HIWIN®

Motion Control & Systems

Translation of the Original Assembly Instruction W99TE01-2008

Assembly Instructions

DATORKER® Strain wave gearbox

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HIWIN®

DATORKER® Strain wave gearbox

Contents

Preface

DATORKER® strain wave gearboxes 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.

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
- Improved lubricating properties
- High torque – Widely used in automation and inspection equipment
- Wide reduction ratio – Various choices available under same model

1-2 Structure

Flex Spline

Slim and resilient metal with external teeth on the outer circle. Continuous elastic deformation when working; usually used as an output.

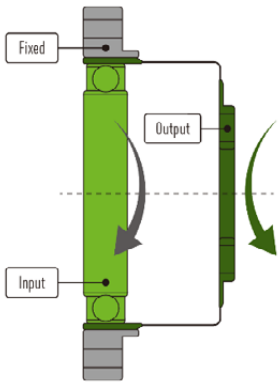
Circular Spline

The rigid circular part has teeth on the inner bore side, and there are two teeth more than the external teeth of flex spline; it is usually used as the fixed end.

Wave Generator

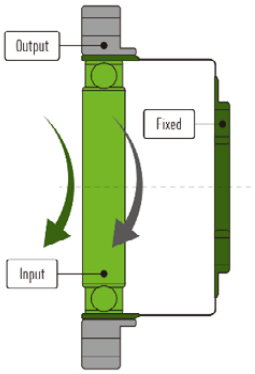
With an elliptical geometric feature, it makes the flex spline engaging with the circular spline. Usually used as an input.

Reduction ratio and rotation direction



Input and Output with reverse direction rotation

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

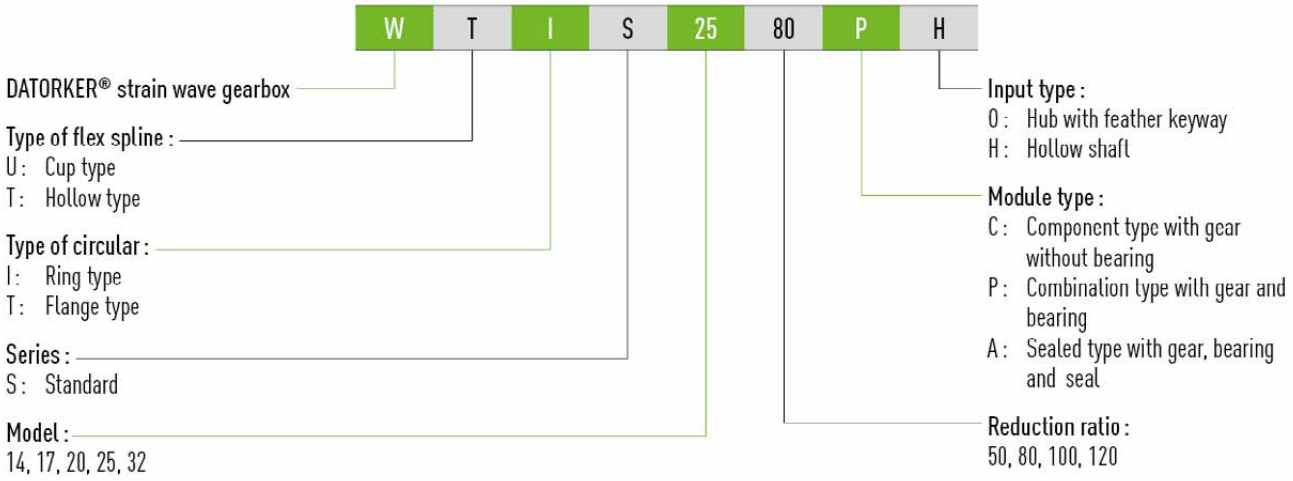


Input and Output with the same direction rotation

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

(R = Reduction ratio from Datasheet)

1-3 Specification



1-4 Type / Function

WUT Type

Combination Type (PO)

- Combination (P) out of gear and bearing
- Connection by hub with feather key
- Withstand axial and radial load

WUI Type

Component Type (CO)

- Component (C) out of gear without bearing
- Connection by hub with feather key
- Self-assembly of parts required

WTI Type

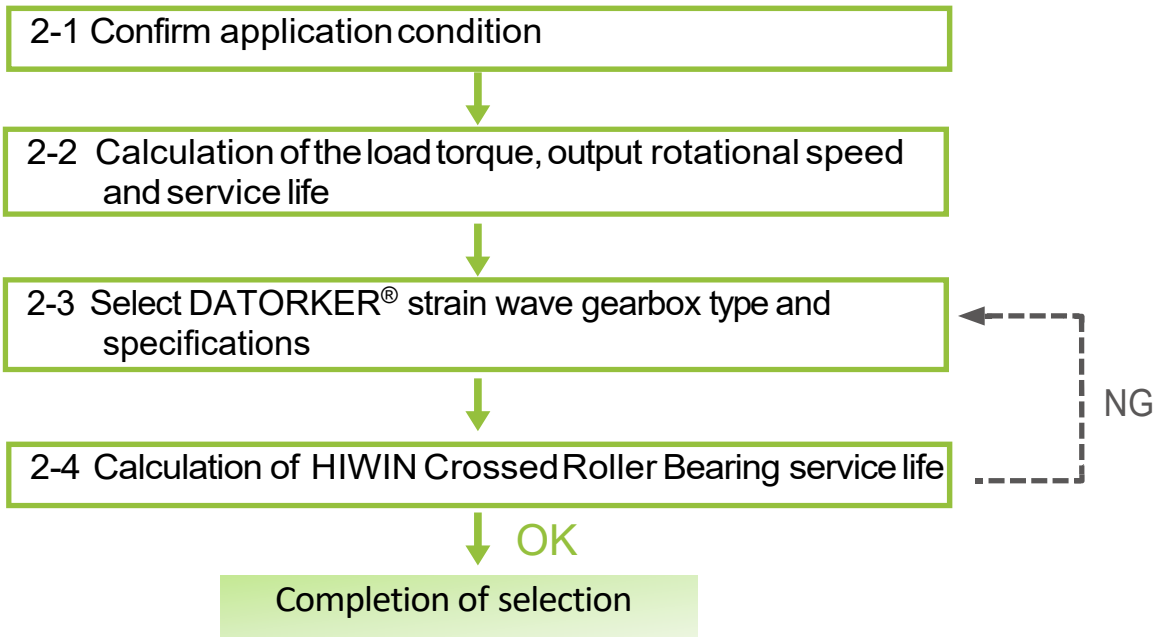
Combination Type (PH)

- Combination (P) out of gear and bearing
- Connection by hollow shaft
- Withstand axial and radial load

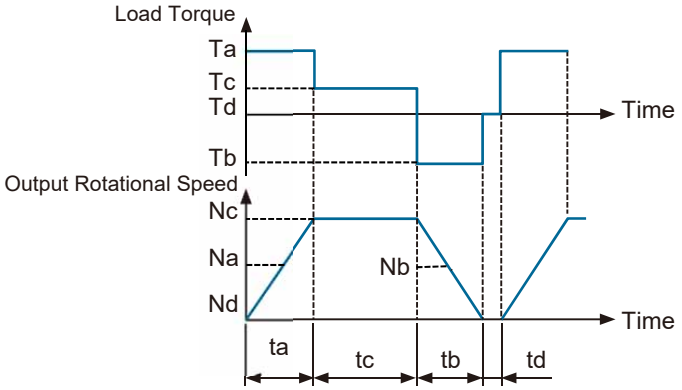
Combination Type (AH)

- Combination (A) out of gear, bearing and seal
- Connection by hollow shaft
- Withstand axial and radial load
- Completely sealed design
- User-friendly design

2 Selection Procedure

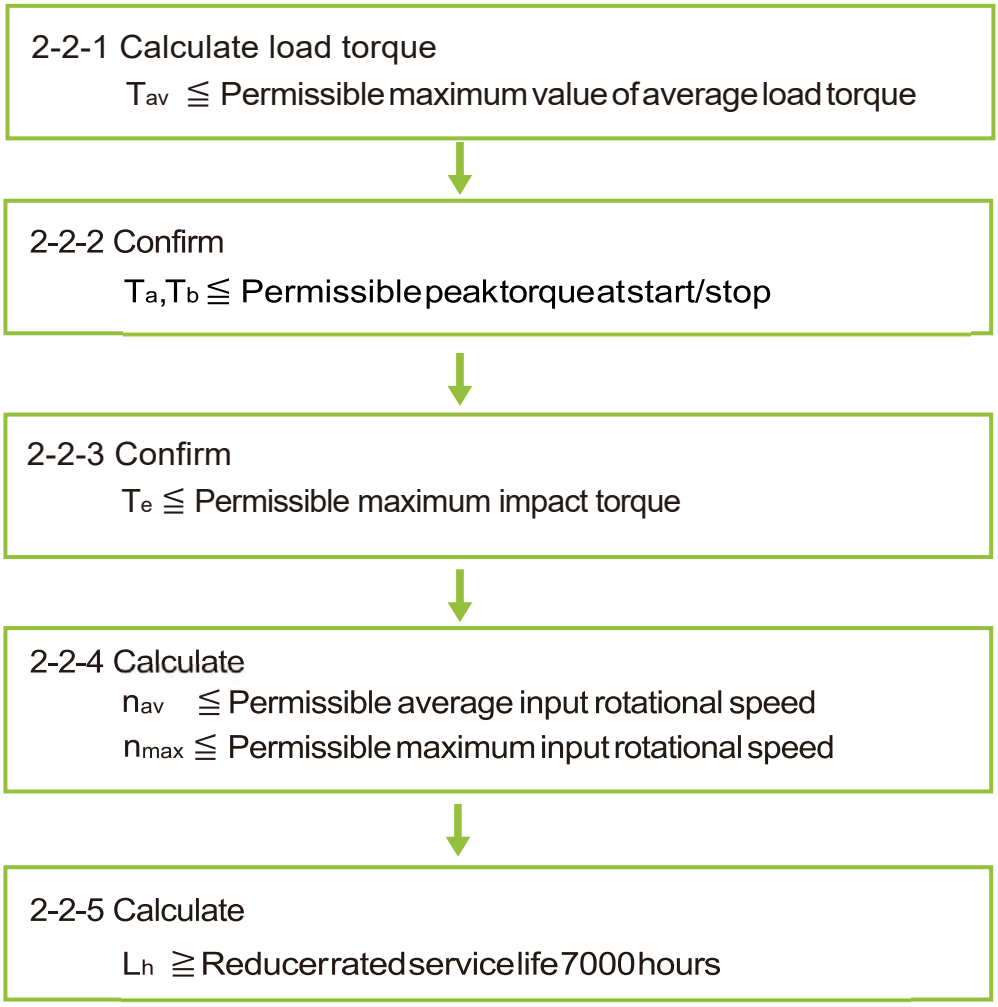


2-1 Confirm application condition



Item / Model	Load Torque	Time	Output Rotational Speed	Maximum Output Rotational Speed	Maximum Input Rotational Speed
Start Time (Acceleration)	Ta	ta	Na	N_{max}	n_{max}
Operation Time (Constant)	Tc	tc	Nc		
Stop Time (Deceleration)	Tb	tb	Nb		
Break Time	Td	td	Nd		
Impact	Te	te	Ne		

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

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 impact 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 $N_{av} = \frac{N_1t_1+N_2t_2+\cdots+N_nt_n}{t_1+t_2+\cdots+t_n}$

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

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

R = 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

$L_h = 7.000 * \left(\frac{T_r}{T_{av}}\right) * \left(\frac{n_r}{n_{av}}\right)$

