NISSEI CORPORATION

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

To order the products in this catalog, contact us as below

2024.11

High Stiffness Reducers

DGS / DGH / DGF type
Gear Head type

Compact but can achieve high precision with powerful drive

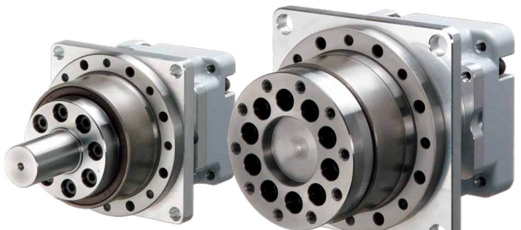
The Best choice for Robots and FA equipment. (other products in need of high-accuracy)

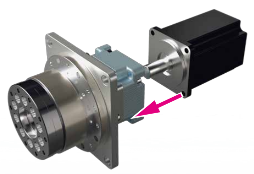
NISSEI CORPORATION

High Stiffness Reducers

DGS / DGH / DGF type

Gear Head type





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

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

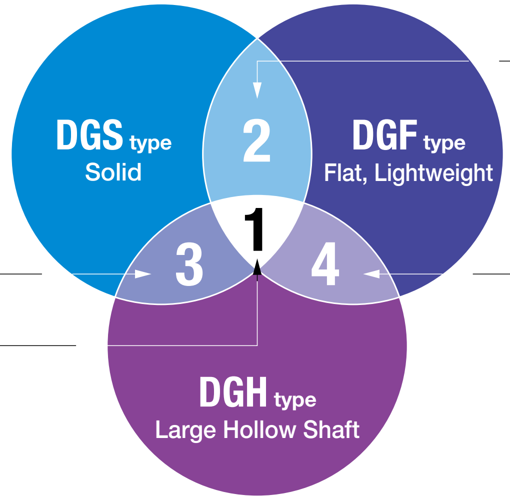
3 Frame Sizes OD: 71.5mm / 81.5mm / 91.5mm 2 stage Reduction 1/50, 1/100

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

High Stiffness Reducers

DGS / DGH / DGF / Gear Head type

The relationship between
the three UXiMO types



Input bearing inside
Compact

Low reduction

High Stiffness & High Torque

Hollow diameter

Gear Head type Easily to be coupled with motors

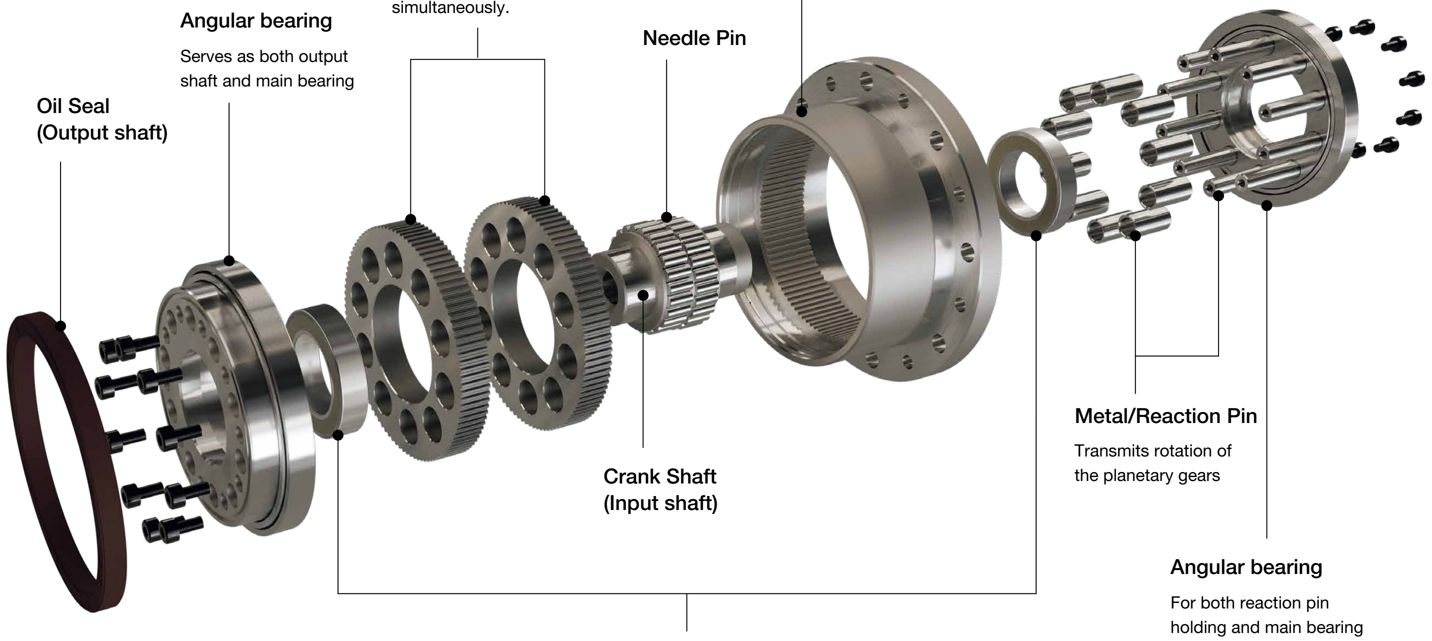
3 Frame Sizes OD: 73mm / 79mm / 93mm 6 stage Reduction 1/19, 1/29, 1/49, 1/79, 1/99, 1/119 * The 1/119 reduction ratio is only available on frame sizes 030 and 050.

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.

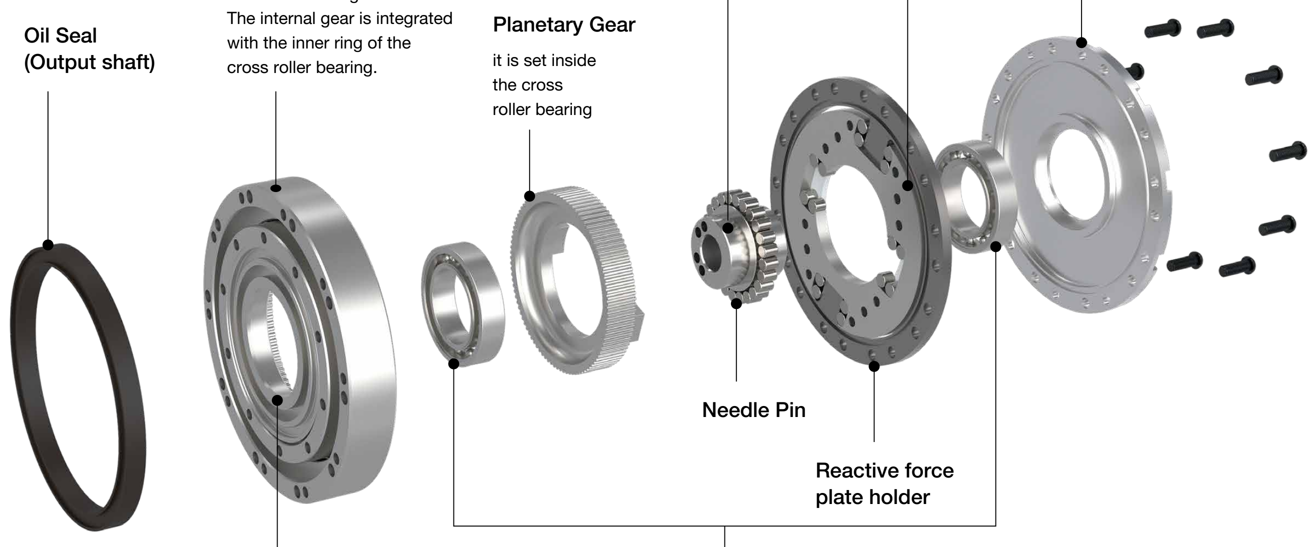
Model configuration table

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

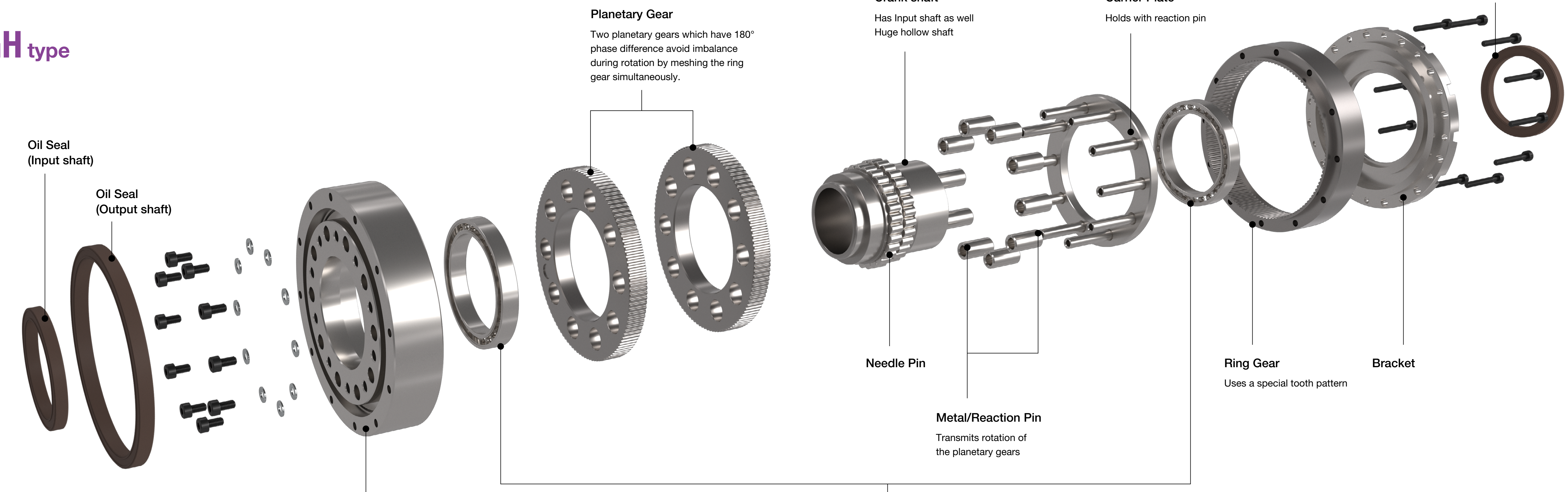


DGF type



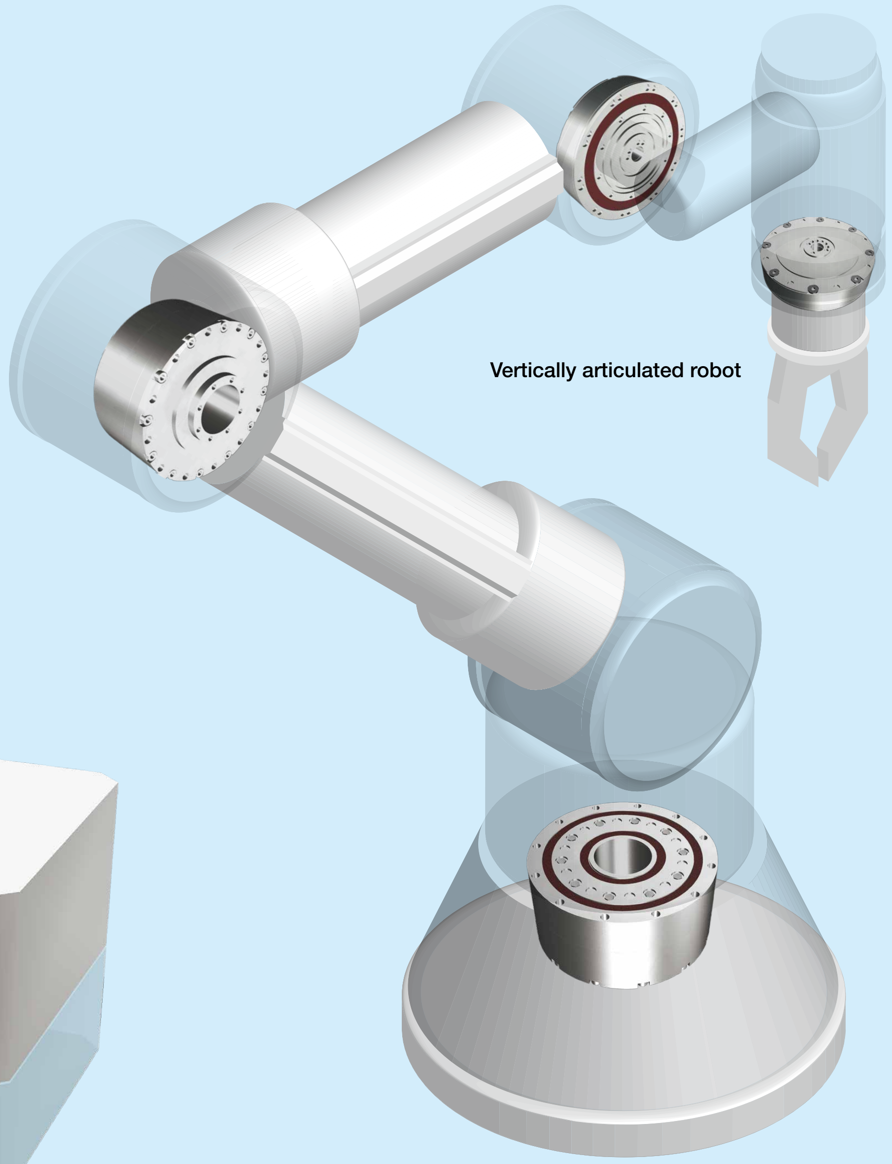
Every element is designed with care.

DGH type

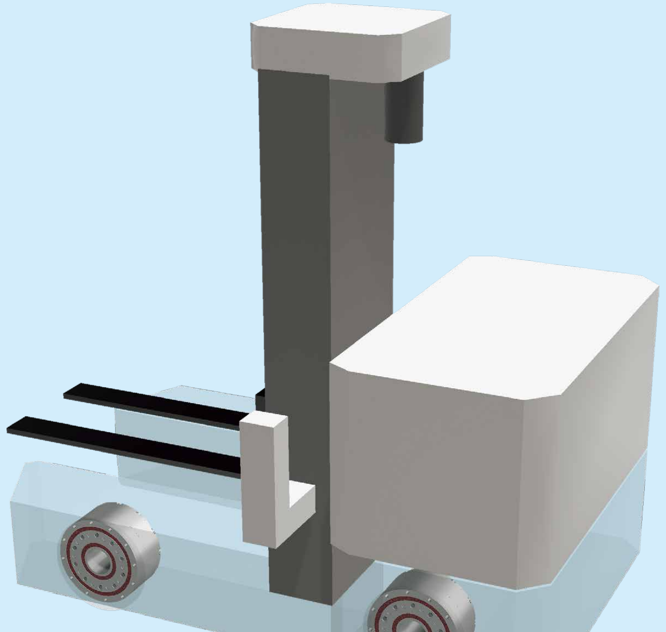


Best fit for wide variety of use

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.



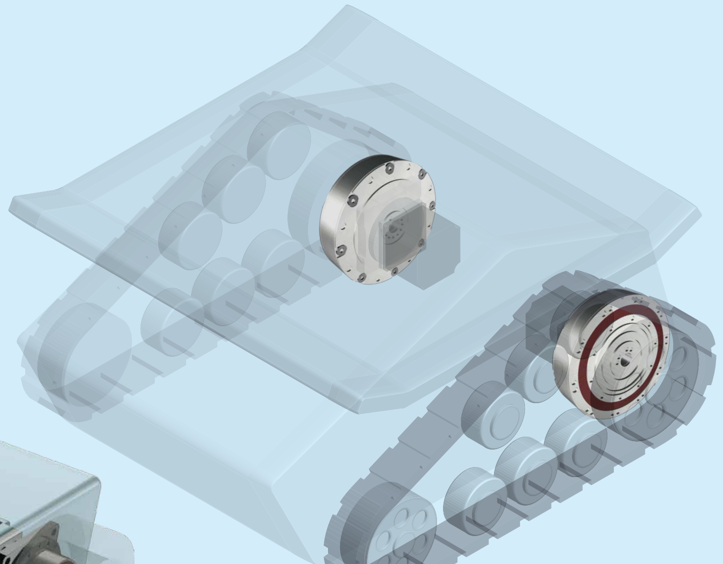
Vertically articulated robot



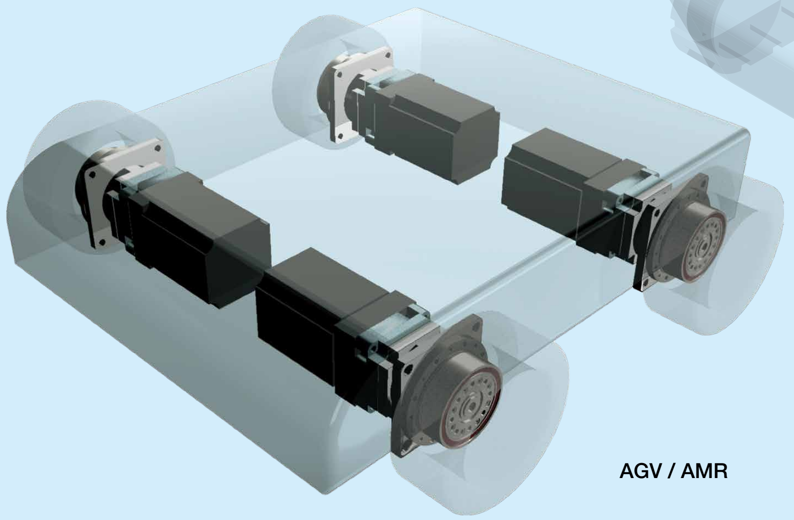
AGF
(Automated Guided Forklift)

Application 02 AGV / AMR

Our reducer can make your autonomous mobiles downsized easily, even more, it can serve as in-wheel reducers on wheel axles under condition where they will get impacted directly; such as low-floor or rough roads.



