [mm] | [kg] |
| HTRG05N003MHN23106J | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 71   | 0,8  |
| HTRG05N005MHN23106J | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 71   | 0,8  |
| HTRG05N009MHN23106J | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 71   | 0,8  |
| HTRG05N012MHN23106J | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 84,8 | 1    |
| HTRG05N020MHN23106J | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 84,8 | 1    |
| HTRG05N100MHN23106J | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 98,6 | 1    |

| Type                | Mn2  | Ma2  | Mp2  | n1    | n1max | φ        | Rn1 | Rn2 | An2 | η   | J                    |
|---------------------|------|------|------|-------|-------|----------|-----|-----|-----|-----|----------------------|
|                     | [Nm] | [Nm] | [Nm] | [rpm] | [rpm] | [arcmin] | [N] | [N] | [N] | [%] | [kgcm <sup>2</sup> ] |
| HTRG05N003MHN23106J | 12   | 22   | 40   | 3300  | 4000  | 15       | 200 | 500 | 600 | 97  | 0.06                 |
| HTRG05N005MHN23106J | 15   | 28   | 45   | 3500  | 5000  | 15       | 200 | 500 | 600 | 97  | 0.04                 |
| HTRG05N009MHN23106J | 12   | 22   | 40   | 4000  | 6000  | 15       | 200 | 500 | 600 | 97  | 0.03                 |
| HTRG05N012MHN23106J | 20   | 30   | 60   | 3300  | 4000  | 15       | 200 | 500 | 600 | 94  | 0.06                 |
| HTRG05N020MHN23106J | 20   | 30   | 60   | 3500  | 5000  | 15       | 200 | 500 | 600 | 94  | 0.04                 |
| HTRG05N100MHN23106J | 20   | 30   | 60   | 3500  | 5000  | 15       | 200 | 500 | 600 | 94  | 0.04                 |

