

DATORKER® Strain Wave Gear

Technical Information



HIWIN Support



About HIWIN



Semiconductor Subsystem

Semiconductor / LED / Panel

- EFEM
(Equipment Front End Module)
- Wafer Robot
- Load Port
- Wafer Aligner



Multi-Axis Robot

Pick-and-Place / Assembly /
Array and Packaging / Semiconductor /
Electro-Optical Industry /
Automotive Industry / Food Industry

- Articulated Robot
- SCARA Robot
- Electric Gripper
- Integrated Electric Gripper



Single-Axis Robot

Precision / Semiconductor /
Medical / FPD

- KK, SK
- KS, KA
- KU, KE, KC
- KA B-TYPE
- KC B-TYPE



Torque Motor Rotary Table

Medical / Automotive Industry /
Machine Tools / Machinery Industry

- RAB Series
- RAS Series
- RCV Series
- RCH Series

Wire-cut EDM / Die-sinker EDM /
Small-hole Drilling EDM

- RAS-E Series
- RCV-E Series
- RCH-E Series



Ball screw

Precision Ground / Rolled

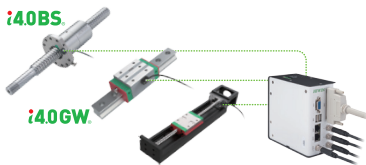
- Super S Series
- Super T Series
- Mini Roller
- Ecological & Economical
Lubrication Module E2
- Auxiliary Lubrication Module EL
- Rotating Nut (R1, R2)
- Energy-Saving & Thermal-
Controlling (Cool Type)
- Heavy Load Series (RD)



Linear Guideway

Automation / Semiconductor / Medical

- Ball Type-HG, EG, WE, MG, CG
- Quiet Type-QH, QE, QW, QR
- Other-Stainless Steel, AG, RG, E2, EL,
PG, SE, RC



i-Series

Semiconductor / Automation
Equipment / Industrial Machines /
Machine Tools

- Intelligent 4.0 Ball screw
- Intelligent 4.0 Guideway
- Intelligent Single-Axis Robot



DATORKER® Strain Wave Gear

Robot / Automation / Semiconductor /
Machine Tools

- Standard-DSC, DSH Type
- Heavy Load-DGC, DGH Type
- Lightweight-DLC Type



Ball Spline

Robot / Medical / Automation
Equipment / Industrial Machines /
Machine Tools / Semiconductor

- Linear ball spline-
RS Type, FS Type, FSR Type
- Compound ball spline-FBR Type



Bearing

Machine Tools / Robot /
Industrial Machines / Automation

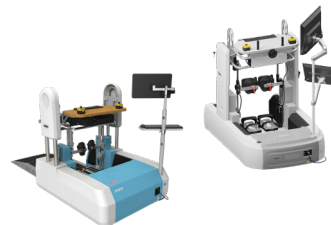
- Crossed Roller Bearing
- Support Unit



Controller / Drive/ AC Servo Motor

Semiconductor / SMT / 3C Electronics /
Automation Equipment /
New Energy Equipment /
Industrial Machinery

- Controller-HIMC3
- Drives-E1, E2, D1, D2T/D2T-LM Series
- Motors-E, FR Series



Medical Equipment

Hospital / Rehabilitation Centers /
Long-term Care Facility

- Robotic Gait Training System MRG-P110
- Robotic Gait Training System MRG-P100



Linear Motor / Linear Motor System

Automated Transport /
AOI Application /
Precision Positioning /
Semiconductor Application

- Ironcore Linear Motor
- Ironless Linear Motor
- Tubular Motors
- Air Bearing Platform
- XY Stage • Gantry Systems
- Single-Axis Linear Motor Stage



Torque Motor / Direct Drive Motor

Machine Tools / Lithium-ion Battery /
Gear Machining and Inspection

- Torque Motor-
TM-5, IM-2, TMRW, TM-5(J0) Series

Display / Automation / Semiconductor /
Lithium-ion Battery / Robot /
Laser Cutting / AOI Inspection

- Direct Drive Motor-
DMS, DMY, DMN, DMT, DMH Series



DATORKER® Strain Wave Gear

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Standard Series

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DATORKER® Strain Wave Gear

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Preface

DATORKER® – Strain Wave Gear has the characteristics of high precision, high efficiency, high torsional rigidity and low starting torque. It is widely used in robots, automation equipment, semiconductor equipment, machine tools and other industries.

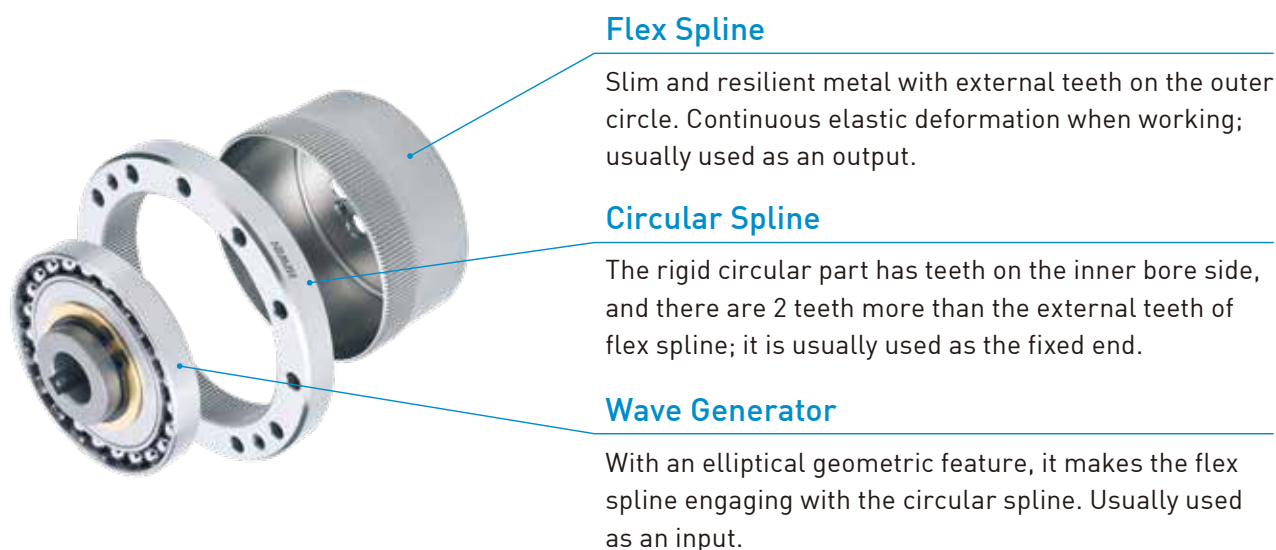
HIWIN has developed various specifications and reduction ratios to provide customers with wide range of choice. HIWIN is able to provide customized services to meet customers' various design and requirement.

1. Basic Information

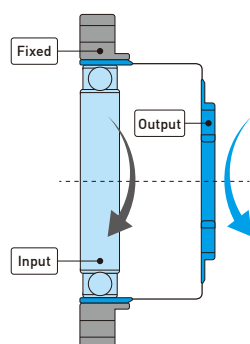
1-1 Features

- Compact and light weight – Easy for user to assemble and work with.
- High accuracy – Provides stable repeatability and positioning.
- Customization – Can be customized according to requirements.
- High torque – Widely used in automation and inspection equipment.
- Wide reduction ratio – Various choices available under same model.

1-2 Structure



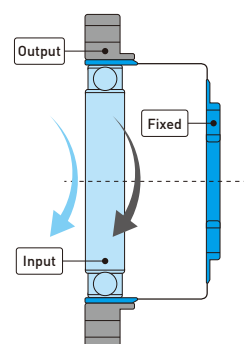
Reduction ratio and rotation direction



Input and Output with reverse direction rotation

$$\text{Reduction ratio} = \frac{-1}{R}$$

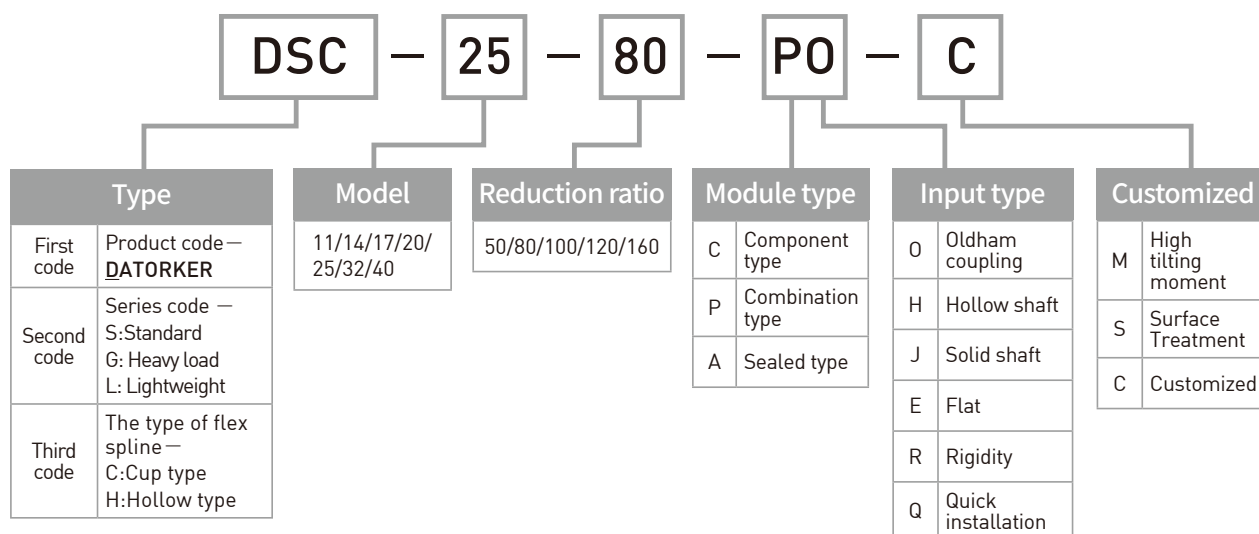
(R = No. of external teeth ÷ difference between no. of external and internal teeth)



Input and Output with the same direction rotation

$$\text{Reduction ratio} = \frac{1}{R+1}$$

1-3 Specification



1-4 Type / Function

Standard Series-DSC Type



Oldham Component Type (CO)

- Input shaft self-aligning.
- Self-assembly of parts required.



Oldham Combination Type (PO)

- Input shaft self-aligning.
- Withstand axial and radial load.



Oldham Combination Type (PO)

- Input shaft self-aligning.
- Withstand axial and radial load.



Solid Shaft Type (AJ)

- Input solid shaft design.
- Withstand axial and radial load.

Standard Series-DSH Type



Oldham Combination Type (PO)

- Input shaft self-aligning.
- Withstand axial and radial load.



Hollow Combination Type (PH)

- Input hollow shaft design.
- Withstand axial and radial load.



Hollow Sealed Type (AH)

- Input hollow shaft design.
- Withstand axial and radial load.
- Completely sealed design.
- User friendly design.



Solid Shaft Type (AJ)

- Input solid shaft design.
- Withstand axial and radial load.

Heavy Load Series-DGC Type (Higher torque load and life compare with DSC type)



Oldham Component Type (CO)

- Input shaft self-aligning.
- Self-assembly of parts required.



Oldham Combination Type (PO)

- Input shaft self-aligning.
- Withstand axial and radial load.

Heavy Load Series-DGH Type (Higher torque load and life compare with DSH type)



Oldham Combination Type (PO)

- Input shaft self-aligning.
- Withstand axial and radial load.



Hollow Combination Type (PH)

- Input hollow shaft design.
- Withstand axial and radial load.



Hollow Sealed Type (AH)

- Input hollow shaft design.
- Withstand axial and radial load.
- Completely sealed design.
- User friendly design.



Solid Shaft Type (AJ)

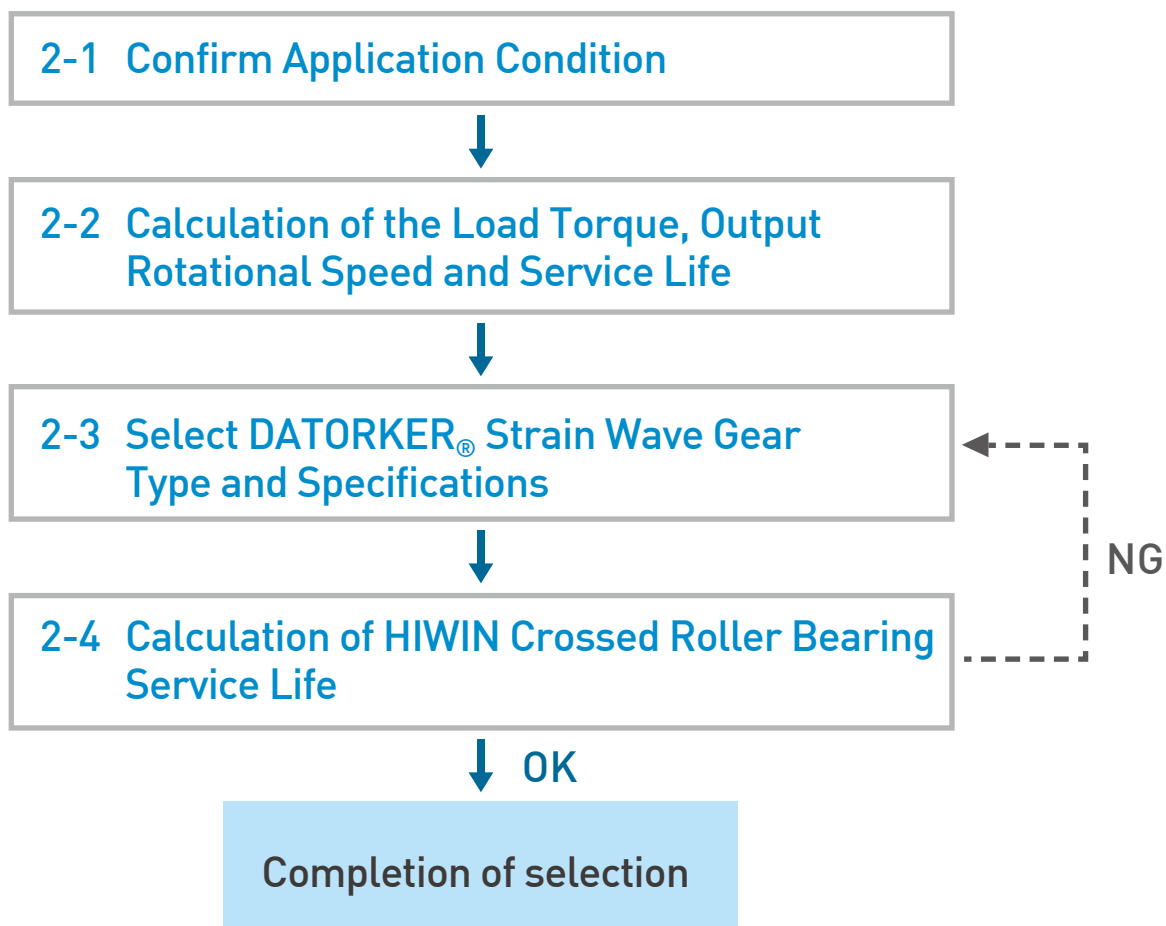
- Input solid shaft design.
- Withstand axial and radial load.

Lightweight Series-DLC Type (Weight lighter compare with DSC-CO type)

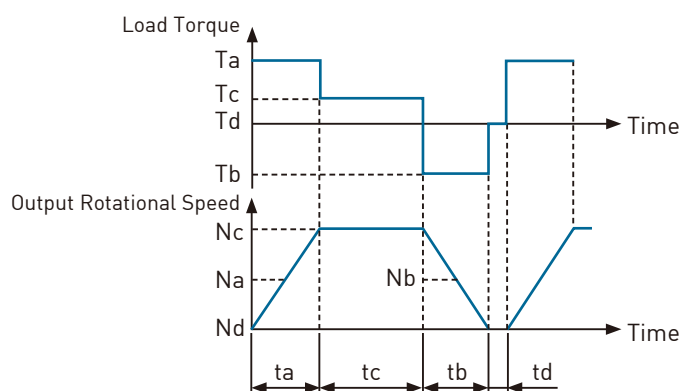


- Lightweight construction.
- Self-assembly of parts required.

2. Selection Procedure

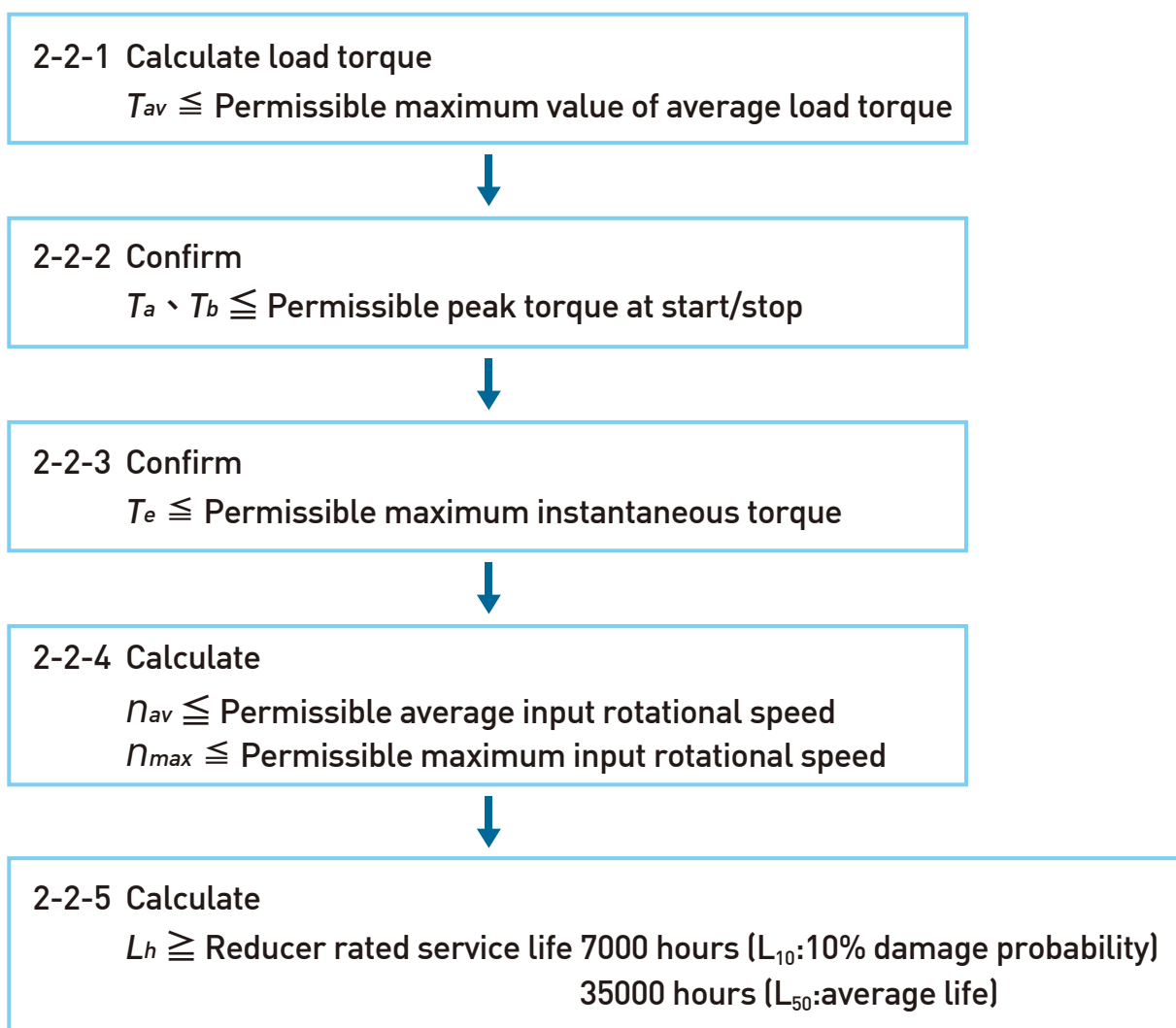


2-1 Confirm Application Condition



Model \ Item	Load Torque	Time	Output Rotational Speed	Maximum Output Rotational Speed	Maximum Input Rotational Speed
Start Time [Acceleration]	T_a	t_a	N_a	N_{max}	n_{max}
Operation Time [Constant]	T_c	t_c	N_c		
Stop Time [Deceleration]	T_b	t_b	N_b		
Break Time	T_d	t_d	N_d		
Impact	T_e	t_e	N_e		

2-2 Calculation of Load Torque, Rotational Speed and Service Life



2-2-1 Permissible maximum value of average load torque

When the input rotational speed or load torque changes, please calculate the average load torque and confirm whether it meets the rated performance table values of each specification. Please pay attention that if the value exceeds the catalog value, it may cause premature lubricant deterioration and abnormal gear wear due to heat.

Calculate average load torque $T_{av} = \sqrt[3]{\frac{N_1 t_1 |T_1|^3 + N_2 t_2 |T_2|^3 + \dots + N_n t_n |T_n|^3}{N_1 t_1 + N_2 t_2 + \dots + N_n t_n}}$

2-2-2 Permissible peak torque at start/stop

During start and stop, due to the moment of inertia of the load, a load greater than the average torque will act on the reducer.

2-2-3 Permissible maximum instantaneous torque

The maximum allowable load torque when an impact occurs.

2-2-4 Permissible average input rotational speed & permissible maximum input rotational speed

When setting the operating conditions of the reducer, do not exceed the values indicated in the rated performance table.

Calculate average output rotational speed $N_{av} = \frac{N_1 t_1 + N_2 t_2 + \dots + N_n t_n}{t_1 + t_2 + \dots + t_n}$

Calculate average input rotational speed $n_{av} = N_{av} \times R$

Calculate maximum input rotational speed $n_{max} = N_{max} \times R$

R is Reduction Ratio

2-2-5 Reducer rated service life

The operating service life of the reducer depends on the flex bearing of the wave generator. The nominal service life of the wave generator is 7000 hours. The calculation formula is as follows:

Calculate service life $L_h = 7000 \times \left(\frac{T_r}{T_{av}}\right)^3 \times \left(\frac{n_r}{n_{av}}\right)$

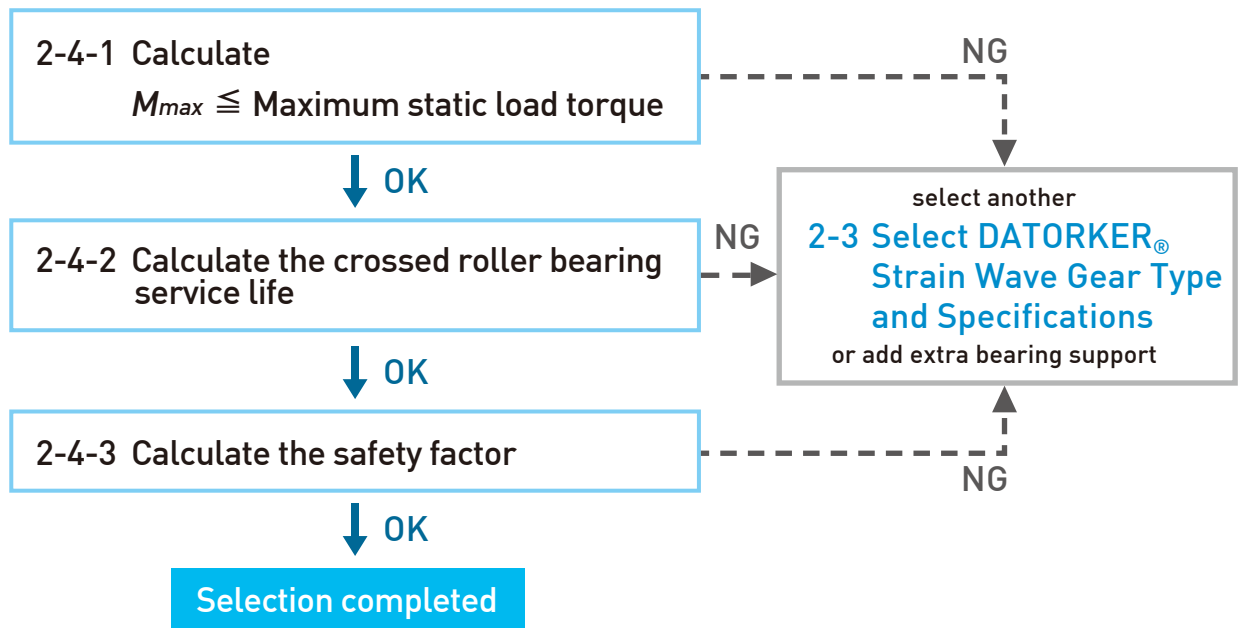
T_r is Rated torque (Nm)

n_r is Rated rotational speed (rpm)

2-3 DATORKER® Type and Specification Selection

Select the DATORKER® model according to the operation requirements, and check the Rated performance table of each unit according to the calculation results from the previous step, to confirm if the selected model specifications will meet the application. If the reducer is installed with a crossed roller bearing, please proceed to the next step and calculate the service life of the crossed roller bearing.

2-4 Calculation of the Crossed Roller Bearing Service Life



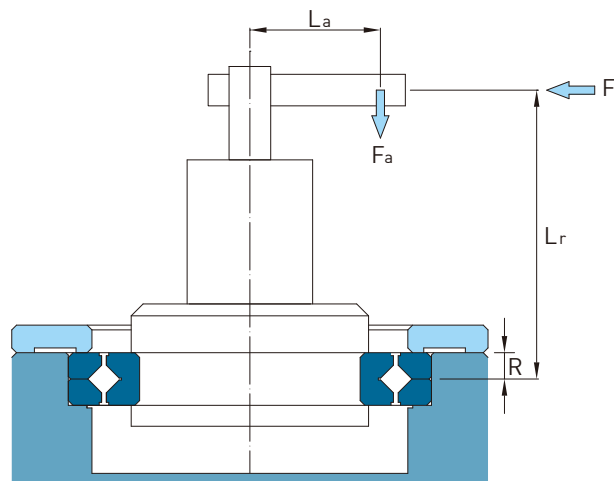
2-4-1 Maximum static load moment

The crossed roller bearing can withstand the maximum radial and maximum axial load.

Calculate maximum static load moment $M_{max} = Fr_{max} \times L_r + Fa_{max} \times L_a$

Fr is radial load (N)

Fa is axial load (N)



2-4-2 Calculation for service life of crossed roller bearings

Calculate basic service life $L = \left(\frac{C}{F_W \times P} \right)^{\frac{10}{3}}$

P is dynamic equivalent load

C is basic dynamic load rating

F_W is load factor

Load condition	Load factor (Fw)
No impact / vibration	1 ~ 1.2
Normal	1.2 ~ 1.5
With impact & vibration	1.5 ~ 3

Calculate dynamic equivalent load $P = X \left(F_r + \frac{2M}{D_{pw}} \right) + YF_a$

where $\frac{F_a}{F_r + \frac{2M}{D_{pw}}} \leq 1.5$ for, $X=1, Y=0.45$. where $\frac{F_a}{F_r + \frac{2M}{D_{pw}}} \geq 1.5$ for, $X=0.67, Y=0.67$.

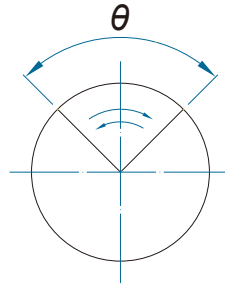
M is Torque (Nm)

D_{pw} is pitch circle diameter (mm)

In a reciprocating oscillation application, please calculate according to the following formula

Calculate service life of oscillating $L_{oc} = \frac{180^\circ}{\theta} \times L$

θ is the angle of the oscillating



2-4-3 Calculate the safety factor

The safety factor is determined by the basic static load rating and the static equivalent load, as follows :

Calculate Safety factor $f_s = \frac{C_o}{P_o}$

P_o is static equivalent load

C_o is basic static load rating

Operation condition	Safety factor (f _s)
Standard operation	≥ 1.5
Bearing with vibrating load	≥ 2
High rotational speed and high accuracy	≥ 3

Calculate basic static equivalent load

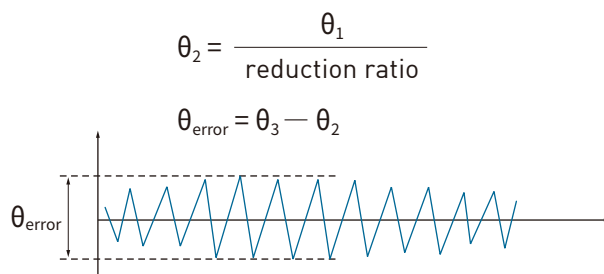
$$P_o = F_r + \frac{2M}{D_{pw}} + 0.44F_a$$

* The above table shows the lower limit of the static safety factor. If it is a dynamic situation, it is recommended to safety factor of 7 or more.

3. Definition

3-1 Angle Transmission Accuracy

When any rotation angle (θ_1) is input, the difference in the value (θ_{error}) between the theoretical output rotation angle (θ_2) and the actual output rotation angle (θ_3) is the angle transmission accuracy.



3-2 Starting Torque

The maximum torque value required under no-load conditions, when the input (high speed) applies torque and the output (low speed) starts to operate.

3-3 Reversed Starting Torque

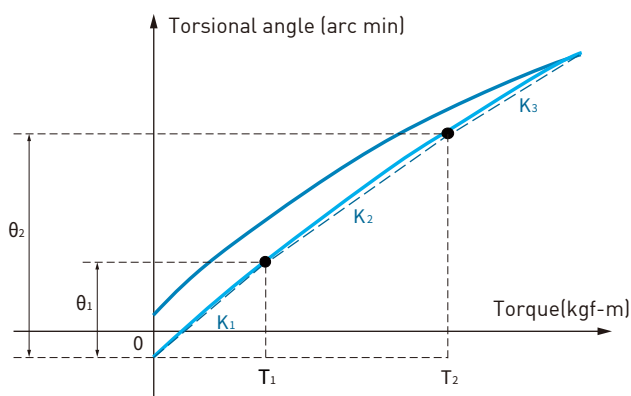
The maximum Torque value required under no-load conditions, when the output (low speed) applies torque and the input (high speed) starts to operate.

3-4 Torsional Rigidity

It is defined as the fixed input (wave generator) and applies a torque to the output (flex spline) of the Strain Wave Gear. The ratio generated by torque and the torsion angle.

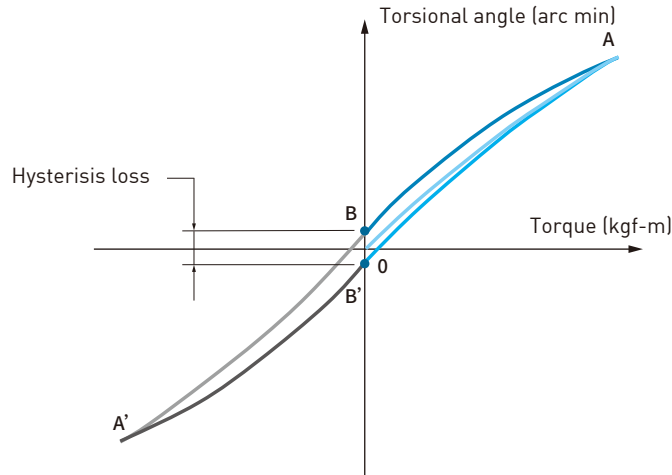
The slope of the "torque-torsion angle graph" is expressed as a spring constant. The "torque-torsion angle diagram" is divided into 3 parts, and the spring constant of each area is K_1 , K_2 and K_3 represent.

- K_1 refers to the spring constant from "0" to " T_1 "
- K_2 refers to the spring constant from " T_1 " to " T_2 "
- K_3 refers to the spring constant with a torque above " T_2 "



3-5 Hysteresis Loss

After the torque is applied to the rated value and return to "0", the torsion angle will not be completely "0", and will have some displacement (B-B'), which is called hysteresis loss. The hysteresis loss is mainly caused by internal friction. When the torque is extremely small, it is almost non-existent.



3-6 Maximum Backlash

In a mechanical system, the maximum displacement or amount of rotation or rotation of another part in a certain direction while maintaining one part stationary. The backlash of the HIWIN DATORKER® gear engage part is suppressed to "0". The source of the maximum backlash is caused by the gap between the Oldham coupling and the wave generator.

3-7 Axial Force from the Wave Generator and Shaft Securing

During operation, the flexspline undergoes continuous elastic deformation, which generates an axial thrust on the wave generator. Therefore, it is crucial to firmly secure the wave generator in the mechanical design to prevent displacement or damage.

- When the system is in deceleration mode, the thrust direction is F1.
- When the system is in acceleration mode, the thrust direction becomes F2.

The axial thrust acting on the wave generator can be calculated using the following formulas:

- For a reduction ratio of 50:

$$F = 2 \times \frac{T}{D} \times 0.07 \times \tan 30^\circ$$

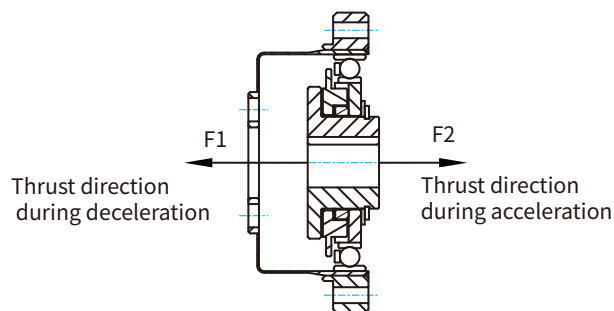
- For a reduction ratio of 80 or above:

$$F = 2 \times \frac{T}{D} \times 0.07 \times \tan 20^\circ$$

F represents the thrust

D is model X 0.00254

T is output torque



4. Product Series

4-1 DSC-C0 Type

4-1-1 Technical data

Table 4-1-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
11	50	3.5	0.36	8.3	0.85	5.5	0.56	17	1.7	8500	3500
	100	5.0	0.51	11	1.1	8.9	0.91	25	2.6		
14	50	5.4	0.55	18	1.8	6.9	0.7	35	3.6	8500	3500
	80	7.8	0.80	23	2.4	11	1.1	47	4.8		
	100	7.8	0.80	28	2.9	11	1.1	54	5.5		
17	50	16	1.6	34	3.5	26	2.6	70	7.1	7300	3500
	80	22	2.2	43	4.4	27	2.7	87	8.9		
	100	24	2.4	54	5.5	39	4	108	11		
	120	24	2.4	54	5.5	39	4	86	8.8		
20	50	25	2.5	56	5.7	34	3.5	98	10	6500	3500
	80	34	3.5	74	7.5	47	4.8	127	13		
	100	40	4.1	82	8.4	49	5	147	15		
	120	40	4.1	87	8.9	49	5	147	15		
	160	40	4.1	92	9.4	49	5	147	15		
25	50	39	4.0	98	10	55	5.6	186	19	5600	3500
	80	63	6.4	137	14	87	8.9	255	26		
	100	67	6.8	157	16	108	11	284	29		
	120	67	6.8	167	17	108	11	304	31		
	160	67	6.8	176	18	108	11	314	32		
32	50	76	7.8	216	22	108	11	382	39	4800	3500
	80	118	12	304	31	167	17	568	58		
	100	137	14	333	34	216	22	647	66		
	120	137	14	353	36	216	22	686	70		
	160	137	14	372	38	216	22	686	70		
40	50	137	14	402	41	196	20	686	70	4000	3000
	80	206	21	519	53	284	29	980	100		
	100	265	27	568	58	372	38	1080	110		
	120	294	30	617	63	451	46	1180	120		
	160	294	30	647	66	451	46	1180	120		

※1 Permissible rated torque

※2 Permissible maximum torque

※3 Permissible average torque

※4 Permissible maximum value of impact

Table 4-1-2 Angle transmission accuracy

Reduction ratio \ Model		11	14	17	20	25	32	40
50 up	$\times 10^{-4}$ rad	5.8	4.4	4.4	2.9	2.9	2.9	2.9
	arc min	2	1.5	1.5	1	1	1	1

Table 4-1-3 Hysteresis loss

Reduction ratio \ Model		11	14	17	20	25	32	40
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8	5.8	5.8
	arc min	2.0	2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad	5.8	2.9	2.9	2.9	2.9	2.9	2.9
	arc min	2.0	1.0	1.0	1.0	1.0	1.0	1.0

Table 4-1-4 Maximum backlash

Reduction ratio \ Model		11	14	17	20	25	32	40
50	$\times 10^{-5}$ rad	14.1	17.5	9.7	8.2	8.2	6.8	6.8
	arc sec	24	36	20	17	17	14	14
80	$\times 10^{-5}$ rad	—	11.2	6.3	5.3	5.3	4.4	4.4
	arc sec	—	23	13	11	11	9	9
100	$\times 10^{-5}$ rad	7.3	8.7	4.8	4.4	4.4	3.4	3.4
	arc sec	15	18	10	9	9	7	7
120	$\times 10^{-5}$ rad	—	—	3.9	3.9	3.9	2.9	2.9
	arc sec	—	—	8	8	8	6	6
160	$\times 10^{-5}$ rad	—	—	—	2.9	2.9	2.4	2.4
	arc sec	—	—	—	6	6	5	5

Table 4-1-5 Starting torque

Unit : cNm

Reduction ratio \ Model		11	14	17	20	25	32	40
50		1.6	3.3	5.1	6.6	12	26	46
80		—	2.4	3.3	4.1	7.7	16	29
100		1.1	2.1	2.9	3.7	6.9	15	26
120		—	—	2.7	3.3	6.3	13	24
160		—	—	—	2.9	5.5	12	21

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-1-6 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	11	14	17	20	25	32	40
50	1	1.4	2.5	4	7.5	16	28
80	—	1.4	2.5	4.2	7.7	16	28
100	1.4	1.7	2.8	4.5	8.4	18	31
120	—	—	3.1	4.9	9.2	19	34
160	—	—	—	5.8	11	23	40

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

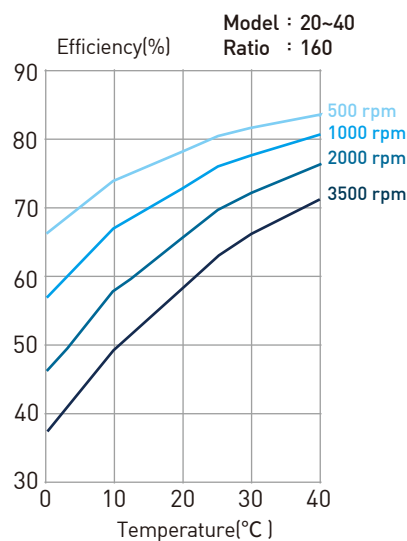
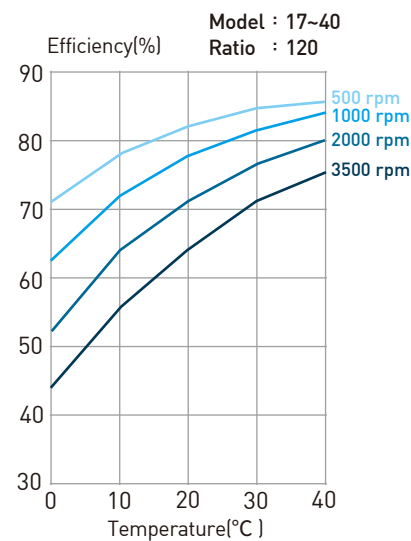
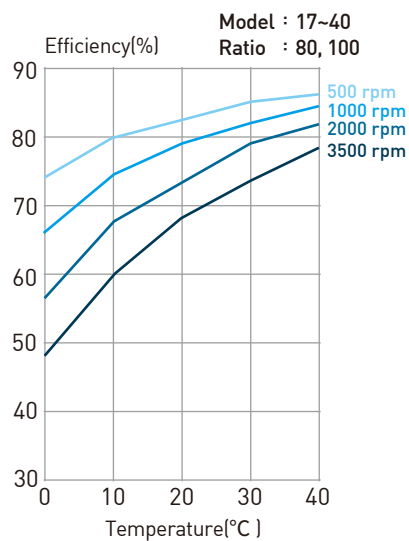
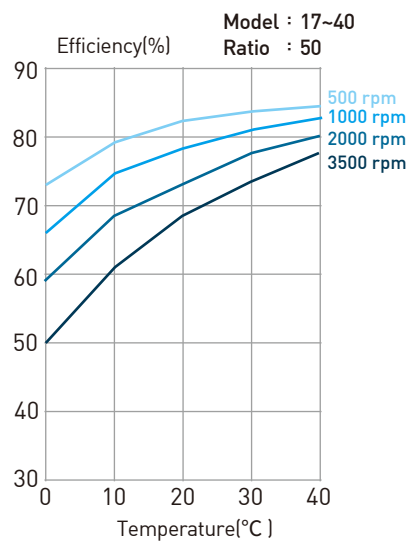
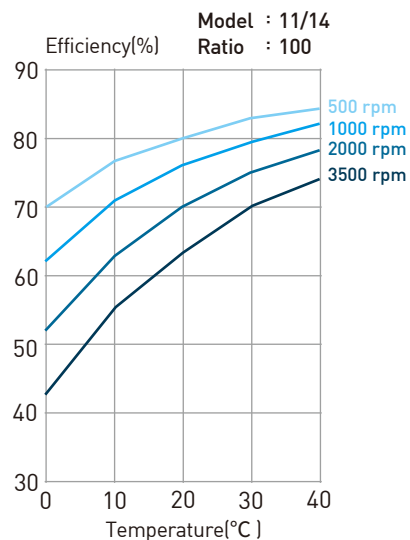
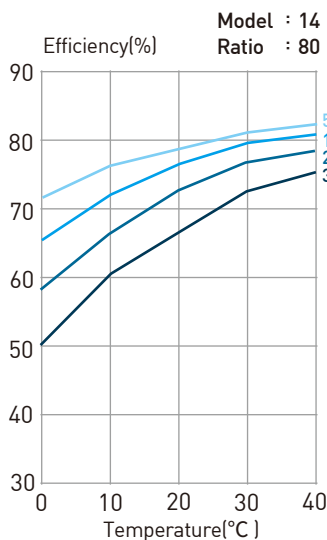
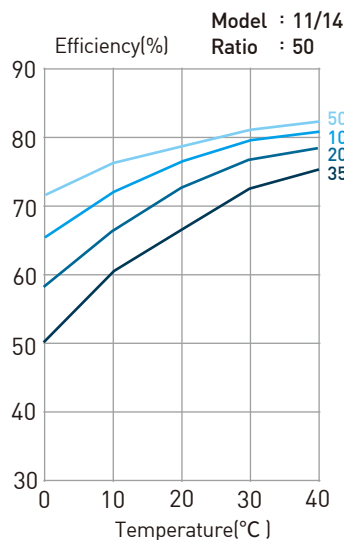
Table 4-1-7 Torsional rigidity

Reduction ratio \ Model		11	14	17	20	25	32	40
T ₁	Nm	0.8	2.0	3.9	7.0	14	29	54
	kgfm	0.082	0.2	0.4	0.7	1.4	3.0	5.5
T ₂	Nm	2.0	6.9	12	25	48	108	196
	kgfm	0.2	0.7	1.2	2.5	4.9	11	20
50	K ₁	× 10 ⁴ Nm/rad	0.22	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.066	0.1	0.24	0.38	0.74	1.6
	K ₂	× 10 ⁴ Nm/rad	0.3	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.09	0.14	0.32	0.52	1.0	2.3
	K ₃	× 10 ⁴ Nm/rad	0.32	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.096	0.17	0.4	0.67	1.3	2.9
	θ ₁	× 10 ⁻⁴ rad	3.6	5.8	4.9	5.2	5.5	5.2
		arc min	1.2	2.0	1.7	1.8	1.9	1.8
	θ ₂	× 10 ⁻⁴ rad	8	16	12	15.4	15.7	15.4
		arc min	2.6	5.6	4.2	5.3	5.4	5.3
80 up	K ₁	× 10 ⁴ Nm/rad	0.27	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.08	0.14	0.3	0.47	0.92	2.0
	K ₂	× 10 ⁴ Nm/rad	0.34	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.1	0.18	0.4	0.75	1.5	3.2
	K ₃	× 10 ⁴ Nm/rad	0.44	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.13	0.21	0.46	0.85	1.7	3.7
	θ ₁	× 10 ⁻⁴ rad	3.0	4.1	3.9	4.4	4.4	4.1
		arc min	1.0	1.4	1.3	1.5	1.5	1.4
	θ ₂	× 10 ⁻⁴ rad	6	12	9.7	11.3	11.1	11.6
		arc min	2.2	4.2	3.3	3.9	3.8	3.8

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-1-2 Efficiency E_R

DATORKER® efficiency would change by model, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity) .

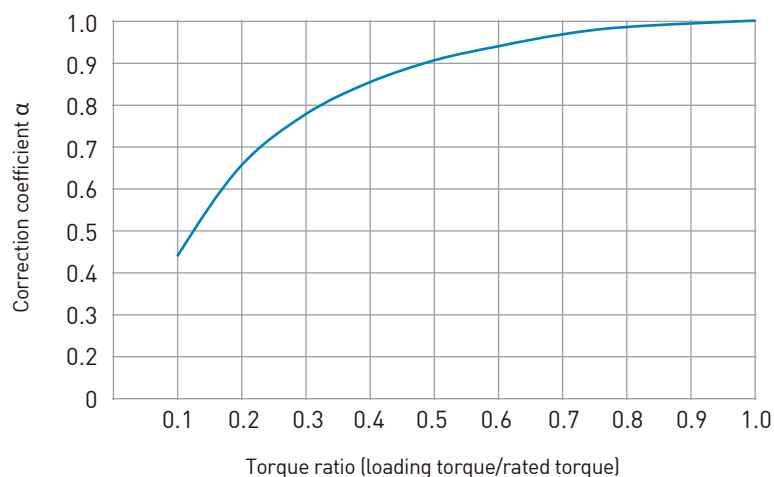


Efficiency correction coefficient α

$$\text{Efficiency} = \alpha \times E_R$$

α is correction coefficient

E_R is efficiency at the rated torque



4-1-3 No-load operating torque

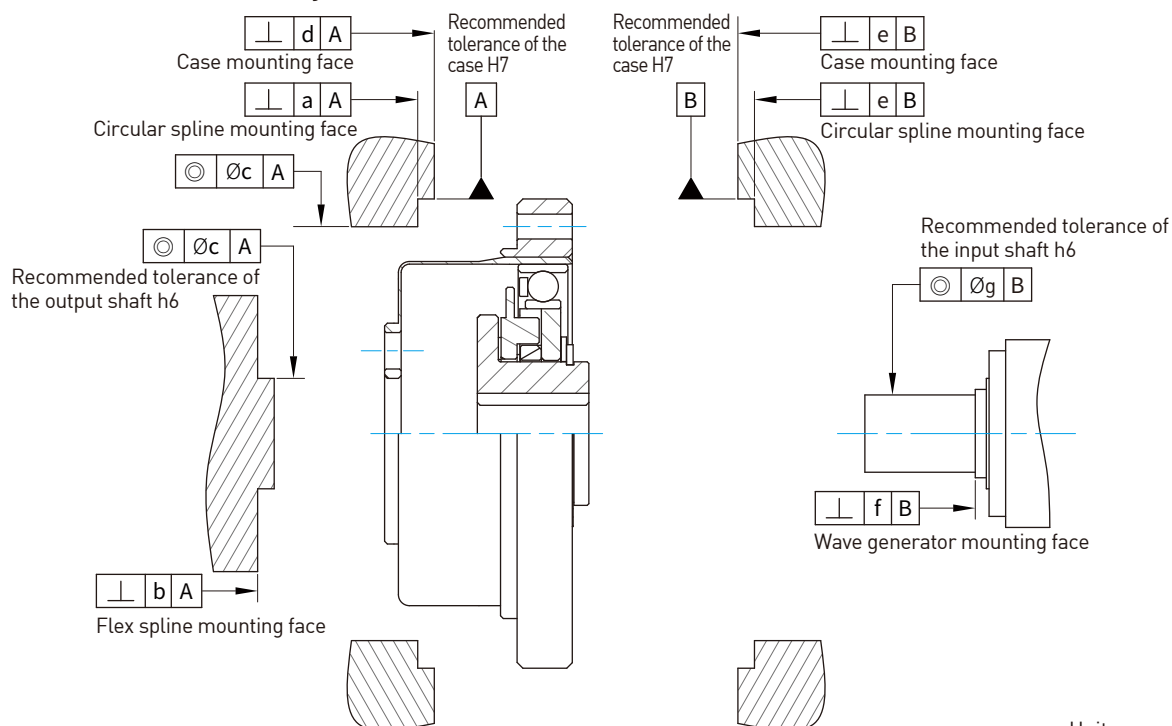
The torque required to drive the DATORKER® input (high-speed end) after running in at an input speed of 2000 r/min under an average ambient temperature of 25° C without load for more than 2 hours.

Unit: cNm

Reduction ratio	Input rotational speed	Model						
		11	14	17	20	25	32	40
50	500 r/min	1.2	1.8	3.4	5.1	9.7	21.2	38
	1000 r/min	1.6	2.3	4.4	6.9	12.5	27.2	51
	2000 r/min	2.1	3.1	5.8	9.4	18.5	37.2	73
	3500 r/min	2.8	4.2	7.9	13.4	25.5	50.2	98
80	500 r/min	—	1.4	2.6	3.9	7.6	16.8	31.2
	1000 r/min	—	1.9	3.6	5.7	10.4	22.8	44.2
	2000 r/min	—	2.7	5	8.2	16.4	32.8	65.2
	3500 r/min	—	3.8	7.1	12.2	23.4	45.8	91.2
100	500 r/min	0.9	1.3	2.5	3.7	7.2	16	30
	1000 r/min	1.3	1.8	3.5	5.5	10	22	43
	2000 r/min	1.8	2.6	4.9	8	16	32	64
	3500 r/min	2.5	3.7	7	12	23	45	90
120	500 r/min	—	—	2.4	3.5	6.9	15.4	29.1
	1000 r/min	—	—	3.4	5.2	9.7	21.4	42.1
	2000 r/min	—	—	4.8	7.8	15.7	31.4	63.1
	3500 r/min	—	—	6.9	11.8	22.7	44.4	89.1
160	500 r/min	—	—	—	3.4	6.6	14.8	27.8
	1000 r/min	—	—	—	5.2	9.4	20.8	40.8
	2000 r/min	—	—	—	7.7	15.4	30.8	61.8
	3500 r/min	—	—	—	11.7	22.4	43.8	87.8

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

4-1-4 Installation accuracy

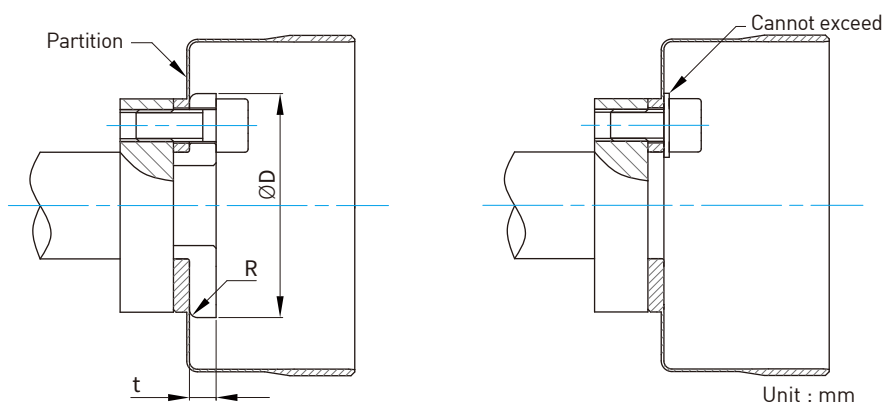


Unit : mm

Mark	Model	11	14	17	20	25	32	40
a		0.011	0.011	0.012	0.013	0.014	0.016	0.016
b		0.006	0.008	0.011	0.014	0.018	0.022	0.025
Øc		0.008	0.015	0.018	0.019	0.022	0.022	0.024
d		0.010	0.011	0.015	0.017	0.024	0.026	0.026
e		0.010	0.011	0.015	0.017	0.024	0.026	0.026
f		0.012	0.017 (0.008)	0.020 (0.010)	0.020 (0.010)	0.024 (0.012)	0.024 (0.012)	0.032 (0.012)
Øg		0.015	0.030 (0.016)	0.034 (0.018)	0.044 (0.019)	0.047 (0.022)	0.050 (0.022)	0.063 (0.024)

Note: The value in () is the value of the wave generator (without oldham coupling).

4-1-5 Recommend size of the press plate



Unit : mm

Mark	Model	11	14	17	20	25	32	40
ØD _{-0.1} ⁰		17.8	24.5	29	34	42	55	68
R ₀ ^{+0.1}		0.5	1.2	1.2	1.4	1.5	2	2.5
t		2	2	2.5	2.5	5	7	7

Note : In order to avoid the sinking or loosening of the bolts on the press plate, it is recommended that: 1. The material is S45C; 2. The heat treatment hardness should be HB200~270.

4-1-6 Installation bolt tightening torque

1. Flex spline flange side

- When the load torque is less than the rated performance value in "Peak torque at start/stop" Table 4-1-1, use only bolts for installation.
- If the load torque may reach the rated performance value in "Instantaneous permissible max torque" Table 4-1-1, please use a combination of bolts and pins for installation.