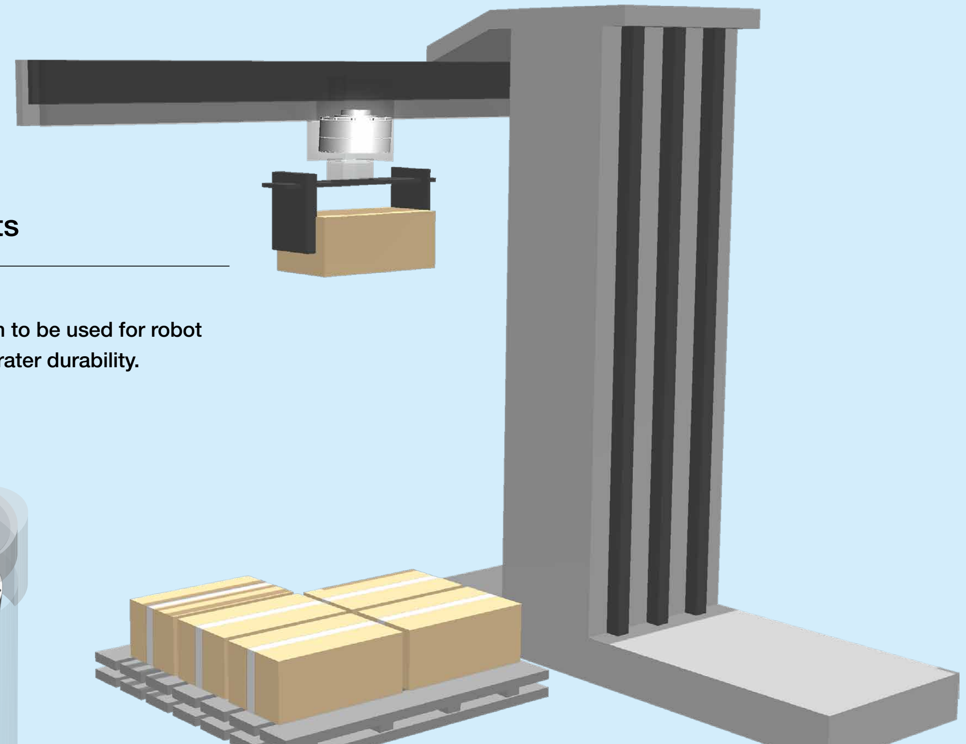
UGV / AMR
(Crawler system)



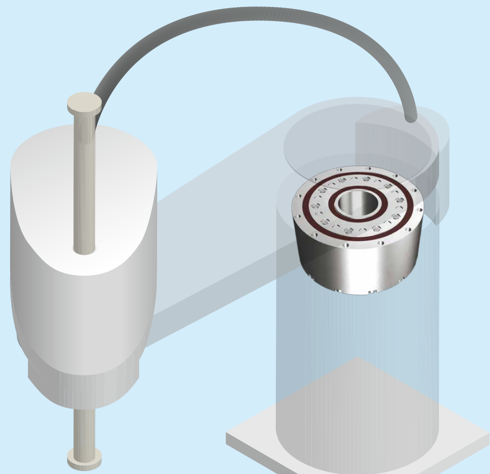
AGV / AMR

Application 01 Industrial robots

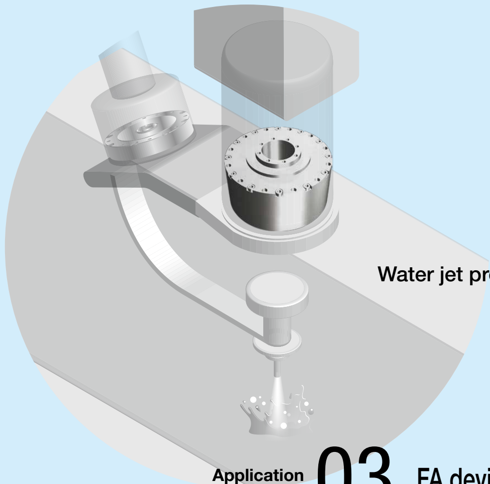
Our reducer is lightweight and compact.
However they are stiff and accurate enough to be used for robot joints. That gives robots faster move and grater durability.



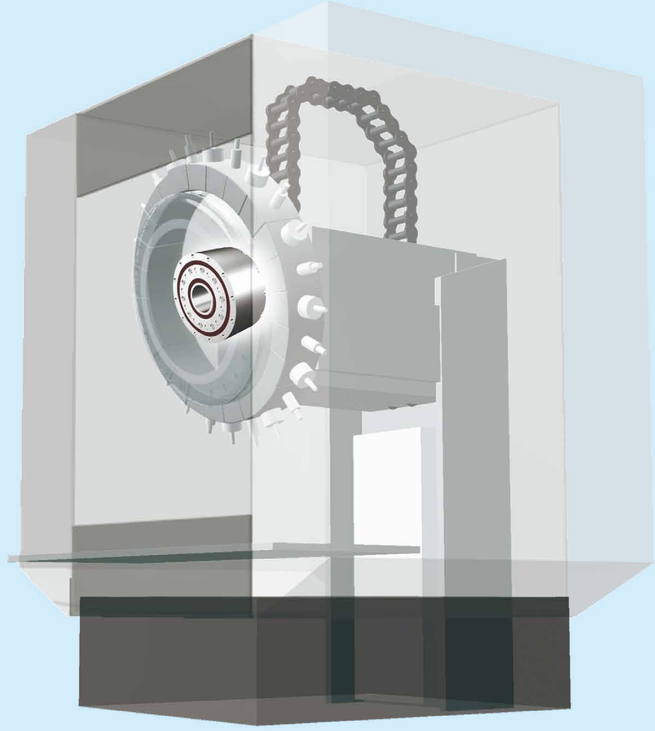
Palletizing robot



SCARA robot



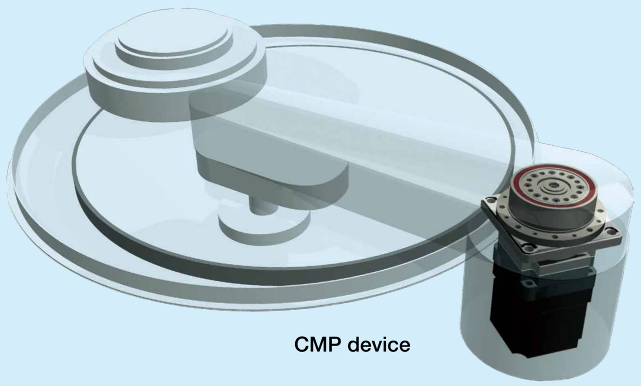
Water jet processing machine



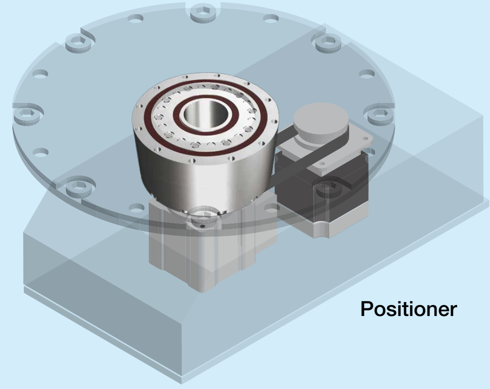
Machine tool
(Magazine reducer)

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

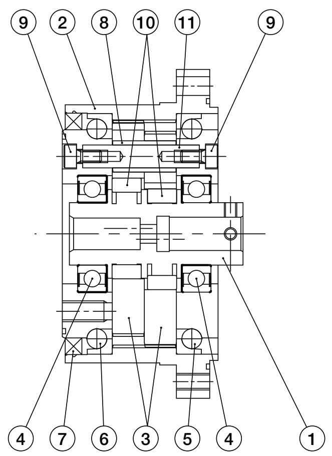
Model and Specs

Model Name	Type	Frame Size *1		Reduction Ratio
DG	S	030	–	029
DG Series	S: Solid	11 N・m → "010" 31 N・m → "030" 52 N・m → "050"		1/19 → "019" 1/79 → "079" 1/29 → "029" 1/99 → "099" 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	$\times10^{-4}$kg・m^2	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.

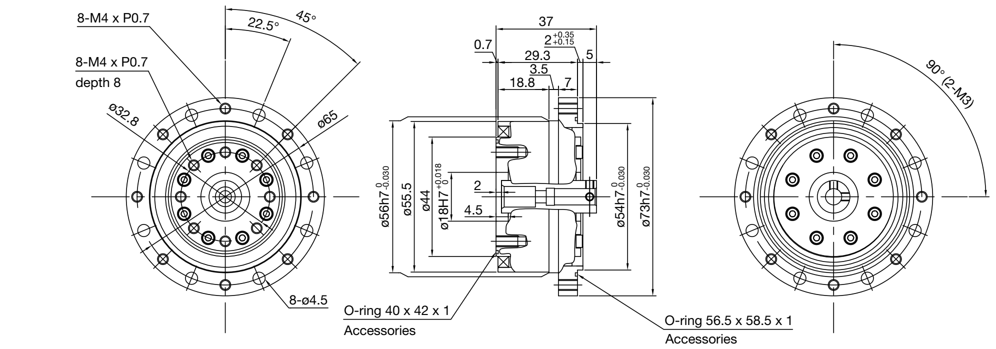
*4 Allowable value of the maximum torque instantaneously applied due to an impact, etc. Torque the shaft can withstand about 10,000 times (does not cause plastic deformation).

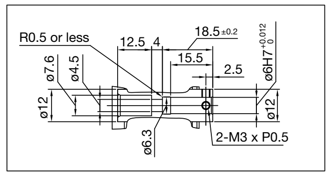
*5 The values are for reference. The lower limit value is about 80% of the displayed value.

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

Drawings

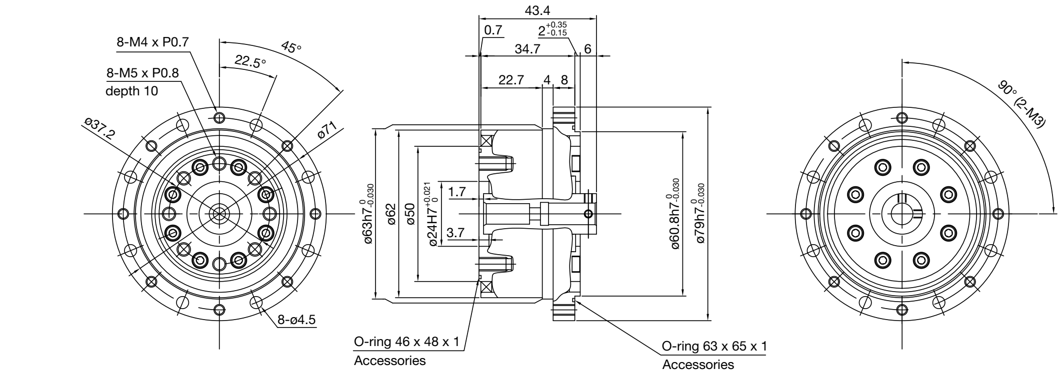
DGS010

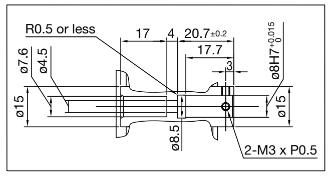




Details of input side

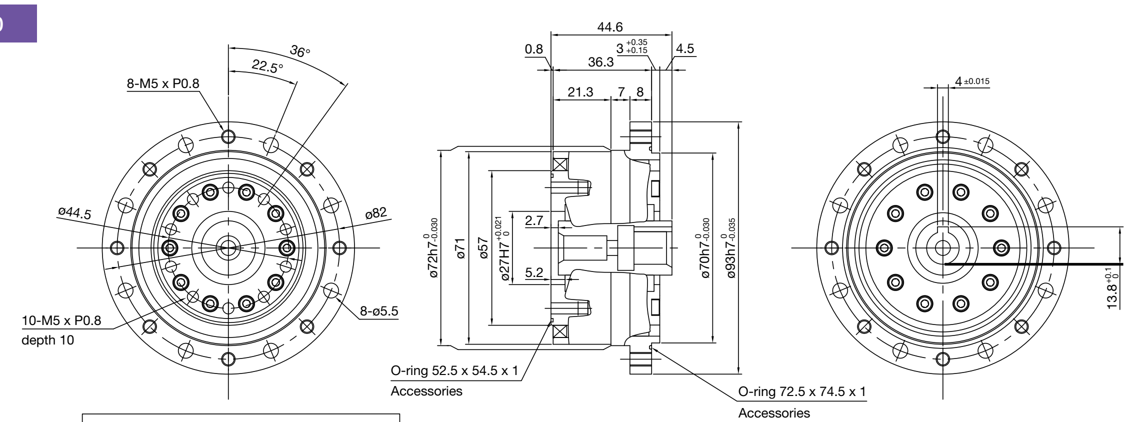
DGS030

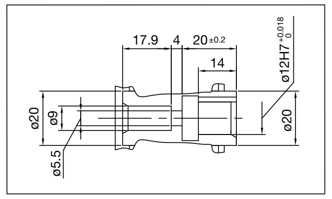




Details of input side

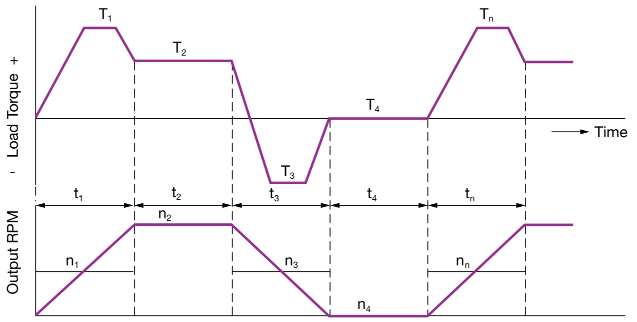
DGS050





Details of input side

■ 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) 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 · 119 = 1904r/min ≤ 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 · 119 = 2380r/min ≤ 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 · m ≤ 90N · m (DGS030-119 start/stop allowable peak torque)
T_3 = 40N · m ≤ 90N · m (DGS030-119 start/stop allowable peak torque)
Temporarily select DGS030-119 from T_S = 100N · m ≤ 147N · 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.

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

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})

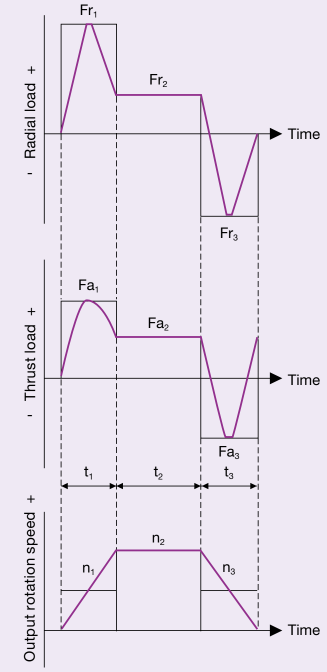
$$Fa_{av} = \sqrt[3]{\frac{n_1t_1(|Fa_1|)^3 + n_2t_2(|Fa_2|)^3 \cdots n_nt_n(|Fa_n|)^3}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

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})

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

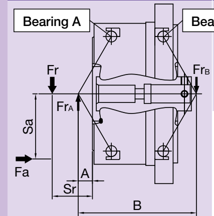
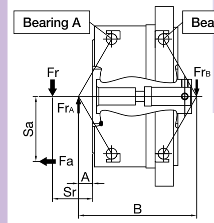
B.Graph



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	$Fa_A = \frac{Fr_B}{2Y_0} + Fa_{av}$	$Fr_A = \frac{Fr_{av}(Sr - A + B) + Fa_{av} \cdot Sa}{B}$	$Pc_A = X \cdot Fr_A + Y \cdot Fa_A$ 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 $Pc_A = Fr_A$
		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

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

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

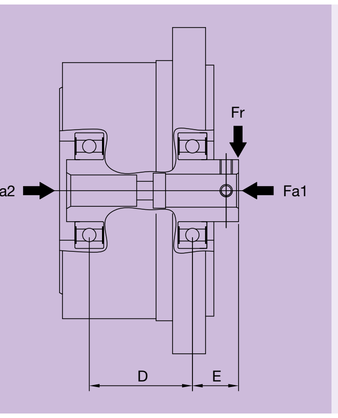
Symbol	Unit	Content
L_{10}	h	Life time
N_{av}	r/min	Average Output RPM
Pc	N	Dynamic Equivalent Radial Load
Fr_{av}	N	Average Radial Load
Fa_{av}	N	Average Thrust Load
Sr,Sa	m	See Fig. A
Fr_A, Fr_B	N	Radial load on bearings A and B obtained from Fr_{av} and Fa_{av}
Fa_A, Fa_B	N	Thrust load on bearings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

Confirmation of load on input shaft

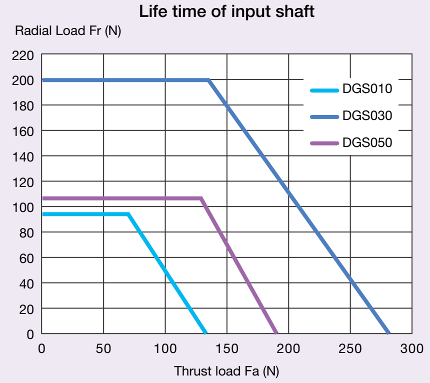
Frame Size	D	E	Allowable thrust load Fa1, Fa2	Allowable radial load Fr
	(m)	(m)	(N)	(N)
DGS010	0.02	0.01	134	95
DGS030	0.025	0.0112	281	199
DGS050	0.0258	0.0101	193	106

* 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.