## Dimensions HTRG06

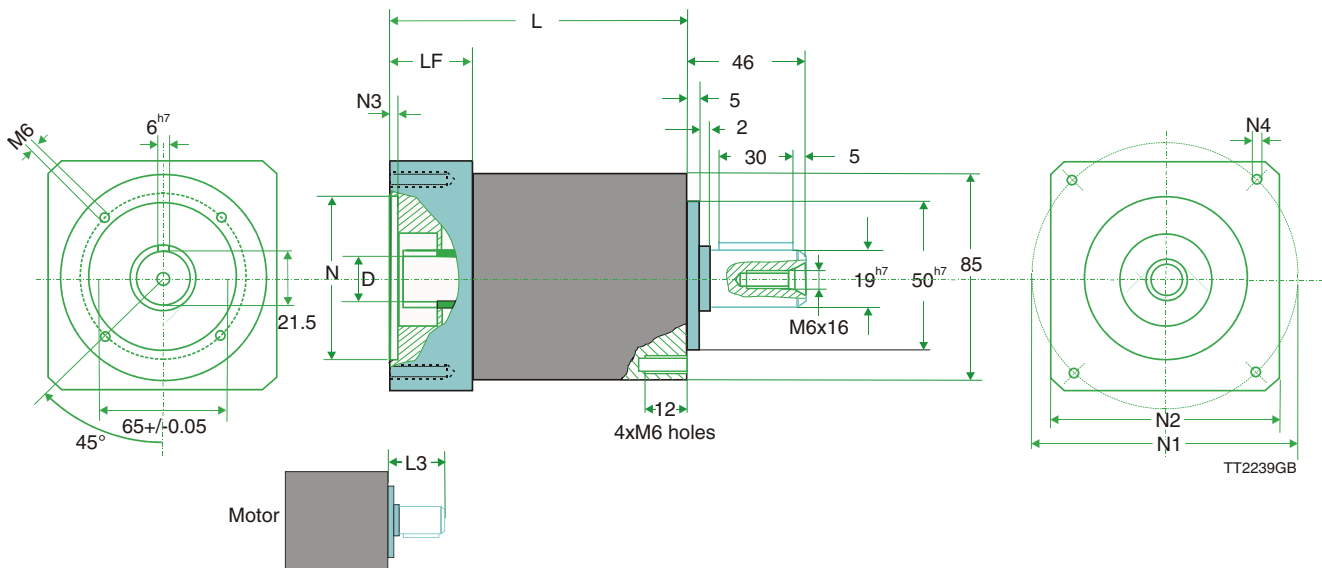


TT2238GB

| Type                 | D    | N    | N1   | N2   | N3   | N4    | LF   | L3   | L     | m    |
|----------------------|------|------|------|------|------|-------|------|------|-------|------|
|                      | [mm] | [mm] | [mm] | [mm] | [mm] | [mm]  | [mm] | [mm] | [mm]  | [kg] |
| HTRG06N005MHN23106JC | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 75,55 | 1,2  |
| HTRG06N009MH050114MC | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 92,25 | 1,7  |
| HTRG06N012MH050114MC | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 92,25 | 1,7  |
| HTRG06N036MHN23106JC | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 92,25 | 1,7  |
| HTRG06N100MHN23106JC | 6,35 | 38,1 | 66,6 | 60   | 3    | M4x10 | 18   | 25   | 92,25 | 1,7  |

| Type                 | Mn2  | Ma2  | Mp2  | n1    | n1 max | φ        | Rn1 | Rn2 | An2 | η   | J                    |
|----------------------|------|------|------|-------|--------|----------|-----|-----|-----|-----|----------------------|
|                      | [Nm] | [Nm] | [Nm] | [rpm] | [rpm]  | [arcmin] | [N] | [N] | [N] | [%] | [kgcm <sup>2</sup> ] |
| HTRG06N005MHN23106JC | 25   | 40   | 90   | 3500  | 5000   | 15       | 200 | 600 | 700 | 97  | 0.05                 |
| HTRG06N009MH050114MC | 18   | 35   | 70   | 3300  | 4000   | 15       | 200 | 600 | 700 | 94  | 0.12                 |
| HTRG06N012MH050114MC | 30   | 45   | 100  | 3300  | 4000   | 15       | 200 | 600 | 700 | 94  | 0.11                 |
| HTRG06N036MHN23106JC | 25   | 40   | 90   | 3500  | 5000   | 15       | 200 | 600 | 700 | 94  | 0.04                 |
| HTRG06N100MHN23106JC | 18   | 35   | 70   | 4000  | 6000   | 15       | 200 | 600 | 700 | 94  | 0.03                 |

