SEIMITSU
ACCESS to a BRIGHTER FUTURE

**NISSEI CORPORATION**

https://www.nissei-gtr.global/en/

+91 9028121211 / 020 - 46212700 sales@seimitsu.in www.seimitsu.in

# High Stiffness Reducers

# DGS / DGH / DGF type

## Gear Head type



**Compact but can achieve high precision with powerful drive**

**The Best choice for Robots and FA equipment. (other products in need of high-accuracy)**

**NISSEI CORPORATION**

# In multiple ways, High accuracy drive.

**The High Stiffness Reducer has superior functions and abilities to meet the needs for productivity improvement from every angle. Make Industrial robots and FA products more powerful and faster. Obtain a large degree of freedom in product design and composition with compact body.**

## We will provide greater performance than ever in various applications with High Stiffness Reducer.



## DGS type — High torque and wide range of reduction ratios

3 Frame Sizes OD: 73mm / 79mm / 93mm 6 stage Reduction 1/19, 1/29, 1/49, 1/79, 1/99, 1/119 *The 1/119 reduction ratio is only available on frame sizes 030 and 050.

High torque, a wide range of reduction ratios, and high stiffness for resistance to impacts. A compact and flexible design is possible.



## DGH type — Large Hollow Shaft with High Stiffness and High Torque

5 Frame Sizes OD: 71mm / 81mm / 95mm / 110mm / 142mm 3 stage Reduction 1/19, 1/29, 1/59

Powerful drive, High resistance against loads and impacts. Large hollow bore shaft is able to contain a thick cable.



## DGF type — Flat and lightweight with input bearing inside

3 Frame Sizes OD: 71.5mm / 81.5mm / 91.5mm 2 stage Reduction 1/50, 1/100

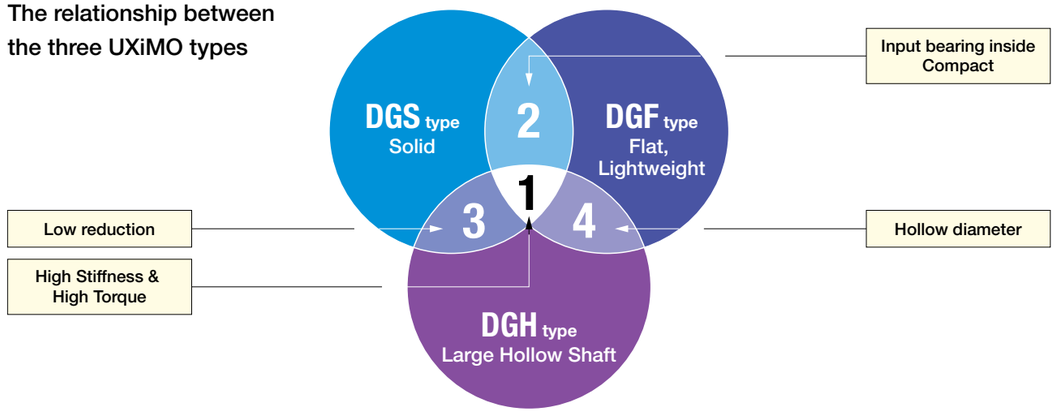
The planetary gear is inside the cross roller bearing, enabling thinness and lightweight. It will give you greater freedom on equipment design.

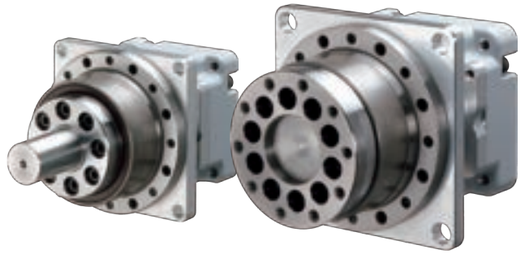


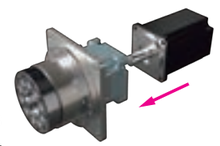
# UXiMO

## DGS / DGH / DGF / Gear Head type

The relationship between the three UXiMO types





## Gear Head type — Easy connection to motors allows reduction of manufacturing work-hours

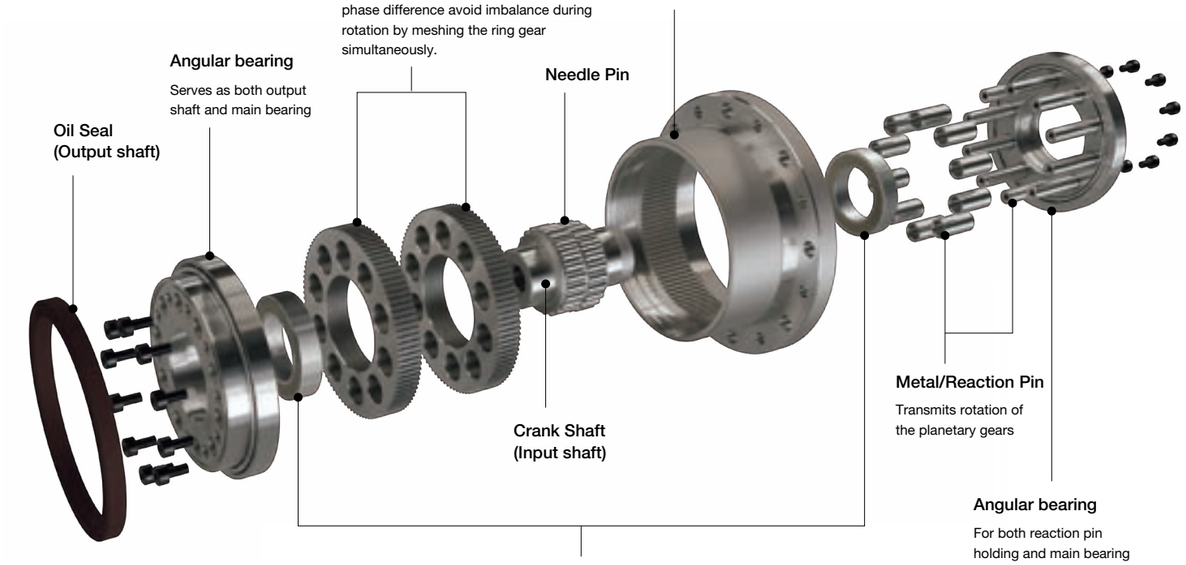
3 Frame Sizes OD: 73mm / 79mm / 93mm 6 stage Reduction 1/19, 1/29, 1/49, 1/79, 1/99, 1/119 *The 1/119 reduction ratio is only available on frame sizes 030 and 050.

In addition to compact body with a high torque and wide range of reduction ratios, easy and trouble-free motor coupling dramatically improve work efficiency. It enables more flexible designs than ever before for all types of applications.

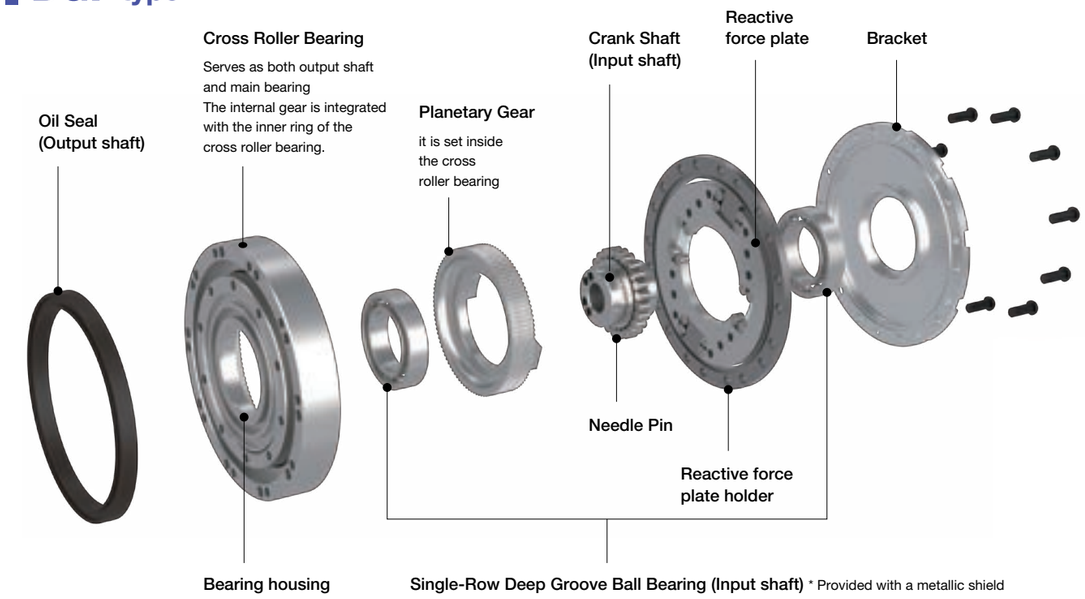
Model configuration table

| Type | Frame Size | Reduction Ratio |
|---|---|---|
| DGS Gear Head | 010 | 1/19, 1/29, 1/49, 1/79, 1/99 |
| | 030 | 1/19, 1/29, 1/49, 1/79, 1/99, 1/119 |
| | 050 | 1/19, 1/29, 1/49, 1/79, 1/99, 1/119 |
| DGH | 010 | 1/19, 1/29, 1/59 |
| | 030 | 1/19, 1/29, 1/59 |
| | 040 | 1/19, 1/29, 1/59 |
| | 080 | 1/19, 1/29, 1/59 |
| | 150 | 1/19, 1/29, 1/59 |
| DGF | 005 | 1/50, 1/100 |
| | 020 | 1/50, 1/100 |
| | 030 | 1/50, 1/100 |

## DGS type

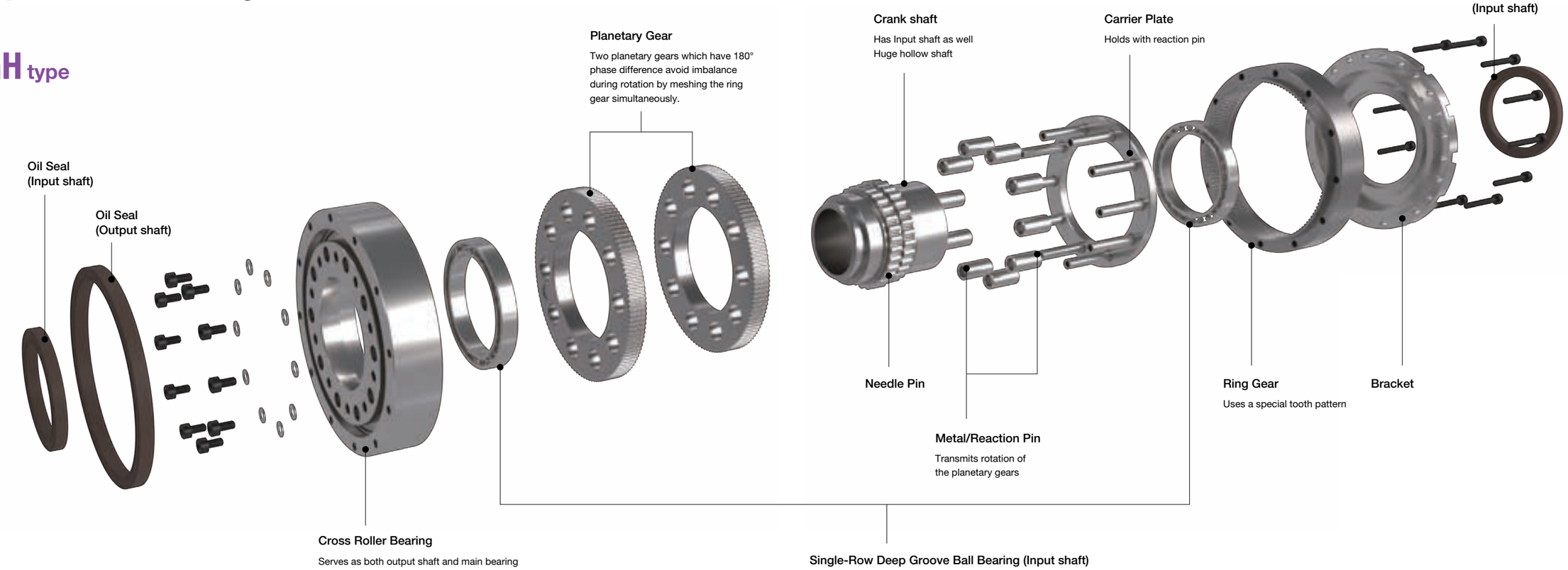



## DGF type



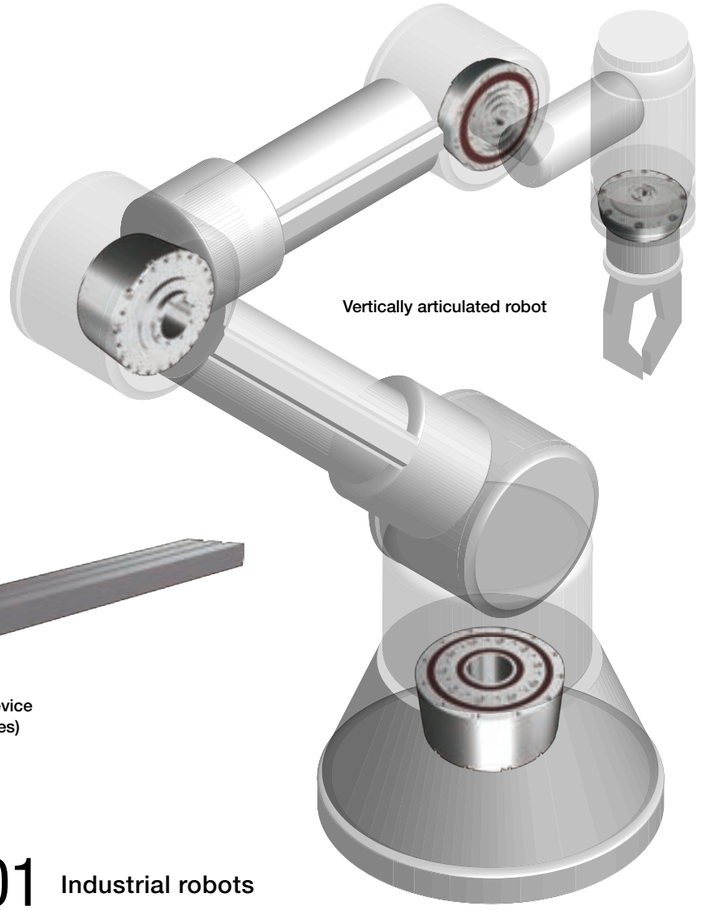

# Every element is designed with care.

## DGH type



# Best fit for wide variety of use

**Choose optimum size from three types, DGS type, DGH type and DGF type, for robots, FA equipment, and other various applications.**
**Outstanding scalability meet customer's needs with high performance.**



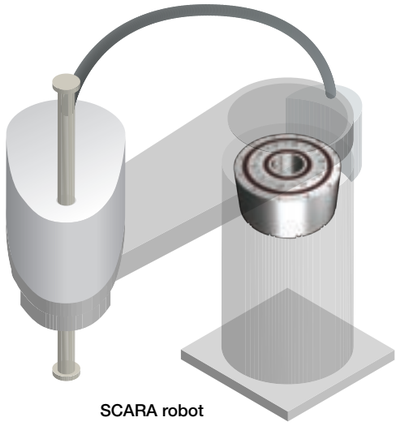
Vertically articulated robot



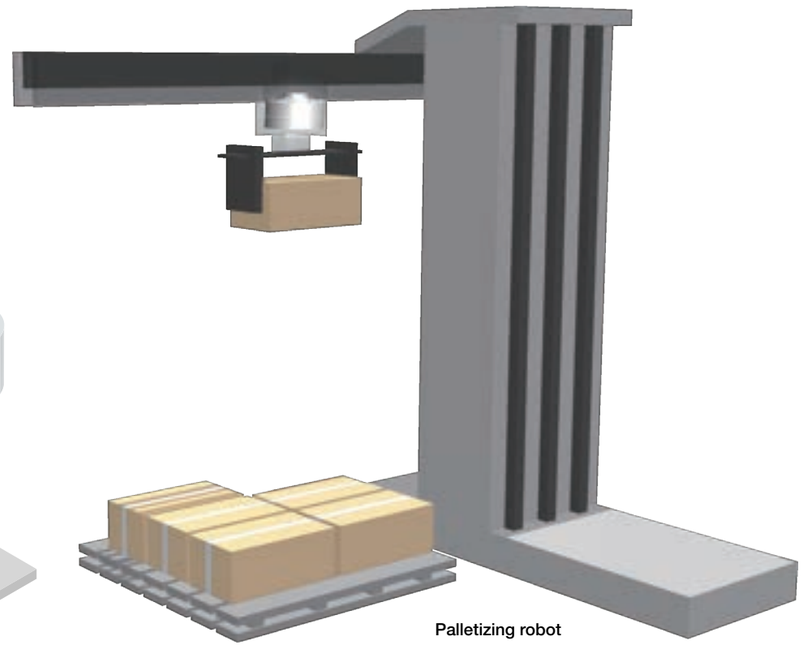
Loading device
(X, Y, ⊖ axes)

## Application 01 Industrial robots

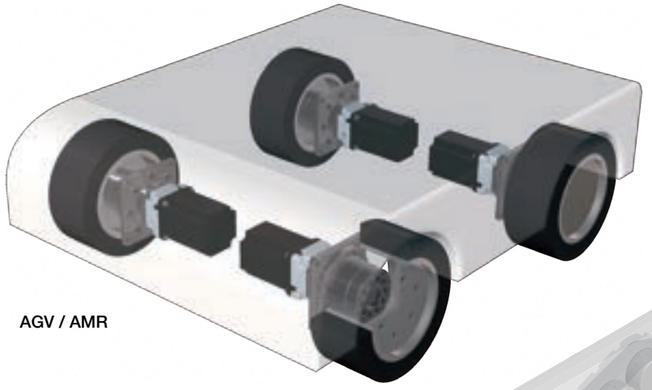
Our reducer is lightweight and compact.
However they are stiff and accurate enough to be used for robot joints.
That gives robots faster move and grater durability.



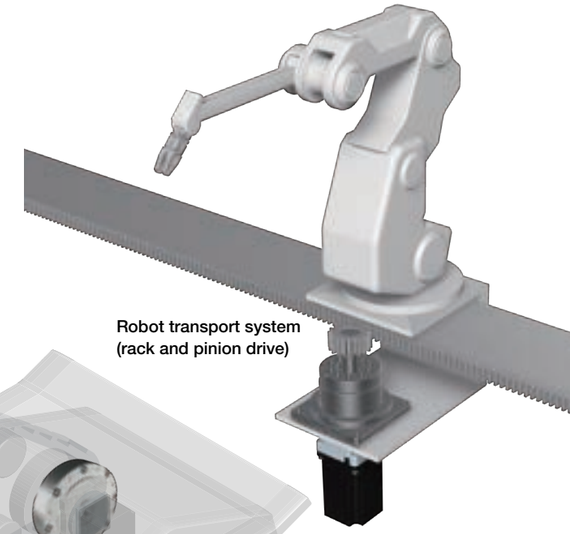
SCARA robot



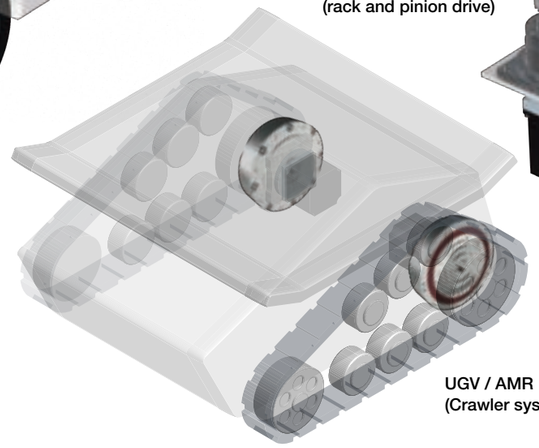
Palletizing robot



AGV / AMR



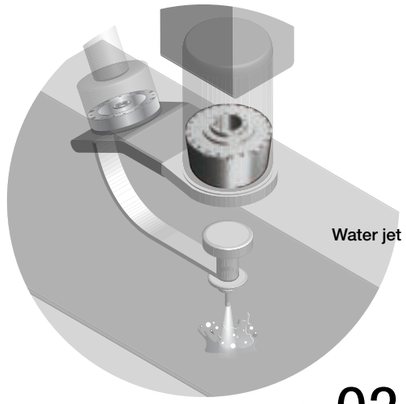
Robot transport system
(rack and pinion drive)



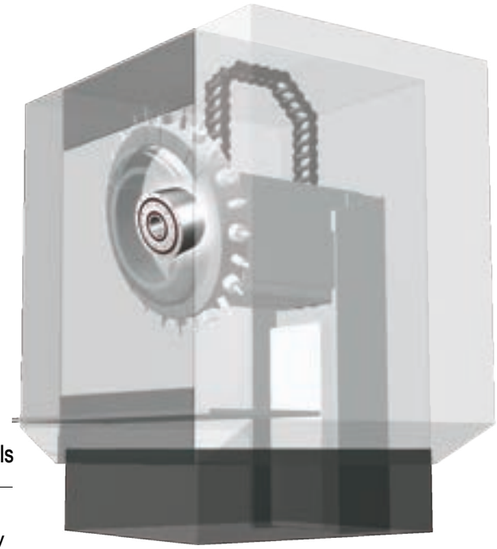
UGV / AMR
(Crawler system)

## Application 02 AGV / AMR / Transport axes

By using our reducers as in-wheel reducers on wheel axles, autonomous mobiles can be downsized and floors can be made lower; in addition, shocks can be directly received in use environments such as driving on poor road surfaces.
In addition, for the gearhead type, select the output shaft shape from 2 types: flange and straight shaft.



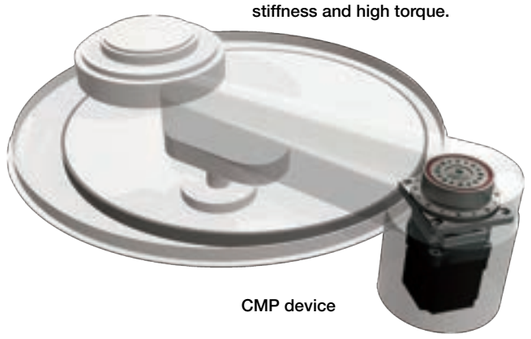
Water jet processing machine



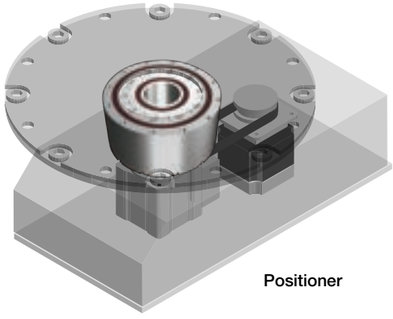
Machine tool
(Magazine reducer)

## Application 03 FA devices/Machine tools

Our reducer can contribute to FA/working machine which are required to be downsized by reducing number of components with its high stiffness and high torque.



CMP device



Positioner

# High Stiffness Reducers

## DGS Solid type type



DGS010 DGS030 DGS050

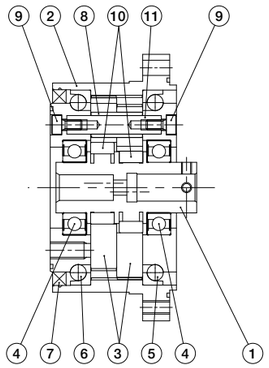
### Model and Specs

| Model Name | Type | Frame Size *1 | – | Reduction Ratio |
|---|---|---|---|---|
| DG | S | 030 | – | 029 |
| DG Series | S: Solid | 11 N · m → "010" 31 N · m → "030"<br>52 N · m → "050" | | 1/19 → "019" 1/79 → "079"<br>1/29 → "029" 1/99 → "099"<br>1/49 → "049" 1/119 → "119" *2 |

*1. The rated torque for a 1/49 reduction ratio is shown for each frame size.

*2. The 1/119 reduction ratio is only available on frame sizes 030 and 050.

### Structure




■ Rotational Direction Relationship
The rotational direction of the output shaft is opposite to that of the input shaft.

| No. | Part Name |
|---|---|
| 1 | Crank shaft |
| 2 | Ring Gear |
| 3 | Planetary Gear |
| 4 | Bearing |
| 5 | Angular bearing |
| 6 | Angular bearing |
| 7 | Oil Seal |
| 8 | Metal |
| 9 | Hex Socket Head Cap Bolt |
| 10 | Needle Pin |
| 11 | Reaction Pin |

* Please use our dedicated grease sold separately. The input shaft is not provided with an oil seal.

### Performance Table

| Frame Size | Reduction Ratio | Rated Torque (Input 2000r/min) *1 | Start/Stop Allowable Peak Torque *2 | Allowable Average Load Torque *3 | Allowable Instantaneous Maximum Torque *4 | Allowable Max. Input RPM | Allowable Average Input RPM | Rated Speed | Spring Constant *5 | Hysteresis Loss | Angular Transmission Error | Moment of inertia (input shaft equivalent) | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N · m | N · m | N · m | N · m | r/min | r/min | r/min | N · m/arc min | arc min | arc min | ×10⁻⁴kg · m² | kg |
| 010 | 1/19 | 6.5 | 14.5 | 8 | 23 | 6000 | 3500 | 2000 | 2.0 | 3.0 | 2.0 | 0.011 | 0.54 |
| | 1/29 | 10 | 22.5 | 12 | 36 | 6000 | 3500 | 2000 | 2.5 | 3.0 | 2.0 | 0.011 | 0.55 |
| | 1/49 | 11 | 36.5 | 14.5 | 60 | 6000 | 3500 | 2000 | 2.8 | 2.0 | 1.5 | 0.010 | 0.56 |
| | 1/79 | 13 | 39 | 18 | 75 | 6000 | 3500 | 2000 | 3.1 | 1.0 | 1.5 | 0.010 | 0.57 |
| | 1/99 | 13 | 46.5 | 18 | 75 | 6000 | 3500 | 2000 | 3.1 | 1.0 | 1.5 | 0.010 | 0.57 |
| 030 | 1/19 | 20 | 37 | 25 | 62 | 6000 | 3500 | 2000 | 3.6 | 3.0 | 1.5 | 0.025 | 0.77 |
| | 1/29 | 24 | 53 | 35 | 90 | 6000 | 3500 | 2000 | 4.3 | 3.0 | 1.5 | 0.023 | 0.80 |
| | 1/49 | 31 | 66 | 45 | 118 | 6000 | 3500 | 2000 | 5.1 | 2.0 | 1.5 | 0.023 | 0.81 |
| | 1/79 | 38 | 74 | 47 | 140 | 6000 | 3500 | 2000 | 6.2 | 1.0 | 1.5 | 0.023 | 0.82 |
| | 1/99 | 40 | 90 | 66 | 147 | 6000 | 3500 | 2000 | 6.7 | 1.0 | 1.5 | 0.023 | 0.82 |
| | 1/119 | 40 | 90 | 66 | 147 | 6000 | 3500 | 2000 | 6.7 | 1.0 | 1.5 | 0.022 | 0.82 |
| 050 | 1/19 | 26 | 50 | 32 | 95 | 6000 | 3500 | 2000 | 6.5 | 3.0 | 1.5 | 0.069 | 1.09 |
| | 1/29 | 40 | 75 | 50 | 145 | 6000 | 3500 | 2000 | 8.7 | 3.0 | 1.5 | 0.066 | 1.12 |
| | 1/49 | 52 | 116 | 58 | 186 | 6000 | 3500 | 2000 | 10.0 | 2.0 | 1.0 | 0.066 | 1.14 |
| | 1/79 | 63 | 125 | 79 | 214 | 6000 | 3500 | 2000 | 10.6 | 1.0 | 1.0 | 0.065 | 1.15 |
| | 1/99 | 67 | 140 | 83 | 240 | 6000 | 3500 | 2000 | 11.2 | 1.0 | 1.0 | 0.065 | 1.16 |
| | 1/119 | 67 | 147 | 83 | 246 | 6000 | 3500 | 2000 | 11.2 | 1.0 | 1.0 | 0.065 | 1.16 |

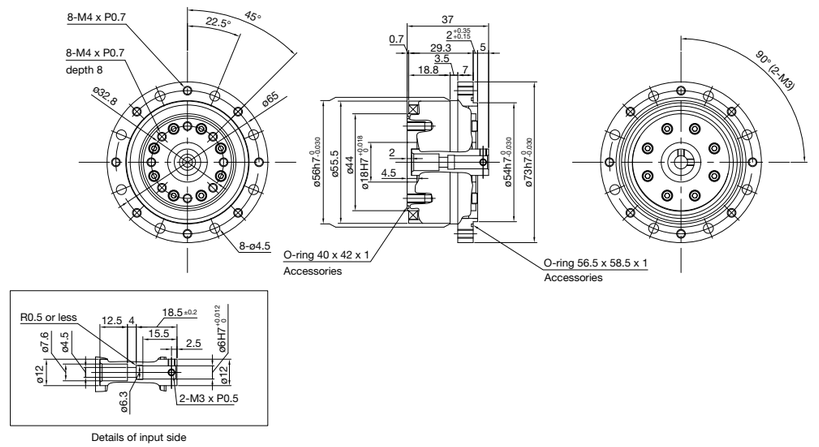
*1 Average load torque at which the basic rated life $L_{10}$ becomes 10,000 hours when the average input speed is 2,000 r/min.
*2 Allowable value of the acceleration/deceleration torque to be applied to the output shaft by the moment of inertia on start or stop.
*3 Allowable average load torque during operation when the load fluctuates.
*4 Allowable value of the maximum torque instantaneously applied due to an impact, etc. Torque the shaft can withstand about 10,000 times (does not cause plastic deformation).
*5 The values are for reference. The lower limit value is about 80% of the displayed value.