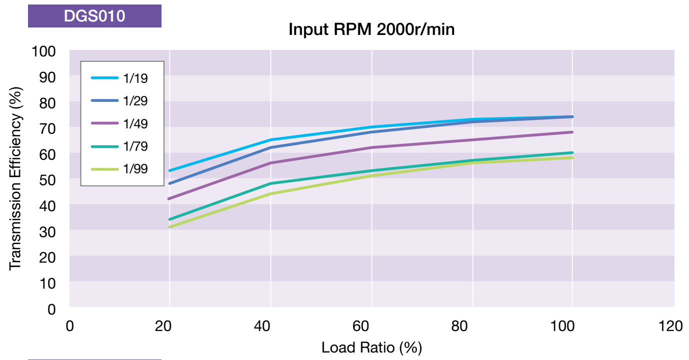
Life time of input shaft

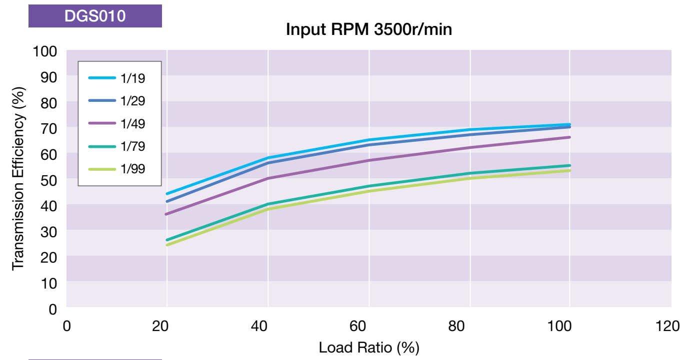


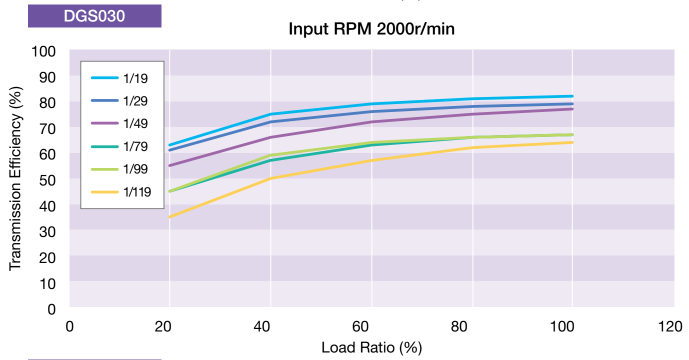
Efficiency Characteristics

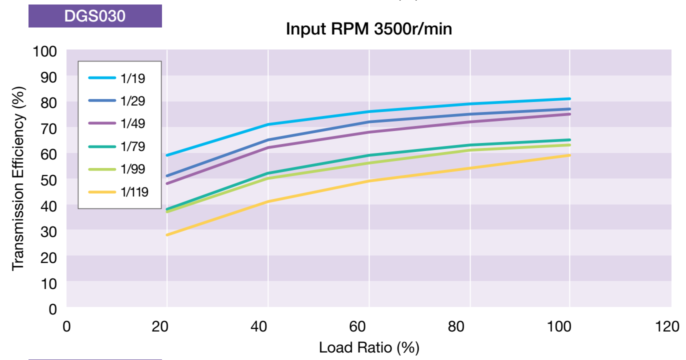
Measurement conditions: Input RPM 2000 r/min, values are measured after two-hours of warm operation

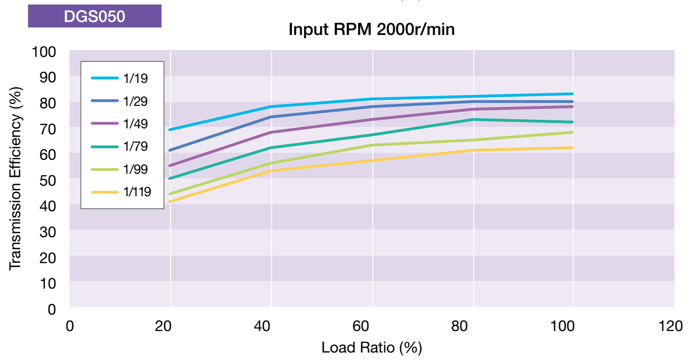
* The values in this graph vary according to usage conditions and can be used for Reference purpose only.

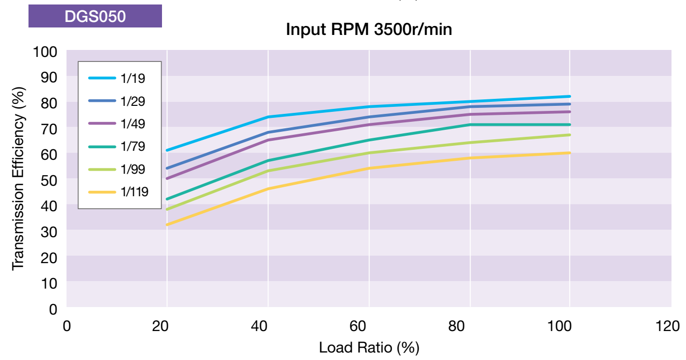












Starting Torque

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)

Frame Size / Reduction Ratio	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)

Frame Size / Reduction Ratio	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)

Frame Size / Reduction Ratio	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

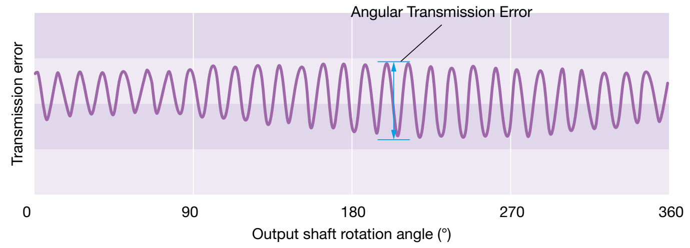
* The values in the table above vary according to usage conditions and are for use as reference only.

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)

Frame Size / Reduction Ratio	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)

Frame Size / Reduction Ratio	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

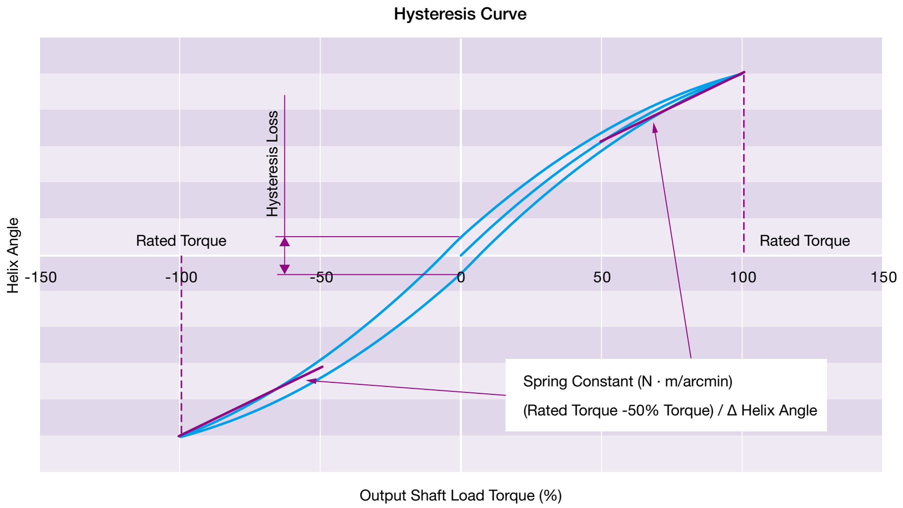
Spring Constant

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

(Unit: N · m / arc min)

Frame Size / Reduction Ratio	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.



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

High Stiffness Reducers

DGH type Large Hollow Shaft type


DGH010


DGH030


DGH040


DGH080

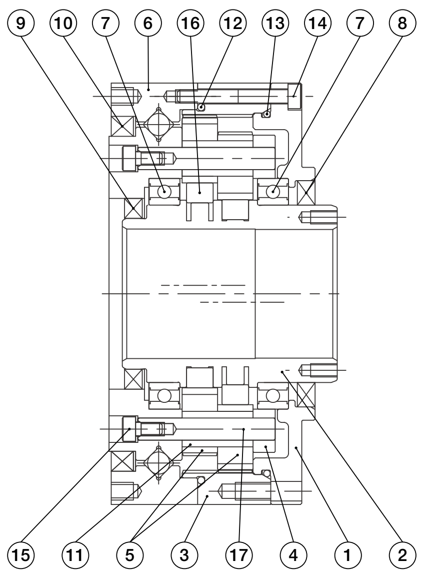

DGH150

Model and Specs

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

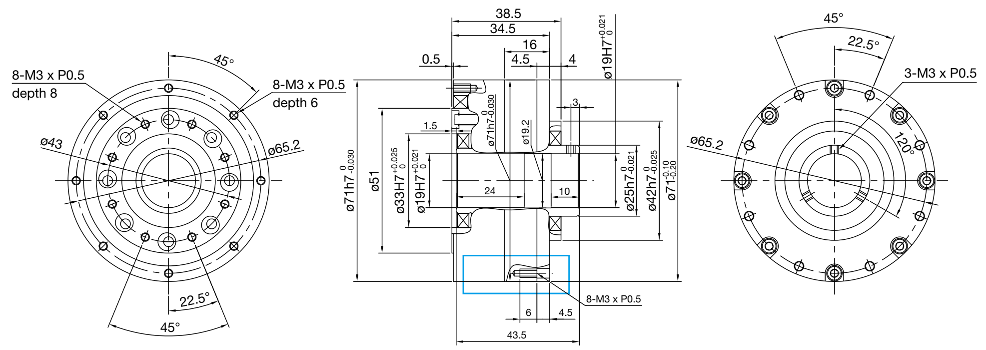
Frame Size	Reduction Ratio	Rated Torque (Input 2000r/min) *1	Start/Stop Allowable Peak Torque *2	Allowable Average Load Torque *3	Allowable Instantaneous Maximum Torque *4	Allowable Max. Input RPM	Allowable Average Input RPM	Rated Speed	Spring Constant *5	Hysteresis Loss	Angular Transmission Error	Moment 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.

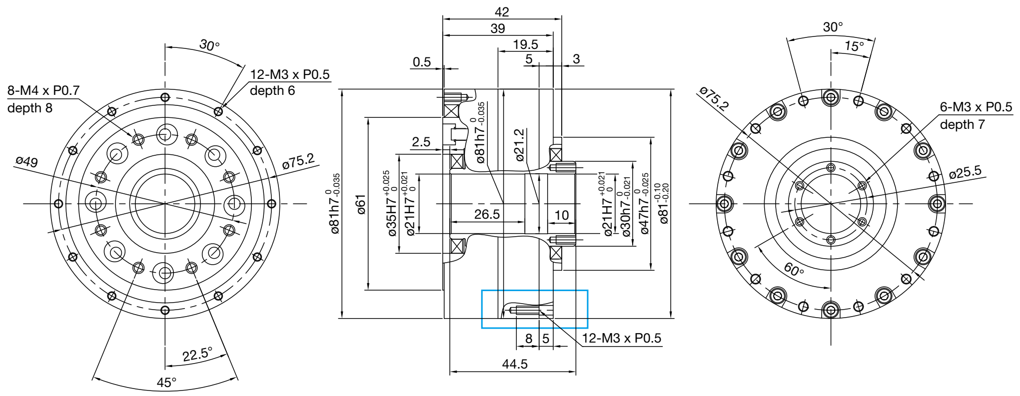
(All performance-related values contained in this catalog are obtained under the designated test conditions by NISSEI CORPORATION.)

Drawings

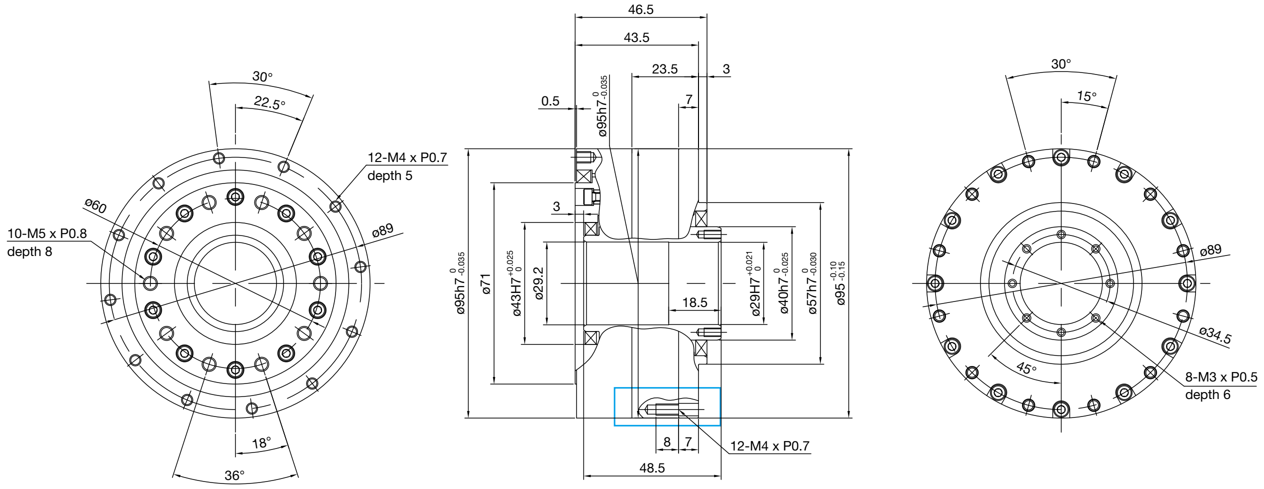
DGH010



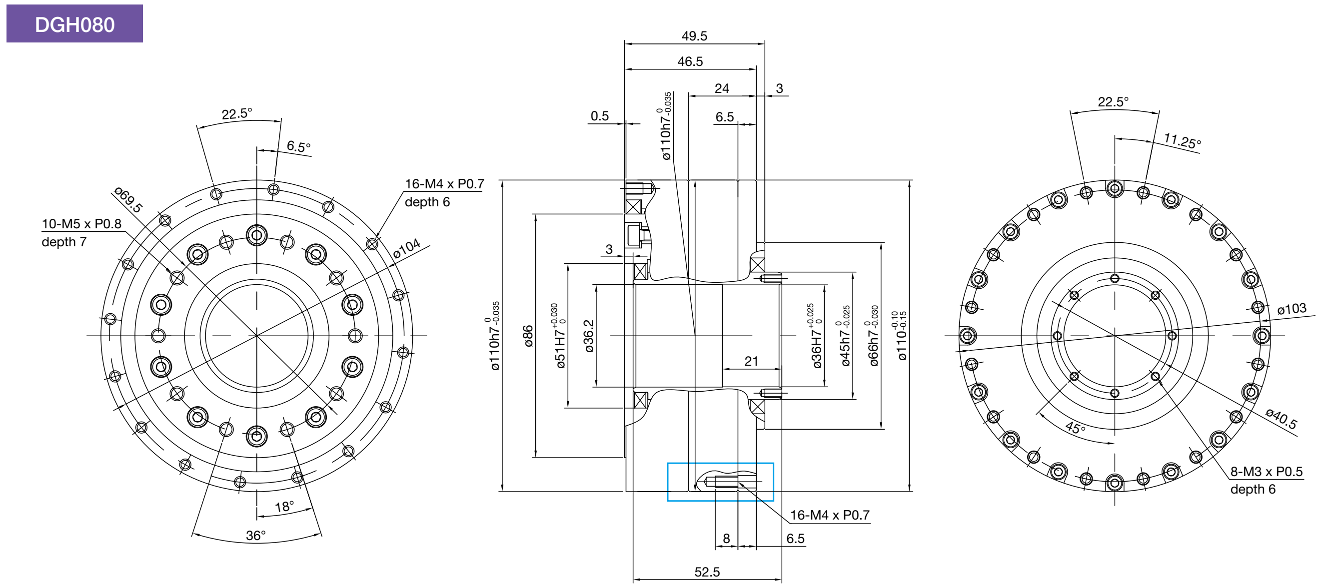
DGH030



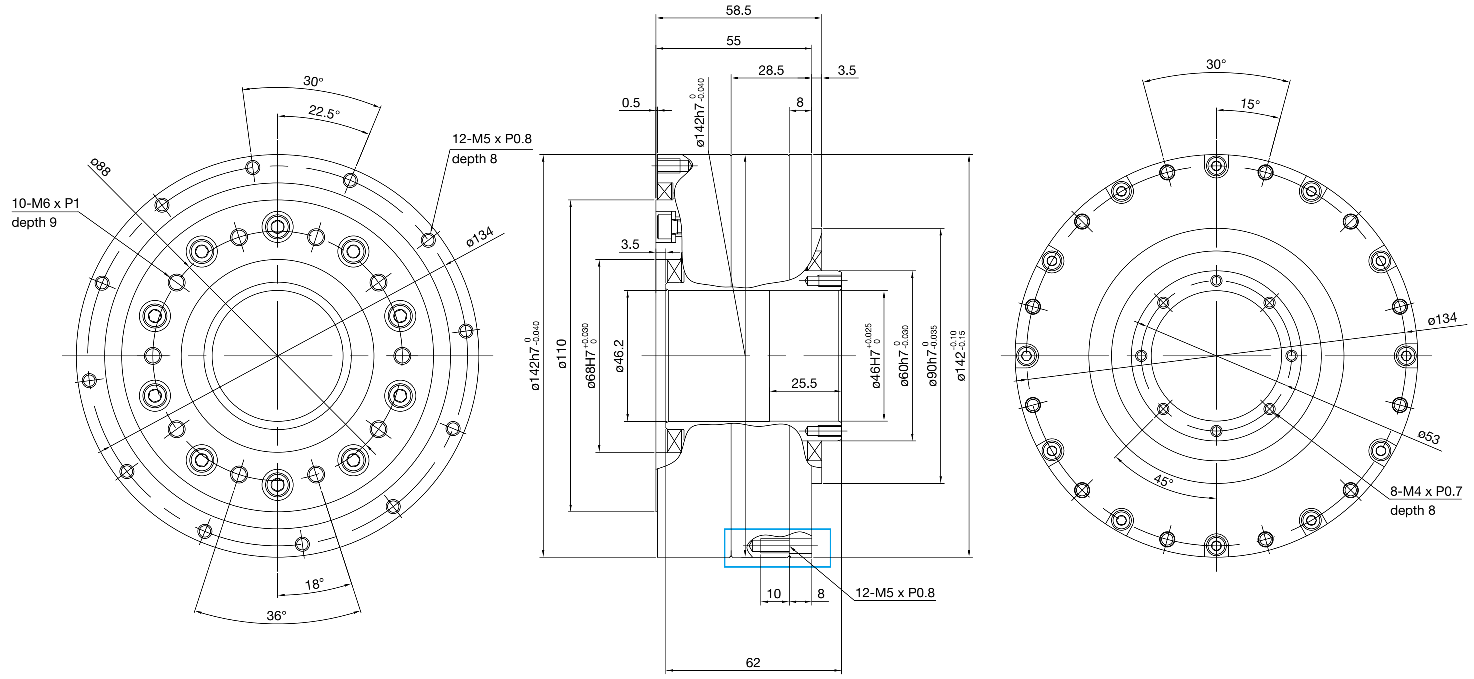
DGH040



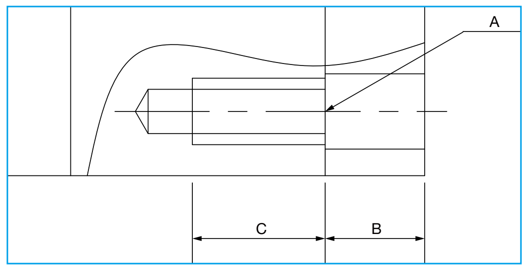
DGH080



DGH150



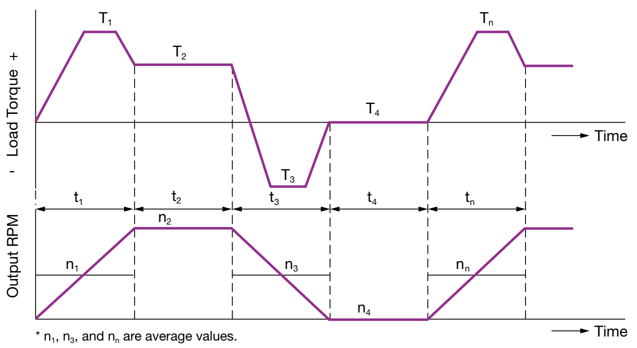
part details



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

DGS
DGH
DGF
Gear Head

■ Operation Pattern



<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 / Selection Process Example