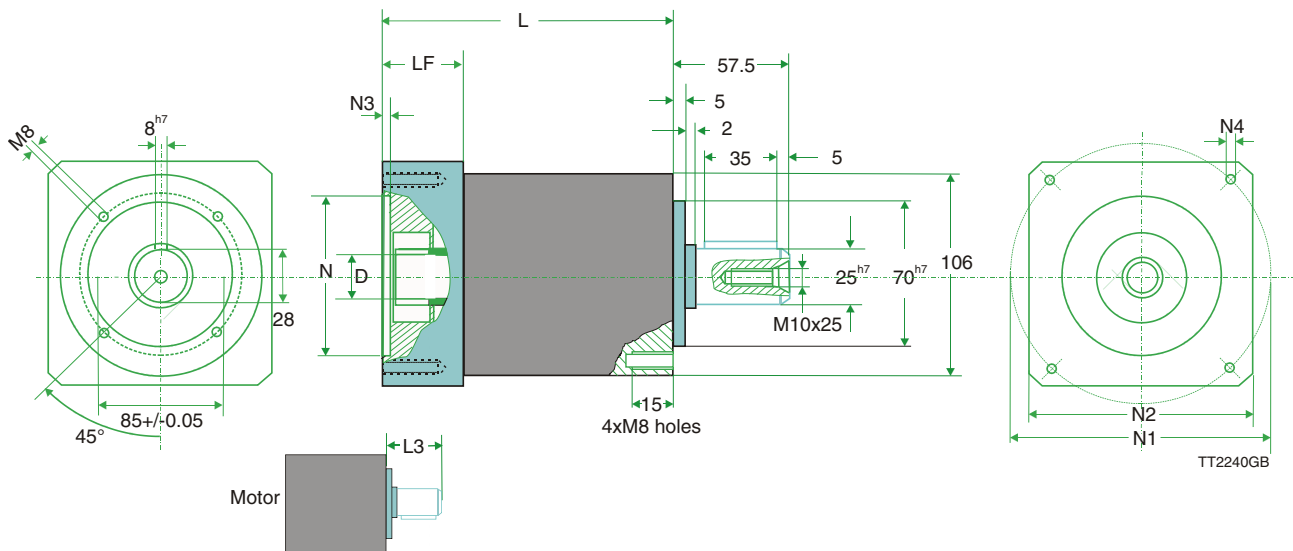
## Dimensions HTRG08



| Type                 | D    | N    | N1   | N2   | N3   | N4    | LF   | L3   | L     | m    |
|----------------------|------|------|------|------|------|-------|------|------|-------|------|
|                      | [mm] | [mm] | [mm] | [mm] | [mm] | [mm]  | [mm] | [mm] | [mm]  | [kg] |
| HTRG08N003MHN34109J  | 9,52 | 73   | 98,4 | 80   | 4    | M5x16 | 34   | 40   | 117,5 | 4    |
| HTRG08N003MHP70119MC | 19   | 70   | 90   | 80   | 4    | M5x16 | 34   | 40   | 117,5 | 4    |
| HTRG08N005MHN34109J  | 9,52 | 73   | 98,4 | 80   | 4    | M5x16 | 34   | 40   | 117,5 | 4    |
| HTRG08N005MH050114MC | 14   | 50   | 70   | 80   | 4    | M4x10 | 34   | 40   | 117,5 | 4    |
| HTRG08N005MHP70119MC | 19   | 70   | 90   | 80   | 4    | M5x16 | 34   | 40   | 117,5 | 4    |
| HTRG08N010MHP70119MC | 19   | 70   | 90   | 80   | 4    | M5x16 | 34   | 40   | 117,5 | 4    |
| HTRG08N012MH050114MC | 14   | 50   | 70   | 80   | 4    | M4x10 | 34   | 40   | 142   | 4,6  |
| HTRG08N012MHP70119MC | 19   | 70   | 90   | 80   | 4    | M5x16 | 34   | 40   | 142   | 4,6  |
| HTRG08N020MHN34109J  | 14   | 50   | 70   | 80   | 4    | M4x10 | 34   | 40   | 142   | 4,6  |
| HTRG08N020MHP70119MC | 19   | 70   | 90   | 80   | 4    | M5x16 | 34   | 40   | 142   | 4,6  |
| HTRG08N036MH050114MC | 14   | 50   | 70   | 80   | 4    | M4x10 | 34   | 40   | 142   | 4,6  |
| HTRG08N036MHP70119MC | 19   | 70   | 90   | 80   | 4    | M5x16 | 34   | 40   | 142   | 4,6  |
| HTRG08N100MHP70119MC | 19   | 70   | 90   | 80   | 4    | M5x16 | 34   | 40   | 142   | 4,6  |

| Type                 | Mn2  | Ma2  | Mp2  | n1    |       | φ        | Rn1 | Rn2  | An2  | η   | J                    |
|----------------------|------|------|------|-------|-------|----------|-----|------|------|-----|----------------------|
|                      | [Nm] | [Nm] | [Nm] | [rpm] | [rpm] | [arcmin] | [N] | [N]  | [N]  | [%] | [kgcm <sup>2</sup> ] |
| HTRG08N003MHN34109J  | 40   | 80   | 180  | 2900  | 3500  | 15       | 400 | 1300 | 1400 | 97  | 0.50                 |
| HTRG08N003MHP70119MC | 40   | 80   | 180  | 2900  | 3500  | 15       | 400 | 1300 | 1400 | 97  | 0.59                 |
| HTRG08N005MHN34109J  | 50   | 80   | 200  | 3200  | 4500  | 15       | 400 | 1300 | 1400 | 97  | 0.28                 |
| HTRG08N005MH050114MC | 50   | 80   | 200  | 3200  | 4500  | 15       | 400 | 1300 | 1400 | 97  | 0.37                 |
| HTRG08N005MHP70119MC | 50   | 80   | 200  | 3200  | 4500  | 15       | 400 | 1300 | 1400 | 97  | 0.37                 |
| HTRG08N010MHP70119MC | 40   | 80   | 180  | 4000  | 6000  | 15       | 400 | 1300 | 1400 | 97  | 0.29                 |
| HTRG08N012MH050114MC | 70   | 100  | 250  | 2900  | 3500  | 15       | 400 | 1300 | 1400 | 94  | 0.56                 |
| HTRG08N012MHP70119MC | 70   | 100  | 250  | 2900  | 3500  | 15       | 400 | 1300 | 1400 | 94  | 0.56                 |
| HTRG08N020MHN34109J  | 70   | 100  | 250  | 3200  | 4500  | 15       | 400 | 1300 | 1400 | 94  | 0.27                 |
| HTRG08N020MHP70119MC | 70   | 100  | 250  | 3200  | 4500  | 15       | 400 | 1300 | 1400 | 94  | 0.36                 |
| HTRG08N036MH050114MC | 50   | 80   | 200  | 3200  | 4500  | 15       | 400 | 1300 | 1400 | 94  | 0.20                 |
| HTRG08N036MHP70119MC | 50   | 80   | 200  | 3200  | 4500  | 15       | 400 | 1300 | 1400 | 94  | 0.29                 |
| HTRG08N100MHP70119MC | 40   | 80   | 180  | 4000  | 6000  | 15       | 400 | 1300 | 1400 | 94  | 0.28                 |