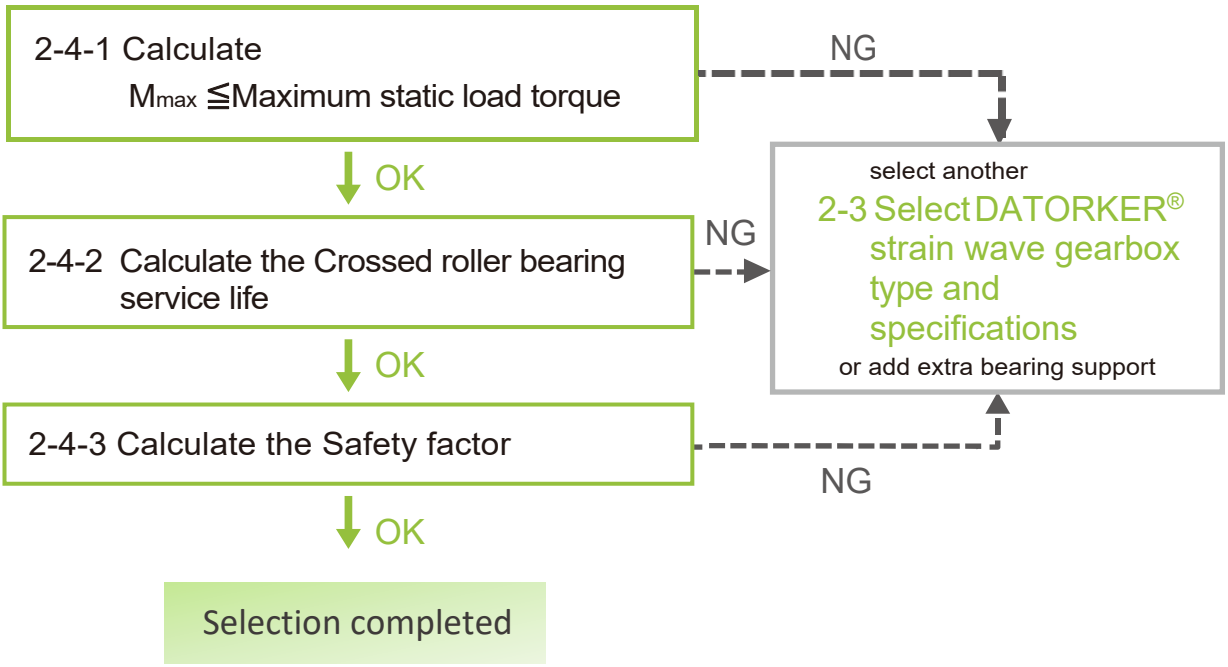
Tr = Rated torque

nr = Rated rotational speed

2-3 DATORKER® Strain wave gearbox type and specification selection

Select the DATORKER® strain wave gearbox 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

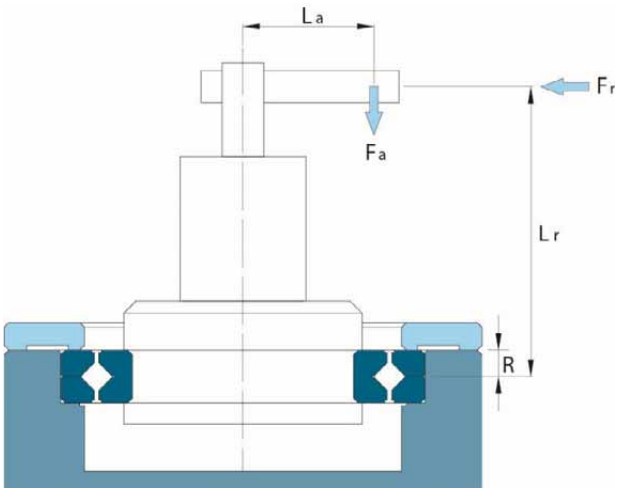


2-4-1 Maximum static load moment

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

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

Fr = radial load
Fa = axial load



2-4-2 Calculation for Service life of Crossed roller bearings

Calculate basic service life $L = \left(\frac{C_{dyn}}{F_w * P_{dyn}}\right)^{\frac{10}{3}}$

P_{dyn} = dynamic equivalent load
C_{dyn} = basic dynamic load rating
F_w = load factor

Load condition	Load factor (F_w)
No impact / vibration	2! !2/3!
Normal	2/3! !2/6!
With impact & vibration	2/6! !4!

Calculate dynamic equivalent load $P_{dyn} = X(F_r + \frac{2M}{Dpw} + Y * F_A)$

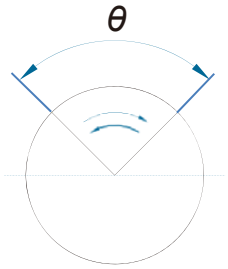
where $\frac{F_a}{F_r + \frac{2M}{Dpw}} \leq 1.5$ for $X = 1, Y = 0.45°$ where !$\frac{F_a}{F_r + \frac{2M}{Dpw}} \geq 1.5$ for $X = 0.67, Y = 0.67°$

M = Torque
Dpw = pitch circle diameter

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

Calculate service life of oscillating $L_{oc} = \frac{180°}{\theta} * L$

θ = 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_0 = static equivalent load
C_0 = 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

* 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.

Calculate basic static equivalent load

$P_0 = F_r + \frac{2M}{Dpw} + 0{,}44\ F_a$

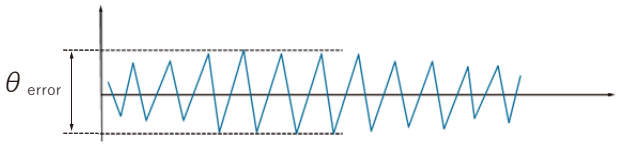
3 Definition

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.

$$\theta = \frac{\theta_1}{\text{reduction ratio}}$$

$$\theta_{error} = \theta_3 - \theta_2$$



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.

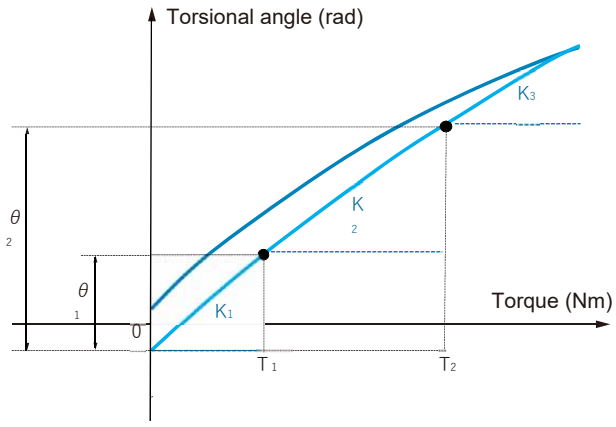
3-3 Reversed Starting Torque

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

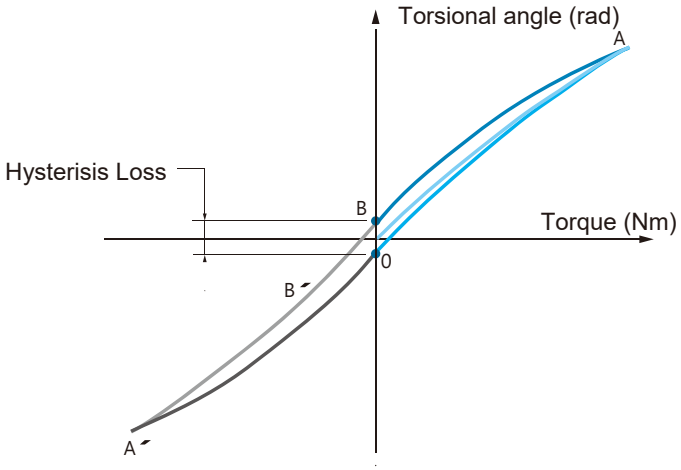
It is defined as the fixed input (wave generator) and applies a torque to the output (flex spline) of the strain wave gearbox. The ratio generated by torque and the torsion angle.
The slope of the "torque-torsion angle graph" is expressed as a spring constant. The "torque-torsion angle diagram" is divided into three 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 Hysterisis 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® strain wave gearbox gear engage part is suppressed to "0". The source of the maximum backlash is caused by the gap between the coupling and the wave generator.

4 Product Series

4-1 WUT-PO Type

4-1-1 Technical data

Table 4-1-1 Rating table

Item / Model	Reduction Ratio	Rated torque at input 2000 r/min	Peak torque at start/stop	Permissible max. value of average load torque	Permissible impact torque	Permissible max. input speed	Permissible average input speed
		Nm	Nm	Nm	Nm	r/min	r/min
14	50	5.4	18	6.9	35	8500	3500
	80	7.8	23	11	47		
	100	7.8	28	11	54		
17	50	16.0	34	26	70	7300	3500
	80	22.0	43	27	87		
	100	24.0	54	39	108		
	120	24.0	54	39	86		
20	50	25.0	56	34	98	6500	3500
	80	34.0	74	47	127		
	100	40.0	82	49	147		
	120	40.0	87	49	147		
25	50	39.0	98	55	186	5600	3500
	80	63.0	137	87	255		
	100	67.0	157	108	284		
	120	67.0	167	108	304		
32	50	76.0	216	108	382	4800	3500
	80	118.0	304	167	568		
	100	137.0	333	216	647		
	120	137.0	353	216	686		

Table 4-1-2 Crossed roller bearing specifications

Model	Pitch circle diameter of roller	Offset amount	Basic load ratings		Permissible moment load	Moment rigidity
	Dpw	R	Dynamic load C	Static load Co		
	m	m	kN	kN	Nm	$\times 10^4$ Nm/rad
14	0.0350	0.0095	4.7	6.1	41	4.38
17	0.0425	0.0095	5.3	7.6	64	7.75
20	0.0500	0.0095	5.8	9.0	91	12.80
25	0.0620	0.0115	9.6	15.1	156	24.20
32	0.0800	0.0130	15.0	25.0	313	53.90

Table 4-1-3 Angle Transmission Accuracy

Reduction Ratio \ Model		14	17	20	25	32
50 -120	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9

Table 4-1-4 Hysterisis Loss

Reduction Ratio \ Model		14	17	20	25	32
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8
80 -120	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9

Table 4-1-5 Maximum Backlash

Reduction Ratio \ Model		14	17	20	25	32
50	$\times 10^{-5}$ rad	17.5	9.7	8.2	8.2	6.8
80	$\times 10^{-5}$ rad	11.2	6.3	5.3	5.3	4.4
100	$\times 10^{-5}$ rad	8.7	4.8	4.4	4.4	3.4
120	$\times 10^{-5}$ rad	-	3.9	3.9	3.9	2.9

Table 4-1-6 Starting Torque

Unit: cNm

Reduction Ratio \ Model	14	17	20	25	32
50	4.1	6.1	7.8	15.0	31
80	2.8	4.0	4.9	9.2	19
100	2.5	3.4	4.3	8.0	18
120	–	3.1	3.8	7.3	15

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 Reversed Starting Torque

Unit: Nm

Reduction Ratio \ Model	14	17	20	25	32
50	1.6	3.0	4.7	9.0	18
80	1.6	3.0	4.8	9.1	19
100	1.8	3.3	5.1	9.8	20
120	–	3.5	5.5	11.0	22

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.