Selection Process and Examples	Selection Process Example
1. Calculation of average load torque on output shaft side in terms of usage $T_{av} = \sqrt[3]{\dfrac{n_1 \cdot t_1 \cdot (T_1)^3 + n_2 \cdot t_2 \cdot (T_2)^3 + \cdots n_n \cdot t_n \cdot (T_n)^3}{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}}$	$T_{av} = \sqrt[3]{\dfrac{21r/min \cdot 0.3s \cdot (150N \cdot m)^3 + 42r/min \cdot 3s \cdot (100N \cdot m)^3 + 21r/min \cdot 0.4s \cdot (70N \cdot m)^3}{21r/min \cdot 0.3s + 42r/min \cdot 3s + 21r/min \cdot 0.4s}}$ $\approx 102N \cdot m$
2-1. Calculation of average output RPM $No_{av} = \dfrac{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}{t_1 + t_2 + \cdots t_n}$	$No_{av} = \dfrac{21r/min \cdot 0.3s + 42r/min \cdot 3s + 21r/min \cdot 0.4s + 0r/min \cdot 0.2s}{0.3s + 3s + 0.4s + 0.2s} \approx 36\,r/min$
2-2. Deciding on reduction ratio $\dfrac{Ni_{max}}{No_{max}} \geq R$	$\dfrac{2500\,r/min}{42r/min} = 59.52 \geq 59 = R$
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 · 59 = 2124r/min ≤ 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 · 59 = 2478r/min ≤ 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 · m ≤ 178N · m (DGH080 start/stop allowable peak torque) T_3 = 70N · m ≤ 178N · m (DGH080 start/stop allowable peak torque) T_S = 250N · m ≤ 332N · m (DGH080 allowable instantaneous maximum torque) Temporarily select DGH080-059 from T_{av} = 102 N · m ≤ 113 N · m (DGH080 allowable average load torque)
4. Calculation of reducer Life time $L_{10} = 10000 \cdot \left(\dfrac{T_r}{T_{av}}\right)^3 \cdot \left(\dfrac{N_r}{Ni_{av}}\right)$ * 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 · m (DGH080 rated torque) N_r = 2000r/min (DGH080 rated RPM) $L_{10} = 10000 \cdot \left(\dfrac{82}{102}\right)^3 \cdot \left(\dfrac{2000}{2124}\right) \approx 4892\ (h) \geq 4000\ (h)$ 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)
$\dfrac{Fa_{av}}{Fr_{av} + 2\,(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa)\,/\,dp} \leq 1.5$	1	0.45
$\dfrac{Fa_{av}}{Fr_{av} + 2\,(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa)\,/\,dp} > 1.5$	0.67	0.67

C. Calculation of life time

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

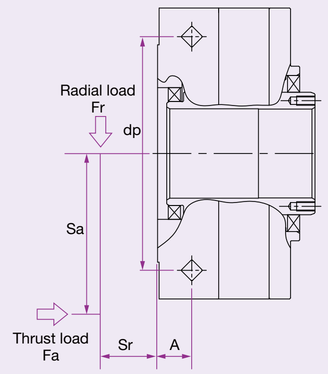
$$Pc = X \cdot \left(Fr_{av} + \frac{2(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa)}{dp}\right) + Y \cdot Fa_{av}$$

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

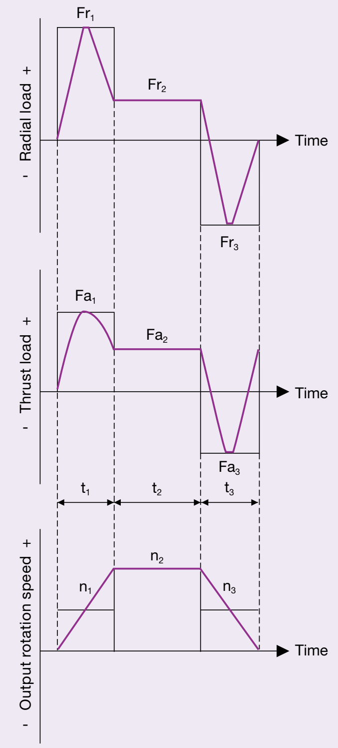
Load Coefficient

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



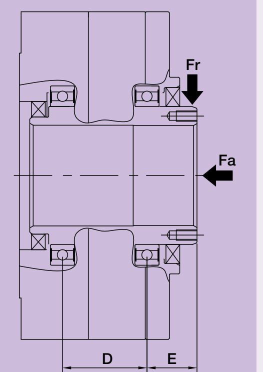
Frame Size	Roller Pitch Diameter (dp) (m)	Roller Position from Output Shaft End (A) (m)	Basic Dynamic Rated Load (C) (N)	Basic Static Rated Load (C_0) (N)	Allowable Moment (Mc) (N · m)
DGH010	0.0556	0.0095	7100	10830	74
DGH030	0.064	0.01	12100	18310	126
DGH040	0.0759	0.0112	17500	25900	220
DGH080	0.0885	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

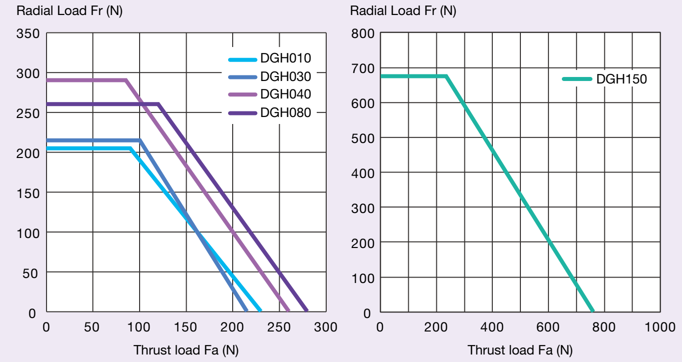
Confirmation of load on input shaft

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



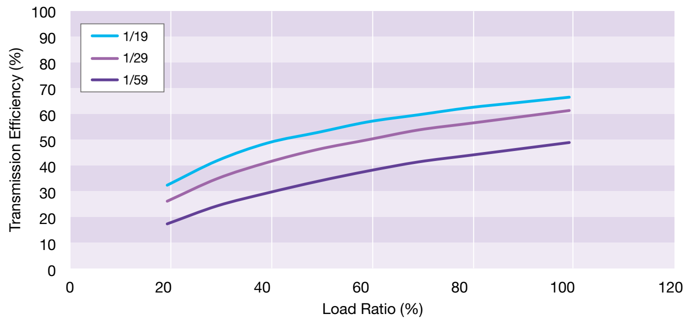
Efficiency Characteristics

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.

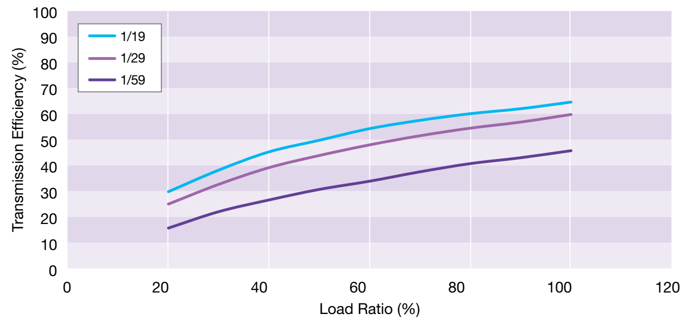
DGH010

Input RPM 2000r/min



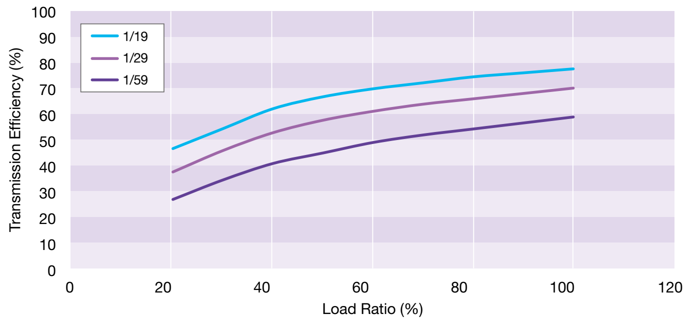
DGH010

Input RPM 3500r/min



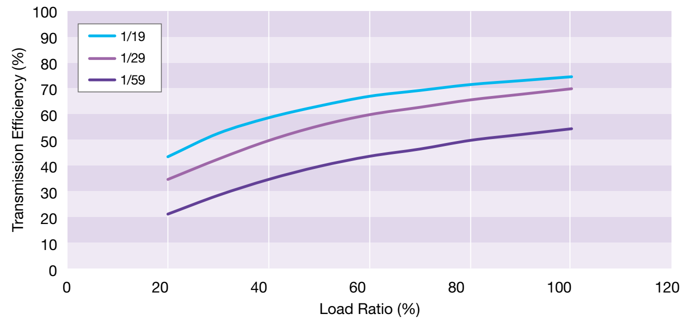
DGH030

Input RPM 2000r/min



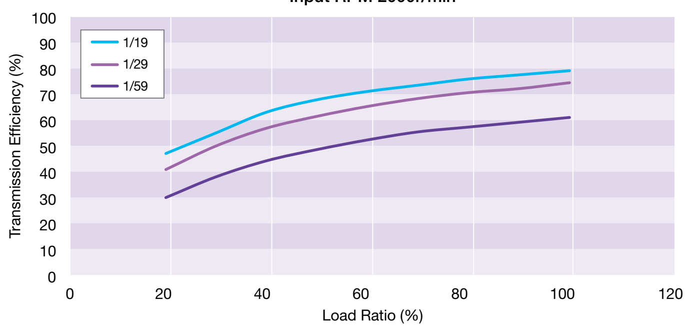
DGH030

Input RPM 3500r/min



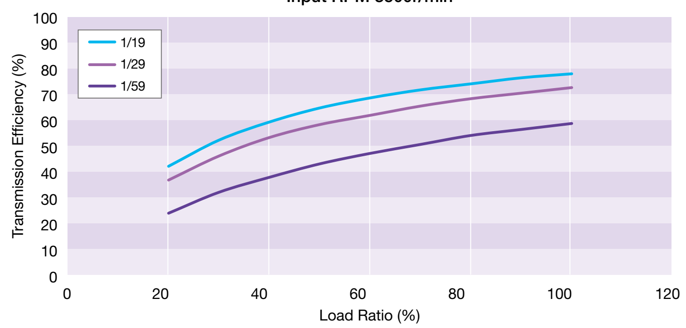
DGH040

Input RPM 2000r/min



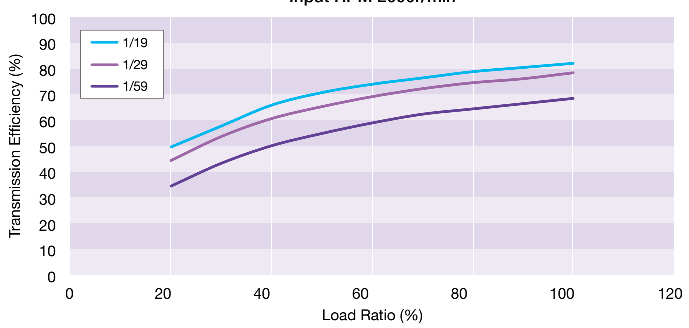
DGH040

Input RPM 3500r/min



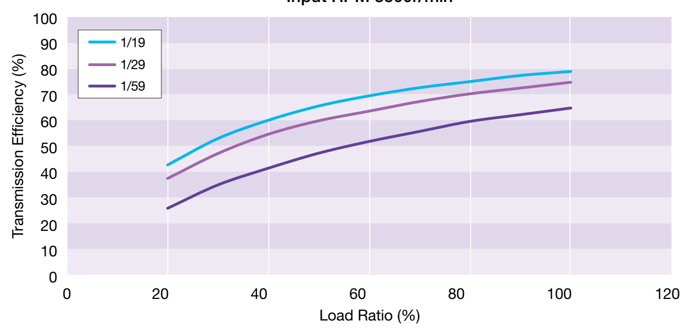
DGH080

Input RPM 2000r/min



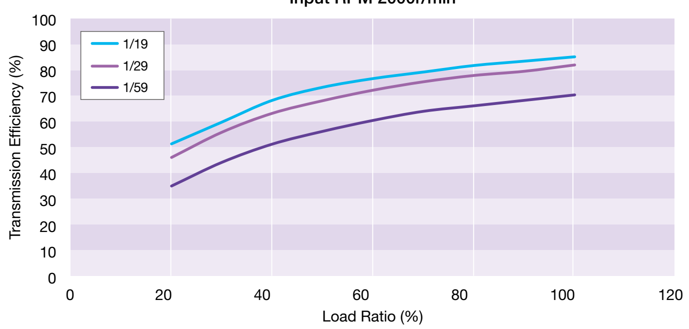
DGH080

Input RPM 3500r/min



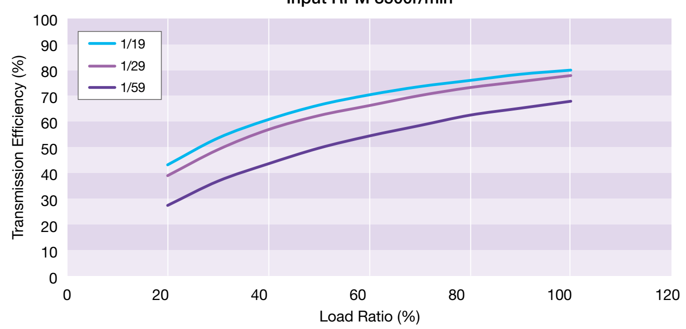
DGH150

Input RPM 2000r/min



DGH150

Input RPM 3500r/min



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

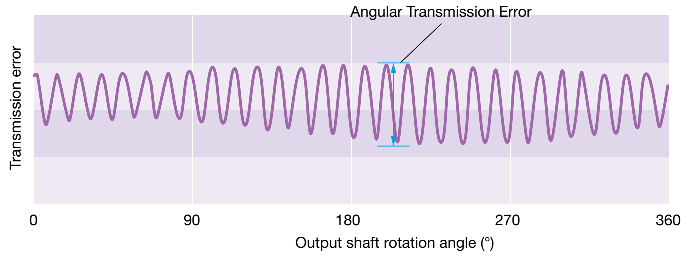
*The values in the table above vary according to usage conditions and are for use as reference only.

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

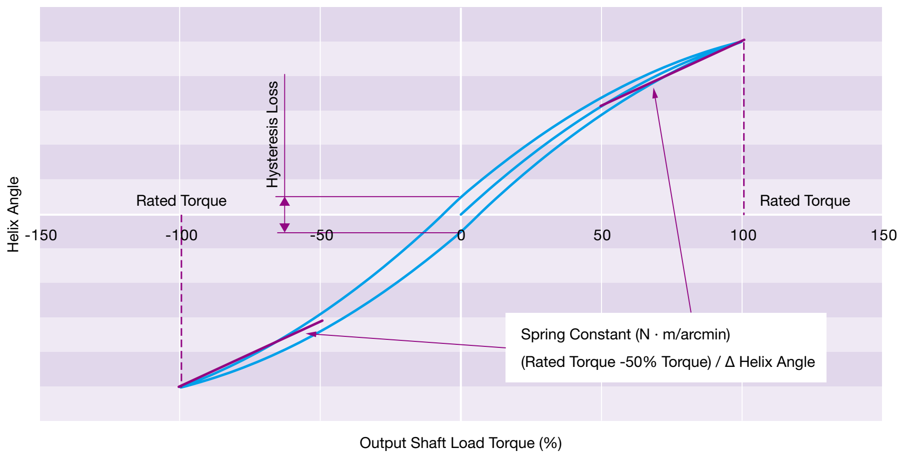
This is the resistance to torsion (torsional rigidity) against rotational force.