(All performance-related values contained in this catalog are obtained under the designated test conditions by NISSEI CORPORATION.)



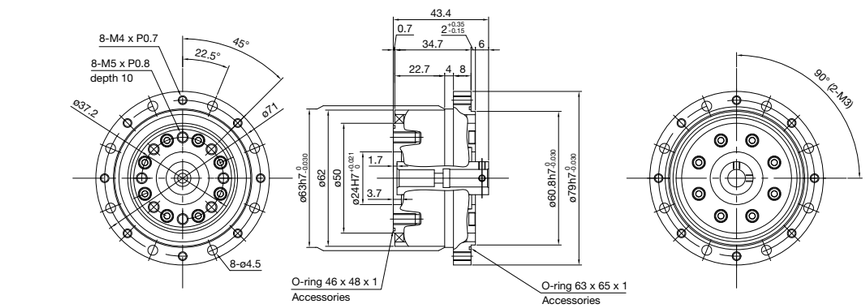
### Drawings

DGS010



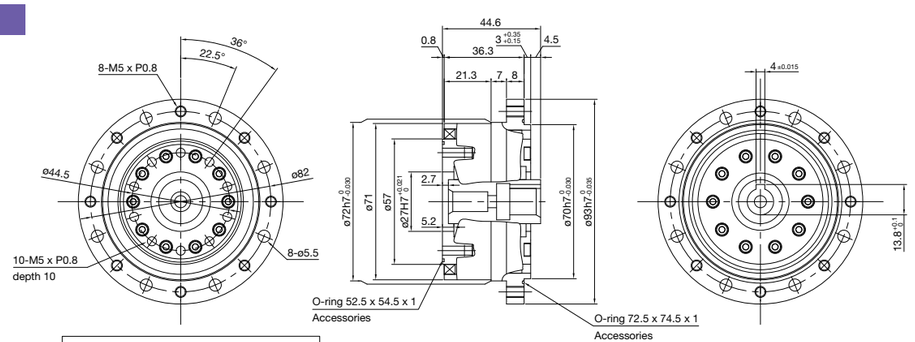

Details of input side

DGS030




Details of input side

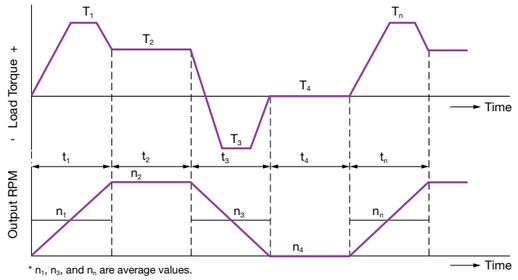
DGS050




Details of input side

# Selection Procedure and Examples

## ■ Operation Pattern




* $n_1$, $n_3$, and $n_n$ are average values.

<Operation Conditions :Eg>

| Operation Pattern | Load Torque ($T_n$) (N · m) | | Time ($t_n$) (s) | | Output RPM ($n_n$) (r/min) | |
|---|---|---|---|---|---|---|
| At the Start | $T_1$ | 74 | $t_1$ | 0.3 | $n_1$ | 11 |
| During normal operation | $T_2$ | 54 | $t_2$ | 3 | $n_2$ | 20 |
| While stopping (reducing speed) | $T_3$ | 40 | $t_3$ | 0.5 | $n_3$ | 11 |
| When at rest | $T_4$ | 0 | $t_4$ | 0.6 | $n_4$ | 0 |

Maximum Output RPM $No_{max}$ = 20(r/min) Impact Torque $T_s$ = 100(N · m)
Maximum Input RPM $Ni_{max}$ = 2500(r/min) Life time $L_{10}$ = 4000(h)

## Selection Process and Examples

## Selection Process Example

### 1. Calculation of average load torque on output shaft side in terms of usage

$$T_{av} = \sqrt[3]{\frac{n_1 \cdot t_1 \cdot (T_1)^3 + n_2 \cdot t_2 \cdot (T_2)^3 + \cdots n_n \cdot t_n \cdot (T_n)^3}{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}}$$

$$T_{av} = \sqrt[3]{\frac{11r/min \cdot 0.3s \cdot (74N \cdot m)^3 + 20r/min \cdot 3s \cdot (54N \cdot m)^3 + 11r/min \cdot 0.5s \cdot (40N \cdot m)^3}{11r/min \cdot 0.3s + 20r/min \cdot 3s + 11r/min \cdot 0.5s}}$$

$$\approx 54N \cdot m$$

### 2-1. Calculation of average output RPM

$$No_{av} = \frac{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}{t_1 + t_2 + \cdots t_n}$$

$$No_{av} = \frac{11r/min \cdot 0.3s + 20r/min \cdot 3s + 11r/min \cdot 0.5s + 0r/min \cdot 0.6s}{0.3s + 3s + 0.5s + 0.6s} \approx 16r/min$$

### 2-2. Deciding on reduction ratio

$$\frac{Ni_{max}}{No_{max}} \geq R$$

$$\frac{2500\,r/min}{20r/min} = 125 \geq 119 = R$$

### 2-3. Calculation of average input RPM

$$Ni_{av} = No_{av} \cdot R$$

Make sure the average input RPM is within the allowable average input RPM.
$Ni_{av} = 16r/min \cdot 119 = 1904r/min \leq 3500r/min$ (allowable average input RPM of DGS)

### 2-4. Calculation of maximum input RPM

$$Ni_{max} = No_{max} \cdot R$$

Confirm that the maximum input RPM is within the permissible level.
$Ni_{max} = 20r/min \cdot 119 = 2380r/min \leq 6000r/min$ (allowable maximum input RPM of DGS)

### 3. Temporarily select a model with performance table values that satisfy the usage conditions

$T_1 = 74N \cdot m \leq 90N \cdot m$ (DGS030-119 start/stop allowable peak torque)
$T_3 = 40N \cdot m \leq 90N \cdot m$ (DGS030-119 start/stop allowable peak torque)
Temporarily select DGS030-119 from $T_S = 100N \cdot m \leq 147N \cdot m$
(DGS030-119 allowable instantaneous maximum torque)

### 4. Calculation of reducer Life time

$$L_{10} = 10000 \cdot \left(\frac{T_r}{T_{av}}\right)^3 \cdot \frac{N_r}{Ni_{av}}$$

* However, $L_{10}$ is equal to or smaller than 10,000.

$$L_{10} = 10000 \cdot \left(\frac{40}{54}\right)^3 \cdot \left(\frac{2000}{1904}\right) \approx 4269(h) \geq 4000(h)$$

Therefore, select DGS030-119 and confirm the main bearing and input shaft load.



## Confirmation of main bearing life

### A. Calculation of max load moment

$M_{max} = Fr_{max}(Sr - A + B) + Fa_{max} \cdot Sa$

### Confirmation of max load moment

Maximum load moment ($M_{max}$) ≤ Allowable moment (Mc)

### B. Calculation of average load

**Average radial load ($Fr_{av}$)**

$$Fr_{av} = \sqrt[3]{\frac{n_1t_1(|Fr_1|)^3 + n_2t_2(|Fr_2|)^3 \cdots n_nt_n(|Fr_n|)^3}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

Let the maximum radial load within the $t_1$ space be $Fr_1$ and the maximum radial load within the $t_3$ space be $Fr_3$.

**Average Thrust Load ($Fa_{av}$)**

$$Fa_{av} = \sqrt[3]{\frac{n_1t_1(|Fa_1|)^3 + n_2t_2(|Fa_2|)^3 \cdots n_nt_n(|Fa_n|)^3}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

Let the maximum thrust load within the $t_1$ space be $Fa_1$ and the maximum thrust load within the $t_3$ space be $Fa_3$.

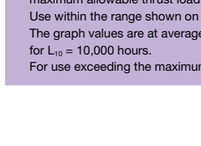
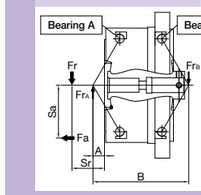
**Average Output RPM ($N_{av}$)**

$$N_{av} = \frac{n_1t_1 + n_2t_2 + \cdots + n_nt_n}{t_1 + t_2 + \cdots t_n}$$

### C. Calculation of life time

$$L_{10} = \left(\frac{10^6}{60 \times N_{av}}\right) \times \left(\frac{C}{fw \cdot Pc}\right)^3$$

* However, $L_{10}$ is equal to or smaller than 10,000.

| Direction of Thrust Load (Figure A) | Load conditions | Bearing classification | Thrust load | Radial load | Dynamic equivalent load |
|---|---|---|---|---|---|
|  | $\frac{Fr_B}{2Y_0} + Fa_{av} \geq \frac{Fr_A}{2Y_0}$ | Bearing A | $Fa_A = \frac{Fr_B}{2Y_0} + Fa_{av}$ | $Fr_A = \frac{Fr_{av}(Sr-A+B) + Fa_{av} \cdot Sa}{B}$ | $Pc_A = X \cdot Fr_A + Y \cdot Fa_A$<br>However, when $Pc_A < Fr_A$, use $Pc_A = Fr_A$ |
| | | Bearing B | $Fa_B = 0$ | $Fr_B = \frac{Fr_{av}(Sr-A) + Fa_{av} \cdot Sa}{B}$ | $Pc_B = Fr_B$ |
| | $\frac{Fr_B}{2Y_0} + Fa_{av} < \frac{Fr_A}{2Y_0}$ | Bearing A | $Fa_A = 0$ | $Fr_A = \frac{Fr_{av}(Sr-A+B) + Fa_{av} \cdot Sa}{B}$ | $Pc_A = Fr_A$ |
| | | Bearing B | $Fa_B = \frac{Fr_A}{2Y_0} - Fa_{av}$ | $Fr_B = \frac{Fr_{av}(Sr-A) + Fa_{av} \cdot Sa}{B}$ | $Pc_B = X \cdot Fr_B + Y \cdot Fa_B$<br>However, when $Pc_B < Fr_B$, use $Pc_B = Fr_B$ |
|  | $\frac{Fr_B}{2Y_0} \leq \frac{Fr_A}{2Y_0} + Fa_{av}$ | Bearing A | $Fa_A = 0$ | $Fr_A = \frac{Fr_{av}(Sr-A+B) - Fa_{av} \cdot Sa}{B}$ | $Pc_A = Fr_A$ |
| | | Bearing B | $Fa_B = \frac{Fr_A}{2Y_0} + Fa_{av}$ | $Fr_B = \frac{Fr_{av}(Sr-A) - Fa_{av} \cdot Sa}{B}$ | $Pc_B = X \cdot Fr_B + Y \cdot Fa_B$<br>However, when $Pc_B < Fr_B$, use $Pc_B = Fr_B$ |
| | $\frac{Fr_B}{2Y_0} > \frac{Fr_A}{2Y_0} + Fa_{av}$ | Bearing A | $Fa_A = \frac{Fr_B}{2Y_0} - Fa_{av}$ | $Fr_A = \frac{Fr_{av}(Sr-A+B) - Fa_{av} \cdot Sa}{B}$ | $Pc_A = X \cdot Fr_A + Y \cdot Fa_A$<br>However, when $Pc_A < Fr_A$, use $Pc_A = Fr_A$ |
| | | Bearing B | $Fa_B = 0$ | $Fr_B = \frac{Fr_{av}(Sr-A) - Fa_{av} \cdot Sa}{B}$ | $Pc_B = Fr_B$ |



*1 $Y_0$=0.76 *2 The radial load on the bearings should be regarded as positive even if the load direction is opposite to the arrows in the above figure.

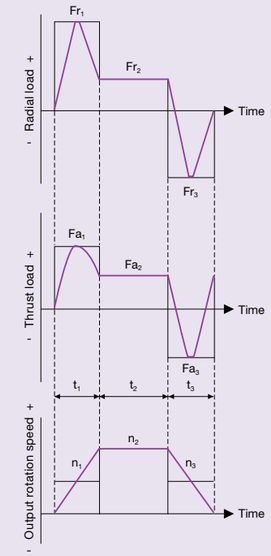
**Load Coefficient**

| Load Status | fw |
|---|---|
| For smooth movement with no impacts | 1 to 1.2 |
| For normal movement | 1.2 to 1.5 |
| For high vibration and impacts | 1.5 to 3 |

**Calculation of load coefficient**

| Bearing A | Bearing B | Radial Load Coefficient (X) | Thrust Load Coefficient (Y) |
|---|---|---|---|
| $\frac{Fa_A}{Fr_A} \leq 0.8$ | $\frac{Fa_B}{Fr_B} \leq 0.8$ | 1 | 0 |
| $\frac{Fa_A}{Fr_A} > 0.8$ | $\frac{Fa_B}{Fr_B} > 0.8$ | 0.39 | 0.76 |

**B.Graph**




| Frame Size | Distance from end of output shaft to point of action (A) (m) | Distance between points of action (B) (m) |
|---|---|---|
| DGS010 | 0.0052 | 0.0444 |
| DGS030 | 0.00625 | 0.0519 |
| DGS050 | 0.0068 | 0.0568 |

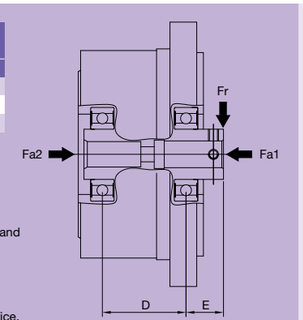
| Frame Size | Basic Dynamic Rated Load (C) (N) | Basic Static Rated Load ($C_o$) (N) | Allowable Moment (Mc) (N · m) |
|---|---|---|---|
| DGS010 | 5590 | 5600 | 112 |
| DGS030 | 8800 | 7850 | 163 |
| DGS050 | 8900 | 8030 | 241 |

| Symbol | Unit | Content |
|---|---|---|
| $L_{10}$ | h | Life time |
| $N_{av}$ | r/min | Average Output RPM |
| Pc | N | Dynamic Equivalent Radial Load |
| $Fr_{av}$ | N | Average Radial Load |
| $Fa_{av}$ | N | Average Thrust Load |
| Sr,Sa | m | See Fig. A |
| $Fr_A$, $Fr_B$ | N | Radial load on bearings A and B obtained from $Fr_{av}$ and $Fa_{av}$ |
| $Fa_A$, $Fa_B$ | N | Thrust load on bearings A and B |

## Confirmation of load on input shaft

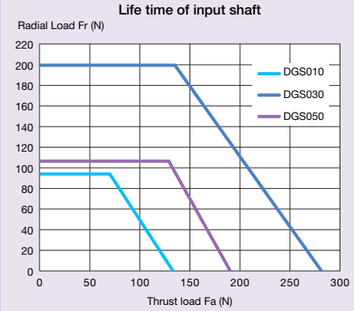
| Frame Size | D (m) | E (m) | Allowable thrust load Fa1, Fa2 (N) | Allowable radial load Fr (N) |
|---|---|---|---|---|
| DGS010 | 0.02 | 0.01 | 134 | 95 |
| DGS030 | 0.025 | 0.0112 | 281 | 199 |
| DGS050 | 0.0258 | 0.0101 | 193 | 106 |

* Assuming a case where a load is applied to Fa1 or Fa2




The graph shows the relation between the maximum allowable radial load and maximum allowable thrust load for each frame size.
Use within the range shown on the graph at right side.
The graph values are at average input RPM 2000r/min and basic rated life for $L_{10}$ = 10,000 hours.
For use exceeding the maximum radial load, consult your nearest sales office.

**Life time of input shaft**

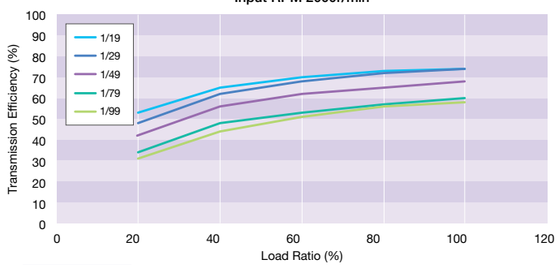


## Efficiency Characteristics

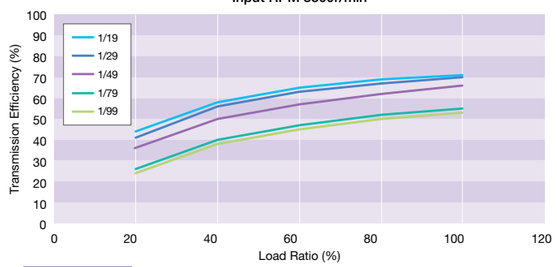
**Measurement conditions:** Input RPM 2000 r/min, values are measured after two-hours of warm operation

* The values in this graph vary according to usage conditions and can be used for Reference purpose only.

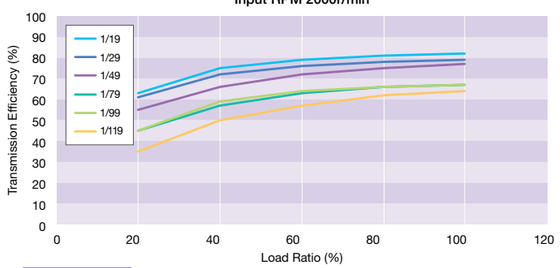
DGS010



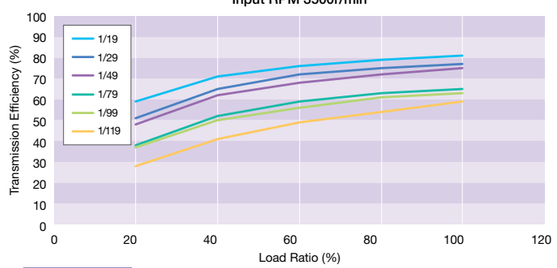

DGS010




DGS030




DGS030




DGS050




DGS050




## Starting Torque

The torque required to start up (rotate) the reducer from the input shaft with no load.

Measurement conditions: Value after two hours of running-in at an input speed of 2,000 r/min

(Unit: cN · m)

| Reduction Ratio \ Frame Size | DGS010 | DGS030 | DGS050 |
|---|---|---|---|
| 1/19 | 14.1 | 20.1 | 30.5 |
| 1/29 | 11.6 | 16.0 | 23.6 |
| 1/49 | 8.9 | 12.3 | 15.3 |
| 1/79 | 7.5 | 9.9 | 12.0 |
| 1/99 | 7.1 | 9.1 | 11.2 |
| 1/119 | – | 8.8 | 10.7 |

* The values in the table above vary according to usage conditions and are for use as reference only.

## Accelerating Torque

The torque required to start up (rotate) the reducer from the output shaft with no load.

Measurement conditions: Value after two hours of running-in at an input speed of 2,000 r/min

(Unit: N · m)

| Reduction Ratio \ Frame Size | DGS010 | DGS030 | DGS050 |
|---|---|---|---|
| 1/19 | 4.4 | 6.2 | 9.3 |
| 1/29 | 4.6 | 6.6 | 9.8 |
| 1/49 | 5.0 | 7.0 | 9.7 |
| 1/79 | 6.9 | 9.0 | 12.2 |
| 1/99 | 8.3 | 10.7 | 14.2 |
| 1/119 | – | 12.7 | 16.7 |

* The values in the table above vary according to usage conditions and are for use as reference only.



## Running Torque with No Load

The torque required on the input side to rotate the reducer with no load.

Measurement conditions: Input RPM 2000 r/min, values are measured after two-hours of warm operation

(Unit: cN · m)

| Reduction Ratio \ Frame Size | DGS010 | DGS030 | DGS050 |
|---|---|---|---|
| 1/19 | 11 | 18 | 28.8 |
| 1/29 | 10 | 16.9 | 27.5 |
| 1/49 | 8.3 | 14.1 | 23.6 |
| 1/79 | 7.1 | 12.5 | 21.4 |
| 1/99 | 6.9 | 12.1 | 20.7 |
| 1/119 | – | 11.8 | 20.4 |

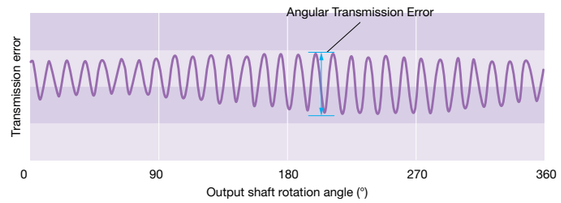
* The values in the table above vary according to usage conditions and are for use as reference only.

## Angular Transmission Error

With an arbitrary rotation angle input, the difference between the theoretical rotating output rotation angle and the actual rotating output rotation angle.

(Unit: arc min)

| Reduction Ratio \ Frame Size | DGS010 | DGS030 | DGS050 |
|---|---|---|---|
| 1/19 | 2.0 | 1.5 | 1.5 |
| 1/29 | 2.0 | 1.5 | 1.5 |
| 1/49 | 1.5 | 1.5 | 1.0 |
| 1/79 | 1.5 | 1.5 | 1.0 |
| 1/99 | 1.5 | 1.5 | 1.0 |
| 1/119 | – | 1.5 | 1.0 |




## Hysteresis Loss

When fixing the input shaft and, after increasing from zero to rated torque on the output shaft, returning the torque to zero, the output shaft torsion angle will retain a minimal amount rather than returning entirely to zero. This is called hysteresis loss.

(Unit: arc min)

| Reduction Ratio \ Frame Size | DGS010 | DGS030 | DGS050 |
|---|---|---|---|
| 1/19 | 3.0 | 3.0 | 3.0 |
| 1/29 | 3.0 | 3.0 | 3.0 |
| 1/49 | 2.0 | 2.0 | 2.0 |
| 1/79 | 1.0 | 1.0 | 1.0 |
| 1/99 | 1.0 | 1.0 | 1.0 |
| 1/119 | – | 1.0 | 1.0 |

## Spring Constant

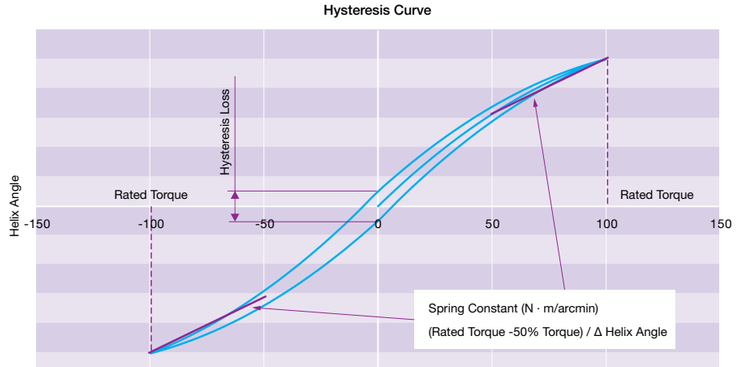
This is the resistance to torsion (torsional rigidity) against rotational force.

(Unit: N · m / arc min)

| Reduction Ratio \ Frame Size | DGS010 | DGS030 | DGS050 |
|---|---|---|---|
| 1/19 | 2.0 | 3.6 | 6.5 |
| 1/29 | 2.5 | 4.3 | 8.7 |
| 1/49 | 2.8 | 5.1 | 10.0 |
| 1/79 | 3.1 | 6.2 | 10.6 |
| 1/99 | 3.1 | 6.7 | 11.2 |
| 1/119 | – | 6.7 | 11.2 |

* The values are for reference. The lower limit value is about 80% of the displayed value.

**Hysteresis Curve**




(All performance-related values contained in this catalog are obtained under the designated test conditions by NISSEI CORPORATION.)

# High Stiffness Reducers

## DGH Large Hollow Shaft type

## type



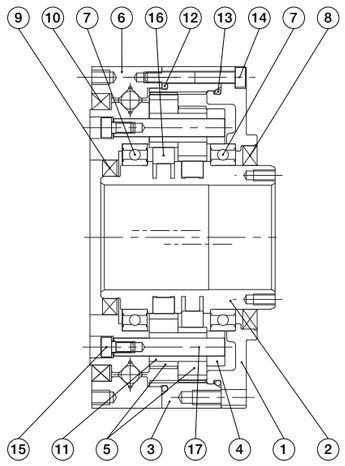
DGH010 DGH030 DGH040 DGH080 DGH150

### Model and Specs

| Model Name | Type | Frame Size *1 | | – | Reduction Ratio |
|---|---|---|---|---|---|
| DG | H | 040 | | – | 029 |
| DG Series | H: Hollow bore | 10 N · m → "010"<br>29 N · m → "030"<br>44 N · m → "040" | 82 N · m → "080"<br>153 N · m → "150" | | 1/19 → "019"<br>1/29 → "029"<br>1/59 → "059" |

*1. The rated torque value of each size is indicated as the frame size.

### Structure




■ Rotational Direction Relationship

The rotational direction of the output shaft is opposite to that of the input shaft.

| No. | Part Name | No. | Part Name |
|---|---|---|---|
| 1 | Bracket | 10 | Oil Seal (Output shaft) |
| 2 | Crank shaft | 11 | Metal |
| 3 | Ring Gear | 12 | O-ring |
| 4 | Carrier Plate | 13 | O-ring |
| 5 | Planetary Gear | 14 | Hex Socket Head Cap Bolt |
| 6 | Cross Roller Bearing | 15 | Hex Socket Head Cap Bolt *2 |
| 7 | Single-Row Deep Groove Ball Bearing (Input shaft) | 16 | Needle Pin |
| 8 | Oil Seal (Input shaft) | 17 | Reaction Pin |
| 9 | Oil Seal (Input shaft) | | |

*2 Frame sizes 010 and 030 use a retaining ring.