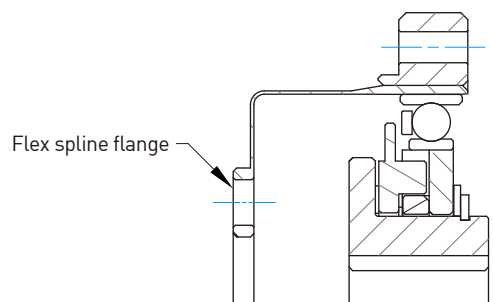


Table 4-1-8 Flex spline flange side bolt tightening torque

Item \ Model		11	14	17	20	25	32	40
Number of bolts		6	6	6	8	8	8	8
Bolts size		M3	M4	M5	M5	M6	M8	M10
Installation of bolts PCD	mm	12	17	19	24	30	40	50
Bolt tightening torque	Nm	2.0	4.5	9.0	9.0	15.3	37	74
	kgfm	0.20	0.46	0.92	0.92	1.56	3.8	7.5
Transmission torque	Nm	15	35	64	108	186	460	910
	kgfm	1.5	3.6	6.5	11	19	47	93

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu_K = \mu_G = 0.125$

2. Bolt-in depth at least 2 x thread diameter

Table 4-1-9 Pin installation of flex spline flange

Item \ Model		11	14	17	20	25	32	40
Number of bolts		2	2	2	2	2	2	2
Pin diameter	mm	2	3	3	3	4	5	6
Pin hole PCD	mm	15.2	18.5	21.5	27	34	45	56
Bolt plus pin's transmission torque	kgfm	3.0	7.5	11	17	32	74	140

Note : Recommended pin type: parallel pin; material : S45C-Q

2. Circular spline flange side

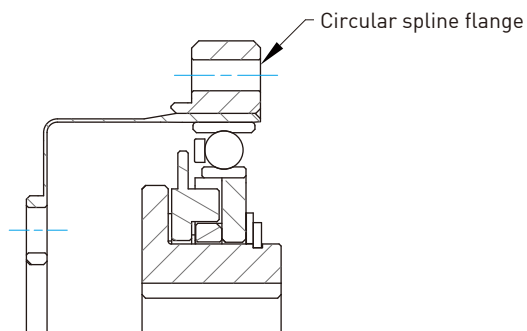


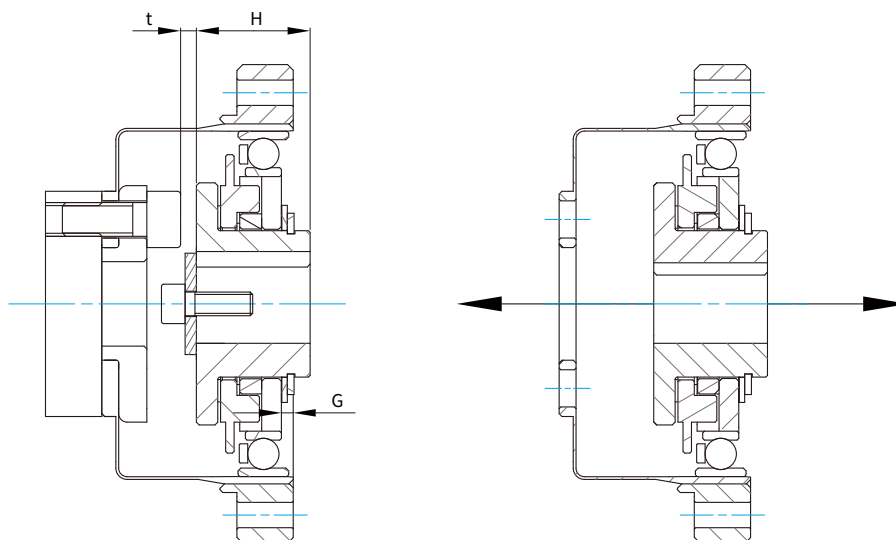
Table 4-1-10 Bolt installation of circular spline flange

Model		11	14	17	20	25	32	40
Item								
Number of bolts		8	6	12	12	12	12	12
Bolts size		M2.5	M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	35	44	54	62	75	100	120
Bolt tightening torque	Nm	1.1	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.11	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	39	54	131	147	314	676	1150
	kgfm	4.0	5.5	13	15	32	69	117

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$

2. Bolt-in depth at least 2 x thread diameter

4-1-7 Installation of wave generator



Unit : mm

Model	14	17	20	25	32	40
Mark						
G	0.4	0.3	0.1	2.1	2.5	3.3
$H_{-0.1}^0$	17.6	19.5	20.1	20.2	22	27.5
t	2.5	2.5	2.9	2.8	3.8	4.5

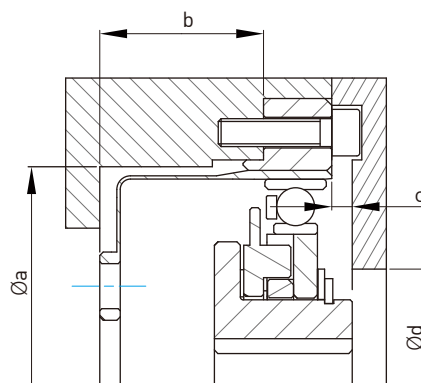
Note: 1. Avoid interference between the Wave generator and the locking bolt of the flex spline.

2. Due to the elastic deformation of the flex spline, the Strain Wave Gear applies thrust to the Wave generator during operation. The thrust will change with the operating conditions. In any case, a mechanism that prevents slipping due to the thrust of the Wave generator must be used.

4-1-8 Lubrication

1. Recommended dimensions for the inner wall of the case

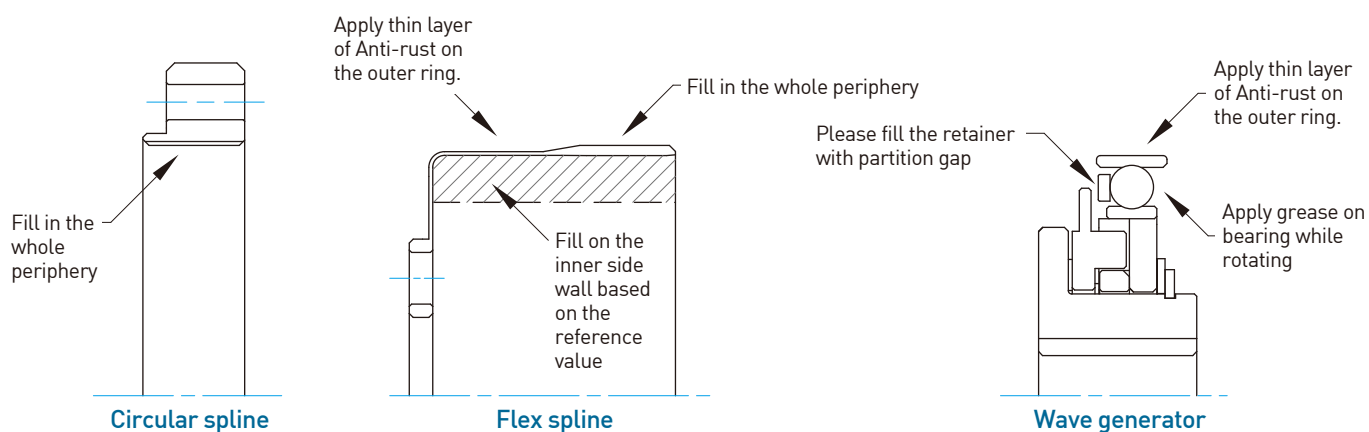
In order to avoid the splashing of excessive lubricant on other parts during operation. It is recommended to adhere to the following dimensions:



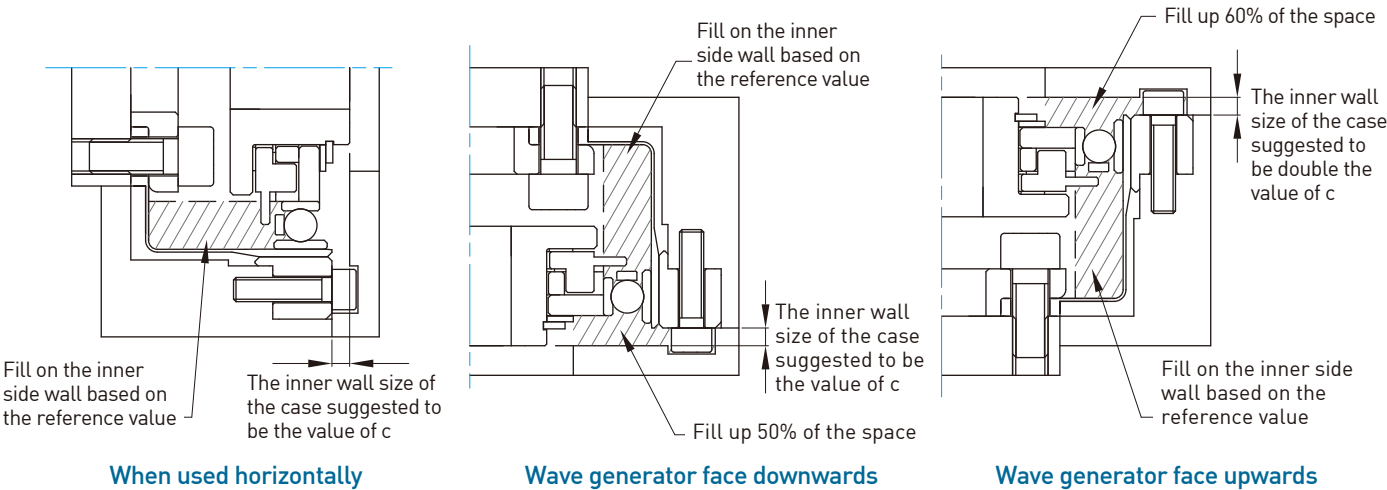
Unit : mm

Model	11	14	17	20	25	32	40
Mark							
Øa	30	38	45	53	66	86	106
b	14	17.1	19	20.5	23	26.8	33
c	0.5	1	1	1.5	1.5	1.5	2
Ød	16	16	26	30	37	37	45

2. Lubricant application



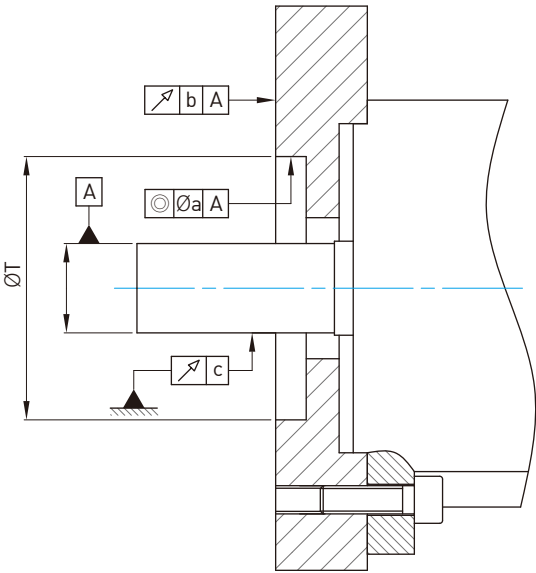
3.The key points of different application methods



Unit : g

Instructions		Model	11	14	17	20	25	32	40
Used horizontally			2.9	5.5	10	16	30	60	110
Used vertical	Wave generator is facing down		3.5	7	12	18	35	70	125
	Wave generator is facing up		4.4	8.5	14	21	40	80	145

4-1-9 Motor installation

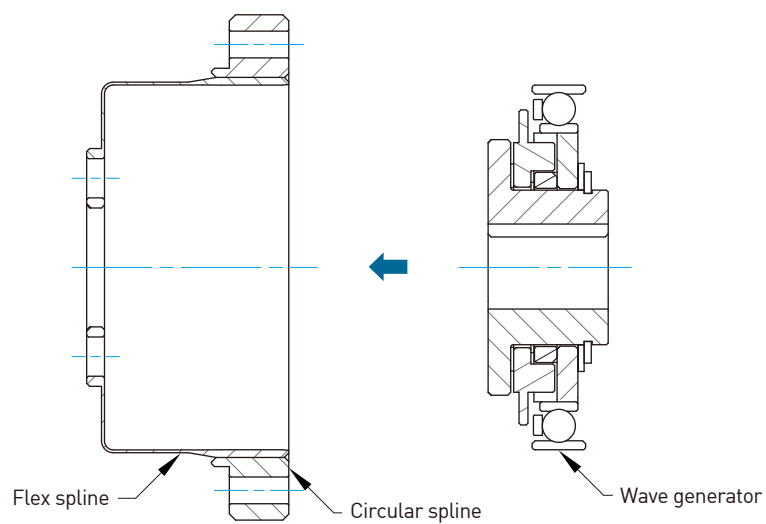


Unit : mm

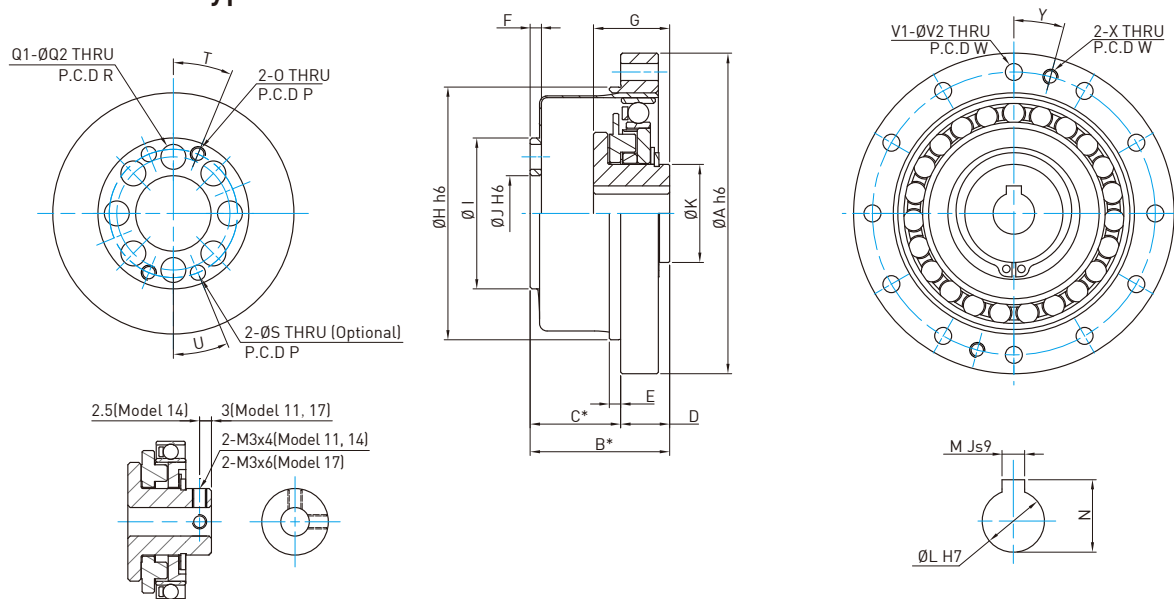
Mark		Model	14	17	20	25	32	40
a			0.03	0.04	0.04	0.04	0.04	0.05
b			0.03	0.04	0.04	0.04	0.04	0.05
c			0.015	0.015	0.018	0.018	0.018	0.018
ØT H6			50	60	70	85	110	135

4-1-10 Installation sequence

Install the circular spline and flex spline into the mechanism then install the Wave generator.



4-1-11 DSC-C0 type size chart



Model 11、14、17

Unit : mm

Mark	Model	11	14	17	20	25	32	40
ØA h6		40	50	60	70	85	110	135
B*		25.8 ⁰ _{-0.7}	28.5 ⁰ _{-0.8}	32.5 ⁰ _{-0.9}	33.5 ⁰ _{-1.0}	37 ⁰ _{-1.0}	44 ⁰ _{-1.1}	53 ⁰ _{-1.1}
C*		14.5 ^{+0.4} ₀	17.5 ^{+0.4} ₀	20 ^{+0.5} ₀	21.5 ^{+0.6} ₀	24 ^{+0.6} ₀	28 ^{+0.6} ₀	34 ^{+0.6} ₀
D		5	6	6.5	7.5	10	14	17
E		2	2	2.5	3	3	3	4
F		2	2.4	3	3	3	3.2	4
G		16 ⁰ _{-0.1}	17.6 ⁰ _{-0.1}	19.5 ⁰ _{-0.1}	20.1 ⁰ _{-0.1}	20.2 ⁰ _{-0.1}	22 ⁰ _{-0.1}	27.5 ⁰ _{-0.1}
ØH h6		31	38	48	54	67	90	110
ØI		17.8	23	27.2	32	40	52	64
ØJ H6		6	11	10	16	20	26	32
ØK		11	14	18	21	26	26	32
ØL H7		5	6	8	9	11	14	14
M Js9		-	-	-	3	4	5	5
N		-	-	-	10.4 ^{+0.1} ₀	12.8 ^{+0.1} ₀	16.3 ^{+0.1} ₀	16.3 ^{+0.1} ₀
O		-	M3	M3	M3	M4	M5	M6
P (P.C.D)		-	18.5	21.5	27	34	45	56
Q1		6	6	6	8	8	8	8
ØQ2		3.4	4.5	5.5	5.5	6.6	9	11
R (P.C.D)		12	17	19	24	30	40	50
S (Optional)		2 ^{+0.015} ₀	3 ^{+0.015} ₀	3 ^{+0.015} ₀	3 ^{+0.015} ₀	4 ^{+0.015} ₀	5 ^{+0.015} ₀	6 ^{+0.015} ₀
T (Degree)		-	30°	30°	22.5°	22.5°	22.5°	22.5°
U (Degree)		-	30°	30°	-	-	-	-
V1		8	6	12	12	12	12	12
ØV2		2.9	3.5	3.5	3.5	4.5	5.5	6.6
W (P.C.D)		35	44	54	62	75	100	120
X		M2.5	M3	M3	M3	M4	M5	M6
Y (Degree)		22.5°	30°	15°	15°	15°	15°	15°
Moment of inertia (×10 ⁻⁴ kgm ²)		0.012	0.033	0.079	0.193	0.413	1.69	4.50
Weight (Kg)		0.05	0.09	0.15	0.28	0.45	0.89	1.7

*1. The dimension B, C is the fitting position and permissible tolerance in the axial direction.

*2. If the load torque may reach the rated performance value in "Instantaneous permissible max torque please use a combination of bolts and pins for installation.

4-2 DSC-P0 Type

4-2-1 Technical data

Table 4-2-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	5.4	0.55	18	1.8	6.9	0.7	35	3.6	8500	3500
	80	7.8	0.80	23	2.4	11	1.1	47	4.8		
	100	7.8	0.80	28	2.9	11	1.1	54	5.5		
17	50	16	1.6	34	3.5	26	2.6	70	7.1	7300	3500
	80	22	2.2	43	4.4	27	2.7	87	8.9		
	100	24	2.4	54	5.5	39	4	108	11		
	120	24	2.4	54	5.5	39	4	86	8.8		
20	50	25	2.5	56	5.7	34	3.5	98	10	6500	3500
	80	34	3.5	74	7.5	47	4.8	127	13		
	100	40	4.1	82	8.4	49	5	147	15		
	120	40	4.1	87	8.9	49	5	147	15		
	160	40	4.1	92	9.4	49	5	147	15		
25	50	39	4.0	98	10	55	5.6	186	19	5600	3500
	80	63	6.4	137	14	87	8.9	255	26		
	100	67	6.8	157	16	108	11	284	29		
	120	67	6.8	167	17	108	11	304	31		
	160	67	6.8	176	18	108	11	314	32		
32	50	76	7.8	216	22	108	11	382	39	4800	3500
	80	118	12	304	31	167	17	568	58		
	100	137	14	333	34	216	22	647	66		
	120	137	14	353	36	216	22	686	70		
	160	137	14	372	38	216	22	686	70		
40	50	137	14	402	41	196	20	686	70	4000	3000
	80	206	21	519	53	284	29	980	100		
	100	265	27	568	58	372	38	1080	110		
	120	294	30	617	63	451	46	1180	120		
	160	294	30	647	66	451	46	1180	120		

※1 Permissible rated torque

※2 Permissible maximum torque

※3 Permissible average torque

※4 Permissible maximum value of impact

Table 4-2-2 Crossed roller bearing specifications

Model			14	17	20	25	32	40	
Item									
Pitch circle diameter of roller		Dpw	m	0.035	0.0425	0.05	0.062	0.08	0.096
Offset amount		R	m	0.0095	0.0095	0.0095	0.0115	0.013	0.0145
Basic load ratings	Dynamic load C	C	kN	4.7	5.3	5.8	9.6	15.0	21.3
			kgf	480	540	590	980	1530	2170
	Static load Co	Co	kN	6.1	7.6	9.0	15.1	25.0	36.5
			kgf	620	770	920	1540	2550	3720
Moment rigidity		K	×10 ⁴ Nm/rad	4.38	7.75	12.8	24.2	53.9	91.0
			kgfm/arc min	1.3	2.3	3.8	7.2	16	27
Permissible dynamic tilting moment		M	Nm	41	64	91	156	313	450
Permissible static tilting moment		Mo	Nm	53	80	113	234	500	876
Permissible axial load		Fa	kN	1.004	1.130	1.235	2.051	3.205	4.550
Permissible radial load		Fr	kN	0.673	0.757	0.827	1.374	2.147	3.049

Table 4-2-3 Angle transmission accuracy

Model		14	17	20	25	32	40
Reduction ratio							
50 up	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9	2.9
	arc min	1.5	1.5	1	1	1	1

Table 4-2-4 Hysteresis loss

Model		14	17	20	25	32	40
Reduction ratio							
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8	5.8
	arc min	2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9	2.9
	arc min	1.0	1.0	1.0	1.0	1.0	1.0

Table 4-2-5 Maximum backlash

Model		14	17	20	25	32	40
Reduction ratio							
50	$\times 10^{-5}$ rad	17.5	9.7	8.2	8.2	6.8	6.8
	arc sec	36	20	17	17	14	14
80	$\times 10^{-5}$ rad	11.2	6.3	5.3	5.3	4.4	4.4
	arc sec	23	13	11	11	9	9
100	$\times 10^{-5}$ rad	8.7	4.8	4.4	4.4	3.4	3.4
	arc sec	18	10	9	9	7	7
120	$\times 10^{-5}$ rad	—	3.9	3.9	3.9	2.9	2.9
	arc sec	—	8	8	8	6	6
160	$\times 10^{-5}$ rad	—	—	2.9	2.9	2.4	2.4
	arc sec	—	—	6	6	5	5

Table 4-2-6 Starting torque

Unit : cNm

Reduction ratio \ Model	14	17	20	25	32	40
50	4.1	6.1	7.8	15	31	55
80	2.8	4	4.9	9.2	19	35
100	2.5	3.4	4.3	8	18	31
120	—	3.1	3.8	7.3	15	28
160	—	—	3.3	6.3	14	24

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-2-7 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	1.6	3	4.7	9	18	33
80	1.6	3	4.8	9.1	19	33
100	1.8	3.3	5.1	9.8	20	36
120	—	3.5	5.5	11	22	39
160	—	—	6.4	13	26	46

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

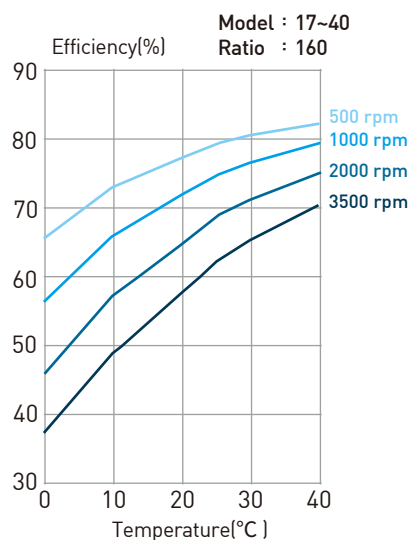
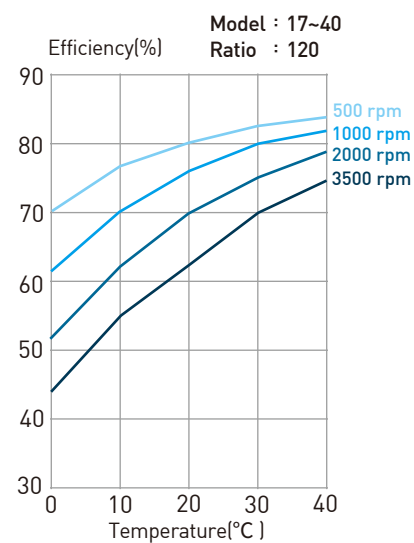
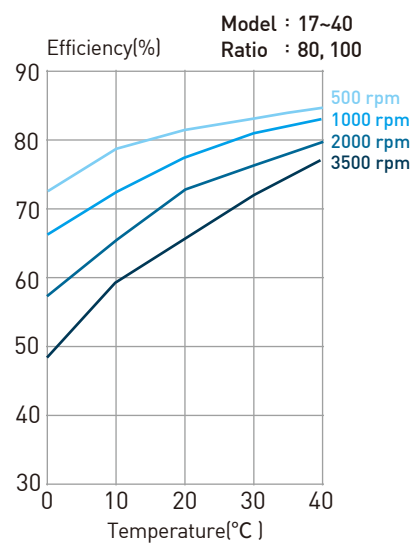
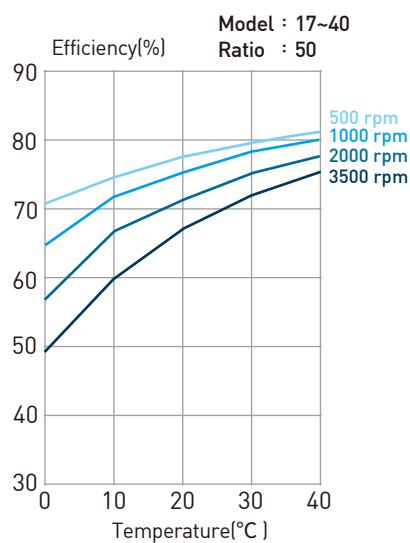
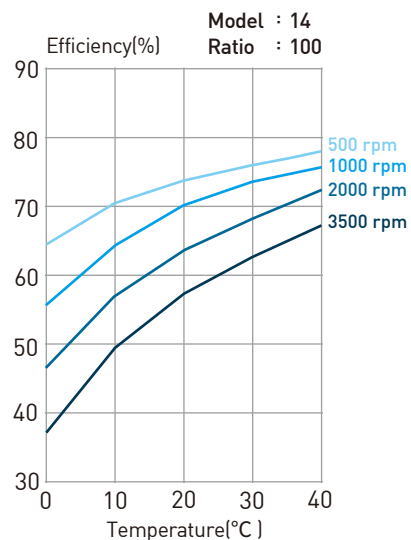
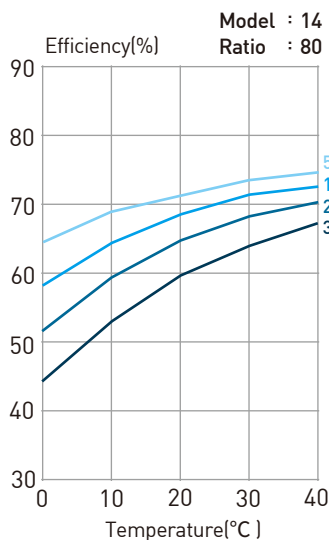
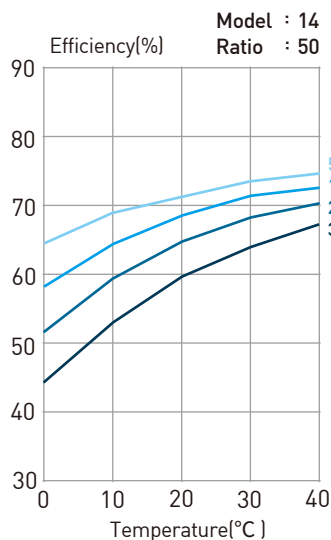
Table 4-2-8 Torsional rigidity

Reduction ratio \ Model		14	17	20	25	32	40
T ₁	Nm	2.0	3.9	7.0	14	29	54
	kgfm	0.2	0.4	0.7	1.4	3.0	5.5
T ₂	Nm	6.9	12	25	48	108	196
	kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	× 10 ⁴ Nm/rad	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6
	K ₂	× 10 ⁴ Nm/rad	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3
	K ₃	× 10 ⁴ Nm/rad	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9
	θ ₁	× 10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.2
		arc min	2.0	1.7	1.8	1.9	1.8
	θ ₂	× 10 ⁻⁴ rad	16	12	15.4	15.7	15.4
		arc min	5.6	4.2	5.3	5.4	5.3
80 up	K ₁	× 10 ⁴ Nm/rad	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0
	K ₂	× 10 ⁴ Nm/rad	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2
	K ₃	× 10 ⁴ Nm/rad	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7
	θ ₁	× 10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.1
		arc min	1.4	1.3	1.5	1.5	1.4
	θ ₂	× 10 ⁻⁴ rad	12	9.7	11.3	11.1	11.1
		arc min	4.2	3.3	3.9	3.8	3.8

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-2-2 Efficiency E_R

DATORKER® efficiency would change by model, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity) .

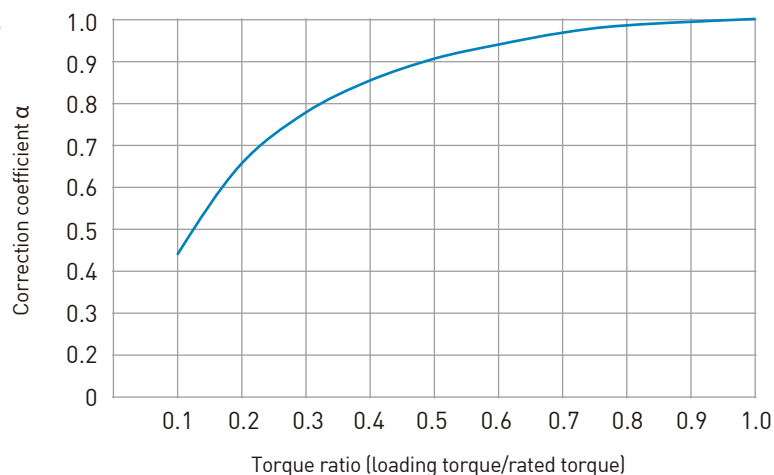


Efficiency correction coefficient α

$$\text{Efficiency} = \alpha \times E_R$$

α is correction coefficient

E_R is efficiency at the rated torque



4-2-3 No-load operating torque

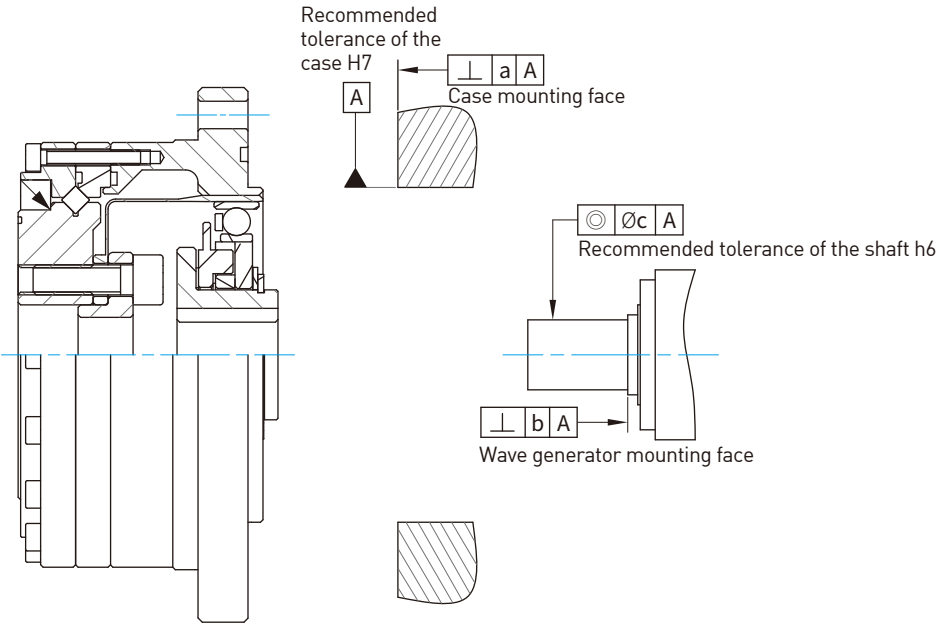
The torque required to drive the DATORKER® input (high-speed end) after running in at an input speed of 2000 r/min under an average ambient temperature of 25° C without load for more than 2 hours.

Unit: cNm

Reduction ratio	Input rotational speed	Model					
		14	17	20	25	32	40
50	500 r/min	3.2	5.1	7.3	12.8	26.1	46
	1000 r/min	3.9	6.1	9.1	17.8	33.1	58
	2000 r/min	4.6	7.6	11.8	21.8	44.1	79
	3500 r/min	5.9	9.6	12.7	28.8	57.1	103
80	500 r/min	2.3	3.8	5.5	9.7	20.3	36.1
	1000 r/min	3	4.8	7.3	14.7	27.3	48.1
	2000 r/min	3.7	6.3	10	18.7	38.3	69.1
	3500 r/min	5	8.3	10.9	25.7	51.3	93.1
100	500 r/min	2.1	3.5	5	9	19	34
	1000 r/min	2.8	4.5	6.8	14	26	46
	2000 r/min	3.5	6	9.5	18	37	67
	3500 r/min	4.8	8	10.4	25	50	91
120	500 r/min	-	3.3	4.7	8.5	18.1	32.5
	1000 r/min	-	4.3	6.5	13.5	25.1	44.5
	2000 r/min	-	5.8	9.2	17.5	36.1	65.5
	3500 r/min	-	7.8	10.1	24.5	49.1	89.5
160	500 r/min	-	-	4.2	7.8	16.8	30.5
	1000 r/min	-	-	6	12.8	23.8	42.5
	2000 r/min	-	-	8.7	16.8	34.8	63.5
	3500 r/min	-	-	9.6	23.8	47.8	87.5

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

4-2-4 Installation accuracy

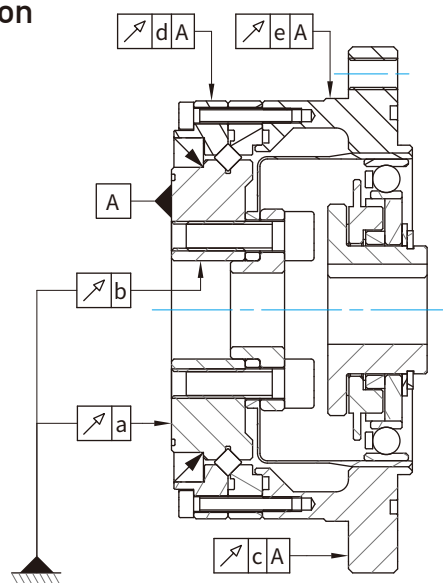


Unit : mm

Mark	Model	14	17	20	25	32	40
a		0.011	0.015	0.017	0.024	0.026	0.026
b		0.017	0.020	0.020	0.024	0.024	0.032
		(0.008)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)
c		0.030	0.034	0.044	0.047	0.050	0.063
		(0.016)	(0.018)	(0.019)	(0.022)	(0.022)	(0.024)

Note: The value in () is the value of the wave generator (without oldham coupling).

4-2-5 Mechanical precision



Unit : mm

Mark	Model	14	17	20	25	32	40
a		0.010	0.010	0.010	0.015	0.015	0.015
b		0.010	0.012	0.012	0.013	0.013	0.015
c		0.024	0.026	0.038	0.045	0.056	0.060
d		0.010	0.010	0.010	0.010	0.010	0.015
e		0.038	0.038	0.047	0.049	0.054	0.060

4-2-6 Installation bolt tightening torque

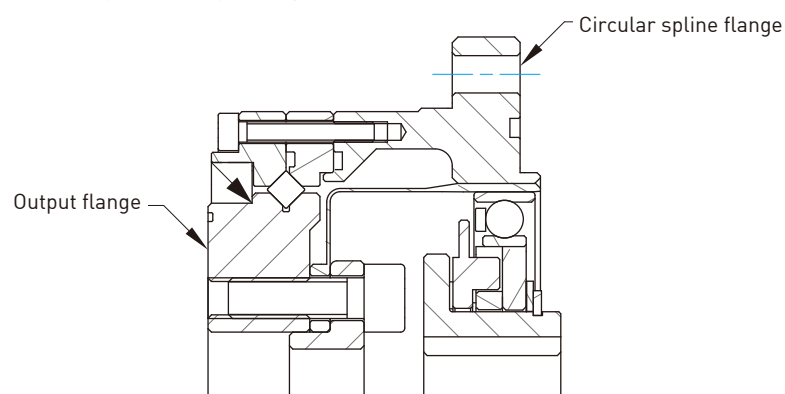


Table 4-2-9 Bolt tightening torque for output flange

Item	Model	14	17	20	25	32	40
Number of bolts		6	6	8	8	8	8
Bolts size		M4	M5	M6	M8	M10	M10
Installation of bolts PCD	mm	23	27	32	42	55	68
Bolts tightening torque	Nm	4.5	9	15.3	37	74	74
	kgfm	0.46	0.92	1.56	3.8	7.6	7.6
Transmission torque	Nm	49	91	204	486	1108	1258
	kgfm	5.0	9.3	21	50	104	128

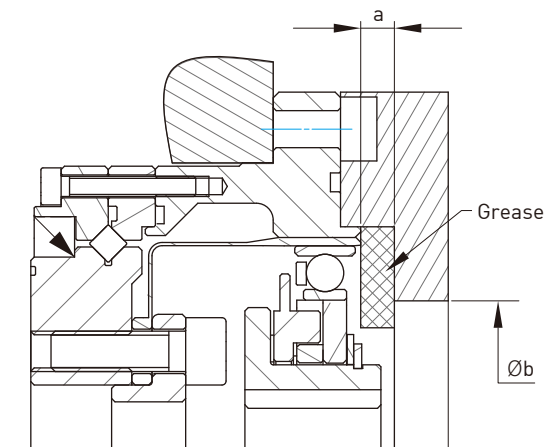
Table 4-2-10 Bolt tightening torque for circular spline flange

Item \ Model		14	17	20	25	32	40
Number of bolts		6	6	6	8	12	8
Bolts size		M4	M4	M5	M5	M6	M8
Installation of bolts PCD	mm	65	71	82	96	125	144
Bolts tightening torque	Nm	4.5	4.5	9.0	9.0	15.3	37
	kgfm	0.46	0.46	0.92	0.92	1.56	3.8
Transmission torque	Nm	137	147	274	431	1200	1680
	kgfm	14	15	28	44	122	171

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$
 2. Bolt-in depth at least 2 x thread diameter

4-2-7 Lubrication

Keep the space between the reducer and mounting flange as narrow as possible so that grease can be kept inside during operation.



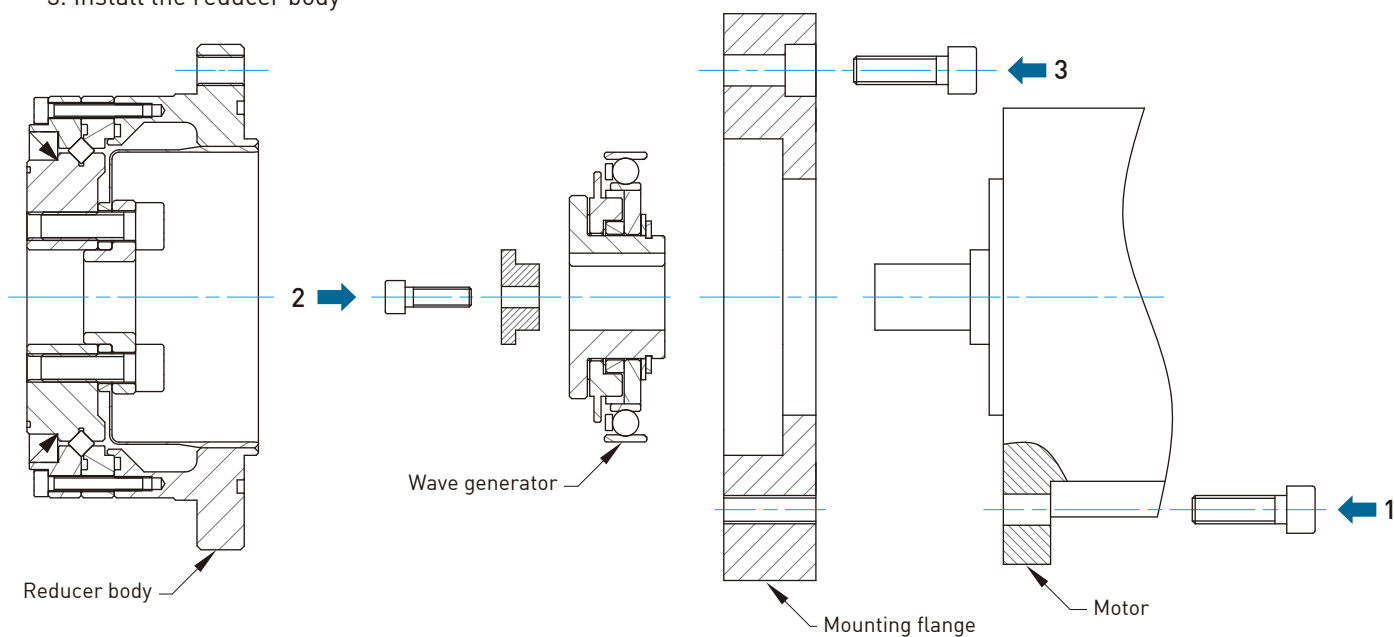
Unit : mm

Item \ Model		14	17	20	25	32	40
a ※1		1	1	1.5	1.5	1.5	2
a ※2		3	3	4.5	4.5	4.5	6
Øb		16	26	30	37	37	45

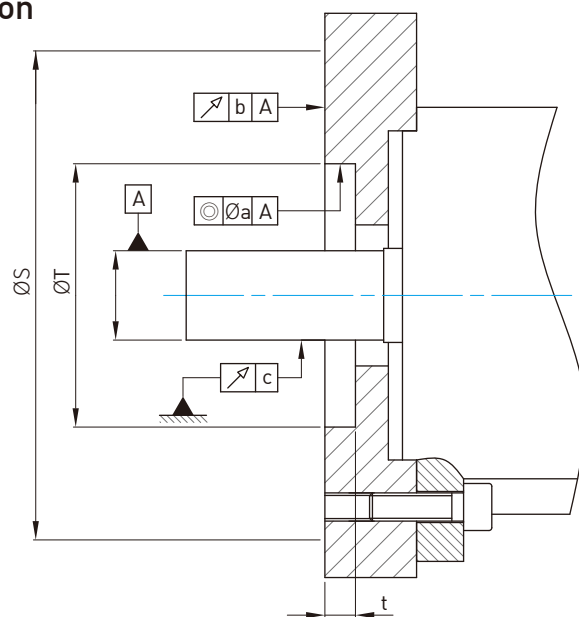
※1 Center shaft horizontal or vertical: when the wave generator is facing downward
 ※2 Center shaft vertical: when the wave generator is facing upward

4-2-8 Installation procedure

1. Install the mounting flange on the motor mounting surface
2. Install the wave generator on the motor output shaft
3. Install the reducer body



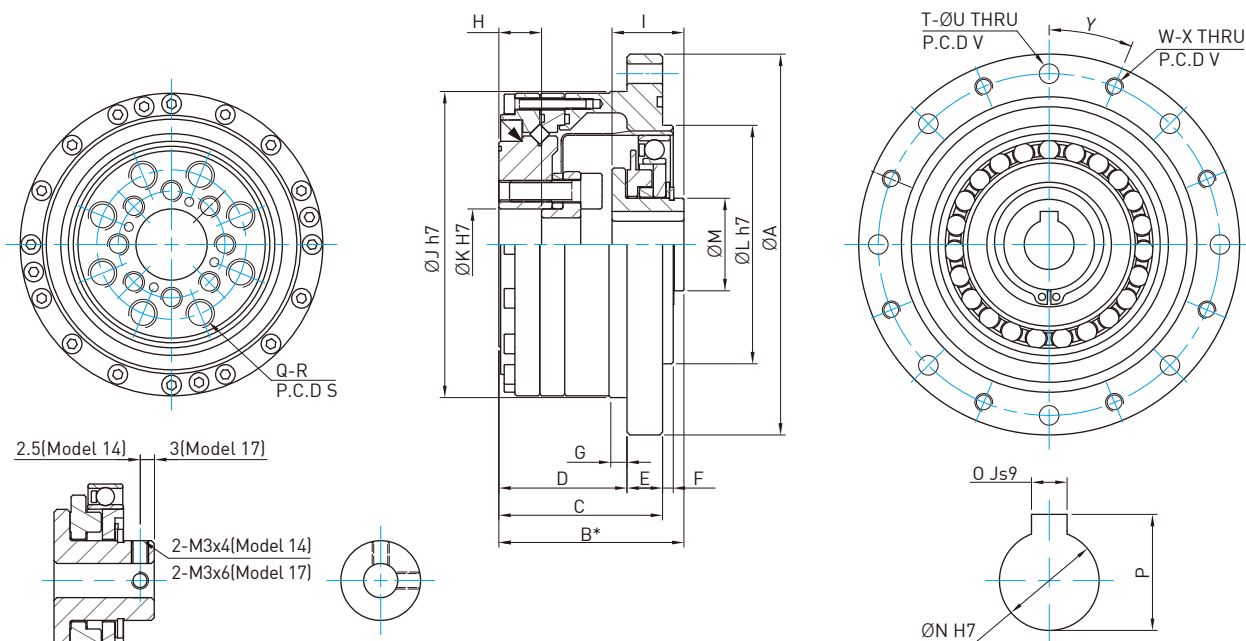
4-2-9 Motor installation



Unit : mm

Mark	Model	14	17	20	25	32	40
a		0.03	0.04	0.04	0.04	0.04	0.05
b		0.03	0.04	0.04	0.04	0.04	0.05
c		0.015	0.015	0.018	0.018	0.018	0.018
$\varnothing S$		73	79	93	107	138	160
t		3	3	4.5	4.5	4.5	6
$\varnothing T$ H7		38	48	56	67	90	110

4-2-10 DSC-P0 type size chart



Unit : mm

Mark	Model	14	17	20	25	32	40
ØA		73	79	93	107	138	160
B*		41 ⁰ _{-0.9}	45 ⁰ _{-0.9}	45.5 ⁰ ₋₁	52 ⁰ ₋₁	62 ⁰ _{-1.1}	72.5 ⁰ _{-1.1}
C		34	37	38	46	57	66.5
D		27	29	28	36	45	50.5
E		7	8	10	10	12	16
F		2	2	3	3	3	4
G		3.5	4	5	5	5	5
H		9.4	9.5	9	12	15	5
I		17.6 ⁰ _{-0.1}	19.5 ⁰ _{-0.1}	20.1 ⁰ _{-0.1}	20.2 ⁰ _{-0.1}	22 ⁰ _{-0.1}	27.5 ⁰ _{-0.1}
ØJ h7		56	63	72	86	113	127
ØK H7		11	10	14	20	26	32
ØL h7		38	48	56	67	90	110
ØM		14	18	21	26	26	32
ØN H7		6	8	12	14	14	14
O Js9		-	-	4	5	5	5
P		-	-	13.8 ^{+0.1} ₀	16.3 ^{+0.1} ₀	16.3 ^{+0.1} ₀	16.3 ^{+0.1} ₀
Q		6	6	8	8	8	8
R		M4 x 8DP	M5 x 10DP	M6 x 9DP	M8 x 12DP	M10 x 15DP	M10x15DP
S (P.C.D)		23	27	32	42	55	68
T		6	6	6	8	12	8
ØU		4.5	4.5	5.5	5.5	6.6	9
V (P.C.D)		65	71	82	96	125	144
W		6	6	6	8	12	8
X		M4	M4	M5	M5	M6	M8
Y (Degree)		30°	30°	30°	22.5°	15°	22.5°
Moment of inertia [×10 ⁻⁴ kgm ²]		0.033	0.079	0.193	0.413	1.69	4.50
Weight [kg]		0.52	0.68	0.98	1.5	3.2	5.0

*The dimension B is the fitting position and permissible tolerance in the axial direction.

4-3 DSC-P0-M Type

4-3-1 Technical data

Table 4-3-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	5.4	0.55	18	1.8	6.9	0.7	35	3.6	8500	3500
	80	7.8	0.8	23	2.4	11	1.1	47	4.8		
	100	7.8	0.8	28	2.9	11	1.1	54	5.5		
17	50	16	1.6	34	3.5	26	2.6	70	7.1	7300	3500
	80	22	2.2	43	4.4	27	2.7	87	8.9		
	100	24	2.4	54	5.5	39	4	110	11		
	120	24	2.4	54	5.5	39	4	86	8.8		
20	50	25	2.5	56	5.7	34	3.5	98	10	6500	3500
	80	34	3.5	74	7.5	47	4.8	127	13		
	100	40	4.1	82	8.4	49	5	147	15		
	120	40	4.1	87	8.9	49	5	147	15		
	160	40	4.1	92	9.4	49	5	147	15		
25	50	39	4	98	10	55	5.6	186	19	5600	3500
	80	63	6.4	137	14	87	8.9	255	26		
	100	67	6.8	157	16	108	11	284	29		
	120	67	6.8	167	17	108	11	304	31		
	160	67	6.8	176	18	108	11	314	32		
32	50	76	7.8	216	22	108	11	382	39	4800	3500
	80	118	12	304	31	167	17	568	58		
	100	137	14	333	34	216	22	647	66		
	120	137	14	353	36	216	22	686	70		
	160	137	14	372	38	216	22	686	70		
40	50	137	14	402	41	196	20	686	70	4000	3000
	80	206	21	519	53	284	29	980	100		
	100	265	27	568	58	372	38	1080	110		
	120	294	30	617	63	451	46	1180	120		
	160	294	30	647	66	451	46	1180	120		

- ※1 Permissible rated torque
 ※2 Permissible maximum torque
 ※3 Permissible average torque
 ※4 Permissible maximum value of impact

Table 4-3-2 Crossed roller bearing specifications

Item			Model	14	17	20	25	32	40
Pitch circle diameter of roller	Dpw	m		0.0465	0.059	0.070	0.088	0.114	0.134
Offset amount	R	m		0.014	0.014	0.016	0.018	0.020	0.026
Basic load ratings	Dynamic load C	C	kN	8.25	10.7	21.0	21.8	34.5	43.3
			kgf	840	1090	2140	2230	3520	4415
	Static load Co	Co	kN	11.4	14.8	27.0	35.8	59	81.6
			kgf	1160	1510	2750	3660	6020	8320
Moment rigidity	K		$\times 10^4$ Nm/rad	7.9	13.7	24.0	39.0	120.3	179.4
			kgfm/arc min	2.4	4.1	7.1	11.6	35.7	53.2
Permissible dynamic tilting moment	M	Nm		73	114	172	254	578	886
Permissible static tilting moment	Mo	Nm		155	276	603	1050	2242	3645
Permissible axial load	Fa	kN		2.030	2.286	4.486	5.298	9.357	10.361
Permissible radial load	Fr	kN		1.360	1.532	3.006	3.550	6.269	6.942

Table 4-3-3 Angle transmission accuracy

Reduction ratio		Model	14	17	20	25	32	40
50 up	$\times 10^{-4}$ rad		4.4	4.4	2.9	2.9	2.9	2.9
	arc min		1.5	1.5	1	1	1	1

Table 4-3-4 Hysteresis loss

Reduction ratio		Model	14	17	20	25	32	40
50	$\times 10^{-4}$ rad		5.8	5.8	5.8	5.8	5.8	5.8
	arc min		2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad		2.9	2.9	2.9	2.9	2.9	2.9
	arc min		1.0	1.0	1.0	1.0	1.0	1.0

Table 4-3-5 Maximum backlash

Reduction ratio		Model	14	17	20	25	32	40
50	$\times 10^{-5}$ rad		17.5	9.7	8.2	8.2	6.8	6.8
	arc sec		36	20	17	17	14	14
80	$\times 10^{-5}$ rad		11.2	6.3	5.3	5.3	4.4	4.4
	arc sec		23	13	11	11	9	9
100	$\times 10^{-5}$ rad		8.7	4.8	4.4	4.4	3.4	3.4
	arc sec		18	10	9	9	7	7
120	$\times 10^{-5}$ rad		—	3.9	3.9	3.9	2.9	2.9
	arc sec		—	8	8	8	6	6
160	$\times 10^{-5}$ rad		—	—	2.9	2.9	2.4	2.4
	arc sec		—	—	6	6	5	5

Table 4-3-6 Starting torque

Unit : cNm

Reduction ratio \ Model	14	17	20	25	32	40
50	4.1	6.1	7.8	15	31	55
80	2.8	4	4.9	9.2	19	35
100	2.5	3.4	4.3	8	18	31
120	—	3.1	3.8	7.3	15	28
160	—	—	3.3	6.3	14	24

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-3-7 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	1.6	3	4.7	9	18	33
80	1.6	3	4.8	9.1	19	33
100	1.8	3.3	5.1	9.8	20	36
120	—	3.5	5.5	11	22	39
160	—	—	6.4	13	26	46

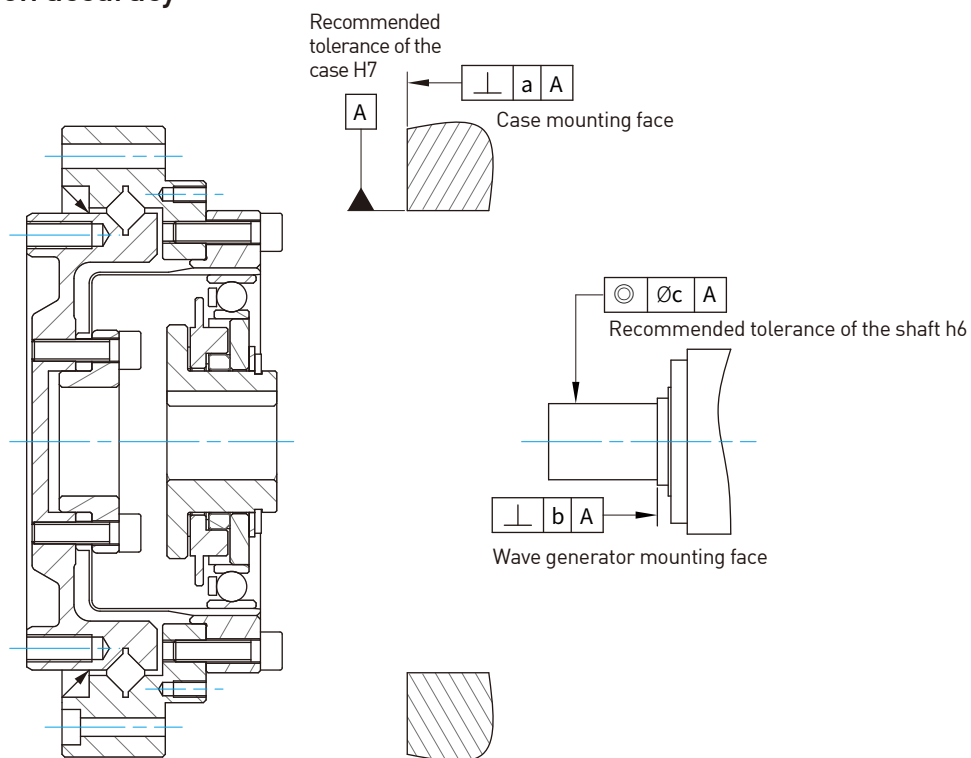
Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-3-8 Torsional rigidity

Reduction ratio		Model	14	17	20	25	32	40
T ₁		Nm	2.0	3.9	7.0	14	29	54
		kgfm	0.2	0.4	0.7	1.4	3.0	5.5
T ₂		Nm	6.9	12	25	48	108	196
		kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	× 10 ⁴ Nm/rad	0.34	0.81	1.3	2.5	5.4	10
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6	3.0
	K ₂	× 10 ⁴ Nm/rad	0.47	1.1	1.8	3.4	7.8	14
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3	4.2
	K ₃	× 10 ⁴ Nm/rad	0.57	1.3	2.3	4.4	9.8	18
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9	5.3
	θ ₁	× 10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.5	5.2
		arc min	2.0	1.7	1.8	1.9	1.9	1.8
	θ ₂	× 10 ⁻⁴ rad	16	12	15.4	15.7	15.7	15.4
		arc min	5.6	4.2	5.3	5.4	5.4	5.3
80 up	K ₁	× 10 ⁴ Nm/rad	0.47	1	1.6	3.1	6.7	13
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0	3.8
	K ₂	× 10 ⁴ Nm/rad	0.61	1.4	2.5	5.0	11	20
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2	6.0
	K ₃	× 10 ⁴ Nm/rad	0.71	1.6	2.9	5.7	12	23
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7	6.8
	θ ₁	× 10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.4	4.1
		arc min	1.4	1.3	1.5	1.5	1.5	1.4
	θ ₂	× 10 ⁻⁴ rad	12	9.7	11.3	11.1	11.6	11.1
		arc min	4.2	3.3	3.9	3.8	4.0	3.8

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-3-2 Installation accuracy

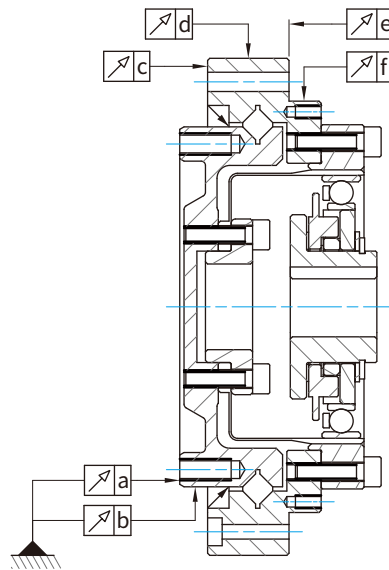


Unit : mm

Mark \ Model	14	17	20	25	32	40
a	0.011	0.015	0.017	0.024	0.026	0.026
b	0.017 (0.008)	0.020 (0.010)	0.020 (0.010)	0.024 (0.012)	0.024 (0.012)	0.032 (0.012)
c	0.030 (0.016)	0.034 (0.018)	0.044 (0.019)	0.047 (0.022)	0.050 (0.022)	0.063 (0.024)

Note: The value in () is the value of the wave generator (without oldham coupling).