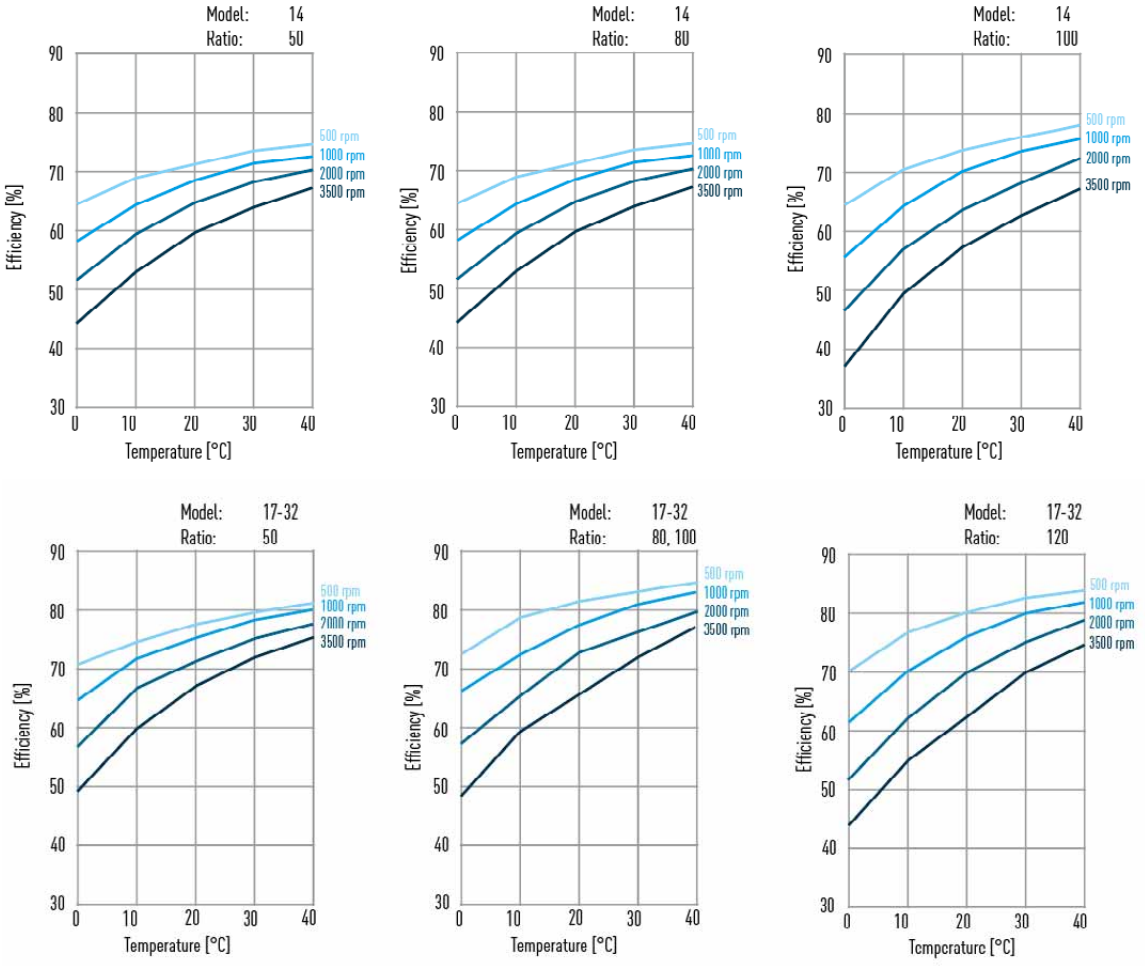
Table 4-1-8 Torsional Rigidity

Reduction Ratio \ Model			14	17	20	25	32
T_1		Nm	2.0	3.9	7.0	14	29
T_2		Nm	6.9	12.0	25	48	108
50	K_1	$\times 10^4$ Nm/rad	0.34	0.81	1.3	2.5	5.4
	K_2	$\times 10^4$ Nm/rad	0.47	1.1	1.8	3.4	7.8
	K_3	$\times 10^4$ Nm/rad	0.57	1.3	2.3	4.4	9.8
	θ_1	$\times 10^{-4}$ rad	5.8	4.9	5.2	5.5	5.5
	θ_2	$\times 10^{-4}$ rad	16.0	12.0	15.4	15.7	15.7
80 - 120	K_1	$\times 10^4$ Nm/rad	0.47	1.0	1.6	3.1	6.7
	K_2	$\times 10^4$ Nm/rad	0.61	1.4	2.5	5.0	11
	K_3	$\times 10^4$ Nm/rad	0.71	1.6	2.9	5.7	12
	θ_1	$\times 10^{-4}$ rad	4.1	3.9	4.4	4.4	4.4
	θ_2	$\times 10^{-4}$ rad	12.0	9.7	11.3	11.1	11.6

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

4-1-2 Efficiency E_R

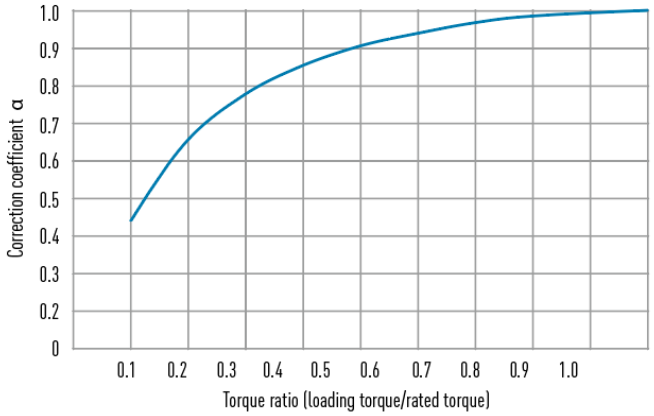
DATORKER® strain wave gearbox efficiency would change by specification, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity).



Efficiency correction coefficient α

Efficiency = α x E_R

α = correction coefficient
E_R = efficiency at the rated torque



4-1-3 No-load operating torque

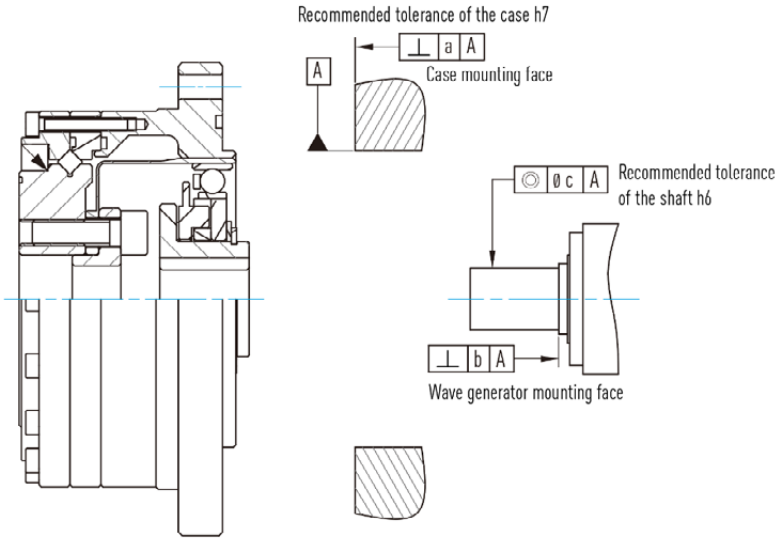
The torque necessary to drive the DATORKER® strain wave gearbox input (high-speed end) after running in at an input speed of 2000r/min under an average ambient temperature of 25 °C without load for more than 2 hours.

Unit: cNm

Reduction Ratio	Input rotational speed	Model				
		14	17	20	25	32
50	500 r/min	3.2	5.1	7.3	12.8	26.1
	1000 r/min	3.9	6.1	9.1	17.8	33.1
	2000 r/min	4.6	7.6	11.8	21.8	44.1
	3500 r/min	5.9	9.6	12.7	28.8	57.1
80	500 r/min	2.3	3.8	5.5	9.7	20.3
	1000 r/min	3.0	4.8	7.3	14.7	27.3
	2000 r/min	3.7	6.3	10.0	18.7	38.3
	3500 r/min	5.0	8.3	10.9	25.7	51.3
100	500 r/min	2.1	3.5	5.0	9.0	19.0
	1000 r/min	2.8	4.5	6.8	14.0	26.0
	2000 r/min	3.5	6.0	9.5	18.0	37.0
	3500 r/min	4.8	8.0	10.4	25.0	50.0
120	500 r/min	-	3.3	4.7	8.5	18.1
	1000 r/min	-	4.3	6.5	13.5	25.1
	2000 r/min	-	5.8	9.2	17.5	36.1
	3500 r/min	-	7.8	10.1	24.5	17.2

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

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

4-1-5 Installation bolt tightening torque

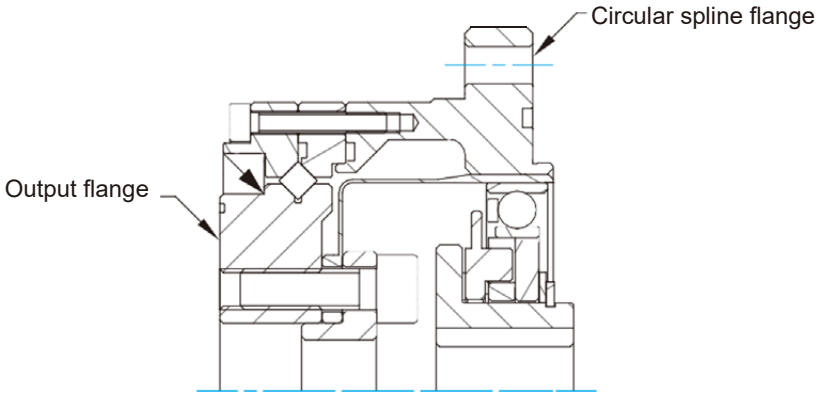


Table 4-1-9 Bolts tightening torque for Output flange

Item \ Model		14	17	20	25	32
Number of bolts		6	6	8	8	8
Bolts size		M4	M5	M6	M8	M10
Installation of Bolts PCD	mm	23	27	32	42	55
Bolts tightening torque	Nm	4.5	9	15.3	37	74

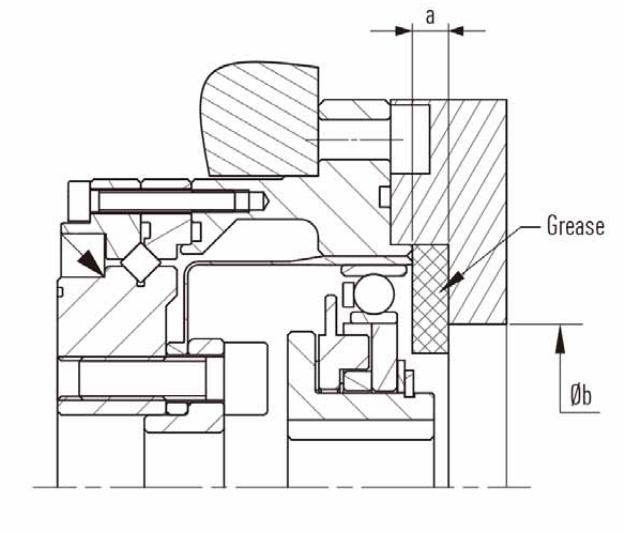
Table 4-1-10 Bolt tightening torque for Circular spline flange

Item \ Model		14	17	20	25	32
Number of bolts		6	6	6	8	12
Bolts size		M4	M4	M5	M5	M6
Installation of Bolts PCD	mm	65	71	82	96	125
Bolts tightening torque	Nm	4.5	4.5	9.0	9.0	15.3

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

4-1-6 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

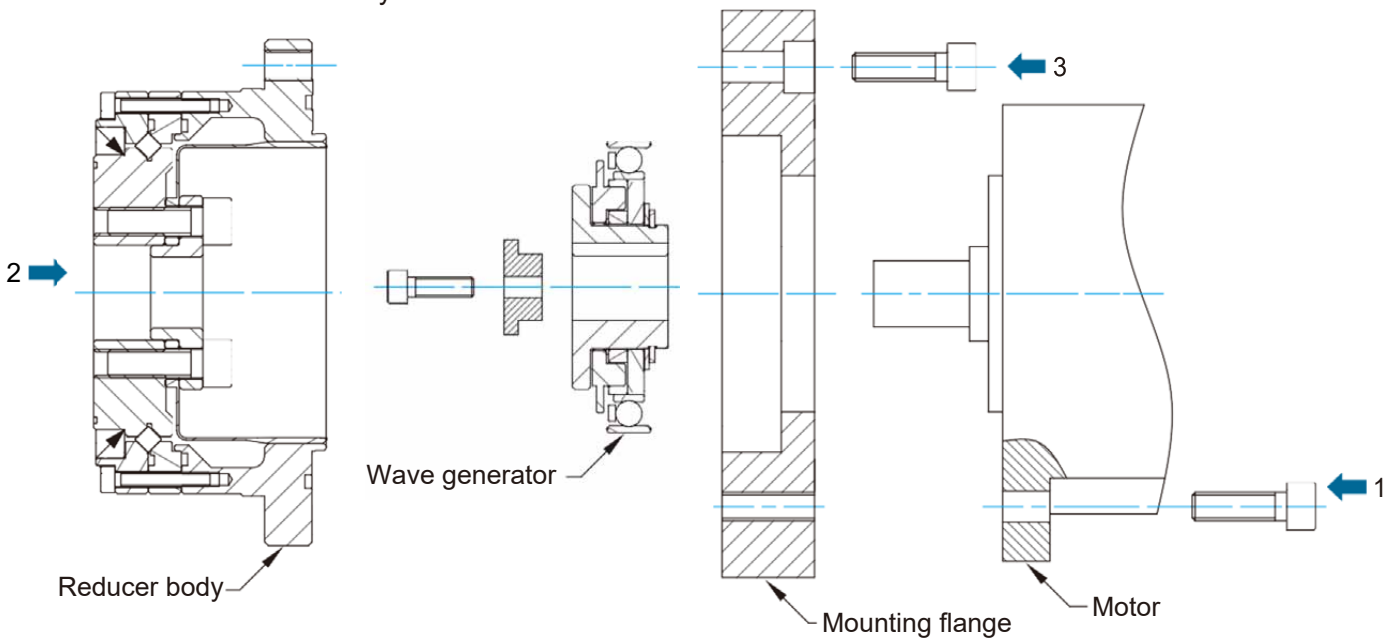
Item \ Model	14	17	20	25	32
a ※1	1	1	1.5	1.5	1.5
a ※2	3	3	4.5	4.5	4.5
øb	16	26	30	37	37

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

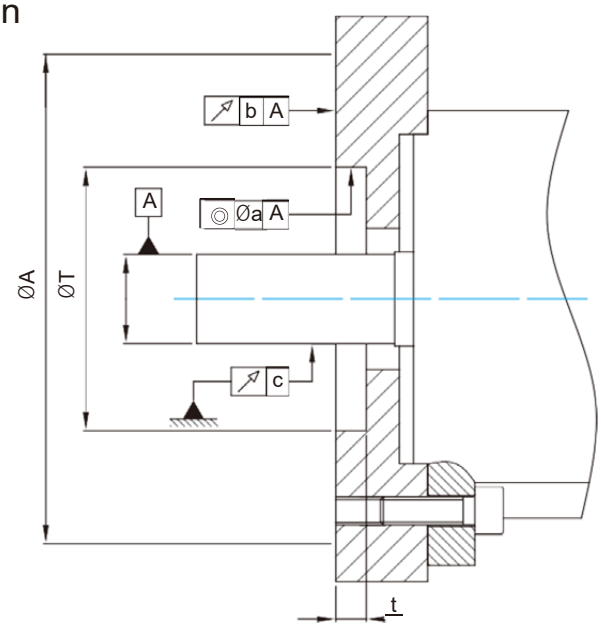
※2 Center shaft vertical: when the wave generator is facing upward