### Performance Table

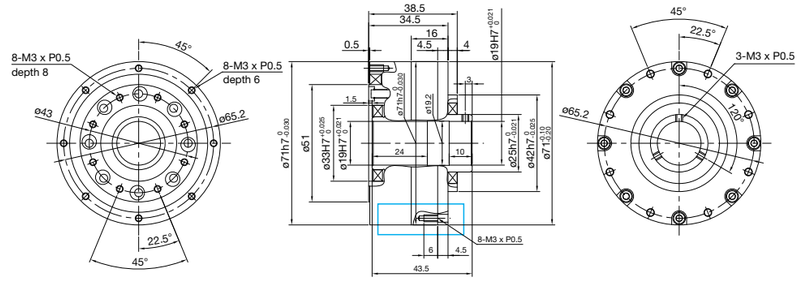
| Frame Size | Reduction Ratio | Rated Torque (Input 2000r/min) *1 | Start/Stop Allowable Peak Torque *2 | Allowable Average Load Torque *3 | Allowable Instantaneous Maximum Torque *4 | Allowable Max. Input RPM | Allowable Average Input RPM | Rated Speed | Spring Constant *5 | Hysteresis Loss | Angular Transmission Error | Moment of inertia (input shaft equivalent) | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N · m | N · m | N · m | N · m | r/min | r/min | r/min | N · m/ arc min | arc min | arc min | x $10^{-4}$kg · $m^2$ | kg |
| 010 | 1/19 | 10 | 30 | 19 | 61 | 6000 | 3500 | 2000 | 3.1 | 2.0 | 2.0 | 0.104 | 0.77 |
| | 1/29 | 10 | 30 | 19 | 61 | 6000 | 3500 | 2000 | 3.1 | 2.0 | 2.0 | 0.101 | 0.77 |
| | 1/59 | 10 | 30 | 19 | 61 | 6000 | 3500 | 2000 | 3.1 | 2.0 | 1.5 | 0.100 | 0.77 |
| 030 | 1/19 | 29 | 56 | 35 | 113 | 6000 | 3500 | 2000 | 7.5 | 2.0 | 1.5 | 0.224 | 1.14 |
| | 1/29 | 29 | 56 | 35 | 113 | 6000 | 3500 | 2000 | 7.5 | 2.0 | 1.5 | 0.218 | 1.14 |
| | 1/59 | 29 | 56 | 35 | 113 | 6000 | 3500 | 2000 | 7.5 | 2.0 | 1.5 | 0.214 | 1.14 |
| 040 | 1/19 | 44 | 96 | 61 | 165 | 6000 | 3500 | 2000 | 11.2 | 2.0 | 1.5 | 0.685 | 1.8 |
| | 1/29 | 44 | 96 | 61 | 165 | 6000 | 3500 | 2000 | 11.2 | 2.0 | 1.2 | 0.674 | 1.8 |
| | 1/59 | 44 | 96 | 61 | 165 | 6000 | 3500 | 2000 | 11.8 | 2.0 | 1.0 | 0.667 | 1.8 |
| 080 | 1/19 | 82 | 178 | 113 | 332 | 6000 | 3500 | 2000 | 22.5 | 2.0 | 1.5 | 1.220 | 2.6 |
| | 1/29 | 82 | 178 | 113 | 332 | 6000 | 3500 | 2000 | 24.3 | 2.0 | 1.2 | 1.197 | 2.6 |
| | 1/59 | 82 | 178 | 113 | 332 | 6000 | 3500 | 2000 | 26.2 | 2.0 | 1.0 | 1.182 | 2.6 |
| 150 | 1/19 | 153 | 395 | 217 | 738 | 6000 | 3500 | 2000 | 41.2 | 2.0 | 1.5 | 4.42 | 5.2 |
| | 1/29 | 153 | 395 | 217 | 738 | 6000 | 3500 | 2000 | 45.6 | 2.0 | 1.2 | 4.34 | 5.2 |
| | 1/59 | 153 | 395 | 217 | 738 | 6000 | 3500 | 2000 | 50 | 2.0 | 1.0 | 4.30 | 5.2 |

*1 Average load torque at which the basic rated life $L_{10}$ becomes 10,000 hours when the average input speed is 2,000 r/min.
*2 Allowable value of the acceleration/deceleration torque to be applied to the output shaft by the moment of inertia on start or stop.
*3 Allowable average load torque during operation when the load fluctuates.
*4 Allowable value of the maximum torque instantaneously applied due to an impact, etc. Torque the shaft can withstand about 10,000 times (does not cause plastic deformation).
*5 The values are for reference. The lower limit value is about 80% of the displayed value.

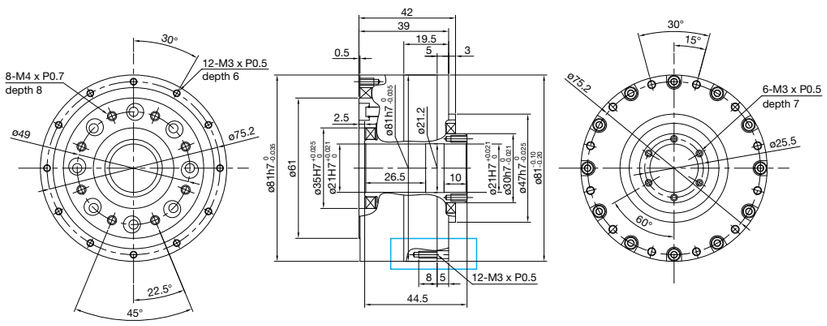
(All performance-related values contained in this catalog are obtained under the designated test conditions by NISSEI CORPORATION.)

## Drawings

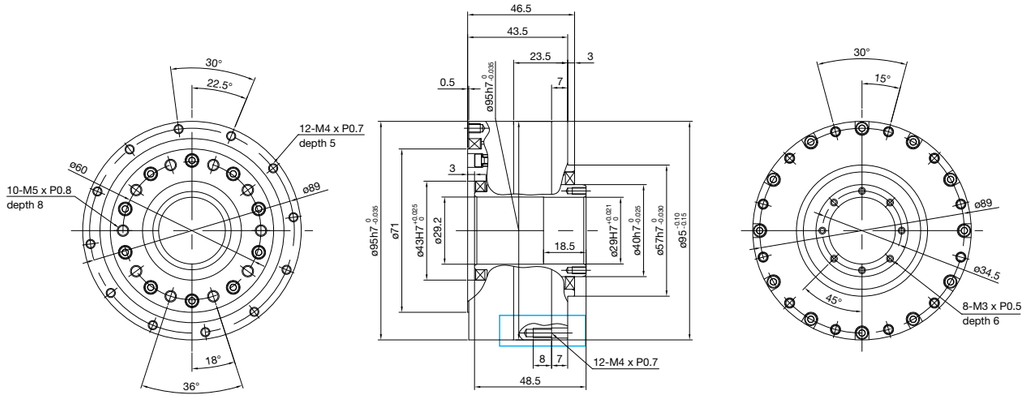
### DGH010



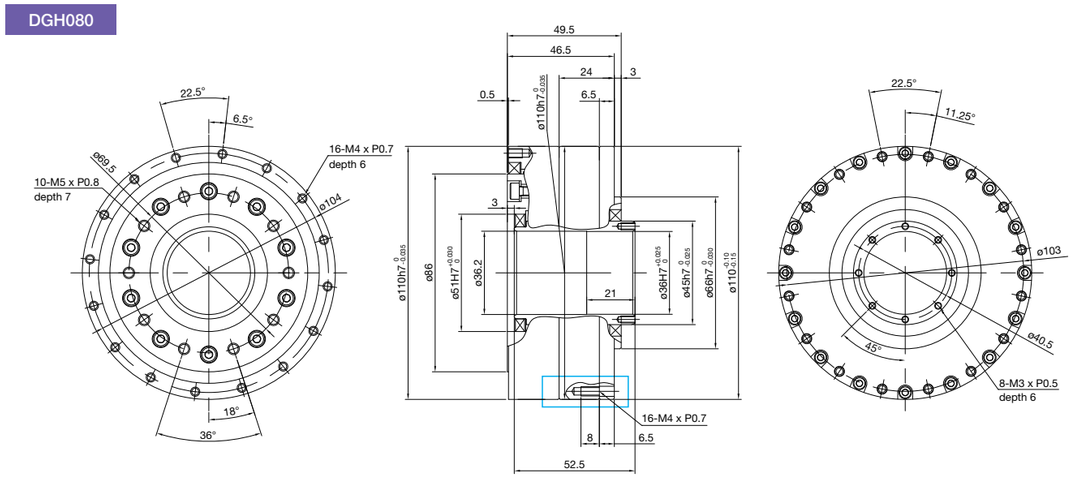

### DGH030



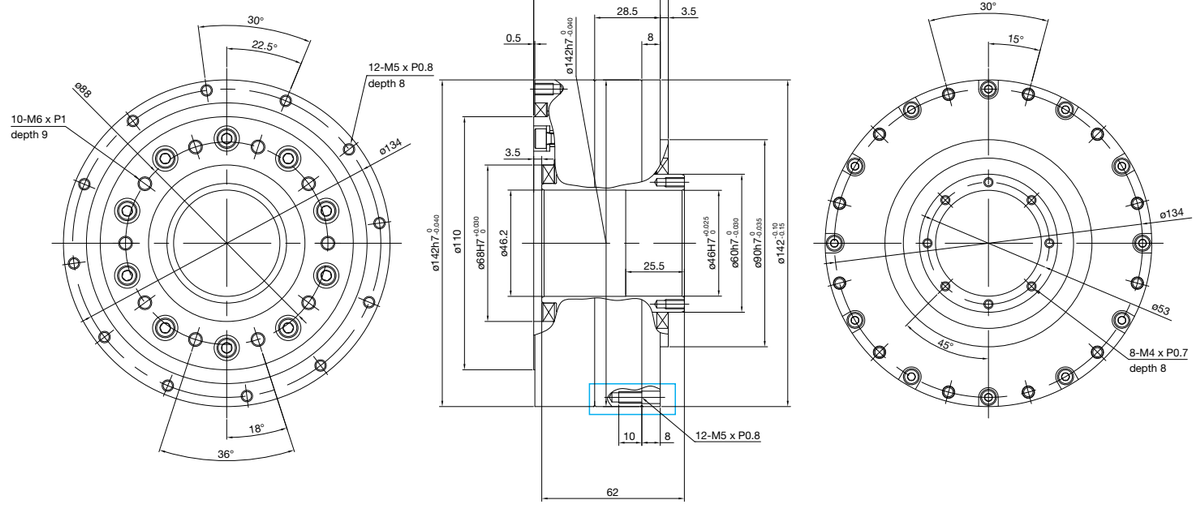

### DGH040



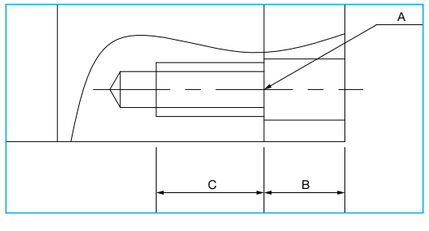

### DGH080




### DGH150



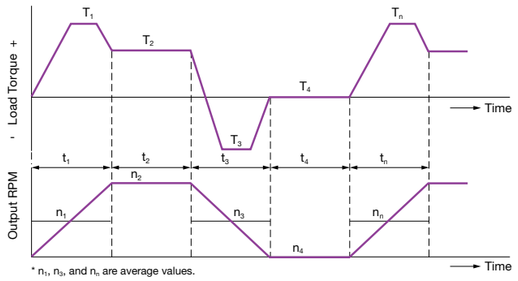

part details




| Frame Size | A | B | C |
|---|---|---|---|
| DGH010 | 8-M3 | 4.5 | 6 |
| DGH030 | 12-M3 | 5 | 8 |
| DGH040 | 12-M4 | 7 | 8 |
| DGH080 | 16-M4 | 6.5 | 8 |
| DGH150 | 12-M5 | 8 | 10 |

## Selection Procedure and Examples

### ■ Operation Pattern




* $n_1$, $n_3$, and $n_n$ are average values.

<Operation Conditions :Eg>

| Operation Pattern | Load Torque ($T_n$) (N · m) | | Time ($t_n$) (s) | | Output RPM ($n_n$) (r/min) | |
|---|---|---|---|---|---|---|
| At the Start | $T_1$ | 150 | $t_1$ | 0.3 | $n_1$ | 21 |
| During normal operation | $T_2$ | 100 | $t_2$ | 3 | $n_2$ | 42 |
| While stopping (reducing speed) | $T_3$ | 70 | $t_3$ | 0.4 | $n_3$ | 21 |
| When at rest | $T_4$ | 0 | $t_4$ | 0.2 | $n_4$ | 0 |

Maximum Output RPM $No_{max}$ = 42(r/min) Impact Torque $T_s$ = 250(N · m)
Maximum Input RPM $Ni_{max}$ = 2500(r/min) Life time $L_{10}$ = 4000(h)

### Selection Process and Examples

**1.** Calculation of average load torque on output shaft side in terms of usage

$$T_{av} = \sqrt[3]{\frac{n_1 \cdot t_1 \cdot (T_1)^3 + n_2 \cdot t_2 \cdot (T_2)^3 + \cdots n_n \cdot t_n \cdot (T_n)^3}{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}}$$

### Selection Process Example

$$T_{av} = \sqrt[3]{\frac{21r/min \cdot 0.3s \cdot (150N \cdot m)^3 + 42r/min \cdot 3s \cdot (100N \cdot m)^3 + 21r/min \cdot 0.4s \cdot (70N \cdot m)^3}{21r/min \cdot 0.3s + 42r/min \cdot 3s + 21r/min \cdot 0.4s}}$$

$$\approx 102N \cdot m$$

**2-1.** Calculation of average output RPM

$$No_{av} = \frac{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}{t_1 + t_2 + \cdots t_n}$$

$$No_{av} = \frac{21r/min \cdot 0.3s + 42r/min \cdot 3s + 21r/min \cdot 0.4s + 0r/min \cdot 0.2s}{0.3s + 3s + 0.4s + 0.2s} \approx 36\,r/min$$

**2-2.** Deciding on reduction ratio

$$\frac{Ni_{max}}{No_{max}} \geq R \qquad \frac{2500\,r/min}{42r/min} = 59.52 \geq 59 = R$$

**2-3.** Calculation of average input RPM

$Ni_{av} = No_{av} \cdot R$

Make sure the average input RPM is within the allowable average input RPM.
$Ni_{av} = 36r/min \cdot 59 = 2124r/min \leq 3500r/min$ (allowable average input RPM of DGH)

**2-4.** Calculation of maximum input RPM

$Ni_{max} = No_{max} \cdot R$

Confirm that the maximum input RPM is within the permissible level.
$Ni_{max} = 42r/min \cdot 59 = 2478r/min \leq 6000r/min$ (allowable maximum input RPM of DGH)

**3.** Temporarily select a model with performance table values that satisfy the usage conditions

$T_1 = 150N \cdot m \leq 178N \cdot m$ (DGH080 start/stop allowable peak torque)
$T_3 = 70N \cdot m \leq 178N \cdot m$ (DGH080 start/stop allowable peak torque)
$T_S = 250N \cdot m \leq 332N \cdot m$ (DGH080 allowable instantaneous maximum torque)
Temporarily select DGH080-059 from $T_{av} = 102\ N \cdot m \leq 113\ N \cdot m$
(DGH080 allowable average load torque)

**4.** Calculation of reducer Life time

$$L_{10} = 10000 \cdot \left(\frac{T_r}{T_{av}}\right)^3 \cdot \left(\frac{N_r}{Ni_{av}}\right)$$

* However, $L_{10}$ is equal to or smaller than 10,000.

Confirm that the reducer life time is greater than the required duration.
$T_r = 82N \cdot m$ (DGH080 rated torque)
$N_r = 2000r/min$ (DGH080 rated RPM)

$$L_{10} = 10000 \cdot \left(\frac{82}{102}\right)^3 \cdot \left(\frac{2000}{2124}\right) \approx 4892\,(h) \geq 4000\,(h)$$

Therefore, select DGH080-059 and confirm the main bearing life and input shaft load.





## Confirmation of main bearing life

**A.** Calculation of max load moment

$$M_{max} = Fr_{max}(Sr + A) + Fa_{max} \cdot Sa$$

Confirmation of max load moment
Maximum load moment ($M_{max}$) ≤ Allowable moment (Mc)

**B.** Calculation of average load

Average radial load ($Fr_{av}$)

$$Fr_{av} = \sqrt[10/3]{\frac{n_1t_1(|Fr_1|)^{10/3} + n_2t_2(|Fr_2|)^{10/3} \cdots n_nt_n(|Fr_n|)^{10/3}}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

Let the maximum radial load within the $t_1$ space be $Fr_1$ and the maximum radial load within the $t_3$ space be $Fr_3$.

Average Thrust Load ($Fa_{av}$)

$$Fa_{av} = \sqrt[10/3]{\frac{n_1t_1(|Fa_1|)^{10/3} + n_2t_2(|Fa_2|)^{10/3} \cdots n_nt_n(|Fa_n|)^{10/3}}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

Let the thrust load within the $t_1$ space be $Fa_1$ and the maximum thrust load within the $t_3$ space be $Fa_3$.

Average Output RPM ($N_{av}$)

$$N_{av} = \frac{n_1t_1 + n_2t_2 + \cdots + n_nt_n}{t_1 + t_2 + \cdots t_n}$$

Calculation of load coefficient

| To find the Load factor | Radial Load Coefficient (X) | Thrust Load Coefficient (Y) |
|---|---|---|
| $\frac{Fa_{av}}{Fr_{av} + 2(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa) / dp} \leq 1.5$ | 1 | 0.45 |
| $\frac{Fa_{av}}{Fr_{av} + 2(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa) / dp} > 1.5$ | 0.67 | 0.67 |

**C.** Calculation of life time

$$L_{10} = \left(\frac{10^6}{60 \times N_{av}}\right) \times \left(\frac{C}{fw \cdot Pc}\right)^{10/3}$$

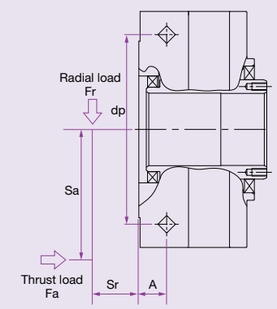
$$Pc = X \cdot \left(Fr_{av} + \frac{2(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa)}{dp}\right) + Y \cdot Fa_{av}$$

* However, $L_{10}$ is equal to or smaller than 10,000.

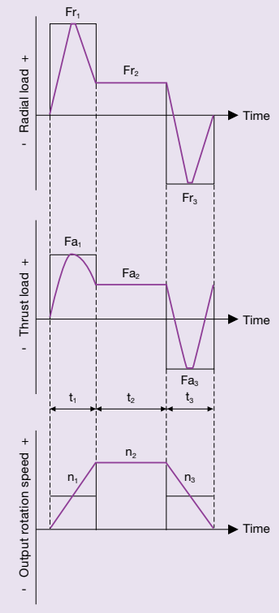
Load Coefficient

| Load Status | fw |
|---|---|
| For smooth movement with no impacts | 1 to 1.2 |
| For normal movement | 1.2 to 1.5 |
| For high vibration and impacts | 1.5 to 3 |

A. Fig.




B.Graph



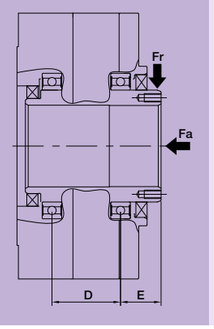

| Frame Size | Roller Pitch Diameter (dp) (m) | Roller Position from Output Shaft End (A) (m) | Basic Dynamic Rated Load (C) (N) | Basic Static Rated Load ($C_o$) (N) | Allowable Moment (Mc) (N · m) |
|---|---|---|---|---|---|
| DGH010 | 0.0556 | 0.0095 | 7100 | 10830 | 74 |
| DGH030 | 0.064 | 0.01 | 12100 | 18310 | 126 |
| DGH040 | 0.0759 | 0.0112 | 17500 | 25900 | 220 |
| DGH080 | 0.0885 | 0.012 | 19100 | 30600 | 290 |
| DGH150 | 0.1125 | 0.013 | 40800 | 62500 | 582 |

| Symbol | Unit | Content |
|---|---|---|
| $L_{10}$ | h | Life time |
| $N_{av}$ | r/min | Average Output RPM |
| Pc | N | Dynamic Equivalent Radial Load |
| $Fr_{av}$ | N | Average Radial Load |
| $Fa_{av}$ | N | Average Thrust Load |
| Sr,Sa | m | See Fig. A |

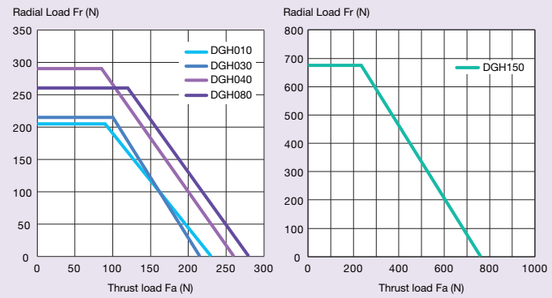
## Confirmation of load on input shaft

| Frame Size | D (m) | E (m) | Maximum Radial Load (N) |
|---|---|---|---|
| DGH010 | 0.02 | 0.0145 | 205 |
| DGH030 | 0.023 | 0.013 | 215 |
| DGH040 | 0.0245 | 0.0145 | 290 |
| DGH080 | 0.02695 | 0.0153 | 260 |
| DGH150 | 0.0325 | 0.0175 | 675 |

The graph shows the relation between the maximum allowable radial load and maximum allowable thrust load for each frame size.
Use within the range shown on the graph at right side.
The graph values are at average input RPM 2000r/min and basic rated life for $L_{10}$ = 10,000hours.
For use exceeding the maximum radial load, consult your nearest sales office.




Input Bearing Allowable Load

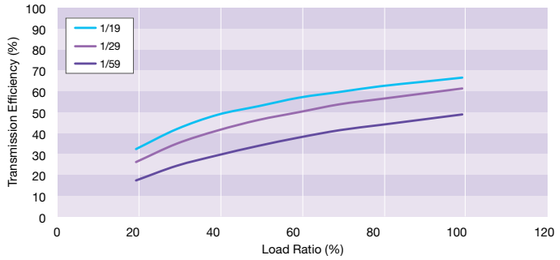


## Efficiency Characteristics

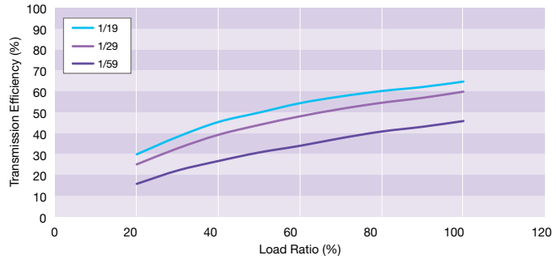
**Measurement conditions:** Input RPM 2000 r/min, values are measured after two-hours of warm operation

* The values in this graph vary according to usage conditions and can be used for Reference purpose only.

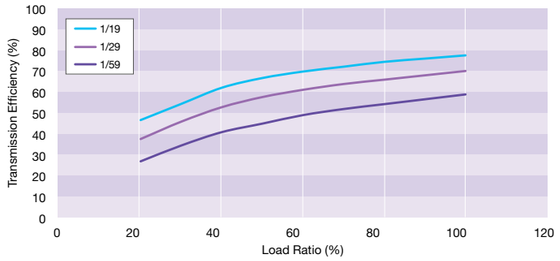
DGH010



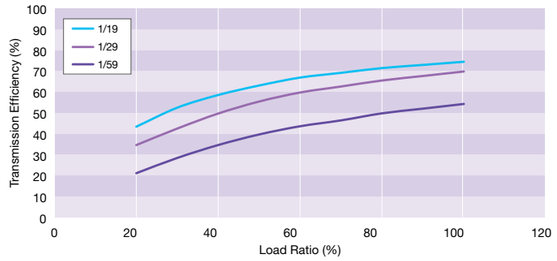

DGH010



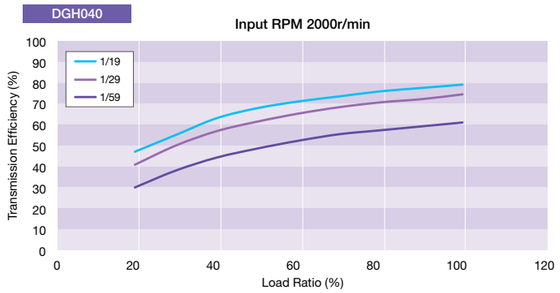

DGH030



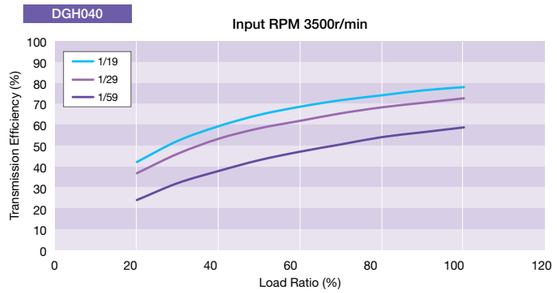

DGH030



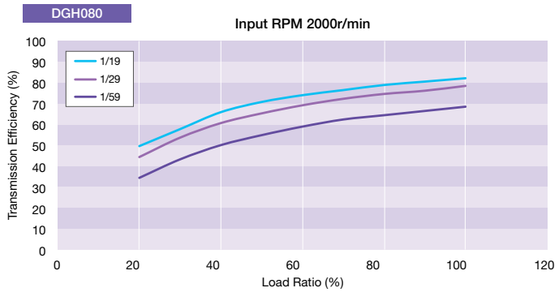

DGH040



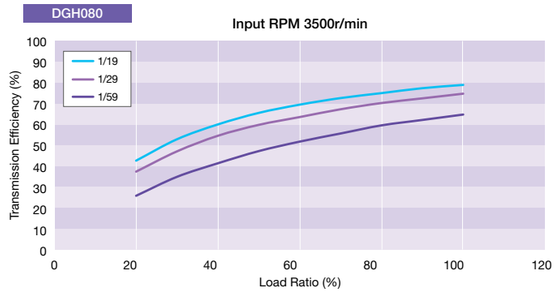

DGH040



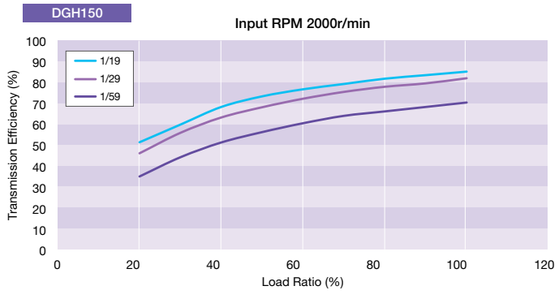

DGH080



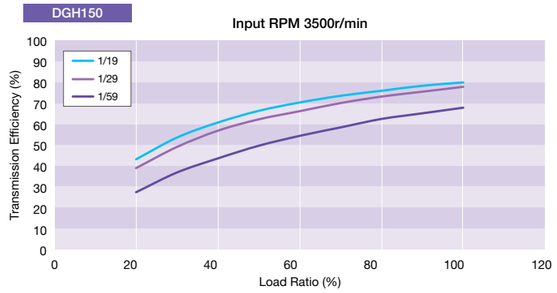

DGH080




DGH150




DGH150






## Starting Torque

The torque required to start up (rotate) the reducer from the input shaft with no load.

Measurement conditions: Value after two hours of running-in at an input speed of 2,000 r/min

(Unit: cN · m)

| Reduction Ratio \ Frame Size | DGH010 | DGH030 | DGH040 | DGH080 | DGH150 |
|---|---|---|---|---|---|
| 1/19 | 16.3 | 35.0 | 43.0 | 64.0 | 112.0 |
| 1/29 | 14.2 | 30.0 | 43.0 | 64.0 | 112.0 |
| 1/59 | 12.4 | 26.0 | 36.0 | 56.0 | 85.0 |

* The values in the table above vary according to usage conditions and are for use as reference only.

## Accelerating Torque

The torque required to start up (rotate) the reducer from the output shaft with no load.

Measurement conditions: Value after two hours of running-in at an input speed of 2,000 r/min

(Unit: N · m)

| Reduction Ratio \ Frame Size | DGH010 | DGH030 | DGH040 | DGH080 | DGH150 |
|---|---|---|---|---|---|
| 1/19 | 8.2 | 20 | 23 | 35 | 57 |
| 1/29 | 7.3 | 17 | 23 | 35 | 57 |
| 1/59 | 9.8 | 19 | 22 | 34 | 51 |

* The values in the table above vary according to usage conditions and are for use as reference only.

## Running Torque with No Load

The torque required on the input side to rotate the reducer with no load.