4-3-3 Mechanical precision



Unit : mm

Mark	Model	14	17	20	25	32	40
a		0.010	0.010	0.010	0.010	0.012	0.012
b		0.010	0.010	0.010	0.010	0.010	0.010
c		0.010	0.010	0.010	0.010	0.012	0.012
d		0.010	0.010	0.010	0.010	0.010	0.010
e		0.020	0.020	0.020	0.020	0.020	0.020
f		0.015	0.015	0.015	0.015	0.015	0.015

4-3-4 Installation bolt tightening torque

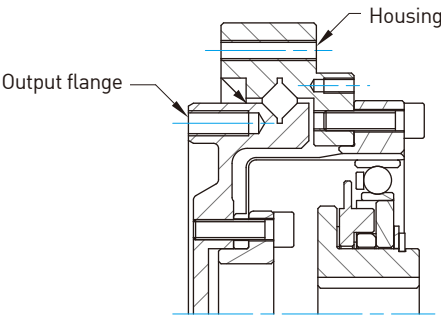


Table 4-3-9 Bolt tightening torque for output flange

Item	Model	14	17	20	25	32	40
Number of bolts		12	12	12	12	12	12
Bolts size		M3	M4	M4	M5	M6	M8
Installation of bolts PCD	mm	43	52	62	76	96	118
Bolts tightening torque	Nm	2.3	5.1	5.1	10	17.4	42.2
	kgfm	0.23	0.52	0.52	1.0	1.8	4.3
Transmission torque	Nm	85	188	228	463	847	1964
	kgfm	8.6	19.1	23.2	47.2	86.3	200.2

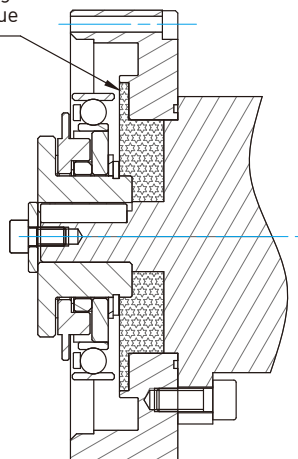
Table 4-3-10 Bolt tightening torque for circular spline flange

Item \ Model		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	68	80	89	105	135	168
Bolts tightening torque	Nm	2.3	2.3	2.3	5.1	10.0	17.4
	kgfm	0.23	0.23	0.23	0.52	1.0	1.8
Transmission torque	Nm	89	158	177	378	805	1482
	kgfm	9.1	16.1	18.0	38.6	82.1	151.1

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$
2. Bolt-in depth at least 2 x thread diameter

4-3-5 Lubrication

Fill on the inside of the flange
based on the reference value

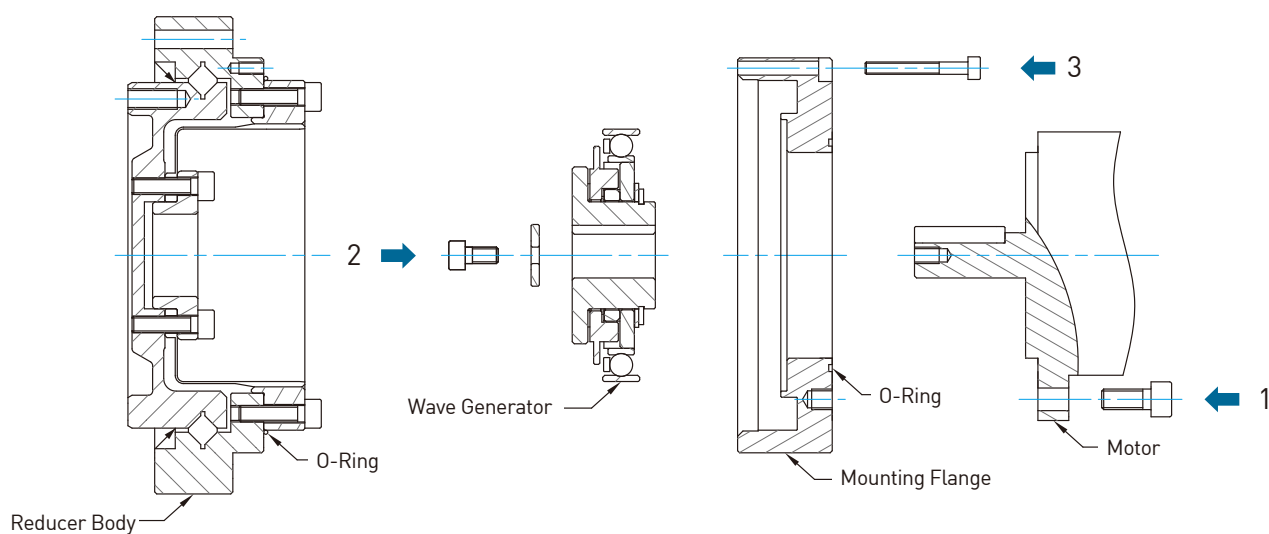


Unit : g

Model	14	17	20	25	32	40
Standard grease quantity	5.5	10	16	40	60	130

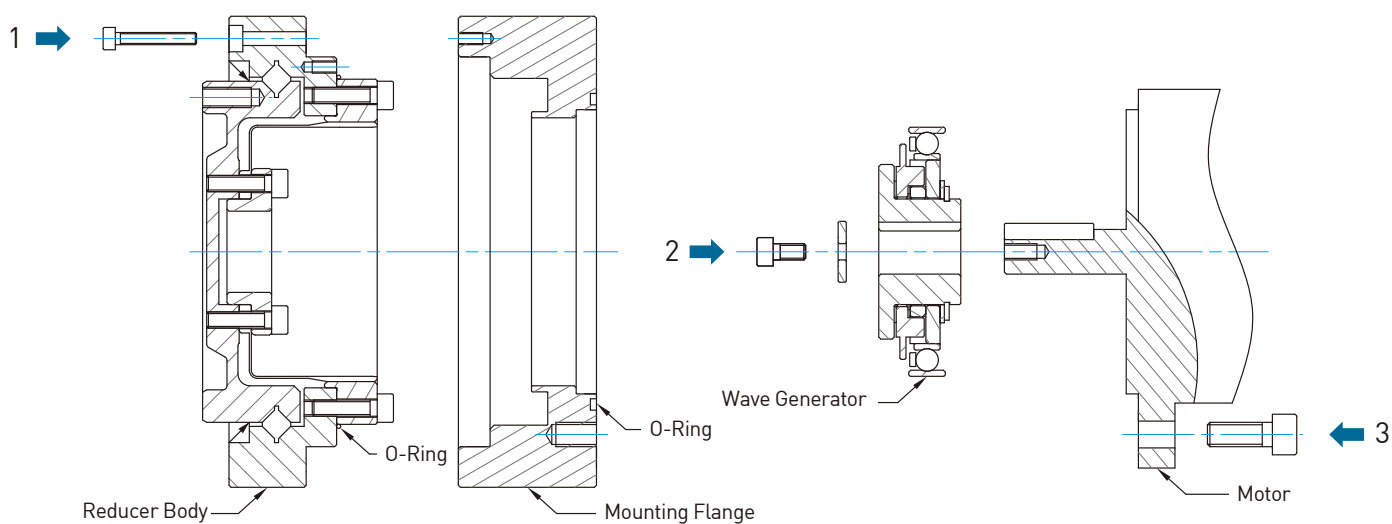
4-3-6 Installation sequence

Mounting flange type A



1. Install the mounting flange on the motor mounting surface
2. Install the wave generator on the motor output shaft
3. Install the reducer body

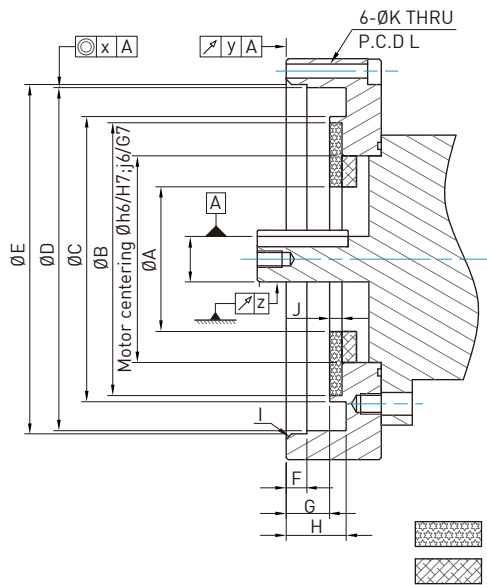
Mounting flange type B



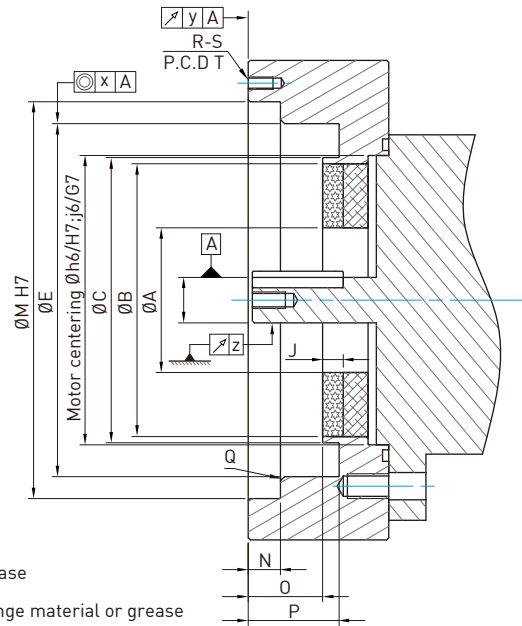
1. Install the reducer body on the mounting flange surface
2. Install the wave generator on the motor output shaft
3. Install the mounting flange on the motor mounting surface

4-3-7 Motor installation

Mounting flange type A



Mounting flange type B

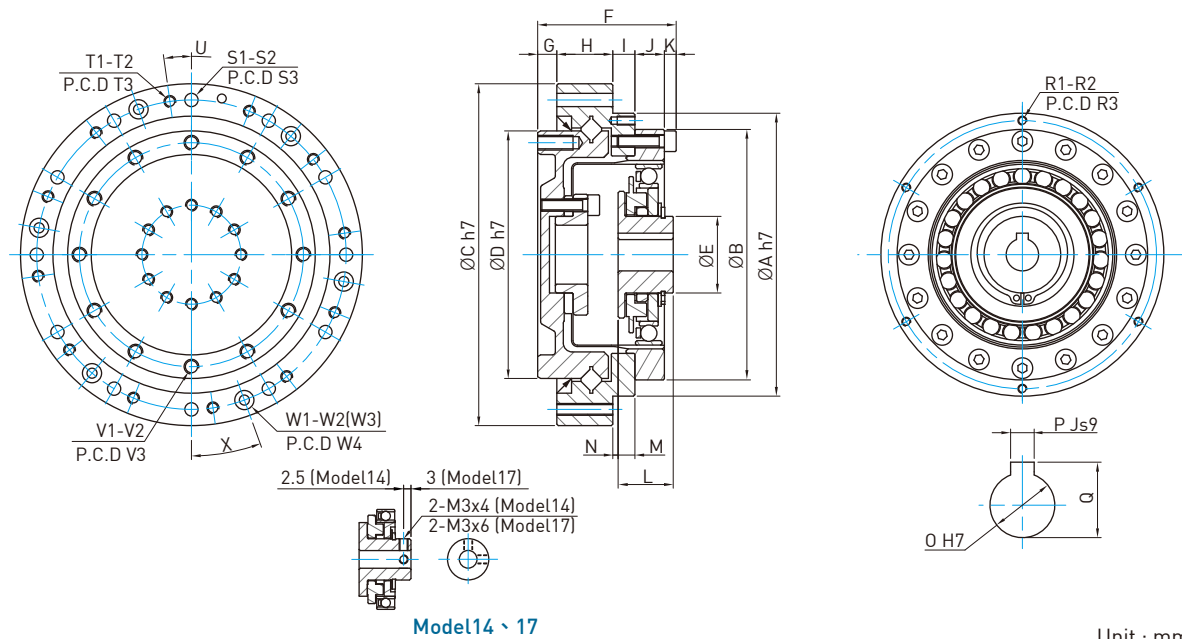


Unit : mm

Mark	Model	14	17	20	25	32	40
ØA		16	26	30	37	37	45
ØB		36.5	47	53	66	86	106
ØC		37.5 ^{+0.1} _{-0.1}	48 ^{+0.1} _{-0.1}	55.5 ^{+0.1} _{-0.1}	69 ^{+0.1} _{-0.1}	90.5 ^{+0.1} _{-0.1}	110 ^{+0.1} _{-0.1}
ØD		50 ^{+0.027} ₀	60 ^{+0.034} ₀	70 ^{+0.036} ₀	85 ^{+0.050} ₀	110 ^{+0.055} ₀	135 ^{+0.065} ₀
ØE		50.4 ^{+0.1} ₀	60.4 ^{+0.1} ₀	70.4 ^{+0.1} ₀	85.4 ^{+0.1} ₀	110.4 ^{+0.1} ₀	135.4 ^{+0.1} ₀
F		2.5	3	3	5	6.5	11
G		6.5 ^{+0.1} ₀	7 ^{+0.1} ₀	8 ^{+0.1} ₀	10.5 ^{+0.1} ₀	14.5 ^{+0.1} ₀	18 ^{+0.1} ₀
H		9.5 ^{+0.1} ₀	10 ^{+0.1} ₀	11 ^{+0.1} ₀	14.5 ^{+0.1} ₀	19.5 ^{+0.1} ₀	24 ^{+0.1} ₀
I		1 ⁰ _{-0.1}	1.3 ⁰ _{-0.1}	1.3 ⁰ _{-0.1}	1.3 ⁰ _{-0.1}	1.3 ⁰ _{-0.1}	2 ⁰ _{-0.1}
J		1	1.5	1.5	1.5	2	2
ØK		2.9	3.4	3.4	3.4	4.5	5.5
L(P.C.D)		55	66	76	91	118	144
ØM		60	72	82	96	125	154
N		4.3 ^{+0.1} ₀	6.3 ^{+0.1} ₀	6.9 ^{+0.1} ₀	7.8 ^{+0.1} ₀	9.8 ^{+0.1} ₀	10.3 ^{+0.1} ₀
O		10.5 ^{+0.1} ₀	13 ^{+0.1} ₀	14.6 ^{+0.1} ₀	18 ^{+0.1} ₀	24 ^{+0.1} ₀	28 ^{+0.1} ₀
P		13.5 ^{+0.1} ₀	16 ^{+0.1} ₀	17.6 ^{+0.1} ₀	22 ^{+0.1} ₀	29 ^{+0.1} ₀	34 ^{+0.1} ₀
Q		0.7 ⁰ _{-0.1}	1 ⁰ _{-0.1}	1 ⁰ _{-0.1}	1 ⁰ _{-0.1}	1 ⁰ _{-0.1}	1.7 ⁰ _{-0.1}
R		4	6	6	6	6	6
S		M2.5	M2.5	M2.5	M3	M4	M5
T(P.C.D)		68	78	88	105	135	165
X		0.030	0.034	0.044	0.047	0.050	0.063
Y		0.030	0.040	0.040	0.040	0.040	0.050
Z		0.030 (0.016)	0.034 (0.018)	0.044 (0.019)	0.047 (0.022)	0.050 (0.022)	0.063 (0.024)

Note: The value in () is the value of the wave generator (without oldham coupling).

4-3-8 DSC-PO-M type size chart



Unit : mm

Mark	Model	14	17	20	25	32	40
ØA h7		60	72	82	96	125	154
ØB		50 ^{+0.01} _{-0.015}	60 ^{+0.01} _{-0.02}	70 ^{+0.01} _{-0.02}	85 ^{+0.01} _{-0.025}	110 ^{+0.01} _{-0.025}	135 ^{+0.1} _{-0.03}
ØC h7		78	88	98	116	148	180
ØD h7		49	59	69	84	110	132
ØE		14	18	21	26	26	32
F		30	34	40	47	59	69.5
G		5	5	5.7	6.5	6.5	7.5
H		12	13.5	17.2	19	24	29
I		4	6	6.6	7.5	9.5	10
J		6	6.5	7.5	10	14	17
K		3	3	3	4	5	6
L		17.6 ⁰ _{-0.1}	19.5 ⁰ _{-0.1}	20.1 ⁰ _{-0.1}	20.2 ⁰ _{-0.1}	22 ⁰ _{-0.1}	27.5 ⁰ _{-0.1}
M (flange type A)		6.6 ^{+0.4} ₀	7 ^{+0.45} ₀	8.1 ^{+0.5} ₀	7.2 ^{+0.5} ₀	6 ^{+0.55} ₀	8.5 ^{+0.55} ₀
N (flange type B)		2.6 ^{+0.4} ₀	1 ^{+0.45} ₀	1.5 ^{+0.5} ₀	0.3 ⁰ _{-0.5}	3.5 ⁰ _{-0.55}	1.5 ⁰ _{-0.55}
ØO H7		6	8	9	11	14	14
P Js9		—	—	3	4	5	5
Q		—	—	10.4 ^{+0.1} ₀	12.8 ^{+0.1} ₀	16.3 ^{+0.1} ₀	16.3 ^{+0.1} ₀
R1		6	6	6	6	6	6
R2		M2.5 x 4DP	M3 x 6DP	M3 x 6DP	M3 x 6DP	M4 x 8DP	M5 x 10DP
R3 (P.C.D)		55	66	76	91	118	144
S1		8	12	12	12	12	12
ØS2		3.4	3.4	3.4	4.5	5.5	6.6
S3 (P.C.D)		68	80	89	105	135	168
T1		8	12	12	12	12	12
T2		M3 x 7.8DP	M3	M3	M4	M5	M6
T3 (P.C.D)		68	80	89	105	135	168
U (Degree)		15°	10°	10°	8°	10°	10°
V1		12	12	12	12	12	12
V2		M3 x 6DP	M4 x 8DP	M4 x 8DP	M5 x 10DP	M6 x 10DP	M8 x 14DP
V3 (P.C.D)		43	52	62	76	96	118
W1		4	6	6	6	6	6
W2		Ø5.5 x 3DP	Ø5.5 x 3DP	Ø5.5 x 3DP	Ø6.5 x 3.4DP	Ø8 x 4.4DP	Ø10 x 6DP
ØW3		2.9	2.9	2.9	3.4	4.5	5.5
W4 (P.C.D)		68	78	88	105	135	165
X (Degree)		30°	20°	20°	20°	20°	20°
Moment of inertia (× 10 ⁻⁴ kgm ²)		0.033	0.079	0.193	0.413	1.69	4.50
Weight (Kg)		0.54	0.79	1.30	1.95	3.90	6.90

4-4 DSC-AJ-M Type

4-4-1 Technical data

Table 4-4-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	5.4	0.55	18	1.8	6.9	0.7	35	3.6	8500	3500
	80	7.8	0.8	23	2.4	11	1.1	47	4.8		
	100	7.8	0.8	28	2.9	11	1.1	54	5.5		
17	50	16	1.6	34	3.5	26	2.6	70	7.1	7300	3500
	80	22	2.2	43	4.4	27	2.7	87	8.9		
	100	24	2.4	54	5.5	39	4	110	11		
	120	24	2.4	54	5.5	39	4	86	8.8		
20	50	25	2.5	56	5.7	34	3.5	98	10	6500	3500
	80	34	3.5	74	7.5	47	4.8	127	13		
	100	40	4.1	82	8.4	49	5	147	15		
	120	40	4.1	87	8.9	49	5	147	15		
	160	40	4.1	92	9.4	49	5	147	15		
25	50	39	4	98	10	55	5.6	186	19	5600	3500
	80	63	6.4	137	14	87	8.9	255	26		
	100	67	6.8	157	16	108	11	284	29		
	120	67	6.8	167	17	108	11	304	31		
	160	67	6.8	176	18	108	11	314	32		
32	50	76	7.8	216	22	108	11	382	39	4800	3500
	80	118	12	304	31	167	17	568	58		
	100	137	14	333	34	216	22	647	66		
	120	137	14	353	36	216	22	686	70		
	160	137	14	372	38	216	22	686	70		
40	50	137	14	402	41	196	20	686	70	4000	3000
	80	206	21	519	53	284	29	980	100		
	100	265	27	568	58	372	38	1080	110		
	120	294	30	617	63	451	46	1180	120		
	160	294	30	647	66	451	46	1180	120		

- ※1 Permissible rated torque
 ※2 Permissible maximum torque
 ※3 Permissible average torque
 ※4 Permissible maximum value of impact

Table 4-4-2 Crossed roller bearing specifications

Item			Model	14	17	20	25	32	40
Pitch circle diameter of roller		Dpw	m	0.0465	0.059	0.070	0.088	0.114	0.134
Offset amount		R	m	0.014	0.014	0.016	0.018	0.020	0.026
Basic load ratings	Dynamic load C	C	kN	8.25	10.7	21.0	21.8	34.5	43.3
			kgf	840	1090	2140	2230	3520	4415
	Static load Co	Co	kN	11.4	14.8	27.0	35.8	59	81.6
			kgf	1160	1510	2750	3660	6020	8320
Moment rigidity		K	×10 ⁴ Nm/rad	7.9	13.7	24.0	39.0	120.3	179.4
			kgfm/arc min	2.4	4.1	7.1	11.6	35.7	53.2
Permissible dynamic tilting moment		M	Nm	73	114	172	254	578	886
Permissible static tilting moment		Mo	Nm	155	276	603	1050	2242	3645
Permissible axial load		Fa	kN	2.030	2.286	4.486	5.298	9.357	10.361
Permissible radial load		Fr	kN	1.360	1.532	3.006	3.550	6.269	6.942

Table 4-4-3 Angle transmission accuracy

Reduction ratio			Model	14	17	20	25	32	40
50 up	$\times 10^{-4}$ rad			4.4	4.4	2.9	2.9	2.9	2.9
	arc min			1.5	1.5	1	1	1	1

Table 4-4-4 Hysteresis loss

Reduction ratio			Model	14	17	20	25	32	40
50	$\times 10^{-4}$ rad			5.8	5.8	5.8	5.8	5.8	5.8
	arc min			2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad			2.9	2.9	2.9	2.9	2.9	2.9
	arc min			1.0	1.0	1.0	1.0	1.0	1.0

Table 4-4-5 Starting torque

Unit : cNm

Reduction ratio			Model	14	17	20	25	32	40
50				5.7	9.7	14	22	41	72
80				4.4	7.2	11	15	29	52
100				3.7	6.5	9.9	14	27	47
120				—	6.2	9.3	13	24	44

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-4-6 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	3.4	5.8	8.4	13	25	43
80	4.2	6.9	10	15	28	50
100	4.5	7.8	12	17	33	56
120	—	8.9	13	19	34	63

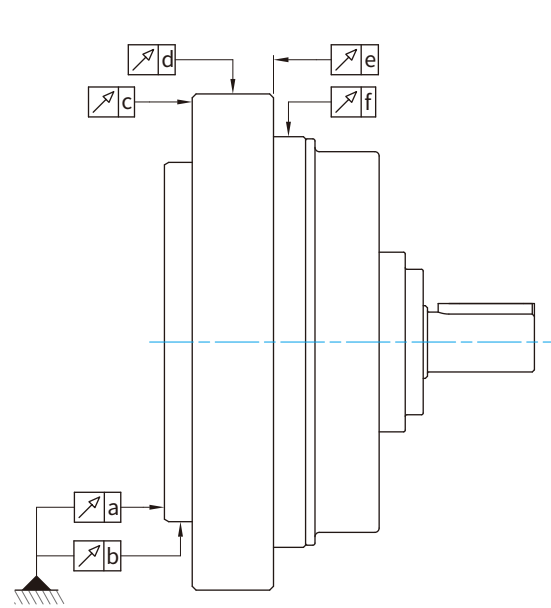
Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-4-7 Torsional rigidity

Reduction ratio \ Model			14	17	20	25	32	40
T ₁		Nm	2.0	3.9	7.0	14	29	54
		kgfm	0.2	0.4	0.7	1.4	3.0	5.5
T ₂		Nm	6.9	12	25	48	108	196
		kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	$\times 10^4$ Nm/rad	0.34	0.81	1.3	2.5	5.4	10
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6	3.0
	K ₂	$\times 10^4$ Nm/rad	0.47	1.1	1.8	3.4	7.8	14
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3	4.2
	K ₃	$\times 10^4$ Nm/rad	0.57	1.3	2.3	4.4	9.8	18
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9	5.3
	θ_1	$\times 10^{-4}$ rad	5.8	4.9	5.2	5.5	5.5	5.2
		arc min	2.0	1.7	1.8	1.9	1.9	1.8
	θ_2	$\times 10^{-4}$ rad	16	12	15.4	15.7	15.7	15.4
		arc min	5.6	4.2	5.3	5.4	5.4	5.3
80 up	K ₁	$\times 10^4$ Nm/rad	0.47	1	1.6	3.1	6.7	13
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0	3.8
	K ₂	$\times 10^4$ Nm/rad	0.61	1.4	2.5	5.0	11	20
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2	6.0
	K ₃	$\times 10^4$ Nm/rad	0.71	1.6	2.9	5.7	12	23
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7	6.8
	θ_1	$\times 10^{-4}$ rad	4.1	3.9	4.4	4.4	4.4	4.1
		arc min	1.4	1.3	1.5	1.5	1.5	1.4
	θ_2	$\times 10^{-4}$ rad	12	9.7	11.3	11.1	11.6	11.1
		arc min	4.2	3.3	3.9	3.8	4.0	3.8

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-4-2 Mechanical precision



Unit : mm

Mark	Model	14	17	20	25	32	40
a		0.010	0.010	0.010	0.010	0.012	0.012
b		0.010	0.010	0.010	0.010	0.010	0.010
c		0.010	0.010	0.010	0.010	0.012	0.012
d		0.010	0.010	0.010	0.010	0.010	0.010
e		0.020	0.020	0.020	0.020	0.020	0.020
f		0.015	0.015	0.015	0.015	0.015	0.015

4-4-3 Installation bolt tightening torque

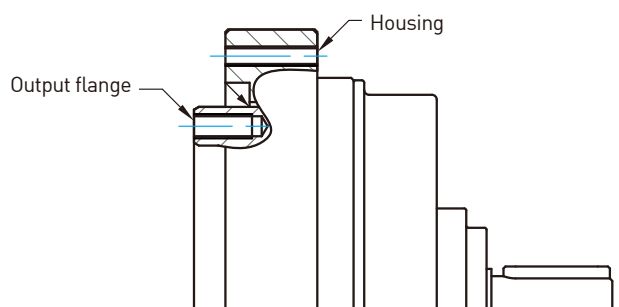


Table 4-4-8 Bolt tightening torque for output flange

Item \ Model		14	17	20	25	32	40
Number of bolts		12	12	12	12	12	12
Bolts size		M3	M4	M4	M5	M6	M8
Installation of bolts PCD	mm	43	52	62	76	96	118
Bolts tightening torque	Nm	2.3	5.1	5.1	10	17.4	42.2
	kgfm	0.23	0.52	0.52	1.0	1.8	4.3
Transmission torque	Nm	85	188	228	463	847	1964
	kgfm	8.6	19.1	23.2	47.2	86.3	200.2

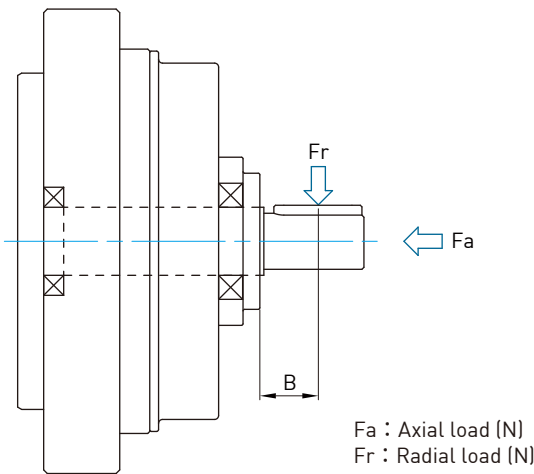
Table 4-4-9 Bolt tightening torque for housing

Item \ Model		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	68	80	89	105	135	168
Bolts tightening torque	Nm	2.3	2.3	2.3	5.1	10.0	17.4
	kgfm	0.23	0.23	0.23	0.52	1.0	1.8
Transmission torque	Nm	89	158	177	378	805	1482
	kgfm	9.1	16.1	18.0	38.6	82.1	151.1

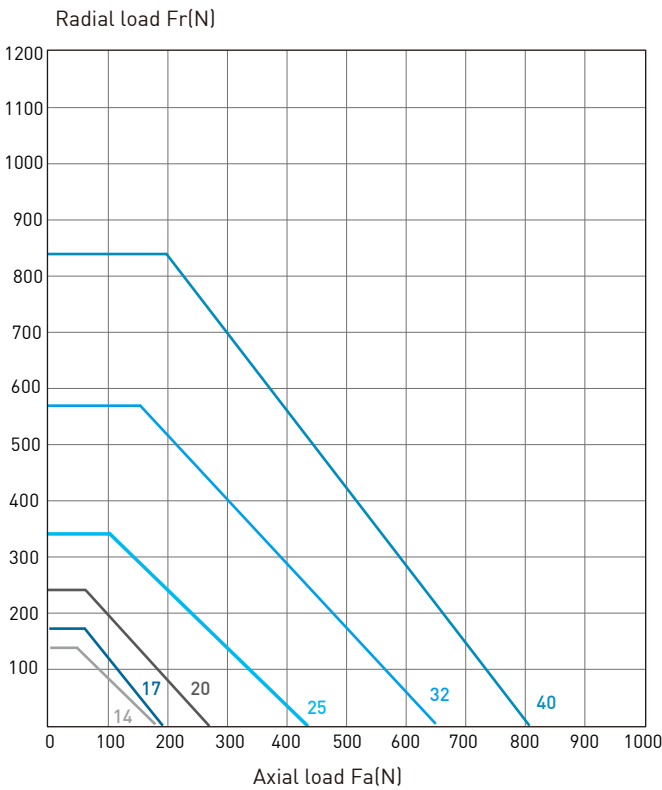
Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$
 2. Bolt-in depth at least 2 x thread diameter

4-4-4 Permissible input load

To ensure proper performance of the reducer, please confirm the load applied to the input section as shown below:

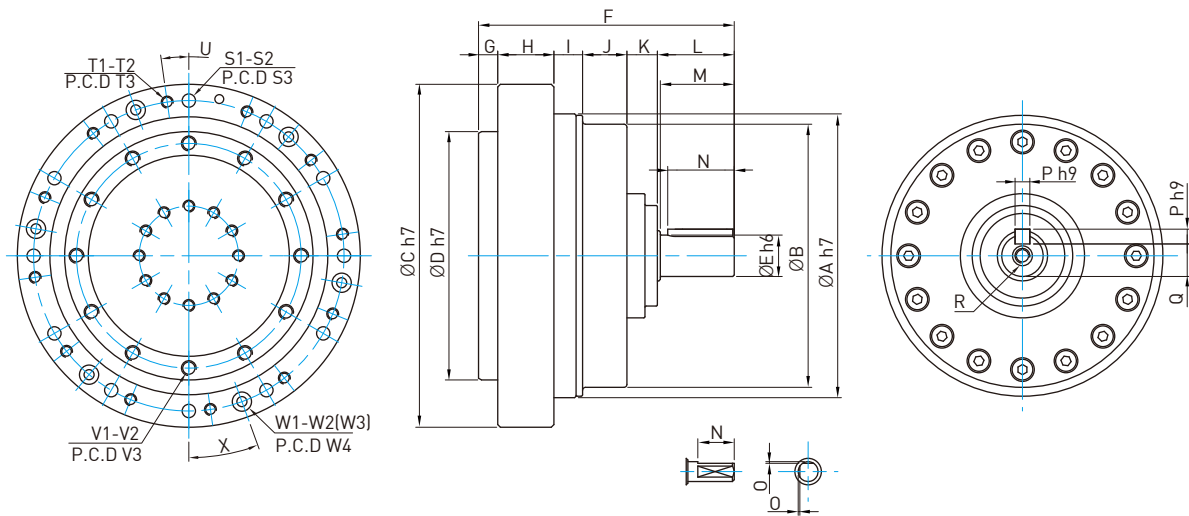


The figure below shows the average input speed of 2000rpm and the basic rated life $L_{10} = 7000$ hour.



Item \ Model		14	17	20	25	32	40
Offset (B)	mm	7	8	10	12.5	12.5	15
Maximum radial load (Fr)	N	118	145	232	342	567	825

4-4-5 DSC-AJ-M type size chart



Model 14、17

Unit : mm

Mark	Model	14	17	20	25	32	40
ØA h7		60	72	82	96	125	154
ØB		53	64	74	89	116	142
ØC h7		78	88	98	116	148	180
ØD h7		49	59	69	84	110	132
ØE h6		6	8	10	14	14	16
F		55	61.5	73.5	86.5	100.5	117.5
G		5	5	5.7	6.5	6.5	7.5
H		12	13.5	17.2	19	24	29
I		5.7	8.2	8.8	9.7	12.7	13.7
J		9.8	9.8	11.5	15	20	24.5
K		7.5	8	9.3	10.3	11.3	11.8
L		15	17	21	26	26	31
M		14	16	20	25	25	30
N		11	12	16.5	22.5	22.5	27.5
O		0.5	0.5	—	—	—	—
P h9		—	—	3	5	5	5
Q		—	—	8.2 ⁰ _{-0.1}	11 ⁰ _{-0.1}	11 ⁰ _{-0.1}	13 ⁰ _{-0.1}
R		—	—	M3 x 6DP	M5 x 10DP	M5 x 10DP	M5 x 10DP
S1		8	12	12	12	12	12
ØS2		3.4	3.4	3.4	4.5	5.5	6.6
S3 (P.C.D)		68	80	89	105	135	168
T1		8	12	12	12	12	12
T2		M3 x 7.8DP	M3	M3	M4	M5	M6
T3 (P.C.D)		68	80	89	105	135	168
U [Degree]		15°	10°	10°	8°	10°	10°
V1		12	12	12	12	12	12
V2		M3 x 6DP	M4 x 8DP	M4 x 8DP	M5 x 10DP	M6 x 10DP	M8 x 14DP
V3 (P.C.D)		43	52	62	76	96	118
W1		4	6	6	6	6	6
W2		Ø5.5 x 3DP	Ø5.5 x 3DP	Ø5.5 x 3DP	Ø6.5 x 3.4DP	Ø8 x 4.4DP	Ø10 x 6DP
ØW3		2.9	2.9	2.9	3.4	4.5	5.5
W4 (P.C.D)		68	78	88	105	135	165
X [Degree]		30°	20°	20°	20°	20°	20°
Moment of Inertia (×10 ⁻⁴ kgm ²)		0.025	0.059	0.137	0.32	1.20	3.41
Weight (Kg)		0.64	0.95	1.40	2.50	5.40	8.80

4-5 DSH-P0 Type

4-5-1 Technical data

Table 4-5-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	5.4	0.55	18	1.8	6.9	0.7	35	3.6	8500	3500
	80	7.8	0.80	23	2.4	11	1.1	47	4.8		
	100	7.8	0.80	28	2.9	11	1.1	54	5.5		
17	50	16	1.6	34	3.5	26	2.6	70	7.1	7300	3500
	80	22	2.2	43	4.4	27	2.7	87	8.9		
	100	24	2.4	54	5.5	39	4	110	11		
	120	24	2.4	54	5.5	39	4	86	8.8		
20	50	25	2.5	56	5.7	34	3.5	98	10	6500	3500
	80	34	3.5	74	7.5	47	4.8	127	13		
	100	40	4.1	82	8.4	49	5	147	15		
	120	40	4.1	87	8.9	49	5	147	15		
	160	40	4.1	92	9.4	49	5	147	15		
25	50	39	4.0	98	10	55	5.6	186	19	5600	3500
	80	63	6.4	137	14	87	8.9	255	26		
	100	67	6.8	157	16	108	11	284	29		
	120	67	6.8	167	17	108	11	304	31		
	160	67	6.8	176	18	108	11	314	32		
32	50	76	7.8	216	22	108	11	382	39	4800	3500
	80	118	12	304	31	167	17	568	58		
	100	137	14	333	34	216	22	647	66		
	120	137	14	353	36	216	22	686	70		
	160	137	14	372	38	216	22	686	70		
40	50	137	14	402	41	196	20	686	70	4000	3000
	80	206	21	519	53	284	29	980	100		
	100	265	27	568	58	372	38	1080	110		
	120	294	30	617	63	451	46	1180	120		
	160	294	30	647	66	451	46	1180	120		

※1 Permissible rated torque

※2 Permissible maximum torque

※3 Permissible average torque

※4 Permissible maximum value of impact

Table 4-5-2 Crossed roller bearing specifications

Model			14	17	20	25	32	40	
Item									
Pitch circle diameter of roller		Dpw	m	0.050	0.060	0.070	0.085	0.111	0.133
Offset amount		R	m	0.0217	0.0239	0.0255	0.0296	0.0364	0.0440
Basic load ratings	Dynamic load C	C	kN	5.8	10.4	14.6	21.8	38.2	43.3
			kgf	590	1060	1490	2230	3900	4410
	Static load Co	Co	kN	8.6	16.3	22.0	35.8	65.4	81.6
			kgf	880	1670	2250	3660	6680	8330
Moment rigidity		K	×10 ⁴ Nm/rad	8.5	15.4	25.2	39.2	100	179
			kgfm/arc min	2.5	4.6	7.5	11.6	29.6	53.2
Permissible dynamic tilting moment		M	Nm	74	124	187	258	580	849
Permissible static tilting moment		Mo	Nm	144	328	515	1070	2425	3623
Permissible axial load		Fa	kN	1.239	2.222	3.119	4.657	8.161	9.250
Permissible radial load		Fr	kN	0.83	1.489	2.090	3.120	5.468	6.198

Table 4-5-3 Angle transmission accuracy

Model		14	17	20	25	32	40
Reduction ratio							
50 up	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9	2.9
	arc min	1.5	1.5	1	1	1	1

Table 4-5-4 Hysteresis loss

Model		14	17	20	25	32	40
Reduction ratio							
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8	5.8
	arc min	2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9	2.9
	arc min	1.0	1.0	1.0	1.0	1.0	1.0

Table 4-5-5 Maximum backlash

Model		14	17	20	25	32	40
Reduction ratio							
50	$\times 10^{-5}$ rad	17.5	9.7	8.2	8.2	6.8	6.8
	arc sec	36	20	17	17	14	14
80	$\times 10^{-5}$ rad	11.2	6.3	5.3	5.3	4.4	4.4
	arc sec	23	13	11	11	9	9
100	$\times 10^{-5}$ rad	8.7	4.8	4.4	4.4	3.4	3.4
	arc sec	18	10	9	9	7	7
120	$\times 10^{-5}$ rad	—	3.9	3.9	3.9	2.9	2.9
	arc sec	—	8	8	8	6	6
160	$\times 10^{-5}$ rad	—	—	2.9	2.9	2.4	2.4
	arc sec	—	—	6	6	5	5

Table 4-5-6 Starting torque

Unit : cNm

Reduction ratio \ Model	14	17	20	25	32	40
50	4.1	6.1	7.8	15	31	55
80	2.8	4	4.9	9.2	19	35
100	2.5	3.4	4.3	8	18	31
120	—	3.1	3.8	7.3	15	28
160	—	—	3.3	6.3	14	24

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-5-7 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	1.6	3	4.7	9	18	33
80	1.6	3	4.8	9.1	19	33
100	1.8	3.3	5.1	9.8	20	36
120	—	3.5	5.5	11	22	39
160	—	—	6.4	13	26	46

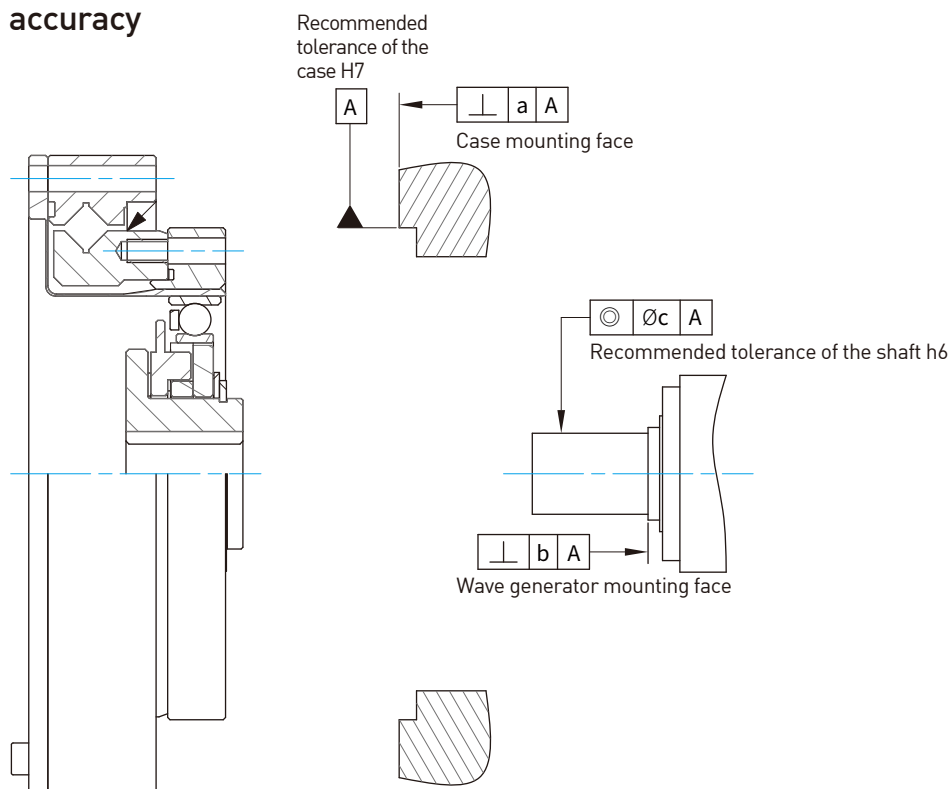
Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-5-8 Torsional rigidity

Reduction ratio \ Model		14	17	20	25	32	40
T ₁	Nm	2.0	3.9	7.0	14	29	54
	kgfm	0.2	0.4	0.7	1.4	3.0	5.5
T ₂	Nm	6.9	12	25	48	108	196
	kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	× 10 ⁴ Nm/rad	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6
	K ₂	× 10 ⁴ Nm/rad	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3
	K ₃	× 10 ⁴ Nm/rad	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9
	θ ₁	× 10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.5
		arc min	2.0	1.7	1.8	1.9	1.8
	θ ₂	× 10 ⁻⁴ rad	16	12	15.4	15.7	15.7
		arc min	5.6	4.2	5.3	5.4	5.4
80 up	K ₁	× 10 ⁴ Nm/rad	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0
	K ₂	× 10 ⁴ Nm/rad	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2
	K ₃	× 10 ⁴ Nm/rad	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7
	θ ₁	× 10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.1
		arc min	1.4	1.3	1.5	1.5	1.4
	θ ₂	× 10 ⁻⁴ rad	12	9.7	11.3	11.1	11.6
		arc min	4.2	3.3	3.9	3.8	4.0

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-5-2 Installation accuracy



Unit : mm

Mark \ Model	14	17	20	25	32	40
a	0.011	0.015	0.017	0.024	0.026	0.026
b	0.017	0.020	0.020	0.024	0.024	0.024
	(0.008)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)
c	0.030	0.034	0.044	0.047	0.047	0.05
	(0.016)	(0.018)	(0.019)	(0.022)	(0.022)	(0.022)

Note: The value in () is the value of the wave generator (without oldham coupling).

4-5-3 Installation bolt tightening torque

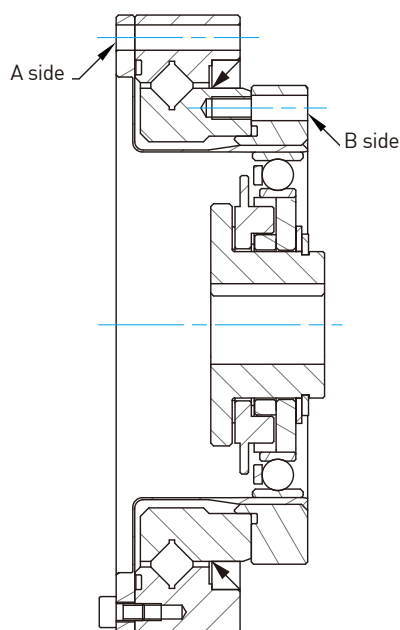


Table 4-5-9 A side mounting bolt tightening torque

Item \ Model		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	64	74	84	102	132	158
Bolts tightening torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	108	186	206	431	892	1509
	kgfm	11	19	21	44	91	154

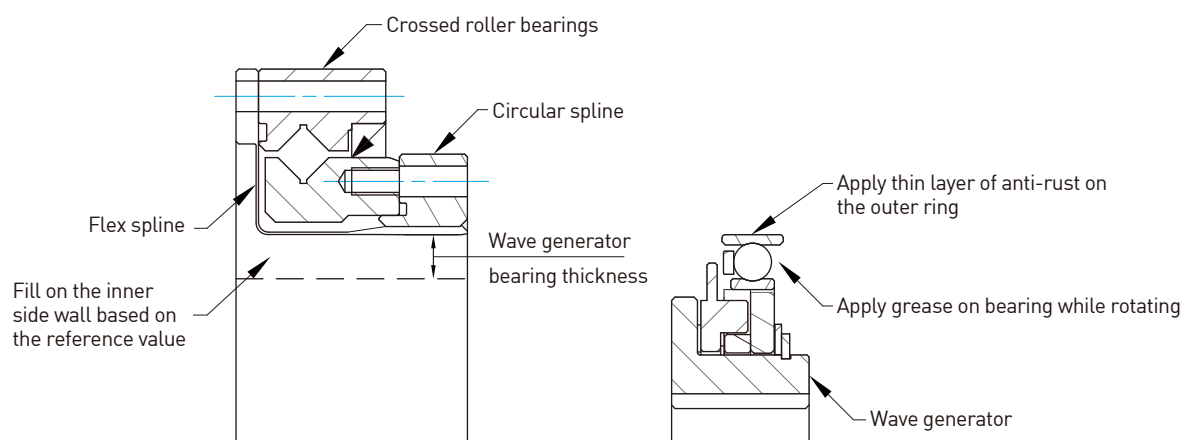
Table 4-5-10 B side mounting bolt tightening torque

Item \ Model		14	17	20	25	32	40
Number of bolts		8	16	16	16	16	16
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	44	54	62	77	100	122
Bolts tightening torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	72	176	206	431	902	1558
	kgfm	7.3	18	21	44	92	159

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$
2. Bolt-in depth at least 2 x thread diameter

4-5-4 Lubrication

Other than the tooth space of DSH-PO Type, all other parts are not packed with lubricant. Please follow the below points for applying the lubricant.

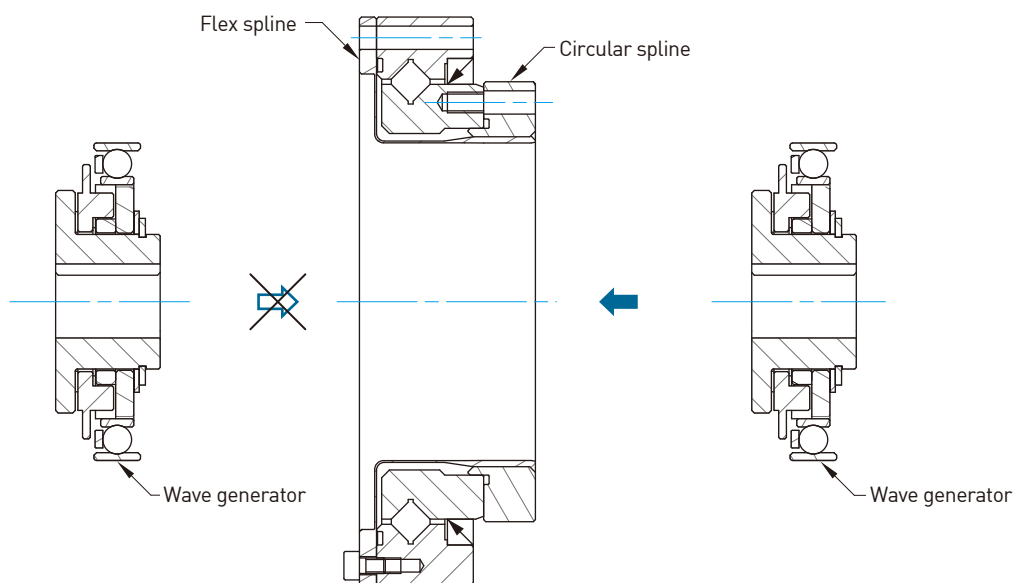


Unit : g

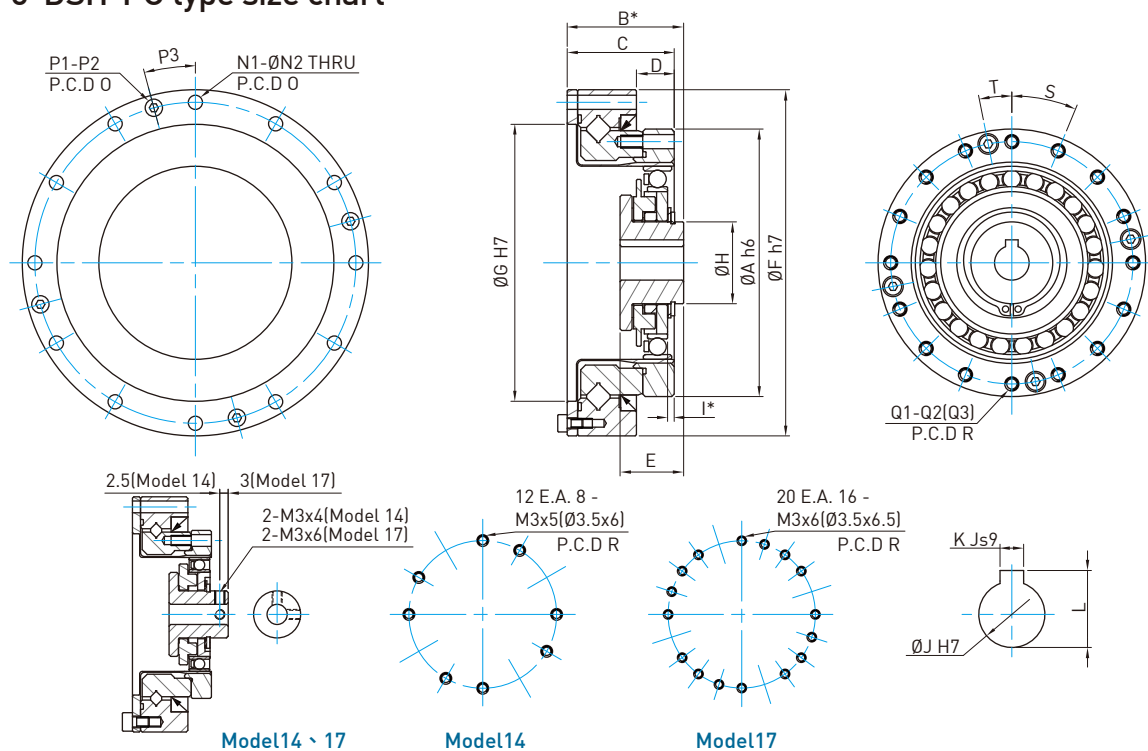
Instructions		Model	14	17	20	25	32	40
Used horizontally			5.8	11	18	32	64	120
Used vertical	Wave generator is facing down		7.5	13	19	37	74	130
	Wave generator is facing up		8.9	15	22	42	84	150

4-5-5 Installation sequence

Install the wave generator only after installing the reducer body into the case. Please note the installation sequence to avoid damage on the tooth face.