4-1-7 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



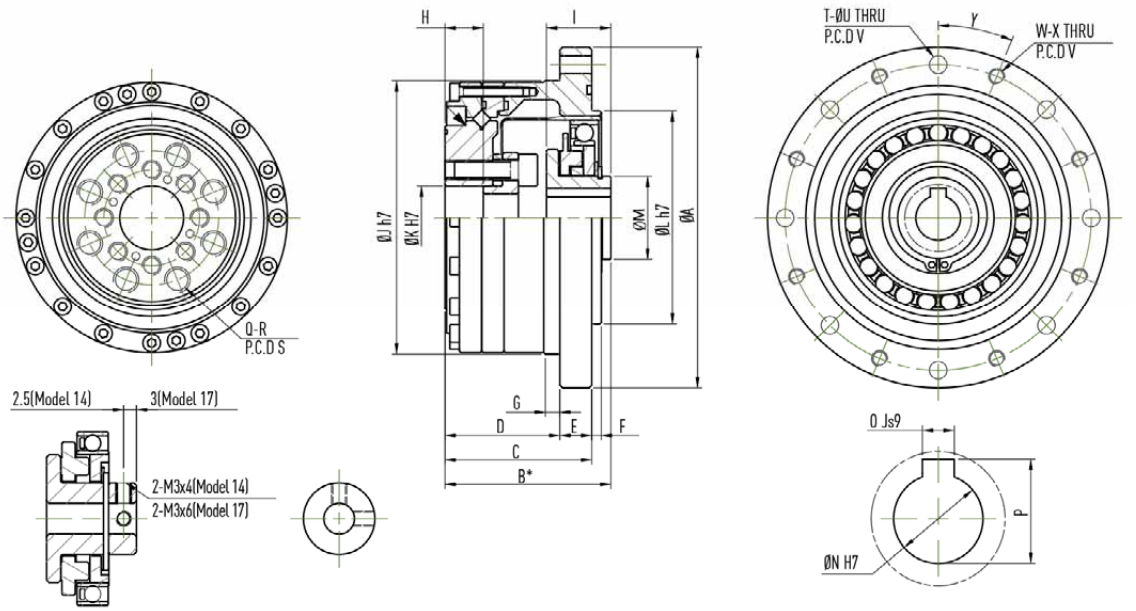
4-1-8 Motor installation



Unit: mm

Mark \ Model	14	17	20	25	32
a	0.03	0.04	0.04	0.04	0.04
b	0.03	0.04	0.04	0.04	0.04
c	0.015	0.015	0.018	0.018	0.018
ØA	73	79	93	107	138
t	3	3	4.5	4.5	4.5
ØT	38H7	48H7	56H7	67H7	90H7

4-1-9 WUT-PO Type Size Chart



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

*The dimension B is the fitting position and permissible tolerance in the axial direction.
Dimensions without unit in mm

4-2 WUI-CO Type

4-2-1 Technical data

Table 4-2-1 Rating table

Item / Model	Reduction Ratio	Rated torque at input 2000 r/min	Peak torque at start/stop	Permissible max. value of average load torque	Permissible impact torque	Permissible max. input speed	Permissible average input speed
		Nm	Nm	Nm	Nm	r/min	r/min
14	50	5.4	18	6.9	35	8500	3500
	80	7.8	23	11	47		
	100	7.8	28	11	54		
17	50	16.0	34	26	70	7300	3500
	80	22.0	43	27	87		
	100	24.0	54	39	108		
	120	24.0	54	39	86		
20	50	25.0	56	34	98	6500	3500
	80	34.0	74	47	127		
	100	40.0	82	49	147		
	120	40.0	87	49	147		
25	50	39.0	98	55	186	5600	3500
	80	63.0	137	87	255		
	100	67.0	157	108	284		
	120	67.0	167	108	304		
32	50	76.0	216	108	382	4800	3500
	80	118.0	304	167	568		
	100	137.0	333	216	647		
	120	137.0	353	216	686		

Table 4-2-2 Angle Transmission Accuracy

Reduction Ratio / Model		14	17	20	25	32
50 - 120	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9

Table 4-2-3 Hysterisis Loss

Reduction Ratio / Model		14	17	20	25	32
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8
80 - 120	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9

Table 4-2-4 Maximum Backlash

Reduction Ratio \ Model		14	17	20	25	32
50	$\times 10^{-5}$ rad	17.5	9.7	8.2	8.2	6.8
80	$\times 10^{-5}$ rad	11.2	6.3	5.3	5.3	4.4
100	$\times 10^{-5}$ rad	8.7	4.8	4.4	4.4	3.4
120	$\times 10^{-5}$ rad	-	3.9	3.9	3.9	2.9

Table 4-2-5 Starting Torque

Unit: cNm

Reduction Ratio \ Model	14	17	20	25	32
50	3.3	5.1	6.6	12.0	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

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 4-2-6 Reversed Starting Torque

Unit: Nm

Reduction Ratio \ Model	14	17	20	25	32
50	1.4	2.5	4.0	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

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.

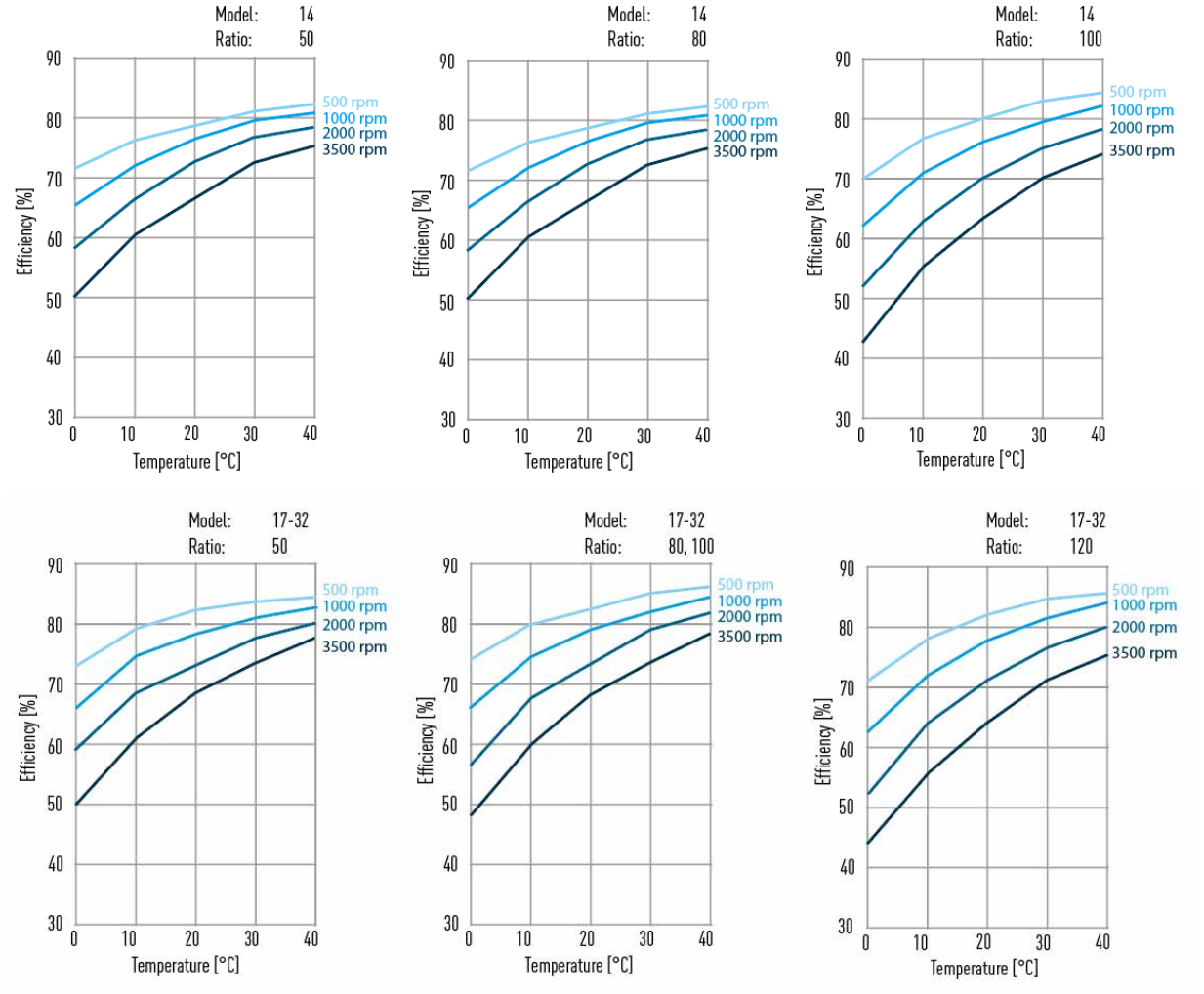
Table 4-2-7 Torsional Rigidity

Reduction Ratio \ Model			14	17	20	25	32
T_1		Nm	2.0	3.9	7.0	14.0	29.0
T_2		Nm	6.9	12.0	25.0	48.0	108.0
50	K_1	$\times 10^4$ Nm/rad	0.34	0.81	1.3	2.5	5.4
	K_2	$\times 10^4$ Nm/rad	0.47	1.1	1.8	3.4	7.8
	K_3	$\times 10^4$ Nm/rad	0.57	1.3	2.3	4.4	9.8
	θ_1	$\times 10^{-4}$ rad	5.8	4.9	5.2	5.5	5.5
	θ_2	$\times 10^{-4}$ rad	16	12.0	15.4	15.7	15.7
80 - 120	K_1	$\times 10^4$ Nm/rad	0.47	1.0	1.6	3.1	6.7
	K_2	$\times 10^4$ Nm/rad	0.61	1.4	2.5	5.0	11.0
	K_3	$\times 10^4$ Nm/rad	0.71	1.6	2.9	5.7	12.0
	θ_1	$\times 10^{-4}$ rad	4.1	3.9	4.4	4.4	4.4
	θ_2	$\times 10^{-4}$ rad	12	9.7	11.3	11.1	11.6

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

4-2-2 Efficiency E_R

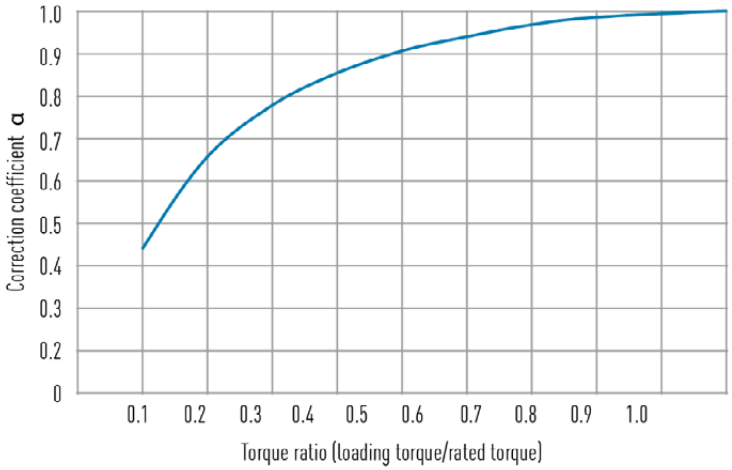
DATORKER® strain wave gearbox efficiency would change by specification, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity).



Efficiency correction coefficient α

Efficiency = α x E_R

α = correction coefficient
E_R = efficiency at the rated torque



4-2-3 No-load operating torque

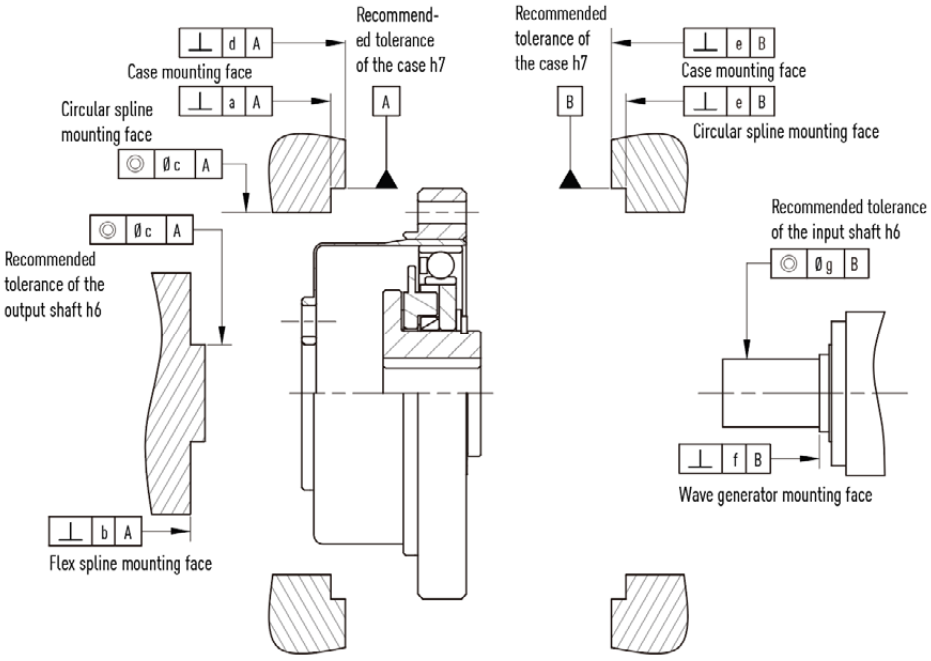
The torque necessary to drive the DATORKER® strain wave gearbox input (high-speed end) after running in at an input speed of 2000r/min under an average ambient temperature of 25 °C without load for more than 2 hours.