Measurement conditions: Input RPM 2000 r/min, values are measured after two-hours of warm operation

(Unit: cN · m)

| Reduction Ratio \ Frame Size | DGH010 | DGH030 | DGH040 | DGH080 | DGH150 |
|---|---|---|---|---|---|
| 1/19 | 21.5 | 36.3 | 53.4 | 87.8 | 137.5 |
| 1/29 | 20.2 | 31.3 | 45.9 | 75.6 | 120.3 |
| 1/59 | 18.0 | 28.6 | 42.6 | 70.2 | 110.0 |

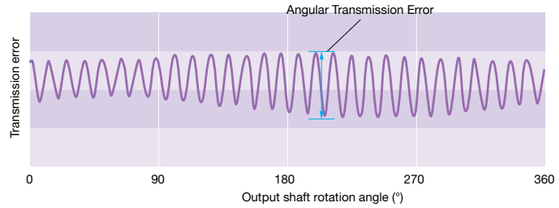
*The values in the table above vary according to usage conditions and are for use as reference only.

## Angular Transmission Error

With an arbitrary rotation angle input, the difference between the theoretical rotating output rotation angle and the actual rotating output rotation angle.

(Unit: arc min)

| Reduction Ratio \ Frame Size | DGH010 | DGH030 | DGH040 | DGH080 | DGH150 |
|---|---|---|---|---|---|
| 1/19 | 2.0 | 1.5 | 1.5 | 1.5 | 1.5 |
| 1/29 | 2.0 | 1.5 | 1.2 | 1.2 | 1.2 |
| 1/59 | 1.5 | 1.5 | 1.0 | 1.0 | 1.0 |




## Hysteresis Loss

When fixing the input shaft and, after increasing from zero to rated torque on the output shaft, returning the torque to zero, the output shaft torsion angle will retain a minimal amount rather than returning entirely to zero. This is called hysteresis loss.

(Unit: arc min)

| Reduction Ratio \ Frame Size | DGH010 | DGH030 | DGH040 | DGH080 | DGH150 |
|---|---|---|---|---|---|
| 1/19 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 1/29 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 1/59 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |

## Spring Constant

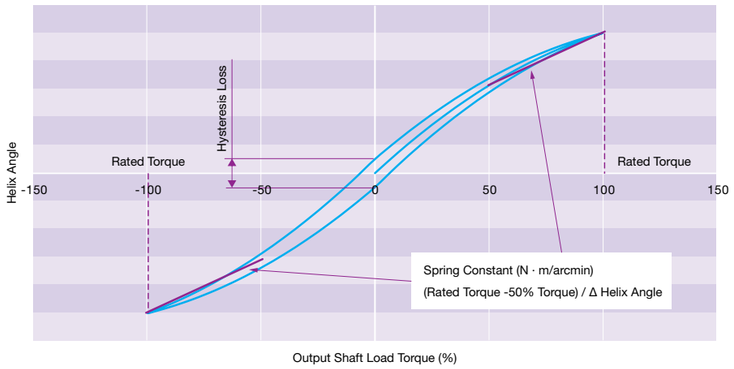
This is the resistance to torsion (torsional rigidity) against rotational force.

(Unit: N · m / arc min)

| Reduction Ratio \ Frame Size | DGH010 | DGH030 | DGH040 | DGH080 | DGH150 |
|---|---|---|---|---|---|
| 1/19 | 3.1 | 7.5 | 11.2 | 22.5 | 41.2 |
| 1/29 | 3.1 | 7.5 | 11.2 | 24.3 | 45.6 |
| 1/59 | 3.1 | 7.5 | 11.8 | 26.2 | 50.0 |

* The values are for reference. The lower limit value is about 80% of the displayed value.

Hysteresis Curve




(All performance-related values contained in this catalog are obtained under the designated test conditions by NISSEI CORPORATION.)

# High Stiffness Reducers

## DGF type

**Flat, lightweight type**



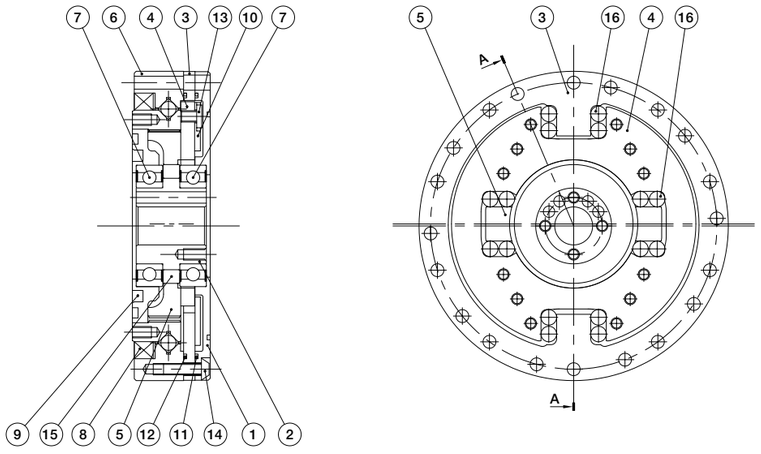
DGF005 DGF020 DGF030

### Model and Specs

| Model Name | Type | Frame Size *1 | | Reduction Ratio |
|---|---|---|---|---|
| DG | F | 020 | – | 050 |
| DG Series | F: Flat | 5.4N · m → "005" 16N · m → "020"<br>28N · m → "030" | | 1/50 → "050"<br>1/100 → "100" |

*1. The rated torque value of each size is indicated as the frame size.

### Structure




Cross section A-A

■ Rotational Direction Relationship
The rotational direction of the output shaft is the same as that of the input shaft.

| No. | Part Name |
|---|---|
| 1 | Bracket |
| 2 | Crank shaft |
| 3 | Reactive force plate holder |
| 4 | Reactive force plate |
| 5 | Planetary Gear |
| 6 | Cross Roller Bearing |
| 7 | Single-Row Deep Groove Ball Bearing (Input shaft) |
| 8 | Oil Seal |
| 9 | Housing |
| 10 | Reinforcing plate |
| 11 | O-ring |
| 12 | O-ring |
| 13 | Hex head cap low-head screw |
| 14 | Hex head cap button screw |
| 15 | Needle Pin |
| 16 | Needle Pin |

* Please use our dedicated grease sold separately. The input shaft is not provided with an oil seal.

### Performance Table

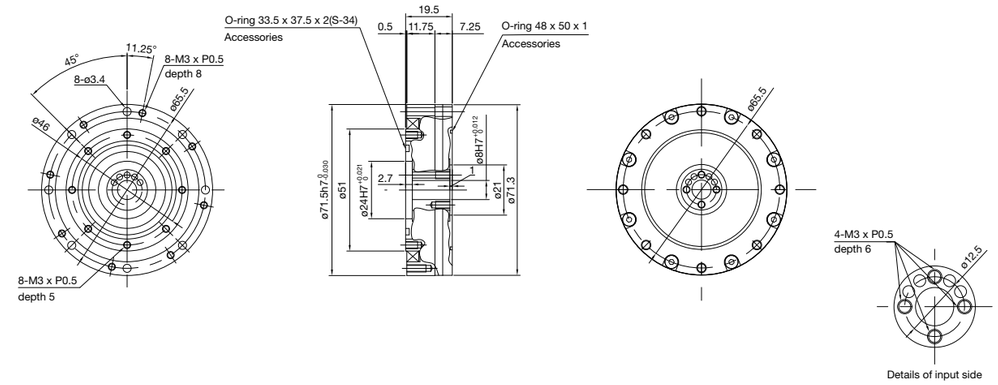
| Frame Size | Reduction Ratio | Rated Torque (Input 2000r/min) *1 | Start/Stop Allowable Peak Torque *2 | Allowable Average Load Torque *3 | Allowable Instantaneous Maximum Torque *4 | Allowable Max. Input RPM | Allowable Average Input RPM | Rated Speed | Spring Constant *5 | Hysteresis Loss | Angular Transmission Error | Moment of inertia (input shaft equivalent) | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N · m | N · m | N · m | N · m | r/min | r/min | r/min | N · m/ arc min | arc min | arc min | x $10^{-4}$kg · $m^2$ | kg |
| 005 | 1/50 | 5.4 | 19 | 7.7 | 35 | 6000 | 3500 | 2000 | 1.1 | 2.5 | 1.5 | 0.012 | 0.44 |
| | 1/100 | 5.4 | 19 | 7.7 | 35 | 6000 | 3500 | 2000 | 1.3 | 2.0 | 1.5 | 0.012 | 0.44 |
| 020 | 1/50 | 16 | 37 | 27 | 71 | 6000 | 3500 | 2000 | 2.6 | 2.0 | 1.5 | 0.024 | 0.59 |
| | 1/100 | 16 | 37 | 27 | 71 | 6000 | 3500 | 2000 | 2.7 | 1.0 | 1.5 | 0.024 | 0.59 |
| 030 | 1/50 | 28 | 57 | 34 | 95 | 6000 | 3500 | 2000 | 4.3 | 2.0 | 1.0 | 0.117 | 0.85 |
| | 1/100 | 28 | 57 | 34 | 95 | 6000 | 3500 | 2000 | 4.7 | 1.0 | 1.0 | 0.116 | 0.85 |

*1 Average load torque at which the basic rated life $L_{10}$ becomes 10,000 hours when the average input speed is 2,000 r/min.
*2 Allowable value of the acceleration/deceleration torque to be applied to the output shaft by the moment of inertia on start or stop.
*3 Allowable average load torque during operation when the load fluctuates.
*4 Allowable value of the maximum torque instantaneously applied due to an impact, etc. Torque the shaft can withstand about 10,000 times (does not cause plastic deformation).
*5 The values are for reference. The lower limit value is about 80% of the displayed value.

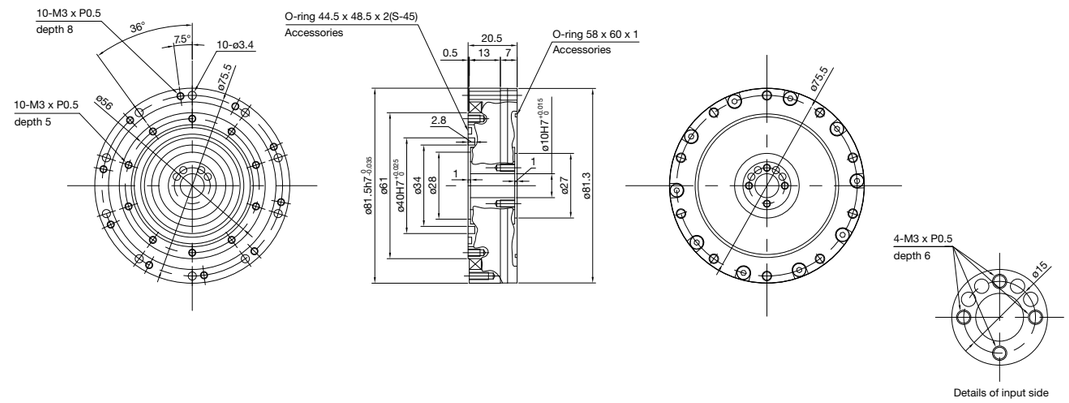


## Drawings

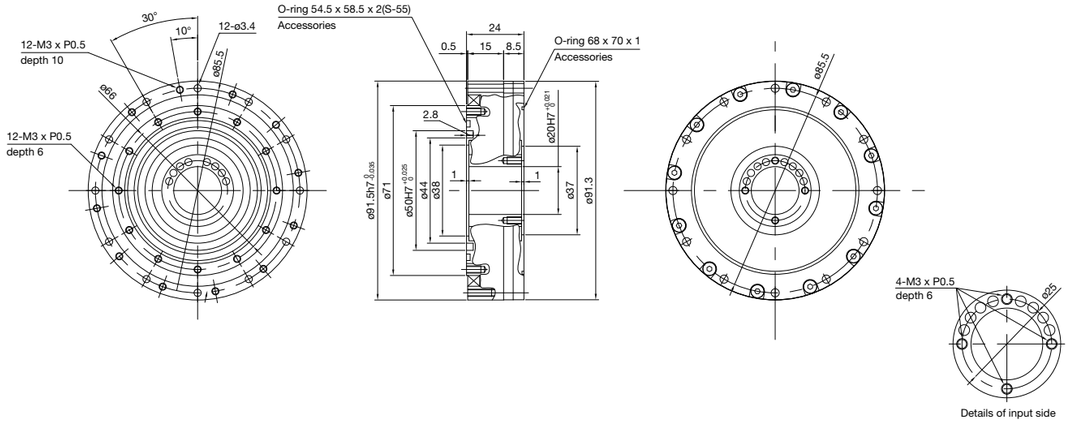
### DGF005




### DGF020

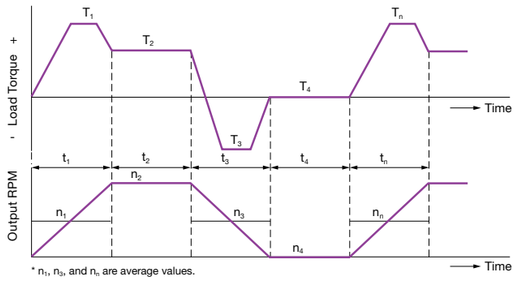



### DGF030



## Selection Procedure and Examples

■ Operation Pattern




* $n_1$, $n_3$, and $n_n$ are average values.

<Operation Conditions :Eg>

| Operation Pattern | Load Torque ($T_n$) (N · m) | | Time ($t_n$) (s) | | Output RPM ($n_n$) (r/min) | |
|---|---|---|---|---|---|---|
| At the Start | $T_1$ | 30 | $t_1$ | 0.5 | $n_1$ | 15 |
| During normal operation | $T_2$ | 15 | $t_2$ | 5 | $n_2$ | 23 |
| While stopping (reducing speed) | $T_3$ | 25 | $t_3$ | 0.8 | $n_3$ | 15 |
| When at rest | $T_4$ | 0 | $t_4$ | 0.7 | $n_4$ | 0 |

Maximum Output RPM $No_{max}$ = 23(r/min) Impact Torque $T_s$ = 60(N · m)
Maximum Input RPM $Ni_{max}$ = 2500(r/min) Life time $L_{10}$ = 4000(h)

### Selection Process and Examples

**1.** Calculation of average load torque on output shaft side in terms of usage

$$T_{av} = \sqrt[3]{\frac{n_1 \cdot t_1 \cdot (T_1)^3 + n_2 \cdot t_2 \cdot (T_2)^3 + \cdots n_n \cdot t_n \cdot (T_n)^3}{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}}$$

### Selection Process Example

$$T_{av} = \sqrt[3]{\frac{15r/min \cdot 0.5s \cdot (30N \cdot m)^3 + 23r/min \cdot 5s \cdot (15N \cdot m)^3 + 15r/min \cdot 0.8s \cdot (25N \cdot m)^3}{15r/min \cdot 0.5s + 23r/min \cdot 5s + 15r/min \cdot 0.8s}}$$

$$\approx 18N \cdot m$$

**2-1.** Calculation of average output RPM

$$No_{av} = \frac{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}{t_1 + t_2 + \cdots t_n}$$

$$No_{av} = \frac{15r/min \cdot 0.5s + 23r/min \cdot 5s + 15r/min \cdot 0.8s + 0r/min \cdot 0.7s}{0.5s + 5s + 0.8s + 0.7s} \approx 19r/min$$

**2-2.** Deciding on reduction ratio

$$\frac{Ni_{max}}{No_{max}} \geq R$$

$$\frac{2500\,r/min}{23r/min} = 108.7 \geq 100 = R$$

**2-3.** Calculation of average input RPM

$$Ni_{av} = No_{av} \cdot R$$

Make sure the average input RPM is within the allowable average input RPM.
$Ni_{av} = 19r/min \cdot 100 = 1900r/min \leq 3500r/min$ (allowable average input RPM of DGF)

**2-4.** Calculation of maximum input RPM

$$Ni_{max} = No_{max} \cdot R$$

Confirm that the maximum input RPM is within the permissible level.
$Ni_{max} = 23r/min \cdot 100 = 2300r/min \leq 6000r/min$ (allowable maximum input RPM of DGF)

**3.** Temporarily select a model with performance table values that satisfy the usage conditions

$T_1 = 30N \cdot m \leq 37N \cdot m$ (DGF020 start/stop allowable peak torque)
$T_3 = 25N \cdot m \leq 37N \cdot m$ (DGF020 start/stop allowable peak torque)
$T_S = 60N \cdot m \leq 71N \cdot m$ (DGF020 allowable instantaneous maximum torque)
Temporarily select DGF020-100 from $T_{av} = 18\ N \cdot m \leq 27\ N \cdot m$
(DGF020 allowable average load torque)

**4.** Calculation of reducer Life time

$$L_{10} = 10000 \cdot \left(\frac{T_r}{T_{av}}\right)^3 \cdot \left(\frac{N_r}{Ni_{av}}\right)$$

* However, $L_{10}$ is equal to or smaller than 10,000.

Confirm that the reducer life time is greater than the required duration.
$T_r = 16N \cdot m$ (DGF020 rated torque)
$N_r = 2000r/min$ (DGF020 rated RPM)

$$L_{10} = 10000 \cdot \left(\frac{16}{18}\right)^3 \cdot \left(\frac{2000}{1900}\right) \approx 7393(h) \geq 4000(h)$$

Therefore, select DGF020-100 and confirm the main bearing life and input shaft load.



### Confirmation of main bearing life

**A.** Calculation of max load moment

$$M_{max} = Fr_{max}(Sr + A) + Fa_{max} \cdot Sa$$

Confirmation of max load moment
Maximum load moment ($M_{max}$) ≤ Allowable moment (Mc)

**B.** Calculation of average load

Average radial load ($Fr_{av}$)

$$Fr_{av} = \sqrt[10/3]{\frac{n_1t_1(|Fr_1|)^{10/3} + n_2t_2(|Fr_2|)^{10/3} \cdots n_nt_n(|Fr_n|)^{10/3}}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

Let the maximum radial load within the $t_1$ space be $Fr_1$ and the maximum radial load within the $t_3$ space be $Fr_3$.

Average Thrust Load ($Fa_{av}$)

$$Fa_{av} = \sqrt[10/3]{\frac{n_1t_1(|Fa_1|)^{10/3} + n_2t_2(|Fa_2|)^{10/3} \cdots n_nt_n(|Fa_n|)^{10/3}}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

Let the thrust load within the $t_1$ space be $Fa_1$ and the maximum thrust load within the $t_3$ space be $Fa_3$.

Average Output RPM ($N_{av}$)

$$N_{av} = \frac{n_1t_1 + n_2t_2 + \cdots + n_nt_n}{t_1 + t_2 + \cdots t_n}$$

Calculation of load coefficient

| To find the Load factor | | Radial Load Coefficient (X) | Thrust Load Coefficient (Y) |
|---|---|---|---|
| $\frac{Fa_{av}}{Fr_{av} + 2(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa) / dp}$ | ≤ 1.5 | 1 | 0.45 |
| $\frac{Fa_{av}}{Fr_{av} + 2(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa) / dp}$ | > 1.5 | 0.67 | 0.67 |

**C.** Calculation of life time

$$L_{10} = \left(\frac{10^6}{60 \times N_{av}}\right) \times \left(\frac{C}{fw \cdot Pc}\right)^{10/3}$$

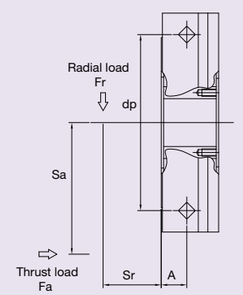
$$Pc = X \cdot \left(Fr_{av} + \frac{2(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa)}{dp}\right) + Y \cdot Fa_{av}$$

* However, $L_{10}$ is equal to or smaller than 10,000.

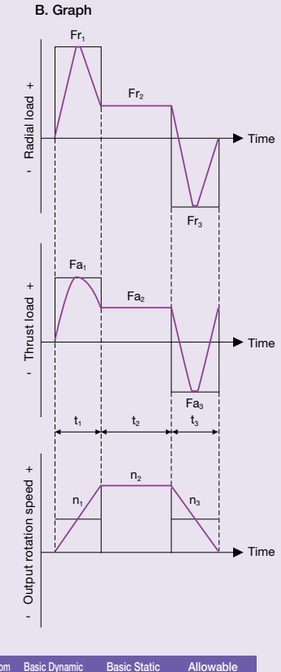
Load Coefficient

| Load Status | fw |
|---|---|
| For smooth movement with no impacts | 1 to 1.2 |
| For normal movement | 1.2 to 1.5 |
| For high vibration and impacts | 1.5 to 3 |

A. Fig.




B. Graph




| Frame Size | Roller Pitch Diameter (dp) (m) | Roller Position from Output Shaft End (A) (m) | Basic Dynamic Rated Load (C) (N) | Basic Static Rated Load ($C_o$) (N) | Allowable Moment (Mc) (N · m) |
|---|---|---|---|---|---|
| DGF005 | 0.05195 | 0.0089 | 6440 | 9370 | 91 |
| DGF020 | 0.0616 | 0.0095 | 11160 | 16540 | 124 |
| DGF030 | 0.0736 | 0.0107 | 17330 | 26350 | 195 |

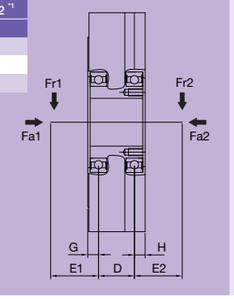
| Symbol | Unit | Content |
|---|---|---|
| $L_{10}$ | h | Life time |
| $N_{av}$ | r/min | Average Output RPM |
| Pc | N | Dynamic Equivalent Radial Load |
| $Fr_{av}$ | N | Average Radial Load |
| $Fa_{av}$ | N | Average Thrust Load |
| Sr,Sa | m | See Fig. A |

### Confirmation of load on input shaft

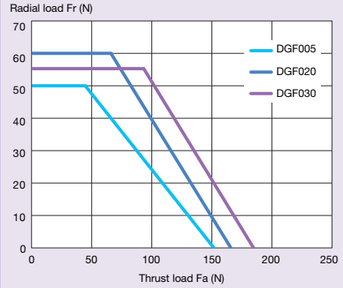
| Frame Size | D (m) | E1 (m) | E2 (m) | G (m) | H (m) | Allowable thrust load Fa1, Fa2 (N) | Allowable radial load Fr1, Fr2 *1 (N) |
|---|---|---|---|---|---|---|---|
| DGF005 | 0.0107 | 0.025 | 0.025 | 0.0053 | 0.0035 | 150 | 50 |
| DGF020 | 0.0115 | 0.025 | 0.025 | 0.0045 | 0.0045 | 165 | 60 |
| DGF030 | 0.015 | 0.025 | 0.025 | 0.0045 | 0.0045 | 184 | 55 |

*1 Assuming a case where a load is applied to Fr1 or Fr2

The graph shows the relation between the maximum allowable radial load and maximum allowable thrust load for each frame size.
Use within the range shown on the graph at right side.
The graph values are at average input RPM 2000r/min and basic rated life for $L_{10}$ = 10,000hours.
For use exceeding the maximum radial load, consult your nearest sales office.




Life time of input shaft

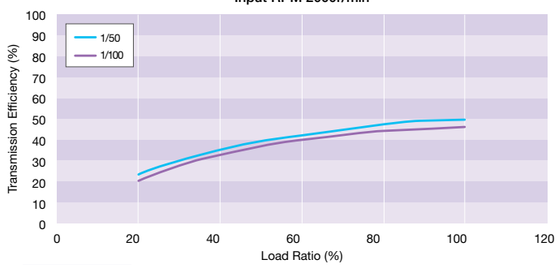


## Efficiency Characteristics

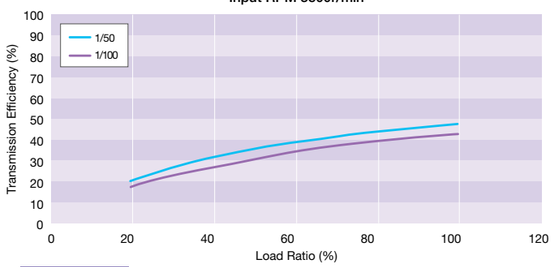
**Measurement conditions:** Input RPM 2000 r/min, values are measured after two-hours of warm operation

* The values in this graph vary according to usage conditions and can be used for Reference purpose only.

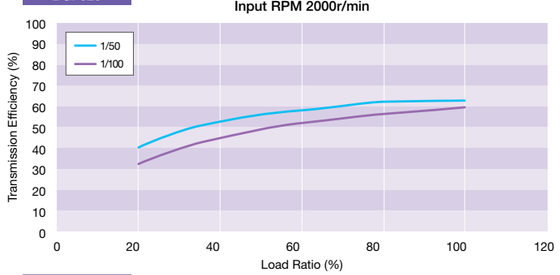
DGF005



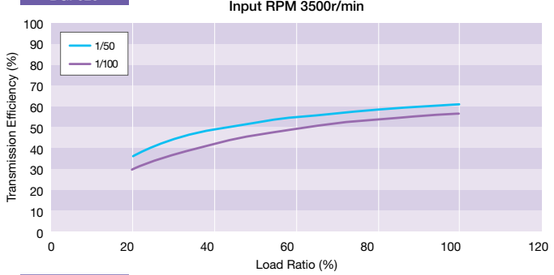

DGF005



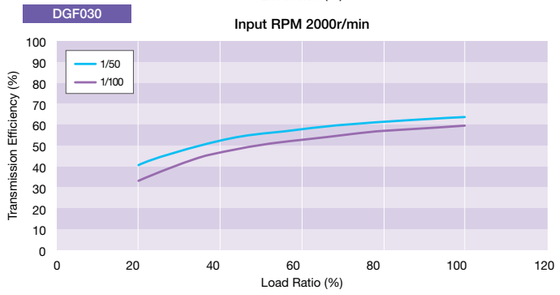

DGF020



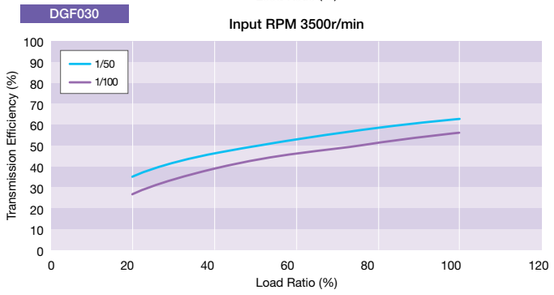

DGF020




DGF030




DGF030




## Starting Torque

The torque required to start up (rotate) the reducer from the input shaft with no load.

Measurement conditions: Value after two hours of running-in at an input speed of 2,000 r/min

(Unit: cN · m)

| Reduction Ratio \ Frame Size | DGF005 | DGF020 | DGF030 |
|---|---|---|---|
| 1/50 | 5.5 | 7.8 | 10.2 |
| 1/100 | 3.4 | 4.5 | 6.0 |

* The values in the table above vary according to usage conditions and are for use as reference only.

## Accelerating Torque

The torque required to start up (rotate) the reducer from the output shaft with no load.

Measurement conditions: Value after two hours of running-in at an input speed of 2,000 r/min

(Unit: N · m)

| Reduction Ratio \ Frame Size | DGF005 | DGF020 | DGF030 |
|---|---|---|---|
| 1/50 | 3.5 | 4.9 | 6.0 |
| 1/100 | 4.3 | 5.4 | 7.1 |

* The values in the table above vary according to usage conditions and are for use as reference only.

## Running Torque with No Load

The torque required on the input side to rotate the reducer with no load.

Measurement conditions: Input RPM 2000 r/min, values are measured after two-hours of warm operation

(Unit: cN · m)

| Reduction Ratio \ Frame Size | DGF005 | DGF020 | DGF030 |
|---|---|---|---|
| 1/50 | 6.6 | 10.3 | 18.0 |
| 1/100 | 5.1 | 8.4 | 15.4 |

* The values in the table above vary according to usage conditions and are for use as reference only.

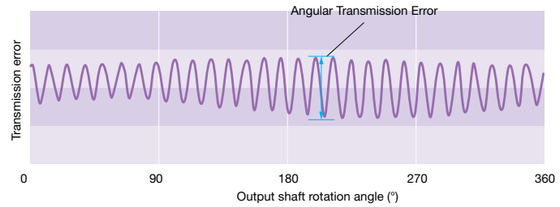


## Angular Transmission Error

With an arbitrary rotation angle input, the difference between the theoretical rotating output rotation angle and the actual rotating output rotation angle.