4-5-6 DSH-P0 type size chart



Unit : mm

Mark	Model	14	17	20	25	32	40
ØA h6		50	60	70	85	110	135
B*		28.5 ⁰ _{-0.8}	32.5 ⁰ _{-0.9}	33.5 ⁰ ₋₁	37 ⁰ _{-1.1}	44 ⁰ _{-1.1}	53 ⁰ _{-1.1}
C		23.5	26.5	29	34	42	51
D		7	7.5	8.5	12	15	18
E		17.6 ⁰ _{-0.1}	19.5 ⁰ _{-0.1}	20.1 ⁰ _{-0.1}	20.2 ⁰ _{-0.1}	22 ⁰ _{-0.1}	27.5 ⁰ _{-0.1}
ØF h7		70	80	90	110	142	170
ØG H7		48	60	70	88	114	140
ØH		14	18	21	26	26	32
I*		0.4	0.3	0.1	2.1	2.5	3.3
ØJ H7		6	8	9	11	14	14
K Js9		-	-	3	4	5	5
L		-	-	10.4 ^{+0.1} ₀	12.8 ^{+0.1} ₀	16.3 ^{+0.1} ₀	16.3 ^{+0.1} ₀
N1		8	12	12	12	12	12
ØN2		3.5	3.5	3.5	4.5	5.5	6.6
O (P.C.D)		64	74	84	102	132	158
P1		2	4	4	4	4	6
P2		M3	M3	M3	M3	M4	M4
P3 (Degree)		22.5°	15°	15°	15°	15°	15°
Q1		12 E.A. 8	20 E.A. 16	16	16	16	16
Q2		M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP	M6 x 10DP
Q3		Ø3.5 x 6DP	Ø3.5 x 6.5DP	Ø3.5 x 7.5DP	Ø4.5 x 10DP	Ø5.5 x 14DP	Ø6.6 x 17DP
ØR		44	54	62	77	100	122
S (Degree)		30°	18°	22.5°	22.5°	22.5°	22.5°
T (Degree)		30°	18°	11.25°	11.25°	11.25°	11.25°
Moment of inertia [×10 ⁻⁴ kgm ²]		0.033	0.079	0.193	0.413	1.69	4.50
Weight [Kg]		0.41	0.57	0.81	1.31	2.94	5.1

*The dimension B, I is the fitting position and permissible tolerance in the axial direction.

4-6 DSH-PH Type

4-6-1 Technical data

Table 4-6-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	5.4	0.55	18	1.8	6.9	0.7	35	3.6	8500	3500
	80	7.8	0.80	23	2.4	11	1.1	47	4.8		
	100	7.8	0.80	28	2.9	11	1.1	54	5.5		
17	50	16	1.6	34	3.5	26	2.6	70	7.1	7300	3500
	80	22	2.2	43	4.4	27	2.7	87	8.9		
	100	24	2.4	54	5.5	39	4	110	11		
	120	24	2.4	54	5.5	39	4	86	8.8		
20	50	25	2.5	56	5.7	34	3.5	98	10	6500	3500
	80	34	3.5	74	7.5	47	4.8	127	13		
	100	40	4.1	82	8.4	49	5	147	15		
	120	40	4.1	87	8.9	49	5	147	15		
	160	40	4.1	92	9.4	49	5	147	15		
25	50	39	4.0	98	10	55	5.6	186	19	5600	3500
	80	63	6.4	137	14	87	8.9	255	26		
	100	67	6.8	157	16	108	11	284	29		
	120	67	6.8	167	17	108	11	304	31		
	160	67	6.8	176	18	108	11	314	32		
32	50	76	7.8	216	22	108	11	382	39	4800	3500
	80	118	12	304	31	167	17	568	58		
	100	137	14	333	34	216	22	647	66		
	120	137	14	353	36	216	22	686	70		
	160	137	14	372	38	216	22	686	70		
40	50	137	14	402	41	196	20	686	70	4000	3000
	80	206	21	519	53	284	29	980	100		
	100	265	27	568	58	372	38	1080	110		
	120	294	30	617	63	451	46	1180	120		
	160	294	30	647	66	451	46	1180	120		

- ※1 Permissible rated torque
 ※2 Permissible maximum torque
 ※3 Permissible average torque
 ※4 Permissible maximum value of impact

Table 4-6-2 Crossed roller bearing specifications

Item			Model	14	17	20	25	32	40
Pitch circle diameter of roller	Dpw	m		0.050	0.060	0.070	0.085	0.111	0.133
Offset amount	R	m		0.0217	0.0239	0.0255	0.0296	0.0364	0.0440
Basic load ratings	Dynamic load C	C	kN	5.8	10.4	14.6	21.8	38.2	43.3
			kgf	590	1060	1490	2230	3900	4410
	Static load Co	Co	kN	8.6	16.3	22.0	35.8	65.4	81.6
			kgf	880	1670	2250	3660	6680	8330
Moment rigidity	K		$\times 10^4$ Nm/rad	8.5	15.4	25.2	39.2	100	179
			kgfm/arc min	2.5	4.6	7.5	11.6	29.6	53.2
Permissible dynamic tilting moment	M	Nm		74	124	187	258	580	849
Permissible static tilting moment	Mo	Nm		144	328	515	1070	2425	3623
Permissible axial load	Fa	kN		1.239	2.222	3.119	4.657	8.161	9.250
Permissible radial load	Fr	kN		0.83	1.489	2.090	3.120	5.468	6.198

Table 4-6-3 Angle transmission accuracy

Reduction ratio		Model	14	17	20	25	32	40
50 up	$\times 10^{-4}$ rad		4.4	4.4	2.9	2.9	2.9	2.9
	arc min		1.5	1.5	1	1	1	1

Table 4-6-4 Hysteresis loss

Reduction ratio		Model	14	17	20	25	32	40
50	$\times 10^{-4}$ rad		5.8	5.8	5.8	5.8	5.8	5.8
	arc min		2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad		2.9	2.9	2.9	2.9	2.9	2.9
	arc min		1.0	1.0	1.0	1.0	1.0	1.0

Table 4-6-5 Starting torque

Unit : cNm

Reduction ratio		Model	14	17	20	25	32	40
50			4.1	6.1	7.8	15	31	55
80			2.8	4	4.9	9.2	19	35
100			2.5	3.4	4.3	8	18	31
120			—	3.1	3.8	7.3	15	28
160			—	—	3.3	6.3	14	24

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-6-6 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	1.6	3	4.7	9	18	33
80	1.6	3	4.8	9.1	19	33
100	1.8	3.3	5.1	9.8	20	36
120	—	3.5	5.5	11	22	39
160	—	—	6.4	13	26	46

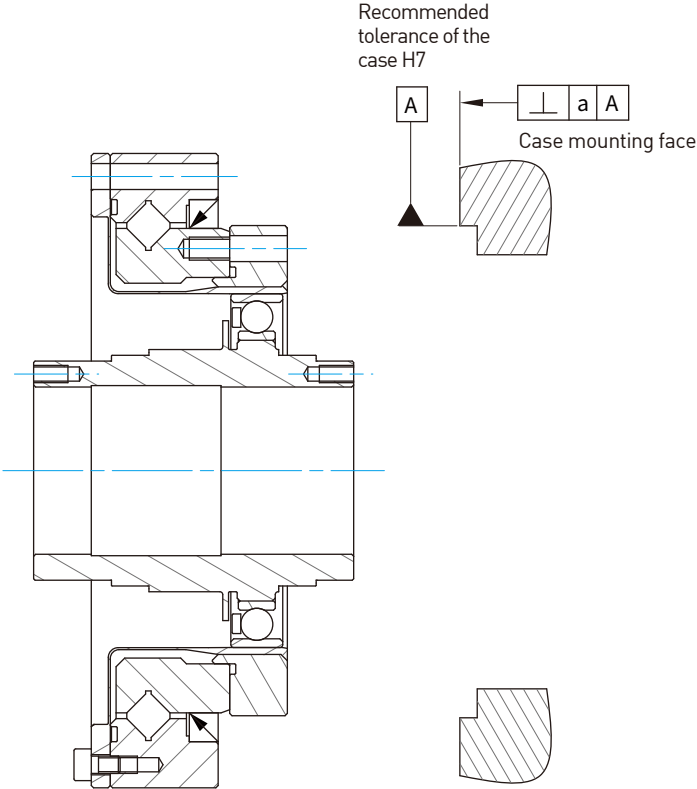
Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-6-7 Torsional rigidity

Reduction ratio \ Model		14	17	20	25	32	40
T ₁	Nm	2.0	3.9	7.0	14	29	54
	kgfm	0.2	0.4	0.7	1.4	3.0	5.5
T ₂	Nm	6.9	12	25	48	108	196
	kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	× 10 ⁴ Nm/rad	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6
	K ₂	× 10 ⁴ Nm/rad	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3
	K ₃	× 10 ⁴ Nm/rad	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9
	θ ₁	× 10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.5
		arc min	2.0	1.7	1.8	1.9	1.9
	θ ₂	× 10 ⁻⁴ rad	16	12	15.4	15.7	15.7
		arc min	5.6	4.2	5.3	5.4	5.4
80 up	K ₁	× 10 ⁴ Nm/rad	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0
	K ₂	× 10 ⁴ Nm/rad	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2
	K ₃	× 10 ⁴ Nm/rad	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7
	θ ₁	× 10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.4
		arc min	1.4	1.3	1.5	1.5	1.5
	θ ₂	× 10 ⁻⁴ rad	12	9.7	11.3	11.1	11.6
		arc min	4.2	3.3	3.9	3.8	4.0

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-6-2 Installation accuracy



Unit : mm

Mark	Model	14	17	20	25	32	40
	a	0.011	0.015	0.017	0.024	0.026	0.026

4-6-3 Installation bolt tightening torque

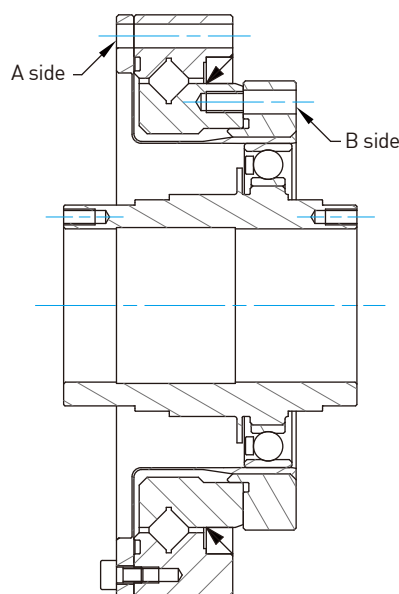


Table 4-6-8 A side mounting bolt tightening torque

Item \ Model		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	64	74	84	102	132	158
Bolts tightening torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	108	186	206	431	892	1509
	kgfm	11	19	21	44	91	154

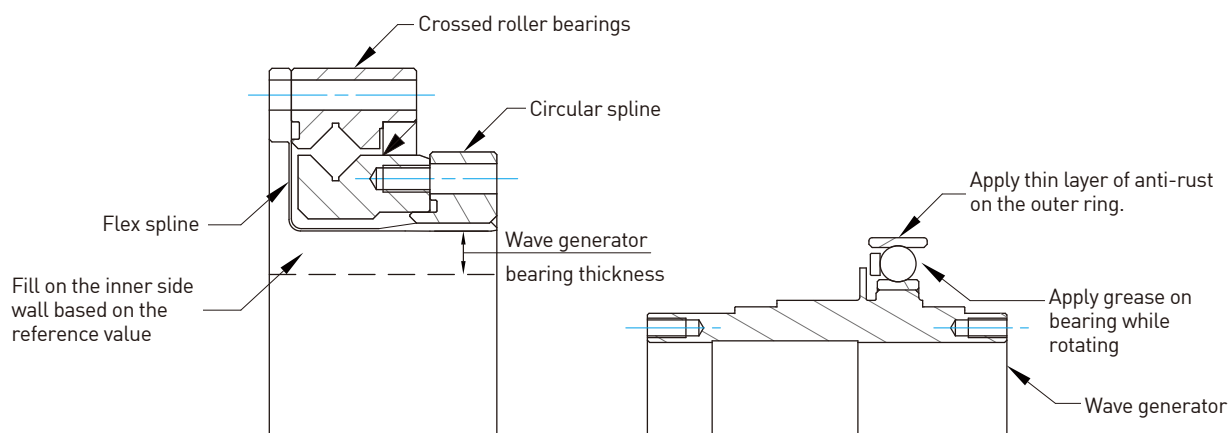
Table 4-6-9 B side mounting bolt tightening torque

Item \ Model		14	17	20	25	32	40
Number of bolts		8	16	16	16	16	16
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	44	54	62	77	100	122
Bolts tightening torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	72	176	206	431	902	1558
	kgfm	7.3	18	21	44	92	159

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$
 2. Bolt-in depth at least 2 x thread diameter

4-6-4 Lubrication

Other than the tooth space of DSH-PH Type, all other parts are not packed with lubricant. Please follow the below points for applying the lubricant.

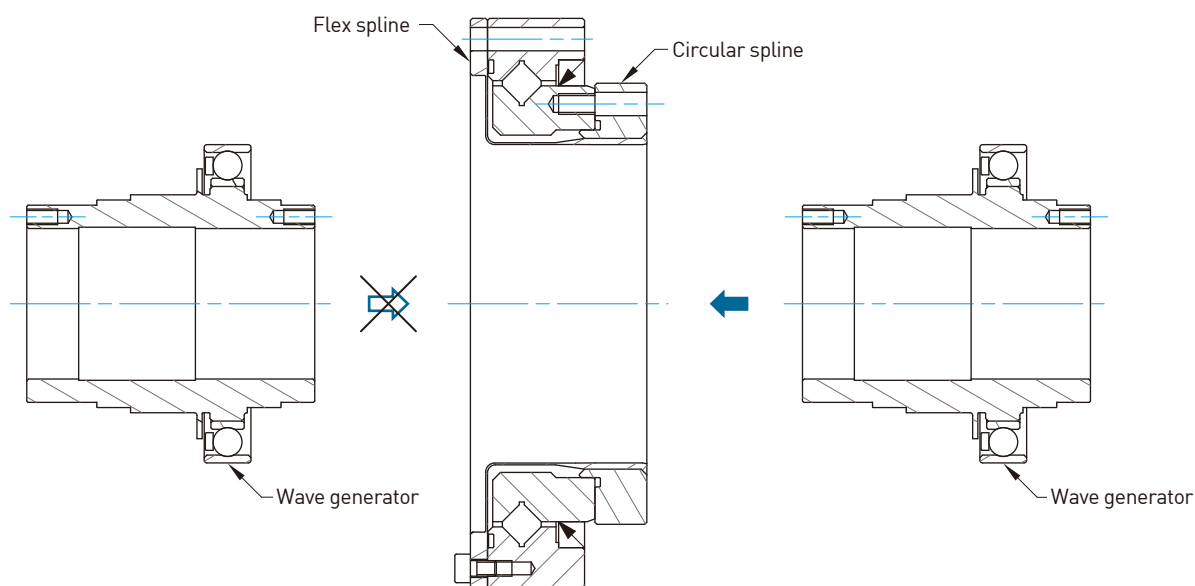


Unit : g

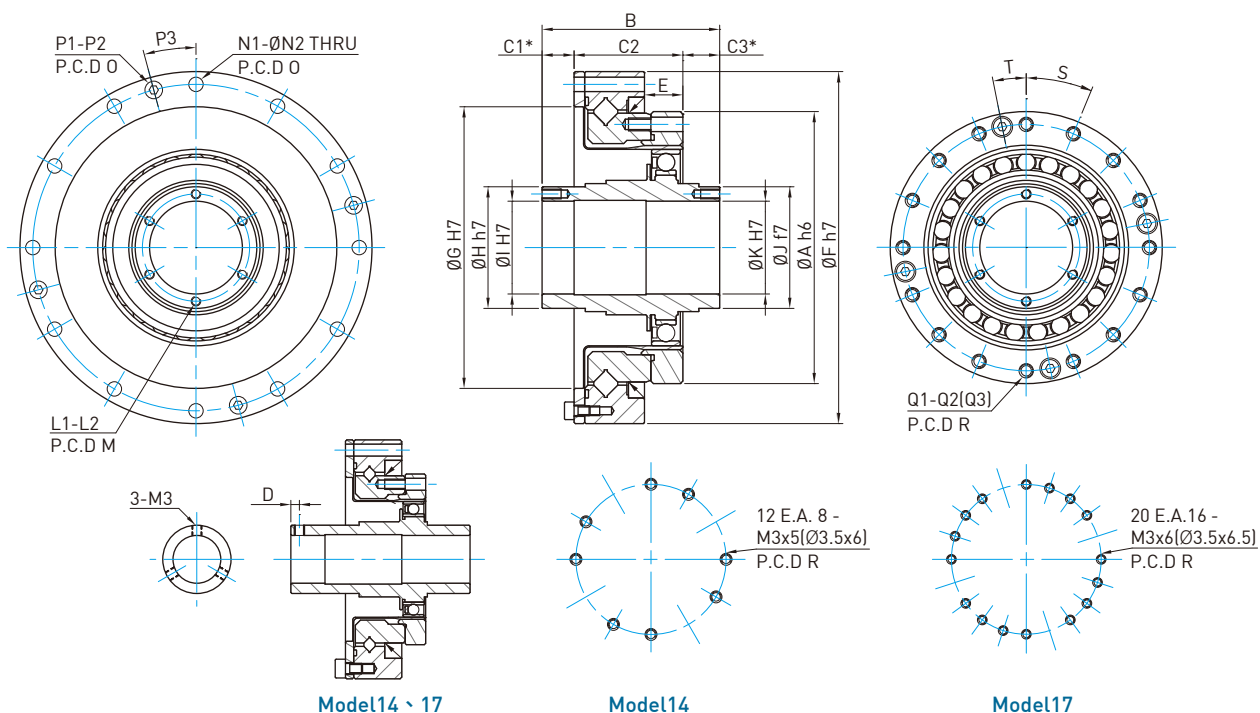
Instructions		Model	14	17	20	25	32	40
Used horizontally			5.8	11	18	32	64	120
Used vertical	Wave generator is facing down		7.5	13	19	37	74	130
	Wave generator is facing up		8.9	15	22	42	84	150

4-6-5 Installation sequence

Install the wave generator only after installing the reducer body into the case. Please note the installation sequence to avoid damage on the tooth face.



4-6-6 DSH-PH type size chart

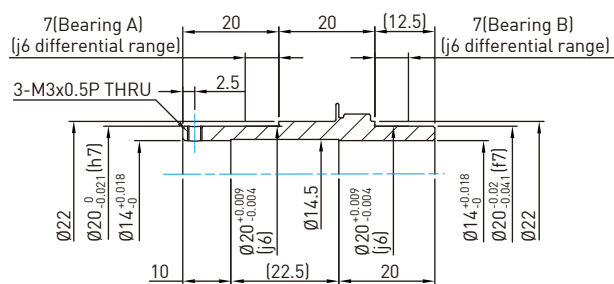


Model14、17

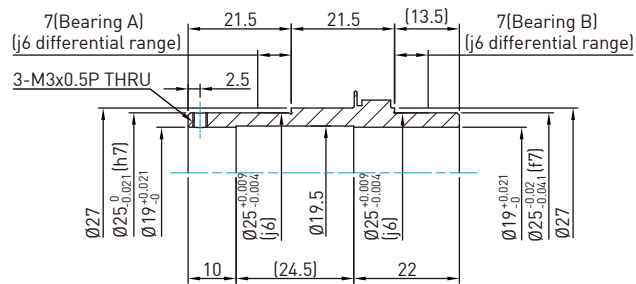
Model14

Model17

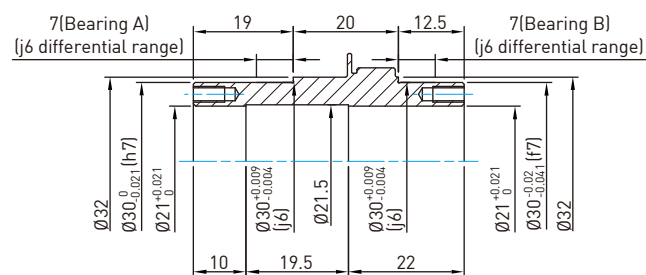
Model14



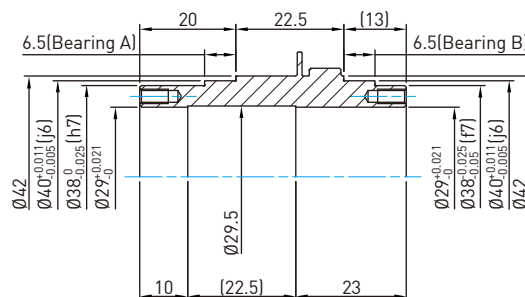
Model17



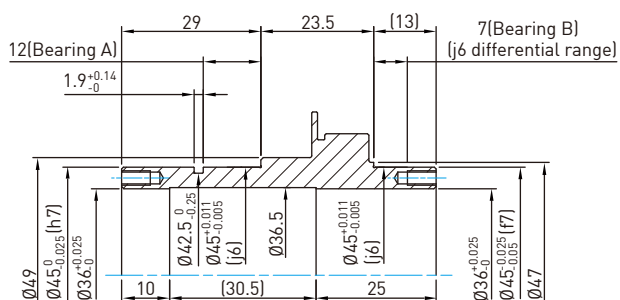
Model20



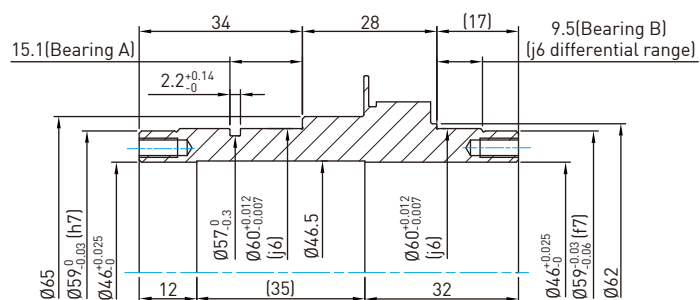
Model25



Model32



Model40



Unit : mm

Mark \ Model	14	17	20	25	32	40
ØA h6	50	60	70	85	110	135
B	52.5 ⁰ _{-0.1}	56.5 ⁰ _{-0.1}	51.5 ⁰ _{-0.1}	55.5 ⁰ _{-0.1}	65.5 ⁰ _{-0.1}	79 ⁰ _{-0.1}
C1*	16 ^{+0.8} ₀	16 ^{+0.9} ₀	9.5 ^{+1.0} ₀	10 ^{+1.1} ₀	12 ^{+1.1} ₀	13 ^{+1.1} ₀
C2	23.5	26.5	29	34	42	51
C3*	13	14	13	11.5	11.5	15
D	2.5	2.5	–	–	–	–
E	7	7.5	8.5	12	15	18
ØF h7	70	80	90	110	142	170
ØG H7	48	60	70	88	114	140
ØH h7	20	25	30	38	45	59
ØI H7	14	19	21	29	36	46
ØJ f7	20	25	30	38	45	59
ØK H7	14	19	21	29	36	46
L1	3	3	2x6	2x6	2x6	2x6
L2	M3	M3	M3 x 6DP	M3 x 6DP	M3 x 6DP	M4 x 8DP
M (P.C.D)	–	–	25.5	33.5	40.5	52
N1	8	12	12	12	12	12
ØN2	3.5	3.5	3.5	4.5	5.5	6.6
O (P.C.D)	64	74	84	102	132	158
P1	2	4	4	4	4	6
P2	M3	M3	M3	M3	M4	M4
P3 (Degree)	22.5°	15°	15°	15°	15°	15°
Q1	12 E.A. 8	20 E.A. 16	16	16	16	16
Q2	M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP	M6 x 10DP
Q3	Ø3.5 x 6DP	Ø3.5 x 6.5DP	Ø3.5 x 7.5DP	Ø4.5 x 10DP	Ø5.5 x 14DP	Ø6.6 x 17DP
ØR	44	54	62	77	100	122
S (Degree)	30°	18°	22.5°	22.5°	22.5°	22.5°
T (Degree)	30°	18°	11.25°	11.25°	11.25°	11.25°
Bearing A**	6804ZZ	6805ZZ	6806ZZ	6808ZZ	6909ZZ	6912ZZ
Bearing B**	6804ZZ	6805ZZ	6806ZZ	6808ZZ	6809ZZ	6812ZZ
Moment of inertia [× 10 ⁻⁴ kgm ²]	0.091	0.193	0.404	1.070	2.85	9.28
Weight [Kg]	0.45	0.63	0.89	1.44	3.1	5.4

*The dimension C1, C3 is the fitting position and permissible tolerance in the axial direction.

**It is recommended to use a deep groove bearing model.

4-7 DSH-AH Type

4-7-1 Technical data

Table 4-7-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	5.4	0.55	18	1.8	6.9	0.7	35	3.6	8500	3500
	80	7.8	0.80	23	2.4	11	1.1	47	4.8		
	100	7.8	0.80	28	2.9	11	1.1	54	5.5		
17	50	16	1.6	34	3.5	26	2.6	70	7.1	7300	3500
	80	22	2.2	43	4.4	27	2.7	87	8.9		
	100	24	2.4	54	5.5	39	4	110	11		
	120	24	2.4	54	5.5	39	4	86	8.8		
20	50	25	2.5	56	5.7	34	3.5	98	10	6500	3500
	80	34	3.5	74	7.5	47	4.8	127	13		
	100	40	4.1	82	8.4	49	5	147	15		
	120	40	4.1	87	8.9	49	5	147	15		
	160	40	4.1	92	9.4	49	5	147	15		
25	50	39	4.0	98	10	55	5.6	186	19	5600	3500
	80	63	6.4	137	14	87	8.9	255	26		
	100	67	6.8	157	16	108	11	284	29		
	120	67	6.8	167	17	108	11	304	31		
	160	67	6.8	176	18	108	11	314	32		
32	50	76	7.8	216	22	108	11	382	39	4800	3500
	80	118	12	304	31	167	17	568	58		
	100	137	14	333	34	216	22	647	66		
	120	137	14	353	36	216	22	686	70		
	160	137	14	372	38	216	22	686	70		
40	50	137	14	402	41	196	20	686	70	4000	3000
	80	206	21	519	53	284	29	980	100		
	100	265	27	568	58	372	38	1080	110		
	120	294	30	617	63	451	46	1180	120		
	160	294	30	647	66	451	46	1180	120		

- ※1 Permissible rated torque
 ※2 Permissible maximum torque
 ※3 Permissible average torque
 ※4 Permissible maximum value of impact

Table 4-7-2 Crossed roller bearing specifications

Item			Model	14	17	20	25	32	40
Pitch circle diameter of roller	Dpw	m		0.050	0.060	0.070	0.085	0.111	0.133
Offset amount	R	m		0.0217	0.0239	0.0255	0.0296	0.0364	0.0440
Basic load ratings	Dynamic load C	C	kN	5.8	10.4	14.6	21.8	38.2	43.3
			kgf	590	1060	1490	2230	3900	4410
	Static load Co	Co	kN	8.6	16.3	22.0	35.8	65.4	81.6
			kgf	880	1670	2250	3660	6680	8330
Moment rigidity	K	K	$\times 10^4$ Nm/rad	8.5	15.4	25.2	39.2	100	179
			kgfm/arc min	2.5	4.6	7.5	11.6	29.6	53.2
Permissible dynamic tilting moment	M	Nm		74	124	187	258	580	849
Permissible static tilting moment	Mo	Nm		144	328	515	1070	2425	3623
Permissible axial load	Fa	kN		1.239	2.222	3.119	4.657	8.161	9.250
Permissible radial load	Fr	kN		0.83	1.489	2.090	3.120	5.468	6.198

Table 4-7-3 Angle transmission accuracy

Reduction ratio		Model	14	17	20	25	32	40
50 up	$\times 10^{-4}$ rad		4.4	4.4	2.9	2.9	2.9	2.9
	arc min		1.5	1.5	1	1	1	1

Table 4-7-4 Hysterisis loss

Reduction ratio		Model	14	17	20	25	32	40
50	$\times 10^{-4}$ rad		5.8	5.8	5.8	5.8	5.8	5.8
	arc min		2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad		2.9	2.9	2.9	2.9	2.9	2.9
	arc min		1.0	1.0	1.0	1.0	1.0	1.0

Table 4-7-5 Starting torque

Unit : cNm

Reduction ratio		Model	14	17	20	25	32	40
50			8.8	27	36	56	85	136
80			7.5	25	33	50	74	117
100			6.9	24	32	49	72	112
120			—	24	31	48	68	110
160			—	—	31	47	67	105

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-7-6 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	5.3	16	22	34	51	82
80	7.2	24	31	48	70	112
100	8.2	29	38	59	86	134
120	—	34	45	69	97	158
160	—	—	59	90	128	201

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-7-7 Torsional rigidity

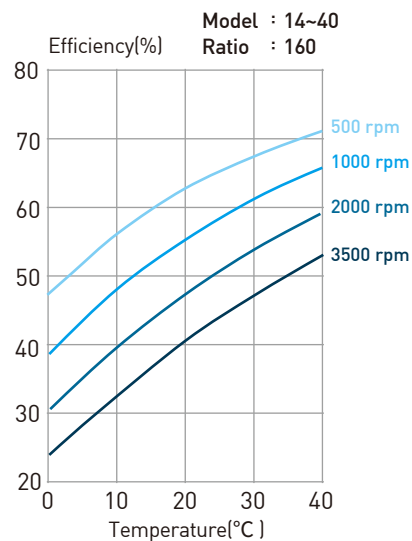
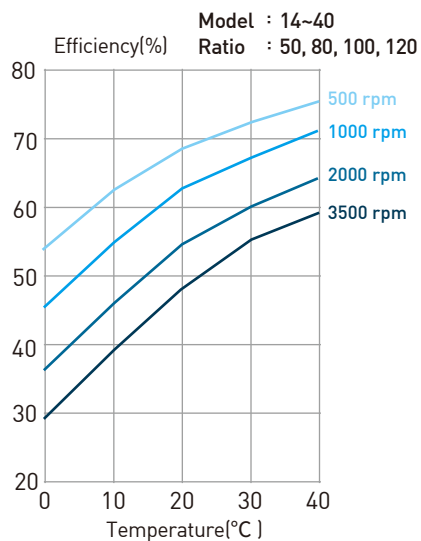
Reduction ratio \ Model		14	17	20	25	32	40
T ₁	Nm	2.0	3.9	7.0	14	29	54
	kgfm	0.2	0.4	0.7	1.4	3.0	5.5
T ₂	Nm	6.9	12	25	48	108	196
	kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	× 10 ⁴ Nm/rad	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6
	K ₂	× 10 ⁴ Nm/rad	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3
	K ₃	× 10 ⁴ Nm/rad	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9
	θ ₁	× 10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.5
		arc min	2.0	1.7	1.8	1.9	1.9
	θ ₂	× 10 ⁻⁴ rad	16	12	15.4	15.7	15.7
		arc min	5.6	4.2	5.3	5.4	5.4
80 up	K ₁	× 10 ⁴ Nm/rad	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0
	K ₂	× 10 ⁴ Nm/rad	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2
	K ₃	× 10 ⁴ Nm/rad	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7
	θ ₁	× 10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.4
		arc min	1.4	1.3	1.5	1.5	1.5
	θ ₂	× 10 ⁻⁴ rad	12	9.7	11.3	11.1	11.6
		arc min	4.2	3.3	3.9	3.8	4.0

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-7-2 Efficiency

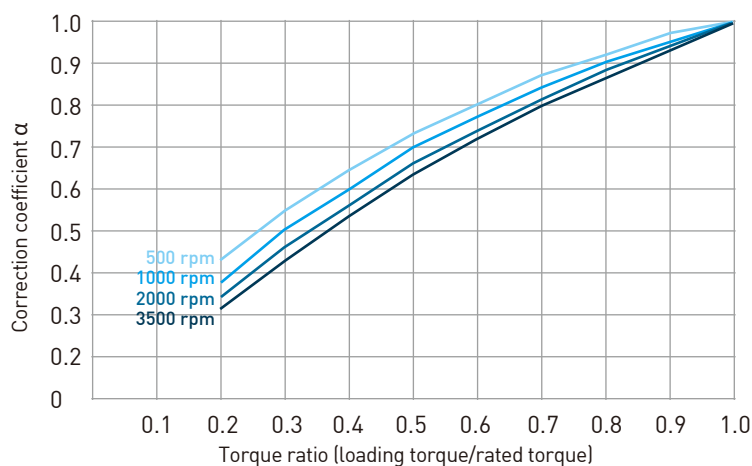
1. Rated torque E_R

DATORKER® efficiency would change by model, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity) .



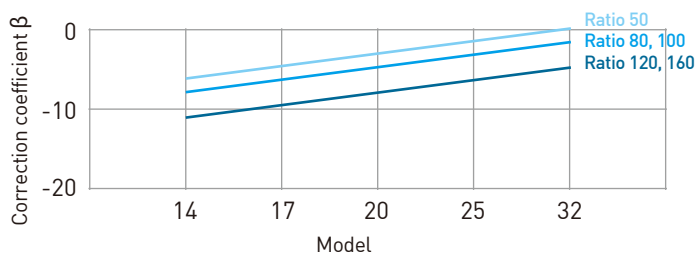
2. Correction coefficient α

Efficiency correction coefficient α
by loading torque



3. Correction coefficient β

Efficiency correction coefficient β
by model.



$$\text{Efficiency} = \alpha \times (E_R + \beta)$$

4-7-3 No-load operating torque

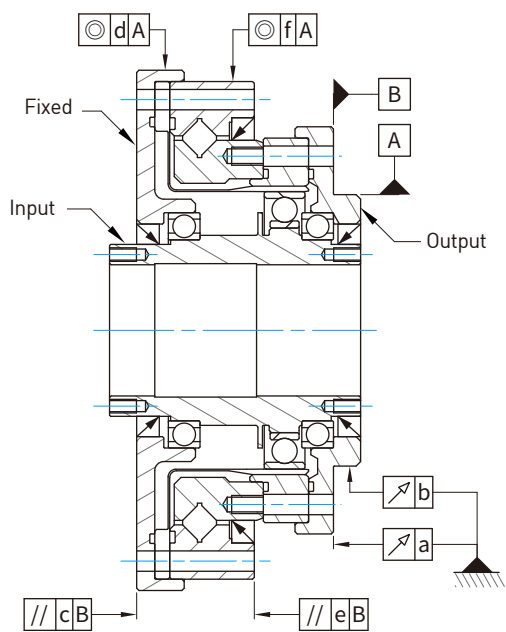
The torque required to drive the DATORKER® input (high-speed end) after running in at an input speed of 2000 r/min under an average ambient temperature of 25° C without load for more than 2 hours.

Unit: cNm

Reduction ratio	Input rotational speed	Model					
		14	17	20	25	32	40
50	500 r/min	6.3	17.8	23.6	37.2	58	103.3
	1000 r/min	7.8	21.8	28.6	49.2	76	168.3
	2000 r/min	10.1	27.8	37.6	62.2	98	183.3
	3500 r/min	14.1	36.8	48.6	89.2	138	236.3
80	500 r/min	5.4	16.4	21.5	33.8	51.5	92.4
	1000 r/min	6.9	20.4	26.5	45.8	69.5	157.4
	2000 r/min	9.2	26.4	35.5	58.8	91.5	172.4
	3500 r/min	13.2	35.4	46.5	85.8	131.5	225.4
100	500 r/min	5.2	16	21	33	50	90
	1000 r/min	6.7	20	26	45	68	155
	2000 r/min	9	26	35	58	90	170
	3500 r/min	13	35	46	85	130	223
120	500 r/min	—	15.8	20.6	32.4	48.9	88.3
	1000 r/min	—	19.8	25.6	44.4	66.9	153.3
	2000 r/min	—	25.8	34.6	57.4	88.9	168.3
	3500 r/min	—	34.8	45.6	84.4	128.9	221.3
160	500 r/min	—	—	20.2	31.7	47.5	86
	1000 r/min	—	—	25.2	43.7	65.5	151
	2000 r/min	—	—	34.2	56.7	87.5	166
	3500 r/min	—	—	45.2	83.7	127.5	219

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

4-7-4 Mechanical precision



Unit : mm

Mark \ Model	14	17	20	25	32	40
a	0.033	0.038	0.040	0.046	0.054	0.057
b	0.035	0.035	0.039	0.041	0.047	0.050
c	0.064	0.071	0.079	0.085	0.104	0.111
d	0.053	0.050	0.059	0.061	0.072	0.075
e	0.040	0.045	0.051	0.057	0.065	0.071
f	0.038	0.038	0.047	0.049	0.054	0.060

4-7-5 Installation bolt tightening torque

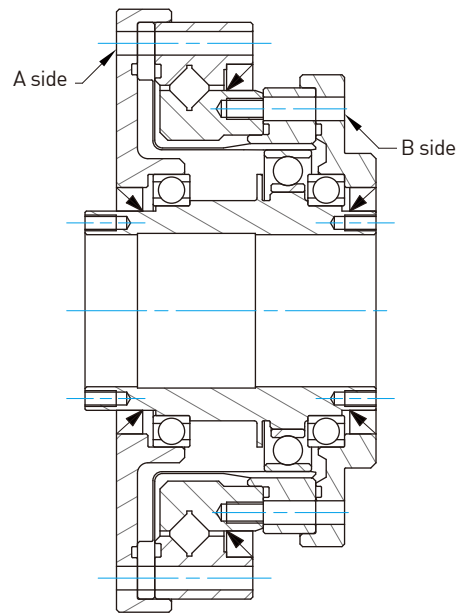


Table 4-7-8 A side mounting bolt tightening torque

Item \ Model		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	64	74	84	102	132	158
Bolts tightening torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	108	186	206	431	892	1509
	kgfm	11	19	21	44	91	154

Table 4-7-9 B side mounting bolt tightening torque

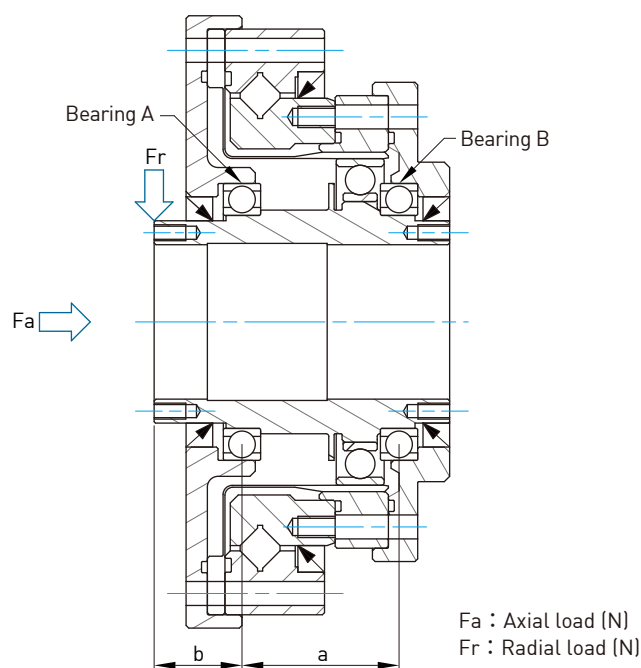
Item \ Model		14	17	20	25	32	40
Number of bolts		8	16	16	16	16	16
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	44	54	62	77	100	122
Bolts tightening torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	72	176	206	431	902	1558
	kgfm	7.3	18	21	44	92	159

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$

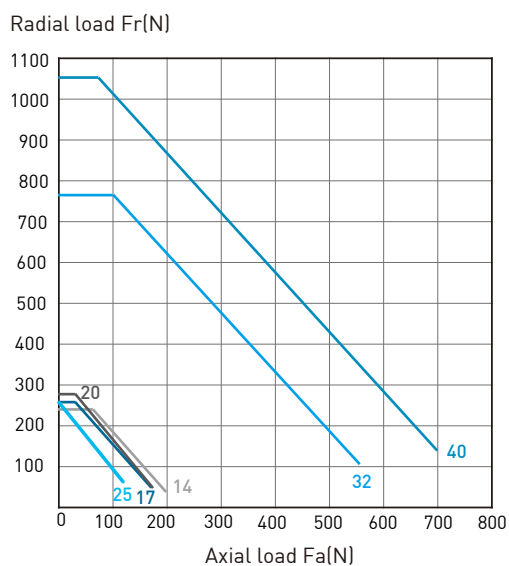
2. Bolt-in depth at least 2 x thread diameter

4-7-6 Permissible input load

The hollow shaft input section is supported by two deep groove bearings. To ensure proper performance of the reducer, please confirm the load applied to the input section. As shown below:

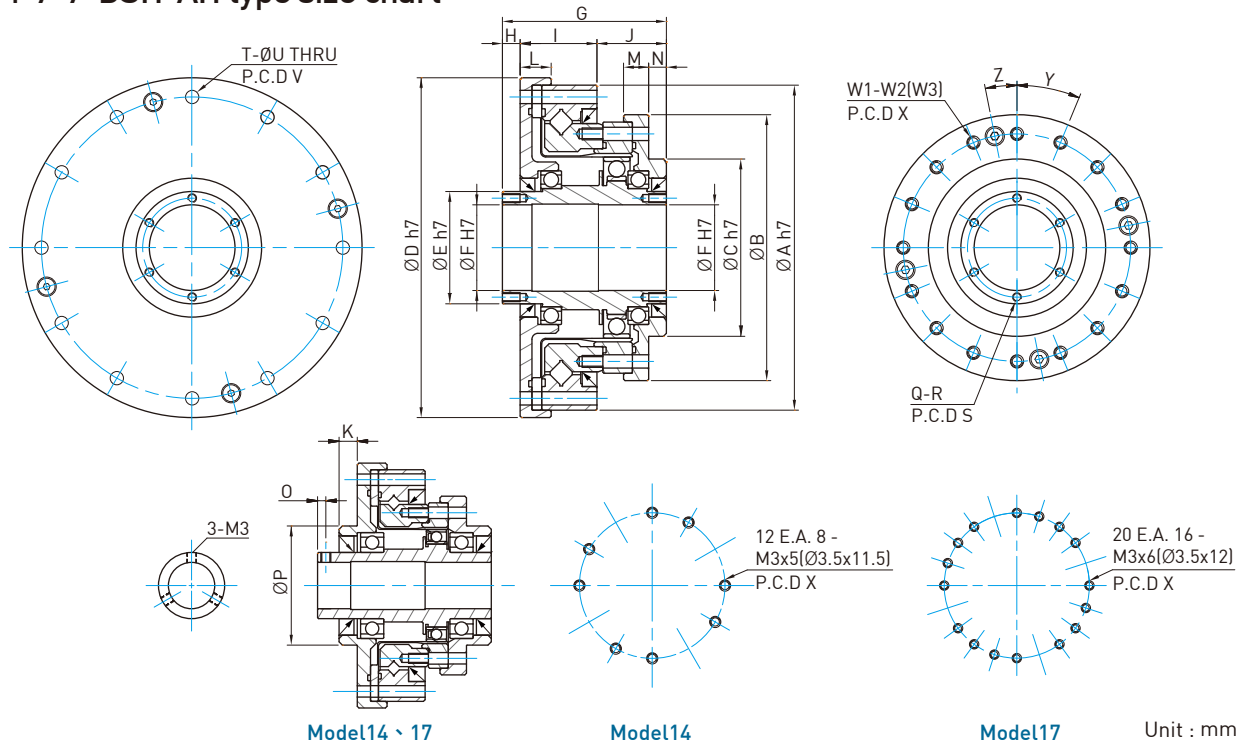


The figure below shows the average input speed of 2000rpm and the basic rated life $L_{10} = 7000$ hour.



Item Model	Bearing A		Bearing B		a (mm)	b (mm)	Maximum radial load Fr (N)
	Dynamic load C (kN)	Static load Co (kN)	Dynamic load C (kN)	Static load Co (kN)			
14	4.0	2.47	4.0	2.47	27	16.5	230
17	4.3	2.95	4.3	2.95	29	17.5	250
20	4.5	3.45	4.5	3.45	27	15.5	275
25	4.9	4.35	4.9	4.35	29.5	16.5	250
32	14.1	10.9	5.35	5.25	33	23	770
40	16.4	14.3	11.5	10.9	39.5	27.5	1060

4-7-7 DSH-AH type size chart



Mark	Model	14	17	20	25	32	40
ØA h7		70	80	90	110	142	170
ØB		54	64	75	90	115	140
ØC h7		36	45	50	60	85	100
ØD h7		74	84	95	115	147	175
ØE h7		20	25	30	38	45	59
ØF H7		14	19	21	29	36	46
G		52.5	56.5	51.5	55.5	65.5	79
H		12	12	5	6	7	8
I		20.5	23	25	26	32	38
J		20	21.5	21.5	23.5	26.5	33
K		5.5	5.5	-	-	-	-
L		9	10	10.5	10.5	12	14
M		8	8.5	9	8.5	9.5	13
N		7.5	8.5	7	6	5	7
O		2.5	2.5	-	-	-	-
P		36	45	-	-	-	-
Q		3	3	2x6	2x6	2x6	2x6
R		M3	M3	M3 x 6DP	M3 x 6DP	M3 x 6DP	M4 x 8DP
S (P.C.D)		-	-	25.5	33.5	40.5	52
T		8	12	12	12	12	12
ØU		3.5	3.5	3.5	4.5	5.5	6.6
V (P.C.D)		64	74	84	102	132	158
W1		12 E.A. 8	20 E.A. 16	16	16	16	16
W2		M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP	M6 x 10DP
W3		Ø3.5 x 11.5DP	Ø3.5 x 12DP	Ø3.5 x 13.5DP	Ø4.5 x 15.5DP	Ø5.5 x 20.5DP	Ø6.6 x 25DP
X (P.C.D)		44	54	62	77	100	122
Y (Degree)		30°	18°	22.5°	22.5°	22.5°	22.5°
Z (Degree)		30°	18°	11.25°	11.25°	11.25°	11.25°
Moment of inertia (×10 ⁻⁴ kgm ²)		0.091	0.193	0.404	1.07	2.85	9.28
Weight (Kg)		0.71	1.0	1.38	2.1	4.5	7.7

4-8 DSH-AJ Type

4-8-1 Technical data

Table 4-8-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	5.4	0.55	18	1.8	6.9	0.7	35	3.6	8500	3500
	80	7.8	0.80	23	2.4	11	1.1	47	4.8		
	100	7.8	0.80	28	2.9	11	1.1	54	5.5		
17	50	16	1.6	34	3.5	26	2.6	70	7.1	7300	3500
	80	22	2.2	43	4.4	27	2.7	87	8.9		
	100	24	2.4	54	5.5	39	4	110	11		
	120	24	2.4	54	5.5	39	4	86	8.8		
20	50	25	2.5	56	5.7	34	3.5	98	10	6500	3500
	80	34	3.5	74	7.5	47	4.8	127	13		
	100	40	4.1	82	8.4	49	5	147	15		
	120	40	4.1	87	8.9	49	5	147	15		
	160	40	4.1	92	9.4	49	5	147	15		
25	50	39	4.0	98	10	55	5.6	186	19	5600	3500
	80	63	6.4	137	14	87	8.9	255	26		
	100	67	6.8	157	16	108	11	284	29		
	120	67	6.8	167	17	108	11	304	31		
	160	67	6.8	176	18	108	11	314	32		
32	50	76	7.8	216	22	108	11	382	39	4800	3500
	80	118	12	304	31	167	17	568	58		
	100	137	14	333	34	216	22	647	66		
	120	137	14	353	36	216	22	686	70		
	160	137	14	372	38	216	22	686	70		
40	50	137	14	402	41	196	20	686	70	4000	3000
	80	206	21	519	53	284	29	980	100		
	100	265	27	568	58	372	38	1080	110		
	120	294	30	617	63	451	46	1180	120		
	160	294	30	647	66	451	46	1180	120		

※1 Permissible rated torque

※2 Permissible maximum torque

※3 Permissible average torque

※4 Permissible maximum value of impact

Table 4-8-2 Crossed roller bearing specifications

Model			14	17	20	25	32	40
Item								
Pitch circle diameter of roller	Dpw	m	0.050	0.060	0.070	0.085	0.111	0.133
Offset amount	R	m	0.0217	0.0239	0.0255	0.0296	0.0364	0.0440
Basic load ratings	Dynamic load C	C	kN	5.8	10.4	14.6	21.8	38.2
			kgf	590	1060	1490	2230	3900
	Static load Co	Co	kN	8.6	16.3	22.0	35.8	65.4
			kgf	880	1670	2250	3660	6680
Moment rigidity	K	K	$\times 10^4 \text{ Nm/rad}$	8.5	15.4	25.2	39.2	100
			kgfm/arc min	2.5	4.6	7.5	11.6	29.6
Permissible dynamic tilting moment	M	Nm	74	124	187	258	580	849
Permissible static tilting moment	Mo	Nm	144	328	515	1070	2425	3623
Permissible axial load	Fa	kN	1.239	2.222	3.119	4.657	8.161	9.250
Permissible radial load	Fr	kN	0.83	1.489	2.090	3.120	5.468	6.198

Table 4-8-3 Angle transmission accuracy

Model		14	17	20	25	32	40
Reduction ratio							
50 up	$\times 10^{-4} \text{ rad}$	4.4	4.4	2.9	2.9	2.9	2.9
	arc min	1.5	1.5	1	1	1	1

Table 4-8-4 Hysterisis loss

Model		14	17	20	25	32	40
Reduction ratio							
50	$\times 10^{-4} \text{ rad}$	4.4	4.4	2.9	2.9	2.9	5.8
	arc min	1.5	1.5	1	1	1	2.0
80 up	$\times 10^{-4} \text{ rad}$	4.4	4.4	2.9	2.9	2.9	2.9
	arc min	1.5	1.5	1	1	1	1.0

Table 4-8-5 Starting torque

Unit : cNm

Model		14	17	20	25	32	40
Reduction ratio							
50		5.7	9.7	14	22	41	72
80		4.4	7.2	11	15	29	52
100		3.7	6.5	9.9	14	27	47
120		—	6.2	9.3	13	24	44
160		—	—	8.6	12	23	39

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-8-6 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	3.4	5.8	8.4	13	25	43
80	4.2	6.9	10	15	28	50
100	4.5	7.8	12	17	33	56
120	—	8.9	13	19	34	63
160	—	—	17	23	43	75

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-8-7 Torsional rigidity

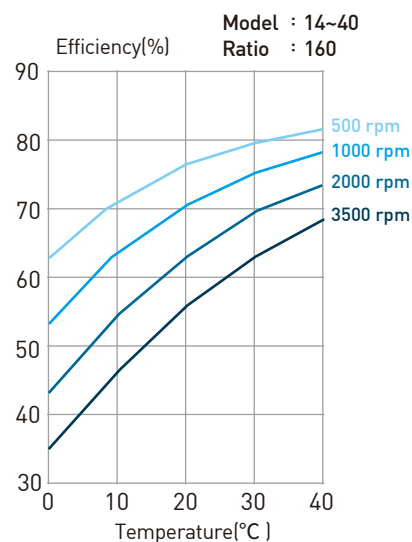
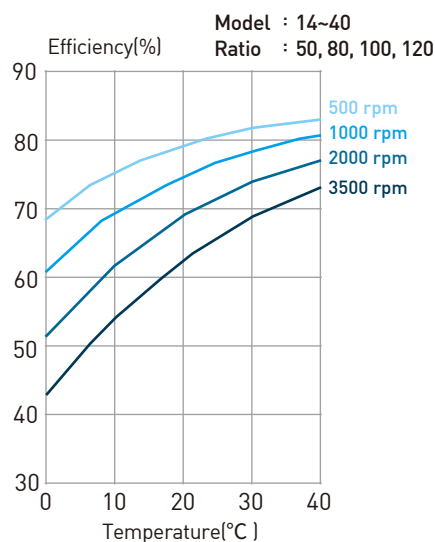
Reduction ratio		Model	14	17	20	25	32	40
T ₁		Nm	2.0	3.9	7.0	14	29	54
		kgfm	0.2	0.4	0.7	1.4	3.0	5.5
T ₂		Nm	6.9	12	25	48	108	196
		kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	×10 ⁴ Nm/rad	0.34	0.81	1.3	2.5	5.4	10
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6	3.0
	K ₂	×10 ⁴ Nm/rad	0.47	1.1	1.8	3.4	7.8	14
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3	4.2
	K ₃	×10 ⁴ Nm/rad	0.57	1.3	2.3	4.4	9.8	18
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9	5.3
	θ ₁	×10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.5	5.2
		arc min	2.0	1.7	1.8	1.9	1.9	1.8
	θ ₂	×10 ⁻⁴ rad	16	12	15.4	15.7	15.7	15.4
		arc min	5.6	4.2	5.3	5.4	5.4	5.3
80 up	K ₁	×10 ⁴ Nm/rad	0.47	1	1.6	3.1	6.7	13
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0	3.8
	K ₂	×10 ⁴ Nm/rad	0.61	1.4	2.5	5.0	11	20
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2	6.0
	K ₃	×10 ⁴ Nm/rad	0.71	1.6	2.9	5.7	12	23
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7	6.8
	θ ₁	×10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.4	4.1
		arc min	1.4	1.3	1.5	1.5	1.5	1.4
	θ ₂	×10 ⁻⁴ rad	12	9.7	11.3	11.1	11.6	11.1
		arc min	4.2	3.3	3.9	3.8	4.0	3.8

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-8-2 Efficiency

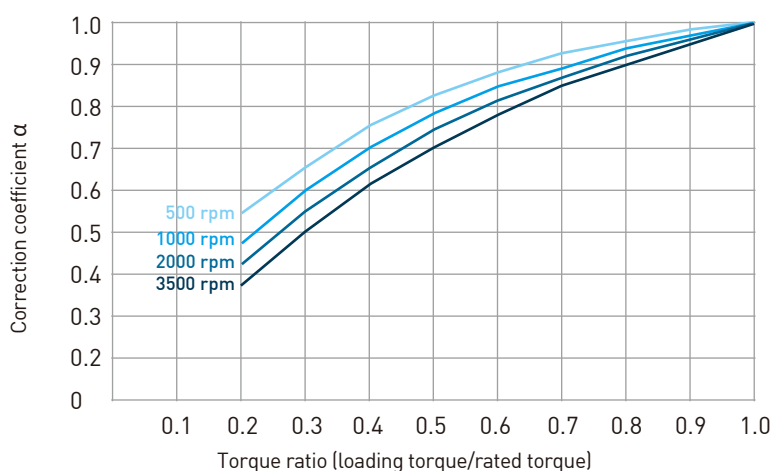
1. Rated torque E_R

DATORKER® efficiency would change by model, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity) .