Unit: cNm

Reduction Ratio	Input rotational speed	Model				
		14	17	20	25	32
50	500 r/min	1.8	3.4	5.1	9.7	21.2
	1000 r/min	2.3	4.4	6.9	12.5	27.2
	2000 r/min	3.1	5.8	9.4	18.5	37.2
	3500 r/min	4.2	7.9	13.4	25.5	50.2
80	500 r/min	1.4	2.6	3.9	7.6	16.8
	1000 r/min	1.9	3.6	5.7	10.4	22.8
	2000 r/min	2.7	5.0	8.2	16.4	32.8
	3500 r/min	3.8	7.1	12.2	23.4	45.8
100	500 r/min	1.3	2.5	3.7	7.2	16.0
	1000 r/min	1.8	3.5	5.5	10.0	22.0
	2000 r/min	2.6	4.9	8.0	16.0	32.0
	3500 r/min	3.7	7.0	12.0	23.0	45.0
120	500 r/min	-	2.4	3.5	6.9	15.4
	1000 r/min	-	3.4	5.2	9.7	21.4
	2000 r/min	-	4.8	7.8	15.7	31.4
	3500 r/min	-	6.9	11.8	22.7	44.4

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

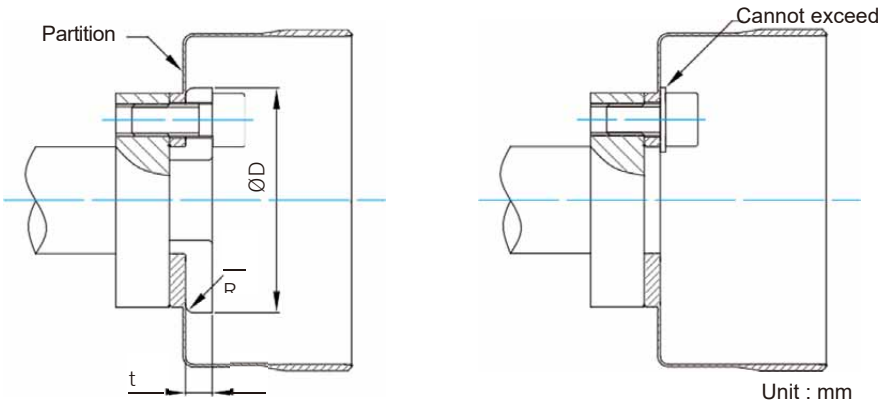


Unit: mm

Mark \ Model	14	17	20	25	32
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	0.017 (0.008)	0.020 (0.010)	0.020 (0.010)	0.024 (0.012)	0.024 (0.012)
Øg	0.030 (0.016)	0.034 (0.018)	0.044 (0.019)	0.047 (0.022)	0.050 (0.022)

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

4-2-5 Recommend size of the Press plate



Unit : mm

Mark \ Model	14	17	20	25	32
$ØD\ ^{0}_{-0.1}$	24.5	29.0	34.0	42.0	55.0
$R\ ^{+0.1}_{0}$	1.2	1.2	1.4	1.5	2.0
t	2.0	2.5	2.5	5.0	7.0

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.

4-2-6 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 4-2-1, use only bolts for installation.
- If the load torque may reach the rated performance value in "Instantaneous permissible max torque" Table 4-2-1, please use a combination of bolts and pins for installation.

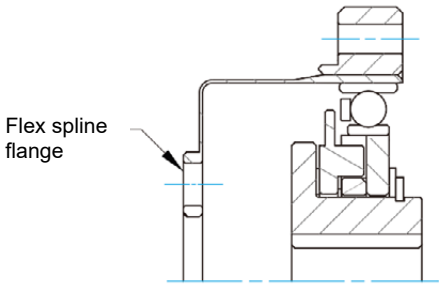


Table 4-2-8 Flex spline flange side bolt tightening torque

Item \ Model		14	17	20	25	32
Number of bolts		6	6	8	8	8
Bolts size		M4	M5	M5	M6	M8
Installation of Bolts PCD	mm	17	19	24	30	40
Bolt tightening torque	Nm	4.5	9.0	9.0	15.3	37

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

Table 4-2-9 Pin installation of Flex spline flange

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

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

2. Circular spline flange side

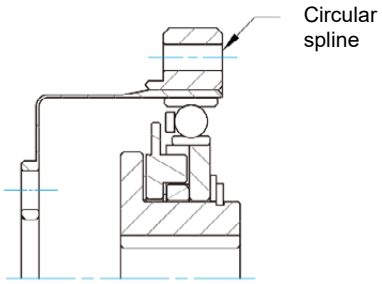
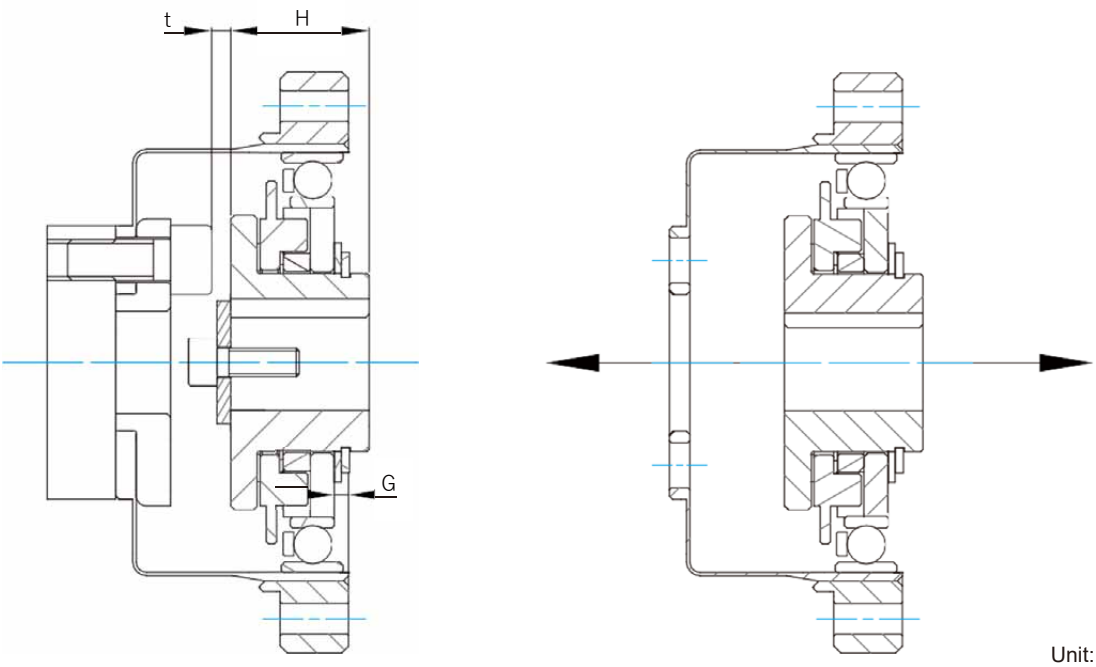


Table 4-2-10 Bolt installation of Circular spline flange

Item \ Model		14	17	20	25	32
Number of bolts		6	12	12	12	12
Bolts size		M3	M3	M3	M4	M5
Installation of Bolts PCD	mm	44	54	62	75	100
Bolt tightening torque	Nm	2.0	2.0	2.0	4.5	9.0

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

4-2-7 Installation of Wave generator



Unit: mm

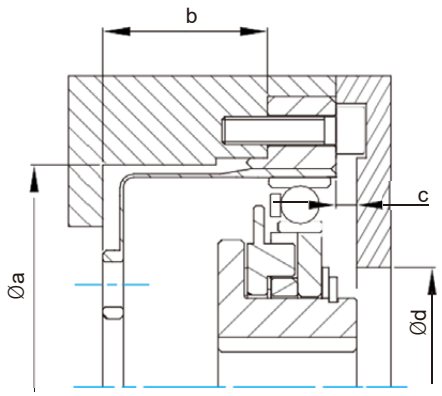
Mark \ Model	14	17	20	25	32
G	0.4	0.3	0.1	2.1	2.5
$H\ ^{0}_{-0.1}$	17.6	19.5	20.1	20.2	22.0
t	2.5	2.5	2.9	2.8	3.8

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 Robot Reducer 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.

4-2-8 Lubrication

1.Recommended dimensions for the inner wall of the case

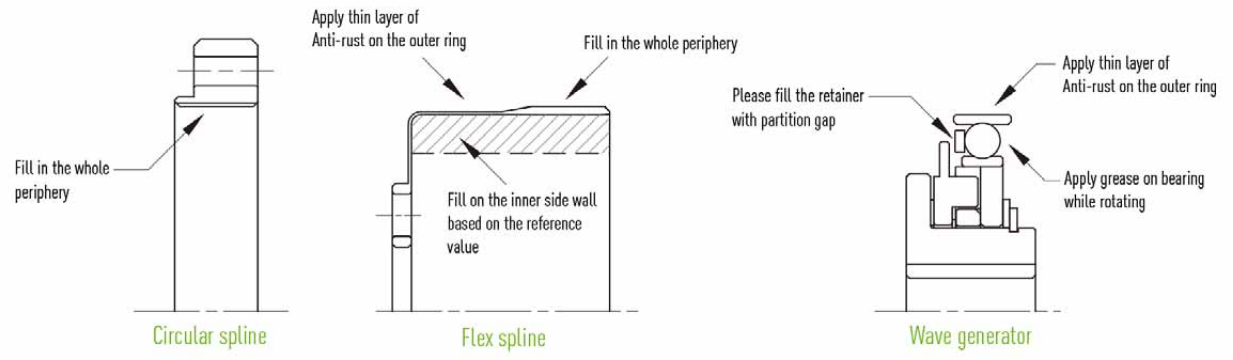
In order to avoid the splashing of excessive lubricant on other parts during operation. It is recommended to adhere to the following dimensions:



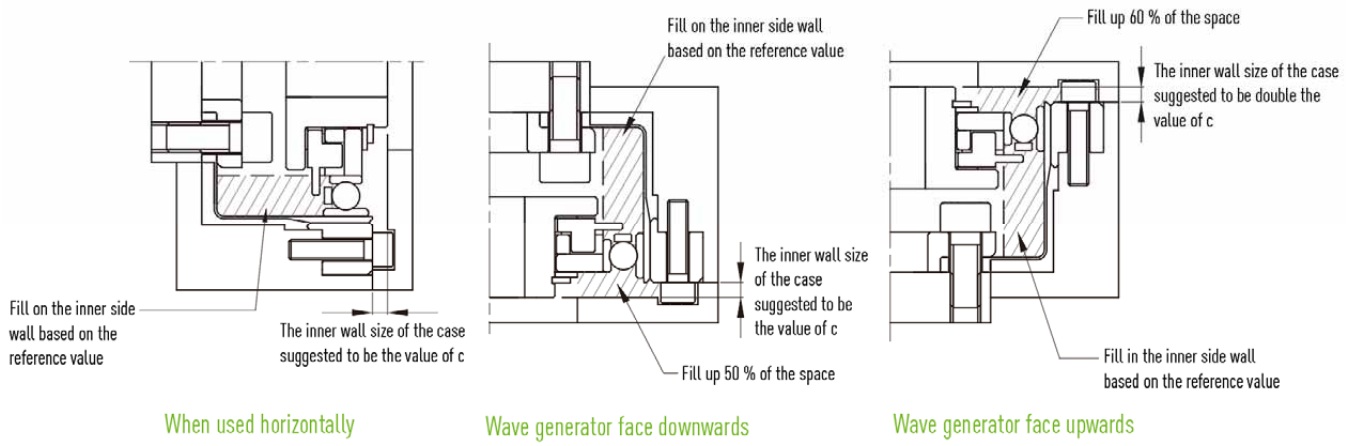
Unit: mm

Mark \ Model	14	17	20	25	32
Øa	38.0	45.0	53.0	66.0	86.0
b	17.1	19.0	20.5	23.0	26.8
c	1.0	1.0	1.5	1.5	1.5
Ød	16.0	26.0	30.0	37.0	37.0