(Unit: arc min)

| Reduction Ratio \ Frame Size | DGF005 | DGF020 | DGF030 |
|---|---|---|---|
| 1/50 | 1.5 | 1.5 | 1.0 |
| 1/100 | 1.5 | 1.5 | 1.0 |



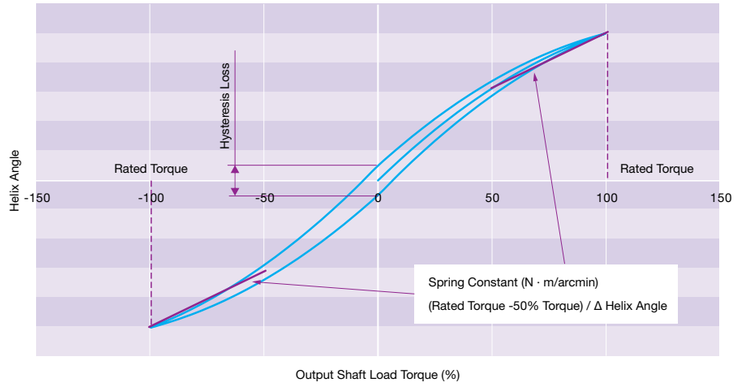

## Hysteresis Loss

When fixing the input shaft and, after increasing from zero to rated torque on the output shaft, returning the torque to zero, the output shaft torsion angle will retain a minimal amount rather than returning entirely to zero. This is called hysteresis loss.

(Unit: arc min)

| Reduction Ratio \ Frame Size | DGF005 | DGF020 | DGF030 |
|---|---|---|---|
| 1/50 | 2.5 | 2.0 | 2.0 |
| 1/100 | 2.0 | 1.0 | 1.0 |

Hysteresis Curve




## Spring Constant

This is the resistance to torsion (torsional rigidity) against rotational force.

(Unit: N · m / arc min)

| Reduction Ratio \ Frame Size | DGF005 | DGF020 | DGF030 |
|---|---|---|---|
| 1/50 | 1.1 | 2.6 | 4.3 |
| 1/100 | 1.3 | 2.7 | 4.7 |

* The values are for reference. The lower limit value is about 80% of the displayed value.

(All performance-related values contained in this catalog are obtained under the designated test conditions by NISSEI CORPORATION.)

# Precautions for Use

- Make sure that the surface temperature of the reducer does not exceed 80°C. Failure to follow this precaution may result in damage to the equipment or burns.
- Make sure that the surface temperature of the reducer does not exceed 80°C during continuous operation in one direction and during start/stop operation with a high load in a short period of time. Failure to follow this precaution may result in failure.
- Please read this catalog and the respective Instruction Manual very carefully before using our products and be sure to use the products correctly. Please download the Instruction Manual using the link below.

## Installation Environment

| | |
|---|---|
| Ambient Temperature | 0°C to 40°C |
| Ambient Humidity | 85% RH or less (no condensation) |
| Altitude | 1000m or less |
| Installation Environment | A well-ventilated location with no exposure to corrosive gases, explosive gases, steam, chemicals, etc.<br>A location not directly exposed to rain.<br>A location not directly exposed to sunlight.<br>A well-ventilated location with no dust. |

## Installation Method

- Secure with bolts on a vibration-free and flat machine-processed surface.
- Tighten the bolts with the tightening torque shown in the table below.
- If the foundation is bad or the mounting surface is not flat enough, vibration may occur during operation and the service life of the reducer may be shortened.
- Make sure the flatness of the mounting surface is 0.1 mm or less.
- Do not place the seating face of a bolt directly against the DGF type bracket. Use a washer. Refer to the DGF type O-ring mount position <Figure 4> for the relevant location.

<Table 1>

| Bolt Size | Tightening Torque | |
|---|---|---|
| | (N · m) | (kgf · m) |
| M3 | 2.4 | 0.24 |
| M4 | 5.4 | 0.55 |
| M5 | 10.8 | 1.10 |
| M6 | 18.4 | 1.87 |

* The bolt strength category (JIS B 1051) shall be the case for 12.9.
Recommended bolt: Hex Head Cap Screw (JIS B 1176)

## Lubrication/sealing material [DGS type/DGF type]

- Grease is sealed in the reducer when it is shipped from our factory. However, there is no oil seal installed on the device side input shaft. If necessary, attach a seal to the device to prevent grease leakage.
- On the device side, fill 70% to 80% of the spatial volume with our dedicated grease from the table below (sold separately).
- For the DGS type, also fill the reducer with our dedicated grease (sold separately).
  Refer to the installation example <Figure 1> for the filling location. For the filling amount, refer to [Reducer grease filling location filling amount] in <Table 2>.

| Product name | Manufacturer | Base oil |
|---|---|---|
| R2 Grease TA-00 V19 | Chukyo Kasei Kogyo Co., Ltd | Mineral oil<br>Synthetic oil |

| Representative property | | |
|---|---|---|
| Appearance | | Yellow |
| Worked penetration | 25°C | 380 |
| Dropping point | °C | 202 |
| Copper plate corrosion | 100°C x 24h | Passed |
| Low-temperature torque (-30°C) | Startup torque, mN · m | 32 |
| | Rotation torque, mN · m | 27 |
| Four-ball test | 1200rpm, 392N, 1h<br>Average wear mark diameter (mm) | 0.35 |
| Oxidative stability test | 99°C x 100h, kPa | 10 |
| Thickener | | Lithium soap |

The values shown above are representative values. Actual values may be slightly different depending on manufacturing lots.

| | |
|---|---|
| Handling precautions | - Avoid direct sunlight, and store the reducer in a well-ventilated place.<br>- Please check the “Safety Data Sheet (SDS)” before starting to use. |

### Precautions for the grease

1. Using grease in over or under designated amount or different grease may result in performance deterioration or early damage.
2. Be careful that no dirt or moisture, etc., gets inside. Failure to follow this precaution may result in failure.

**[Example calculation of grease filling amount for grease filling locations on device side]**

When the spatial volume of the device side is 24 $cm^3$

Amount of grease filling on device side

= <Spatial volume> × <Grease density> <Filling ratio>
= 24$cm^3$ × 0.9g/$cm^3$ × 0.75
= 16.2g

**■ When installing this product, use the attached O-rings (two types).**
For the O-ring mount position, refer to <Figure 2> and <Figure 4> for each type.

1. Before using O-rings, make sure that they are free from damage.
2. When mounting the O-rings, take care not to allow the adherence or entry of foreign substances and dust.
3. Be careful to avoid O-ring twisting and biting during the installation.
4. The O-ring contact surface of your device shall have a surface roughness of Ra 1.6 or less (Rz 3.2 or less).
   Failure to follow this precaution may shorten the service life of the reducer due to grease leakage.
5. When installing the O-ring that is supplied as an accessory, the oil that has been applied may seep out, but this does not affect the quality.

## Lubrication/sealing material [DGH type]

- The reducer is filled with grease when it is shipped from our factory.
- The input shaft oil seal and O-ring have been installed, so the product can be used as it is.

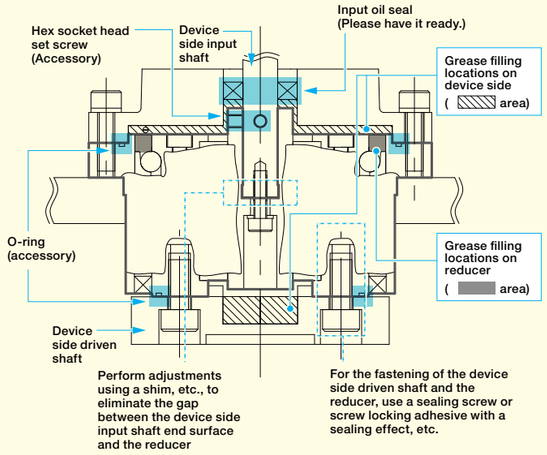
**High Stiffness Reducer Instruction Manual (Homepage)** https://img-ja.nissei-gtr.co.jp/files/user/pdf/data/gtr/manual/rc/rc_e.pdf



# DGS type

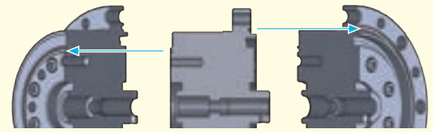
## Installation example

<Figure 1>




## O-ring mount position

<Figure 2>




| Type Codes | O-ring type | |
|---|---|---|
| | O-ring [1] | O-ring [2] |
| DGS010-*** | 40×42×1 | 56.5×58.5×1 |
| DGS030-*** | 46×48×1 | 63×65×1 |
| DGS050-*** | 52.5×54.5×1 | 72.5×74.5×1 |

<Table 2>

| Type Codes | Sealed amount of grease (g) |
|---|---|
| DGS010-*** | 1.6 |
| DGS030-*** | 2.1 |
| DGS050-*** | 2.5 |

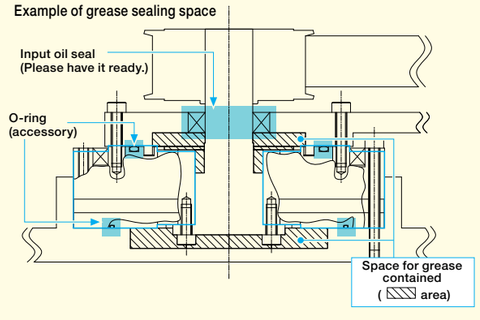
### Reducer and device fastening

- For the fastening of the device side driven shaft and the reducer, use a sealing screw or screw locking adhesive with a sealing effect, etc. If the screw hole for the device side driven shaft is not completely sealed, there is a risk that grease may leak out. For the fastening of the device side driven shaft and the reducer, refer to the installation example in <Figure 1>.
- For the frame sizes 010 and 030, hex socket head set screws (M3 × 3L, 2 pieces) are supplied as accessories. Please use these for the fixing of the device side input shaft. Tightening torque is 0.66 N·m.
- Perform adjustments using a shim, etc., to eliminate the gap between the device side input shaft end surface and the reducer. Refer to the installation example in <Figure 1> for the relevant location.

# DGF type

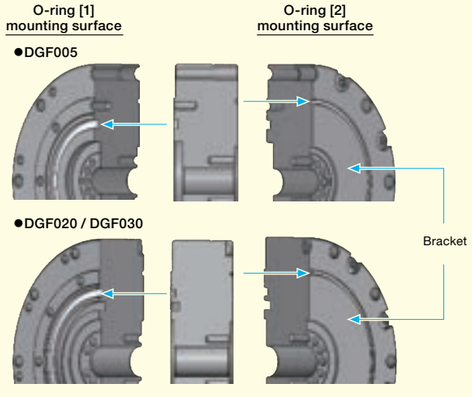
## Installation example

<Figure 3>




## O-ring mount position

<Figure 4>

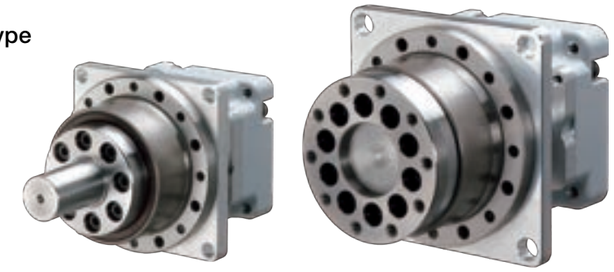



| Type Codes | O-ring type | |
|---|---|---|
| | O-ring [1] | O-ring [2] |
| DGF005-*** | 33.5×37.5×2(S-34) | 48×50×1 |
| DGF020-*** | 44.5×48.5×2(S-45) | 58×60×1 |
| DGF030-*** | 54.5×58.5×2(S-55) | 68×70×1 |

# High Stiffness Reducers

## Gear Head Gear Head type type

Compact and high-torque with a wide range of reduction ratios, the quick, simple motor connection also streamlines work, making design more flexible than ever across all applications.



### Model and Specs

| Model Name | Type | Frame Size *1 | Output shaft type | – | Reduction Ratio | Precision | Flange Type for Motor Mounting *3 | Option 1 | Option 2 | Option Code |
|---|---|---|---|---|---|---|---|---|---|---|
| DG | S | 030 | F | – | 029 | N | KS2 | N | X | U1 |
| DG Series | S: Solid | 11 N · m → "010"<br>31 N · m → "030"<br>52 N · m → "050" | F: Flange shaft<br>J: Straight shaft<br>(No key, no shaft end tapping) | | 1/19 → "019"<br>1/29 → "029"<br>1/49 → "049"<br>1/79 → "079"<br>1/99 → "099"<br>1/119 → "119" *2 | N: Standard Specification | HS1, KS2 etc. | N: Standard Specification | Blank: Standard Specification<br>X: Special Specification Code | U1: Addition of output shaft key and shaft end tapping |

*1 The rated torque for a 1/49 reduction ratio is shown for each frame size.

*2 The 1/119 reduction ratio is only available on frame sizes 030 and 050.

*3 Please contact us for details.

### Performance Table

| Frame Size | Reduction Ratio | Rated torque (Input of 2000 r/min)*1 | Start/Stop Allowable Peak Torque *2 | Allowable Average Load Torque *3 | Allowable Instantaneous Maximum Torque *4 | Allowable Max. Input RPM | Allowable Average Input RPM | Rated Speed | Spring Constant *5 | Hysteresis Loss | Angular Transmission Error | Applicable Flange Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N · m | N · m | N · m | N · m | r/min | r/min | r/min | N · m/arc min | arc min | arc min | |
| 010 | 1/19 | 6.5 | 14.5 | 8 | 23 | 6000 | 3500 | 2000 | 1.7 | 3.3 | 2.2 | HS1 HS3 HS6 KS1 KS2 KS3 KS5 KS7 |
| | 1/29 | 10 | 22.5 | 12 | 36 | 6000 | 3500 | 2000 | 2.2 | 3.3 | 2.2 | |
| | 1/49 | 11 | 36.5 | 14.5 | 60 | 6000 | 3500 | 2000 | 2.6 | 2.2 | 1.7 | |
| | 1/79 | 13 | 39 | 18 | 75 | 6000 | 3500 | 2000 | 2.8 | 1.1 | 1.7 | |
| | 1/99 | 13 | 46.5 | 18 | 75 | 6000 | 3500 | 2000 | 2.8 | 1.1 | 1.7 | |
| 030 | 1/19 | 20 | 37 | 25 | 62 | 6000 | 3500 | 2000 | 3.2 | 3.3 | 1.7 | HS6 KS1 KS2 KS3 KS5 KS7 LS3 |
| | 1/29 | 24 | 53 | 35 | 90 | 6000 | 3500 | 2000 | 4.0 | 3.3 | 1.7 | |
| | 1/49 | 31 | 66 | 45 | 118 | 6000 | 3500 | 2000 | 4.6 | 2.2 | 1.7 | |
| | 1/79 | 38 | 74 | 47 | 140 | 6000 | 3500 | 2000 | 5.6 | 1.1 | 1.7 | |
| | 1/99 | 40 | 90 | 66 | 147 | 6000 | 3500 | 2000 | 6.1 | 1.1 | 1.7 | |
| | 1/119 | 40 | 90 | 66 | 147 | 6000 | 3500 | 2000 | 6.1 | 1.1 | 1.7 | |
| 050 | 1/19 | 26 | 50 | 32 | 95 | 6000 | 3500 | 2000 | 5.8 | 3.3 | 1.7 | MS1 MS8 MS2 MS9 MS3 MF6 MS4 MF7 MS6 |
| | 1/29 | 40 | 75 | 50 | 145 | 6000 | 3500 | 2000 | 7.8 | 3.3 | 1.7 | |
| | 1/49 | 52 | 116 | 58 | 186 | 6000 | 3500 | 2000 | 9.0 | 2.2 | 1.1 | |
| | 1/79 | 63 | 125 | 79 | 214 | 6000 | 3500 | 2000 | 9.6 | 1.1 | 1.1 | KS2 KS6 KS7 LS3 |
| | 1/99 | 67 | 140 | 83 | 240 | 6000 | 3500 | 2000 | 10.1 | 1.1 | 1.1 | |
| | 1/119 | 67 | 147 | 83 | 246 | 6000 | 3500 | 2000 | 10.1 | 1.1 | 1.1 | |

*1 Average load torque at which the basic rated life $L_{10}$ becomes 10,000 hours when the average input speed is 2,000 r/min.
*2 Allowable value of the acceleration/deceleration torque to be applied to the output shaft by the moment of inertia on start or stop.
*3 Allowable average load torque during operation when the load fluctuates.
*4 Allowable value of the maximum torque instantaneously applied due to an impact, etc. Torque the shaft can withstand about 10,000 times (does not cause plastic deformation).
*5 The values are for reference. The lower limit value is about 80% of the displayed value.
(All performance-related values contained in this catalog are obtained under the designated test conditions by NISSEI CORPORATION.)



### Moment of inertia (input shaft equivalent)

#### Flange Shaft

(Unit: $\times 10^{-4}$kg · m$^2$)

| Frame Size | Reduction Ratio | Motor Mounting Flange Type | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | HS1 | HS3 | HS6 | KS1 | KS2 | KS3 | KS5 | KS6 | KS7 | LS3 | MS1 | MS2 | MS3 | MS4 | MS6 | MS8 | MS9 | MF6 | MF7 |
| 010 | 1/19 | 0.136 | 0.136 | 0.136 | 0.135 | 0.131 | 0.135 | 0.136 | – | 0.135 | – | – | – | – | – | – | – | – | – | – |
| | 1/29 | 0.135 | 0.135 | 0.134 | 0.133 | 0.129 | 0.133 | 0.134 | – | 0.133 | – | – | – | – | – | – | – | – | – | – |
| | 1/49 | 0.134 | 0.134 | 0.133 | 0.132 | 0.129 | 0.132 | 0.133 | – | 0.132 | – | – | – | – | – | – | – | – | – | – |
| | 1/79 | 0.133 | 0.133 | 0.133 | 0.132 | 0.128 | 0.132 | 0.133 | – | 0.132 | – | – | – | – | – | – | – | – | – | – |
| | 1/99 | 0.133 | 0.133 | 0.133 | 0.132 | 0.128 | 0.132 | 0.133 | – | 0.132 | – | – | – | – | – | – | – | – | – | – |
| 030 | 1/19 | – | – | 0.151 | 0.150 | 0.146 | 0.150 | 0.151 | – | 0.150 | 0.146 | – | – | – | – | – | – | – | – | – |
| | 1/29 | – | – | 0.148 | 0.147 | 0.143 | 0.147 | 0.148 | – | 0.147 | 0.143 | – | – | – | – | – | – | – | – | – |
| | 1/49 | – | – | 0.146 | 0.145 | 0.142 | 0.145 | 0.146 | – | 0.145 | 0.142 | – | – | – | – | – | – | – | – | – |
| | 1/79 | – | – | 0.146 | 0.145 | 0.141 | 0.145 | 0.146 | – | 0.145 | 0.141 | – | – | – | – | – | – | – | – | – |
| | 1/99 | – | – | 0.146 | 0.145 | 0.141 | 0.145 | 0.146 | – | 0.145 | 0.141 | – | – | – | – | – | – | – | – | – |
| | 1/119 | – | – | 0.146 | 0.145 | 0.141 | 0.145 | 0.146 | – | 0.145 | 0.141 | – | – | – | – | – | – | – | – | – |
| 050 | 1/19 | – | – | – | – | – | – | – | – | – | – | 0.695 | 0.684 | 0.684 | 0.695 | 0.700 | 0.703 | 0.695 | 0.704 | 0.695 |
| | 1/29 | – | – | – | – | – | – | – | – | – | – | 0.690 | 0.678 | 0.678 | 0.690 | 0.694 | 0.698 | 0.690 | 0.698 | 0.690 |
| | 1/49 | – | – | – | – | – | – | – | – | – | – | 0.687 | 0.676 | 0.676 | 0.687 | 0.691 | 0.695 | 0.687 | 0.696 | 0.687 |
| | 1/79 | – | – | – | – | 0.186 | – | – | 0.191 | 0.190 | 0.186 | – | – | – | – | – | – | – | – | – |
| | 1/99 | – | – | – | – | 0.186 | – | – | 0.191 | 0.190 | 0.186 | – | – | – | – | – | – | – | – | – |
| | 1/119 | – | – | – | – | 0.186 | – | – | 0.191 | 0.190 | 0.186 | – | – | – | – | – | – | – | – | – |

#### Straight Shaft

(Unit: $\times 10^{-4}$kg · m$^2$)

| Frame Size | Reduction Ratio | Motor Mounting Flange Type | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | HS1 | HS3 | HS6 | KS1 | KS2 | KS3 | KS5 | KS6 | KS7 | LS3 | MS1 | MS2 | MS3 | MS4 | MS6 | MS8 | MS9 | MF6 | MF7 |
| 010 | 1/19 | 0.135 | 0.135 | 0.135 | 0.134 | 0.130 | 0.134 | 0.135 | – | 0.134 | – | – | – | – | – | – | – | – | – | – |
| | 1/29 | 0.134 | 0.134 | 0.134 | 0.133 | 0.129 | 0.133 | 0.134 | – | 0.133 | – | – | – | – | – | – | – | – | – | – |
| | 1/49 | 0.134 | 0.134 | 0.133 | 0.132 | 0.128 | 0.132 | 0.133 | – | 0.132 | – | – | – | – | – | – | – | – | – | – |
| | 1/79 | 0.133 | 0.133 | 0.133 | 0.132 | 0.128 | 0.132 | 0.133 | – | 0.132 | – | – | – | – | – | – | – | – | – | – |
| | 1/99 | 0.133 | 0.133 | 0.133 | 0.132 | 0.128 | 0.132 | 0.133 | – | 0.132 | – | – | – | – | – | – | – | – | – | – |
| 030 | 1/19 | – | – | 0.149 | 0.148 | 0.144 | 0.148 | 0.149 | – | 0.148 | 0.144 | – | – | – | – | – | – | – | – | – |
| | 1/29 | – | – | 0.147 | 0.146 | 0.142 | 0.146 | 0.147 | – | 0.146 | 0.142 | – | – | – | – | – | – | – | – | – |
| | 1/49 | – | – | 0.146 | 0.145 | 0.141 | 0.145 | 0.146 | – | 0.145 | 0.141 | – | – | – | – | – | – | – | – | – |
| | 1/79 | – | – | 0.146 | 0.145 | 0.141 | 0.145 | 0.146 | – | 0.145 | 0.141 | – | – | – | – | – | – | – | – | – |
| | 1/99 | – | – | 0.146 | 0.145 | 0.141 | 0.145 | 0.146 | – | 0.145 | 0.141 | – | – | – | – | – | – | – | – | – |
| | 1/119 | – | – | 0.146 | 0.145 | 0.141 | 0.145 | 0.146 | – | 0.145 | 0.141 | – | – | – | – | – | – | – | – | – |
| 050 | 1/19 | – | – | – | – | – | – | – | – | – | – | 0.692 | 0.681 | 0.681 | 0.692 | 0.696 | 0.700 | 0.692 | 0.701 | 0.692 |
| | 1/29 | – | – | – | – | – | – | – | – | – | – | 0.688 | 0.677 | 0.677 | 0.688 | 0.693 | 0.696 | 0.688 | 0.697 | 0.688 |
| | 1/49 | – | – | – | – | – | – | – | – | – | – | 0.686 | 0.675 | 0.675 | 0.686 | 0.691 | 0.694 | 0.686 | 0.695 | 0.686 |
| | 1/79 | – | – | – | – | 0.186 | – | – | 0.191 | 0.190 | 0.186 | – | – | – | – | – | – | – | – | – |
| | 1/99 | – | – | – | – | 0.186 | – | – | 0.191 | 0.190 | 0.186 | – | – | – | – | – | – | – | – | – |
| | 1/119 | – | – | – | – | 0.186 | – | – | 0.191 | 0.189 | 0.186 | – | – | – | – | – | – | – | – | – |

## Motor Matching / Motor Power Design List

**[Notes]**

- The tables show below representative examples as of October 2025. The specifications of servo motors are subject to change. When placing an order, be sure to check the dimensions of the servo motor flange you are going to use and the dimensions of the area in which our reducer for servo motor will be installed.
- The tables below show servo motors of various standard specifications.
  For servo motors using an oil seal or other options, be sure to check whether a reducer can be mounted by referencing the Detailed Dimensions of Input Shaft and Flange Shapes on pages 42 to 45.
- For more details, please contact your nearest Sales Office or the CS Center.