(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

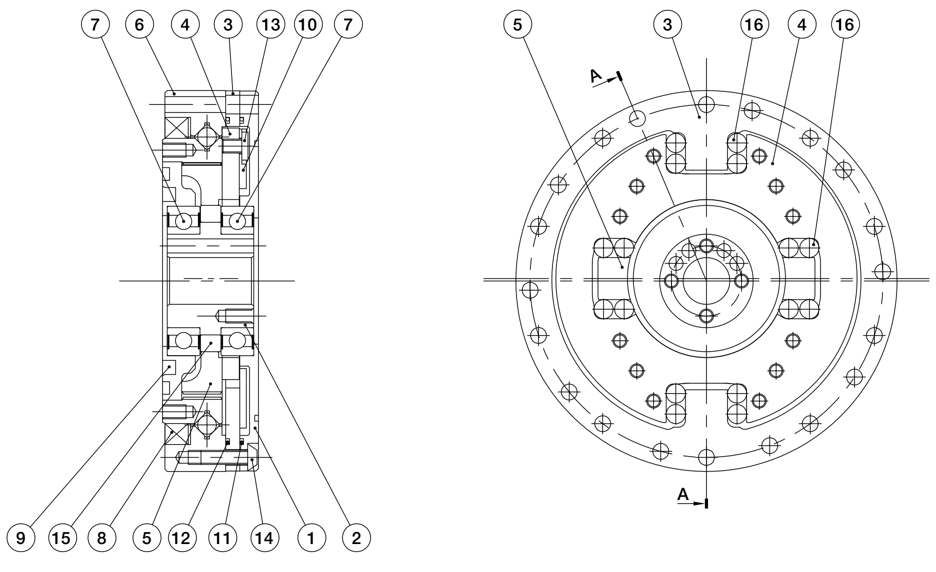
DGF005 DGF020 DGF030

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" 28N · m → "030"		1/50 → "050" 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.

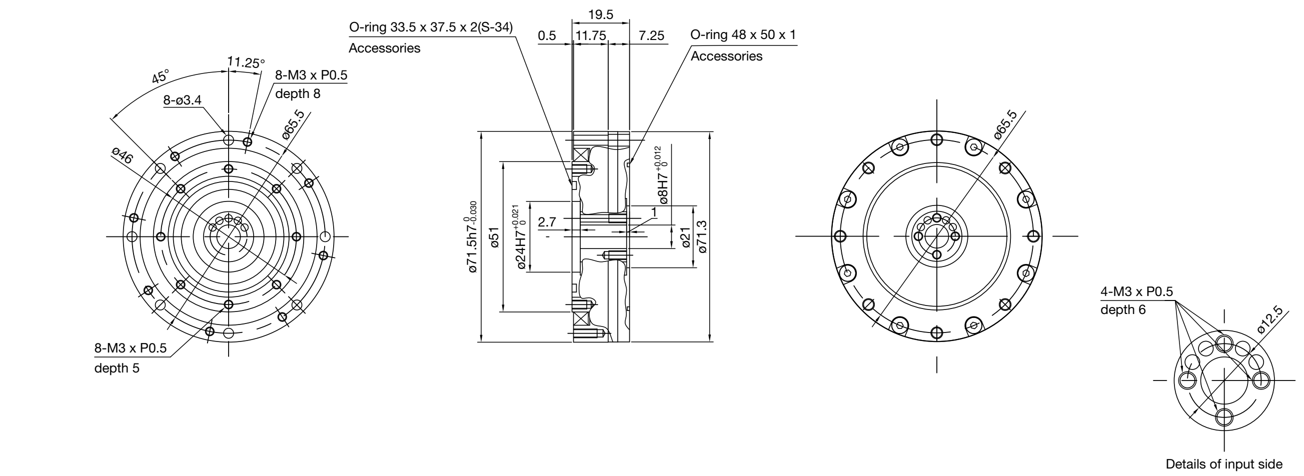
Performance Table

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

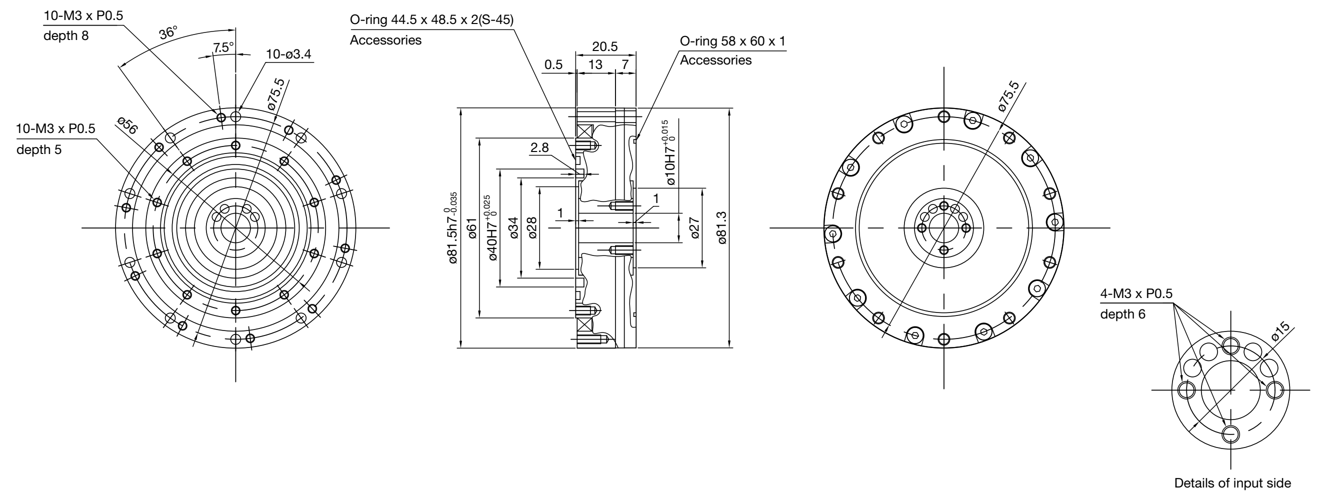
*1 Average load torque at which the basic rated life L_{10} becomes 10,000 hours when the average input speed is 2,000 r/min.
*2 Allowable value of the acceleration/deceleration torque to be applied to the output shaft by the moment of inertia on start or stop.
*3 Allowable average load torque during 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

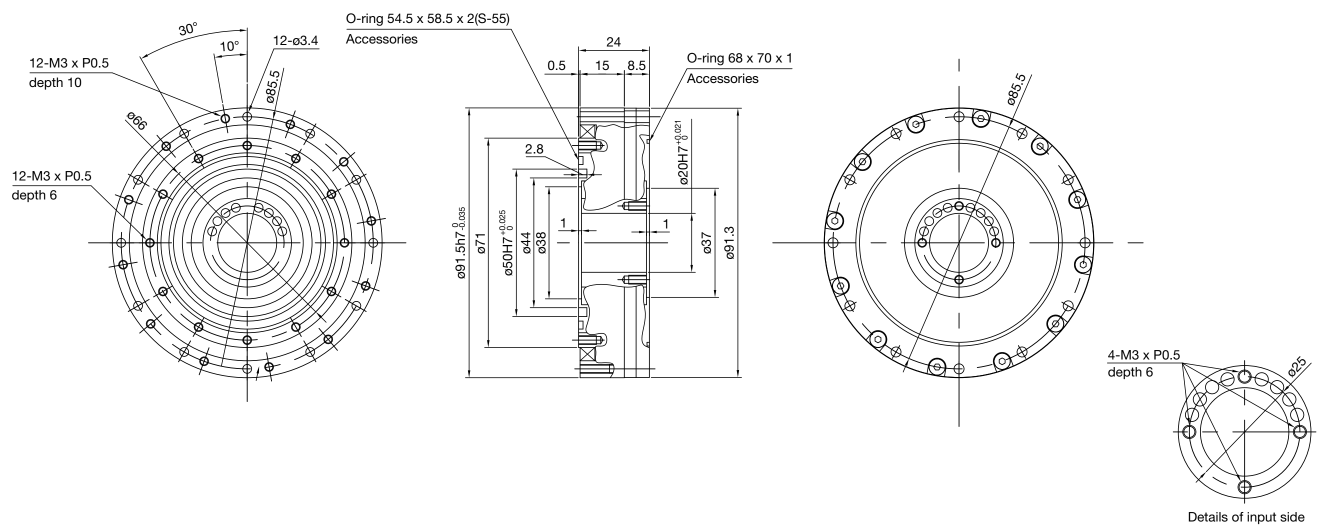
DGF005



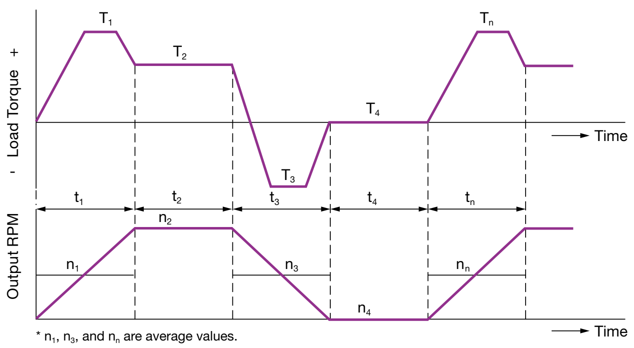
DGF020



DGF030



■ **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 | Selection Process Example

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

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

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

$$\approx 18\text{N} \cdot \text{m}$$

2-1. Calculation of average output RPM

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

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

2-2. Deciding on reduction ratio

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

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

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 · 100 = 1900r/min ≤ 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 · 100 = 2300r/min ≤ 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 · m ≤ 37N · m (DGF020 start/stop allowable peak torque)
T_3 = 25N · m ≤ 37N · m (DGF020 start/stop allowable peak torque)
T_S = 60N · m ≤ 71N · m (DGF020 allowable instantaneous maximum torque)
Temporarily select DGF020-100 from T_{av} = 18 N · m ≤ 27 N · 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 · m (DGF020 rated torque)
N_r = 2000r/min (DGF020 rated RPM)

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

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

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

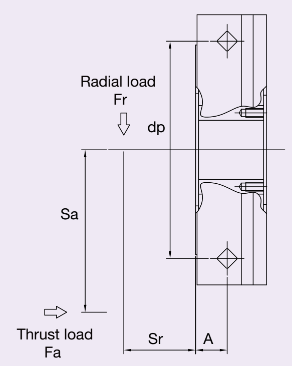
$$Pc = X \cdot \left(Fr_{av} + \frac{2(Fr_{av}(Sr + A) + Fa_{av} \cdot Sa)}{dp}\right) + Y \cdot Fa_{av}$$

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

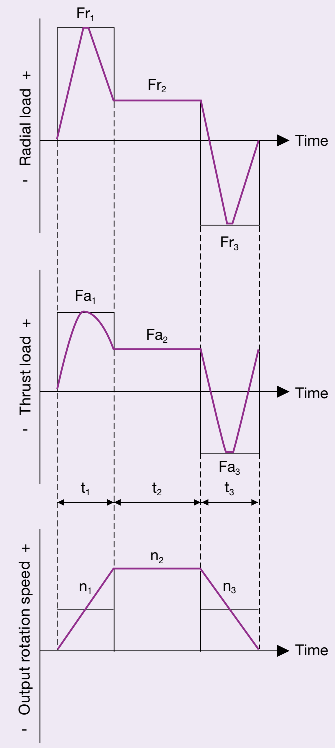
Load Coefficient

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

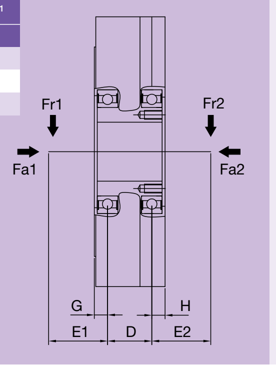
Symbol	Unit	Content
L_{10}	h	Life time
N_{av}	r/min	Average Output RPM
Pc	N	Dynamic Equivalent Radial Load
Fr_{av}	N	Average Radial Load
Fa_{av}	N	Average Thrust Load
Sr,Sa	m	See Fig. A

Confirmation of load on input shaft

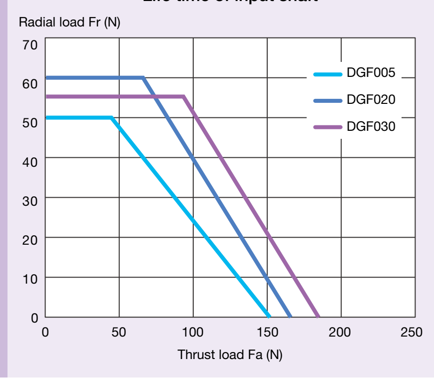
Frame Size	D (m)	E1 (m)	E2 (m)	G (m)	H (m)	Allowable thrust load Fa1, Fa2 (N)	Allowable radial load Fr1, Fr2 *1 (N)
DGF005	0.0107	0.025	0.025	0.0053	0.0035	150	50
DGF020	0.0115	0.025	0.025	0.0045	0.0045	165	60
DGF030	0.015	0.025	0.025	0.0045	0.0045	184	55

*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



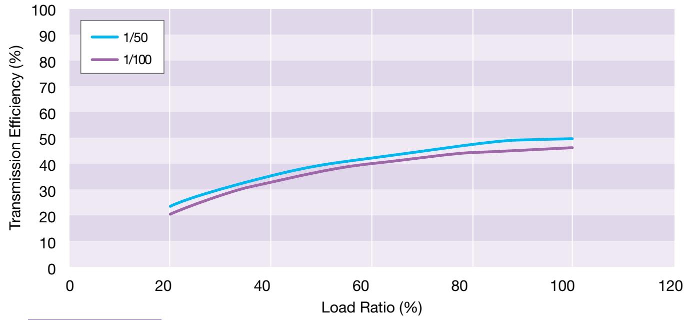
Efficiency Characteristics

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.

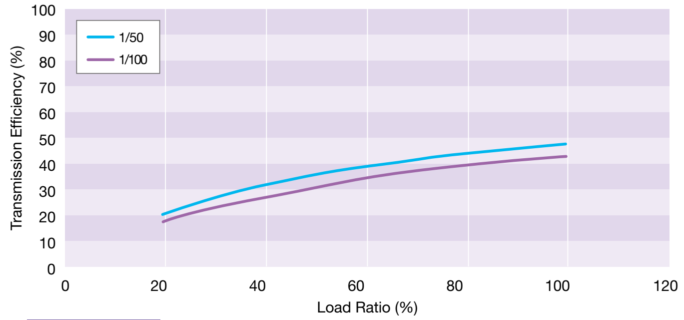
DGF005

Input RPM 2000r/min



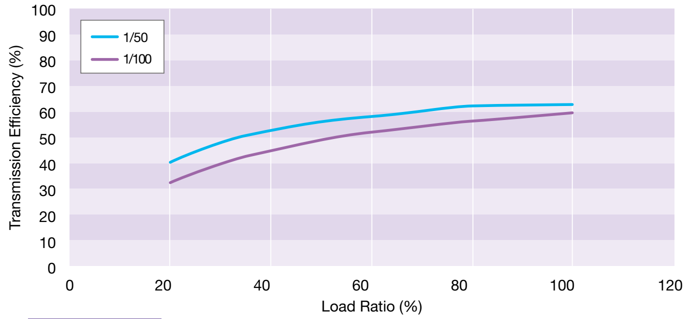
DGF005

Input RPM 3500r/min



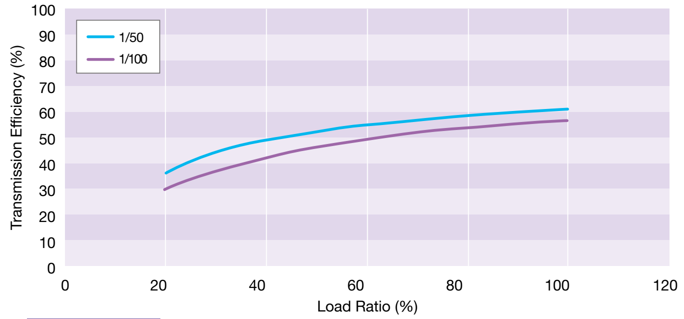
DGF020

Input RPM 2000r/min



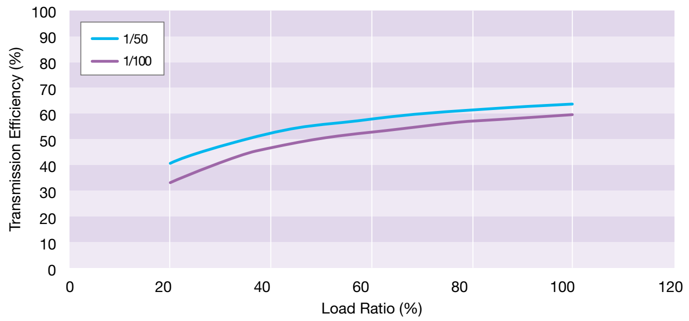
DGF020

Input RPM 3500r/min



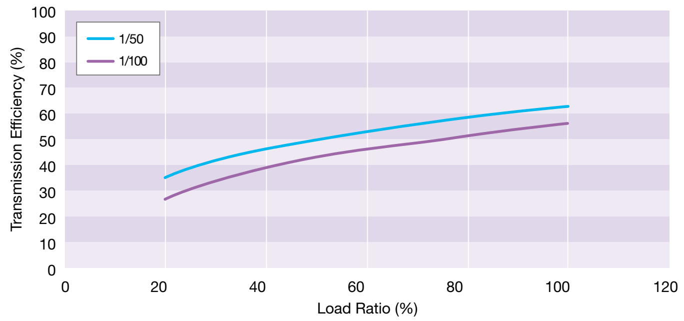
DGF030

Input RPM 2000r/min



DGF030

Input RPM 3500r/min



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)

Frame Size / Reduction Ratio	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)

Frame Size / Reduction Ratio	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)

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

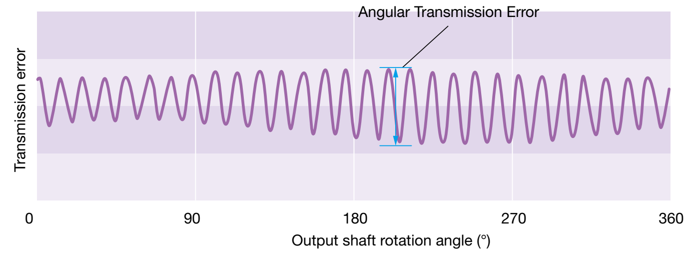
* The values in the table above vary according to usage conditions and are for use as reference only.