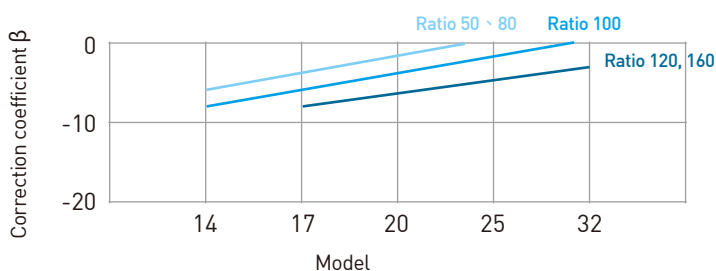
2. Correction coefficient α

Efficiency correction coefficient α
by loading torque



3. Correction coefficient β

Efficiency correction coefficient β
by model.



$$\text{Efficiency} = \alpha \times (E_R + \beta)$$

4-8-3 No-load operating torque

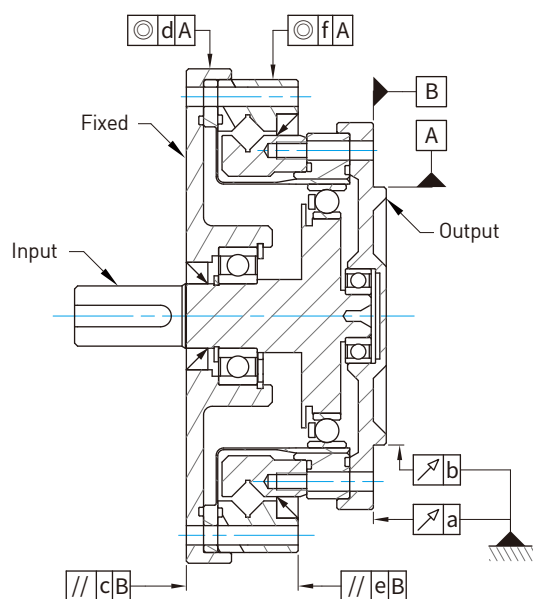
The torque required to drive the DATORKER® input (high-speed end) after running in at an input speed of 2000 r/min under an average ambient temperature of 25° C without load for more than 2 hours.

Unit : cNm

Reduction ratio	Input rotational speed	Model					
		14	17	20	25	32	40
50	500 r/min	3.9	8	11.6	18.2	31	55.3
	1000 r/min	4.7	9.8	14.6	22.2	38	71.3
	2000 r/min	5.8	12.8	19.6	28.2	53	93.3
	3500 r/min	7	14.8	22.6	35.2	68	137.3
80	500 r/min	3	6.6	9.5	14.8	24.5	44.4
	1000 r/min	3.8	8.4	12.5	18.8	31.5	60.4
	2000 r/min	4.9	11.4	17.5	24.8	46.5	82.4
	3500 r/min	6.1	13.4	20.5	31.8	61.5	126.4
100	500 r/min	2.8	6.2	9	14	23	42
	1000 r/min	3.6	8	12	18	30	58
	2000 r/min	4.7	11	17	24	45	80
	3500 r/min	5.9	13	20	31	60	124
120	500 r/min	—	6	8.6	13.4	21.9	40.3
	1000 r/min	—	7.8	11.6	17.4	28.9	56.3
	2000 r/min	—	10.8	16.6	23.4	43.9	78.3
	3500 r/min	—	12.8	19.6	30.4	58.9	122.3
160	500 r/min	—	—	8.2	12.7	20.5	38
	1000 r/min	—	—	11.2	16.7	27.5	54
	2000 r/min	—	—	16.2	22.7	42.5	76
	3500 r/min	—	—	19.2	29.7	57.5	120

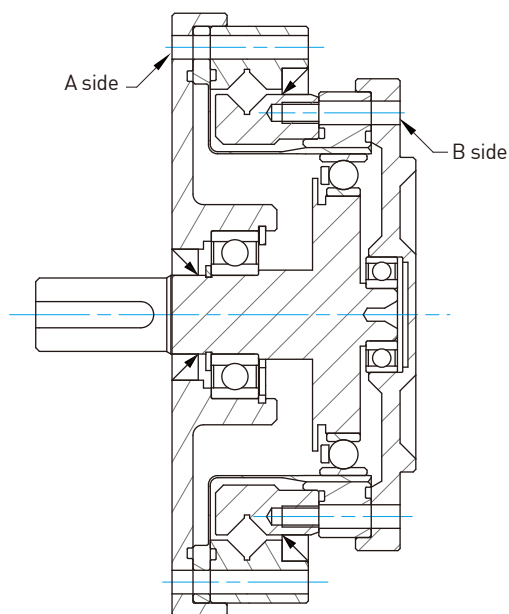
Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

4-8-4 Mechanical precision



Unit : mm

Mark \ Model	14	17	20	25	32	40
a	0.033	0.038	0.040	0.046	0.054	0.057
b	0.035	0.035	0.039	0.041	0.047	0.050
c	0.064	0.071	0.079	0.085	0.104	0.111
d	0.053	0.050	0.059	0.061	0.072	0.075
e	0.040	0.045	0.051	0.057	0.065	0.071
f	0.038	0.038	0.047	0.049	0.054	0.060

4-8-5 Installation bolt tightening torque**Table 4-8-8 A side mounting bolt tightening torque**

Item \ Model		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	64	74	84	102	132	158
Bolts tightening torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	108	186	206	431	892	1509
	kgfm	11	19	21	44	91	154

Table 4-8-9 B side mounting bolt tightening torque

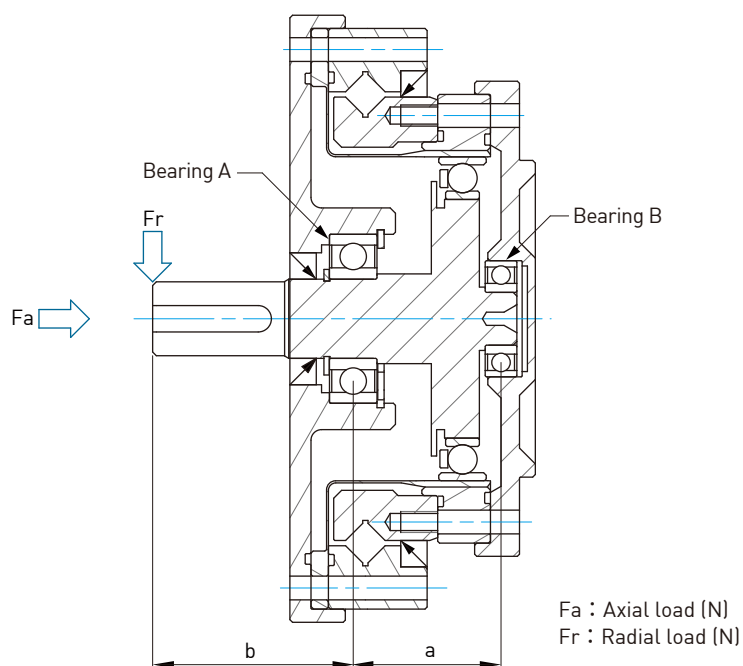
Item \ Model		14	17	20	25	32	40
Number of bolts		8	16	16	16	16	16
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	44	54	62	77	100	122
Bolts tightening torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	72	176	206	431	902	1558
	kgfm	7.3	18	21	44	92	159

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$

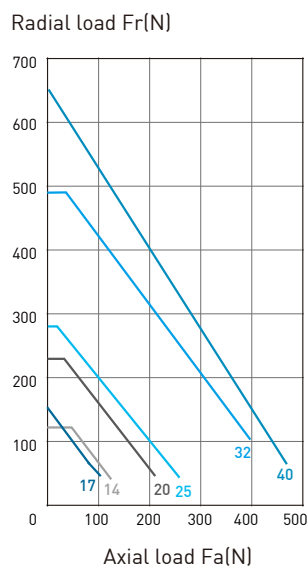
2. Bolt-in depth at least 2 x thread diameter

4-8-6 Permissible input load

The solid shaft input section is supported by two deep groove bearings. To ensure proper performance of the reducer, please confirm the load applied to the input section. As shown below:

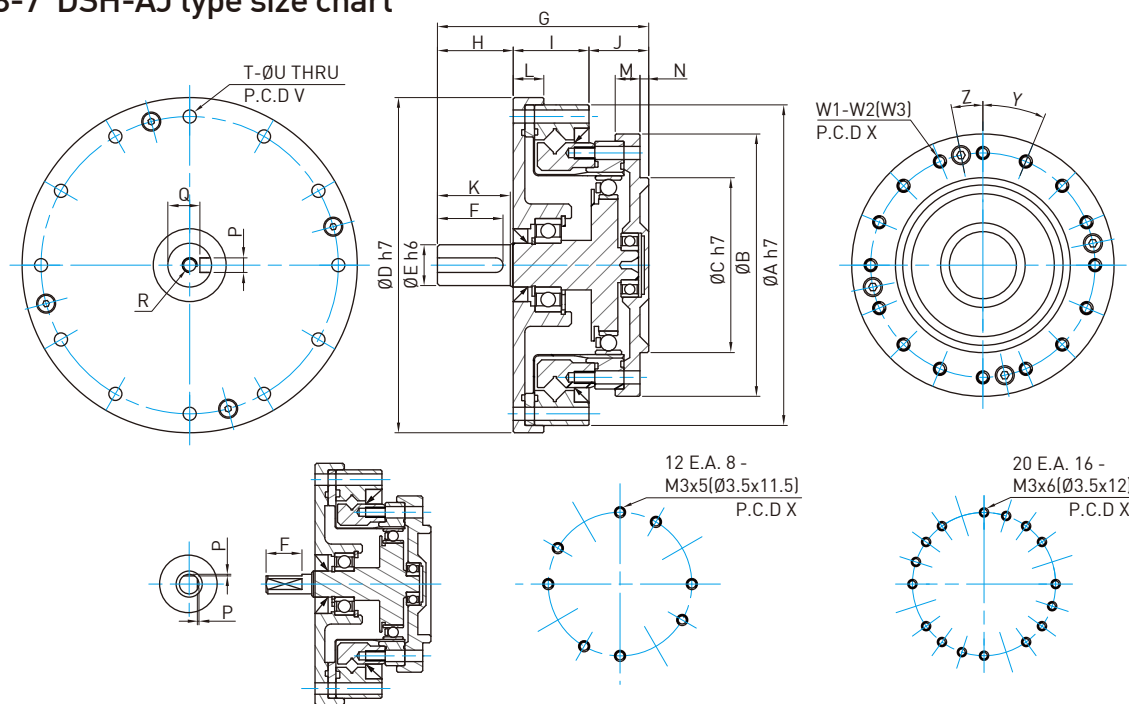


The figure below shows the average input speed of 2000rpm and the basic rated life $L_{10} = 7000$ hour.



Item Model	Bearing A		Bearing B		a (mm)	b (mm)	Maximum radial load Fr (N)
	Dynamic load C (kN)	Static load C_0 (kN)	Dynamic load C (kN)	Static load C_0 (kN)			
14	2.24	0.91	1.08	0.43	20	14	110
17	2.7	1.27	1.61	0.71	23.5	21	135
20	4.35	2.26	2.24	0.91	26.5	23.3	210
25	5.6	2.83	2.7	1.27	28	28	270
32	9.4	5	4.35	2.26	36	27	490
40	13.2	8.3	6	3.25	43	32.5	660

4-8-7 DSH-AJ type size chart



Model14、17

Model14

Model17

Unit : mm

Mark	Model	14	17	20	25	32	40
ØA h7		70	80	90	110	142	170
ØB		54	64	75	90	115	140
ØC h7		36	45	50	60	85	100
ØD h7		74	84	95	115	147	175
ØE h6		6	8	10	14	14	16
ØF		11	12	16.5	22.5	22.5	27.5
G		50.5	56	63.5	72.5	84.5	100
H		15	17	21	26	26	31
I		20.5	23	25	26	32	38
J		15	16	17.5	20.5	26.5	31
K		14	16	20	25	25	30
L		9	10	10.5	10.5	12	14
M		8	8.5	9	8.5	9.5	13
N		2.5	3	3	3	5	5
P		0.5	0.5	3 ⁰ _{-0.025}	5 ⁰ _{-0.03}	5 ⁰ _{-0.03}	5 ⁰ _{-0.03}
Q		-	-	8.2 ⁰ _{-0.1}	11 ⁰ _{-0.1}	11 ⁰ _{-0.1}	13 ⁰ _{-0.1}
R		-	-	M3 x 6DP	M5 x 10DP	M5 x 10DP	M5 x 10DP
T		8	12	12	12	12	12
ØU		3.5	3.5	3.5	4.5	5.5	6.6
V (P.C.D)		64	74	84	102	132	158
W1		12 E.A. 8	20 E.A. 16	16	16	16	16
W2		M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP	M6 x 10DP
W3		Ø3.5 x 11.5DP	Ø3.5 x 12DP	Ø3.5 x 13.5DP	Ø4.5 x 15.5DP	Ø5.5 x 20.5DP	Ø6.6 x 25DP
X (P.C.D)		44	54	62	77	100	122
Y (Degree)		30°	18°	22.5°	22.5°	22.5°	22.5°
Z (Degree)		30°	18°	11.25°	11.25°	11.25°	11.25°
Moment of inertia (× 10 ⁻⁴ kgm ²)		0.025	0.059	0.137	0.32	1.2	3.41
Weight (Kg)		0.66	0.94	1.38	2.1	4.4	7.3

4-9 DGC-CO Type

4-9-1 Technical data

Table 4-9-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	7.0	0.7	23	2.3	9.0	0.9	46	4.7	8500	3500
	80	10	1.0	30	3.1	14	1.4	61	6.2		
	100	10	1.0	36	3.7	14	1.4	70	7.2		
17	50	21	2.1	44	4.5	34	3.4	91	9	7300	3500
	80	29	2.9	56	5.7	35	3.6	113	12		
	100	31	3.2	70	7.2	51	5.2	143	15		
	120	31	3.2	70	7.2	51	5.2	112	11		
20	50	33	3.3	73	7.4	44	4.5	127	13	6500	3500
	80	44	4.5	96	9.8	61	6.2	165	17		
	100	52	5.3	107	10.9	64	6.5	191	20		
	120	52	5.3	113	11.5	64	6.5	191	20		
	160	52	5.3	120	12.2	64	6.5	191	20		
25	50	51	5.2	127	13	72	7.3	242	25	5600	3500
	80	82	8.4	178	18	113	12	332	34		
	100	87	8.9	204	21	140	14	369	38		
	120	87	8.9	217	22	140	14	395	40		
	160	87	8.9	229	23	140	14	408	42		
32	50	99	10	281	29	140	14	497	51	4800	3500
	80	153	16	395	40	217	22	738	75		
	100	178	18	433	44	281	29	841	86		
	120	178	18	459	47	281	29	892	91		
	160	178	18	484	49	281	29	892	91		
40	50	178	18	523	53	255	26	892	91	4000	3000
	80	268	27	675	69	369	38	1270	130		
	100	345	35	738	75	484	49	1400	143		
	120	382	39	802	82	586	60	1530	156		
	160	382	39	841	86	586	60	1530	156		

- ※1 Permissible rated torque
 ※2 Permissible maximum torque
 ※3 Permissible average torque
 ※4 Permissible maximum value of impact

Table 4-9-2 Angle transmission accuracy

Reduction ratio \ Model		14	17	20	25	32	40
50 up	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9	2.9
	arc min	1.5	1.5	1	1	1	1

Table 4-9-3 Hysteresis loss

Reduction ratio \ Model		14	17	20	25	32	40
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8	5.8
	arc min	2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9	2.9
	arc min	1.0	1.0	1.0	1.0	1.0	1.0

Table 4-9-4 Maximum backlash

Reduction ratio \ Model		14	17	20	25	32	40
50	$\times 10^{-5}$ rad	17.5	9.7	8.2	8.2	6.8	6.8
	arc sec	36	20	17	17	14	14
80	$\times 10^{-5}$ rad	11.2	6.3	5.3	5.3	4.4	4.4
	arc sec	23	13	11	11	9	9
100	$\times 10^{-5}$ rad	8.7	4.8	4.4	4.4	3.4	3.4
	arc sec	18	10	9	9	7	7
120	$\times 10^{-5}$ rad	-	3.9	3.9	3.9	2.9	2.9
	arc sec	-	8	8	8	6	6
160	$\times 10^{-5}$ rad	-	-	2.9	2.9	2.4	2.4
	arc sec	-	-	6	6	5	5

Table 4-9-5 Starting torque

Unit : cNm

Reduction ratio \ Model		14	17	20	25	32	40
50		3.6	5.6	7.3	13	29	51
80		2.6	3.6	4.5	8.5	18	32
100		2.3	3.2	4.1	7.6	17	29
120		-	3.0	3.6	6.9	14	26
160		-	-	3.2	6.1	13	23

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-9-6 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	1.5	2.8	4.4	8.3	18	31
80	1.5	2.8	4.6	8.5	18	31
100	1.9	3.1	5.0	9.2	20	34
120	-	3.4	5.4	10	21	37
160	-	-	6.4	12	25	44

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

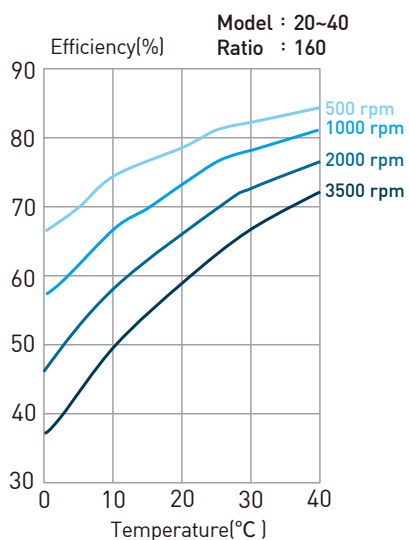
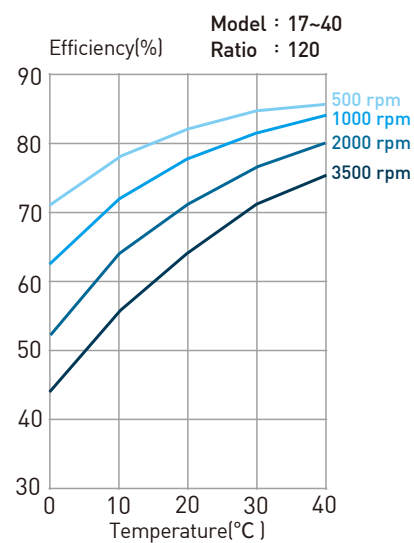
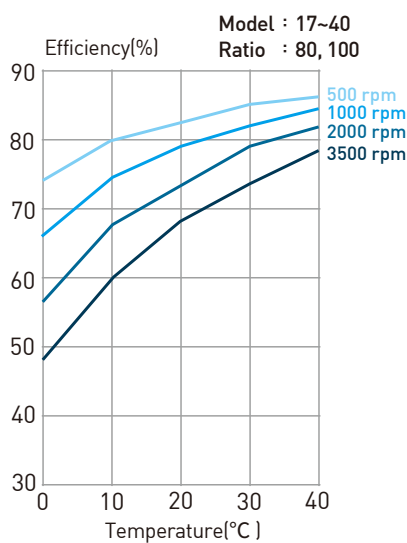
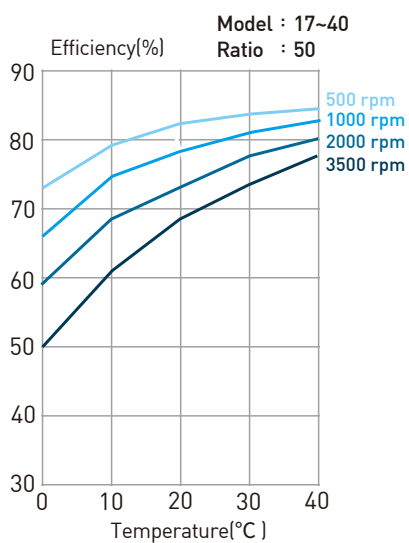
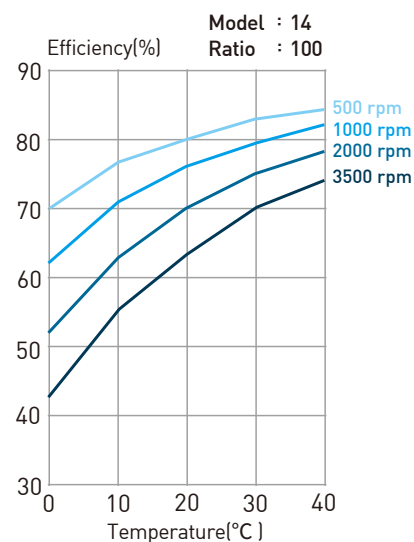
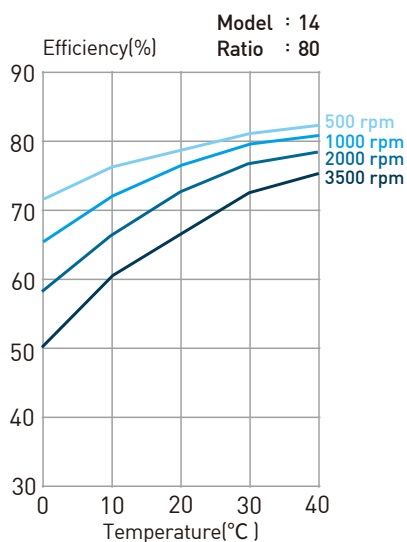
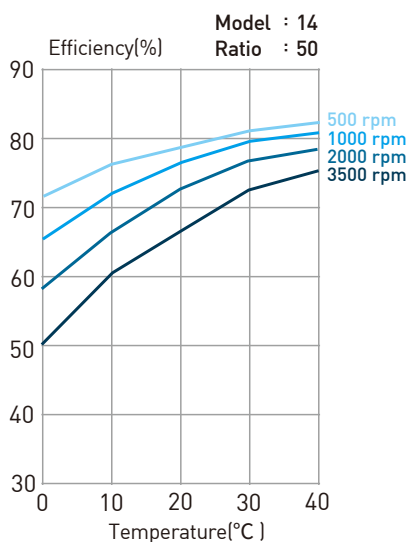
Table 4-9-7 Torsional rigidity

Reduction ratio \ Model		14	17	20	25	32	40
T ₁	Nm	2.0	3.9	7.0	14	29	54
	kgfm	0.20	0.40	0.70	1.4	3.0	5.5
T ₂	Nm	6.9	12	25	48	108	196
	kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	× 10 ⁴ Nm/rad	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6
	K ₂	× 10 ⁴ Nm/rad	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3
	K ₃	× 10 ⁴ Nm/rad	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9
	θ ₁	× 10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.2
		arc min	2.0	1.7	1.8	1.9	1.8
	θ ₂	× 10 ⁻⁴ rad	16	12	15.4	15.7	15.4
		arc min	5.6	4.2	5.3	5.4	5.3
80 up	K ₁	× 10 ⁴ Nm/rad	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0
	K ₂	× 10 ⁴ Nm/rad	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2
	K ₃	× 10 ⁴ Nm/rad	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7
	θ ₁	× 10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.1
		arc min	1.4	1.3	1.5	1.5	1.4
	θ ₂	× 10 ⁻⁴ rad	12	9.7	11.3	11.1	11.1
		arc min	4.2	3.3	3.9	3.8	3.8

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-9-2 Efficiency E_R

DATORKER® efficiency would change by model, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity) .

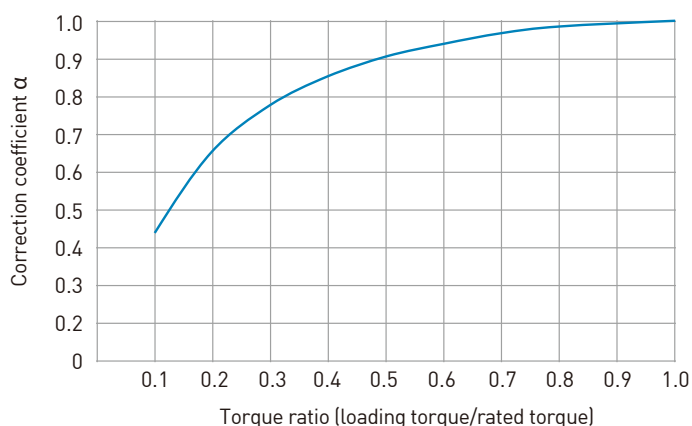


Efficiency correction coefficient α

$$\text{Efficiency} = \alpha \times E_R$$

α is correction coefficient

E_R is efficiency at the rated torque



4-9-3 No-load operating torque

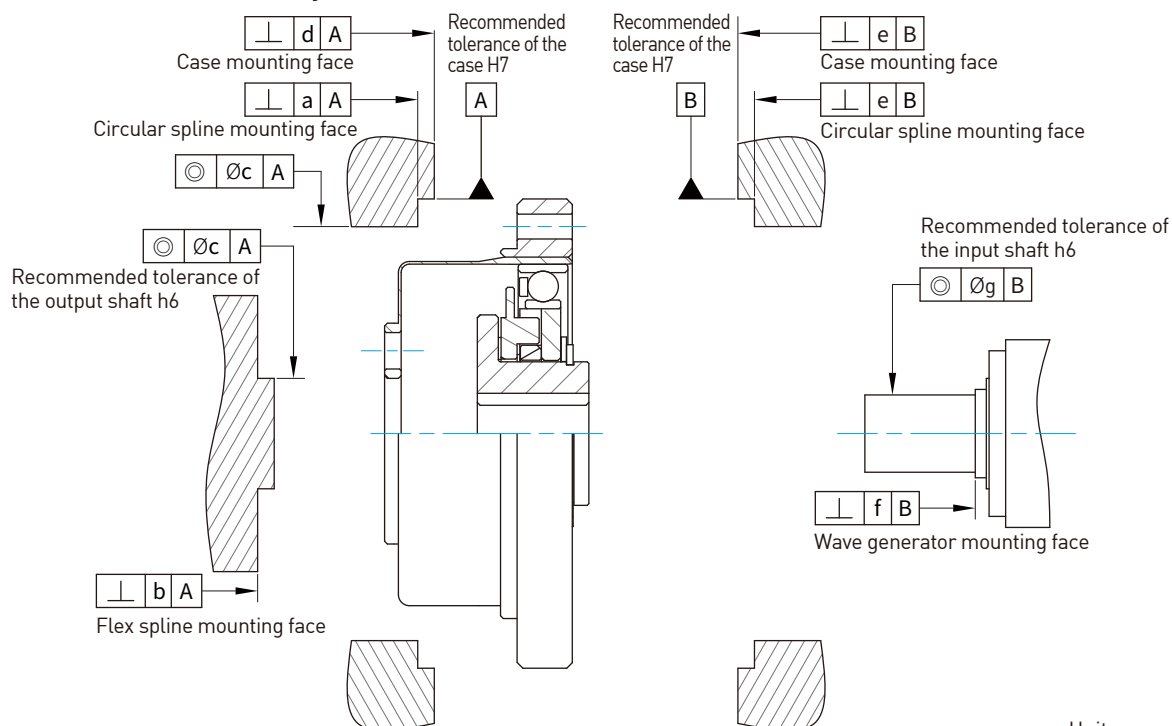
The torque required to drive the DATORKER® input (high-speed end) after running in at an input speed of 2000 r/min under an average ambient temperature of 25° C without load for more than 2 hours.

Unit: cNm

Reduction ratio	Input rotational speed	Model					
		14	17	20	25	32	40
50	500 r/min	1.8	3.4	5.1	9.7	21.2	38
	1000 r/min	2.3	4.4	6.9	12.5	27.2	51
	2000 r/min	3.1	5.8	9.4	18.5	37.2	73
	3500 r/min	4.2	7.9	13.4	25.5	50.2	98
80	500 r/min	1.4	2.6	3.9	7.6	16.8	31.2
	1000 r/min	1.9	3.6	5.7	10.4	22.8	44.2
	2000 r/min	2.7	5	8.2	16.4	32.8	66.2
	3500 r/min	3.8	7.1	12.2	23.4	45.8	91.2
100	500 r/min	1.3	2.5	3.7	7.2	16	30
	1000 r/min	1.8	3.5	5.5	10	22	43
	2000 r/min	2.6	4.9	8	16	32	65
	3500 r/min	3.7	7	12	23	45	90
120	500 r/min	-	2.4	3.5	6.9	15.4	29.1
	1000 r/min	-	3.4	5.2	9.7	21.4	42.1
	2000 r/min	-	4.8	7.8	15.7	31.4	64.1
	3500 r/min	-	6.9	11.8	22.7	44.4	89.1
160	500 r/min	-	-	3.4	6.6	14.8	27.8
	1000 r/min	-	-	5.2	9.4	20.8	40.8
	2000 r/min	-	-	7.7	15.4	30.8	62.8
	3500 r/min	-	-	11.7	22.4	43.8	87.8

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

4-9-4 Installation accuracy

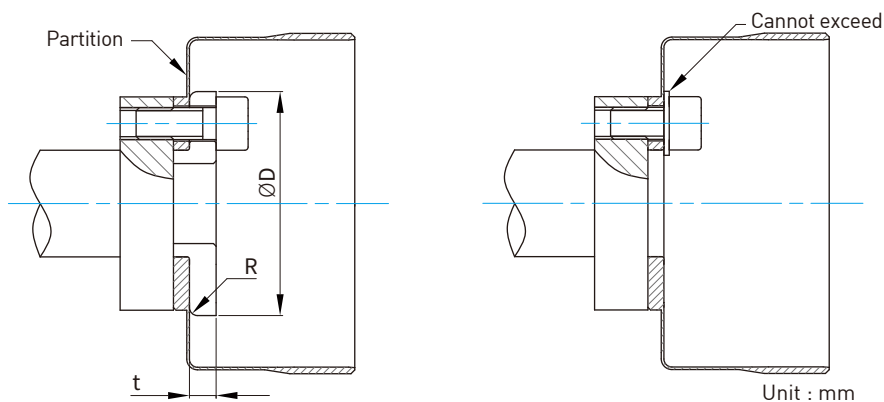


Unit : mm

Mark	Model	14	17	20	25	32	40
a		0.011	0.012	0.013	0.014	0.016	0.016
b		0.008	0.011	0.014	0.018	0.022	0.025
Øc		0.015	0.018	0.019	0.022	0.022	0.024
d		0.011	0.015	0.017	0.024	0.026	0.026
e		0.011	0.015	0.017	0.024	0.026	0.026
f		0.017 (0.008)	0.020 (0.010)	0.020 (0.010)	0.024 (0.012)	0.024 (0.012)	0.032 (0.012)
Øg		0.030 (0.016)	0.034 (0.018)	0.044 (0.019)	0.047 (0.022)	0.050 (0.022)	0.063 (0.024)

Note: The value in () is the value of the wave generator (without oldham coupling).

4-9-5 Recommend size of the press plate



Unit : mm

Mark	Model	14	17	20	25	32	40
ØD _{-0.1} ⁰		24.5	29	34	42	55	68
R ₀ ^{+0.1}		1.2	1.2	1.4	1.5	2	2.5
t		2	2.5	2.5	5	7	7

Note : In order to avoid the sinking or loosening of the bolts on the press plate, it is recommended that: 1. The material is S45C; 2. The heat treatment hardness should be HB200~270.

4-9-6 Installation bolt tightening torque

1. Flex spline flange side

- When the load torque is less than the rated performance value in "Peak torque at start/stop" Table 4-1-1, use only bolts for installation.
- If the load torque may reach the rated performance value in "Instantaneous permissible max torque" Table 4-1-1, please use a combination of bolts and pins for installation.

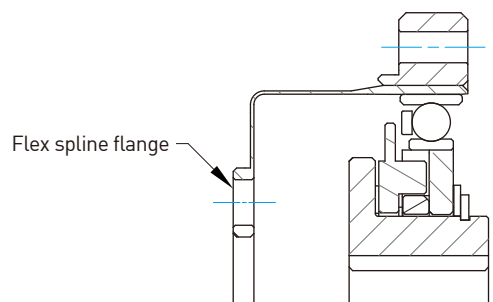


Table 4-9-8 Flex spline flange side bolt tightening torque

Item \ Model		14	17	20	25	32	40
Number of bolts		6	6	8	8	8	8
Bolts size		M4	M5	M5	M6	M8	M10
Installation of bolts PCD	mm	17	19	24	30	40	50
Bolts tightening torque	Nm	5.4	10.8	10.8	18.4	44.4	88.8
	kgfm	0.55	1.10	1.10	1.87	4.53	9.06
Transmission torque	Nm	43	77	130	230	555	1110
	kgfm	4.4	8	13	23	57	113

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$

2. Bolt-in depth at least 2 x thread diameter

Table 4-9-9 Pin installation of flex spline flange

Item \ Model		14	17	20	25	32	40
Number of bolts		4	4	4	4	4	4
Bolts size		3	3	3	4	5	6
Installation of bolts PCD	mm	18.5	21.5	27	34	45	56
Bolt tightening torque	Nm	120	166	242	481	1070	2040
	kgfm	12	17	25	49	110	208

Note : Recommended pin type: parallel pin; material : S45C-Q

2. Circular spline flange side

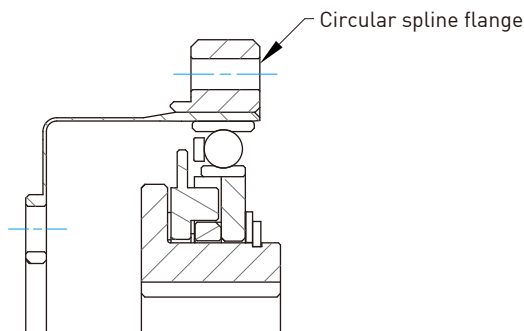
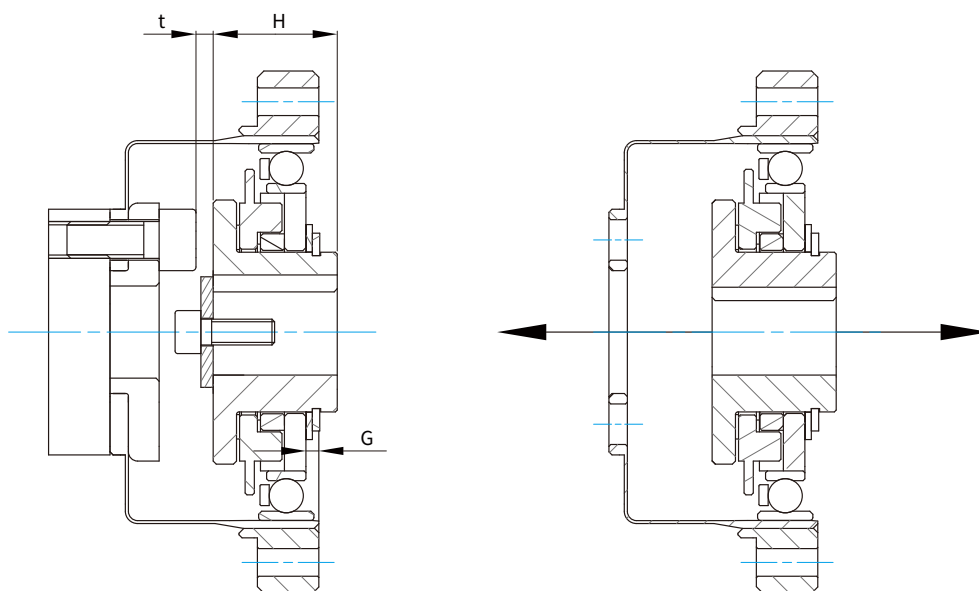


Table 4-9-10 Bolt installation of circular spline flange

Item \ Model		14	17	20	25	32	40
Number of bolts		8	16	16	16	16	16
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	44	54	62	75	100	120
Bolts tightening torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	72	175	196	419	901	1530
	kgfm	7.3	18	20	43	92	156

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$
2. Bolt-in depth at least 2 x thread diameter

4-9-7 Installation of wave generator



Unit : mm

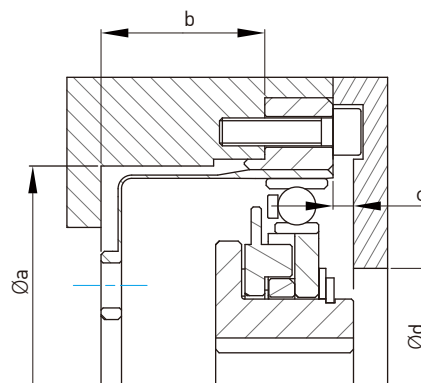
Mark \ Model	14	17	20	25	32	40
G	0.4	0.3	0.1	2.1	2.5	3.3
$H_{-0.1}^0$	18.5	20.7	21.5	21.6	23.6	29.7
t	1.6	1.3	1.5	1.4	2.2	2.3

Note: 1. Avoid interference between the Wave generator and the locking bolt of the flex spline.
2. Due to the elastic deformation of the flex spline, the Strain Wave Gear applies thrust to the Wave generator during operation. The thrust will change with the operating conditions. In any case, a mechanism that prevents slipping due to the thrust of the Wave generator must be used.

4-9-8 Lubrication

1. Recommended dimensions for the inner wall of the case

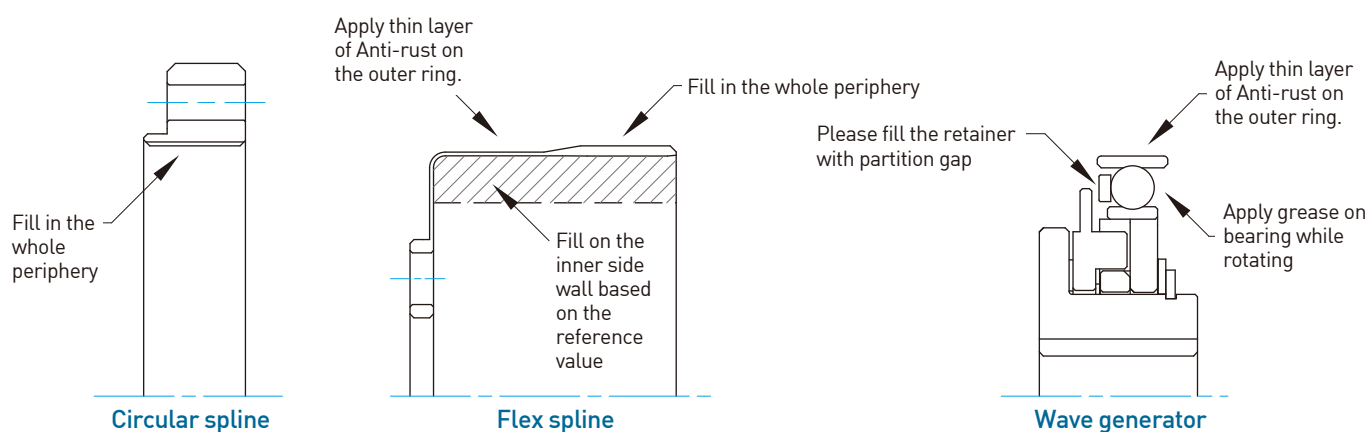
In order to avoid the splashing of excessive lubricant on other parts during operation. It is recommended to adhere to the following dimensions:



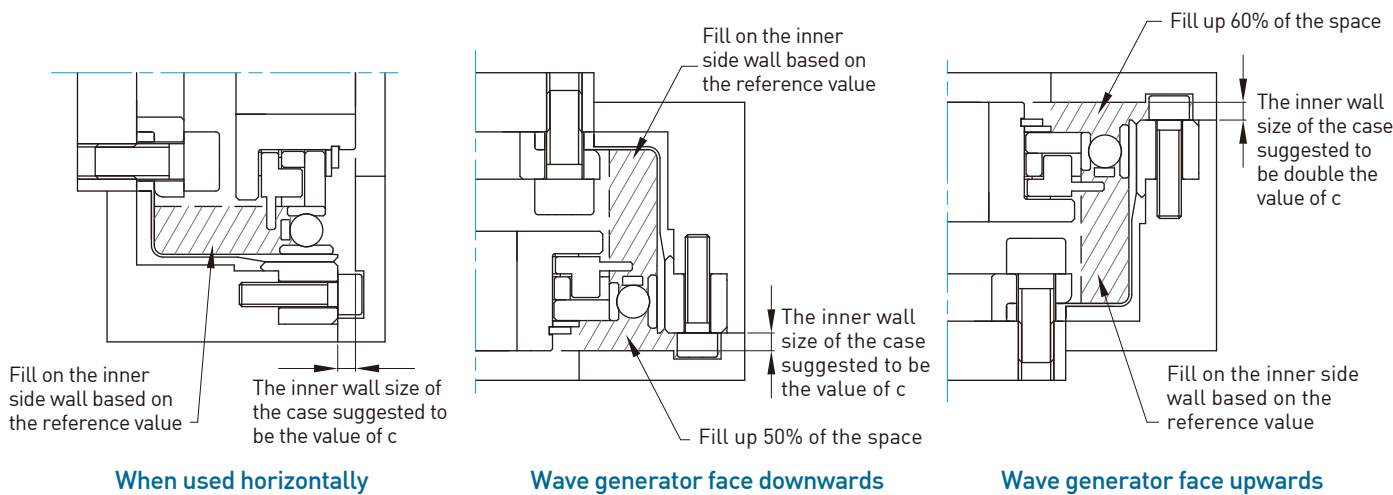
Unit : mm

Mark \ Model	14	17	20	25	32	40
Øa	38	45	53	66	86	106
b	17.1	19	20.5	23	26.8	33
c	1	1	1.5	1.5	1.5	2
Ød	16	26	30	37	37	4.5

2. Lubricant application

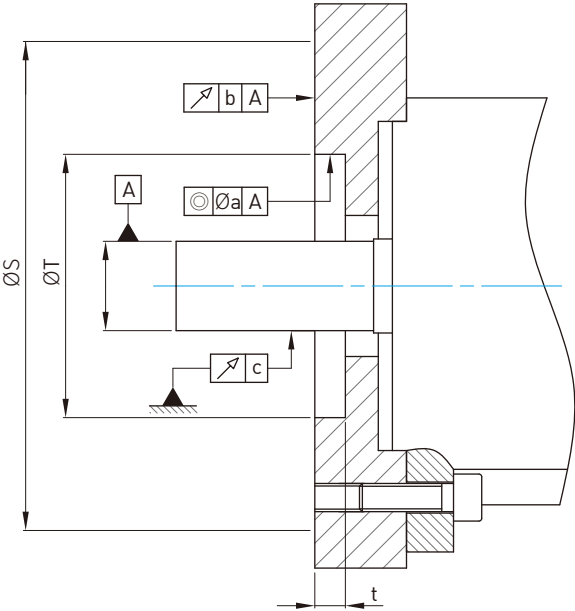


3.The key points of different application methods



							Unit : g
Model		14	17	20	25	32	40
Instructions							
Used horizontally		5.5	10	16	30	60	110
Used vertical	Wave generator is facing down	7	12	18	35	70	125
	Wave generator is facing up	8.5	14	21	40	80	145

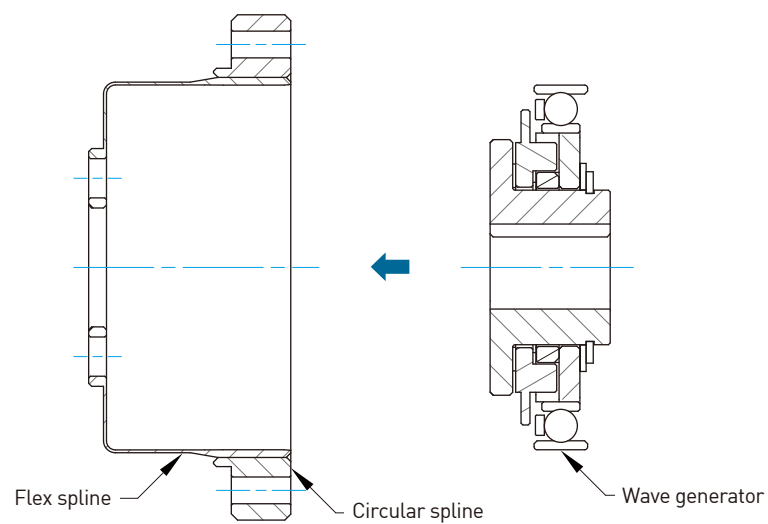
4-9-9 Motor installation



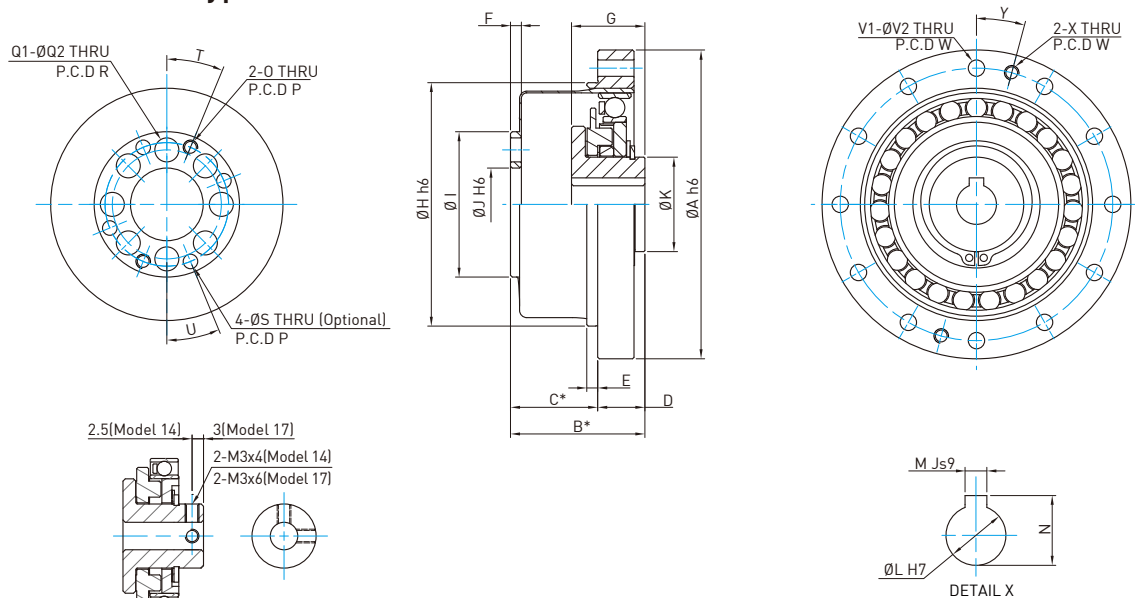
		Unit : mm					
Mark	Model	14	17	20	25	32	40
a		0.03	0.04	0.04	0.04	0.04	0.05
b		0.03	0.04	0.04	0.04	0.04	0.05
c		0.015	0.015	0.018	0.018	0.018	0.018
ØT H6		50	60	70	85	110	135

4-9-10 Installation sequence

Install the circular spline and flex spline into the mechanism then install the wave generator.



4-9-11 DGC-C0 type size chart



Model14、17

Unit : mm

Mark	Model	14	17	20	25	32	40
ØA h6		50	60	70	85	110	135
B*		28.5 ⁰ _{-0.4}	32.5 ⁰ _{-0.4}	33.5 ⁰ _{-0.4}	37 ⁰ _{-0.5}	44 ⁰ _{-0.6}	53 ⁰ _{-0.6}
C*		17.5 ^{+0.4} ₀	20 ^{+0.5} ₀	21.5 ^{+0.6} ₀	24 ^{+0.6} ₀	28 ^{+0.6} ₀	34 ^{+0.6} ₀
D		6	6.5	7.5	10	14	17
E		2	2.5	3	3	3	4
F		2.4	3	3	3	3.2	4
G		18.5 ⁰ _{-0.1}	20.7 ⁰ _{-0.1}	21.5 ⁰ _{-0.1}	21.6 ⁰ _{-0.1}	23.6 ⁰ _{-0.1}	29.7 ⁰ _{-0.1}
ØH h6		38	48	54	67	90	110
ØI		23	27.2	32	40	52	64
ØJ H6		11	10	16	20	26	32
ØK		14	18	21	26	26	32
ØL H7		6	8	9	11	14	14
M Js9		—	—	3	4	5	5
N		—	—	10.4 ^{+0.1} ₀	12.8 ^{+0.1} ₀	16.3 ^{+0.1} ₀	16.3 ^{+0.1} ₀
O		M3	M3	M3	M4	M5	M6
P (P.C.D)		18.5	21.5	27	34	45	56
Q1		6	6	8	8	8	8
ØQ2		4.5	5.5	5.5	6.6	9	11
R (P.C.D)		17	19	24	30	40	50
S (Optional)		3 ^{+0.015} ₀	3 ^{+0.015} ₀	3 ^{+0.015} ₀	4 ^{+0.015} ₀	5 ^{+0.015} ₀	6 ^{+0.015} ₀
T (Degree)		30°	30°	22.5°	22.5°	22.5°	22.5°
U (Degree)		30°	30°	22.5°	22.5°	22.5°	—
V1		8	16	16	16	16	16
ØV2		3.5	3.5	3.5	4.5	5.5	6.6
W (P.C.D)		44	54	62	75	100	120
X		M3	M3	M3	M4	M5	M6
Y (Degree)		22.5°	11.25°	11.25°	11.25°	11.25°	11.25°
Moment of inertia [× 10 ⁻⁴ kgm ²]		0.033	0.079	0.193	0.413	1.69	4.50
Weight (Kg)		0.09	0.15	0.28	0.45	0.89	1.7

*1. The dimension B, C is the fitting position and permissible tolerance in the axial direction.

*2. If the load torque may reach the rated performance value in "Instantaneous permissible max torque please use a combination of bolts and pins for installation.