| Motor Power (W) | Manufacturer | Type | Rated Speed (r/min) | Flange Type |
|---|---|---|---|---|
| 100 | Allen Bradley/Rockwell Automation | TLP-A046-010 | 3000 | HS1 |
| | ABB | BSM | 3000 | HS1 |
| | INOVANCE | MS1H1-10B30CB-XXXXZ-INT | 3000 | HS1 |
| | LS ELECTRIC | PEGA-A01A | 2400 | HS1 |
| | | APMC-FAL01A | 3000 | HS1 |
| | OMRON Corporation | G Series R88M-G (Cylinder Type 3000 r/min) | 3000 | HS1 |
| | | G5 Series R88M-K (Cylinder Type 3000 r/min, 100 VAC/200 VAC) | 3000 | HS1 |
| | | 1S Series R88M-1M (3000 r/min, 100 VAC) | 3000 | HS1 |
| | | 1S Series R88M-1M (3000 r/min, 200 VAC) | 3000 | HS1 |
| | KEYENCE Corporation | SV Series | 3000 | HS1 |
| | | SV2 Series | 3000 | HS1 |
| | Sanyo Denki Co., Ltd. | R2AA04 (R Series/R2/□40/200 VAC) | 3000 | HS1 |
| | | R1AA04 (R Series/R1/□40/200 VAC) | 3000 | HS1 |
| | | R1EA04 (R Series/R1/□40/100 VAC) | 3000 | HS1 |
| | | GAM1E4 (G Series/G1/□40/100V AC) | 3000 | HS1 |
| | | GAM1A4 (G Series/G1/□40/200V AC) | 3000 | HS1 |
| | | GAM2E4 (G Series/G2/□40/100V AC) | 3000 | HS1 |
| | | GAM2A4 (G Series/G2/□40/200V AC) | 3000 | HS1 |
| | KOYO ELECTRONICS INDUSTRIES CO., LTD. | KSV-B3 | 3000 | HS1 |
| | CKD Nikki Denso Co., Ltd. | NA80 Series | 3000 | HS1 |
| | Shibaura Machine Co., Ltd. | VLBSV-ZA(3000min$^{-1}$) | 3000 | HS1 |
| | Tamagawa Seiki Co.,Ltd. | TS4613,TSM3303,TSM4303 | 3000 | HS1 |
| | | TS4603,TSM3104,TSM4104 | 3000 | HS1 |
| | Delta Electronics, Inc. | ECMA-C*04(□40) | 3000 | HS1 |
| | | ECM-A3L-C*040(□40) | 3000 | HS1 |
| | | ECM-A3H-C*040(□40) | 3000 | HS1 |
| | | ECM-B3L-C*040(□40) | 3000 | HS1 |
| | Panasonic Corporation | MHMF (MINAS A6 Series) | 3000 | HS1 |
| | | MSMF (MINAS A6 Series) | 3000 | HS3 (Note 1) |
| | Hitachi Industrial Equipment Systems Co., Ltd. | ADMA Series | 3000 | HS1 |
| | Fuji Electric Co., Ltd. | GYS (ALPHA7 Series) | 3000 | HS1 |
| | Bosch Rexroth | MSM019B | – | HS3 (Note 1) |
| | Mitsubishi Electric Corporation | HG-KR (J4 Series, JN Series) | 3000 | HS1 |
| | | HG-MR (J4 Series) | 3000 | HS1 |
| | | HF-KN (JN Series) | 3000 | HS1 |
| | | HK-KT_W (□40) (J5 Series) | 3000 | HS1 |
| | | MM-GKR (Sensor-less Servo Series) | 3000 | HS1 |
| | | HK-MT_VW (□40) (J5 Series) | 3000 | HS1 |
| | | HK-MT_W (□40) (J5 Series) | 3000 | HS1 |
| | YASKAWA Electric Corporation | SGM7J (Σ-7 Series) | 3000 | HS1 |
| | | SGM7A (Σ-7 Series) | 3000 | HS1 |
| | | SGMXJ (Σ-X Series) | 3000 | HS1 |
| | | SGMXA (Σ-X Series) | 3000 | HS1 |
| 150 | LS ELECTRIC | APMC-FAL015A | 3000 | HS1 |
| | Sanyo Denki Co., Ltd. | GAM1A4015F0 | 3000 | HS1 |
| | | GAM2A4015V0 | 3000 | HS1 |
| | | GAM2A4015F0 | 3000 | HS1 |
| | Mitsubishi Electric Corporation | HK-KT1M3W | 3000 | HS1 |
| | | HK-MT1M3W | 3000 | HS1 |
| | | HK-MT1M3VW | 3000 | HS1 |
| | YASKAWA Electric Corporation | SGMXJ-C2A | 3000 | HS1 |
| | | SGMXA-C2A | 3000 | HS1 |
| | | SGM7J-C2A | 3000 | HS1 |
| | | SGM7A-C2A | 3000 | HS1 |
| 160 | Allen Bradley/Rockwell Automation | MPL-A1510V | 8000 | HS6 |
| | | MPL-B1510V | 8000 | HS6 |
| 190 | Allen Bradley/Rockwell Automation | VPL-A0631E | 4500 | HS6 |
| 200 | Allen Bradley/Rockwell Automation | TLP-A070-020 | 3000 | KS2 |
| | INOVANCE | MS1H1-20B30CB-XXXXZ-INT | 3000 | KS2 |
| | OMRON Corporation | G Series R88M-G (Cylinder Type 3000 r/min) | 3000 | KS3 |
| | | G5 Series R88M-K (Cylinder Type 3000 r/min, 100 VAC/200 VAC) | 3000 | KS3 |
| | | 1S Series R88M-1M (3000 r/min, 100 VAC) | 3000 | KS3 |
| | | 1S Series R88M-1M (3000 r/min, 200 VAC) | 3000 | KS3 |
| | KEYENCE Corporation | SV Series | 3000 | KS2 |
| | | SV2 Series | 3000 | KS2 |
| | Kinco | SMC (G2 Series) | 3000 | KS2 |
| | | SMC (G1 Series) | 3000 | KS2 |
| | Sanyo Denki Co., Ltd. | R2EA06 (R Series/R2/□60/100 VAC) | 3000 | KS2 |
| | | R2AA06 (R Series/R2/□60/200 VAC) | 3000 | KS2 |
| | | R5AA06 (R Series/R5/□60/200 VAC) | 3000 | KS2 |
| | | R2GA06 (R Series/R2/□60/48 VDC) | 3000 | KS2 |
| | | R1AA06 (R Series/R1/□60/200 VAC) | 3000 | KS2 |
| | | R1EA06 (R Series/R1/□60/100 VAC) | 3000 | KS2 |
| | | GAM1E6 (G Series/G1/□60/100V AC) | 3000 | KS2 |
| | | GAM1A6 (G Series/G1/□60/200V AC) | 3000 | KS2 |
| | | GAM2E6 (G Series/G2/□60/100V AC) | 3000 | KS2 |
| | | GAM2A6 (G Series/G2/□60/200V AC) | 3000 | KS2 |
| | KOYO ELECTRONICS INDUSTRIES CO., LTD. | KSV-B3 | 3000 | KS2 |
| | CKD Nikki Denso Co., Ltd. | NA80 Series | 3000 | KS2 |
| | Shibaura Machine Co., Ltd. | VLBSV-ZA(3000min$^{-1}$) | 3000 | KS2 |
| | Tamagawa Seiki Co.,Ltd. | TS4607,TSM3202,TSM4202 | 3000 | KS2 |
| | | TS4613,TSM3303,TSM4303 | 3000 | KS2 |
| | Delta Electronics, Inc. | ECMA-C*06(□60) | 3000 | KS2 |
| | | ECM-A3L-C*060(□60) | 3000 | KS2 |
| | | ECM-A3H-C*060(□60) | 3000 | KS2 |
| | | ECM-B3M-C*060(□60) | 3000 | KS2 |
| | Panasonic Corporation | MSMF (MINAS A6 Series) | 3000 | KS3 |
| | | MHMF (MINAS A6 Series) | 3000 | KS3 |
| | | MUMA021P1 (100 V) (MINAS E Series) | 3000 | KS3 |
| | | MUMA022P1 (200 V) (MINAS E Series) | 3000 | KS3 |
| | Hitachi Industrial Equipment Systems Co., Ltd. | ADMA Series | 3000 | KS2 |
| | Fuji Electric Co., Ltd. | GYS (ALPHA7 Series) | 3000 | KS2 |
| | | GYB (ALPHA7 Series) | 3000 | KS2 |
| | Mitsubishi Electric Corporation | HG-KR (J4 Series, JN Series) | 3000 | KS2 |
| | | HG-MR (J4 Series) | 3000 | KS2 |
| | | HF-KN (JN Series) | 3000 | KS2 |
| | | HK-KT_W (□60) (J5 Series) | 3000 | KS2 |
| | | MM-GKR (Sensor-less Servo Series) | 3000 | KS2 |
| | | HK-KT_4_W (□60) (J5 Series) | 1500 | KS2 |
| | | HK-KT_4_W (□60) (J5 Series) (200 V amplifier) | 1500 | KS2 |
| | | HK-MT_VW (□60) (J5 Series) | 3000 | KS2 |
| | | HK-MT_W (□60) (J5 Series) | 3000 | KS2 |
| | YASKAWA Electric Corporation | SGM7J (Σ-7 Series) | 3000 | KS2 |
| | | SGM7A (Σ-7 Series) | 3000 | KS2 |
| | | SGMXJ (Σ-X Series) | 3000 | KS2 |
| | | SGMXA (Σ-X Series) | 3000 | KS2 |
| 270 | Allen Bradley/Rockwell Automation | MPL-A1520U | 7000 | HS6 |
| | | MPL-B1520U | 7000 | HS6 |
| 280 | Allen Bradley/Rockwell Automation | VPL-A0631M | 7200 | HS6 |
| 300 | LS ELECTRIC | PEGA-B03A | 3000 | KS2 (Note 1) |
| | FANUC Corporation | βiS 0.5/6000-B | 6000 | KS5 |
| | | βiS 0.5/6000HV-B | 6000 | KS5 |
| 310 | Allen Bradley/Rockwell Automation | VPL-B0631T | 8000 | HS6 |
| | | VPL-B0631U | 8000 | HS6 |
| 370 | Allen Bradley/Rockwell Automation | VPL-A0633C | 3000 | HS6 · KS6 |
| | | VPL-B0632F | 4600 | HS6 |
| | | MPL-A210V | 8000 | KS7 |
| | | MPL-B210V | 8000 | KS7 |
| 375 | Mitsubishi Electric Corporation | HK-KT_4_W (□80) (J5 Series) (200 V amplifier) | 1500 | MS2 |
| 390 | Allen Bradley/Rockwell Automation | VPL-A0632F | 4800 | HS6 |
| | | MPL-A1530U | 7000 | HS6 |
| | | MPL-B1530U | 7000 | HS6 |
| 400 | Allen Bradley/Rockwell Automation | TLP-A070-040 | 3000 | KS2 |
| | | TLP-B070-040 | 3000 | KS2 |
| | INOVANCE | MS1H1-40B30CB-XXXXZ-INT | 3000 | KS2 |
| | | MS1H4-40B30CB-XXXXZ-INT | 3000 | KS2 |

Note 1. Please notice that the dimensions of the square flange of the servo motor and the dimensions of the reducer servo motor mounting square flange are different. Please be cautious.

## Motor Matching / Motor Power Design List

| Motor Power (W) | Manufacturer | Type | Rated Speed (r/min) | Flange Type |
|---|---|---|---|---|
| 400 | OMRON Corporation | G Series R88M-G (Cylinder Type 3000 r/min) | 3000 | LS3 |
| | | G5 Series R88M-K (Cylinder Type 3000 r/min, 100 VAC/200 VAC) | 3000 | LS3 |
| | | 1S Series R88M-1M (3000 r/min, 100 VAC) | 3000 | LS3 |
| | | 1S Series R88M-1M (3000 r/min, 200 VAC) | 3000 | LS3 |
| | KEYENCE Corporation | SV Series | 3000 | KS2 |
| | | SV2 Series | 3000 | KS2 |
| | Kinco | SMC (G2 Series) | 3000 | KS2 |
| | | SMC (G1 Series) | 3000 | KS2 |
| | Sanyo Denki Co., Ltd. | R2AA06 (R Series/R2/□60/200 VAC) | 3000 | KS2 |
| | | R5AA06 (R Series/R5/□60/200 VAC) | 3000 | KS2 |
| | | R1AA06 (R Series/R1/□60/200 VAC) | 3000 | KS2 |
| | | GAM1A6 (G Series/G1/□60/200V AC) | 3000 | KS2 |
| | | GAM2A6 (G Series/G2/□60/200V AC) | 3000 | KS2 |
| | KOYO ELECTRONICS INDUSTRIES CO., LTD. | KSV-B3 | 3000 | KS2 |
| | CKD Nikki Denso Co., Ltd. | NA80 Series | 3000 | KS2 |
| | Shibaura Machine Co., Ltd. | VLBSV-ZA(3000min$^{-1}$) | 3000 | KS2 |
| | Tamagawa Seiki Co.,Ltd. | TS4609,TSM3204,TSM4204 | 3000 | KS2 |
| | | TS4613,TSM3303,TSM4303 | 3000 | KS2 |
| | Delta Electronics, Inc. | ECMA-C*06(□60) | 3000 | KS2 |
| | | ECMA-C-H | 3000 | KS2 |
| | | ECM-A3L-C*060(□60) | 3000 | KS2 |
| | | ECM-A3H-C*060(□60) | 3000 | KS2 |
| | | ECM-B3M-C*060(□60) | 3000 | KS2 |
| | | ECMA-J*06(□60) | 3000 | KS2 |
| | Panasonic Corporation | MSMF (MINAS A6 Series) | 3000 | LS3 |
| | | MHMF (MINAS A6 Series) | 3000 | LS3 |
| | | MUMA042P1 (200 V) (MINAS E Series) | 3000 | LS3 |
| | Hitachi Industrial Equipment Systems Co., Ltd. | ADMA Series | 3000 | KS2 |
| | Fuji Electric Co., Ltd. | GYS (ALPHA7 Series) | 3000 | KS2 |
| | | GYB (ALPHA7 Series) | 3000 | KS2 |
| | Mitsubishi Electric Corporation | HG-KR (J4 Series, JN Series) | 3000 | KS2 |
| | | HG-MR (J4 Series) | 3000 | KS2 |
| | | HF-KN (JN Series) | 3000 | KS2 |
| | | HK-KT_W (□60) (J5 Series) | 3000 | KS2 |
| | | MM-GKR (Sensor-less Servo Series) | 3000 | KS2 |
| | | HK-KT_4_W (□60) (J5 Series) | 3000 | KS2 |
| | | HK-MT_VW (□60) (J5 Series) | 3000 | KS2 |
| | | HK-MT_W (□60) (J5 Series) | 3000 | KS2 |
| | YASKAWA Electric Corporation | SGM7J (Σ-7 Series) | 3000 | KS2 |
| | | SGM7A (Σ-7 Series) | 3000 | KS2 |
| | | SGMXJ(Σ-X Series) | 3000 | KS2 |
| | | SGMXA(Σ-X Series) | 3000 | KS2 |
| | Allen Bradley/Rockwell Automation | TLP-A070-040 | 3000 | KS2 |
| | | TLP-B070-040 | 3000 | KS2 |
| 440 | Allen Bradley/Rockwell Automation | VPL-A0751E | 4800 | KS7 |
| 500 | Allen Bradley/Rockwell Automation | VPL-A0633F | 4500 | HS6 · KS6 |
| | FANUC Corporation | βiS 1/6000-B | 6000 | KS2 |
| | | βiS 1/6000HV-B | 6000 | KS2 |
| | | αiF 1/5000-B(Ø10) | 5000 | HS6 · KS6 |
| 540 | Allen Bradley/Rockwell Automation | VPL-B0632T | 8000 | HS6 · KS6 |
| | | VPL-B0751M | 8000 | KS7 |
| 550 | FANUC Corporation | βiS 1.5/6000-B | 6000 | KS2 |
| | | βiS 1.5/6000HV-B | 6000 | KS2 |
| 560 | Allen Bradley/Rockwell Automation | VPL-A1001C | 2800 | MS9 |
| 570 | Allen Bradley/Rockwell Automation | VPL-B0633M | 6500 | HS6 · KS6 |
| | | VPL-B0633T | 6500 | HS6 · KS6 |
| 590 | Allen Bradley/Rockwell Automation | VPL-A0753C | 3300 | KS7 · MS8 |
| 600 | Kinco | SMC60S-0060-30**K-5DS* | 3000 | KS2 |
| | Sanyo Denki Co., Ltd. | GAM1A6060F0 | 3000 | KS2 |
| | | GAM2A6060V0 | 3000 | KS2 |
| | | GAM2A6060F0 | 3000 | KS2 |
| | CKD Nikki Denso Co., Ltd. | NA80 Series | 3000 | MS2 |
| | Shibaura Machine Co., Ltd. | VLBSV-ZA(3000min$^{-1}$) | 3000 | MS2 |
| | Tamagawa Seiki Co.,Ltd. | TS4613,TSM3303,TSM4303 | 3000 | MS2 |
| | Mitsubishi Electric Corporation | HK-KT63W | 3000 | KS2 |
| | | HK-KT634W | 3000 | KS2 |
| | | HK-MT63W | 3000 | KS2 |
| | | HK-MT63VW | 3000 | KS2 |
| 600 | YASKAWA Electric Corporation | SGMXJ-06A | 3000 | KS2 |
| | | SGMXA-06A | 3000 | KS2 |
| | | SGM7J-06A | 3000 | KS2 |
| | | SGM7A-06A | 3000 | KS2 |
| 650 | Allen Bradley/Rockwell Automation | VPL-B0753F | 4500 | KS7 |
| 750 | Allen Bradley/Rockwell Automation | TLP-A090-075 | 3000 | MS2 |
| | | TLP-B090-075 | 3000 | MS2 |
| | INOVANCE | MS1H1-75B30CB-XXXXZ-INT | 3000 | MS2 |
| | | MS1H4-75B30CB-XXXXZ-INT | 3000 | MS2 |
| | OMRON Corporation | G Series R88M-G (Cylinder Type 3000 r/min) | 3000 | MS3 |
| | | G5 Series R88M-K (Cylinder Type 3000 r/min, 100 VAC/200 VAC) | 3000 | MS3 |
| | | 1S Series R88M-1M (3000 r/min, 200 VAC) | 3000 | MS3 |
| | KEYENCE Corporation | SV Series | 3000 | MS2 |
| | | SV2 Series | 3000 | MS2 |
| | Kinco | SMC (G2 Series) | 3000 | MS2 |
| | | SMC (G1 Series) | 3000 | MS2 |
| | Sanyo Denki Co., Ltd. | R2AA08 (R Series/R2/□80/200 VAC) | 3000 | MS1 |
| | | R5AA08 (R Series/R5/□80/200 VAC) | 3000 | MS1 |
| | | R1AA08 (R Series/R1/□80/200 VAC) | 3000 | MS1 |
| | | GAM1A8 (G Series/G1/□80/200V AC) | 3000 | MS1 |
| | | GAM2A8 (G Series/G2/□80/200V AC) | 3000 | MS1 |
| | KOYO ELECTRONICS INDUSTRIES CO., LTD. | KSV-B3 | 3000 | MS2 |
| | CKD Nikki Denso Co., Ltd. | NA80 Series | 3000 | MS2 |
| | Tamagawa Seiki Co.,Ltd. | TS4614,TSM3304,TSM4304 | 3000 | MS2 |
| | | TS4613,TSM3303,TSM4303 | 3000 | MS2 |
| | Delta Electronics, Inc. | ECMA-C*08(□80) | 3000 | MS2 |
| | | ECMA-C-H | 3000 | MS2 |
| | | ECM-A3L-C*080(□80) | 3000 | MS2 |
| | | ECM-A3H-C*080(□80) | 3000 | MS2 |
| | | ECM-B3M-C*080(□80) | 3000 | MS2 |
| | | ECMA-J*08(□80) | 3000 | MS2 |
| | Panasonic Corporation | MSMF (MINAS A6 Series □80 mm or less) | 3000 | MS3 |
| | | MHMF (MINAS A6 Series □80 mm or less) | 3000 | MS3 |
| | FANUC Corporation | βiS 4/4000-B | 3000 | MS6 |
| | | βiS 4/4000HV-B | 3000 | MS6 |
| | | βiSc 4/4000-B | 3000 | MS6 |
| | | βiSc 4/4000HV-B | 3000 | MS6 |
| | | αiS 2/5000-B(Ø10) | 4000 | MF6 |
| | | αiS 2/6000-B(Ø10) | 6000 | MF6 |
| | | αiS 2/5000-B(Ø10) | 4000 | MF6 |
| | | αiS 2/6000HV-B(Ø10) | 6000 | MF6 |
| | | αiF 2/5000-B(Ø10) | 4000 | MF6 |
| | Hitachi Industrial Equipment Systems Co., Ltd. | ADMA Series | 3000 | MS2 |
| | Fuji Electric Co., Ltd. | GYS (ALPHA7 Series) | 3000 | MS1 |
| | | GYB (ALPHA7 Series) | 3000 | MS2 |
| | Mitsubishi Electric Corporation | HG-KR (J4 Series, JN Series) | 3000 | MS2 |
| | | HG-MR (J4 Series) | 3000 | MS2 |
| | | HG-JR73 (B) | 3000 | MF7 |
| | | HG-JR734 (B) | 3000 | MF7 |
| | | HK-KT_W (□80) (J5 Series) | 3000 | MS2 |
| | | HK-KT_4_W (□80) (J5 Series) | 3000 | MS2 |
| | | MM-GKR (Sensor-less Servo Series) | 3000 | MS2 |
| | | HK-MT_VW (□80) (J5 Series) | 3000 | MS2 |
| | | HK-MT_W (□80) (J5 Series) | 3000 | MS2 |
| | YASKAWA Electric Corporation | SGM7J (Σ-7 Series) | 3000 | MS2 |
| | | SGM7A (Σ-7 Series) | 3000 | MS2 |
| | | SGMXJ (Σ-X Series) | 3000 | MS2 |
| | | SGMXA (Σ-X Series) | 3000 | MS2 |
| | | SGMXG-03A*A | 1500 | MF7 |
| 800 | Allen Bradley/Rockwell Automation | VPL-A0753E | 4600 | MS8 |
| 810 | Allen Bradley/Rockwell Automation | VPL-A0753E | 4500 | MS8 |
| 820 | Allen Bradley/Rockwell Automation | VPL-B0753M | 6000 | MS8 |
| 860 | Allen Bradley/Rockwell Automation | MPL-A230P | 5000 | MS8 |
| | | MPL-B230P | 5000 | MS8 |
| 1000 | FANUC Corporation | αiS 4/6000-B | 6000 | MS6 |
| | | αiS 4/6000HV-B | 6000 | MS6 |
| | | αiS 2/6000-B(Ø10) | 6000 | MF6 |
| | | αiS 2/6000HV-B(Ø10) | 6000 | MF6 |
| 1140 | Allen Bradley/Rockwell Automation | VPL-B1001M | 6000 | MS9 |
| 1290 | Allen Bradley/Rockwell Automation | VPL-A1001M | 6500 | MS9 |

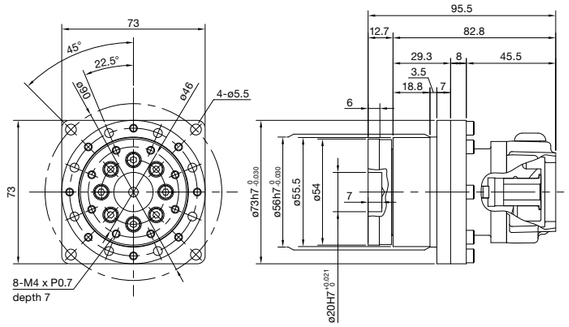
Note 1. Please notice that the dimensions of the square flange of the servo motor and the dimensions of the reducer servo motor mounting square flange are different. Please be cautious.

## Outline Drawings

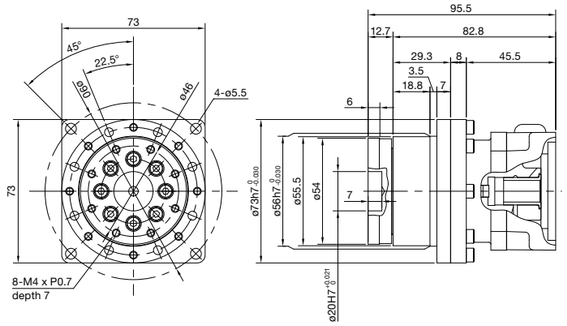
*For representative examples of applicable servo motors of respective manufacturers and flange type corresponding to the servo motors, refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
For more details, please contact your nearest Sales Office or the CS Center.

### DGS010F

<Figure 1>




<Figure 2>



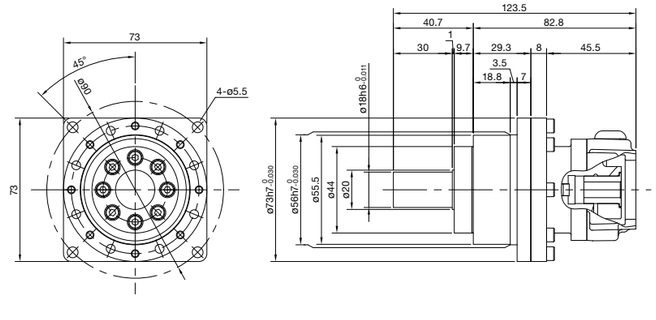

| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS010F-***N△N | 19 | HS1, HS3 | 1 | 1.11 |
| DGS010F-***N△N | 19 | HS6, KS5 | 2 | 1.20 |
| DGS010F-***N△N | 19 | KS1, KS2, KS3 | 2 | 1.19 |
| DGS010F-***N△N | 19 | KS7 | 2 | 1.23 |
| DGS010F-***N△N | 29 | HS1, HS3 | 1 | 1.12 |
| DGS010F-***N△N | 29 | HS6, KS5 | 2 | 1.21 |

| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS010F-***N△N | 29 | KS1, KS2, KS3 | 2 | 1.20 |
| DGS010F-***N△N | 29 | KS7 | 2 | 1.24 |
| DGS010F-***N△N | 49,79,99 | HS1, HS3 | 1 | 1.13 |
| DGS010F-***N△N | 49,79,99 | HS6, KS5 | 2 | 1.22 |
| DGS010F-***N△N | 49,79,99 | KS1, KS2, KS3 | 2 | 1.21 |
| DGS010F-***N△N | 49,79,99 | KS7 | 2 | 1.25 |

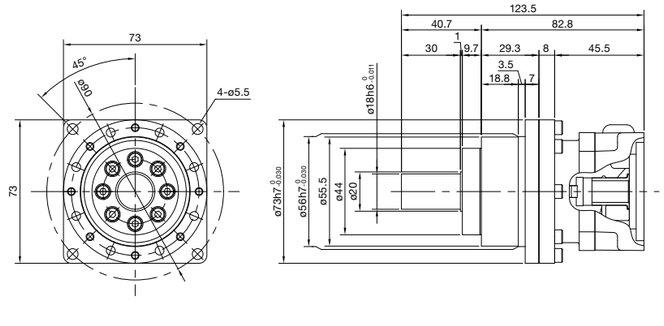
*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
*For the input shaft detailed dimensions, please refer to pages 42 to 45.
*For the performance table, please refer to page 29.

### DGS010J

<Figure 1>




<Figure 2>




| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS010J-***N△N | 19 | HS1, HS3 | 1 | 1.10 |
| DGS010J-***N△N | 19 | HS6, KS5 | 2 | 1.19 |
| DGS010J-***N△N | 19 | KS1, KS2, KS3 | 2 | 1.18 |
| DGS010J-***N△N | 19 | KS7 | 2 | 1.22 |
| DGS010J-***N△N | 29 | HS1, HS3 | 1 | 1.11 |
| DGS010J-***N△N | 29 | HS6, KS5 | 2 | 1.20 |

| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS010J-***N△N | 29 | KS1, KS2, KS3 | 2 | 1.19 |
| DGS010J-***N△N | 29 | KS7 | 2 | 1.23 |
| DGS010J-***N△N | 49,79,99 | HS1, HS3 | 1 | 1.12 |
| DGS010J-***N△N | 49,79,99 | HS6, KS5 | 2 | 1.21 |
| DGS010J-***N△N | 49,79,99 | KS1, KS2, KS3 | 2 | 1.20 |
| DGS010J-***N△N | 49,79,99 | KS7 | 2 | 1.24 |

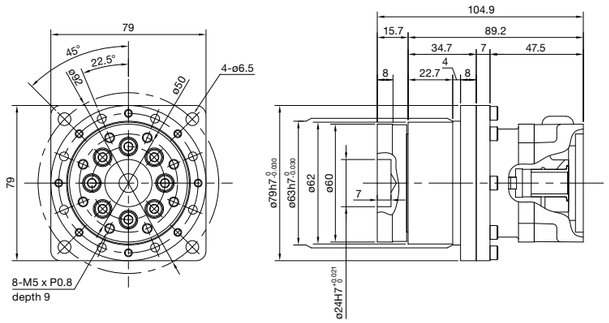
*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
*For the input shaft detailed dimensions, please refer to pages 42 to 45.
*For the performance table, please refer to page 29.

## Outline Drawings

*For representative examples of applicable servo motors of respective manufacturers and flange type corresponding to the servo motors, refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
For more details, please contact your nearest Sales Office or the CS Center.