## Dimensions HTRG10



| Type                 | D    | N    | N1   | N2   | N3   | N4    | LF   | L3   | L    | m    |
|----------------------|------|------|------|------|------|-------|------|------|------|------|
|                      | [mm] | [mm] | [mm] | [mm] | [mm] | [mm]  | [mm] | [mm] | [mm] | [kg] |
| HTRG10N020MHP70119MC | 19   | 70   | 90   | 100  | 5    | M5x12 | 28   | 40   | 168  | 6,5  |
| HTRG10N100MHP70119MC | 19   | 70   | 90   | 100  | 5    | M5x12 | 28   | 40   | 168  | 8,5  |

| Type                 | Mn2  | Ma2  | Mp2  | n1    | n1max | $\phi$   | Rn1 | Rn2  | An2  | $\eta$ | J                    |
|----------------------|------|------|------|-------|-------|----------|-----|------|------|--------|----------------------|
|                      | [Nm] | [Nm] | [Nm] | [rpm] | [rpm] | [arcmin] | [N] | [N]  | [N]  | [%]    | [kgcm <sup>2</sup> ] |
| HTRG10N020MHP70119MC | 170  | 250  | 600  | 3000  | 4500  | 15       | 600 | 1500 | 1600 | 94     | 0.93                 |
| HTRG10N100MHP70119MC | 100  | 180  | 360  | 3500  | 5000  | 15       | 600 | 1500 | 1600 | 94     | 0.38                 |