2. Lubricant application



3. The key points of different application methods

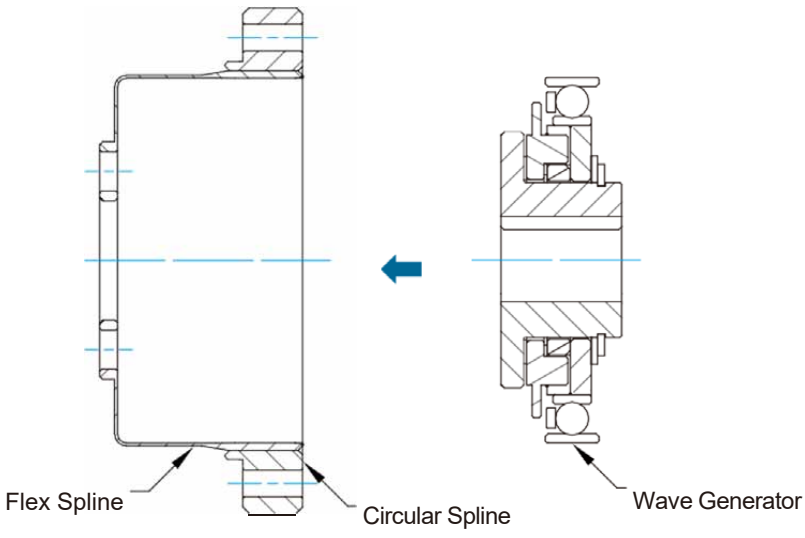


Unit: g

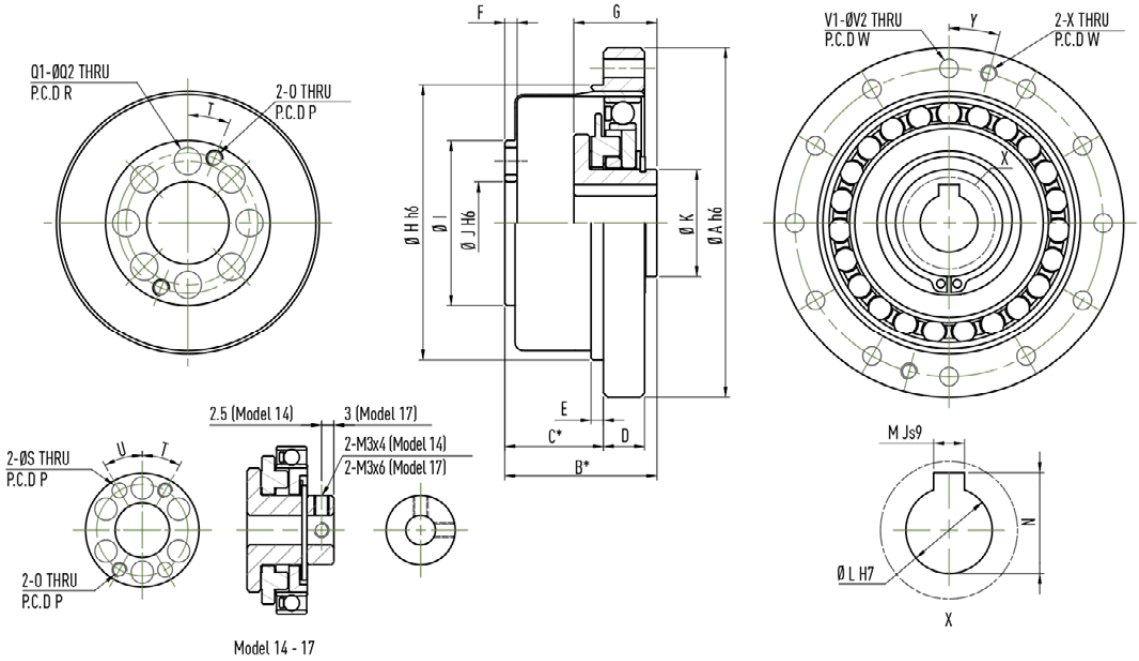
Instructions \ Model		14	17	20	25	32
Used horizontally		5.5	10	16	30	60
Used vertical	Wave generator is facing down	7.0	12	18	35	70
	Wave generator is facing up	8.5	14	21	40	80

4-2-9 Installation sequence

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



4-2-10 WUI-CO Type Size Chart



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

*The dimension B, C is the fitting position and permissible tolerance in the axial direction.
Dimensions without unit in mm

4-3 WTI-PH Type

4-3-1 Technical data

Table 4-3-1 Rating table

Item / Model	Reduction Ratio	Rated torque at input 2000 r/min	Peak torque at start/stop	Permissible max. value of average load torque	Permissible impact torque	Permissible max. input speed	Permissible average input speed
		Nm	Nm	Nm	Nm	r/min	r/min
14	50	5.4	18	6.9	35	8500	3500
	80	7.8	23	11	47		
	100	7.8	28	11	54		
17	50	16.0	34	26	70	7300	3500
	80	22.0	43	27	87		
	100	24.0	54	39	108		
	120	24.0	54	39	86		
20	50	25.0	56	34	98	6500	3500
	80	34.0	74	47	127		
	100	40.0	82	49	147		
	120	40.0	87	49	147		
25	50	39.0	98	55	186	5600	3500
	80	63.0	137	87	255		
	100	67.0	157	108	284		
	120	67.0	167	108	304		
32	50	76.0	216	108	382	4800	3500
	80	118.0	304	167	568		
	100	137.0	333	216	647		
	120	137.0	353	216	686		

Table 4-3-2 Crossed roller bearing specifications

Model	Pitch circle diameter of roller	Offset amount	Basic load ratings		Permissible moment load	Moment rigidity
	Dpw	R	Dynamic load C_{dyn}	Static load C_0		
	m	m	kN	kN	Nm	$\times 10^4$ Nm/rad
14	0.050	0.0217	5.8	8.6	74	8.5
17	0.060	0.0239	10.4	16.3	124	15.4
20	0.070	0.0255	14.6	22.0	187	25.2
25	0.085	0.0296	21.8	35.8	258	39.2
32	0.111	0.0364	38.2	65.4	580	100.0

Table 4-3-3 Angle Transmission Accuracy

Reduction Ratio \ Model		14	17	20	25	32
50 - 120	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9

Table 4-3-4 Hysterisis Loss

Reduction Ratio \ Model		14	17	20	25	32
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8
80 - 120	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9

Table 4-3-5 Maximum Backlash

Reduction Ratio \ Model		14	17	20	25	32
50	$\times 10^{-5}$ rad	17.5	9.7	8.2	8.2	6.8
80	$\times 10^{-5}$ rad	11.2	6.3	5.3	5.3	4.4
100	$\times 10^{-5}$ rad	8.7	4.8	4.4	4.4	3.4
120	$\times 10^{-5}$ rad	-	3.9	3.9	3.9	2.9

Table 4-3-6 Starting Torque

Unit: cNm

Reduction Ratio \ Model	14	17	20	25	32
50	4.1	6.1	7.8	15.0	31
80	2.8	4.0	4.9	9.2	19
100	2.5	3.4	4.3	8.0	18
120	–	3.1	3.8	7.3	15

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
50	1.6	3.0	4.7	9.0	18
80	1.6	3.0	4.8	9.1	19
100	1.8	3.3	5.1	9.8	20
120	–	3.5	5.5	11.0	22

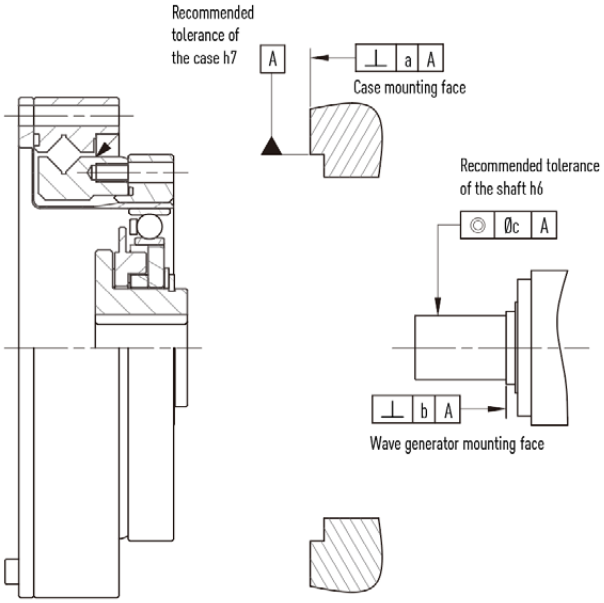
Note: The values in this table will vary depending on the working conditions and are for reference only. The upper limit is 20% above the value in this table.

Table 4-3-8 Torsional Rigidity

Reduction Ratio \ Model			14	17	20	25	32
T_1		Nm	2.0	3.9	7.0	14.0	29.0
T_2		Nm	6.9	12.0	25.0	48.0	108.0
50	K_1	$\times 10^4$ Nm/rad	0.34	0.81	1.3	2.5	5.4
	K_2	$\times 10^4$ Nm/rad	0.47	1.1	1.8	3.4	7.8
	K_3	$\times 10^4$ Nm/rad	0.57	1.3	2.3	4.4	9.8
	θ_1	$\times 10^{-4}$ rad	5.8	4.9	5.2	5.5	5.5
	θ_2	$\times 10^{-4}$ rad	16.0	12.0	15.4	15.7	15.7
80 - 120	K_1	$\times 10^4$ Nm/rad	0.47	1.0	1.6	3.1	6.7
	K_2	$\times 10^4$ Nm/rad	0.61	1.4	2.5	5.0	11
	K_3	$\times 10^4$ Nm/rad	0.71	1.6	2.9	5.7	12
	θ_1	$\times 10^{-4}$ rad	4.1	3.9	4.4	4.4	4.4
	θ_2	$\times 10^{-4}$ rad	12.0	9.7	11.3	11.1	11.6

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
a	0.011	0.015	0.017	0.024	0.026
b	0.017	0.020	0.020	0.024	0.024
	(0.008)	(0.010)	(0.010)	(0.012)	(0.012)
C	0.030	0.034	0.044	0.047	0.047
	(0.016)	(0.018)	(0.019)	(0.022)	(0.022)

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

4-3-3 Installation bolt tightening torque

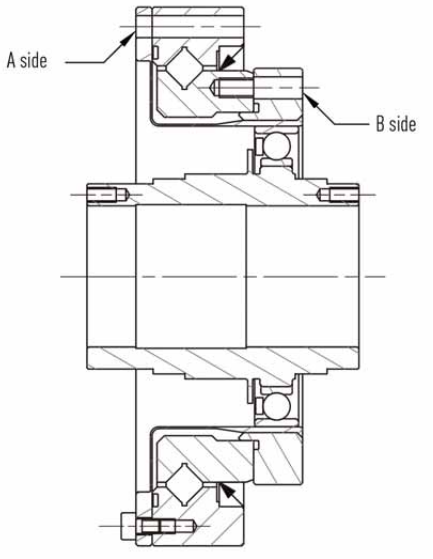


Table 4-3-9 A side mounting bolt tightening torque

Item \ Model		14	17	20	25	32
Number of bolts		8	12	12	12	12
Bolts size		M3	M3	M3	M4	M5
Installation of Bolts PCD	mm	64	74	84	102	132
Bolt tightening torque	Nm	2	2	2	4.5	9

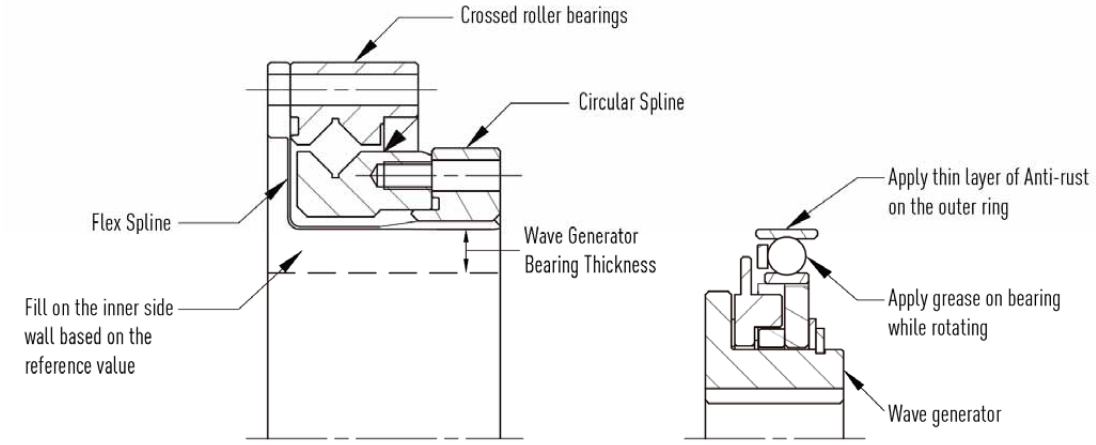
Table 4-3-10 B side mounting bolt tightening torque