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)

Frame Size / Reduction Ratio	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)

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

Spring Constant

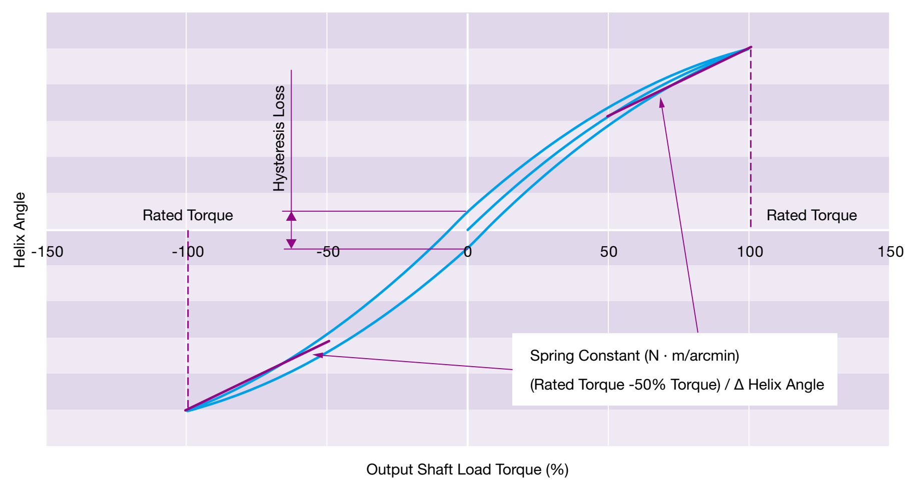
This is the resistance to torsion (torsional rigidity) against rotational force.

(Unit: N · m / arc min)

Frame Size / Reduction Ratio	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.

Hysteresis Curve



(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. A location not directly exposed to rain. A location not directly exposed to sunlight. 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)	Tightening Torque (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 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 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. - 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>
= 24cm^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]

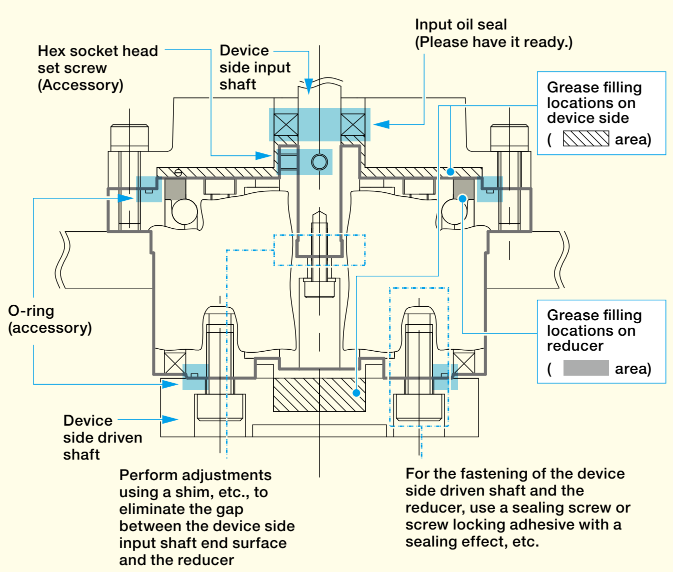
- The reducer is filled with grease when it is shipped from our factory.
- The input shaft oil seal and O-ring have been installed, so the product can be used as it is.

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

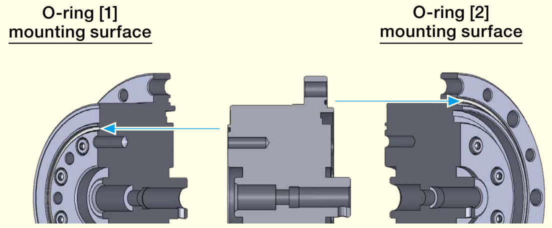
Installation example

<Figure 1>



O-ring mount position

<Figure 2>



Type Codes	O-ring type: O-ring [1]	O-ring type: 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

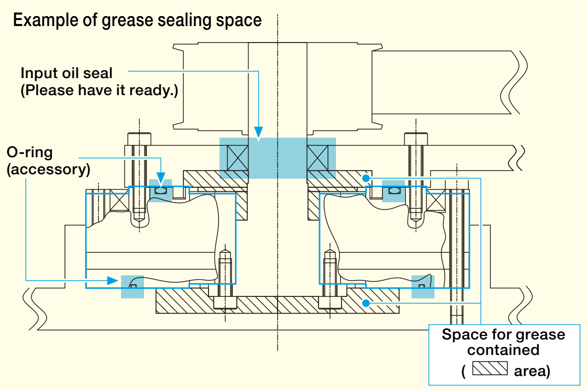
Reducer and device fastening

- 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

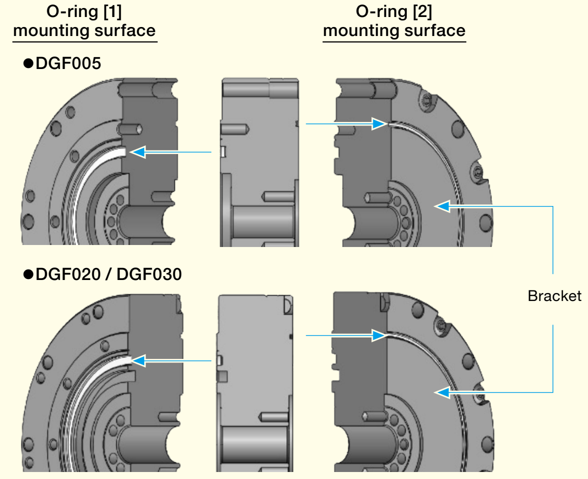
Installation example

<Figure 3>



O-ring mount position

<Figure 4>

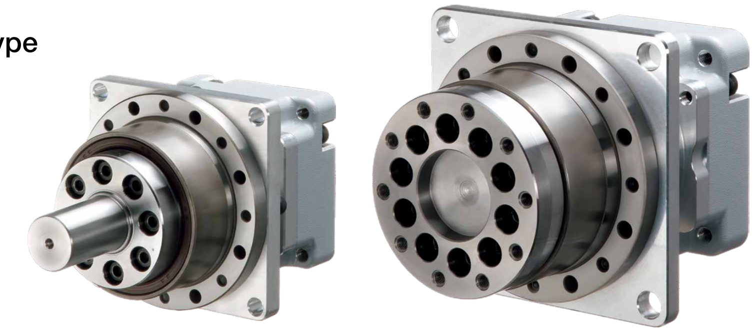


Type Codes	O-ring type: O-ring [1]	O-ring type: O-ring [2]
DGF005-***	33.5×37.5×2(S-34)	48×50×1
DGF020-***	44.5×48.5×2(S-45)	58×60×1
DGF030-***	54.5×58.5×2(S-55)	68×70×1

High Stiffness Reducers

Gear Head 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" 31 N · m → "030" 52 N · m → "050"	F: Flange shaft J: Straight shaft (No key, no shaft end tapping)		1/19 → "019" 1/29 → "029" 1/49 → "049" 1/79 → "079" 1/99 → "099" 1/119 → "119" *2	N: Standard Specification	HS1, KS2 etc.	N: Standard Specification	Blank: Standard Specification 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 KS1 KS2 KS3
	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	KS1 KS2 KS3 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 MS2 MS3 MS4
	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 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	KS1	KS2	KS3	LS3	MS1	MS2	MS3	MS4
010	1/19	0.136	0.136	0.135	0.131	0.135	–	–	–	–	–
	1/29	0.135	0.135	0.133	0.129	0.133	–	–	–	–	–
	1/49	0.134	0.134	0.132	0.129	0.132	–	–	–	–	–
	1/79	0.133	0.133	0.132	0.128	0.132	–	–	–	–	–
	1/99	0.133	0.133	0.132	0.128	0.132	–	–	–	–	–
030	1/19	–	–	0.150	0.146	0.150	0.146	–	–	–	–
	1/29	–	–	0.147	0.143	0.147	0.143	–	–	–	–
	1/49	–	–	0.145	0.142	0.145	0.142	–	–	–	–
	1/79	–	–	0.145	0.141	0.145	0.141	–	–	–	–
	1/99	–	–	0.145	0.141	0.145	0.141	–	–	–	–
	1/119	–	–	0.145	0.141	0.145	0.141	–	–	–	–
050	1/19	–	–	–	–	–	–	0.695	0.684	0.684	0.695
	1/29	–	–	–	–	–	–	0.690	0.678	0.678	0.690
	1/49	–	–	–	–	–	–	0.687	0.676	0.676	0.687
	1/79	–	–	–	0.186	–	0.186	–	–	–	–
	1/99	–	–	–	0.186	–	0.186	–	–	–	–
	1/119	–	–	–	0.186	–	0.186	–	–	–	–

Straight Shaft

(Unit: $\times 10^{-4}$kg · m^2)

Frame Size	Reduction Ratio	Motor Mounting Flange Type									
		HS1	HS3	KS1	KS2	KS3	LS3	MS1	MS2	MS3	MS4
010	1/19	0.135	0.135	0.134	0.130	0.134	–	–	–	–	–
	1/29	0.134	0.134	0.133	0.129	0.133	–	–	–	–	–
	1/49	0.134	0.134	0.132	0.128	0.132	–	–	–	–	–
	1/79	0.133	0.133	0.132	0.128	0.132	–	–	–	–	–
	1/99	0.133	0.133	0.132	0.128	0.132	–	–	–	–	–
030	1/19	–	–	0.148	0.144	0.148	0.144	–	–	–	–
	1/29	–	–	0.146	0.142	0.146	0.142	–	–	–	–
	1/49	–	–	0.145	0.141	0.145	0.141	–	–	–	–
	1/79	–	–	0.145	0.141	0.145	0.141	–	–	–	–
	1/99	–	–	0.145	0.141	0.145	0.141	–	–	–	–
	1/119	–	–	0.145	0.141	0.145	0.141	–	–	–	–
050	1/19	–	–	–	–	–	–	0.692	0.681	0.681	0.692
	1/29	–	–	–	–	–	–	0.688	0.677	0.677	0.688
	1/49	–	–	–	–	–	–	0.686	0.675	0.675	0.686
	1/79	–	–	–	0.186	–	0.186	–	–	–	–
	1/99	–	–	–	0.186	–	0.186	–	–	–	–
	1/119	–	–	–	0.186	–	0.186	–	–	–	–

Motor Matching / Motor Power Design List

[Notes]

- The tables show below representative examples as of October 2024. 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 page 42.
- 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	ABB	BSM	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
	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 (ALPHA5 Series)	3000	HS1
		GYS (ALPHA7 Series)	3000	HS1
	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	SGMAV (Σ-V Series)	3000	HS1
		SGMJV (Σ-V Series)	3000	HS1
		SGM7J (Σ-7 Series)	3000	HS1
		SGM7A (Σ-7 Series)	3000	HS1
		SGMXJ (Σ-X Series)	3000	HS1
		SGMXA (Σ-X Series)	3000	HS1
	Allen Bradley/Rockwell Automation	TLP-A046-010	3000	HS1

Motor Power (W)	Manufacturer	Type	Rated Speed (r/min)	Flange Type
200	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
	Tamagawa Seiki Co.,Ltd.	TS4607,TSM3202,TSM4202	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 (ALPHA5 Series)	3000	KS2
		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	SGMAV (Σ-V Series)	3000	KS2
		SGMJV (Σ-V Series)	3000	KS2
		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-A070-020	3000	KS2
375	Mitsubishi Electric Corporation	HK-KT_4_W (□80) (J5 Series) (200 V amplifier)	1500	MS2

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
	Tamagawa Seiki Co.,Ltd.	TS4609,TSM3204,TSM4204	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
	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 (ALPHA5 Series)	3000	KS2
		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	SGMAV (Σ-V Series)	3000	KS2
		SGMJV (Σ-V Series)	3000	KS2
		SGM7J (Σ-7 Series)	3000	KS2
		SGM7A (Σ-7 Series)	3000	KS2
	Allen Bradley/Rockwell Automation	TLP-A070-040	3000	KS2
		TLP-B070-040	3000	KS2
500	FANUC Corporation	βiS 1/6000-B	6000	KS2
		βiS 1/6000HV-B	6000	KS2
550	FANUC Corporation	βiS 1.5/6000-B	6000	KS2
		βiS 1.5/6000HV-B	6000	KS2

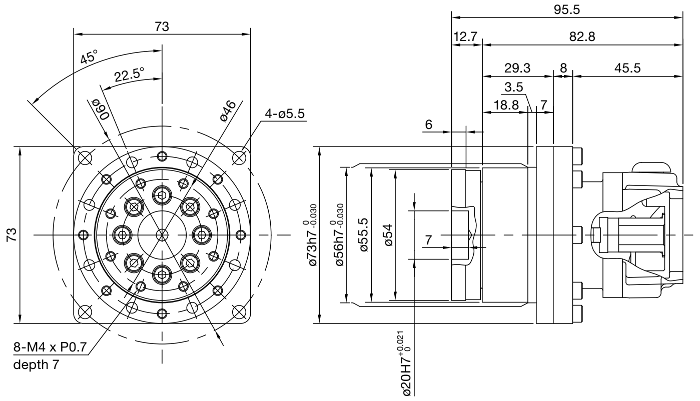
Motor Power (W)	Manufacturer	Type	Rated Speed (r/min)	Flange Type
600	CKD Nikki Denso Co., Ltd.	NA80 Series	3000	MS2
	Shibaura Machine Co., Ltd.	VLBSV-ZA(3000min-1)	3000	MS2
	Tamagawa Seiki Co.,Ltd.	TS4613,TSM3303,TSM4303	3000	MS2
750	OMRON Corporation	G Series R88M-G (Cylinder Type 3000 r/min)	3000	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
	CKD Nikki Denso Co., Ltd.	NA80 Series	3000	MS2
	Tamagawa Seiki Co.,Ltd.	TS4614,TSM3304,TSM4304	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
	Panasonic Corporation	MSMF (MINAS A6 Series □80 mm or less)	3000	MS3
		MHMF (MINAS A6 Series □80 mm or less)	3000	MS3
	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
		HK-KT_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	SGMAV (Σ-V Series)	3000	MS2
		SGMJV (Σ-V Series)	3000	MS2
		SGM7J (Σ-7 Series)	3000	MS2
		SGM7A (Σ-7 Series)	3000	MS2
		SGMXJ (Σ-X Series)	3000	MS2
		SGMXA (Σ-X Series)	3000	MS2
	Allen Bradley/Rockwell Automation	TLP-A090-075	3000	MS2
		TLP-B090-075	3000	MS2

Outline Drawings

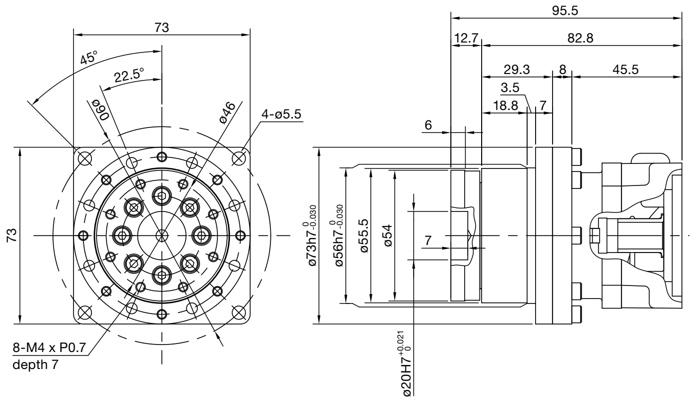
*For representative examples of applicable servo motors of respective manufacturers and flange type corresponding to the servo motors, refer to the Motor Matching / Motor Power Design Lists on pages 33 to 36.
For more details, please contact your nearest Sales Office or the CS Center.

DGS010F

<Figure 1>



<Figure 2>

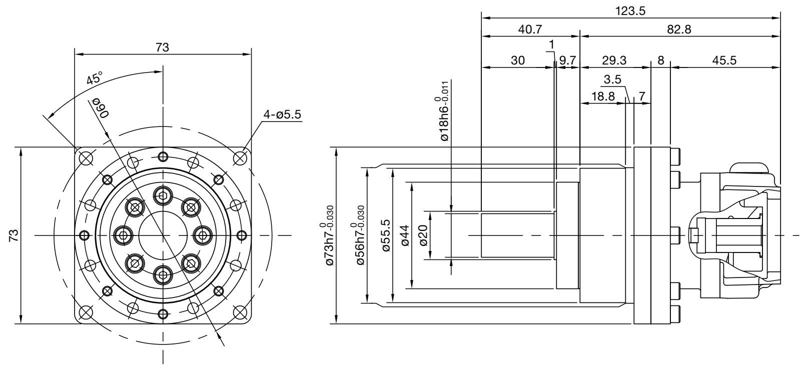


Type Codes	Reduction Ratio	Flange Shape Type	Figure No.	Weight (kg)
DGS010F-***N△N	19	HS1, HS3	1	1.11
DGS010F-***N△N	19	KS1, KS2, KS3	2	1.19
DGS010F-***N△N	29	HS1, HS3	1	1.12
DGS010F-***N△N	29	KS1, KS2, KS3	2	1.20
DGS010F-***N△N	49,79,99	HS1, HS3	1	1.13
DGS010F-***N△N	49,79,99	KS1, KS2, KS3	2	1.21

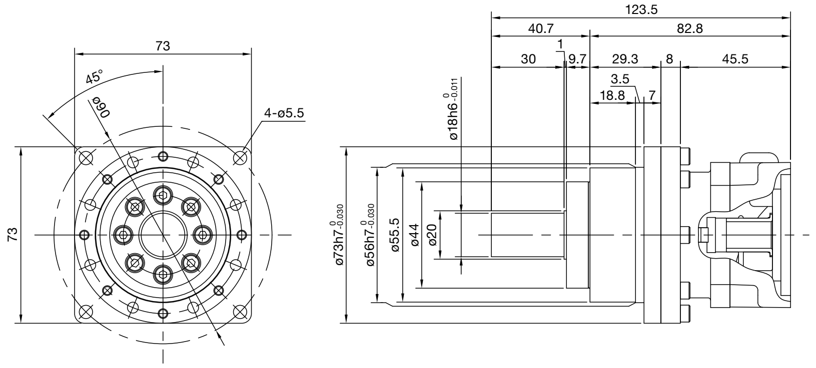
*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 33 to 36.
*For the input shaft detailed dimensions, please refer to page 42.
*For the performance table, please refer to page 32.