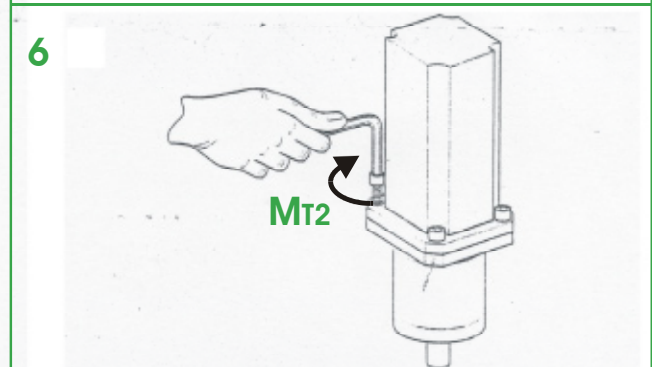
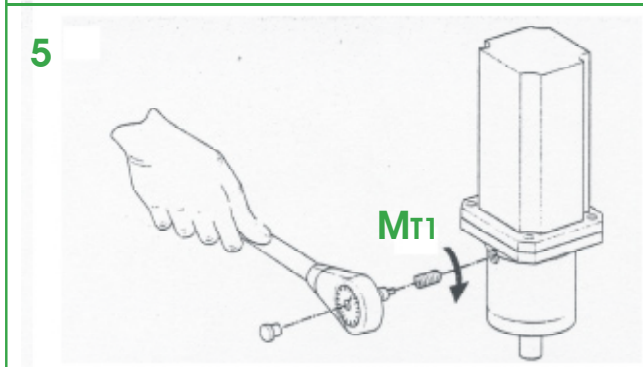
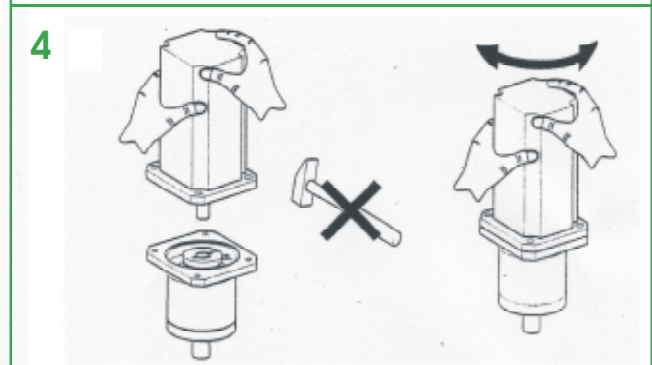
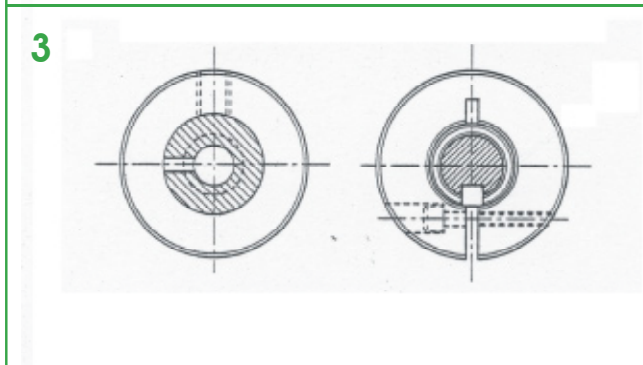
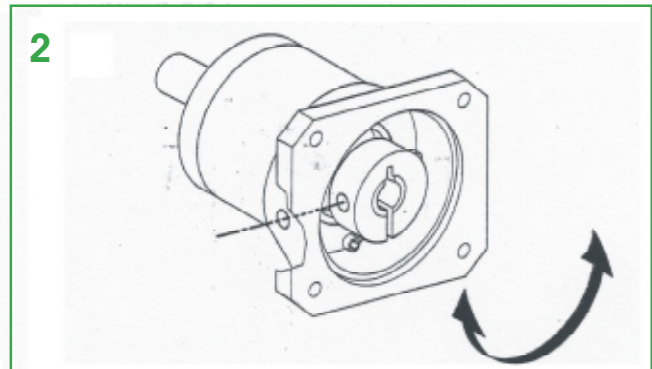
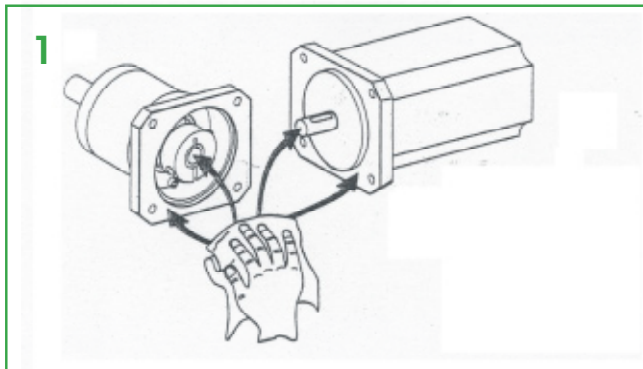


MAC800 and MAC141 integrated servo motors mounted with HTRG gears





## Mounting instructions



The procedure when mounting a HTRG Gear on a motor is as follows:

- A) Remove the small plastic cover in the side of the gear. ( 2 ) and loosen the side screw.
- B) Align the key seat of the motor shaft with the slit of the input coupling
- C) Mount the gear and motor together ( 4 )
- D) If the flange of the motor and the gear are pressed all together, jump to H
- E) Tight the 4 screws holding the motor and gear together firmly ( 6 )
- F) Tight the side screw firmly ( 5 )
- G) Jump to K
- H) Tight the side screw firmly ( 5 )
- I) Tight the 4 screws holding motor and gear together firmly. ( 6 )
- J) Loosen the side screw and tight it firmly once more to avoid tension in the bearings ( 5 ).
- K) Succes!

| Motor shaft diam. | Locking bolt | Tightening torque MT1 (Nm) | Torque transmitted at 20° C (Nm) | Torque transmitted at 90° C (Nm) |
|-------------------|--------------|----------------------------|----------------------------------|----------------------------------|
| 6/6.35            | M4           | 5                          | 9                                | 6                                |
| 9/9.52            | M4           | 5                          | 14                               | 11                               |
| 14                | M6           | 11                         | 35                               | 25                               |
| 19                | M6           | 11                         | 120                              | 90                               |

| Bolt size | Tightening torque MT2 (Nm) |      |      |
|-----------|----------------------------|------|------|
|           | Bolt class                 |      |      |
|           | 8.8                        | 10.9 | 12.9 |
| M4        | 2.9                        | 4.1  | 4.95 |
| M5        | 5.75                       | 8.1  | 9.7  |
| M6        | 9.9                        | 14   | 16.5 |
| M8        | 24                         | 34   | 40   |

## General Information about the HTRG Gears

### ISO 9000 certification:

The manufacturer follows ISO 9001 in its quality control. All components of the gears are tested according to procedures prescribed in the ISO standard.