4-10 DGC-PO Type

4-10-1 Technical data

Table 4-10-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	7.0	0.7	23	2.3	9	0.9	46	4.7	8500	3500
	80	10	1.0	30	3.1	14	1.4	58	5.9		
	100	10	1.0	36	3.7	14	1.4	58	5.9		
17	50	21	2.1	44	4.5	34	3.4	91	9	7300	3500
	80	29	2.9	56	5.7	35	3.6	109	11		
	100	31	3.2	70	7.2	51	5.2	109	11		
	120	31	3.2	70	7.2	51	5.2	109	11		
20	50	33	3.3	73	7.4	44	4.5	127	13	6500	3500
	80	44	4.5	96	9.8	61	6.2	165	17		
	100	52	5.3	107	10.9	64	6.5	191	20		
	120	52	5.3	113	11.5	64	6.5	191	20		
	160	52	5.3	120	12.2	64	6.5	191	20		
25	50	51	5.2	127	13	72	7.3	242	25	5600	3500
	80	82	8.4	178	18	113	12	332	34		
	100	87	8.9	204	21	140	14	369	38		
	120	87	8.9	217	22	140	14	395	40		
	160	87	8.9	229	23	140	14	408	42		
32	50	99	10	281	29	140	14	497	51	4800	3500
	80	153	16	395	40	217	22	738	75		
	100	178	18	433	44	281	29	841	86		
	120	178	18	459	47	281	29	842	86		
	160	178	18	484	49	281	29	842	86		
40	50	178	18	523	53	255	26	892	91	4000	3000
	80	268	27	675	69	369	38	1270	130		
	100	345	35	738	75	484	49	1400	143		
	120	382	39	802	82	586	60	1510	154		
	160	382	39	841	86	586	60	1510	154		

※1 Permissible rated torque

※2 Permissible maximum torque

※3 Permissible average torque

※4 Permissible maximum value of impact

Table 4-10-2 Crossed roller bearing specifications

Item			Model	14	17	20	25	32	40
Pitch circle diameter of roller		Dpw	m	0.035	0.0425	0.05	0.062	0.08	0.096
Offset amount		R	m	0.0095	0.0095	0.0095	0.0115	0.013	0.0145
Basic load ratings	Dynamic load C	C	kN	4.7	5.3	5.8	9.6	15.0	21.3
			kgf	480	540	590	980	1530	2170
	Static load Co	Co	kN	6.1	7.6	9.0	15.1	25.0	36.5
			kgf	620	770	920	1540	2550	3720
Moment rigidity		K	×10 ⁴ Nm/rad	4.38	7.75	12.8	24.2	53.9	91.0
			kgfm/arc min	1.3	2.3	3.8	7.2	16	27
Permissible dynamic tilting moment		M	Nm	41	64	91	156	313	450
Permissible static tilting moment		Mo	Nm	53	80	113	234	500	876
Permissible axial load		Fa	kN	1.004	1.130	1.235	2.051	3.205	4.550
Permissible radial load		Fr	kN	0.673	0.757	0.827	1.374	2.147	3.049

Table 4-10-3 Angle transmission accuracy

Reduction ratio		Model	14	17	20	25	32	40
50 up	$\times 10^{-4}$ rad		4.4	4.4	2.9	2.9	2.9	2.9
	arc min		1.5	1.5	1	1	1	1

Table 4-10-4 Hysterisis loss

Reduction ratio		Model	14	17	20	25	32	40
50	$\times 10^{-4}$ rad		5.8	5.8	5.8	5.8	5.8	5.8
	arc min		2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad		2.9	2.9	2.9	2.9	2.9	2.9
	arc min		1.0	1.0	1.0	1.0	1.0	1.0

Table 4-10-5 Maximum backlash

Unit : Nm

Reduction ratio		Model	14	17	20	25	32	40
50	$\times 10^{-5}$ rad		17.5	9.7	8.2	8.2	6.8	6.8
	arc sec		36	20	17	17	14	14
80	$\times 10^{-5}$ rad		11.2	6.3	5.3	5.3	4.4	4.4
	arc sec		23	13	11	11	9	9
100	$\times 10^{-5}$ rad		8.7	4.8	4.4	4.4	3.4	3.4
	arc sec		18	10	9	9	7	7
120	$\times 10^{-5}$ rad		-	3.9	3.9	3.9	2.9	2.9
	arc sec		-	8	8	8	6	6
160	$\times 10^{-5}$ rad		-	-	2.9	2.9	2.4	2.4
	arc sec		-	-	6	6	5	5

Table 4-10-6 Starting torque

Unit : cNm

Reduction ratio \ Model	14	17	20	25	32	40
50	4.5	6.7	8.6	17	34	61
80	3.1	4.4	5.4	10	21	39
100	2.8	3.7	4.7	8.8	20	34
120	-	3.4	4.2	8.0	17	31
160	-	-	3.6	6.9	15	26

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-10-7 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	1.8	3.3	5.2	9.9	20	36
80	1.8	3.3	5.3	10	21	36
100	2	3.6	5.6	11	22	40
120	-	3.9	6.1	12	24	43
160	-	-	7	14	29	51

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

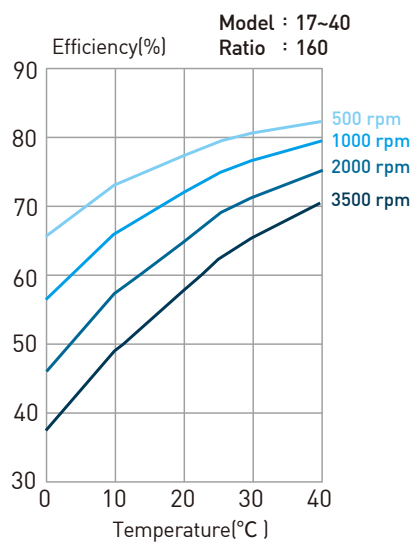
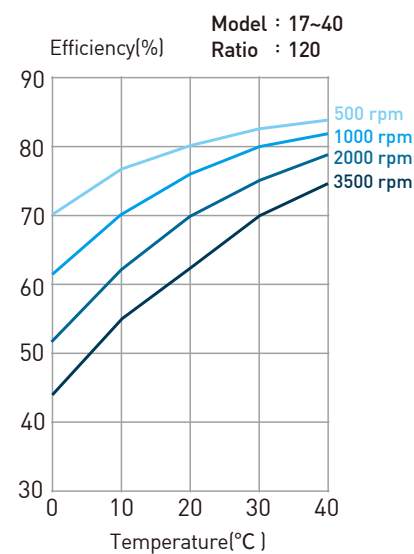
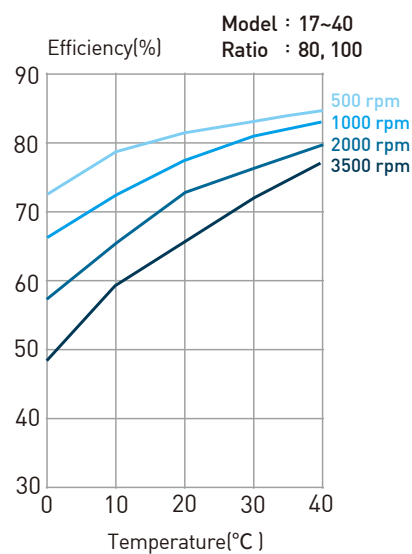
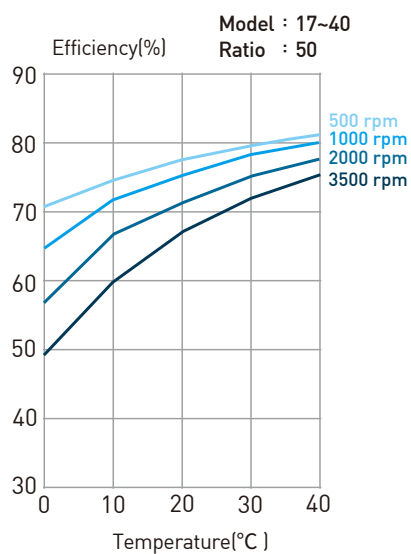
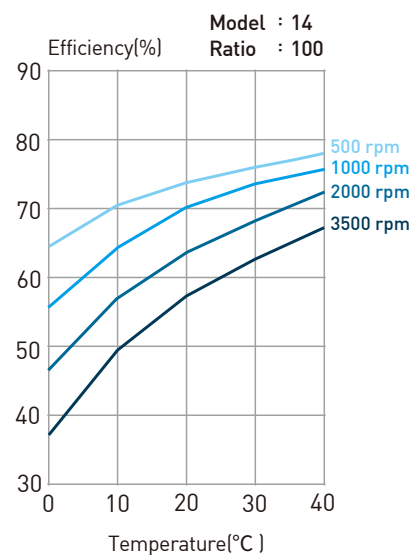
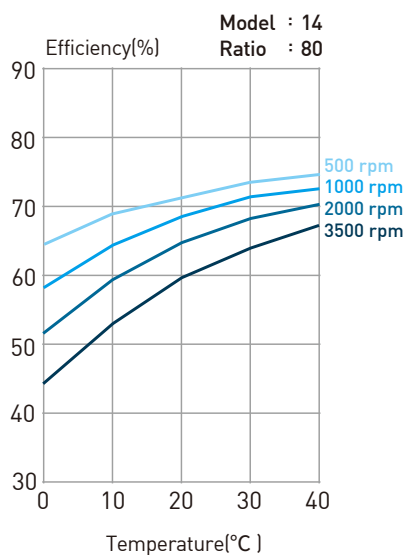
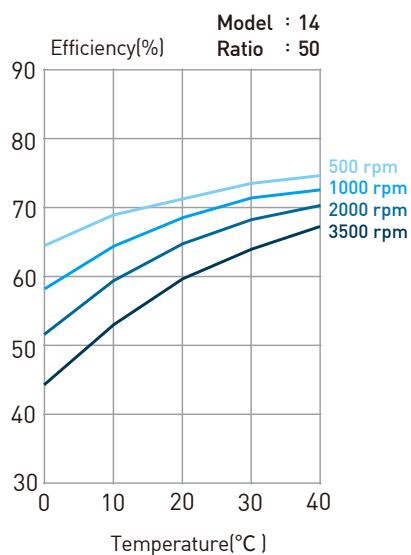
Table 4-10-8 Torsional rigidity

Reduction ratio \ Model			14	17	20	25	32	40
T_1		Nm	2.0	3.9	7.0	14	29	54
		kgfm	0.20	0.40	0.70	1.4	3.0	5.5
T_2		Nm	6.9	12	25	48	108	196
		kgfm	0.7	1.2	2.5	4.9	11	20
50	K_1	$\times 10^4$ Nm/rad	0.34	0.81	1.3	2.5	5.4	10
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6	3.0
	K_2	$\times 10^4$ Nm/rad	0.47	1.1	1.8	3.4	7.8	14
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3	4.2
	K_3	$\times 10^4$ Nm/rad	0.57	1.3	2.3	4.4	9.8	18
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9	5.3
	θ_1	$\times 10^{-4}$ rad	5.8	4.9	5.2	5.5	5.5	5.2
		arc min	2.0	1.7	1.8	1.9	1.9	1.8
	θ_2	$\times 10^{-4}$ rad	16	12	15.4	15.7	15.7	15.4
		arc min	5.6	4.2	5.3	5.4	5.4	5.3
80 up	K_1	$\times 10^4$ Nm/rad	0.47	1	1.6	3.1	6.7	13
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0	3.8
	K_2	$\times 10^4$ Nm/rad	0.61	1.4	2.5	5.0	11	20
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2	6.0
	K_3	$\times 10^4$ Nm/rad	0.71	1.6	2.9	5.7	12	23
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7	6.8
	θ_1	$\times 10^{-4}$ rad	4.1	3.9	4.4	4.4	4.4	4.1
		arc min	1.4	1.3	1.5	1.5	1.5	1.4
	θ_2	$\times 10^{-4}$ rad	12	9.7	11.3	11.1	11.6	11.1
		arc min	4.2	3.3	3.9	3.8	4.0	3.8

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-10-2 Efficiency E_R

DATORKER® efficiency would change by model, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity) .

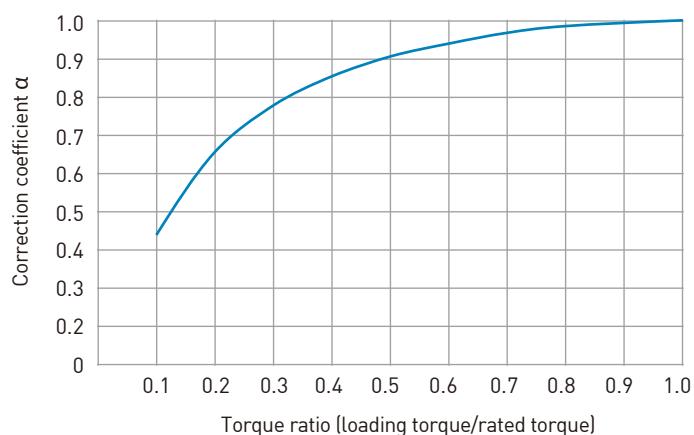


Efficiency correction coefficient α

$$\text{Efficiency} = \alpha \times E_R$$

α is correction coefficient

E_R is efficiency at the rated torque



4-10-3 No-load operating torque

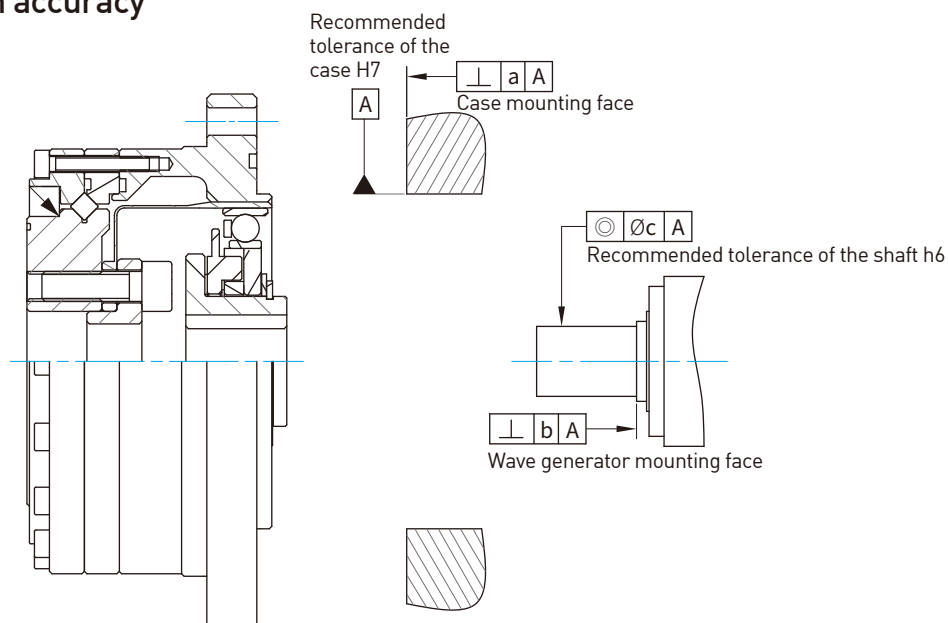
The torque required to drive the DATORKER® input (high-speed end) after running in at an input speed of 2000 r/min under an average ambient temperature of 25° C without load for more than 2 hours.

Unit: cNm

Reduction ratio	Input rotational speed	Model					
		14	17	20	25	32	40
50	500 r/min	3.2	5.1	7.3	12.8	26.1	46
	1000 r/min	3.9	6.1	9.1	17.8	33.1	57
	2000 r/min	4.6	7.6	11.8	21.8	44.1	77
	3500 r/min	5.9	9.6	12.7	28.8	57.1	102
80	500 r/min	2.3	3.8	5.5	9.7	20.3	36.1
	1000 r/min	3	4.8	7.3	14.7	27.3	47.1
	2000 r/min	3.7	6.3	10	18.7	38.3	67.1
	3500 r/min	5	8.3	10.9	25.7	51.3	92.1
100	500 r/min	2.1	3.5	5	9	19	34
	1000 r/min	2.8	4.5	6.8	14	26	45
	2000 r/min	3.5	6	9.5	18	37	65
	3500 r/min	4.8	8	10.4	25	50	90
120	500 r/min	-	3.3	4.7	8.5	18.1	32.5
	1000 r/min	-	4.3	6.5	13.5	25.1	43.5
	2000 r/min	-	5.8	9.2	17.5	36.1	63.5
	3500 r/min	-	7.8	10.1	24.5	49.1	88.5
160	500 r/min	-	-	4.2	7.8	16.8	30.5
	1000 r/min	-	-	6	12.8	23.8	41.5
	2000 r/min	-	-	8.7	16.8	34.8	61.5
	3500 r/min	-	-	9.6	23.8	47.8	86.5

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

4-10-4 Installation accuracy

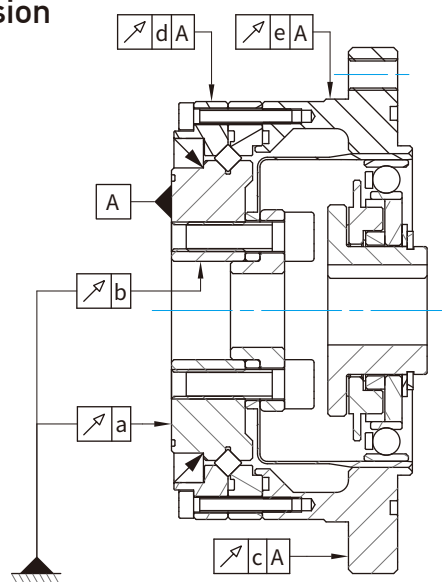


Unit : mm

Mark \ Model	14	17	20	25	32	40
a	0.011	0.015	0.017	0.024	0.026	0.026
b	0.017 [0.008]	0.020 [0.010]	0.020 [0.010]	0.024 [0.012]	0.024 [0.012]	0.032 [0.012]
c	0.030 [0.016]	0.034 [0.018]	0.044 [0.019]	0.047 [0.022]	0.050 [0.022]	0.063 [0.024]

Note: The value in () is the value of the wave generator (without oldham coupling).

4-10-5 Mechanical precision



Unit : mm

Mark \ Model	14	17	20	25	32	40
a	0.010	0.010	0.010	0.015	0.015	0.015
b	0.010	0.012	0.012	0.013	0.013	0.015
c	0.024	0.026	0.038	0.045	0.056	0.060
d	0.010	0.010	0.010	0.010	0.010	0.015
e	0.038	0.038	0.047	0.049	0.054	0.060

4-10-6 Installation bolt tightening torque

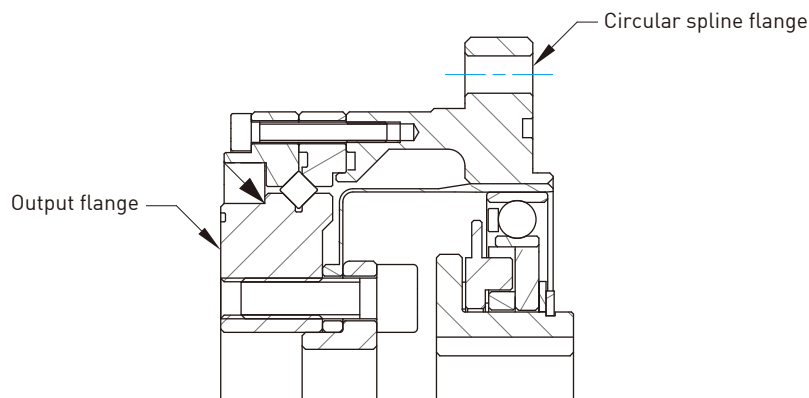


Table 4-10-9 Bolt tightening torque for output flange

Item \ Model		14	17	20	25	32	40
Number of bolts		6	6	8	8	8	8
Bolts size		M4	M5	M6	M8	M10	M10
Installation of bolts PCD	mm	23	27	32	42	55	68
Bolts tightening torque	Nm	5.4	10.8	18.4	45	89	89
	kgfm	0.55	1.1	1.88	4.5	9.1	9.1
Transmission torque	Nm	58	109	245	580	1220	1510
	kgfm	5.9	11.2	25	59	124	154

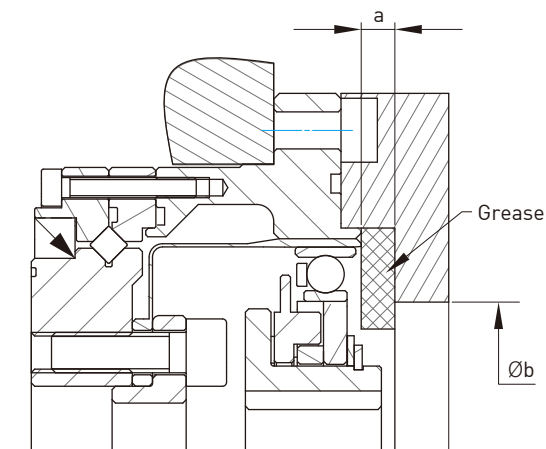
Table 4-10-10 Bolt tightening torque for circular spline flange

Item \ Model		14	17	20	25	32	40
Number of bolts		8	8	8	10	12	10
Bolts size		M4	M4	M5	M5	M6	M8
Installation of bolts PCD	mm	65	71	82	96	125	144
Bolts tightening torque	Nm	4.5	4.5	9.0	9.0	15.3	37
	kgfm	0.46	0.46	0.92	0.92	1.56	3.8
Transmission torque	Nm	182	196	365	538	1200	2100
	kgfm	19	20	37	55	122	214

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$
2. Bolt-in depth at least 2 x thread diameter

4-10-7 Lubrication

Keep the space between the reducer and mounting flange as narrow as possible so that grease can be kept inside during operation.



Unit : mm

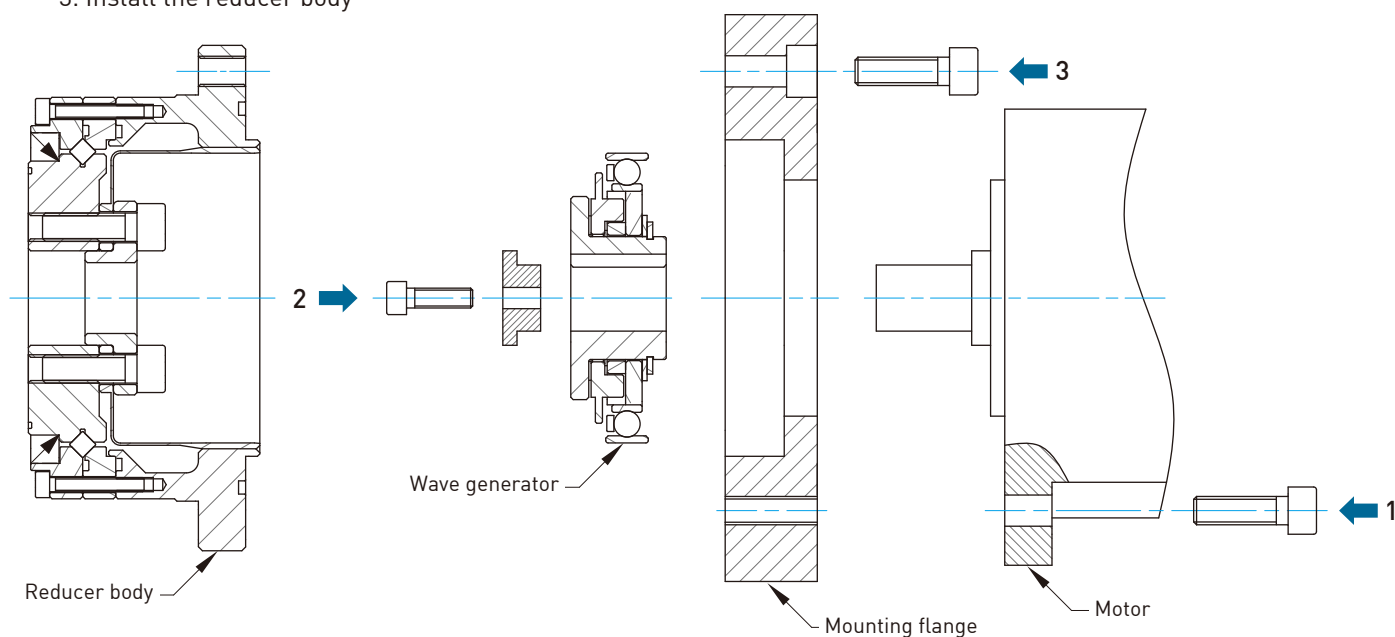
Item \ Model	14	17	20	25	32	40
a ※1	1	1	1.5	1.5	1.5	2
a ※2	3	3	4.5	4.5	4.5	6
Øb	16	26	30	37	37	45

※1 Center shaft horizontal or vertical: when the wave generator is facing downward

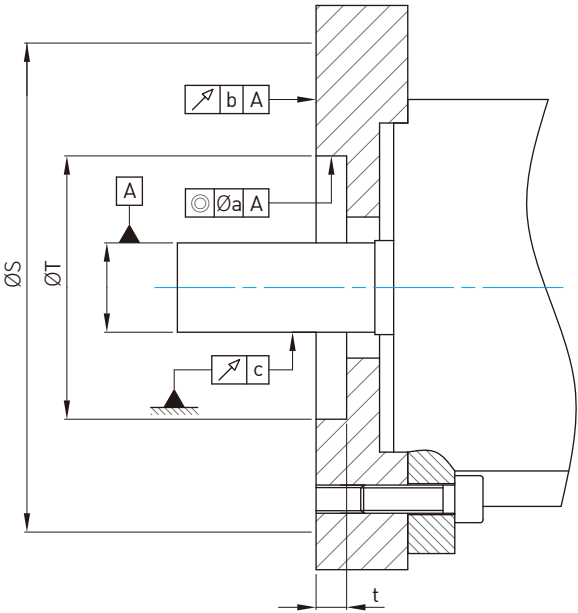
※2 Center shaft vertical: when the wave generator is facing upward

4-10-8 Installation procedure

1. Install the mounting flange on the motor mounting surface
2. Install the wave generator on the motor output shaft
3. Install the reducer body



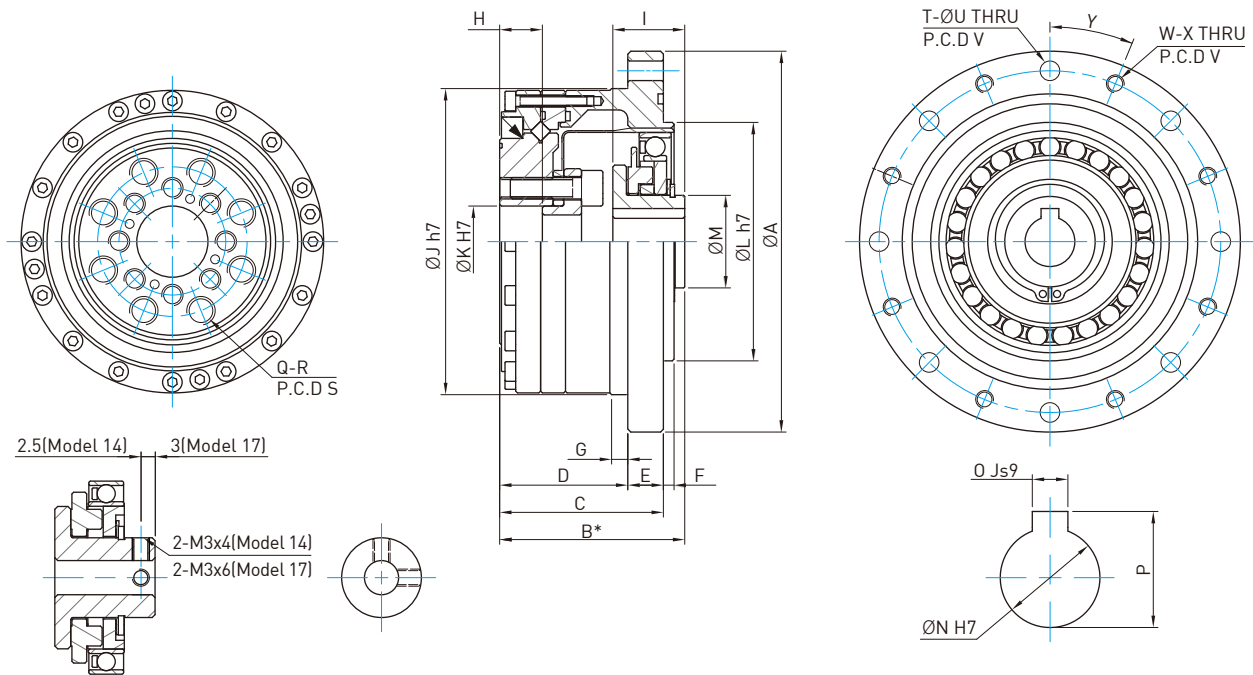
4-10-9 Motor installation



Unit : mm

Mark	Model	14	17	20	25	32	40
a		0.03	0.04	0.04	0.04	0.04	0.05
b		0.03	0.04	0.04	0.04	0.04	0.05
c		0.015	0.015	0.018	0.018	0.018	0.018
ØS		73	79	93	107	138	160
t		3	3	4.5	4.5	4.5	6
ØT H7		38	48	56	67	90	110

4-10-10 DGC-P0 type size chart



Unit : mm

Mark	Model	14	17	20	25	32	40
ØA		73	79	93	107	138	160
B*		41 ⁰ _{-0.9}	45 ⁰ _{-0.9}	45.5 ⁰ ₋₁	52 ⁰ ₋₁	62 ⁰ _{-1.1}	72.5 ⁰ _{-1.1}
C		34	37	38	46	57	66.5
D		27	29	28	36	45	50.5
E		7	8	10	10	12	16
F		2	2	3	3	3	4
G		3.5	4	5	5	5	5
H		9.4	9.5	9	12	15	5
I		18.5 ⁰ _{-0.1}	20.7 ⁰ _{-0.1}	21.5 ⁰ _{-0.1}	21.6 ⁰ _{-0.1}	23.6 ⁰ _{-0.1}	29.7 ⁰ _{-0.1}
ØJ h7		56	63	72	86	113	127
ØK H7		11	10	14	20	26	32
ØL h7		38	48	56	67	90	110
ØM		14	18	21	26	26	32
ØN H7		6	8	12	14	14	14
O Js9		-	-	4	5	5	5
P		-	-	13.8 ^{+0.1} ₀	16.3 ^{+0.1} ₀	16.3 ^{+0.1} ₀	16.3 ^{+0.1} ₀
Q		6	6	8	8	8	8
R		M4 x 8DP	M5 x 10DP	M6 x 9DP	M8 x 12DP	M10 x 15DP	M10 x 15DP
S (P.C.D)		23	27	32	42	55	68
T		8	8	8	10	12	10
ØU		4.5	4.5	5.5	5.5	6.6	9
V (P.C.D)		65	71	82	96	125	144
W		8	8	8	10	12	10
X		M4	M4	M5	M5	M6	M8
Y [Degree]		22.5°	22.5°	22.5°	18°	15°	18°
Moment of inertia (×10 ⁻⁴ kgm ²)		0.033	0.079	0.193	0.413	1.69	4.50
Weight (kg)		0.52	0.68	0.98	1.5	3.2	5.0

*The dimension B is the fitting position and permissible tolerance in the axial direction.

4-11 DGH-PO Type

4-11-1 Technical data

Table 4-11-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	7.0	0.7	23	2.3	9	0.9	46	4.7	8500	3500
	80	10	1.0	30	3.1	14	1.4	61	6.2		
	100	10	1.0	36	3.7	14	1.4	70	7.2		
17	50	21	2.1	44	4.5	34	3.4	91	9	7300	3500
	80	29	2.9	56	5.7	35	3.6	113	12		
	100	31	3.2	70	7.2	51	5.2	143	15		
	120	31	3.2	70	7.2	51	5.2	112	11		
20	50	33	3.3	73	7.4	44	4.5	127	13	6500	3500
	80	44	4.5	96	9.8	61	6.2	165	17		
	100	52	5.3	107	10.9	64	6.5	191	20		
	120	52	5.3	113	11.5	64	6.5	191	20		
	160	52	5.3	120	12.2	64	6.5	191	20		
25	50	51	5.2	127	13	72	7.3	242	25	5600	3500
	80	82	8.4	178	18	113	12	332	34		
	100	87	8.9	204	21	140	14	369	38		
	120	87	8.9	217	22	140	14	395	40		
	160	87	8.9	229	23	140	14	408	42		
32	50	99	10	281	29	140	14	497	51	4800	3500
	80	153	16	395	40	217	22	738	75		
	100	178	18	433	44	281	29	841	86		
	120	178	18	459	47	281	29	892	91		
	160	178	18	484	49	281	29	892	91		
40	50	178	18	523	53	255	26	892	91	4000	3000
	80	268	27	675	69	369	38	1270	130		
	100	345	35	738	75	484	49	1400	143		
	120	382	39	802	82	586	60	1530	156		
	160	382	39	841	86	586	60	1530	156		

※1 Permissible rated torque

※2 Permissible maximum torque

※3 Permissible average torque

※4 Permissible maximum value of impact

Table 4-11-2 Crossed roller bearing specifications

Model			14	17	20	25	32	40
Item								
Pitch circle diameter of roller	Dpw	m	0.050	0.060	0.070	0.085	0.111	0.133
Offset amount	R	m	0.0217	0.0239	0.0255	0.0296	0.0364	0.0440
Basic load ratings	Dynamic load C	C	kN	5.8	10.4	14.6	21.8	38.2
			kgf	590	1060	1490	2230	4410
	Static load Co	Co	kN	8.6	16.3	22.0	35.8	65.4
			kgf	880	1670	2250	3660	6680
Moment rigidity	K	K	$\times 10^4 \text{ Nm/rad}$	8.5	15.4	25.2	39.2	100
			kgfm/arc min	2.5	4.6	7.5	11.6	29.6
Permissible dynamic tilting moment	M	Nm	74	124	187	258	580	849
Permissible static tilting moment	Mo	Nm	144	328	515	1070	2425	3623
Permissible axial load	Fa	kN	1.239	2.222	3.119	4.657	8.161	9.250
Permissible radial load	Fr	kN	0.83	1.489	2.090	3.120	5.468	6.198

Table 4-11-3 Angle transmission accuracy

Model		14	17	20	25	32	40
Reduction ratio							
50 up	$\times 10^{-4} \text{ rad}$	4.4	4.4	2.9	2.9	2.9	2.9
	arc min	1.5	1.5	1	1	1	1

Table 4-11-4 Hysteresis loss

Model		14	17	20	25	32	40
Reduction ratio							
50	$\times 10^{-4} \text{ rad}$	5.8	5.8	5.8	5.8	5.8	5.8
	arc min	2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4} \text{ rad}$	2.9	2.9	2.9	2.9	2.9	2.9
	arc min	1.0	1.0	1.0	1.0	1.0	1.0

Table 4-11-5 Maximum backlash

Unit : Nm

Model		14	17	20	25	32	40
Reduction ratio							
50	$\times 10^{-5} \text{ rad}$	17.5	9.7	8.2	8.2	6.8	6.8
	arc sec	36	20	17	17	14	14
80	$\times 10^{-5} \text{ rad}$	11.2	6.3	5.3	5.3	4.4	4.4
	arc sec	23	13	11	11	9	9
100	$\times 10^{-5} \text{ rad}$	8.7	4.8	4.4	4.4	3.4	3.4
	arc sec	18	10	9	9	7	7
120	$\times 10^{-5} \text{ rad}$	-	3.9	3.9	3.9	2.9	2.9
	arc sec	-	8	8	8	6	6
160	$\times 10^{-5} \text{ rad}$	-	-	2.9	2.9	2.4	2.4
	arc sec	-	-	6	6	5	5

Table 4-11-6 Starting torque

Unit : cNm

Reduction ratio \ Model	14	17	20	25	32	40
50	4.5	6.7	8.6	17	34	61
80	3.1	4.4	5.4	10	21	39
100	2.8	3.7	4.7	8.8	20	34
120	-	3.4	4.2	8.0	17	31
160	-	-	3.6	6.9	15	26

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-11-7 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	1.8	3.3	5.2	9.9	20	36
80	1.8	3.3	5.3	10	21	36
100	2	3.6	5.6	11	22	40
120	-	3.9	6.1	12	24	43
160	-	-	7	14	29	51

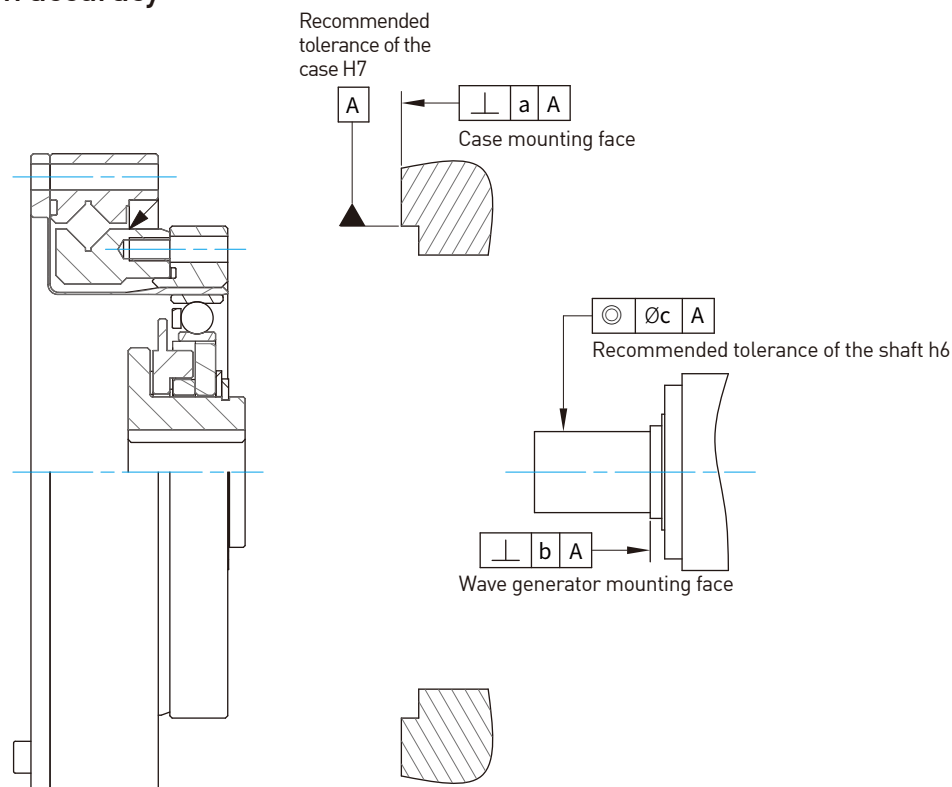
Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-11-8 Torsional rigidity

Reduction ratio		Model	14	17	20	25	32	40
T_1		Nm	2.0	3.9	7.0	14	29	54
		kgfm	0.2	0.4	0.7	1.4	3.0	5.5
T_2		Nm	6.9	12	25	48	108	196
		kgfm	0.7	1.2	2.5	4.9	11	20
50	K_1	$\times 10^4$ Nm/rad	0.34	0.81	1.3	2.5	5.4	10
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6	3.0
	K_2	$\times 10^4$ Nm/rad	0.47	1.1	1.8	3.4	7.8	14
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3	4.2
	K_3	$\times 10^4$ Nm/rad	0.57	1.3	2.3	4.4	9.8	18
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9	5.3
	θ_1	$\times 10^{-4}$ rad	5.8	4.9	5.2	5.5	5.5	5.2
		arc min	2.0	1.7	1.8	1.9	1.9	1.8
	θ_2	$\times 10^{-4}$ rad	16	12	15.4	15.7	15.7	15.4
		arc min	5.6	4.2	5.3	5.4	5.4	5.3
80 up	K_1	$\times 10^4$ Nm/rad	0.47	1	1.6	3.1	6.7	13
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0	3.8
	K_2	$\times 10^4$ Nm/rad	0.61	1.4	2.5	5.0	11	20
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2	6.0
	K_3	$\times 10^4$ Nm/rad	0.71	1.6	2.9	5.7	12	23
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7	6.8
	θ_1	$\times 10^{-4}$ rad	4.1	3.9	4.4	4.4	4.4	4.1
		arc min	1.4	1.3	1.5	1.5	1.5	1.4
	θ_2	$\times 10^{-4}$ rad	12	9.7	11.3	11.1	11.6	11.1
		arc min	4.2	3.3	3.9	3.8	4.0	3.8

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-11-2 Installation accuracy



		Unit : mm					
Mark	Model	14	17	20	25	32	40
a		0.011	0.015	0.017	0.024	0.026	0.026
b		0.017	0.020	0.020	0.024	0.024	0.024
		(0.008)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)
c		0.030	0.034	0.044	0.047	0.047	0.05
		(0.016)	(0.018)	(0.019)	(0.022)	(0.022)	(0.022)

Note: The value in () is the value of the wave generator (without oldham coupling).

4-11-3 Installation bolt tightening torque

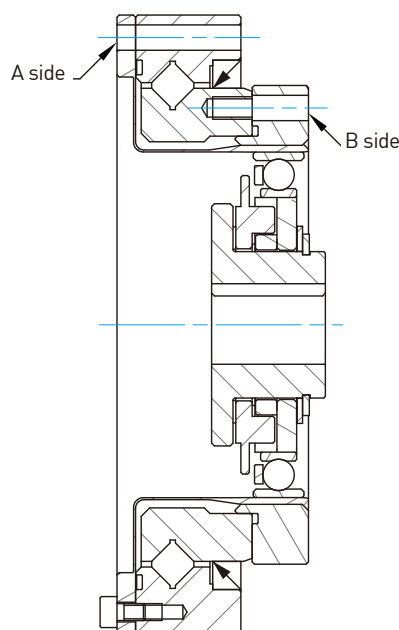


Table 4-11-9 Bolt tightening torque for A side

Model		14	17	20	25	32	40
Item							
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	64	74	84	102	132	158
Bolts tightening torque	Nm	2.4	2.4	2.4	5.4	10.8	18.4
	kgfm	0.24	0.24	0.24	0.55	1.10	1.87
Transmission torque	Nm	128	222	252	516	1069	1813
	kgfm	13	23	26	53	109	185

Table 4-11-10 Bolt tightening torque for B side

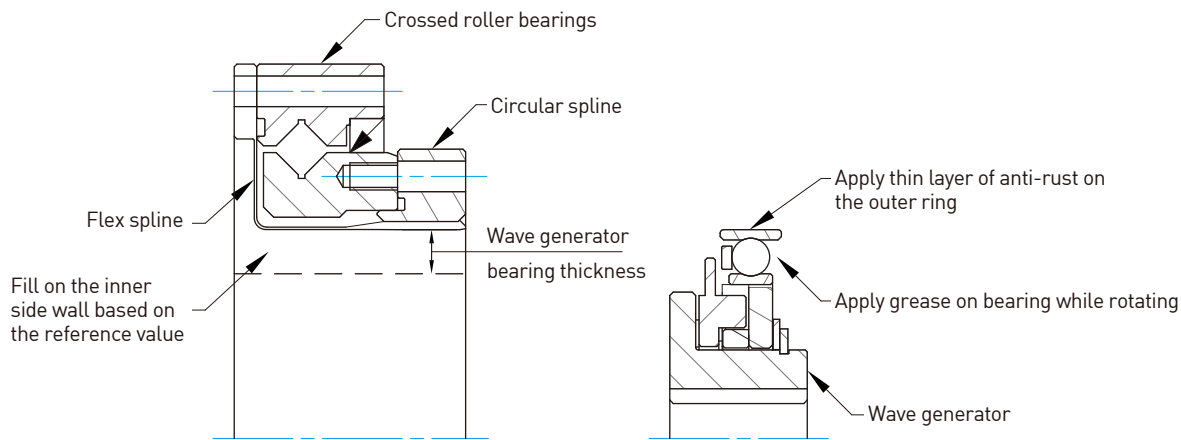
Model		14	17	20	25	32	40
Item							
Number of bolts		8	16	16	16	16	16
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	44	54	62	77	100	122
Bolts tightening torque	Nm	2.4	2.4	2.4	5.4	10.8	18.36
	kgfm	0.24	0.24	0.24	0.55	1.10	1.87
Transmission torque	Nm	88	216	248	520	1080	1867
	kgfm	9.0	22	25.3	53	110	191

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$

2. Bolt-in depth at least 2 x thread diameter

4-11-4 Lubrication

Other than the tooth space of DSH-PO Type, all other parts are not packed with lubricant. Please follow the below points for applying the lubricant.

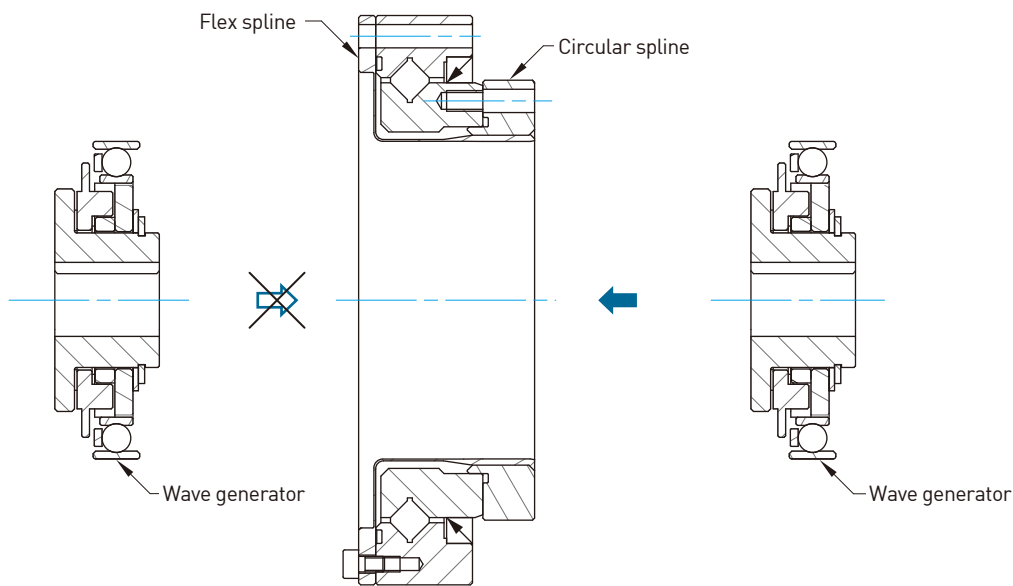


Unit : g

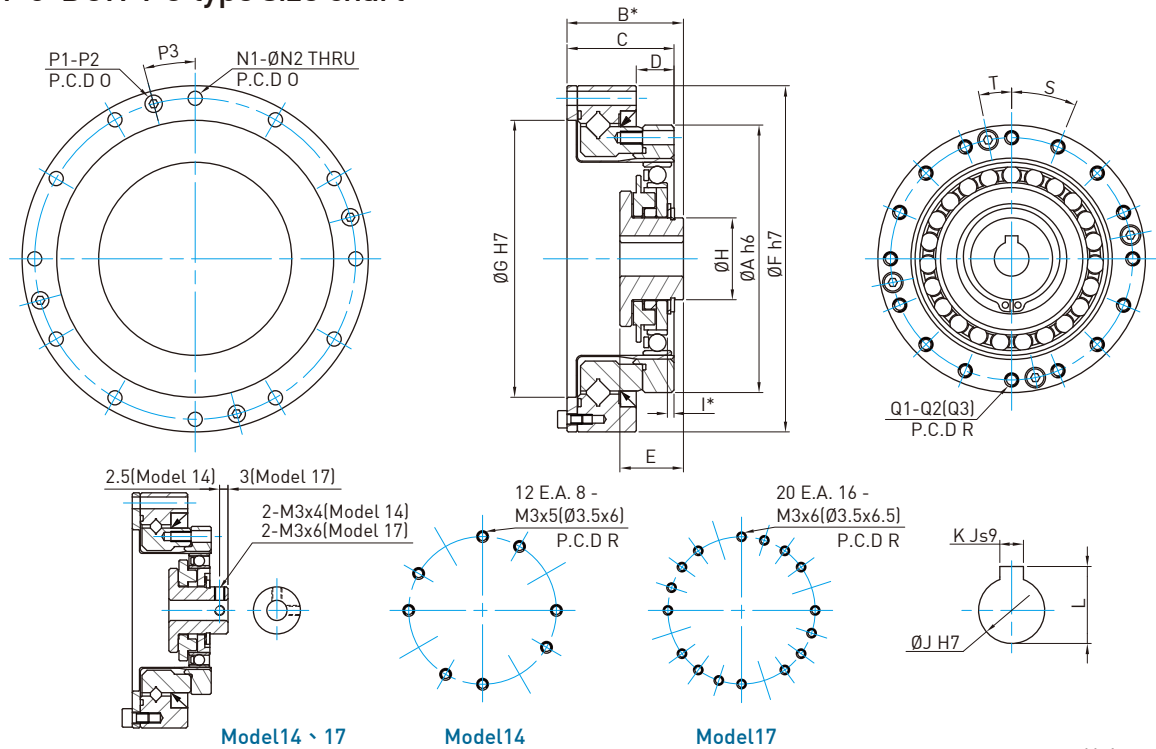
Instructions \ Model		14	17	20	25	32	40
Used horizontally		5.8	11	18	32	64	120
Used vertical	Wave generator is facing down	7.5	13	19	37	74	130
	Wave generator is facing up	8.9	15	22	42	84	150

4-11-5 Installation sequence

Install the wave generator only after installing the reducer body into the case. Please note the installation sequence to avoid damage on the tooth face.



4-11-6 DGH-PO type size chart



Unit : mm

Mark	Model	14	17	20	25	32	40
ØA h6		50	60	70	85	110	135
B*		28.5 ⁰ _{-0.4}	32.5 ⁰ _{-0.4}	33.5 ⁰ _{-0.4}	37 ⁰ _{-0.5}	44 ⁰ _{-0.6}	53 ⁰ _{-0.6}
C		23.5	26.5	29	34	42	51
D		7	7.5	8.5	12	15	18
E		18.5 ⁰ _{-0.1}	20.7 ⁰ _{-0.1}	21.5 ⁰ _{-0.1}	21.6 ⁰ _{-0.1}	23.6 ⁰ _{-0.1}	29.7 ⁰ _{-0.1}
ØF h7		70	80	90	110	142	170
ØG H7		48	60	70	88	114	140
ØH		14	18	21	26	26	32
I*		0.4	0.3	0.1	2.1	2.5	3.3
ØJ H7		6	8	9	11	14	14
K Js9		-	-	3	4	5	5
L		-	-	10.4 ^{+0.1} ₀	12.8 ^{+0.1} ₀	16.3 ^{+0.1} ₀	16.3 ^{+0.1} ₀
N1		8	12	12	12	12	12
ØN2		3.5	3.5	3.5	4.5	5.5	6.6
O (P.C.D)		64	74	84	102	132	158
P1		2	4	4	4	4	6
P2		M3	M3	M3	M3	M4	M4
P3 (Degree)		22.5°	15°	15°	15°	15°	15°
Q1		12 E.A. 8	20 E.A. 16	16	16	16	16
Q2		M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP	M6 x 10DP
Q3		Ø3.5 x 6DP	Ø3.5 x 6.5DP	Ø3.5 x 7.5DP	Ø4.5 x 10DP	Ø5.5 x 14DP	Ø6.6 x 17DP
ØR		44	54	62	77	100	122
S (Degree)		30°	18°	22.5°	22.5°	22.5°	22.5°
T (Degree)		30°	18°	11.25°	11.25°	11.25°	11.25°
Moment of inertia (×10 ⁻⁴ kgm ²)		0.033	0.079	0.193	0.413	1.69	4.50
Weight (Kg)		0.41	0.57	0.81	1.31	2.94	5.1

*The dimension B, I is the fitting position and permissible tolerance in the axial direction.