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	KS1, KS2, KS3	2	1.18
DGS010J-***N△N	29	HS1, HS3	1	1.11
DGS010J-***N△N	29	KS1, KS2, KS3	2	1.19
DGS010J-***N△N	49,79,99	HS1, HS3	1	1.12
DGS010J-***N△N	49,79,99	KS1, KS2, KS3	2	1.20

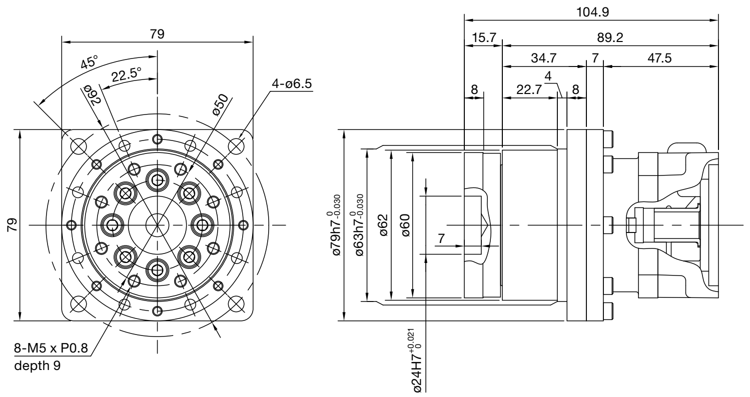
*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 33 to 36.
*For the input shaft detailed dimensions, please refer to page 42.
*For the performance table, please refer to page 32.

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 33 to 36.
For more details, please contact your nearest Sales Office or the CS Center.

DGS030F

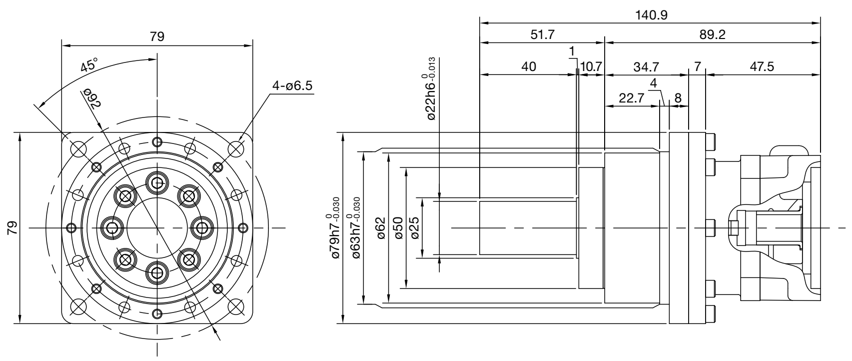
<Figure 1>



Type Codes	Reduction Ratio	Flange Shape Type	Figure No.	Weight (kg)
DGS030F-***N△N	19	KS1, KS2, KS3, LS3	1	1.54
DGS030F-***N△N	29	KS1, KS2, KS3, LS3	1	1.56
DGS030F-***N△N	49	KS1, KS2, KS3, LS3	1	1.57
DGS030F-***N△N	79,99,119	KS1, KS2, KS3, LS3	1	1.58

DGS030J

<Figure 1>

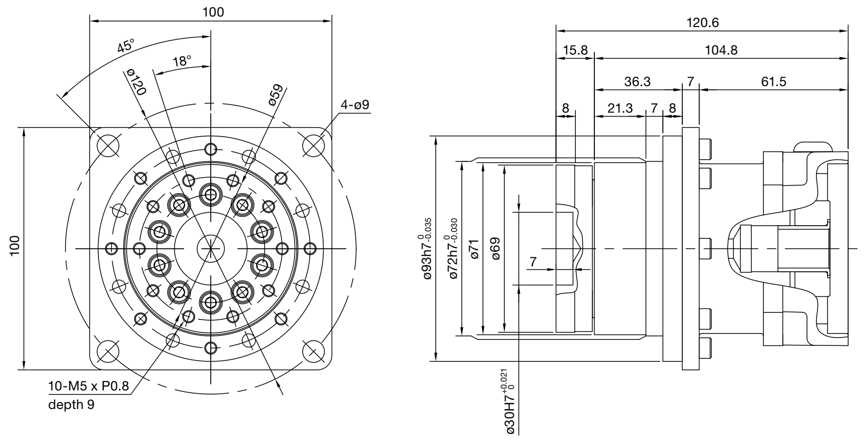


Type Codes	Reduction Ratio	Flange Shape Type	Figure No.	Weight (kg)
DGS030J-***N△N	19	KS1, KS2, KS3, LS3	1	1.55
DGS030J-***N△N	29	KS1, KS2, KS3, LS3	1	1.57
DGS030J-***N△N	49	KS1, KS2, KS3, LS3	1	1.58
DGS030J-***N△N	79,99,119	KS1, KS2, KS3, LS3	1	1.59

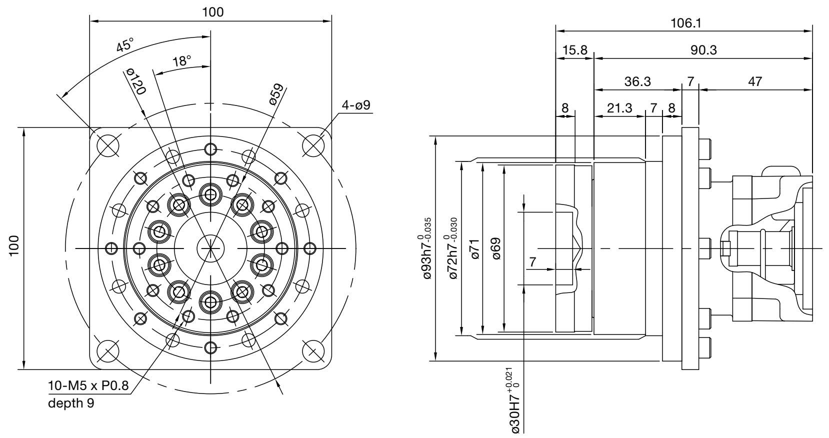
*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 33 to 36.
*For the input shaft detailed dimensions, please refer to page 42.
*For the performance table, please refer to page 32.

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	29	MS1, MS4	1	2.48
DGS050F-***N△N	29	MS2, MS3	1	2.47
DGS050F-***N△N	49	MS1, MS4	1	2.50
DGS050F-***N△N	49	MS2, MS3	1	2.49
DGS050F-***N△N	79	KS2, LS3	2	2.06
DGS050F-***N△N	99,119	KS2, LS3	2	2.07

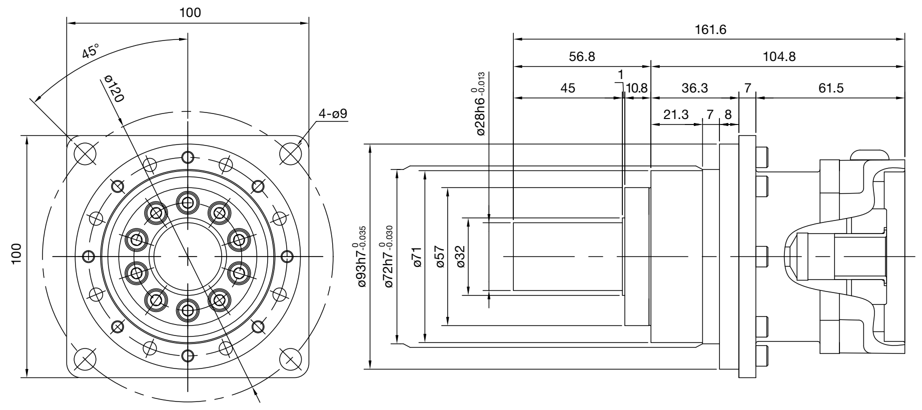
*The reduction ratio will be indicated as *** in the nomenclature. In addition, the flange shape type will be indicated as △.
*For flange type codes, please refer to the Motor Matching / Motor Power Design Lists on pages 33 to 36.
*For the input shaft detailed dimensions, please refer to page 42.
*For the performance table, please refer to page 32.

Outline Drawings

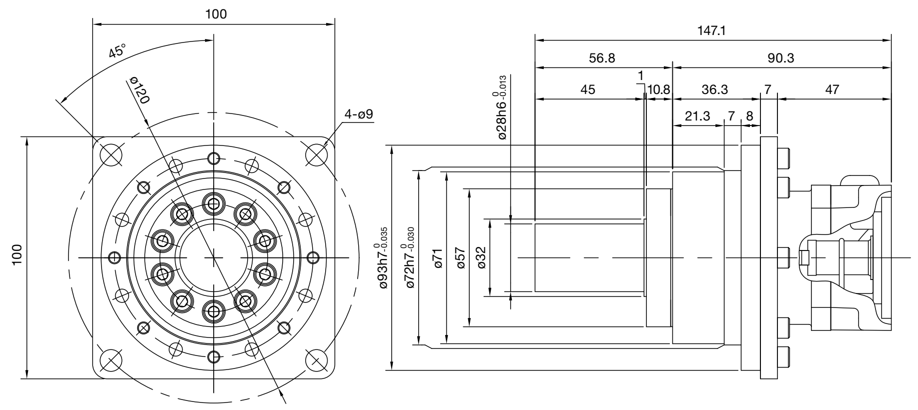
*For representative examples of applicable servo motors of respective manufacturers and flange type corresponding to the servo motors, refer to the Motor Matching / Motor Power Design Lists on pages 33 to 36.
For more details, please contact your nearest Sales Office or the CS Center.

DGS050J

<Figure 1>



<Figure 2>

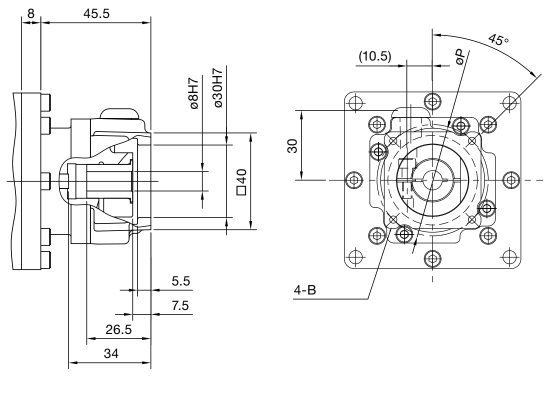


Type Codes	Reduction Ratio	Flange Shape Type	Figure No.	Weight (kg)
DGS050J-***N△N	19	MS1, MS4	1	2.54
DGS050J-***N△N	19	MS2, MS3	1	2.52
DGS050J-***N△N	29	MS1, MS4	1	2.56
DGS050J-***N△N	29	MS2, MS3	1	2.54
DGS050J-***N△N	49	MS1, MS4	1	2.58
DGS050J-***N△N	49	MS2, MS3	1	2.56
DGS050J-***N△N	79	KS2, LS3	2	2.13
DGS050J-***N△N	99,119	KS2, LS3	2	2.14

*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 33 to 36.
*For the input shaft detailed dimensions, please refer to page 42.
*For the performance table, please refer to page 32.

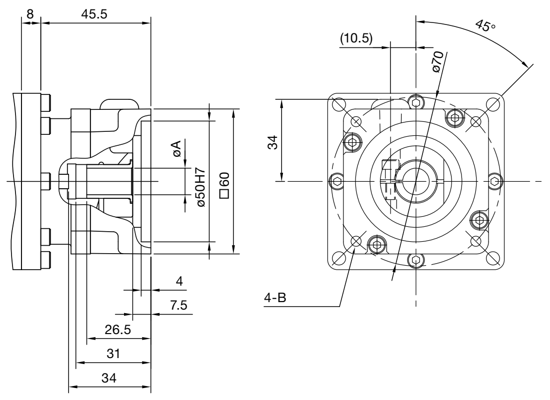
Detailed Dimensions of Input Shaft and Flange Shapes

DGS010-HS1 · HS3



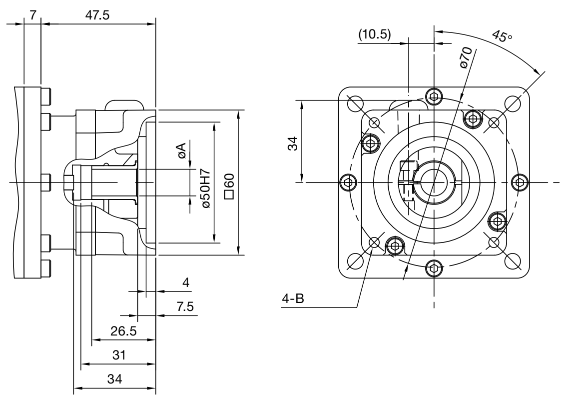
Type	Reduction Ratio	P Dimension	B Dimension	Bush
HS1	1/19 to 1/99	ø46	M4, Depth 10	Yes
HS3	1/19 to 1/99	ø45	M3, Depth 10	Yes

DGS010-KS1 · KS2 · KS3



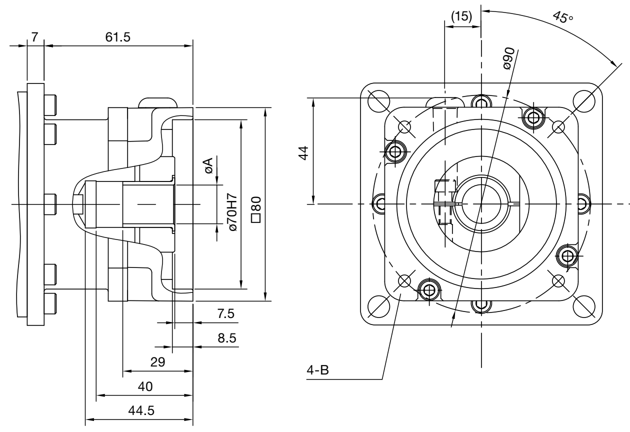
Type	Reduction Ratio	A Dimension	B Dimension	Bush
KS1	1/19 to 1/99	ø11H7	M5, Depth 13.5 (Through)	Yes
KS2	1/19 to 1/99	ø14H7	M5, Depth 13.5 (Through)	No
KS3	1/19 to 1/99	ø11H7	M4, Depth 13.5 (Through)	Yes

DGS030-KS1 · KS2 · KS3 · LS3



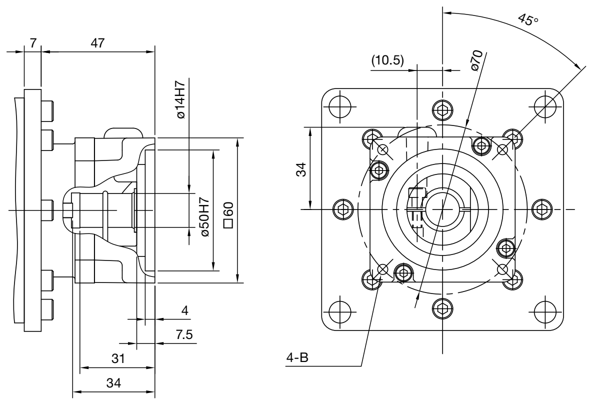
Type	Reduction Ratio	A Dimension	B Dimension	Bush
KS1	1/19 to 1/119	ø11H7	M5, Depth 13.5 (Through)	Yes
KS2	1/19 to 1/119	ø14H7	M5, Depth 13.5 (Through)	No
KS3	1/19 to 1/119	ø11H7	M4, Depth 13.5 (Through)	Yes
LS3	1/19 to 1/119	ø14H7	M4, Depth 13.5 (Through)	No

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-KS2 · LS3



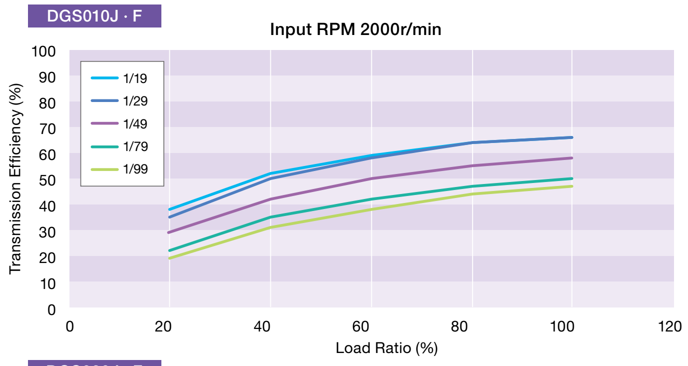
Type	Reduction Ratio	B Dimension	Bush
KS2	1/79 to 1/119	M5, Depth 13.5 (Through)	No
LS3	1/79 to 1/119	M4, Depth 13.5 (Through)	No

Efficiency Characteristics

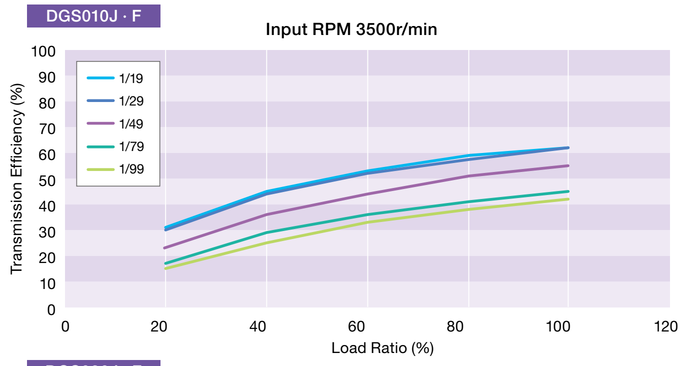
Measurement conditions: Input RPM 2000 r/min, values are measured after two-hours of warm operation