### Materials and manufacture:

The gear housing is manufactured of hardened 38NiCrMo5 steel that is phosphate coated for extra protection. The gear wheels are manufactured of case-hardened 18 NiCrMo5 steel. The gear teeth are all ground finished. In models that use taper roller bearings, the surface of the planetary gear wheels are pieced together to provide optimum alignment. (Models HTRG05 and HTRG06 do not use taper roller bearings due to space requirements. These models use rigid ball bearings.) The taper roller bearings are Cr100 bearings to achieve the highest precision. NSL and INA bearings are used. The output shaft is manufactured of ground finished hardened 38NiCrMo4 steel.

### Tolerances:

The axial and radial slippage are a few hundredths of a mm, corresponding to C3-class bearings. The standard gears have a backlash of between 15' and 20' from the input shaft to the output shaft. Models are also available with less than 10' and 5' backlash.

Model MP053 is also available in a less expensive version with 30' backlash. The backlash is measured at a torque of 10% of the gear's rated torque. Within the ranges specified here, the backlash is dependent on the selected gear ratio. The backlash of a planetary gear is not dependent on the number of stages, but on the gear ratio of the individual stages. The slippage in the stages before the output shaft is reduced by the stage's own and each subsequent stage's gear ratio.

### Temperature:

All components of the gears, including seals and O-rings, can withstand temperatures up to 100°C. During continuous operation the temperature of the gears can reach 70 to 80 °C.

### Sealing:

The gears fulfil IP65 requirements. IP66 requirements can also be achieved if the coupling between the motor and gear is sealed using silicone and the gear housing is painted with protective paint. The gear output shaft is however not stainless steel.

### Lubrication:

The gears are lubricated with a 00-density lubricant, Klubersynth GE-46 1200. This lubricant ensures good lubrication even at the very high

rotational speeds at which planetary gears operate. It may also be possible to use a lubricant of the type Castrol OPTIMOL, but this has not been fully tested.

### Drawings:

Engineering drawings of the gears can be supplied on diskette as AutoCad drawings in DXF format.

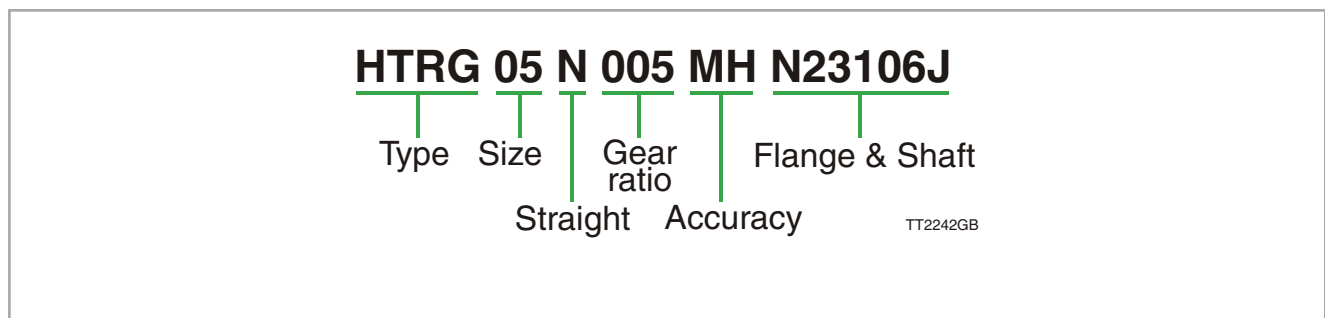
### Gearing:

It is not recommended to use the gears 'in reverse', i.e. for gearing up. It is possible to do this at very low torques, maximum 5Nm for HTRG05 and HTRG06, and maximum 10 Nm for HTRG08 and HTRG10. It is however very risky due to the large speeds attained by planetary gears and the manufacturer recommends it is not done.