4-12 DGH-PH Type

4-12-1 Technical data

Table 4-12-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	7.0	0.7	23	2.3	9	0.9	46	4.7	8500	3500
	80	10	1.0	30	3.1	14	1.4	61	6.2		
	100	10	1.0	36	3.7	14	1.4	70	7.2		
17	50	21	2.1	44	4.5	34	3.4	91	9	7300	3500
	80	29	2.9	56	5.7	35	3.6	113	12		
	100	31	3.2	70	7.2	51	5.2	143	15		
	120	31	3.2	70	7.2	51	5.2	112	11		
20	50	33	3.3	73	7.4	44	4.5	127	13	6500	3500
	80	44	4.5	96	9.8	61	6.2	165	17		
	100	52	5.3	107	10.9	64	6.5	191	20		
	120	52	5.3	113	11.5	64	6.5	191	20		
	160	52	5.3	120	12.2	64	6.5	191	20		
25	50	51	5.2	127	13	72	7.3	242	25	5600	3500
	80	82	8.4	178	18	113	12	332	34		
	100	87	8.9	204	21	140	14	369	38		
	120	87	8.9	217	22	140	14	395	40		
	160	87	8.9	229	23	140	14	408	42		
32	50	99	10	281	29	140	14	497	51	4800	3500
	80	153	16	395	40	217	22	738	75		
	100	178	18	433	44	281	29	841	86		
	120	178	18	459	47	281	29	892	91		
	160	178	18	484	49	281	29	892	91		
40	50	178	18	523	53	255	26	892	91	4000	3000
	80	268	27	675	69	369	38	1270	130		
	100	345	35	738	75	484	49	1400	143		
	120	382	39	802	82	586	60	1530	156		
	160	382	39	841	86	586	60	1530	156		

※1 Permissible rated torque

※2 Permissible maximum torque

※3 Permissible average torque

※4 Permissible maximum value of impact

Table 4-12-2 Crossed roller bearing specifications

Item			Model	14	17	20	25	32	40
Pitch circle diameter of roller	Dpw	m		0.050	0.060	0.070	0.085	0.111	0.133
Offset amount	R	m		0.0217	0.0239	0.0255	0.0296	0.0364	0.0440
Basic load ratings	Dynamic load C	C	kN	5.8	10.4	14.6	21.8	38.2	43.3
			kgf	590	1060	1490	2230	3900	4410
	Static load Co	Co	kN	8.6	16.3	22.0	35.8	65.4	81.6
			kgf	880	1670	2250	3660	6680	8330
Moment rigidity	K		$\times 10^4 \text{ Nm/rad}$	8.5	15.4	25.2	39.2	100	179
			kgfm/arc min	2.5	4.6	7.5	11.6	29.6	53.2
Permissible dynamic tilting moment	M	Nm		74	124	187	258	580	849
Permissible static tilting moment	Mo	Nm		144	328	515	1070	2425	3623
Permissible axial load	Fa	kN		1.239	2.222	3.119	4.657	8.161	9.250
Permissible radial load	Fr	kN		0.83	1.489	2.090	3.120	5.468	6.198

Table 4-12-3 Angle transmission accuracy

Reduction ratio		Model	14	17	20	25	32	40
50 up	$\times 10^{-4} \text{ rad}$		4.4	4.4	2.9	2.9	2.9	2.9
	arc min		1.5	1.5	1	1	1	1

Table 4-12-4 Hysteresis loss

Reduction ratio		Model	14	17	20	25	32	40
50	$\times 10^{-4} \text{ rad}$		5.8	5.8	5.8	5.8	5.8	5.8
	arc min		2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4} \text{ rad}$		2.9	2.9	2.9	2.9	2.9	2.9
	arc min		1.0	1.0	1.0	1.0	1.0	1.0

Table 4-12-5 Starting torque

Unit : cNm

Reduction ratio		Model	14	17	20	25	32	40
50			4.5	6.7	8.6	17	34	61
80			3.1	4.4	5.4	10	21	39
100			2.8	3.7	4.7	8.8	20	34
120			-	3.4	4.2	8.0	17	31
160			-	-	3.6	6.9	15	26

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-12-6 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	1.8	3.3	5.2	9.9	20	36
80	1.8	3.3	5.3	10	21	36
100	2	3.6	5.6	11	22	40
120	-	3.9	6.1	12	24	43
160	-	-	7	14	29	51

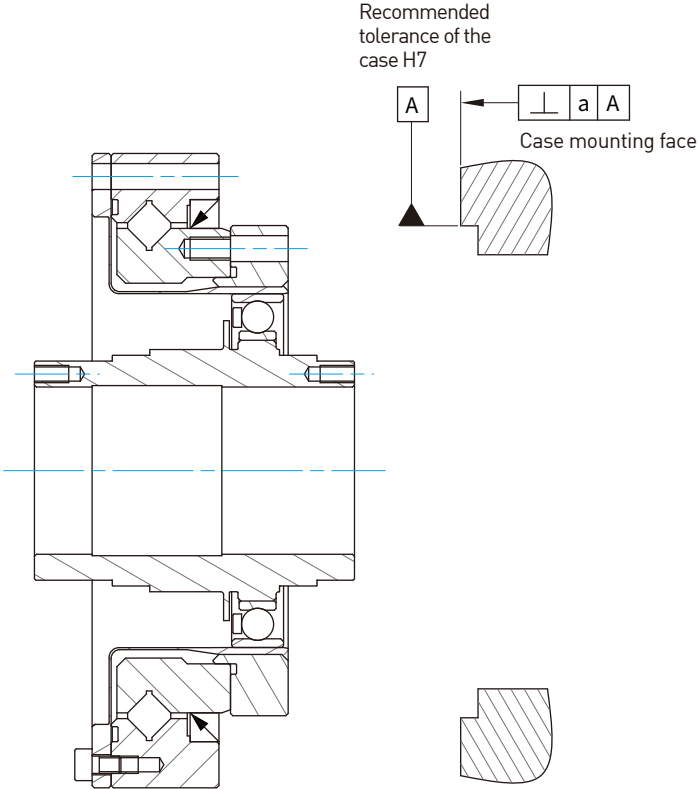
Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-12-7 Torsional rigidity

Reduction ratio \ Model		14	17	20	25	32	40
T ₁	Nm	2.0	3.9	7.0	14	29	54
	kgfm	0.2	0.4	0.7	1.4	3.0	5.5
T ₂	Nm	6.9	12	25	48	108	196
	kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	× 10 ⁴ Nm/rad	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6
	K ₂	× 10 ⁴ Nm/rad	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3
	K ₃	× 10 ⁴ Nm/rad	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9
	θ ₁	× 10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.5
		arc min	2.0	1.7	1.8	1.9	1.9
	θ ₂	× 10 ⁻⁴ rad	16	12	15.4	15.7	15.7
		arc min	5.6	4.2	5.3	5.4	5.4
80 up	K ₁	× 10 ⁴ Nm/rad	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0
	K ₂	× 10 ⁴ Nm/rad	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2
	K ₃	× 10 ⁴ Nm/rad	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7
	θ ₁	× 10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.4
		arc min	1.4	1.3	1.5	1.5	1.5
	θ ₂	× 10 ⁻⁴ rad	12	9.7	11.3	11.1	11.6
		arc min	4.2	3.3	3.9	3.8	4.0

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-12-2 Installation accuracy



Unit : mm

Mark	Model	14	17	20	25	32	40
a		0.011	0.015	0.017	0.024	0.026	0.026

4-12-3 Installation bolt tightening torque

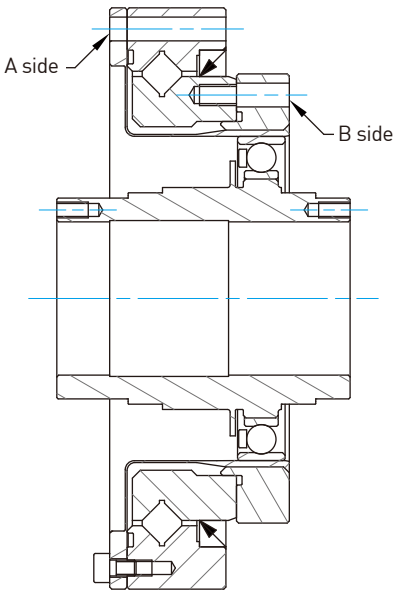


Table 4-12-9 Bolt tightening torque for A side

Item \ Model		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	64	74	84	102	132	158
Bolts tightening torque	Nm	2.4	2.4	2.4	5.4	10.8	18.4
	kgfm	0.24	0.24	0.24	0.55	1.10	1.87
Transmission torque	Nm	128	222	252	516	1069	1813
	kgfm	13	23	26	53	109	185

Table 4-12-10 Bolt tightening torque for B side

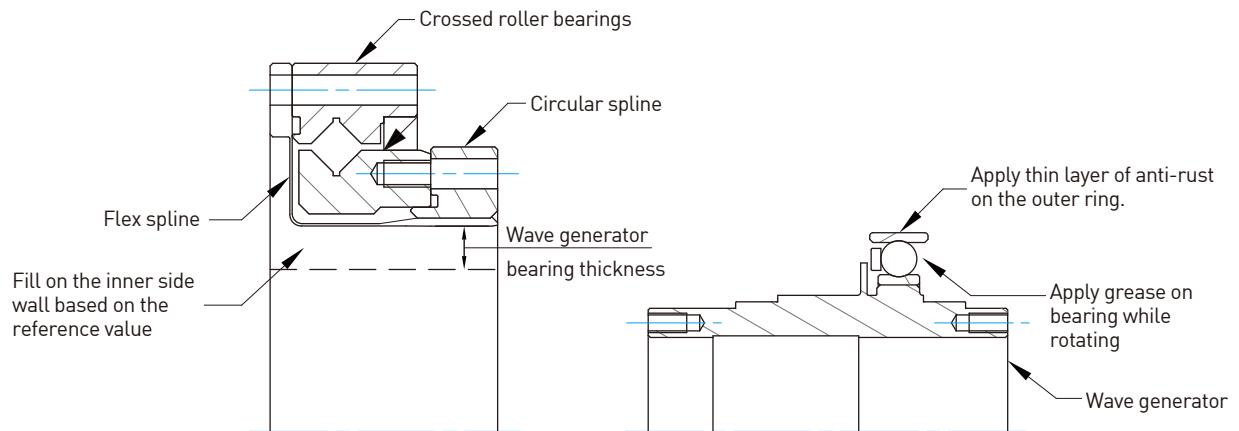
Item \ Model		14	17	20	25	32	40
Number of bolts		8	16	16	16	16	16
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	44	54	62	77	100	122
Bolts tightening torque	Nm	2.4	2.4	2.4	5.4	10.8	18.36
	kgfm	0.24	0.24	0.24	0.55	1.10	1.87
Transmission torque	Nm	88	216	248	520	1080	1867
	kgfm	9.0	22	25.3	53	110	191

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$

2. Bolt-in depth at least 2 x thread diameter

4-12-4 Lubrication

Other than the tooth space of DSH-PH Type, all other parts are not packed with lubricant. Please follow the below points for applying the lubricant.

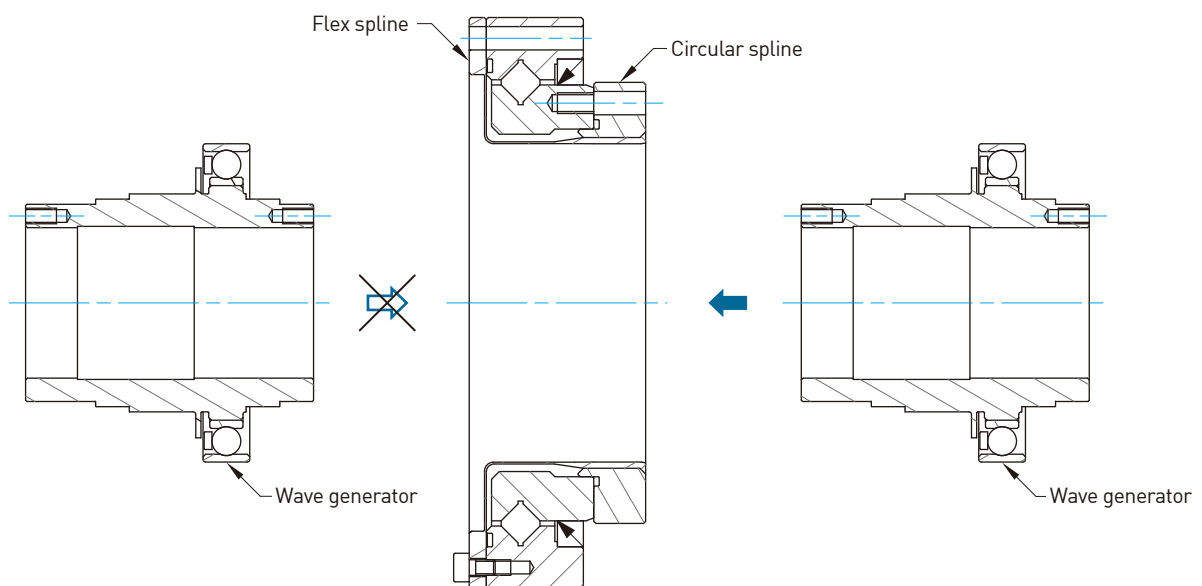


Unit : g

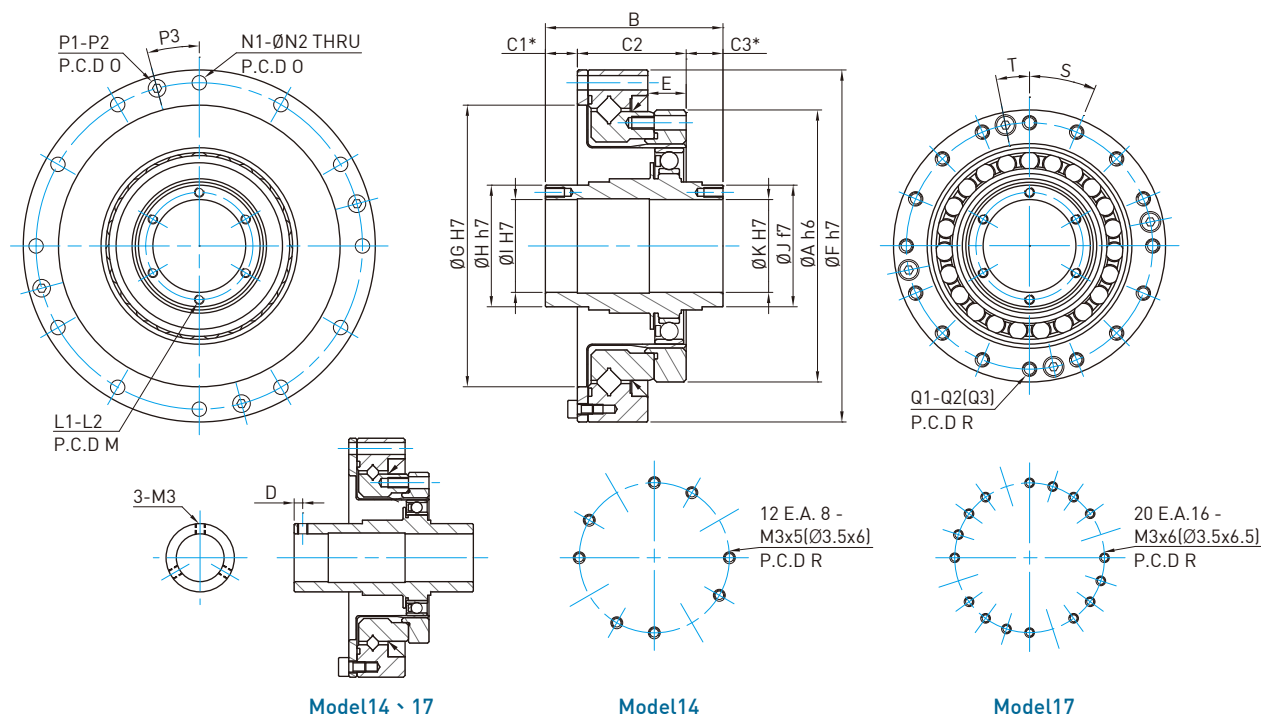
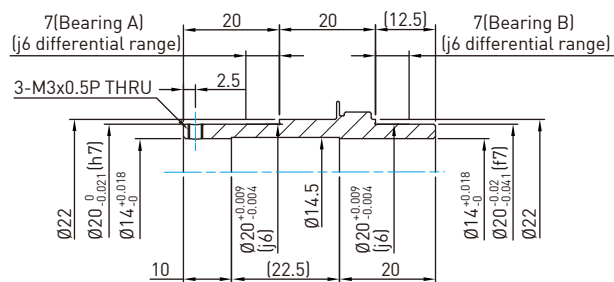
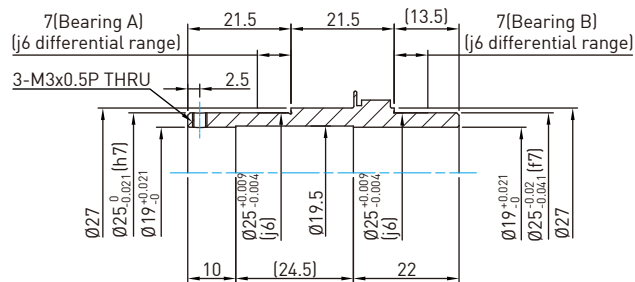
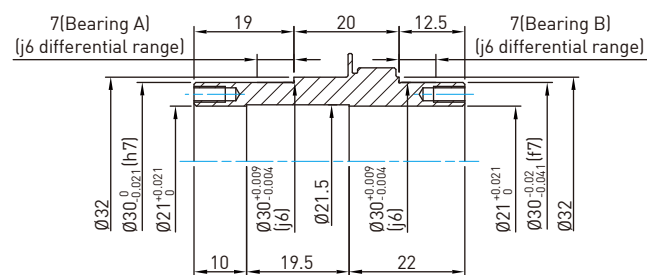
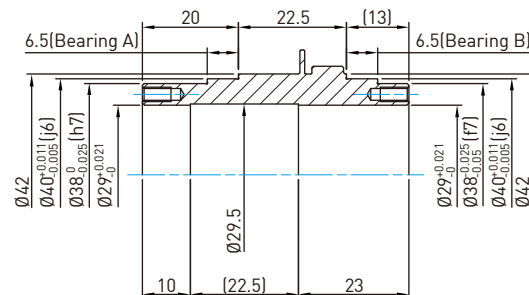
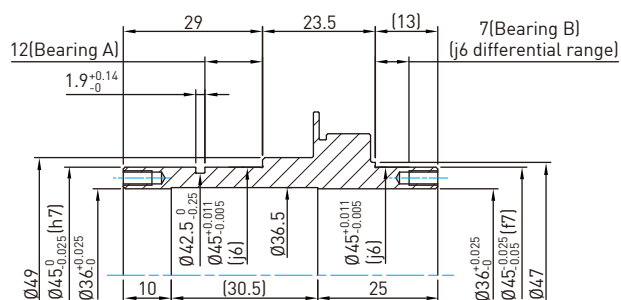
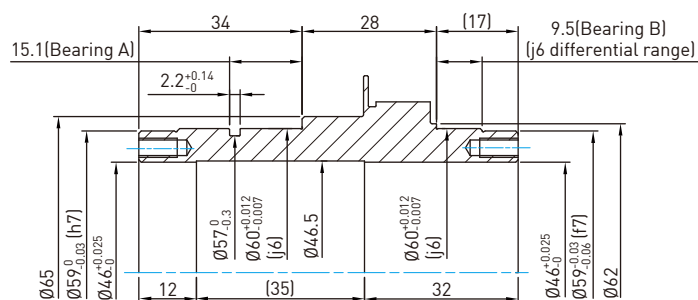
Instructions		Model	14	17	20	25	32	40
Used horizontally			5.8	11	18	32	64	120
Used vertical	Wave generator is facing down		7.5	13	19	37	74	130
	Wave generator is facing up		8.9	15	22	42	84	150

4-12-5 Installation sequence

Install the wave generator only after installing the reducer body into the case. Please note the installation sequence to avoid damage on the tooth face.



4-12-6 DGH-PH type size chart


Model14

Model17

Model20

Model25

Model32

Model40


Unit : mm

Mark \ Model	14	17	20	25	32	40
ØA h6	50	60	70	85	110	135
B	52.5 $\begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$	56.5 $\begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$	51.5 $\begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$	55.5 $\begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$	65.5 $\begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$	79 $\begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$
C1*	16 $\begin{smallmatrix} +0.4 \\ 0 \end{smallmatrix}$	16 $\begin{smallmatrix} +0.4 \\ 0 \end{smallmatrix}$	9.5 $\begin{smallmatrix} +0.4 \\ 0 \end{smallmatrix}$	10 $\begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$	12 $\begin{smallmatrix} +0.6 \\ 0 \end{smallmatrix}$	13 $\begin{smallmatrix} +0.6 \\ 0 \end{smallmatrix}$
C2	23.5	26.5	29	34	42	51
C3*	13	14	13	11.5	11.5	15
D	2.5	2.5	–	–	–	–
E	7	7.5	8.5	12	15	18
ØF h7	70	80	90	110	142	170
ØG H7	48	60	70	88	114	140
ØH h7	20	25	30	38	45	59
ØI H7	14	19	21	29	36	46
ØJ f7	20	25	30	38	45	59
ØK H7	14	19	21	29	36	46
L1	3	3	2x6	2x6	2x6	2x6
L2	M3	M3	M3 x 6DP	M3 x 6DP	M3 x 6DP	M4 x 8DP
M (P.C.D)	–	–	25.5	33.5	40.5	52
N1	8	12	12	12	12	12
ØN2	3.5	3.5	3.5	4.5	5.5	6.6
O (P.C.D)	64	74	84	102	132	158
P1	2	4	4	4	4	6
P2	M3	M3	M3	M3	M4	M4
P3 (Degree)	22.5°	15°	15°	15°	15°	15°
Q1	12 E.A. 8	20 E.A. 16	16	16	16	16
Q2	M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP	M6 x 10DP
Q3	Ø3.5 x 6DP	Ø3.5 x 6.5DP	Ø3.5 x 7.5DP	Ø4.5 x 10DP	Ø5.5 x 14DP	Ø6.6 x 17DP
ØR	44	54	62	77	100	122
S (Degree)	30°	18°	22.5°	22.5°	22.5°	22.5°
T (Degree)	30°	18°	11.25°	11.25°	11.25°	11.25°
Bearing A**	6804ZZ	6805ZZ	6806ZZ	6808ZZ	6909ZZ	6912ZZ
Bearing B**	6804ZZ	6805ZZ	6806ZZ	6808ZZ	6809ZZ	6812ZZ
Moment of inertia (×10 ⁻⁴ kgm ²)	0.091	0.193	0.404	1.070	2.85	9.28
Weight (Kg)	0.45	0.63	0.89	1.44	3.1	5.4

*The dimension C1, C3 is the fitting position and permissible tolerance in the axial direction.

**It is recommended to use a deep groove bearing model.

4-13 DGH-AH Type

4-13-1 Technical data

Table 4-13-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	7.0	0.7	23	2.3	9	0.9	46	4.7	8500	3500
	80	10	1.0	30	3.1	14	1.4	61	6.2		
	100	10	1.0	36	3.7	14	1.4	70	7.2		
17	50	21	2.1	44	4.5	34	3.4	91	9	7300	3500
	80	29	2.9	56	5.7	35	3.6	113	12		
	100	31	3.2	70	7.2	51	5.2	143	15		
	120	31	3.2	70	7.2	51	5.2	112	11		
20	50	33	3.3	73	7.4	44	4.5	127	13	6500	3500
	80	44	4.5	96	9.8	61	6.2	165	17		
	100	52	5.3	107	10.9	64	6.5	191	20		
	120	52	5.3	113	11.5	64	6.5	191	20		
	160	52	5.3	120	12.2	64	6.5	191	20		
25	50	51	5.2	127	13	72	7.3	242	25	5600	3500
	80	82	8.4	178	18	113	12	332	34		
	100	87	8.9	204	21	140	14	369	38		
	120	87	8.9	217	22	140	14	395	40		
	160	87	8.9	229	23	140	14	408	42		
32	50	99	10	281	29	140	14	497	51	4800	3500
	80	153	16	395	40	217	22	738	75		
	100	178	18	433	44	281	29	841	86		
	120	178	18	459	47	281	29	892	91		
	160	178	18	484	49	281	29	892	91		
40	50	178	18	523	53	255	26	892	91	4000	3000
	80	268	27	675	69	369	38	1270	130		
	100	345	35	738	75	484	49	1400	143		
	120	382	39	802	82	586	60	1530	156		
	160	382	39	841	86	586	60	1530	156		

※1 Permissible rated torque

※2 Permissible maximum torque

※3 Permissible average torque

※4 Permissible maximum value of impact

Table 4-13-2 Crossed roller bearing specifications

Model			14	17	20	25	32	40
Item								
Pitch circle diameter of roller	Dpw	m	0.050	0.060	0.070	0.085	0.111	0.133
Offset amount	R	m	0.0217	0.0239	0.0255	0.0296	0.0364	0.0440
Basic load ratings	Dynamic load C	C	kN	5.8	10.4	14.6	21.8	38.2
			kgf	590	1060	1490	2230	3900
	Static load Co	Co	kN	8.6	16.3	22.0	35.8	65.4
			kgf	880	1670	2250	3660	6680
Moment rigidity	K	K	$\times 10^4 \text{ Nm/rad}$	8.5	15.4	25.2	39.2	100
			kgfm/arc min	2.5	4.6	7.5	11.6	29.6
Permissible dynamic tilting moment	M	Nm	74	124	187	258	580	849
Permissible static tilting moment	Mo	Nm	144	328	515	1070	2425	3623
Permissible axial load	Fa	kN	1.239	2.222	3.119	4.657	8.161	9.250
Permissible radial load	Fr	kN	0.83	1.489	2.090	3.120	5.468	6.198

Table 4-13-3 Angle transmission accuracy

Model		14	17	20	25	32	40
Reduction ratio							
50 up	$\times 10^{-4} \text{ rad}$	4.4	4.4	2.9	2.9	2.9	2.9
	arc min	1.5	1.5	1	1	1	1

Table 4-13-4 Hysteresis loss

Model		14	17	20	25	32	40
Reduction ratio							
50	$\times 10^{-4} \text{ rad}$	5.8	5.8	5.8	5.8	5.8	5.8
	arc min	2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4} \text{ rad}$	2.9	2.9	2.9	2.9	2.9	2.9
	arc min	1.0	1.0	1.0	1.0	1.0	1.0

Table 4-13-5 Starting torque

Unit : cNm

Model		14	17	20	25	32	40
Reduction ratio							
50		8.8	27	36	56	85	136
80		7.5	25	33	50	74	117
100		6.9	24	32	49	72	112
120		-	24	31	48	68	110
160		-	-	31	47	67	105

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-13-6 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	5.3	16	22	34	51	82
80	7.2	24	31	48	70	112
100	8.2	29	38	59	86	134
120	-	34	45	69	97	158
160	-	-	59	90	128	201

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-13-7 Torsional rigidity

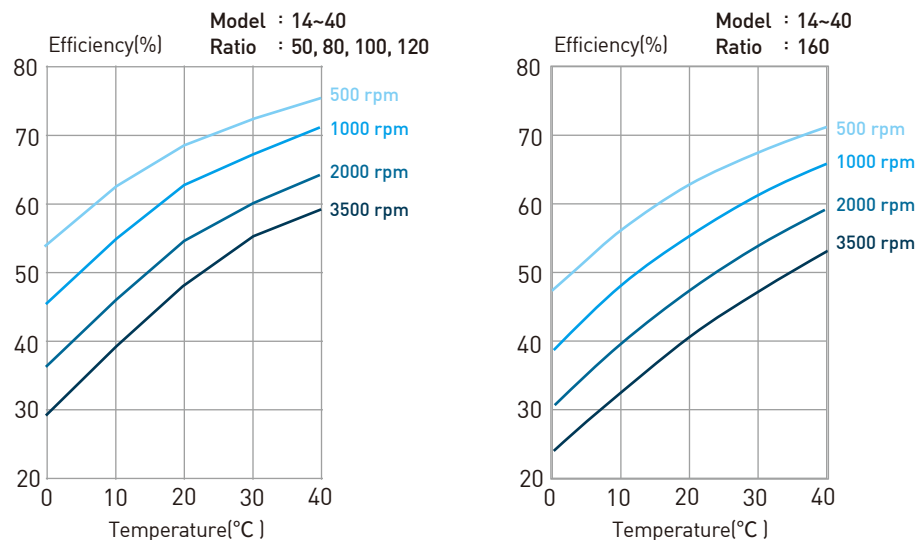
Reduction ratio \ Model		14	17	20	25	32	40
T_1	Nm	2.0	3.9	7.0	14	29	54
	kgfm	0.20	0.40	0.70	1.4	3.0	5.5
T_2	Nm	6.9	12	25	48	108	196
	kgfm	0.7	1.2	2.5	4.9	11	20
50	K_1	$\times 10^4$ Nm/rad	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6
	K_2	$\times 10^4$ Nm/rad	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3
	K_3	$\times 10^4$ Nm/rad	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9
	θ_1	$\times 10^{-4}$ rad	5.8	4.9	5.2	5.5	5.5
		arc min	2.0	1.7	1.8	1.9	1.9
	θ_2	$\times 10^{-4}$ rad	16	12	15.4	15.7	15.7
		arc min	5.6	4.2	5.3	5.4	5.4
80 up	K_1	$\times 10^4$ Nm/rad	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0
	K_2	$\times 10^4$ Nm/rad	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2
	K_3	$\times 10^4$ Nm/rad	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7
	θ_1	$\times 10^{-4}$ rad	4.1	3.9	4.4	4.4	4.4
		arc min	1.4	1.3	1.5	1.5	1.5
	θ_2	$\times 10^{-4}$ rad	12	9.7	11.3	11.1	11.6
		arc min	4.2	3.3	3.9	3.8	4.0

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-13-2 Efficiency

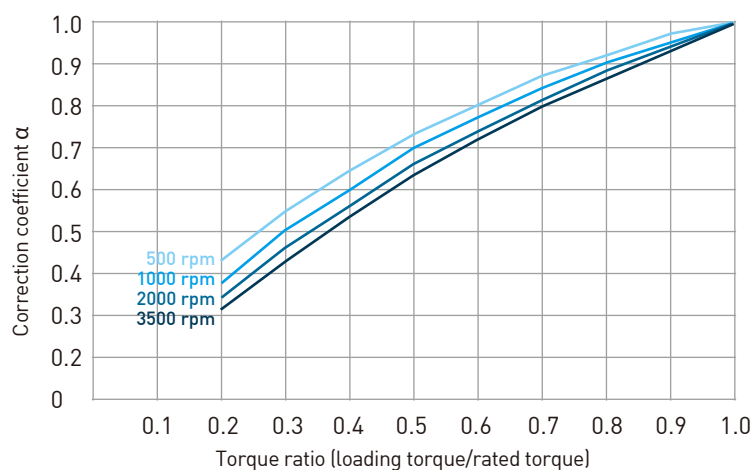
1. Rated torque E_R

DATORKER® efficiency would change by model, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity) .



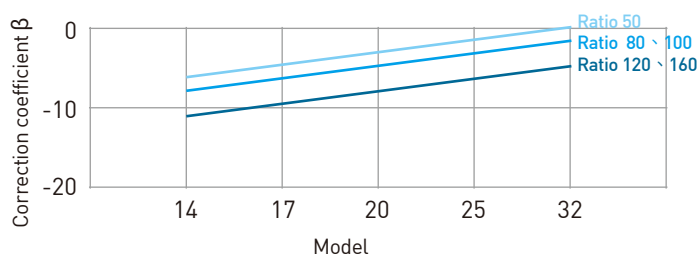
2. Correction coefficient α

Efficiency correction coefficient α
by loading torque



3. Correction coefficient β

Efficiency correction coefficient β
by model.



$$\text{Efficiency} = \alpha \times (E_R + \beta)$$

4-13-3 No-load operating torque

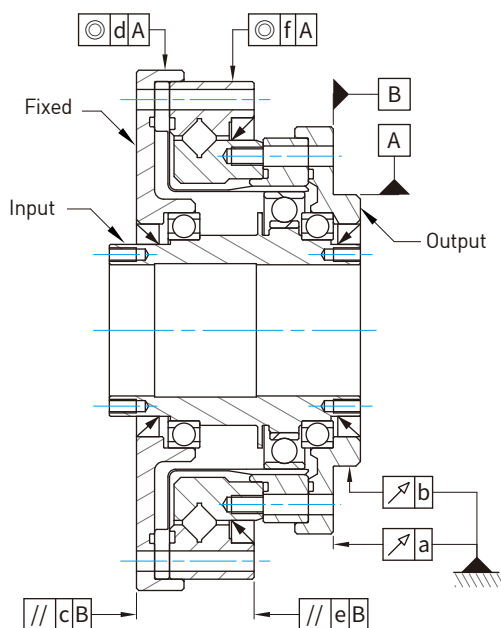
The torque required to drive the DATORKER® input (high-speed end) after running in at an input speed of 2000 r/min under an average ambient temperature of 25° C without load for more than 2 hours.

Unit: cNm

Reduction ratio	Input rotational speed	Model					
		14	17	20	25	32	40
50	500 r/min	6.3	17.8	23.6	37.2	58	103.3
	1000 r/min	7.8	21.8	28.6	49.2	76	168.3
	2000 r/min	10.1	27.8	37.6	62.2	98	183.3
	3500 r/min	14.1	36.8	48.6	89.2	138	236.3
80	500 r/min	5.4	16.4	21.5	33.8	51.5	92.4
	1000 r/min	6.9	20.4	26.5	45.8	69.5	157.4
	2000 r/min	9.2	26.4	35.5	58.8	91.5	172.4
	3500 r/min	13.2	35.4	46.5	85.8	131.5	225.4
100	500 r/min	5.2	16	21	33	50	90
	1000 r/min	6.7	20	26	45	68	155
	2000 r/min	9	26	35	58	90	170
	3500 r/min	13	35	46	85	130	223
120	500 r/min	-	15.8	20.6	32.4	48.9	88.3
	1000 r/min	-	19.8	25.6	44.4	66.9	153.3
	2000 r/min	-	25.8	34.6	57.4	88.9	168.3
	3500 r/min	-	34.8	45.6	84.4	128.9	221.3
160	500 r/min	-	-	20.2	31.7	47.5	86
	1000 r/min	-	-	25.2	43.7	65.5	151
	2000 r/min	-	-	34.2	56.7	87.5	166
	3500 r/min	-	-	45.2	83.7	127.5	219

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

4-13-4 Mechanical precision



Unit : mm

Mark \ Model	14	17	20	25	32	40
a	0.033	0.038	0.040	0.046	0.054	0.057
b	0.035	0.035	0.039	0.041	0.047	0.050
c	0.064	0.071	0.079	0.085	0.104	0.111
d	0.053	0.050	0.059	0.061	0.072	0.075
e	0.040	0.045	0.051	0.057	0.065	0.071
f	0.038	0.038	0.047	0.049	0.054	0.060

4-13-5 Installation bolt tightening torque

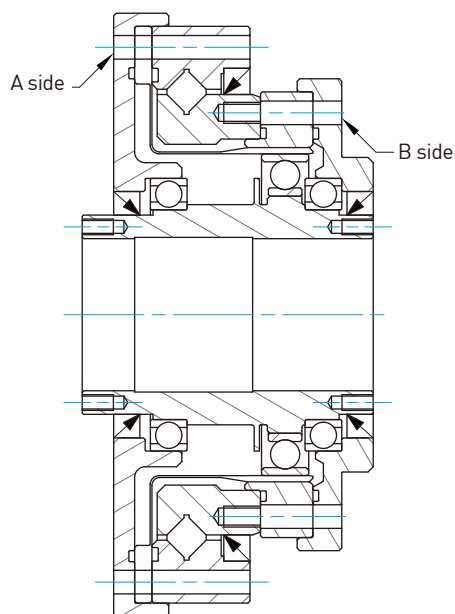


Table 4-13-9 Bolt tightening torque for A side

Item \ Model		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	64	74	84	102	132	158
Bolts tightening torque	Nm	2.4	2.4	2.4	5.4	10.8	18.4
	kgfm	0.24	0.24	0.24	0.55	1.10	1.87
Transmission torque	Nm	128	222	252	516	1069	1813
	kgfm	13	23	26	53	109	185

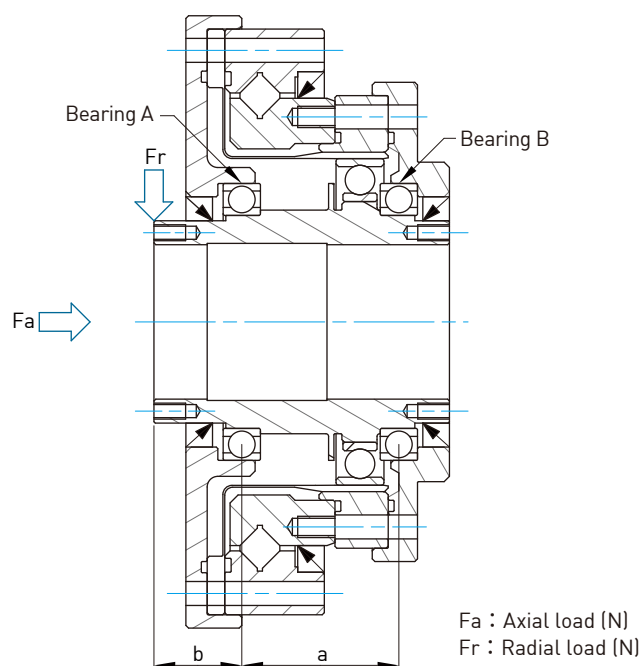
Table 4-13-10 Bolt tightening torque for B side

Item \ Model		14	17	20	25	32	40
Number of bolts		8	16	16	16	16	16
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	44	54	62	77	100	122
Bolts tightening torque	Nm	2.4	2.4	2.4	5.4	10.8	18.36
	kgfm	0.24	0.24	0.24	0.55	1.10	1.87
Transmission torque	Nm	88	216	248	520	1080	1867
	kgfm	9.0	22	25.3	53	110	191

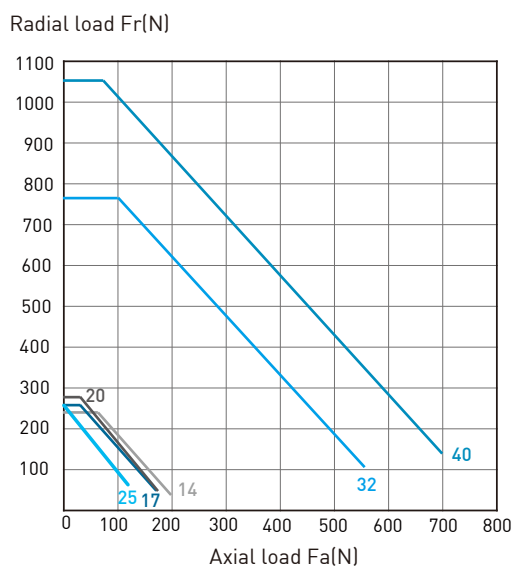
Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$
 2. Bolt-in depth at least 2 x thread diameter

4-13-6 Permissible input load

The hollow shaft input section is supported by two deep groove bearings. To ensure proper performance of the reducer, please confirm the load applied to the input section as shown below:

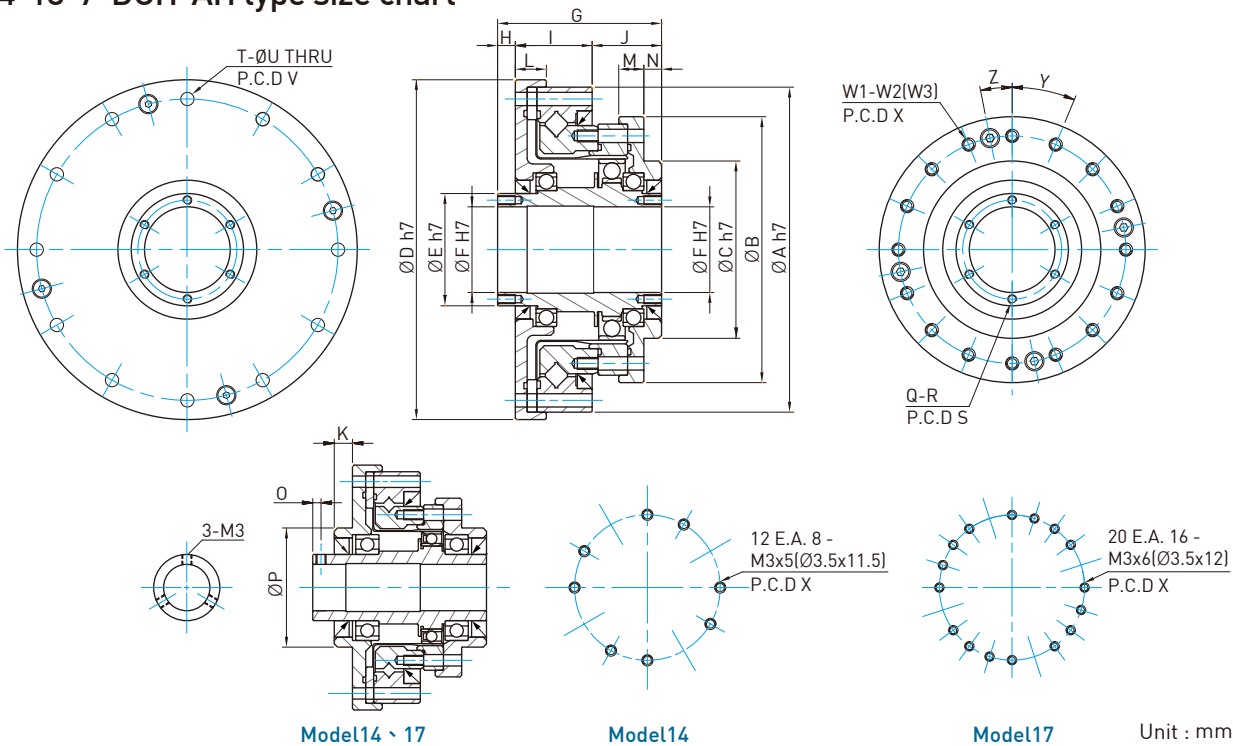


The figure below shows the average input speed of 2000rpm and the basic rated life $L_{10} = 10000$ hour.



Item Model	Bearing A		Bearing B		a (mm)	b (mm)	Maximum radial load Fr (N)
	Dynamic load C (kN)	Static load Co (kN)	Dynamic load C (kN)	Static load Co (kN)			
14	4000	2470	4000	2470	27	16.5	230
17	4300	2950	4300	2950	29	17.5	250
20	4500	3450	4500	3450	27	15.5	275
25	4900	4350	4900	4350	29.5	16.5	250
32	14100	10900	5350	5250	33	23	770
40	16400	14300	11500	10900	39.5	27.5	1060

4-13-7 DGH-AH type size chart



Model14、17

Model14

Model17

Unit : mm

Mark	Model	14	17	20	25	32	40
$\varnothing A$ h7		70	80	90	110	142	170
$\varnothing B$		54	64	75	90	115	140
$\varnothing C$ h7		36	45	50	60	85	100
$\varnothing D$ h7		74	84	95	115	147	175
$\varnothing E$ h7		20	25	30	38	45	59
$\varnothing F$ H7		14	19	21	29	36	46
G		52.5	56.5	51.5	55.5	65.5	79
H		12	12	5	6	7	8
I		20.5	23	25	26	32	38
J		20	21.5	21.5	23.5	26.5	33
K		6.5	6.5	-	-	-	-
L		9	10	10.5	10.5	12	14
M		8	8.5	9	8.5	9.5	13
N		7.5	8.5	7	6	5	7
O		2.5	2.5	-	-	-	-
P		36	45	-	-	-	-
Q		3	3	2x6	2x6	2x6	2x6
R		M3	M3	M3 x 6DP	M3 x 6DP	M3 x 6DP	M4 x 8DP
S (P.C.D)		-	-	25.5	33.5	40.5	52
T		8	12	12	12	12	12
$\varnothing U$		3.5	3.5	3.5	4.5	5.5	6.6
V (P.C.D)		64	74	84	102	132	158
W1		12 E.A. 8	20 E.A. 16	16	16	16	16
W2		M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP	M6 x 10DP
W3		$\varnothing 3.5 \times 11.5DP$	$\varnothing 3.5 \times 12DP$	$\varnothing 3.5 \times 13.5DP$	$\varnothing 4.5 \times 15.5DP$	$\varnothing 5.5 \times 20.5DP$	$\varnothing 6.6 \times 25DP$
X (P.C.D)		44	54	62	77	100	122
Y (Degree)		30°	18°	22.5°	22.5°	22.5°	22.5°
Z (Degree)		30°	18°	11.25°	11.25°	11.25°	11.25°
Moment of inertia [$\times 10^{-4}$ kgm ²]		0.091	0.193	0.404	1.07	2.85	9.28
Weight (Kg)		0.71	1.0	1.38	2.1	4.5	7.7

4-14 DGH-AJ Type

4-14-1 Technical data

Table 4-14-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	7.0	0.7	23	2.3	9	0.9	46	4.7	8500	3500
	80	10	1.0	30	3.1	14	1.4	61	6.2		
	100	10	1.0	36	3.7	14	1.4	70	7.2		
17	50	21	2.1	44	4.5	34	3.4	91	9	7300	3500
	80	29	2.9	56	5.7	35	3.6	113	12		
	100	31	3.2	70	7.2	51	5.2	143	15		
	120	31	3.2	70	7.2	51	5.2	112	11		
20	50	33	3.3	73	7.4	44	4.5	127	13	6500	3500
	80	44	4.5	96	9.8	61	6.2	165	17		
	100	52	5.3	107	10.9	64	6.5	191	20		
	120	52	5.3	113	11.5	64	6.5	191	20		
	160	52	5.3	120	12.2	64	6.5	191	20		
25	50	51	5.2	127	13	72	7.3	242	25	5600	3500
	80	82	8.4	178	18	113	12	332	34		
	100	87	8.9	204	21	140	14	369	38		
	120	87	8.9	217	22	140	14	395	40		
	160	87	8.9	229	23	140	14	408	42		
32	50	99	10	281	29	140	14	497	51	4800	3500
	80	153	16	395	40	217	22	738	75		
	100	178	18	433	44	281	29	841	86		
	120	178	18	459	47	281	29	892	91		
	160	178	18	484	49	281	29	892	91		
40	50	178	18	523	53	255	26	892	91	4000	3000
	80	268	27	675	69	369	38	1270	130		
	100	345	35	738	75	484	49	1400	143		
	120	382	39	802	82	586	60	1530	156		
	160	382	39	841	86	586	60	1530	156		

- ※1 Permissible rated torque
 ※2 Permissible maximum torque
 ※3 Permissible average torque
 ※4 Permissible maximum value of impact

Table 4-14-2 Crossed roller bearing specifications

Item			Model	14	17	20	25	32	40
Pitch circle diameter of roller	Dpw	m		0.050	0.060	0.070	0.085	0.111	0.133
Offset amount	R	m		0.0217	0.0239	0.0255	0.0296	0.0364	0.0440
Basic load ratings	Dynamic load C	C	kN	5.8	10.4	14.6	21.8	38.2	43.3
			kgf	590	1060	1490	2230	3900	4410
	Static load Co	Co	kN	8.6	16.3	22.0	35.8	65.4	81.6
			kgf	880	1670	2250	3660	6680	8330
Moment rigidity	K		$\times 10^4$ Nm/rad	8.5	15.4	25.2	39.2	100	179
			kgfm/arc min	2.5	4.6	7.5	11.6	29.6	53.2
Permissible dynamic tilting moment	M	Nm		74	124	187	258	580	849
Permissible static tilting moment	Mo	Nm		144	328	515	1070	2425	3623
Permissible axial load	Fa	kN		1.239	2.222	3.119	4.657	8.161	9.250
Permissible radial load	Fr	kN		0.83	1.489	2.090	3.120	5.468	6.198

Table 4-14-3 Angle transmission accuracy

Reduction ratio		Model	14	17	20	25	32	40
50 up	$\times 10^{-4}$ rad		4.4	4.4	2.9	2.9	2.9	2.9
	arc min		1.5	1.5	1	1	1	1

Table 4-14-4 Hysterisis loss

Reduction ratio		Model	14	17	20	25	32	40
50	$\times 10^{-4}$ rad		5.8	5.8	5.8	5.8	5.8	5.8
	arc min		2.0	2.0	2.0	2.0	2.0	2.0
80 up	$\times 10^{-4}$ rad		2.9	2.9	2.9	2.9	2.9	2.9
	arc min		1.0	1.0	1.0	1.0	1.0	1.0

Table 4-14-5 Starting torque

Unit : cNm

Reduction ratio		Model	14	17	20	25	32	40
50			5.7	9.7	14	22	41	72
80			4.4	7.2	11	15	29	52
100			3.7	6.5	9.9	14	27	47
120			-	6.2	9.3	13	24	44
160			-	-	8.6	12	23	39

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-14-6 Reversed starting torque

Unit : Nm

Reduction ratio \ Model	14	17	20	25	32	40
50	3.4	5.8	8.4	13	25	43
80	4.2	6.9	10	15	28	50
100	4.5	7.8	12	17	33	56
120	-	8.9	13	19	34	63
160	-	-	17	23	43	75

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-14-7 Torsional rigidity

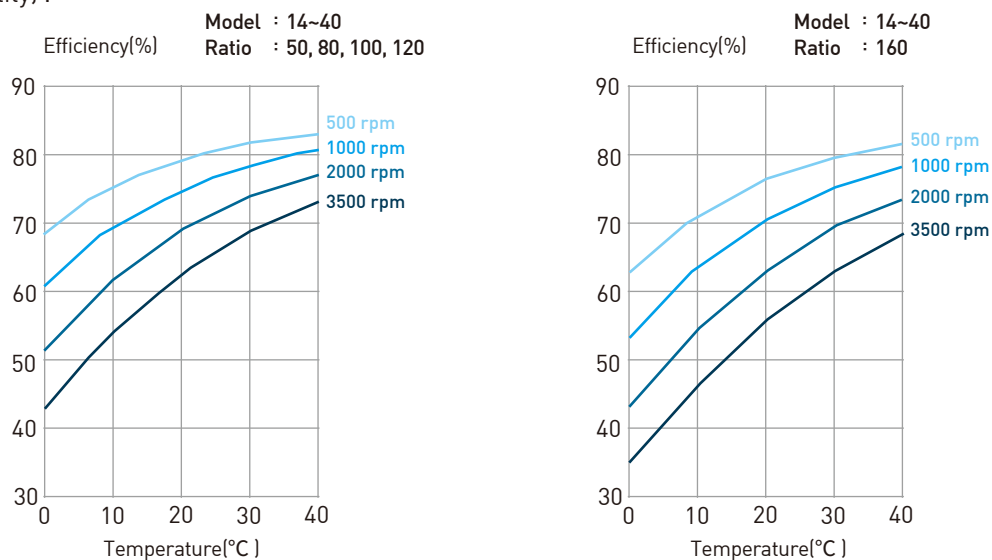
Reduction ratio \ Model		14	17	20	25	32	40
T ₁	Nm	2.0	3.9	7.0	14	29	54
	kgfm	0.20	0.40	0.70	1.4	3.0	5.5
T ₂	Nm	6.9	12	25	48	108	196
	kgfm	0.7	1.2	2.5	4.9	11	20
50	K ₁	× 10 ⁴ Nm/rad	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6
	K ₂	× 10 ⁴ Nm/rad	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3
	K ₃	× 10 ⁴ Nm/rad	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9
	θ ₁	× 10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.5
		arc min	2.0	1.7	1.8	1.9	1.9
	θ ₂	× 10 ⁻⁴ rad	16	12	15.4	15.7	15.7
		arc min	5.6	4.2	5.3	5.4	5.4
80 up	K ₁	× 10 ⁴ Nm/rad	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0
	K ₂	× 10 ⁴ Nm/rad	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2
	K ₃	× 10 ⁴ Nm/rad	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7
	θ ₁	× 10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.4
		arc min	1.4	1.3	1.5	1.5	1.5
	θ ₂	× 10 ⁻⁴ rad	12	9.7	11.3	11.1	11.6
		arc min	4.2	3.3	3.9	3.8	4.0

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-14-2 Efficiency

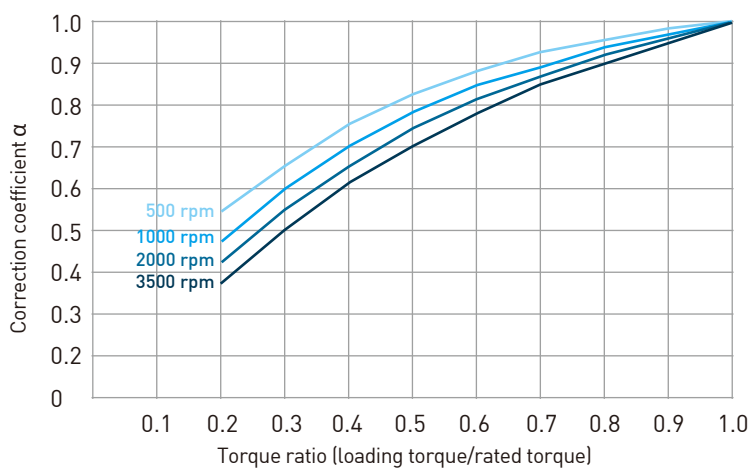
1. Rated torque E_R

DATORKER® efficiency would change by model, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity) .



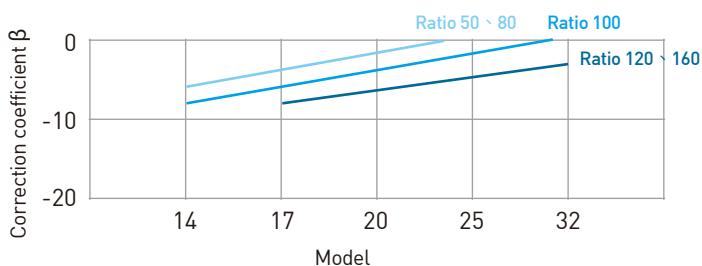
2. Correction coefficient α

Efficiency correction coefficient α
by loading torque



3. Correction coefficient β

Efficiency correction coefficient β
by model.



$$\text{Efficiency} = \alpha \times (E_R + \beta)$$

4-14-3 No-load operating torque

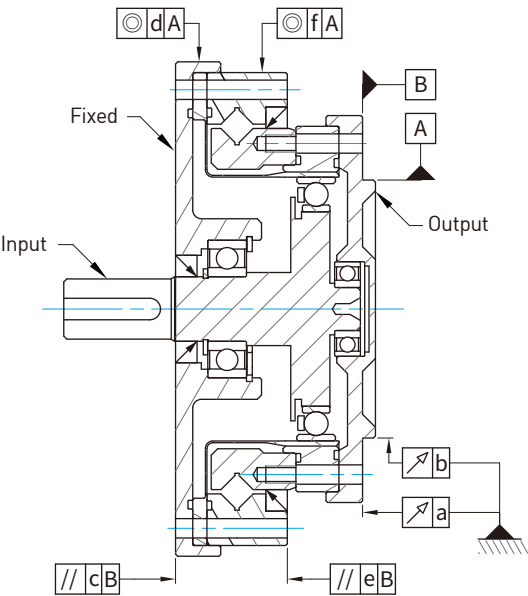
The torque required to drive the DATORKER® input (high-speed end) after running in at an input speed of 2000 r/min under an average ambient temperature of 25° C without load for more than 2 hours.