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

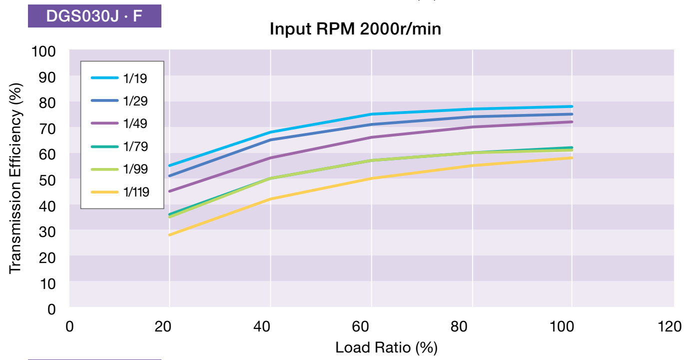
DGS010J · F



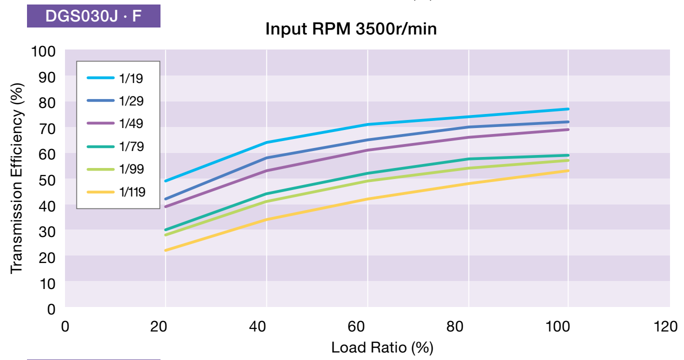
DGS010J · F



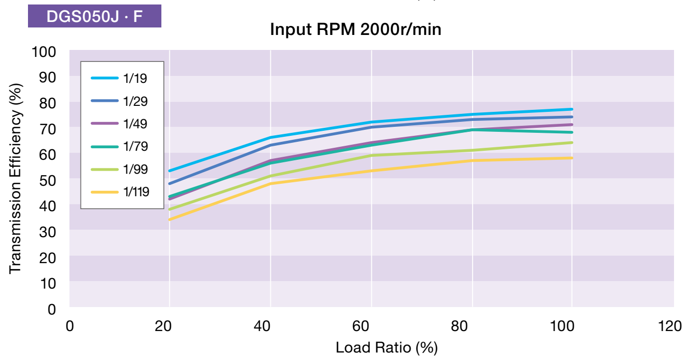
DGS030J · F



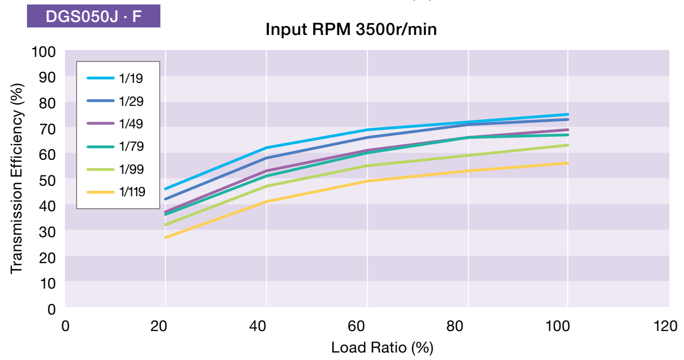
DGS030J · F



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)

Frame Size / Reduction Ratio	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)

Frame Size / Reduction Ratio	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)

Frame Size / Reduction Ratio	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

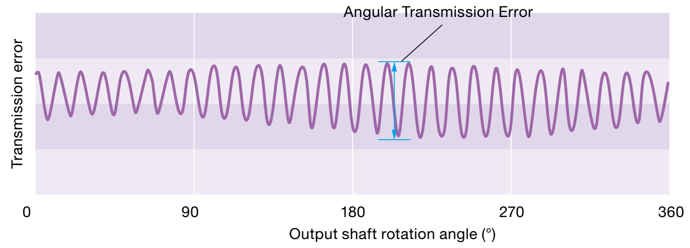
*The values in the table above vary according to usage conditions and are for use as reference only.

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)

Frame Size / Reduction Ratio	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)

Frame Size / Reduction Ratio	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

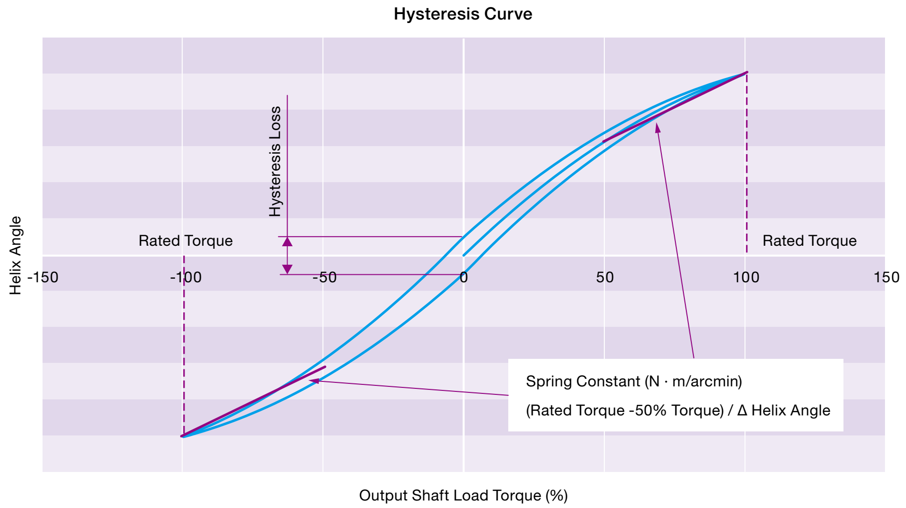
Spring Constant

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

(Unit: N · m / arc min)

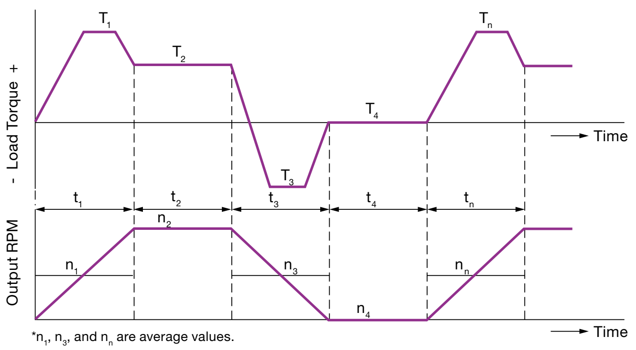
Frame Size / Reduction Ratio	DGS010J · F	DGS030J · F	DGS050J · F
1/19	1.7	3.2	5.8
1/29	2.2	4.0	7.8
1/49	2.6	4.6	9.0
1/79	2.8	5.6	9.6
1/99	2.8	6.1	10.1
1/119	–	6.1	10.1

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



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

■ Operation Pattern



*n_1, n_3, and n_n are average values.

<Operation Conditions :Eg>

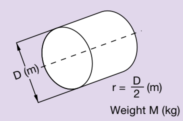
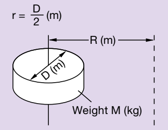
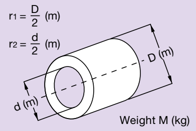
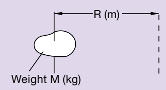
Operation Pattern	Load Torque (T_n) (N · m)		Time (t_n) (s)		Output RPM (n_n) (r/min)	
At the Start	T_1	74	t_1	0.3	n_1	11
During normal operation	T_2	54	t_2	3	n_2	20
While stopping (reducing speed)	T_3	40	t_3	0.5	n_3	11
When at rest	T_4	0	t_4	0.6	n_4	0

Maximum Output RPM No_{max} = 20(r/min)
Maximum Input RPM Ni_{max} = 2500(r/min)
*Limited by the motor, etc.

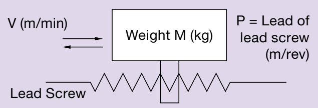
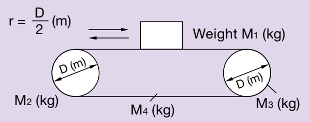
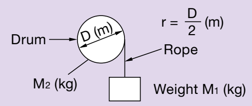
Impact Torque T_s = 100(N · m)
Life time L_{10} = 4000(h)

Method for Calculating the Moment of Inertia J_ℓ

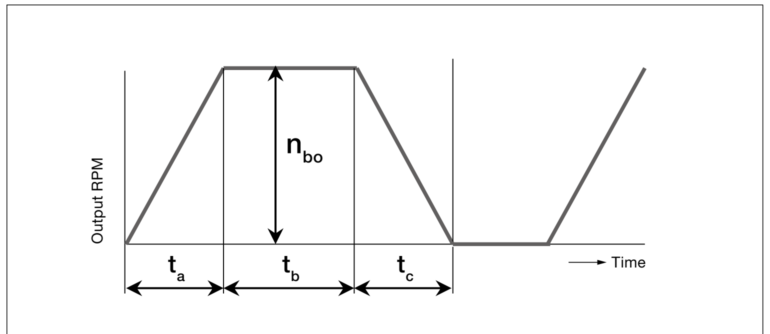
■ Rotor's moment of inertia J_ℓ

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	
	$J_\ell = \frac{1}{2} Mr^2$ (kg · m²)		$J_\ell = \frac{1}{2} Mr^2 + MR^2$ (kg · m²)
	$J_\ell = \frac{1}{2} M (r_1^2 + r_2^2)$ (kg · m²)		(If the size is negligible) $J_\ell = MR^2$ (kg · m²)

■ Moment of inertia J_ℓ in case of linear motion

General case		$J_\ell = \frac{1}{4} M \cdot \left(\frac{V}{\pi \cdot n}\right)^2$ (kg · m²)
In the case of horizontal linear motion (When moving an object with a lead screw)		$J_\ell = \frac{1}{4} M \cdot \left(\frac{P}{\pi}\right)^2 = \frac{1}{4} M \cdot \left(\frac{V}{\pi \cdot n}\right)^2$ (kg · m²)
In the case of horizontal linear motion (Conveyor etc.)		$J_\ell = M_1 r^2 + \frac{1}{2} M_2 r^2 + \frac{1}{2} M_3 r^2 + M_4 r^2$ (kg · m²)
In the case of vertical linear motion (Crane, winch, etc.)		$J_\ell = M_1 r^2 + \frac{1}{2} M_2 r^2$ (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_ℓ : 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_ℓ : 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 $T_{av} = \sqrt[3]{\frac{n_1 \cdot t_1 \cdot (T_1)^3 + n_2 \cdot t_2 \cdot (T_2)^3 + \cdots n_n \cdot t_n \cdot (T_n)^3}{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}}$	$T_{av} = \sqrt[3]{\frac{11r/min \cdot 0.3s \cdot (74N \cdot m)^3 + 20r/min \cdot 3s \cdot (54N \cdot m)^3 + 11r/min \cdot 0.5s \cdot (40N \cdot m)^3}{11r/min \cdot 0.3s + 20r/min \cdot 3s + 11r/min \cdot 0.5s}}$ ≈ 54N · 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 · 119 = 1904r/min ≤ 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 · 119 = 2380r/min ≤ 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 · m ≤ 90N · m (DGS030-119 start/stop allowable peak torque) T_3 = 40N · m ≤ 90N · m (DGS030-119 start/stop allowable peak torque) Temporarily select DGS030-119 from T_s = 100 N·m ≤ 147 N·m (DGS030-119 allowable instantaneous maximum torque)
4. Select the motor to be used according to "Load Torque," "Efficiency Characteristics (p. 43)," and "Performance Table - Moment of Inertia (Input Shaft Equivalent) (p. 31, 32)," and select a motor mounting flange type that can be mounted in accordance with "Detailed Dimensions of Input Shaft and Flange Shapes (p. 42)."	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) η : 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) ≥ 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})

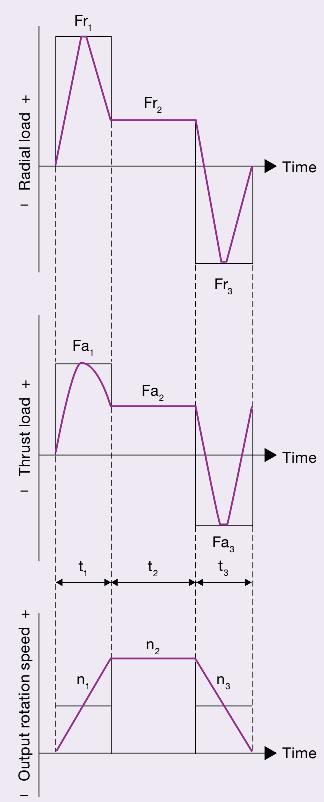
$$Fa_{av} = \sqrt[3]{\frac{n_1t_1(|Fa_1|)^3 + n_2t_2(|Fa_2|)^3 \cdots n_nt_n(|Fa_n|)^3}{n_1t_1 + n_2t_2 \cdots n_nt_n}}$$

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})

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

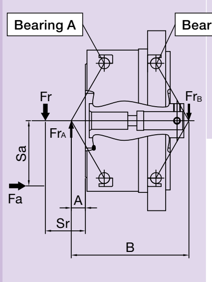
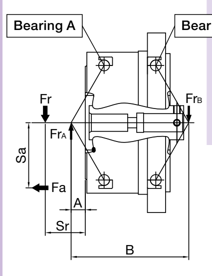
B. Graph



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	$Fa_A = \frac{Fr_B}{2Y_0} + Fa_{av}$	$Fr_A = \frac{Fr_{av}(Sr - A + B) + Fa_{av} \cdot Sa}{B}$	$Pc_A = X \cdot Fr_A + Y \cdot Fa_A$ 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

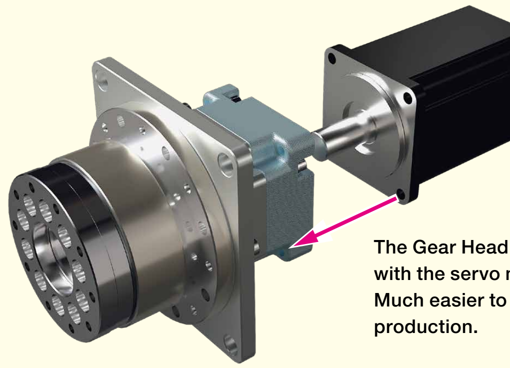
Bearing A	Bearing B	Radial Load Coefficient (X)	Thrust Load Coefficient (Y)
$\frac{Fa_A}{Fr_A} \leq 0.8$	$\frac{Fa_B}{Fr_B} \leq 0.8$	1	0
$\frac{Fa_A}{Fr_A} > 0.8$	$\frac{Fa_B}{Fr_B} > 0.8$	0.39	0.76

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

Frame Size	Basic Dynamic Rated Load (C)	Basic Static Rated Load (C_o)	Allowable Moment (Mc)
	(N)	(N)	(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.

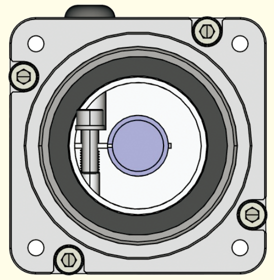


Figure 1 Without Key Groove

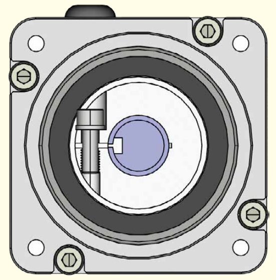


Figure 2 With Key Groove

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.

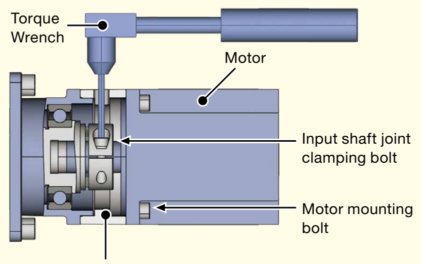
6. Mount the rubber cap (accessory) to the wrench hole for input shaft joint clamping.

Motor Mounting Bolt Tightening Torques (Reference Values)

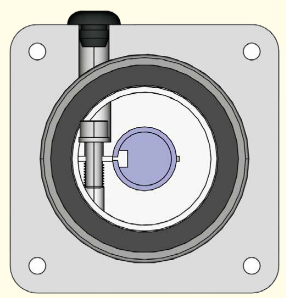
Bolt Size	Tightening Torque (N · m)
M3	1.6
M4	4.4
M5	8.3
M6	14.2

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)



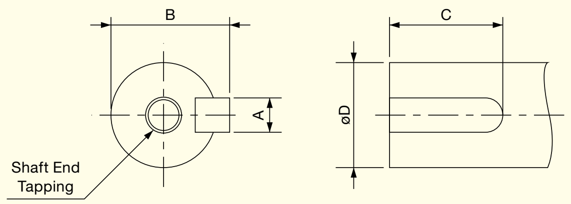
Option

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

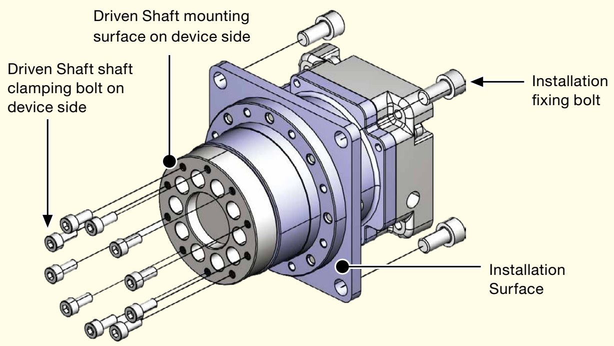
· Make sure that the surface temperature of the reducer does not exceed 80°C. Failure to follow this precaution may result in damage to the equipment or burns.
· Make sure that the surface temperature of the reducer does not exceed 80°C during continuous operation in one direction and during start/stop 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. A location not directly exposed to rain. A location not directly exposed to sunlight. 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