Item \ Model		14	17	20	25	32
Number of bolts		8	16	16	16	16
Bolts size		M3	M3	M3	M4	M5
Installation of Bolts PCD	mm	44	54	62	77	100
Bolt tightening torque	Nm	2	2	2	4.5	9

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

4-3-4 Lubrication

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

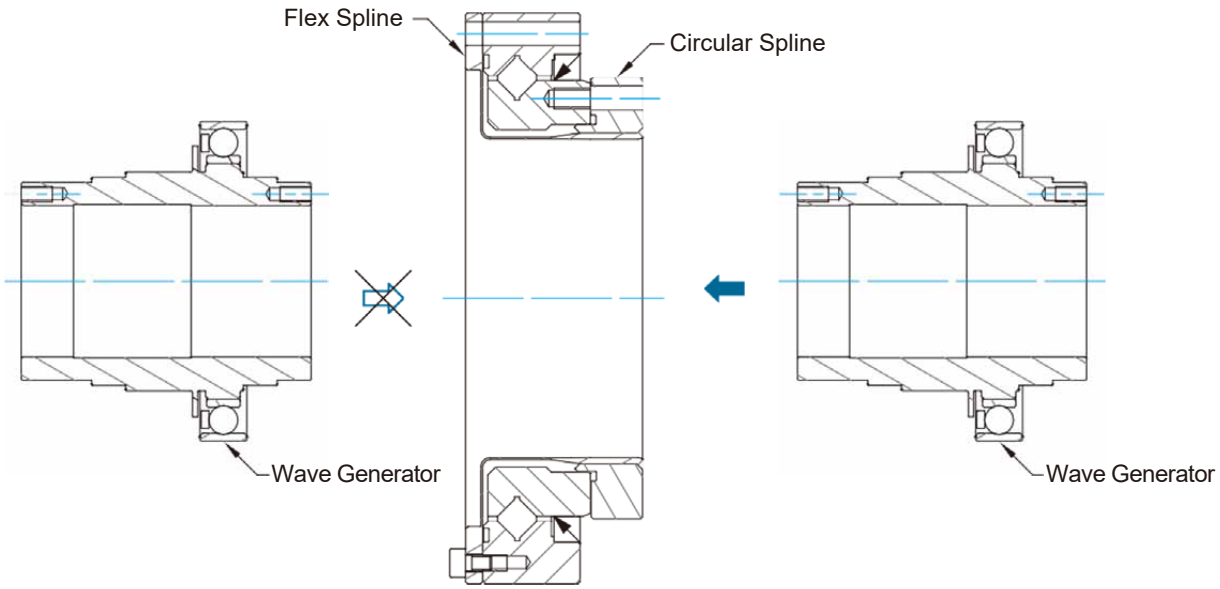


Unit: g

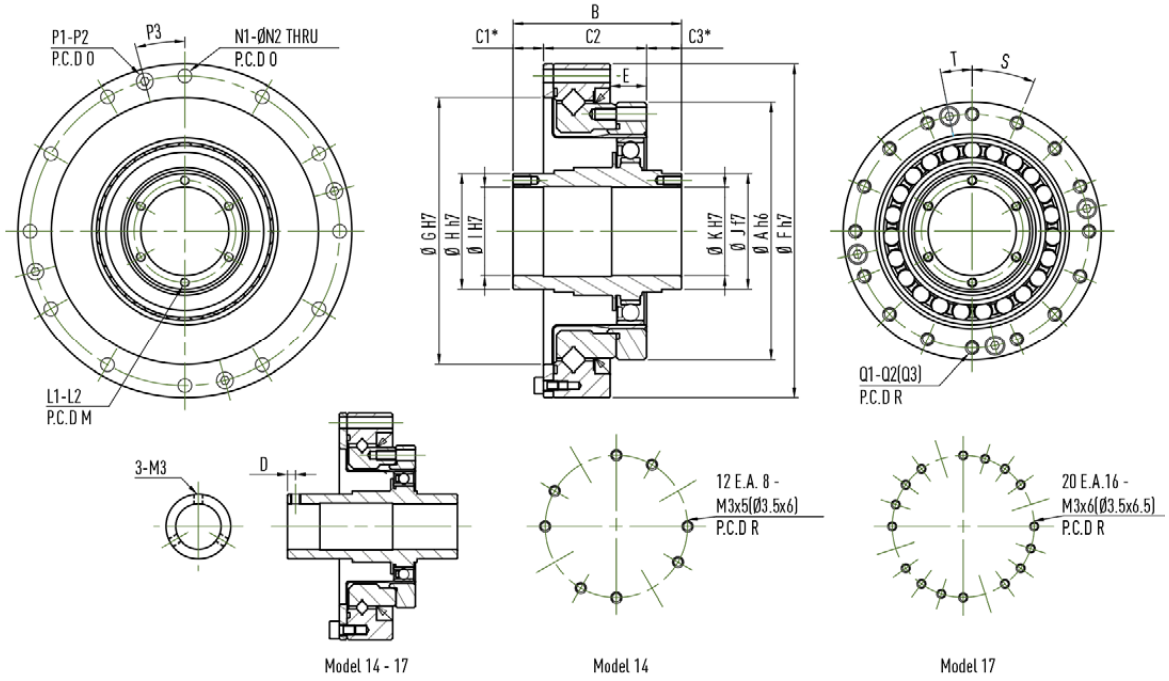
Instructions \ Model		14	17	20	25	32
Used horizontally		5.8	11	18	32	64
Used vertical	Wave generator is facing down	7.5	13	19	37	74
	Wave generator is facing up	8.9	15	22	42	84

4-3-5 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.



4-3-6 WTI-PH Type Size Chart



Mark \ Model	14	17	20	25	32
ØA h6	50	60	70	85	110
B	$52.5\ ^{0}_{-0.1}$	$56.5\ ^{0}_{-0.1}$	$51.5\ ^{0}_{-0.1}$	$55.5\ ^{0}_{-0.1}$	$65.5\ ^{0}_{-0.1}$
C1*	$16\ ^{+0.8}_{0}$	$16\ ^{+0.9}_{0}$	$16\ ^{+1.0}_{0}$	$10\ ^{+1.1}_{0}$	$12\ ^{+1.1}_{0}$
C2	23.5	26.5	29	34	42
C3*	13	14	13	11.5	11.5
D	2.5	2.5	–	–	–
E	7	7.5	8.5	12	15
ØF h7	70	80	90	110	142
ØG H7	48	60	70	88	114
ØH h7	20	25	30	38	45
ØI H7	14	19	21	29	36
ØJ f7	20	25	30	38	45
ØK H7	14	19	21	29	36
L1	3	3	2 x 6	2 x 6	2 x 6
L2	M3	M3	M3 x DP6	M3 x DP6	M3 x DP6
M (P.C.D)	–	–	25.5	33.5	40.5
N1	8	12	12	12	12
ØN2	3.5	3.5	3.5	4.5	5.5
O (P.C.D)	64	74	84	102	132
P1	2	4	4	4	4
P2	M3	M3	M3	M3	M4
P3 (Degree)	22.5°	15°	15°	15°	15°
Q1	12 E.A. 8	20 E.A. 16	16	16	16
Q2	M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP
Q3	Ø3.5 x 6DP	Ø3.5 x 6.5DP	Ø3.5 x 7.5DP	Ø4.5 x 10DP	Ø5.5 x 14DP
ØR	44	54	62	77	100
S (Degree)	30°	18°	22.5°	22.5°	22.5°
T (Degree)	30°	18°	11.25°	11.25°	11.25°
Moment of Inertia ($\times 10^{-4}$ kgm^2)	0.033	0.079	0.193	0.413	1.69
Weight (Kg)	0.45	0.63	0.89	1.44	3.1

*The dimension C1, C3 is the fitting position and permissible tolerance in the axial direction.
Dimensions without unit in mm

4-4 WTI-AH Type

4-4-1 Technical data

Table 4-4-1 Rating table

Item / Model	Reduction Ratio	Rated torque at input 2000 r/min	Peak torque at start/stop	Permissible max. value of average load torque	Permissible impact torque	Permissible max. input speed	Permissible average input speed
		Nm	Nm	Nm	Nm	r/min	r/min
14	50	5.4	18	6.9	35	8500	3500
	80	7.8	23	11	47		
	100	7.8	28	11	54		
17	50	16.0	34	26	70	7300	3500
	80	22.0	43	27	87		
	100	24.0	54	39	108		
	120	24.0	54	39	86		
20	50	25.0	56	34	98	6500	3500
	80	34.0	74	47	127		
	100	40.0	82	49	147		
	120	40.0	87	49	147		
25	50	39.0	98	55	186	5600	3500
	80	63.0	137	87	255		
	100	67.0	157	108	284		
	120	67.0	167	108	304		
32	50	76.0	216	108	382	4800	3500
	80	118.0	304	167	568		
	100	137.0	333	216	647		
	120	137.0	353	216	686		

Table 4-4-2 Crossed roller bearing specifications

Model	Pitch circle diameter of roller	Offset amount	Basic load ratings		Permissible moment load	Moment rigidity
	Dpw	R	Dynamic load C_{dyn}	Static load C_0		
	m	m	kN	kN	Nm	$\times 10^4$ Nm/rad
14	0.050	0.0217	5.8	8.6	74	8.5
17	0.060	0.0239	10.4	16.3	124	15.4
20	0.070	0.0255	14.6	22.0	187	25.2
25	0.085	0.0296	21.8	35.8	258	39.2
32	0.111	0.0364	38.2	65.4	580	100.0

Table 4-4-3 Angle Transmission Accuracy

Reduction Ratio / Model		14	17	20	25	32
50 - 120	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9

Table 4-4-4 Hysterisis Loss

Reduction Ratio \ Model		14	17	20	25	32
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8
80 - 120	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9

Table 4-4-5 Maximum Backlash

Reduction Ratio \ Model		14	17	20	25	32
50	$\times 10^{-5}$ rad	17.5	9.7	8.2	8.2	6.8
80	$\times 10^{-5}$ rad	11.2	6.3	5.3	5.3	4.4
100	$\times 10^{-5}$ rad	8.7	4.8	4.4	4.4	3.4
120	$\times 10^{-5}$ rad	-	3.9	3.9	3.9	2.9

Table 4-4-6 Starting Torque

Unit : cNm

Reduction Ratio \ Model	14	17	20	25	32
50	8.8	27	36	56	85
80	7.5	25	33	50	74
100	6.9	24	32	49	72
120	–	24	31	48	68

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 Reversed Starting Torque

Unit: Nm

Reduction Ratio \ Model	14	17	20	25	32
50	5.3	16	22	34	51
80	7.2	24	31	48	70
100	8.2	29	38	59	86
120	–	34	45	69	97

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 4-4-8 Torsional Rigidity

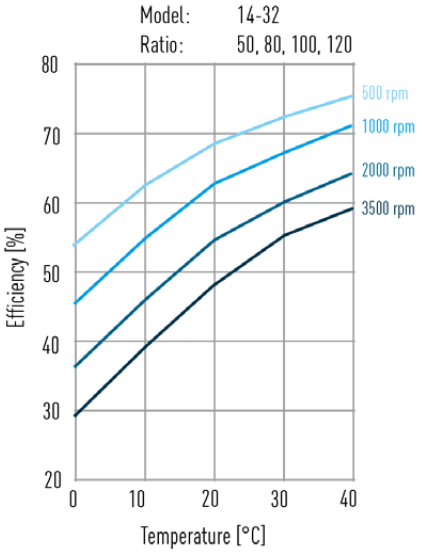
Reduction Ratio \ Model			14	17	20	25	32
T_1		Nm	2.0	3.9	7.0	14.0	29.0
T_2		Nm	6.9	12.0	25.0	48.0	108.0
50	K_1	$\times 10^4$ Nm/rad	0.34	0.81	1.3	2.5	5.4
	K_2	$\times 10^4$ Nm/rad	0.47	1.1	1.8	3.4	7.8
	K_3	$\times 10^4$ Nm/rad	0.57	1.3	2.3	4.4	9.8
	θ_1	$\times 10^{-4}$ rad	5.8	4.9	5.2	5.5	5.5
	θ_2	$\times 10^{-4}$ rad	16.0	12.0	15.4	15.7	15.7
80 - 120	K_1	$\times 10^4$ Nm/rad	0.47	1.0	1.6	3.1	6.7
	K_2	$\times 10^4$ Nm/rad	0.61	1.4	2.5	5.0	11.0
	K_3	$\times 10^4$ Nm/rad	0.71	1.6	2.9	5.7	12.0
	θ_1	$\times 10^{-4}$ rad	4.1	3.9	4.4	4.4	4.4
	θ_2	$\times 10^{-4}$ rad	12.0	9.7	11.3	11.1	11.6

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

4-4-2 Efficiency

1. Rated torque E_R

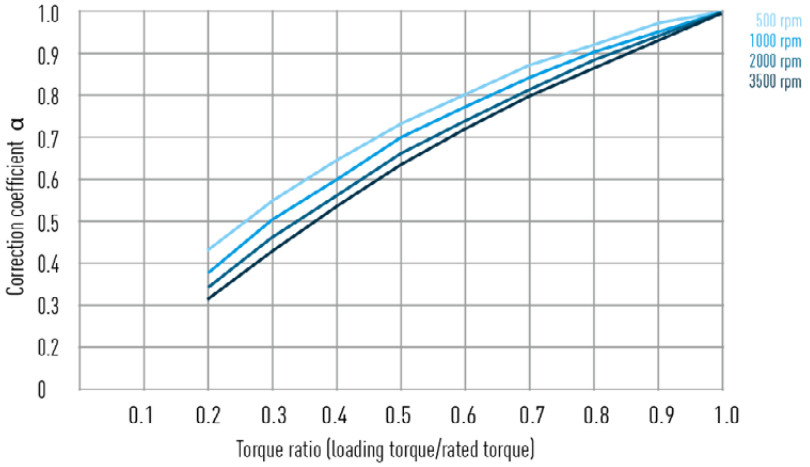
   DATORKER® strain wave gearbox efficiency would change by specification, ratio, operating conditions (speed/loading) and lubrication (lubricant type/quantity).