Unit : cNm

Reduction ratio	Input rotational speed	Model					
		14	17	20	25	32	40
50	500 r/min	3.9	8	11.6	18.2	31	55.3
	1000 r/min	4.7	9.8	14.6	22.2	38	71.3
	2000 r/min	5.8	12.8	19.6	28.2	53	93.3
	3500 r/min	7	14.8	22.6	35.2	68	137.3
80	500 r/min	3	6.6	9.5	14.8	24.5	44.4
	1000 r/min	3.8	8.4	12.5	18.8	31.5	60.4
	2000 r/min	4.9	11.4	17.5	24.8	46.5	82.4
	3500 r/min	6.1	13.4	20.5	31.8	61.5	126.4
100	500 r/min	2.8	6.2	9	14	23	42
	1000 r/min	3.6	8	12	18	30	58
	2000 r/min	4.7	11	17	24	45	80
	3500 r/min	5.9	13	20	31	60	124
120	500 r/min	-	6	8.6	13.4	21.9	40.3
	1000 r/min	-	7.8	11.6	17.4	28.9	56.3
	2000 r/min	-	10.8	16.6	23.4	43.9	78.3
	3500 r/min	-	12.8	19.6	30.4	58.9	122.3
160	500 r/min	-	-	8.2	12.7	20.5	38
	1000 r/min	-	-	11.2	16.7	27.5	54
	2000 r/min	-	-	16.2	22.7	42.5	76
	3500 r/min	-	-	19.2	29.7	57.5	120

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

4-14-4 Mechanical precision



Unit : mm

Mark \ Model	14	17	20	25	32	40
a	0.033	0.038	0.040	0.046	0.054	0.057
b	0.035	0.035	0.039	0.041	0.047	0.050
c	0.064	0.071	0.079	0.085	0.104	0.111
d	0.053	0.050	0.059	0.061	0.072	0.075
e	0.040	0.045	0.051	0.057	0.065	0.071
f	0.038	0.038	0.047	0.049	0.054	0.060

4-14-5 Installation bolt tightening torque

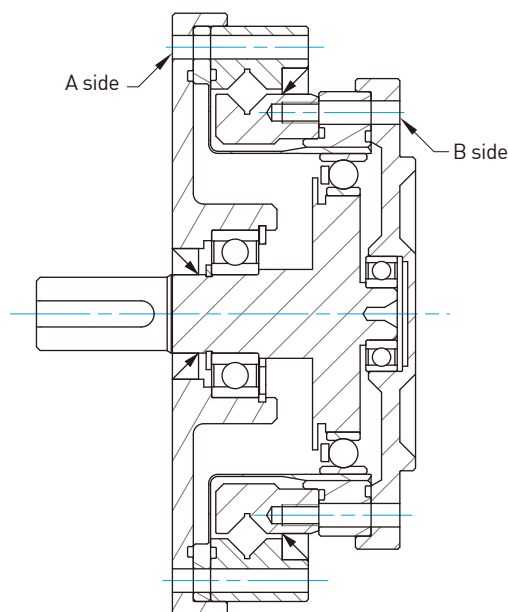


Table 4-14-9 Bolt tightening torque for A side

Item \ Model		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	64	74	84	102	132	158
Bolts tightening torque	Nm	2.4	2.4	2.4	5.4	10.8	18.4
	kgfm	0.24	0.24	0.24	0.55	1.10	1.87
Transmission torque	Nm	128	222	252	516	1069	1813
	kgfm	13	23	26	53	109	185

Table 4-14-10 Bolt tightening torque for B side

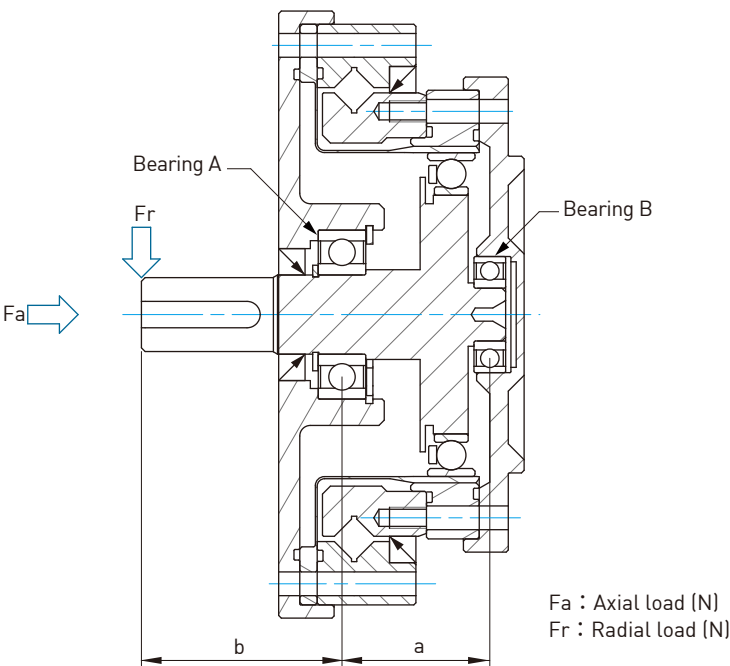
Item \ Model		14	17	20	25	32	40
Number of bolts		8	16	16	16	16	16
Bolts size		M3	M3	M3	M4	M5	M6
Installation of bolts PCD	mm	44	54	62	77	100	122
Bolts tightening torque	Nm	2.4	2.4	2.4	5.4	10.8	18.36
	kgfm	0.24	0.24	0.24	0.55	1.10	1.87
Transmission torque	Nm	88	216	248	520	1080	1867
	kgfm	9.0	22	25.3	53	110	191

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$

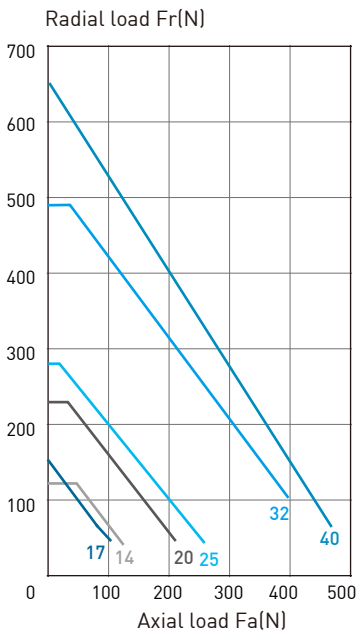
2. Bolt-in depth at least 2 x thread diameter

4-14-6 Permissible input load

The solid shaft input section is supported by two deep groove bearings. To ensure proper performance of the reducer, please confirm the load applied to the input section as shown below:

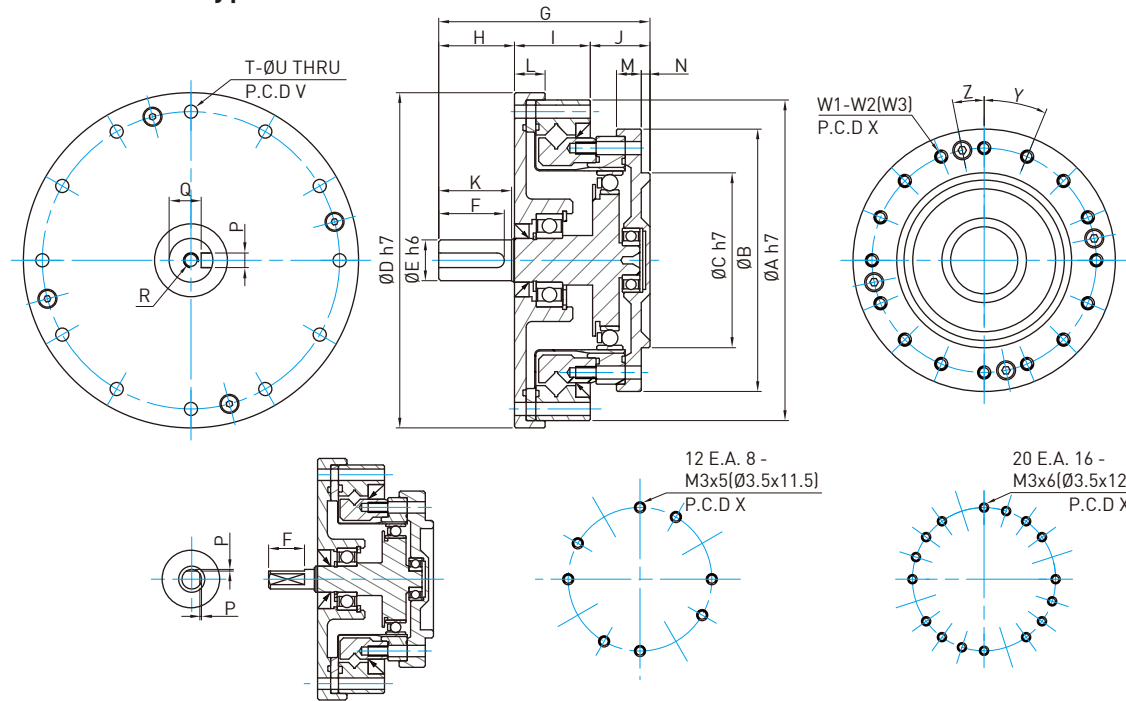


The figure below shows the average input speed of 2000rpm and the basic rated life $L_{10} = 10000$ hour.



Item Model	Bearing A		Bearing B		a (mm)	b (mm)	Maximum radial load F_r (N)
	Dynamic load C (kN)	Static load C_o (kN)	Dynamic load C (kN)	Static load C_o (kN)			
14	2240	910	1080	430	20	14	110
17	2700	1270	1610	710	23.5	21	135
20	4350	2260	2240	910	26.5	23.3	210
25	5600	2830	2700	1270	28	28	270
32	9400	5000	4350	2260	36	27	490
40	13200	8300	6000	3250	43	32.5	660

4-14-7 DGH-AJ type size chart



Model14、17

Model14

Model17

Unit : mm

Mark	Model	14	17	20	25	32	40
ØA h7		70	80	90	110	142	170
ØB		54	64	75	90	115	140
ØC h7		36	45	50	60	85	100
ØD h7		74	84	95	115	147	175
ØE h6		6	8	10	14	14	16
ØF		11	12	16.5	22.5	22.5	27.5
G		50.5	56	63.5	72.5	84.5	100
H		15	17	21	26	26	31
I		20.5	23	25	26	32	38
J		15	16	17.5	20.5	26.5	31
K		14	16	20	25	25	30
L		9	10	10.5	10.5	12	14
M		8	8.5	9	8.5	9.5	13
N		2.5	3	3	3	5	5
P		0.5	0.5	3 ⁰ _{-0.025}	5 ⁰ _{-0.03}	5 ⁰ _{-0.03}	5 ⁰ _{-0.03}
Q		-	-	8.2 ⁰ _{-0.1}	11 ⁰ _{-0.1}	11 ⁰ _{-0.1}	13 ⁰ _{-0.1}
R		-	-	M3 x 6DP	M5 x 10DP	M5 x 10DP	M5 x 10DP
T		8	12	12	12	12	12
ØU		3.5	3.5	3.5	4.5	5.5	6.6
V (P.C.D)		64	74	84	102	132	158
W1		12 E.A. 8	20 E.A. 16	16	16	16	16
W2		M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP	M6 x 10DP
W3		Ø3.5 x 11.5DP	Ø3.5 x 12DP	Ø3.5 x 13.5DP	Ø4.5 x 15.5DP	Ø5.5 x 20.5DP	Ø6.6 x 25DP
X (P.C.D)		44	54	62	77	100	122
Y (Degree)		30°	18°	22.5°	22.5°	22.5°	22.5°
Z (Degree)		30°	18°	11.25°	11.25°	11.25°	11.25°
Moment of inertia (×10 ⁻⁴ kgm ²)		0.025	0.059	0.137	0.32	1.2	3.41
Weight (Kg)		0.66	0.94	1.38	2.1	4.4	7.3

4-15 DLC-CE Type

4-15-1 Technical data

Table 4-15-1 Rating table

Item Model	Reduction ratio	Rated torque at input 2000r/min ※1		Peak torque at start/stop※2		Permissible maximum value of average load torque※3		Instantaneous permissible max. torque※4		Permissible maximum input speed	Permissible average input speed
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	r/min	r/min
14	50	5.4	0.55	18	1.8	6.9	0.7	35	3.6	8500	3500
	80	7.8	0.8	23	2.4	11	1.1	47	4.8		
	100	7.8	0.8	28	2.9	11	1.1	54	5.5		
17	50	16	1.6	34	3.5	26	2.6	70	7.1	7300	3500
	80	22	2.2	43	4.4	27	2.7	87	8.9		
	100	24	2.4	54	5.5	39	4	110	11		
	120	24	2.4	54	5.5	39	4	86	8.8		
20	50	25	2.5	56	5.7	34	3.5	98	10	6500	3500
	80	34	3.5	74	7.5	47	4.8	127	13		
	100	40	4.1	82	8.4	49	5	147	15		
	120	40	4.1	87	8.9	49	5	147	15		
	160	40	4.1	92	9.4	49	5	147	15		
25	50	39	4	98	10	55	5.6	186	19	5600	3500
	80	63	6.4	137	14	87	8.9	255	26		
	100	67	6.8	157	16	108	11	284	29		
	120	67	6.8	167	17	108	11	304	31		
	160	67	6.8	176	17.9	108	11	314	32		
32	50	76	7.8	216	22	108	11	382	39	4800	3500
	80	118	12	304	31	167	17	568	58		
	100	137	14	333	34	216	22	647	66		
	120	137	14	353	36	216	22	686	70		
	160	137	14	372	37.9	216	22	686	70		

※1 Permissible rated torque

※2 Permissible maximum torque

※3 Permissible average torque

※4 Permissible maximum value of impact

Table 4-15-2 Angle transmission accuracy

Reduction ratio \ Model		14	17	20	25	32
50 up	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9
	arc min	1.5	1.5	1	1	1

Table 4-15-3 Hysterisis loss

Reduction ratio \ Model		14	17	20	25	32
50 up	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9
	arc min	1	1	1	1	1

Table 4-15-4 Starting torque

Unit : cNm

Reduction ratio \ Model		14	17	20	25	32
50		3.3	5.1	6.6	12	26
80		2.4	3.3	4.1	7.7	16
100		2.1	2.9	3.7	6.9	15
120		-	2.7	3.3	6.3	13
160		-	-	2.9	5.5	12

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-15-5 Reversed starting torque

Unit : Nm

Reduction ratio \ Model		14	17	20	25	32
50		1.4	2.5	4	7.5	16
80		1.4	2.5	4.2	7.7	16
100		1.7	2.8	4.5	8.4	18
120		-	3.1	4.9	9.2	19
160		-	-	5.8	11	23

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

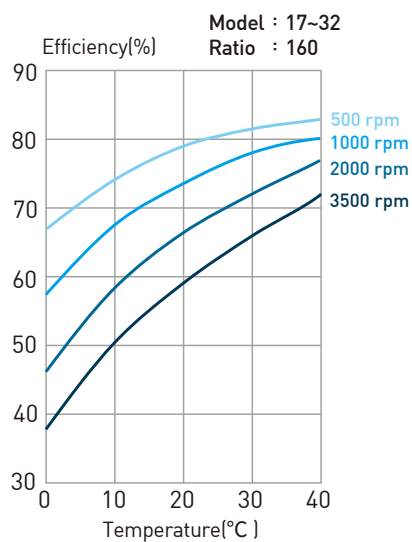
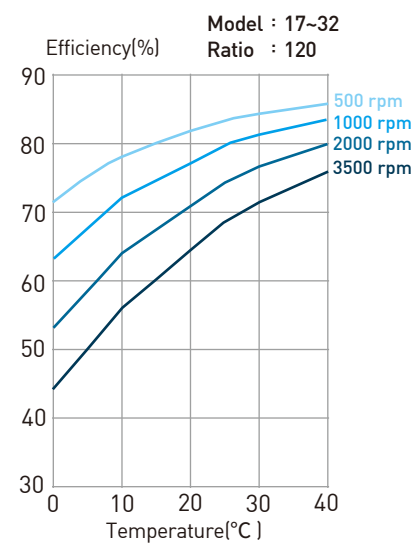
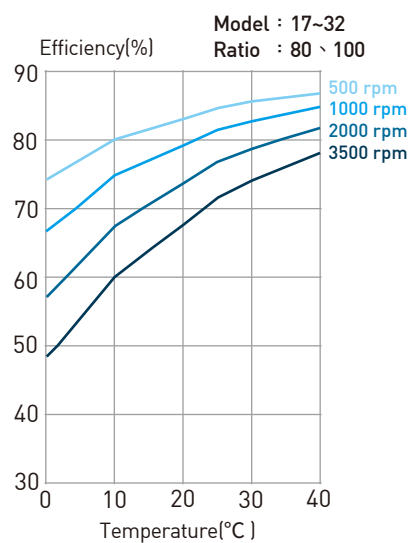
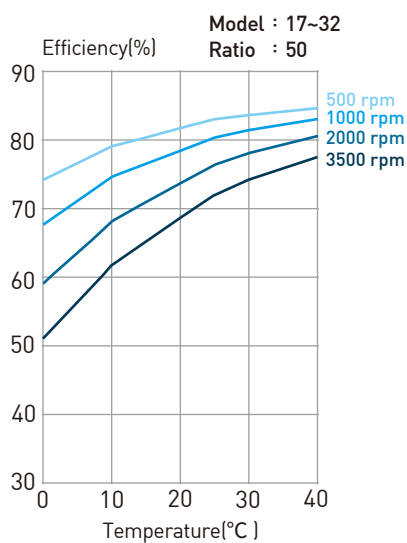
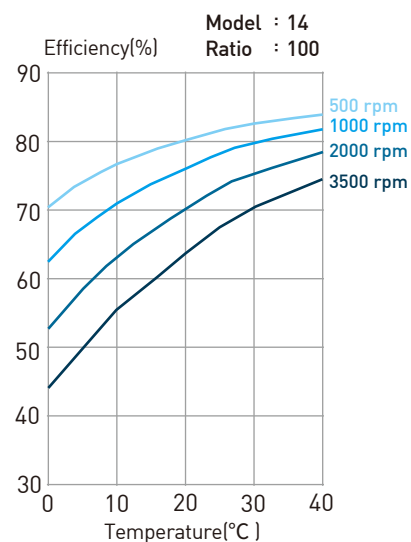
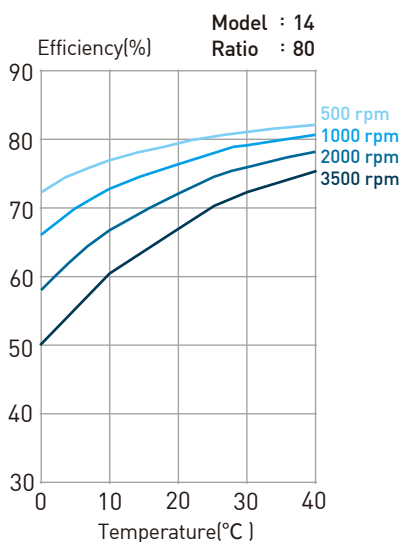
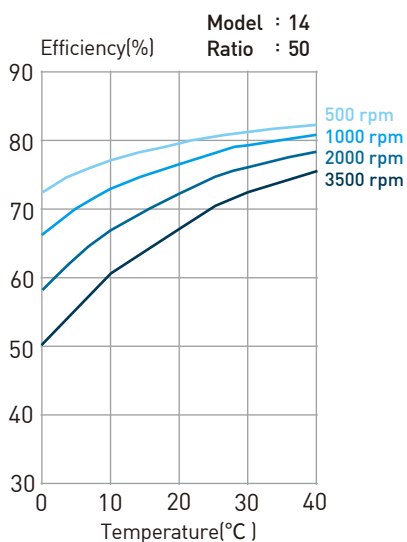
Table 4-15-6 Torsional rigidity

Reduction ratio		Model	14	17	20	25	32
T_1		Nm	2	3.9	7	14	29
		kgfm	0.2	0.4	0.7	1.4	3.0
T_2		Nm	6.9	12	25	48	108
		kgfm	0.7	1.2	2.5	4.9	11
50	K_1	$\times 10^4$ Nm/rad	0.34	0.81	1.3	2.5	5.4
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6
	K_2	$\times 10^4$ Nm/rad	0.47	1.1	1.8	3.4	7.8
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3
	K_3	$\times 10^4$ Nm/rad	0.57	1.3	2.3	4.4	9.8
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9
	θ_1	$\times 10^{-4}$ rad	5.8	4.9	5.2	5.5	5.5
		arc min	2.0	1.7	1.8	1.9	1.9
	θ_2	$\times 10^{-4}$ rad	16	12	15.4	15.7	15.7
		arc min	5.6	4.2	5.3	5.4	5.4
80 up	K_1	$\times 10^4$ Nm/rad	0.47	1	1.6	3.1	6.7
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0
	K_2	$\times 10^4$ Nm/rad	0.61	1.4	2.5	5.0	11
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2
	K_3	$\times 10^4$ Nm/rad	0.71	1.6	2.9	5.7	12
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7
	θ_1	$\times 10^{-4}$ rad	4.1	3.9	4.4	4.4	4.4
		arc min	1.4	1.3	1.5	1.5	1.5
	θ_2	$\times 10^{-4}$ rad	12	9.7	11.3	11.1	11.6
		arc min	4.2	3.3	3.9	3.8	4.0

Note : The values are for reference only. The lower limit is 20% under the value in this table.

4-15-2 Efficiency E_R

DATORKER[®] efficiency would change by model, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity) .

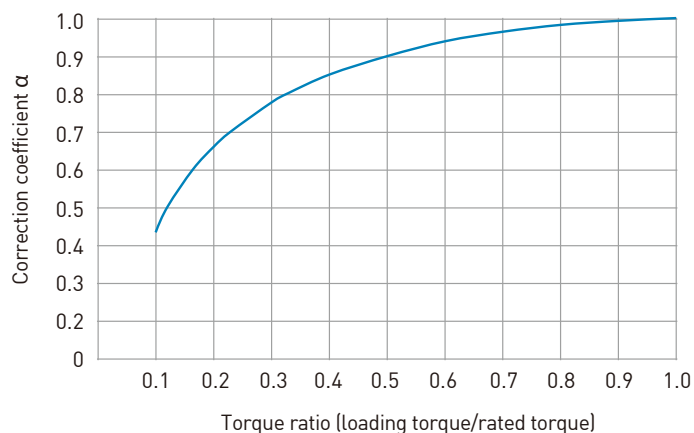


Efficiency correction coefficient α

Efficiency = $\alpha \times E_R$

α is correction coefficient

E_R is efficiency at the rated torque



4-15-3 No-load operating torque

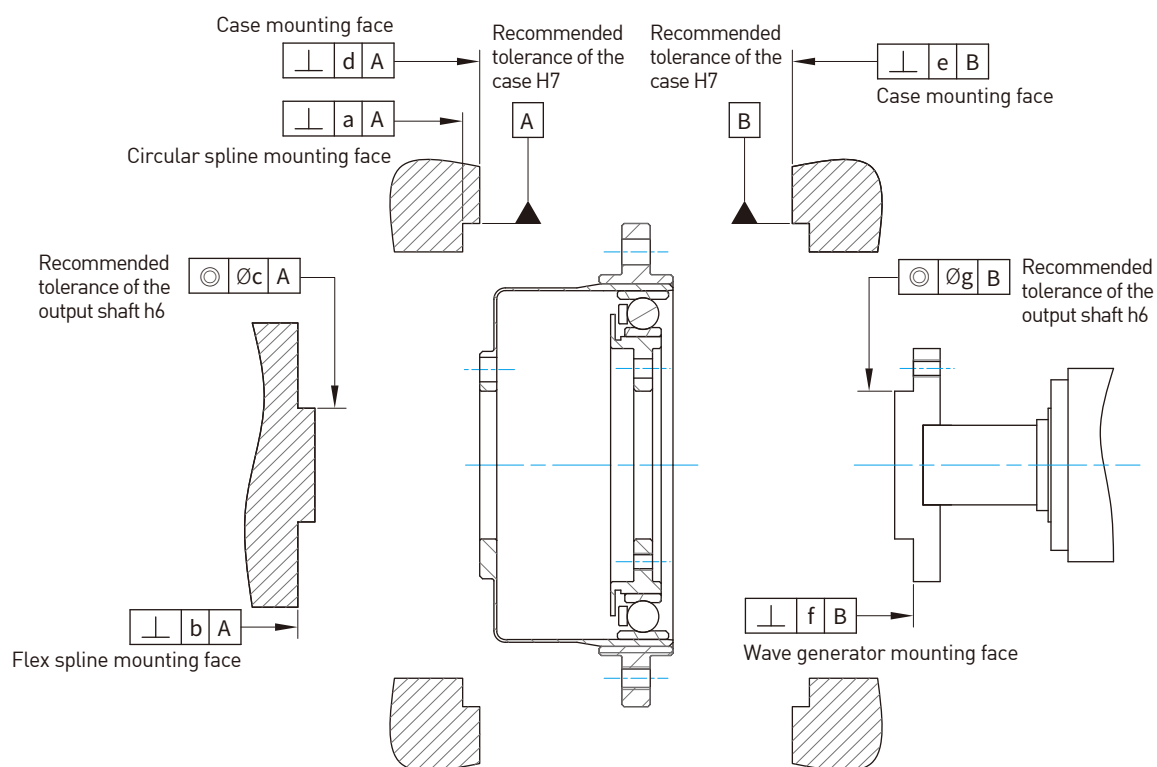
The torque required to drive the DATORKER® input (high-speed end) after running in at an input speed of 2000 r/min under an average ambient temperature of 25° C without load for more than 2 hours.

Unit : cNm

Reduction ratio	Input rotational speed	Model				
		14	17	20	25	32
50	500 r/min	2	2.8	5.2	9.7	21.5
	1000 r/min	2.3	3.6	6.8	14.2	28.5
	2000 r/min	3.3	5.1	10	19.2	39.5
	3500 r/min	4.7	6.8	14.2	27.2	51.5
80	500 r/min	1.6	2.1	4.2	7.8	17.7
	1000 r/min	1.9	2.9	5.8	12.3	24.7
	2000 r/min	2.9	4.4	9	17.3	35.7
	3500 r/min	4.3	6.1	13.2	25.3	47.7
100	500 r/min	1.5	2	4	7.5	17
	1000 r/min	1.8	2.8	5.6	12	24
	2000 r/min	2.8	4.3	8.8	17	35
	3500 r/min	4.2	6	13	25	47
120	500 r/min	-	1.9	3.9	7.3	16.5
	1000 r/min	-	4.7	5.5	11.8	23.5
	2000 r/min	-	4.2	8.7	16.8	34.5
	3500 r/min	-	5.9	12.9	24.8	46.5
160	500 r/min	-	-	3.7	6.9	15.8
	1000 r/min	-	-	5.3	11.4	22.8
	2000 r/min	-	-	8.5	16.4	33.8
	3500 r/min	-	-	12.7	24.4	45.8

Note : The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

4-15-4 Installation accuracy

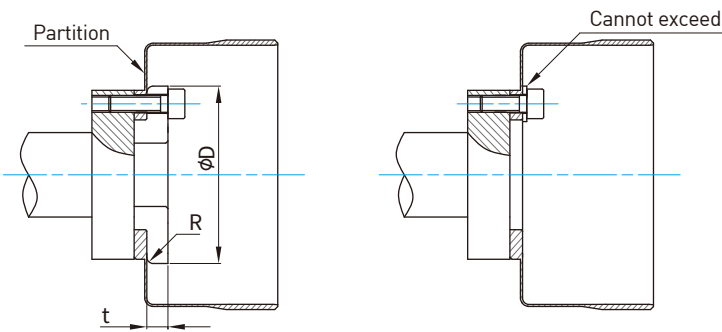


Unit : mm

Mark	Model	14	17	20	25	32
a		0.011	0.012	0.013	0.014	0.016
b		0.008	0.011	0.014	0.018	0.022
øc		0.015	0.018	0.019	0.022	0.022
d		0.011	0.015	0.017	0.024	0.026
e		0.011	0.015	0.017	0.024	0.026
f		0.008	0.01	0.01	0.012	0.012
øg		0.016	0.018	0.019	0.022	0.022

4-15-5 Install the flex spline

It is recommended to install directly with bolts. The head of the bolt should not exceed Dimension D.



		Unit : mm				
Mark	Model	14	17	20	25	32
$\varnothing D_{-0.1}^0$		24.5	29	34	42	55
$R_{0}^{+0.1}$		1.2	1.2	1.4	1.5	2
t		3	3	3	5	7

4-15-6 Installation bolt tightening torque

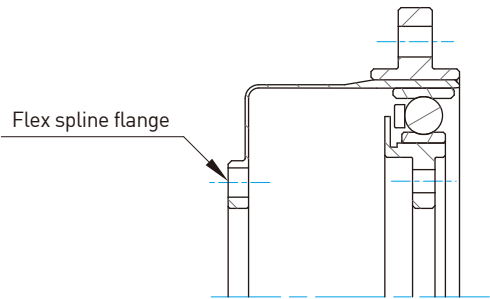


Table 4-15-7 Flex spline flange side bolt tightening torque

Item		Model	14	17	20	25	32
Number of bolts			12	14	12	12	12
Bolts size			M2.5	M2.5	M3	M4	M5
Installation of bolts PCD	mm		18.9	23.1	27	33.6	44.9
	Nm		1.2	1.2	2.2	5.1	10
Bolts tightening torque	kgfm		0.12	0.12	0.22	0.52	1.02
Transmission torque	Nm		95	135	200	446	952
	kgfm		9.69	13.77	20.39	45.48	97.08

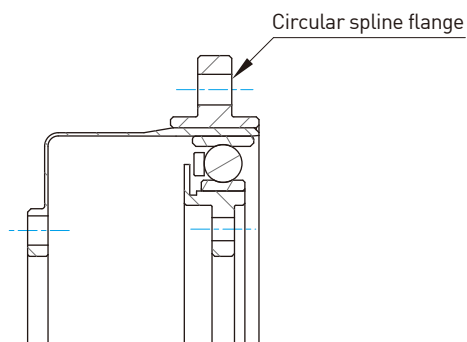


Table 4-15-8 Bolt installation of Circular spline flange

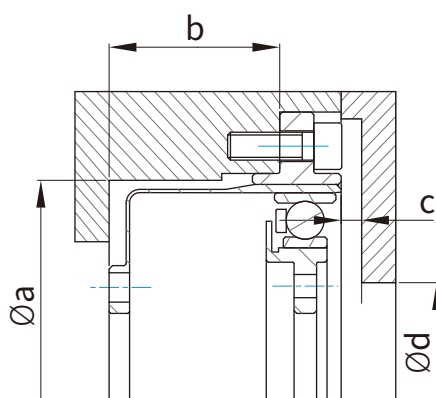
Item		Model	14	17	20	25	32
Number of bolts			12	12	12	12	12
Bolts size			M3	M3	M3	M4	M5
Installation of bolts PCD	mm		44	54	62	75	100
Bolts tightening torque	Nm		2.1	2.1	2.1	5.1	10
	kgfm		0.21	0.21	0.21	0.52	1.02
Transmission torque	Nm		110	130	150	315	690
	kgfm		11.22	13.26	15.3	32.12	70.36

Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for $\mu K = \mu G = 0.125$
2. Bolt-in depth at least 2 x thread diameter

4-15-7 Lubrication

1. Recommended dimensions for the inner wall of the case

In order to avoid the splashing of excessive lubricant on other parts during operation. It is recommended to adhere to the following dimensions:

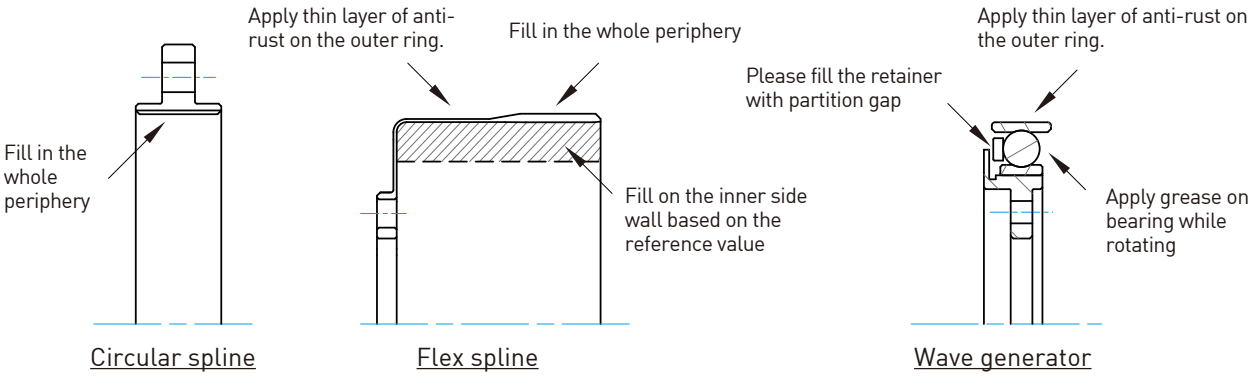


Unit : mm

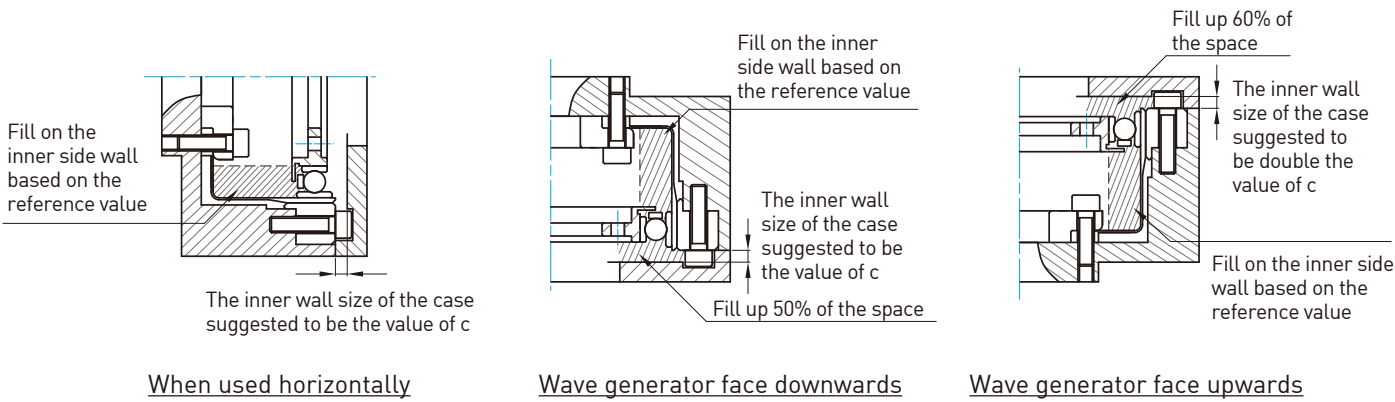
Mark	Model	14	17	20	25	32
$\varnothing a$		38	45	53	66	86
b		17.1	19	20.5	23	26.8
c		1	1	1.5	1.5	1.5
$\varnothing d^{+0.5}_0$		16	26	30	37	37

Note: The value in { } is the value of the wave generator is facing up.

2. Lubricant application



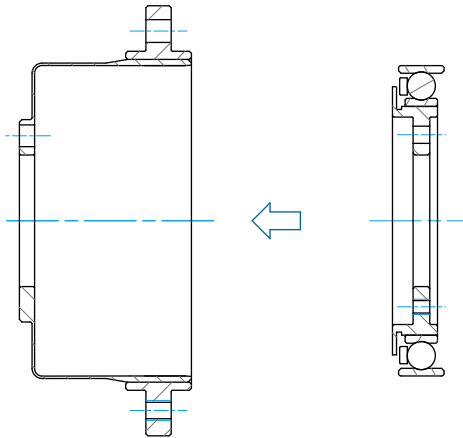
3. The key points of different application methods



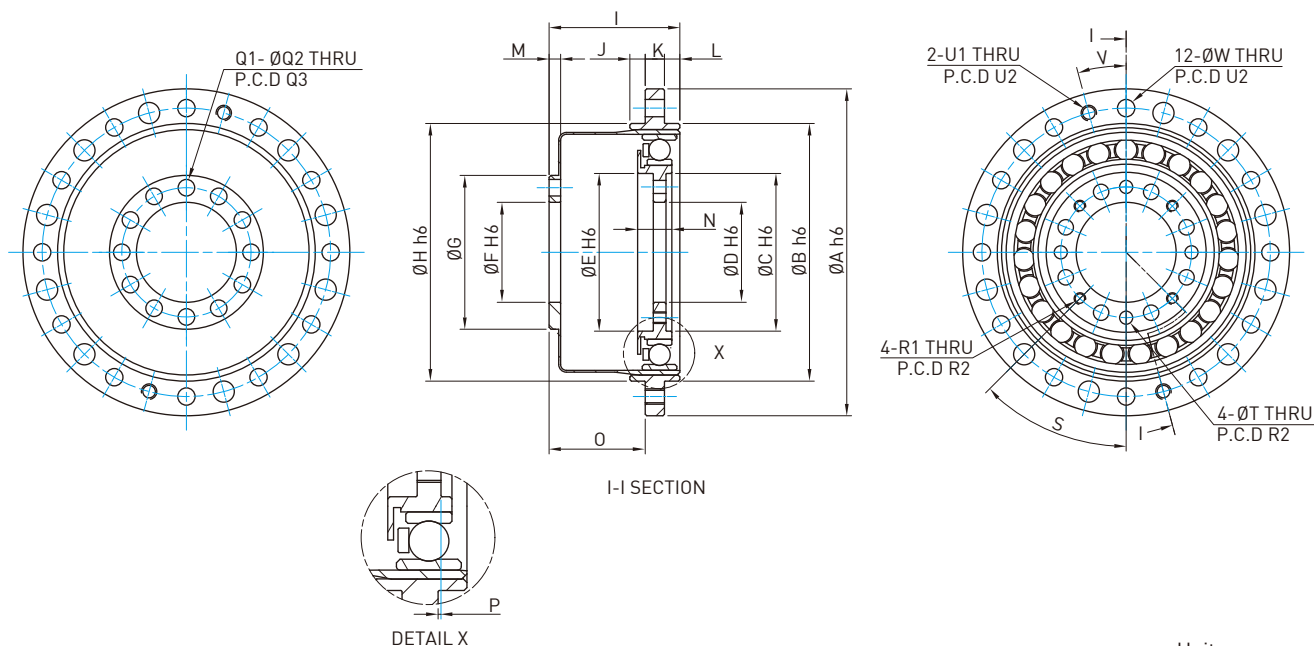
		Unit : g					
Instructions		Model	14	17	20	25	32
Used horizontally			5.5	10	16	30	60
Used vertical	Wave generator is facing down		7	12	18	35	70
	Wave generator is facing up		8.5	14	21	40	80

4-15-8 Installation sequence

Install the circular spline and flex spline into the mechanism then install the Wave generator.



4-15-9 DLC-CE type size chart



Unit : mm

Mark	Model	14	17	20	25	32
ØA h6		50	60	70	85	110
ØB h6		38	48	54	67	90
ØC H6		22.6	27	32	41	53
ØD H6		13.5	18	21	26	36
ØE H6		22.6	27	32	41	53
ØF H6		13.5	18	21	26	36
ØG		23	27.2	32	40	52
ØH H6		38	48	54	67	90
I		23.5	26.5	29	34	42
J		2.5	2.75	3.25	4	5.5
K		3	3.5	4	5	6
L		2.5	2.75	3.25	4	5.5
M		2.4	3	3	3	3.2
N		7.4	7.6	9.1	8.9	11.5
O		18 ^{+0.4} ₀	20.25 ^{+0.5} ₀	21.75 ^{+0.6} ₀	25 ^{+0.6} ₀	30.5 ^{+0.6} ₀
P		0.1 ^{+0.4} ₀	0.2 ⁰ _{-0.45}	0.6 ⁰ _{-0.5}	0.4 ⁰ _{-0.5}	0.5 ⁰ _{-0.55}
Q1		12	14	12	12	12
ØQ2		2.7	2.7	3.5	4.3	5.3
Q3 (P.C.D)		18.9	23.1	27	33.6	44.9
R1		M2	M2	M2.5	M3	M4
R2 (P.C.D)		18	22.5	26.75	34	44.5
S (Degree)		45°	45°	45°	45°	45°
ØT		2.4	2.4	2.9	3.4	4.5
U1		M3	M3	M3	M4	M5
U2 (P.C.D)		44	54	62	75	100
V (Degree)		15°	15°	15°	15°	15°
ØW		3.4	3.4	3.4	4.5	5.5
Moment of inertia (× 10 ⁻⁴ kgm ²)		0.020	0.049	0.112	0.263	0.924
Weight (Kg)		0.055	0.10	0.14	0.24	0.54

5. Installation Notes

5-1 Precautions for Installation of Reducer Body

- Check the flatness of the installation plane and ensure it is not inclined.
- Check case mounting part and ensure it does not interfere with the body.
- When locking the bolt, temporarily tighten to half the value of the specified torque in the diagonal order before reaching the specified torque. Do not tighten the bolts to the specified torque directly.
- The surface of the product is not treated with anti-rust. If anti-rust is required, please apply on the surface.

5-2 Precautions for Installation of Wave Generator

- To avoid excessive force on the wave generator bearing during installation, please rotate the wave generator and insert it smoothly.
- If you choose a wave generator without the Oldham mechanism, kindly ensure to keep the concentricity and perpendicularity within the recommended range. (Refer to "Assembly accuracy" of each series)

5-3 Others

- Do not change the combination of product accessories to avoid affecting the overall performance and accuracy.
- Please do not use it for applications that may fall. Though there is no scar on the surface after falling, the change in internal stress may also reduce the fatigue strength. Please do not use it.
- It is strictly forbidden for dust to fall into the product to avoid abnormal sound, wear and vibration during operation.
- Ensure to use the specified grease in the product. (Please refer to Chapter 6. "Lubricant" of this manual)
- Avoid overload operation.
- Note that the input speed should be within the specified range.
- Please use a thread locker in the threaded hole. We recommend using Loctite 242 to prevent leakage.

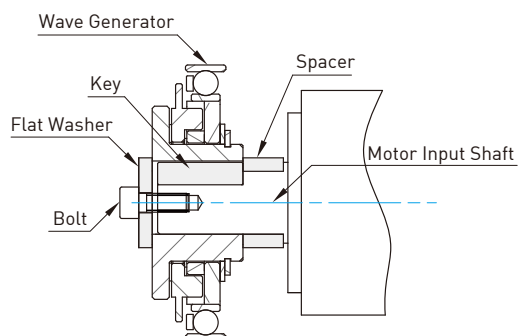
5-4 The Following Conditions May Cause Problems, Please Pay Attention

- Overrun
- Insufficient lubricant
- Bearing/gear components damaged.
- Poor connection with other interface components.

5-5 If the Following Problems Occur, Please Stop Immediately and Check the Reducer

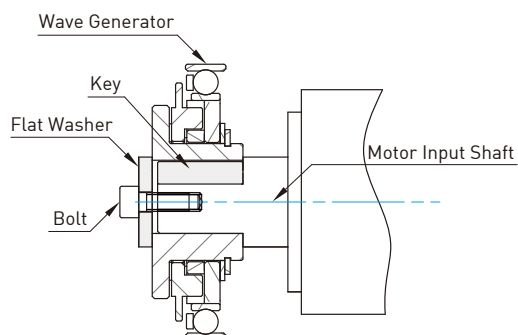
- The internal temperature rises over 80 degrees or the ambient temperature rises over 40 degrees.
- Abnormal noise or vibration.

5-6 Wave Generator and Input Shaft Connection Options

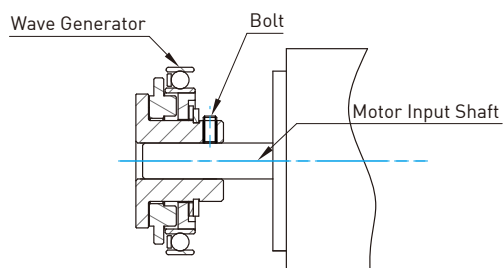


The motor input shaft has a shoulder that is not long enough, so it is necessary to install a spacer between the wave generator and the shaft, and fix it with washers and bolts.

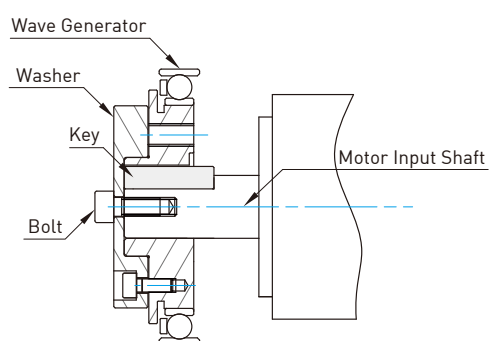
* The parallelism of both ends of the spacer should be less than 0.01mm.



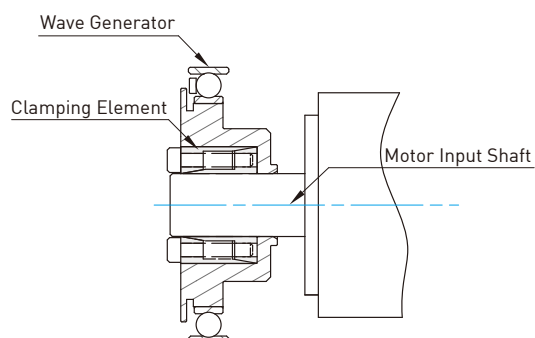
The motor input shaft has a shoulder, install the wave generator and fix it with washers and bolts.



The input shaft of the motor is a round shaft (without keyway). Install the wave generator and fix it with bolts.



Install the washer on the wave generator, then install it into the motor input shaft, and then fix it with bolts.



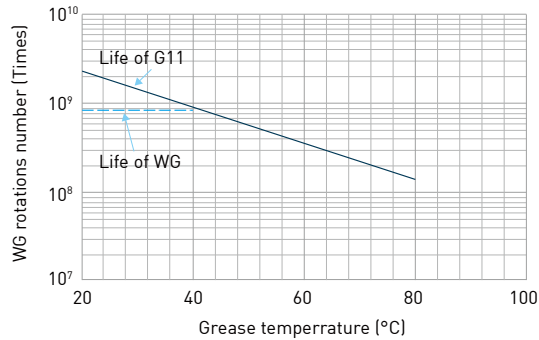
The wave generator is inserted into the motor input shaft, and then fixed with clamping element.

6. Lubricant

6-1 Grease Replacement

When the average load torque is lower than the rated torque, set the grease replacement time as shown in the table below.

- When the average load torque is lower than the rated torque(L_{GTn})



When the average load torque is higher than the rated torque, the grease replacement period can be calculated according to the following formula.

- When the average load torque is higher than the rated torque(L_{GT})

$$L_{GT} = L_{GTn} \times \left(\frac{T_r}{T_{av}} \right)^3$$

L_{GT} is the replacement time when the torque is higher than the rated torque(times)

L_{GTn} is the replacement time when the torque is lower than the rated torque(times)

T_r is the rated torque (Nm) [refer to the rating table of Chapter 4. Product Series](#)

T_{av} is the average load torque (Nm) [refer to 2-2-1](#)

- Others

- Do not mix with other greases.
- When used for fixed load and continuous operation in a fixed direction, it may cause poor lubrication.
- Please strengthen the sealing mechanism according to the use environment.

6-2 HIWIN G11 Special Lubricant Oil for Reducer

○ Conditions and characteristics of use

1. Load resistance
2. Wear resistance
3. Excellent shear stability
4. Suitable for robots, automation equipment, semiconductor equipment, machine tools, etc.

○ Basic properties

Colour	Yellow
Base oil	Mineral oil
Consistency enhancer	Lithium soap
Service temp. (°C)	-20~130
Ambient working temperature (°C)	0~40
NLGI-grade (0.1mm)	265~295
Drop point (°C)	196

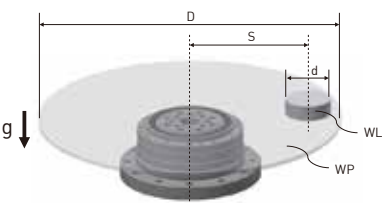
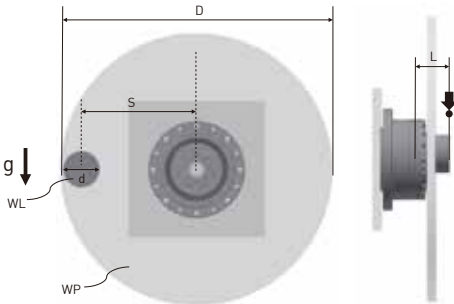
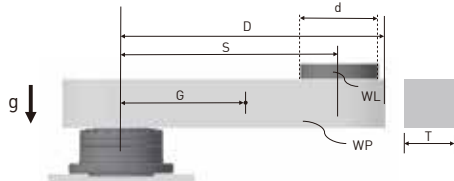
○ Packaging specifications: 400g hard tube packed

○ Others


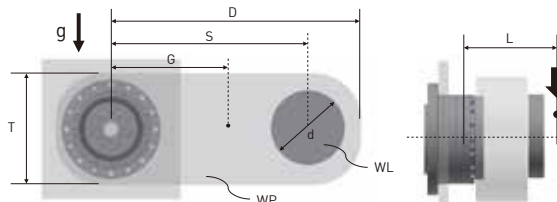
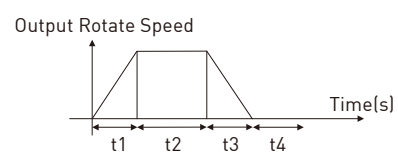
1. HIWIN DATORKER® is prepacked with HIWIN G11 grease can be installed directly. Except for DSC-CO, DGC-CO, DLC-CE type, high speed and high torque conditions, it is recommended to apply additional grease to each part as per the Lubrication instructions in this technical manual.
2. Do not mix and use with different types of Lubricants.
3. For use in special conditions with high vibration, in clean room, vacuum, high temperature or low temperature, please contact us for more detailed evaluation.

7. Inquiry Form

7-1 DATORKER® Inquiry Form

Customer Name		Date / /	
Application		<input type="checkbox"/> Robot _____ <input type="checkbox"/> Semi-conductor equipment _____ <input type="checkbox"/> Machine tool _____ <input type="checkbox"/> Automation equipment _____ <input type="checkbox"/> Inspection equipment _____ <input type="checkbox"/> Medical related equipment _____ <input type="checkbox"/> Others _____	
Type of Reducer Currently Used		<input type="checkbox"/> Harmonic reducer, Maker _____; Spec _____ <input type="checkbox"/> Others, Maker _____; Spec _____	
Environments		<input type="checkbox"/> Normal working conditions (ambient temperature 0°C - 40°C, humidity under 80% RH) <input type="checkbox"/> Special ambient temperature: _____ °C <input type="checkbox"/> Harsh environment (Dusty, Cutting fluid, Dirty, etc) <input type="checkbox"/> Other special conditions: _____	
Special Requirements		<input type="checkbox"/> Sealed and Dustproof <input type="checkbox"/> Anti-rust Treatment <input type="checkbox"/> Custom Dimensions <input type="checkbox"/> High/Low Temperature Lubricant <input type="checkbox"/> Output Support Bearing <input type="checkbox"/> Other _____ ※If you have special requirements, please contact HIWIN.	
Selection	Load Condition*	• Mounting type I : Plate (Horizontal) Table diameter (D): _____ (mm) Table weight (WP): _____ (kg) Load diameter (d): _____ (mm) Load weight (WL): _____ (kg) Distance between load center of rotation axis (S): _____ (mm) Ratio (R): _____ 	
		• Mounting type II : Plate (Perpendicular) Table diameter (D): _____ (mm) Table weight (WP): _____ (kg) Load diameter (d): _____ (mm) Load weight (WL): _____ (kg) Distance between load center of rotation axis (S): _____ (mm) Distance between outputface and loading gravity center (L): _____ (mm) Ratio (R): _____ 	
		• Mounting type III : Square (Horizontal) Arm length (D): _____ (mm) Load diameter (d): _____ (mm) Arm width (T): _____ (mm) Load weight (WL): _____ (kg) Arm weight (WP): _____ (kg) Ratio (R): _____ Distance of arm's gravity center (G): _____ (mm) Distance between load center of rotation axis (S): _____ (mm) 	

*The values are for reference only. The lower limit is 20% under the value in this table.

<div style="text-align: center;">Selection</div> <div style="text-align: center;">  <p>HIWIN Support</p> </div>	<div style="text-align: center;">Load Condition</div> <p>• Mounting type IV : Square (Perpendicular)</p> <p>Arm length (D): _____ (mm) Load diameter (d): _____ (mm)</p> <p>Arm width (T): _____ (mm) Load weight (WL): _____ (kg)</p> <p>Arm weight (WP): _____ (kg) Ratio (R): _____</p> <p>Distance of arm's gravity center (G): _____ (mm)</p> <p>Distance between outputface and loading gravity center (L): _____ (mm)</p> <p>Distance between load center of rotation axis (S): _____ (mm)</p> <div style="text-align: center;">  </div>
	<div style="text-align: center;">Operation Condition</div> <p>Acceleration time (t1): _____ (s)</p> <p>Steady operating time (t2): _____ (s)</p> <p>Decelerating time (t3): _____ (s)</p> <p>Stop time (t4): _____ (s)</p> <p>Equipment operation time (Tr): _____ (hour)</p> <p>Equipment operation day (Ty): _____ (day)</p> <p>Rotate angle (θ): _____ (degree)</p> <p>Reciprocating rotate angle (θ): _____ (degree)</p> <div style="text-align: center;">  </div>

7-2 DATORKER® Strain Wave Gear System Inquiry Form (Optional)

Brake	<input type="checkbox"/> No <input type="checkbox"/> Yes
Input Voltage(V)	<input type="checkbox"/> 220V Single Phase <input type="checkbox"/> 220V Three Phase <input type="checkbox"/> Others
Encoder	<input type="checkbox"/> 17bit (Absolute) <input type="checkbox"/> 23bit (Absolute)
Control Interface	<input type="checkbox"/> Voltage command and Pulse (Standard) <input type="checkbox"/> EtherCAT (CoE) <input type="checkbox"/> Others
Cable	Power Extension Cable (Flexure Resistance) Cable Length : <input type="checkbox"/> 3M (Standard) <input type="checkbox"/> 5M <input type="checkbox"/> 7M <input type="checkbox"/> 10M Encoder Extension Cable (Flexure Resistance) Cable Length : <input type="checkbox"/> 3M (Standard) <input type="checkbox"/> 5M <input type="checkbox"/> 7M <input type="checkbox"/> 10M
Optional Accessories	<input type="checkbox"/> Control Cable (Including Pulse + I/O Pins) <input type="checkbox"/> USB Transfer Cable <input type="checkbox"/> Single Phase Filters <input type="checkbox"/> Three Phase Filters
Host	<input type="checkbox"/> None <input type="checkbox"/> PLC/Brand: _____ Model: _____ <input type="checkbox"/> Motion control card/Brand: _____ Model: _____
Other Requirements	
Below to be filled in by HIWIN or Distributor Suggested Model & Specification:	

DATORKER® Strain Wave Gear Technical Information

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May 2025, 7th edition

-
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