### DGS030F

<Figure 1>

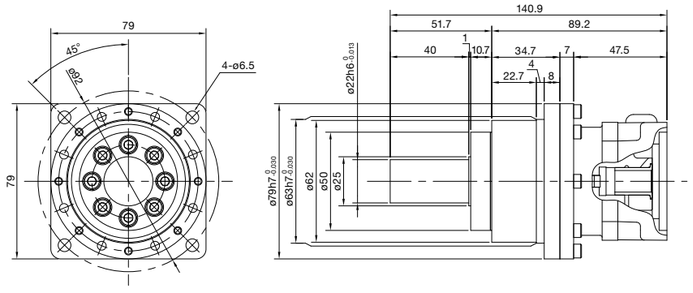



| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS030F-***N△N | 19 | HS6, KS5 | 1 | 1.55 |
| DGS030F-***N△N | 19 | KS1, KS2, KS3, LS3 | 1 | 1.54 |
| DGS030F-***N△N | 19 | KS7 | 1 | 1.58 |
| DGS030F-***N△N | 29 | HS6, KS5 | 1 | 1.57 |
| DGS030F-***N△N | 29 | KS1, KS2, KS3, LS3 | 1 | 1.56 |
| DGS030F-***N△N | 29 | KS7 | 1 | 1.60 |

| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS030F-***N△N | 49 | HS6, KS5 | 1 | 1.58 |
| DGS030F-***N△N | 49 | KS1, KS2, KS3, LS3 | 1 | 1.57 |
| DGS030F-***N△N | 49 | KS7 | 1 | 1.61 |
| DGS030F-***N△N | 79,99,119 | HS6, KS5 | 1 | 1.59 |
| DGS030F-***N△N | 79,99,119 | KS1, KS2, KS3, LS3 | 1 | 1.58 |
| DGS030F-***N△N | 79,99,119 | KS7 | 1 | 1.62 |

### DGS030J

<Figure 1>



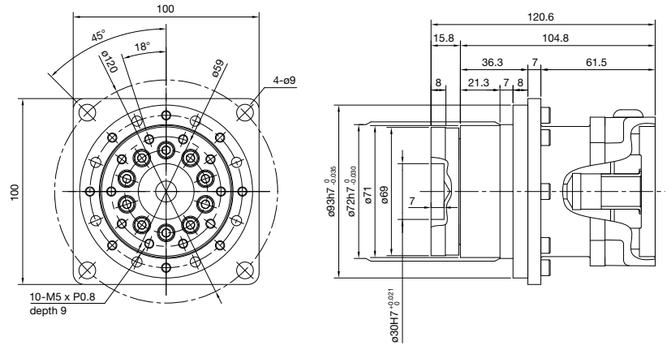

| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS030J-***N△N | 19 | HS6, KS5 | 1 | 1.56 |
| DGS030J-***N△N | 19 | KS1, KS2, KS3, LS3 | 1 | 1.55 |
| DGS030J-***N△N | 19 | KS7 | 1 | 1.59 |
| DGS030J-***N△N | 29 | HS6, KS5 | 1 | 1.58 |
| DGS030J-***N△N | 29 | KS1, KS2, KS3, LS3 | 1 | 1.57 |
| DGS030J-***N△N | 29 | KS7 | 1 | 1.61 |

| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS030J-***N△N | 49 | HS6, KS5 | 1 | 1.59 |
| DGS030J-***N△N | 49 | KS1, KS2, KS3, LS3 | 1 | 1.58 |
| DGS030J-***N△N | 49 | KS7 | 1 | 1.62 |
| DGS030J-***N△N | 79,99,119 | HS6, KS5 | 1 | 1.60 |
| DGS030J-***N△N | 79,99,119 | KS1, KS2, KS3, LS3 | 1 | 1.59 |
| DGS030J-***N△N | 79,99,119 | KS7 | 1 | 1.63 |

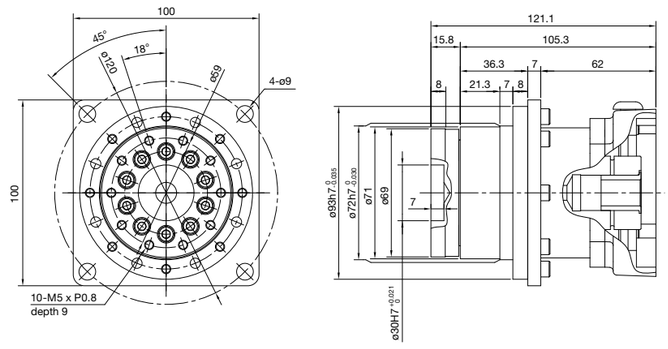
*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
*For the input shaft detailed dimensions, please refer to pages 42 to 45.
*For the performance table, please refer to page 29.

### DGS050F

<Figure 1>




<Figure 2>




| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS050F-***N△N | 19 | MS1, MS4 | 1 | 2.46 |
| DGS050F-***N△N | 19 | MS2, MS3 | 1 | 2.45 |
| DGS050F-***N△N | 19 | MS6 | 2 | 2.55 |
| DGS050F-***N△N | 19 | MS8 | 1 | 2.50 |
| DGS050F-***N△N | 19 | MS9 | 1 | 2.53 |
| DGS050F-***N△N | 29 | MS1, MS4 | 1 | 2.48 |
| DGS050F-***N△N | 29 | MS2, MS3 | 1 | 2.47 |
| DGS050F-***N△N | 29 | MS6 | 2 | 2.57 |

| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS050F-***N△N | 29 | MS8 | 1 | 2.52 |
| DGS050F-***N△N | 29 | MS9 | 1 | 2.55 |
| DGS050F-***N△N | 49 | MS1, MS4 | 1 | 2.50 |
| DGS050F-***N△N | 49 | MS2, MS3 | 1 | 2.49 |
| DGS050F-***N△N | 49 | MS6 | 2 | 2.59 |
| DGS050F-***N△N | 49 | MS8 | 1 | 2.54 |
| DGS050F-***N△N | 49 | MS9 | 1 | 2.57 |

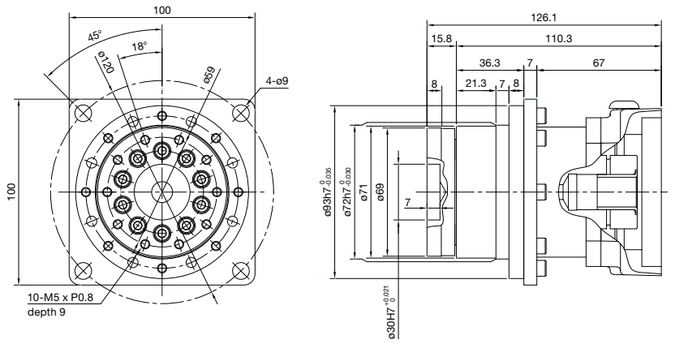
*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
*For the input shaft detailed dimensions, please refer to pages 42 to 45.
*For the performance table, please refer to page 29.

## Outline Drawings

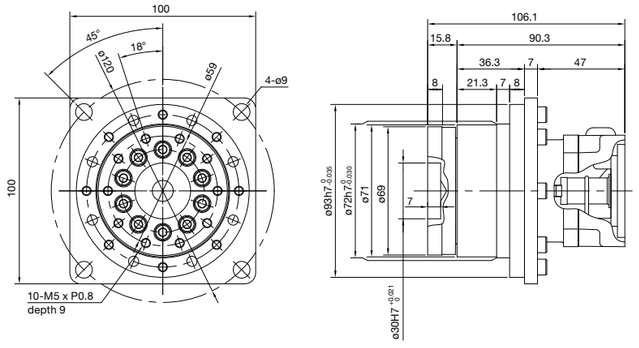
*For representative examples of applicable servo motors of respective manufacturers and flange type corresponding to the servo motors, refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
For more details, please contact your nearest Sales Office or the CS Center.

### DGS050F

<Figure 3>




<Figure 4>




| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS050F-***N△N | 19 | MF6 | 3 | 2.59 |
| DGS050F-***N△N | 19 | MF7 | 3 | 2.57 |
| DGS050F-***N△N | 29 | MF6 | 3 | 2.61 |
| DGS050F-***N△N | 29 | MF7 | 3 | 2.59 |
| DGS050F-***N△N | 49 | MF6 | 3 | 2.63 |
| DGS050F-***N△N | 49 | MF7 | 3 | 2.61 |

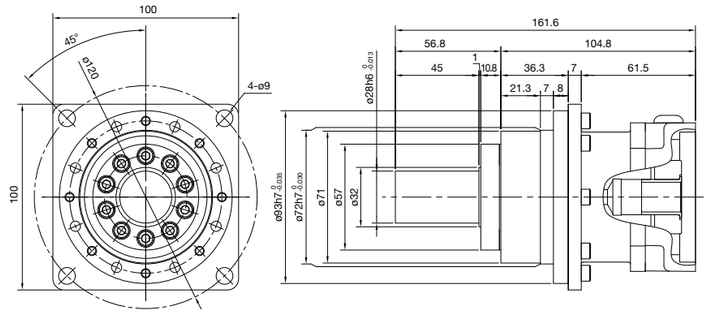
| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS050F-***N△N | 79 | KS2, LS3 | 4 | 2.05 |
| DGS050F-***N△N | 79 | KS6 | 4 | 2.07 |
| DGS050F-***N△N | 79 | KS7 | 4 | 2.10 |
| DGS050F-***N△N | 99,119 | KS2, LS3 | 4 | 2.06 |
| DGS050F-***N△N | 99,119 | KS6 | 4 | 2.08 |
| DGS050F-***N△N | 99,119 | KS7 | 4 | 2.11 |

*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
*For the input shaft detailed dimensions, please refer to pages 42 to 45.
*For the performance table, please refer to page 29.

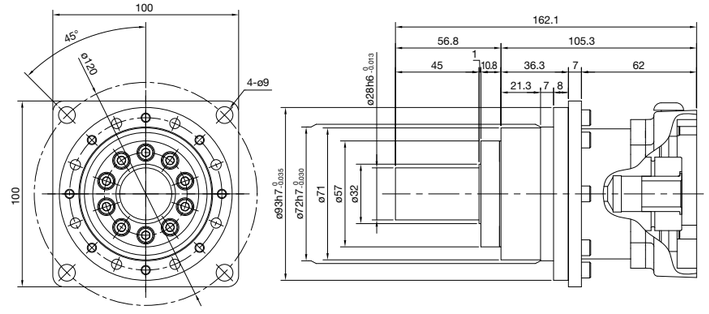


### DGS050J

<Figure 1>




<Figure 2>




| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS050J-***N△N | 19 | MS1, MS4 | 1 | 2.54 |
| DGS050J-***N△N | 19 | MS2, MS3 | 1 | 2.52 |
| DGS050J-***N△N | 19 | MS6 | 2 | 2.62 |
| DGS050J-***N△N | 19 | MS8 | 1 | 2.57 |
| DGS050J-***N△N | 19 | MS9 | 1 | 2.60 |
| DGS050J-***N△N | 29 | MS1, MS4 | 1 | 2.56 |
| DGS050J-***N△N | 29 | MS2, MS3 | 1 | 2.54 |
| DGS050J-***N△N | 29 | MS6 | 2 | 2.64 |

| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS050J-***N△N | 29 | MS8 | 1 | 2.59 |
| DGS050J-***N△N | 29 | MS9 | 1 | 2.62 |
| DGS050J-***N△N | 49 | MS1, MS4 | 1 | 2.58 |
| DGS050J-***N△N | 49 | MS2, MS3 | 1 | 2.56 |
| DGS050J-***N△N | 49 | MS6 | 2 | 2.66 |
| DGS050J-***N△N | 49 | MS8 | 1 | 2.61 |
| DGS050J-***N△N | 49 | MS9 | 1 | 2.64 |

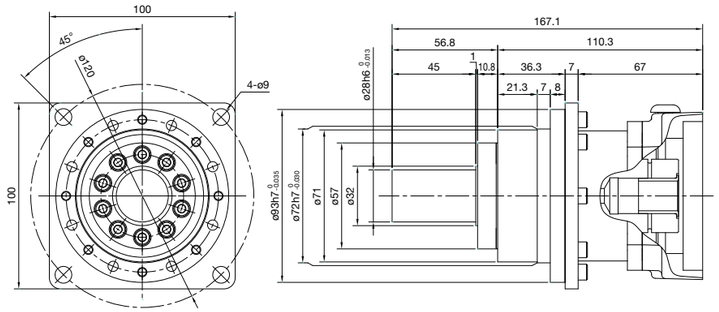
*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
*For the input shaft detailed dimensions, please refer to pages 42 to 45.
*For the performance table, please refer to page 29.

## Outline Drawings

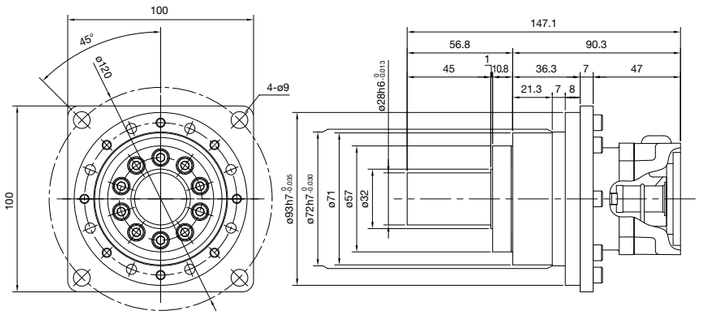
*For representative examples of applicable servo motors of respective manufacturers and flange type corresponding to the servo motors, refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
For more details, please contact your nearest Sales Office or the CS Center.

**DGS050J**

<Figure 3>




<Figure 4>




| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS050J-***N△N | 19 | MF6 | 3 | 2.66 |
| DGS050J-***N△N | 19 | MF7 | 3 | 2.64 |
| DGS050J-***N△N | 29 | MF6 | 3 | 2.68 |
| DGS050J-***N△N | 29 | MF7 | 3 | 2.66 |
| DGS050J-***N△N | 49 | MF6 | 3 | 2.70 |
| DGS050J-***N△N | 49 | MF7 | 3 | 2.68 |

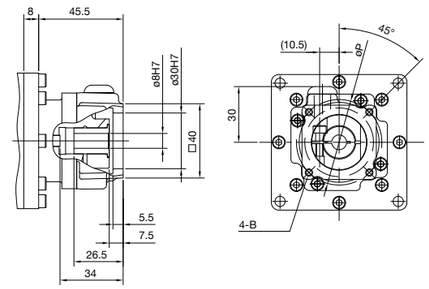
| Type Codes | Reduction Ratio | Flange Shape Type | Figure No. | Weight (kg) |
|---|---|---|---|---|
| DGS050J-***N△N | 79 | KS2, LS3 | 4 | 2.13 |
| DGS050J-***N△N | 79 | KS6 | 4 | 2.14 |
| DGS050J-***N△N | 79 | KS7 | 4 | 2.17 |
| DGS050J-***N△N | 99,119 | KS2, LS3 | 4 | 2.14 |
| DGS050J-***N△N | 99,119 | KS6 | 4 | 2.15 |
| DGS050J-***N△N | 99,119 | KS7 | 4 | 2.18 |

*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 31 to 34.
*For the input shaft detailed dimensions, please refer to pages 42 to 45.
*For the performance table, please refer to page 29.



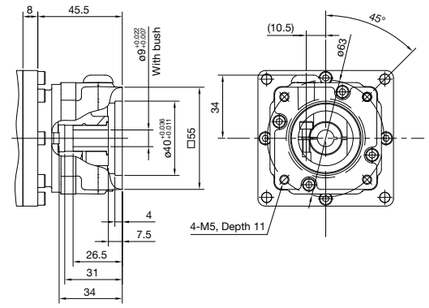
## Detailed Dimensions of Input Shaft and Flange Shapes

### DGS010-HS1 · HS3



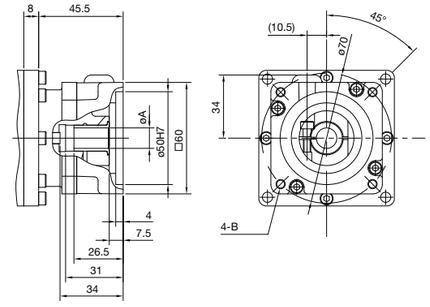

| Type | Reduction Ratio | P Dimension | B Dimension | Bush |
|---|---|---|---|---|
| HS1 | 1/19 to 1/99 | ø46 | M4, Depth 10 | Yes |
| HS3 | 1/19 to 1/99 | ø45 | M3, Depth 10 | Yes |

### DGS010-HS6



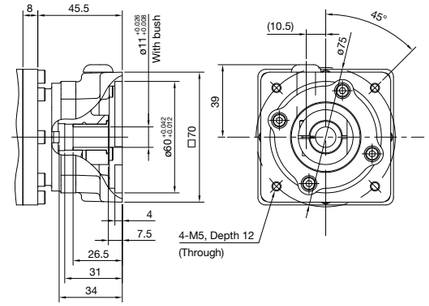

| Type | Reduction Ratio |
|---|---|
| HS6 | 1/19 to 1/99 |

### DGS010-KS1 · KS2 · KS3 · KS5




| Type | Reduction Ratio | A Dimension | B Dimension | Bush |
|---|---|---|---|---|
| KS1 | 1/19 to 1/99 | ø11H7 | M5, Depth 13.5 (Through) | Yes |
| KS2 | 1/19 to 1/99 | ø14H7 | M5, Depth 13.5 (Through) | No |
| KS3 | 1/19 to 1/99 | ø11H7 | M4, Depth 13.5 (Through) | Yes |
| KS5 | 1/19 to 1/99 | ø9H7 | M5, Depth 13.5 (Through) | Yes |

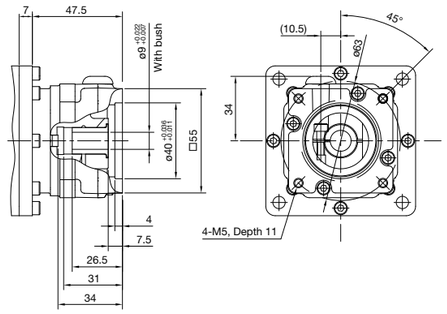
### DGS010-KS7




| Type | Reduction Ratio |
|---|---|
| KS7 | 1/19 to 1/99 |

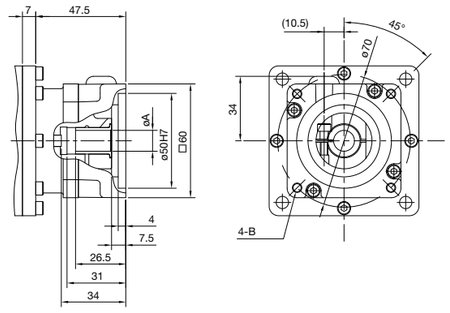
## Detailed Dimensions of Input Shaft and Flange Shapes

### DGS030-HS6



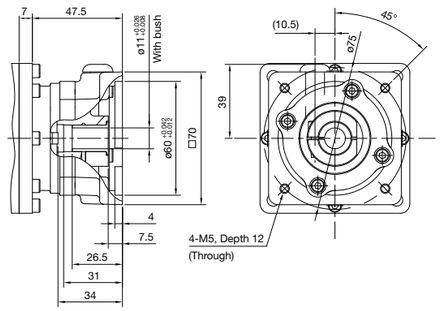

| Type | Reduction Ratio |
|---|---|
| HS6 | 1/19 to 1/99 |

### DGS030-KS1 · KS2 · KS3 · KS5 · LS3



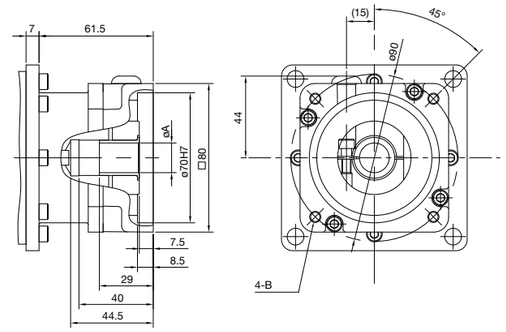

| Type | Reduction Ratio | A Dimension | B Dimension | Bush |
|---|---|---|---|---|
| KS1 | 1/19 to 1/119 | Ø11H7 | M5, Depth 13.5 (Through) | Yes |
| KS2 | 1/19 to 1/119 | Ø14H7 | M5, Depth 13.5 (Through) | No |
| KS3 | 1/19 to 1/119 | Ø11H7 | M4, Depth 13.5 (Through) | Yes |
| KS5 | 1/19 to 1/119 | Ø9H7 | M5, Depth 13.5 (Through) | Yes |
| LS3 | 1/19 to 1/119 | Ø14H7 | M4, Depth 13.5 (Through) | No |

### DGS030-KS7



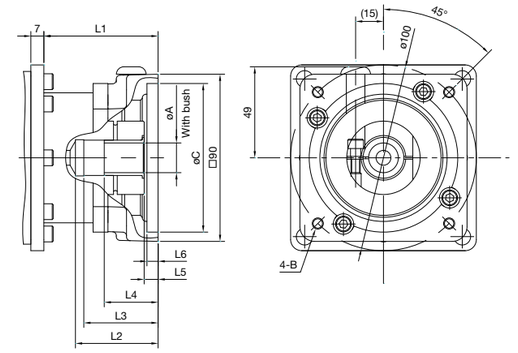

| Type | Reduction Ratio |
|---|---|
| KS7 | 1/19 to 1/119 |

### DGS050-MS1 · MS2 · MS3 · MS4



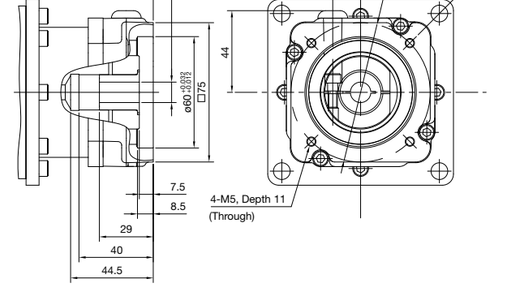

| Type | Reduction Ratio | A Dimension | B Dimension | Bush |
|---|---|---|---|---|
| MS1 | 1/19 to 1/49 | Ø16H7 | M6, Depth 17 (Through) | Yes |
| MS2 | 1/19 to 1/49 | Ø19H7 | M6, Depth 17 (Through) | No |
| MS3 | 1/19 to 1/49 | Ø19H7 | M5, Depth 17 (Through) | No |
| MS4 | 1/19 to 1/49 | Ø16H7 | M5, Depth 17 (Through) | Yes |

### DGS050-MS6 · MS9 · MF6 · MF7




| Type | Reduction Ratio | L1 | L2 | L3 | L4 | L5 | L6 | A Dimension | B Dimension | C Dimension |
|---|---|---|---|---|---|---|---|---|---|---|
| MS6 | 1/19 to 1/49 | 62 | 45 | 40.5 | 29.5 | 8 | 10.5 | Ø14 +0.030 +0.012 | M6, Depth 23 (Through) | Ø80H7 |
| MS9 | 1/19 to 1/49 | 61.5 | 44.5 | 40 | 29 | 7.5 | 6 | Ø16 +0.026 +0.008 | M6, Depth 17 (Through) | Ø80 +0.042 +0.012 |
| MF6 | 1/19 to 1/49 | 67 | 50 | 45.5 | 34.5 | 13 | 10.5 | Ø10H7 | M6, Depth 22 (Through) | Ø80H7 |
| MF7 | 1/19 to 1/49 | 67 | 50 | 45.5 | 34.5 | 13 | 10.5 | Ø16H7 | M6, Depth 22 (Through) | Ø80H7 |

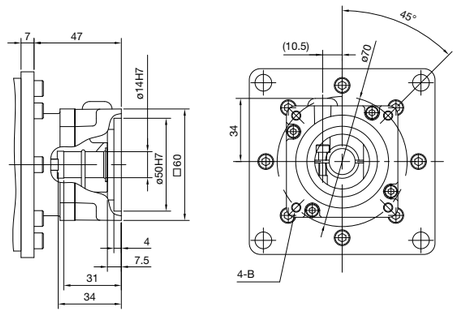
### DGS050-MS8




| Type | Reduction Ratio |
|---|---|
| MS8 | 1/19 to 1/49 |

## Detailed Dimensions of Input Shaft and Flange Shapes

### DGS050-KS2 · LS3

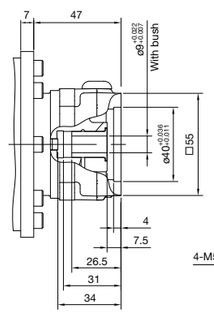


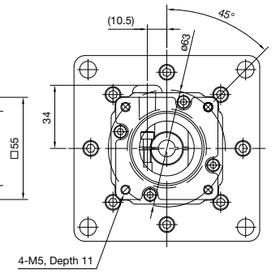




| Type | Reduction Ratio | B Dimension | Bush |
|---|---|---|---|
| KS2 | 1/79 to 1/119 | M5, Depth 13.5 (Through) | No |
| LS3 | 1/79 to 1/119 | M4, Depth 13.5 (Through) | No |

### DGS050-KS6




| Type | Reduction Ratio |
|---|---|
| KS6 | 1/79 to 1/119 |

### DGS050-KS7







| Type | Reduction Ratio |
|---|---|
| KS7 | 1/79 to 1/119 |



# MEMO

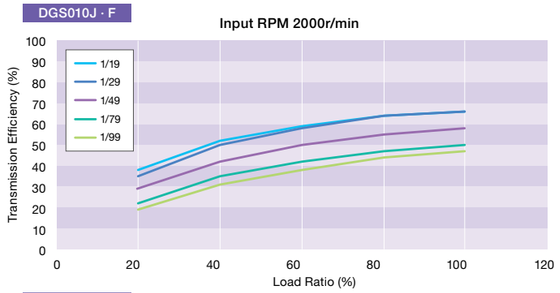
DGS
DGH
DGF
Gear Head

## Efficiency Characteristics

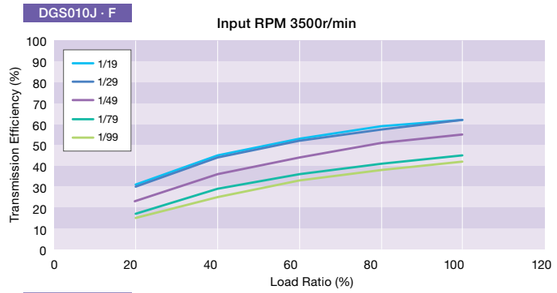
**Measurement conditions:** Input RPM 2000 r/min, values are measured after two-hours of warm operation

*The values in this graph vary according to usage conditions and can be used for Reference purpose only.

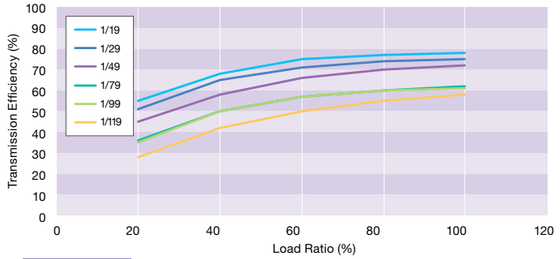
DGS010J · F



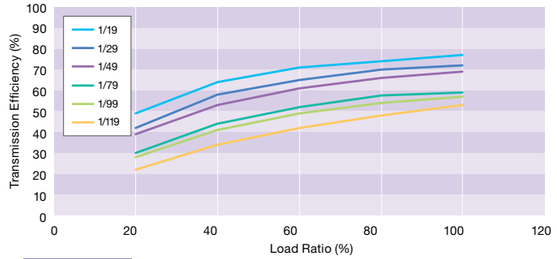

DGS010J · F



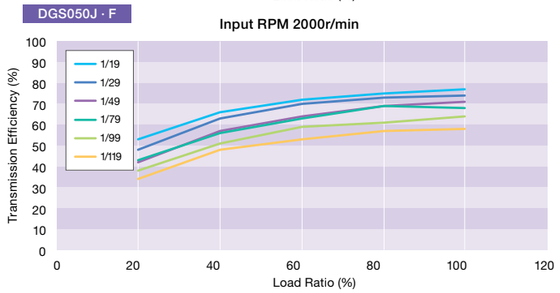

DGS030J · F



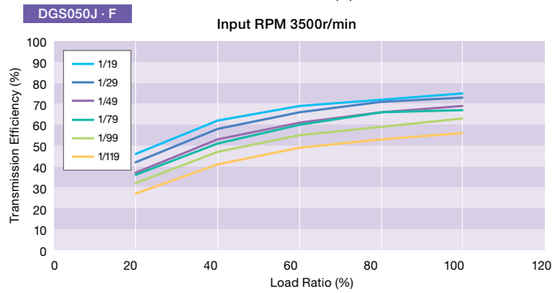

DGS030J · F




DGS050J · F




DGS050J · F




### Starting Torque

The torque required to start up (rotate) the reducer from the input shaft with no load.

Measurement conditions: Value after two hours of running-in at an input speed of 2,000 r/min

(Unit: cN · m)

| Reduction Ratio \ Frame Size | DGS010J · F | DGS030J · F | DGS050J · F |
|---|---|---|---|
| 1/19 | 19.3 | 25.9 | 44.2 |
| 1/29 | 16.6 | 21.4 | 36.6 |
| 1/49 | 13.6 | 17.3 | 27.5 |
| 1/79 | 12.1 | 14.7 | 18.7 |
| 1/99 | 11.6 | 13.8 | 17.6 |
| 1/119 | – | 13.5 | 17.6 |

*The values in the table above vary according to usage conditions and are for use as reference only.

### Accelerating Torque

The torque required to start up (rotate) the reducer from the output shaft with no load.

Measurement conditions: Value after two hours of running-in at an input speed of 2,000 r/min

(Unit: N · m)

| Reduction Ratio \ Frame Size | DGS010J · F | DGS030J · F | DGS050J · F |
|---|---|---|---|
| 1/19 | 6.1 | 7.7 | 12.3 |
| 1/29 | 7.2 | 8.9 | 14.7 |
| 1/49 | 9.6 | 11.1 | 18.8 |
| 1/79 | 15.0 | 16.1 | 18.9 |
| 1/99 | 19.5 | 20.6 | 24.3 |
| 1/119 | – | 26.3 | 32.6 |

*The values in the table above vary according to usage conditions and are for use as reference only.