### Lifetime:

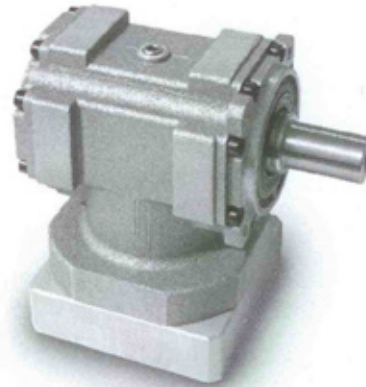
The gears are supplied with a 1-year guarantee on mechanical failure of components. The lifetime of the gear depends on the rotational speed and the radial load. It will typically be 10.000 hours or more. Lubricant supplier, Kluber, specifies a lifetime of 18000 hours for the lubricant under continuous operation of the gears within the specified torque range.

## Gear order numbering system



For full information on gear order numbering please contact JVL

## Angled Gears



Bevel helical units type HTRGxxK, manufactured under the most stringent quality specifications, are designed for dynamic and accurate applications where light weight and space effectiveness are a factor. Many options can be selected as far as motor adaptors and output shaft configurations that facilitate the installation on the driven equipment, are concerned

- Available in one backlash option ( $\phi = 8'$ )
- Single reduction; ratios  $i = 1, 2, 5$
- Radial ball bearings are of standard supply, while taper roller bearings can be optionally specified for particularly demanding loading conditions.
- Protection IP65
- Max. noise level  $LP \leq 70\text{dB(A)} @ n_1 = 3000 \text{ min}^{-1}$
- Units are factory charged with synthetic lubricant suitable for operation at ambient temperatures in the range  $0^\circ$  to  $40^\circ\text{C}$ . The lubricant quantity is affected by mounting position, which therefore will have to be specified at the time of ordering. In the absence of contamination lubricant does not require periodical changes. The type of lubricant, whether grease or oil, depends on type of duty, as charted below:

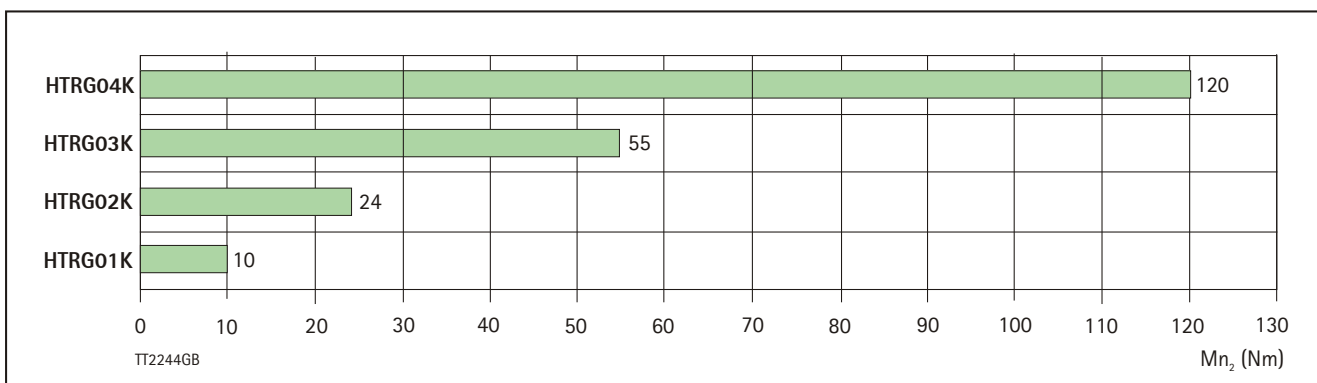
| duty | HTRG01K | HTRG02K | HTRG03K | HTRG04K |
|------|---------|---------|---------|---------|
| S1   | O/V     | O/V     | O/V     | O/V     |
| S5   | G/V     | G/V     | G/V     | G/V     |

**Legend:**

S1 = Continuous duty  
S5 = Intermittent duty

O = Synthetic oil, viscosity ISO VG 220  
G = NLGI Grease, consistency 00

V = Viton® seals





JVL Industri Elektronik A/S  
Blokken 42  
DK-3460 Birkerød, Denmark  
Tel: +45 4582 4440  
Fax: +45 4582 5550  
E-mail: [jvl@jvl.dk](mailto:jvl@jvl.dk) [www.jvl.dk](http://www.jvl.dk)