2. Correction coefficient α

   Efficiency

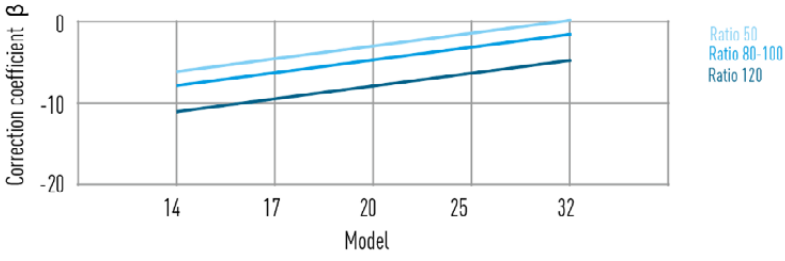
   correction coefficient α by loading torque



3. Correction coefficient β

   Efficiency

   correction coefficient β by specification



Efficiency = $\alpha \times (E_R + \beta)$

4-4-3 No-load operating torque

The torque necessary to drive the DATORKER® strain wave gearbox input (high-speed end) after running in at an input speed of 2000r/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	6.3	17.8	23.6	37.2	58.0
	1000 r/min	7.8	21.8	28.6	49.2	76.0
	2000 r/min	10.1	27.8	37.6	62.2	98.0
	3500 r/min	14.1	36.8	48.6	89.2	138.0
80	500 r/min	5.4	16.4	21.5	33.8	51.5
	1000 r/min	6.9	20.4	26.5	45.8	69.5
	2000 r/min	9.2	26.4	35.5	58.8	91.5
	3500 r/min	13.2	35.4	46.5	85.8	131.5
100	500 r/min	5.2	16.0	21.0	33.0	50.0
	1000 r/min	6.7	20.0	26.0	45.0	68.0
	2000 r/min	9.0	26.0	35.0	58.0	90.0
	3500 r/min	13.0	35.0	46.0	85.0	130.0
120	500 r/min	-	15.8	20.6	32.4	48.9
	1000 r/min	-	19.8	25.6	44.4	66.9
	2000 r/min	-	25.8	34.6	57.4	88.9
	3500 r/min	-	34.8	45.6	84.4	128.9

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.

4-4-4 Installation bolt tightening torque

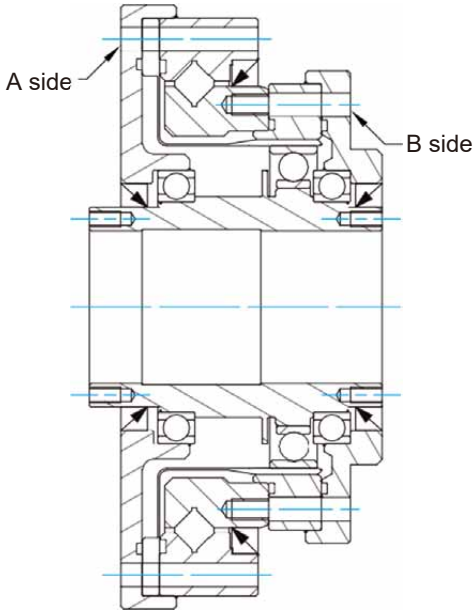


Table 4-4-9 A side mounting bolt tightening torque

Item \ Model		14	17	20	25	32
Number of bolts		8	12	12	12	12
Bolts size		M3	M3	M3	M4	M5
Installation of Bolts PCD	mm	64	74	84	102	132
Bolt tightening torque	Nm	2	2	2	4.5	9

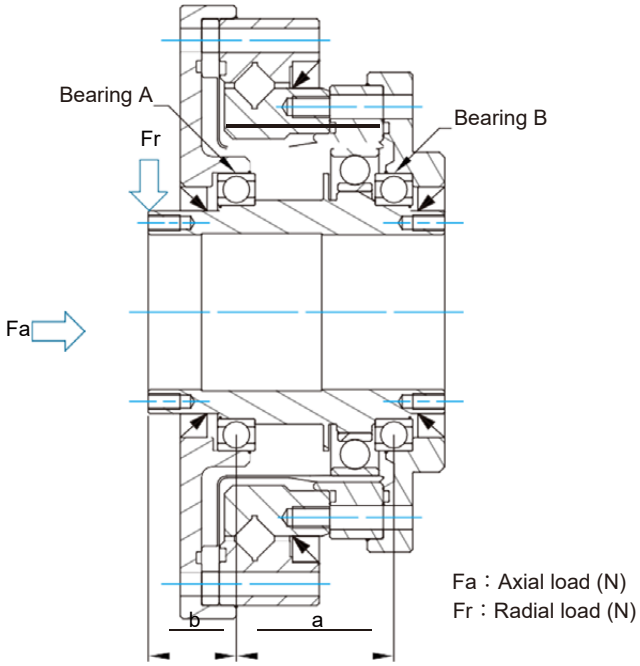
Table 4-4-10 B side mounting bolt tightening torque

Item \ Model		14	17	20	25	32
Number of bolts		8	16	16	16	16
Bolts size		M3	M3	M3	M4	M5
Installation of Bolts PCD	mm	44	54	62	77	100
Bolt tightening torque	Nm	2	2	2	4.5	9

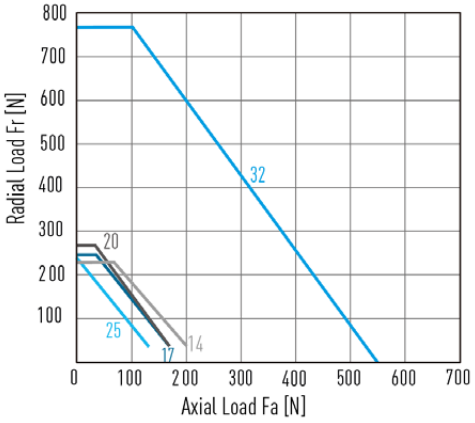
Note : 1. Recommended tightening torques for the 12.9 DIN EN ISO 4762 fastening bolts DIN912 in accordance with VDI 2230 for μK = μG = 0.125
2. Bolt-in depth at least 2 x thread diameter

4-4-5 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:

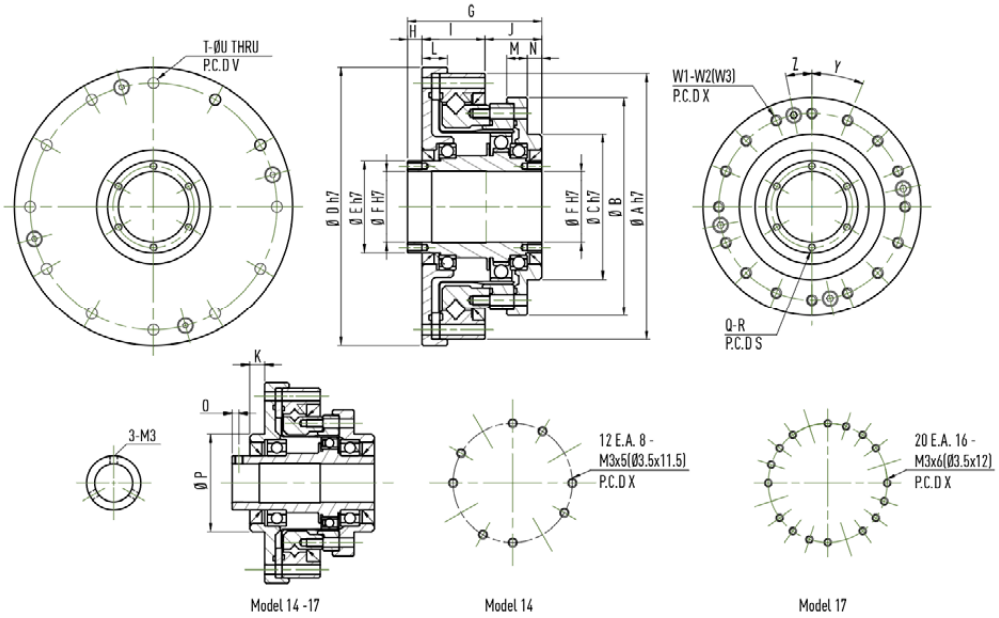


The figure below shows the average input speed of 2000rpm and the basic rated life L_{10} = 7000hour.



Item / Model	Bearing A		Bearing B		a (mm)	b (mm)	Maximum radial load Fr (N)
	Dynamic load C_{dyn} (kN)	Static load C_0 (kN)	Dynamic load C_{dyn} (kN)	Static load C_0 (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	10.90	5.35	5.25	33	23	770

4-4-6 WTI-AH Type Size Chart



Mark \ Model	14	17	20	25	32
ØA h7	70	80	90	110	142
ØB	54	64	75	90	115
ØC h7	36	45	50	60	85
ØD h7	74	84	95	115	147
ØE h7	20	25	30	38	45
ØF H7	14	19	21	29	36
G	52.5	56.5	51.5	55.5	65.5
H	12	12	5	6	7
I	20.5	23	25	26	32
J	20	21.5	21.5	23.5	26.5
K	5.5	5.5	–	–	–
L	9	10	10.5	10.5	12
M	8	8.5	9	8.5	9.5
N	7.5	8.5	7	6	5
O	2.5	2.5	–	–	–
P	36	45	–	–	–
Q	3	3	2 x 6	2 x 6	2 x 6
R	M3	M3	M3 x DP6	M3 x DP6	M3 x DP6
S (P.C.D)	–	–	25.5	33.5	40.5
T	8	12	12	12	12
ØU	3.5	3.5	3.5	4.5	5.5
V (P.C.D)	64	74	84	102	132
W1	12 E.A. 8	20 E.A. 16	16	16	16
W2	M3 x 5DP	M3 x 6DP	M3 x 6DP	M4 x 7DP	M5 x 8DP
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
X (P.C.D)	44	54	62	77	100
Y (Degree)	30°	18°	22.5°	22.5°	22.5°
Z (Degree)	30°	18°	11.25°	11.25°	11.25°
Moment of Inertia ($\times 10^{-4}$ kgm^2)	0.091	0.193	0.404	1.07	2.85
Weight (Kg)	0.71	1.0	1.38	2.1	4.5

Dimensions without unit in mm

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

- 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 (recommended to use Loctite242) in the thread hole and avoid leakage of the thread locker.

5-4 The following conditions may cause problems, please pay attention

- Overrun
- Insufficient lubricant
- Are the 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

6 Lubricant

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. (℃)	-20~130
Ambient working temperature (℃)	0~40
NLGI-grade (0.1mm)	265~295
Drop point (℃)	196

- Packaging specifications: 400g hard tube packed

- Others
  1. HIWIN DATORKER® strain wave gearbox is prepacked with HIWIN G11 grease can be installed directly. Except for WUI-CO 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.

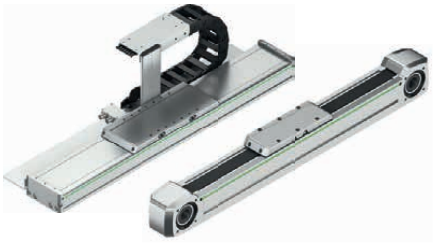
Notes

Notes

We live motion.

Linear Guideways

Ballscrews



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