## Running Torque with No Load

The torque required on the input side to rotate the reducer with no load.

Measurement conditions: Input RPM 2000 r/min, values are measured after two-hours of warm operation

(Unit: cN · m)

| Reduction Ratio \ Frame Size | DGS010J · F | DGS030J · F | DGS050J · F |
|---|---|---|---|
| 1/19 | 18.3 | 26.0 | 47.1 |
| 1/29 | 17.2 | 24.7 | 45.6 |
| 1/49 | 15.3 | 21.7 | 41.3 |
| 1/79 | 14.0 | 19.9 | 29.7 |
| 1/99 | 13.7 | 19.5 | 28.9 |
| 1/119 | – | 19.1 | 28.6 |

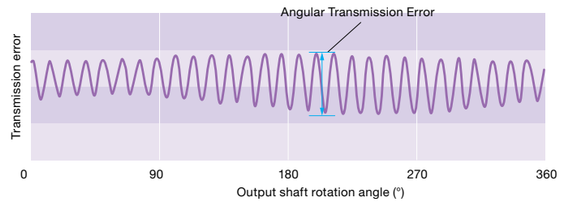
*The values in the table above vary according to usage conditions and are for use as reference only.

## Angular Transmission Error

With an arbitrary rotation angle input, the difference between the theoretical rotating output rotation angle and the actual rotating output rotation angle.

(Unit: arc min)

| Reduction Ratio \ Frame Size | DGS010J · F | DGS030J · F | DGS050J · F |
|---|---|---|---|
| 1/19 | 2.2 | 1.7 | 1.7 |
| 1/29 | 2.2 | 1.7 | 1.7 |
| 1/49 | 1.7 | 1.7 | 1.1 |
| 1/79 | 1.7 | 1.7 | 1.1 |
| 1/99 | 1.7 | 1.7 | 1.1 |
| 1/119 | – | 1.7 | 1.1 |




## Hysteresis Loss

When fixing the input shaft and, after increasing from zero to rated torque on the output shaft, returning the torque to zero, the output shaft torsion angle will retain a minimal amount rather than returning entirely to zero. This is called hysteresis loss.

(Unit: arc min)

| Reduction Ratio \ Frame Size | DGS010J · F | DGS030J · F | DGS050J · F |
|---|---|---|---|
| 1/19 | 3.3 | 3.3 | 3.3 |
| 1/29 | 3.3 | 3.3 | 3.3 |
| 1/49 | 2.2 | 2.2 | 2.2 |
| 1/79 | 1.1 | 1.1 | 1.1 |
| 1/99 | 1.1 | 1.1 | 1.1 |
| 1/119 | – | 1.1 | 1.1 |

## Spring Constant

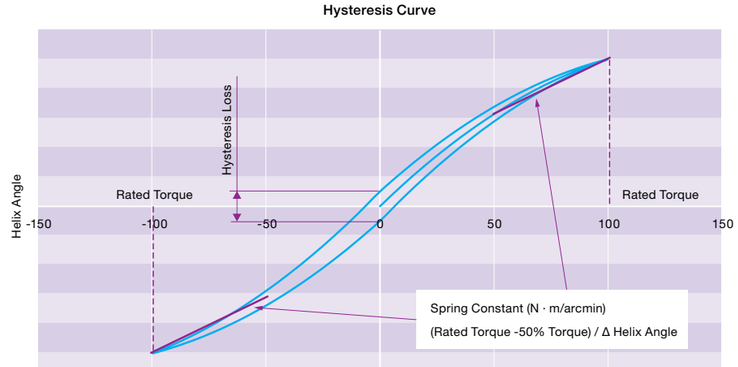
This is the resistance to torsion (torsional rigidity) against rotational force.

(Unit: N · m / arc min)

| Reduction Ratio \ Frame Size | DGS010J · F | DGS030J · F | DGS050J · F |
|---|---|---|---|
| 1/19 | 1.7 | 3.2 | 5.8 |
| 1/29 | 2.2 | 4.0 | 7.8 |
| 1/49 | 2.6 | 4.6 | 9.0 |
| 1/79 | 2.8 | 5.6 | 9.6 |
| 1/99 | 2.8 | 6.1 | 10.1 |
| 1/119 | – | 6.1 | 10.1 |

*The values are for reference. The lower limit value is about 80% of the displayed value.

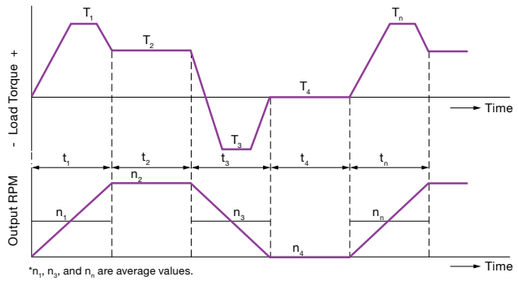
**Hysteresis Curve**




(All performance-related values contained in this catalog are obtained under the designated test conditions by NISSEI CORPORATION.)

## Selection Procedure and Examples

### ■ Operation Pattern




*$n_1$, $n_2$, and $n_n$ are average values.

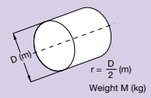
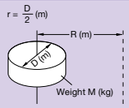
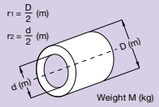
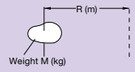
<Operation Conditions :Eg>

| Operation Pattern | Load Torque ($T_n$) (N · m) | | Time ($t_n$) (s) | | Output RPM ($n_n$) (r/min) | |
|---|---|---|---|---|---|---|
| At the Start | $T_1$ | 74 | $t_1$ | 0.3 | $n_1$ | 11 |
| During normal operation | $T_2$ | 54 | $t_2$ | 3 | $n_2$ | 20 |
| While stopping (reducing speed) | $T_3$ | 40 | $t_3$ | 0.5 | $n_3$ | 11 |
| When at rest | $T_4$ | 0 | $t_4$ | 0.6 | $n_4$ | 0 |

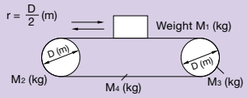
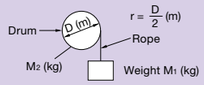
Maximum Output RPM $No_{max}$ = 20(r/min)
Maximum Input RPM $Ni_{max}$ = 2500(r/min)
Impact Torque $T_s$ = 100(N · m)
Life time $L_{10}$ = 4000(h)
*Limited by the motor, etc.

## Method for Calculating the Moment of Inertia $J_\ell$

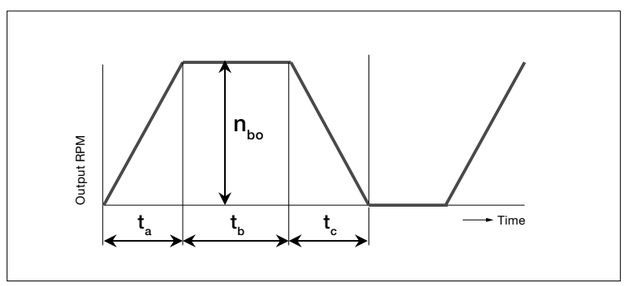
### ■ Rotor's moment of inertia $J_\ell$

| When the center of rotation is aligned with the center of gravity | | When the center of rotation is not aligned with the center of gravity | |
|---|---|---|---|
|  D (m), r = D/2 (m), Weight M (kg) | $J_\ell = \frac{1}{2}Mr^2$ (kg · m²) |  r = D/2 (m), R (m), D (m), Weight M (kg) | $J_\ell = \frac{1}{2}Mr^2 + MR^2$ (kg · m²) |
|  r1 = D/2 (m), r2 = d/2 (m), D (m), d (m), Weight M (kg) | $J_\ell = \frac{1}{2}M(r_1^2 + r_2^2)$ (kg · m²) |  R (m), Weight M (kg) | (If the size is negligible) $J_\ell = MR^2$ (kg · m²) |

### ■ Moment of inertia $J_\ell$ in case of linear motion

| | | |
|---|---|---|
| General case |  Weight M (kg), Velocity V (m/min), Linear Motion, n (r/min) | $J_\ell = \frac{1}{4}M \cdot \left(\frac{V}{\pi \cdot n}\right)^2$ (kg · m²) |
| In the case of horizontal linear motion (When moving an object with a lead screw) |  V (m/min), Weight M (kg), P = Lead of lead screw (m/rev), Lead Screw | $J_\ell = \frac{1}{4}M \cdot \left(\frac{P}{\pi}\right)^2 = \frac{1}{4}M \cdot \left(\frac{V}{\pi \cdot n}\right)^2$ (kg · m²) |
| In the case of horizontal linear motion (Conveyor etc.) |  r = D/2 (m), Weight M1 (kg), D (m), M2 (kg), M4 (kg), M3 (kg) | $J_\ell = M_1r^2 + \frac{1}{2}M_2r^2 + \frac{1}{2}M_3r^2 + M_4r^2$ (kg · m²) |
| In the case of vertical linear motion (Crane, winch, etc.) |  Drum, D (m), r = D/2 (m), Rope, M2 (kg), Weight M1 (kg) | $J_\ell = M_1r^2 + \frac{1}{2}M_2r^2$ (kg · m²) |

## Method of calculating acceleration and deceleration torque




Acceleration Torque : $T_{po} = \frac{2\pi \cdot J_\ell \cdot n_{bo}}{60 \cdot t_a} + T_\ell$

Deceleration Torque : $T_{so} = \frac{2\pi \cdot J_\ell \cdot n_{bo}}{60 \cdot t_c} - T_\ell$

$J_\ell$ : Load Moment of Inertia (kg · m²)
$n_{bo}$ : Output Speed: (r/min)
$t_a$ : Acceleration Time (s)
$t_b$ : Steady-State Operation Time (s)
$t_c$ : Deceleration Time (s)
$T_\ell$ : Load Torque (N · m)



## Selection Process and Examples

## Selection Process Example

**1.** Calculation of average load torque on output shaft side in terms of usage

$$T_{av} = \sqrt[3]{\frac{n_1 \cdot t_1 \cdot (T_1)^3 + n_2 \cdot t_2 \cdot (T_2)^3 + \cdots n_n \cdot t_n \cdot (T_n)^3}{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}}$$

$$T_{av} = \sqrt[3]{\frac{11r/min \cdot 0.3s \cdot (74N \cdot m)^3 + 20r/min \cdot 3s \cdot (54N \cdot m)^3 + 11r/min \cdot 0.5s \cdot (40N \cdot m)^3}{11r/min \cdot 0.3s + 20r/min \cdot 3s + 11r/min \cdot 0.5s}}$$

$\approx 54N \cdot m$

**2-1.** Calculation of average output RPM

$$No_{av} = \frac{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}{t_1 + t_2 + \cdots t_n}$$

$$No_{av} = \frac{11r/min \cdot 0.3s + 20r/min \cdot 3s + 11r/min \cdot 0.5s + 0r/min \cdot 0.6s}{0.3s + 3s + 0.5s + 0.6s} \approx 16r/min$$

**2-2.** Deciding on reduction ratio

$$\frac{Ni_{max}}{No_{max}} \geq R$$

$$\frac{2500r/min}{20r/min} = 125 \geq 119 = R$$

**2-3.** Calculation of average input RPM

$$Ni_{av} = No_{av} \cdot R$$

Make sure the average input RPM is within the allowable average input RPM.
$Ni_{av} = 16r/min \cdot 119 = 1904r/min \leq 3500r/min$ (allowable average input RPM of DGS)

**2-4.** Calculation of maximum input RPM

$$Ni_{max} = No_{max} \cdot R$$

Confirm that the maximum input RPM is within the permissible level.
$Ni_{max} = 20r/min \cdot 119 = 2380r/min \leq 6000r/min$ (allowable maximum input RPM of DGS)

**3.** Temporarily select a model with performance table values that satisfy the usage conditions

$T_1 = 74N \cdot m \leq 90N \cdot m$ (DGS030-119 start/stop allowable peak torque)
$T_3 = 40N \cdot m \leq 90N \cdot m$ (DGS030-119 start/stop allowable peak torque)
Temporarily select DGS030-119 from $T_s = 100\ N{\cdot}m \leq 147\ N{\cdot}m$
(DGS030-119 allowable instantaneous maximum torque)

**4.** Select the motor to be used according to "Load Torque," "Efficiency Characteristics (p. 47)," and "Performance Table - Moment of Inertia (Input Shaft Equivalent) (p. 29, 30)," and select a motor mounting flange type that can be mounted in accordance with "Detailed Dimensions of Input Shaft and Flange Shapes (p. 42 to p.45)."

Steady-State Operation Input Torque : $T_{\ell i} = \frac{T_\ell}{R \cdot \frac{\eta}{100}}$

Acceleration Input Torque : $T_{pi} = \frac{T_{po}}{R \cdot \frac{\eta}{100}} + \frac{2\pi \cdot J_i \cdot n_{bi}}{60 \cdot t_a}$

Deceleration Input Torque : $T_{si} = \frac{T_{so}}{R \cdot \frac{\eta}{100}} - \frac{2\pi \cdot J_i \cdot n_{bi}}{60 \cdot t_c}$

$J_i$ : Reducer Internal Moment of Inertia (Input Shaft Equivalent) (kg · m²)
$n_{bi}$ : Input Speed (r/min)
$\eta$ : Transmission Efficiency (%)

**5.** Calculation of reducer Life time

$$L_{10} = 10000 \cdot \left(\frac{T_r}{T_{av}}\right)^3 \cdot \left(\frac{N_r}{Ni_{av}}\right)$$

*However, $L_{10}$ is equal to or smaller than 10,000.

$$L_{10} = 10000 \cdot \left(\frac{40}{54}\right)^3 \cdot \left(\frac{2000}{1904}\right) \approx 4269\ (h) \geq 4000\ (h)$$

Therefore, select DGS030-119 and verify the service life of the main bearing.

## Selection Procedure and Examples

### Confirmation of main bearing life

**A.** Calculation of max load moment

$$M_{max} = Fr_{max}(Sr - A + B) + Fa_{max} \cdot Sa$$

Confirmation of max load moment

Maximum load moment ($M_{max}$) ≤ Allowable moment (Mc)

**B.** Calculation of average load

Average radial load ($Fr_{av}$)

$$Fr_{av} = \sqrt[3]{\frac{n_1t_1(|Fr_1|)^3 + n_2t_2(|Fr_2|)^3 \cdots n_nt_n(|Fr_n|)^3}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

Let the maximum radial load within the $t_1$ space be $Fr_1$ and the maximum radial load within the $t_3$ space be $Fr_3$.

Average Thrust Load ($Fa_{av}$)

$$Fa_{av} = \sqrt[3]{\frac{n_1t_1(|Fa_1|)^3 + n_2t_2(|Fa_2|)^3 \cdots n_nt_n(|Fa_n|)^3}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

Let the maximum thrust load within the $t_1$ space be $Fa_1$ and the maximum thrust load within the $t_3$ space be $Fa_3$.

Average Output RPM ($N_{av}$)

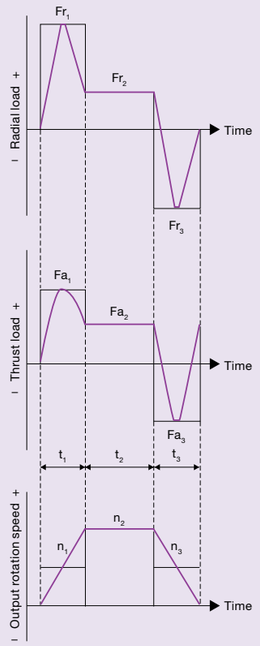
$$N_{av} = \frac{n_1t_1 + n_2t_2 + \cdots + n_nt_n}{t_1 + t_2 + \cdots t_n}$$

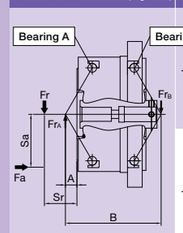
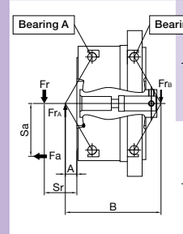
**C.** Calculation of life time

$$L_{10} = \left(\frac{10^6}{60 \times N_{av}}\right) \times \left(\frac{C}{fw \cdot Pc}\right)^3$$

*However, $L_{10}$ is equal to or smaller than 10,000.

B. Graph




| Direction of Thrust Load (Figure A) | Load conditions | Bearing classification | Thrust load | Radial load | Dynamic equivalent load |
|---|---|---|---|---|---|
|  | $\frac{Fr_B}{2Y_0} + Fa_{av} \geq \frac{Fr_A}{2Y_0}$ | Bearing A | $Fa_A = \frac{Fr_B}{2Y_0} + Fa_{av}$ | $Fr_A = \frac{Fr_{av}(Sr - A + B) + Fa_{av} \cdot Sa}{B}$ | $Pc_A = X \cdot Fr_A + Y \cdot Fa_A$ However, when $Pc_A < Fr_A$, use $Pc_A = Fr_A$ |
| | | Bearing B | $Fa_B = 0$ | $Fr_B = \frac{Fr_{av}(Sr - A) + Fa_{av} \cdot Sa}{B}$ | $Pc_B = Fr_B$ |
| | $\frac{Fr_B}{2Y_0} + Fa_{av} < \frac{Fr_A}{2Y_0}$ | Bearing A | $Fa_A = 0$ | $Fr_A = \frac{Fr_{av}(Sr - A + B) + Fa_{av} \cdot Sa}{B}$ | $Pc_A = Fr_A$ |
| | | Bearing B | $Fa_B = \frac{Fr_A}{2Y_0} - Fa_{av}$ | $Fr_B = \frac{Fr_{av}(Sr - A) + Fa_{av} \cdot Sa}{B}$ | $Pc_B = X \cdot Fr_B + Y \cdot Fa_B$ However, when $Pc_B < Fr_B$, use $Pc_B = Fr_B$ |
|  | $\frac{Fr_B}{2Y_0} \leq \frac{Fr_A}{2Y_0} + Fa_{av}$ | Bearing A | $Fa_A = 0$ | $Fr_A = \frac{Fr_{av}(Sr - A + B) - Fa_{av} \cdot Sa}{B}$ | $Pc_A = Fr_A$ |
| | | Bearing B | $Fa_B = \frac{Fr_A}{2Y_0} + Fa_{av}$ | $Fr_B = \frac{Fr_{av}(Sr - A) - Fa_{av} \cdot Sa}{B}$ | $Pc_B = X \cdot Fr_B + Y \cdot Fa_B$ However, when $Pc_B < Fr_B$, use $Pc_B = Fr_B$ |
| | $\frac{Fr_B}{2Y_0} > \frac{Fr_A}{2Y_0} + Fa_{av}$ | Bearing A | $Fa_A = \frac{Fr_B}{2Y_0} - Fa_{av}$ | $Fr_A = \frac{Fr_{av}(Sr - A + B) - Fa_{av} \cdot Sa}{B}$ | $Pc_A = X \cdot Fr_A + Y \cdot Fa_A$ However, when $Pc_A < Fr_A$, use $Pc_A = FrA$ |
| | | Bearing B | $Fa_B = 0$ | $Fr_B = \frac{Fr_{av}(Sr - A) - Fa_{av} \cdot Sa}{B}$ | $Pc_B = Fr_B$ |

*1 Sr,A is the distance from the flange shaft/straight shaft mounting surface. *2 $Y_0$=0.76
*3 The radial load on the bearings should be regarded as positive even if the load direction is opposite to the arrows in the above figure.

**Load Coefficient**

| Load Status | fw |
|---|---|
| For smooth movement with no impacts | 1 to 1.2 |
| For normal movement | 1.2 to 1.5 |
| For high vibration and impacts | 1.5 to 3 |

**Calculation of load coefficient**

| Bearing A | Bearing B | Radial Load Coefficient (X) | Thrust Load Coefficient (Y) |
|---|---|---|---|
| $\frac{Fa_A}{Fr_A} \leq 0.8$ | $\frac{Fa_B}{Fr_B} \leq 0.8$ | 1 | 0 |
| $\frac{Fa_A}{Fr_a} > 0.8$ | $\frac{Fa_B}{Fr_B} > 0.8$ | 0.39 | 0.76 |

| Frame Size | Distance from end of output shaft to point of action (m) | Distance between points of action (B) (m) |
|---|---|---|
| DGS010 | 0.0052 | 0.0444 |
| DGS030 | 0.00625 | 0.0519 |
| DGS050 | 0.0068 | 0.0568 |

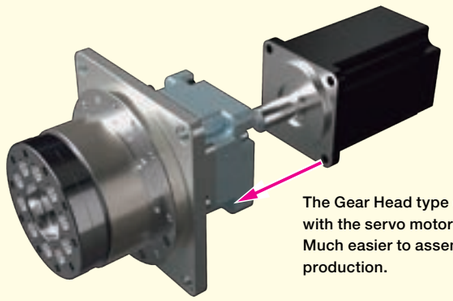
| Frame Size | Basic Dynamic Rated Load (C) (N) | Basic Static Rated Load ($C_0$) (N) | Allowable Moment (Mc) (N · m) |
|---|---|---|---|
| DGS010 | 5590 | 5600 | 112 |
| DGS030 | 8800 | 7850 | 163 |
| DGS050 | 8900 | 8030 | 241 |

| Symbol | Unit | Content |
|---|---|---|
| $L_{10}$ | h | Life time |
| $N_{av}$ | r/min | Average Output RPM |
| Pc | N | Dynamic Equivalent Radial Load |
| $Fr_{av}$ | N | Average Radial Load |
| $Fa_{av}$ | N | Average Thrust Load |
| Sr,Sa | m | See Fig. A |
| $Fr_A$, $Fr_B$ | N | Radial load on bearings A and B obtained from $Fr_{av}$ and $Fa_{av}$ |
| $Fa_A$, $Fa_B$ | N | Thrust load on bearings A and B |





## Motor Mounting



The Gear Head type can be easily coupled with the servo motors of other companies! Much easier to assemble. Less man-hour in production.

**1.** Turn the input shaft joint, then align the bolt head of the input shaft joint clamping to the wrench hole of the input shaft joint clamping on top of the flange.

**2.** Wipe off the input shaft joint guide and motor output shaft of the servo motor with a rust-preventive agent, oil, etc.

**3.** Insert the motor into the reducer body.

*When a bush is provided, align the position of the slit of the bush with the slit of the input shaft joint as shown in Figure 1. Also, if the motor shaft has a key groove, align the position of the slit of the bush with the key groove as shown in Figure 2.



Figure 1 Without Key Groove

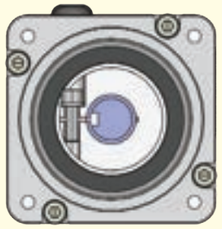


Figure 2 With Key Groove

**4.** Secure the motor and reducer flange with the motor mounting bolts at the tightening torques shown in the table below.

**5.** Secure the input shaft joint clamping bolts at the tightening torques shown in the table below.

*Do not tighten the clamping bolt without inserting the shaft applicable to the flange type into the input shaft joint.

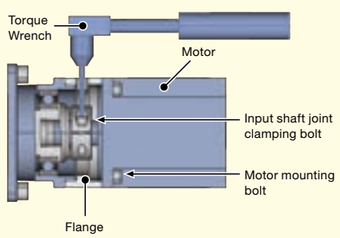
**6.** Mount the rubber cap (accessory) to the wrench hole for input shaft joint clamping.

Motor Mounting Bolt Tightening Torques (Reference Values)

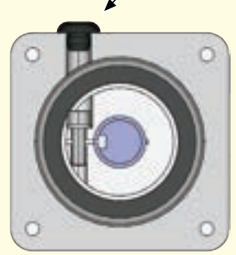
| Bolt Size | Tightening Torque (N · m) |
|---|---|
| M3 | 1.6 |
| M4 | 4.4 |
| M5 | 8.3 |
| M6 | 14.2 |

Input Shaft Joint Clamping Bolt Tightening Torques (Reference Values)

| Bolt Size | Tightening Torque (N · m) |
|---|---|
| M4 | 5.4 |
| M5 | 10.8 |




Wrench hole for input shaft joint clamping (Rubber cap accessory)



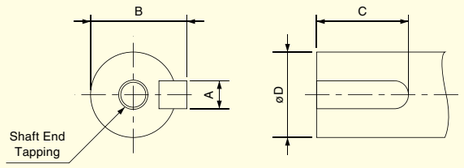
## Option

**Addition of output shaft key and shaft end tapping**

Output shaft type J: Key and shaft end tapping can be added to a straight shaft.
Please place an order with the appropriate type code shown in the table below when needed.

| Option | Option Code |
|---|---|
| X | U1 |

**Model example: Standard specification DGS030J-029NKS2N → DGS030J-029NKS2NXU1**




| Frame Size | A | B | C | D | Shaft End Tapping Size × Pitch × Depth |
|---|---|---|---|---|---|
| DGS010 | 6 | 20.5 | 20 | 18 | M6 × 1.0 × 15 |
| DGS030 | 6 | 24.5 | 30 | 22 | M8 × 1.25 × 20 |
| DGS050 | 8 | 31 | 35 | 28 | M8 × 1.25 × 20 |

## Precautions for Use

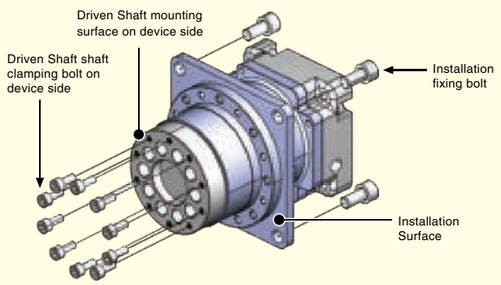
· Make sure that the surface temperature of the reducer does not exceed 80°C. Failure to follow this precaution may result in damage to the equipment or burns.
· Make sure that the surface temperature of the reducer does not exceed 80°C during continuous operation in one direction and during start/stop operation with a high load in a short period of time. Failure to follow this precaution may result in failure.
· Please read this catalog and the respective Instruction Manual very carefully before using our products and be sure to use the products correctly. Please download the Instruction Manual using the link below.

### Installation Environment

| | |
|---|---|
| Ambient Temperature | 0°C to 40°C |
| Ambient Humidity | 85% RH or less (no condensation) |
| Altitude | 1000m or less |
| Installation Environment | A well-ventilated location with no exposure to corrosive gases, explosive gases, steam, chemicals, etc.<br>A location not directly exposed to rain.<br>A location not directly exposed to sunlight.<br>A well-ventilated location with no dust. |

### Installation Method

· Secure with bolts on a vibration-free and flat machine-processed surface.
· Tighten the bolts with the tightening torque shown in the table below.
· If the foundation is bad or the mounting surface is not flat enough, vibration may occur during operation and the service life of the reducer may be shortened.
· Make sure the flatness of the mounting surface is 0.1 mm or less.




(Reference Values)

| Bolt Size | Tightening Torque (N · m) | |
|---|---|---|
| | Driven Shaft shaft clamping bolt on device side | Installation fixing bolt |
| M4 | 5.4 | – |
| M5 | 10.8 | 8.3 |
| M6 | – | 14.2 |
| M8 | – | 29.4 |

[Reference] The bolt strength type (JIS B 1051) should be 12.9.
Recommended Bolts: Hex Head Cap Screws (JIS B 1176)

**High Stiffness Reducer Gear Head Type Instruction Manual (Our Website)** → https://img-ja.nissei-gtr.co.jp/files/user/pdf/data/gtr/manual/rc/rc-gh_e.pdf

**NISSEI CORPORATION**
https://www.nissei-gtr.global/en/

* The specifications in this catalog are subject to change without notice. Kindly inquire in advance before you design.
* Be sure to conduct full inspections and make sure on export procedures while exporting this product, as if its end user is involved with the military, its application connected to weapons manufacture, or in cases of certain export destinations, or it may fall under the Export restrictions stipulated by the Foreign Exchange and Foreign Trade Act of Japan.
To order the products in this catalog, contact us as below



SEIMITSU
ACCESS to a BRIGHTER FUTURE

Seimitsu Kaikan, A-42/43/44, H Block, MIDC,
Pimpri, Pune - 411018 INDIA

+91 9028121211 / 020 - 46212700

www.seimitsu.in sales@seimitsu.in