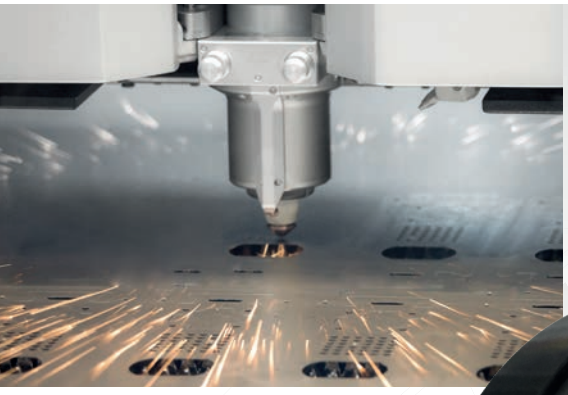
Nidec

All for dreams

FLEXWAVE

An evolution in strain wave gear technology



High Precision Reducer

Take your robot to the next level with FLEXWAVE

Nidec Drive Technology Corporation has a history of supplying the leading robotics and machine tool manufacturers in Japan. Our loyal customers within these industries strongly urged us to develop our own harmonic gear technology and leverage our primary competencies – modularity and flexibility of the core design and highly consistent production in mass volume – to help them become more competitive in the global marketplace. After extensive effort to refine harmonic gear technology and to manufacture at a level that exceeds customer expectations, Nidec Drive Technology has released FLEXWAVE.

FLEXWAVE is a compact harmonic gear reduction mechanism that achieves zero backlash, as well as exceptional positioning accuracy, torque density and repeatability. FLEXWAVE consists of three internal elements – the flexspline, the circular spline and the wave generator. The elasticity properties of the flexspline and the teeth differential between the flexspline and the circular spline result in its unique reduction characteristics.

FLEXWAVE comes in various form factors, including component sets, simple contained assemblies and complete gear units. Cup, hat, solid and hollow input shaft configurations give engineers true freedom in design. FLEXWAVE is also available in Ultra-Flat and High Torque variations for applications with demanding footprint and performance requirements. Dimensions are interchangeable against industry standards, making it easier to implement in legacy equipment. When compared with other gear technologies, FLEXWAVE offers the following advantages:

- **Exceptional Repeatability and Positional Accuracy**
- **Zero Backlash**
- **High Torque Density**
- **High Efficiency Ratings**
- **High Reduction Ratios in a Single Stage**
- **Lightweight and Compact**
- **High Torsional Stiffness**
- **Fully Back Drivable**

These characteristics enable FLEXWAVE to be the superior choice for Robotics, Machine Tool, Medical Equipment, Semiconductor Manufacturing, Satellite Communications and Assembly Automation applications.

FLEXWAVE Form factors and mounting configurations

WPC SERIES
Component Sub-assembly
Cup Housing Style

WPC SERIES
Component Sub-assembly
Cup Housing Style,
Flat

WPS SERIES
Simple Contained Assembly
Hat Housing Style

WPS SERIES
Simple Contained Assembly
Hat Housing Style,
Flat

WPU SERIES
Complete Unit Assembly
Cup Housing Style

WPU SERIES
Complete Unit Assembly
Cup Housing Style, Flat

WPU SERIES
Complete Unit Assembly
Hat Housing Style, Hollow Shaft

WPU SERIES
Complete Unit Assembly
Hat Housing Style, Solid Shaft
Input

Highly suitable for safety control applications in collaborative robots

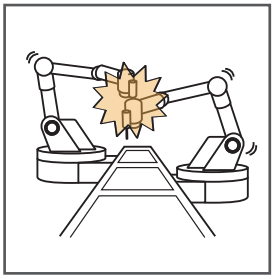
Collision detection
Overload monitoring

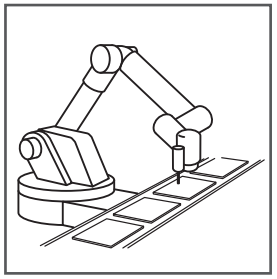
Torque monitoring
for precise
screw fastening

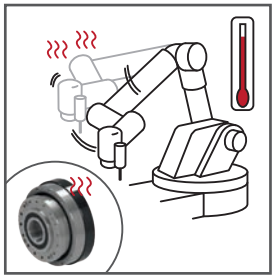
Overheat monitoring
Arm heat effect
compensation

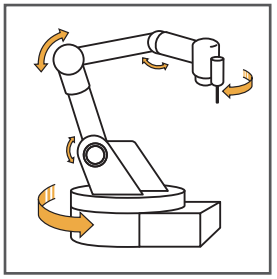
Robot stop position
Angle monitoring

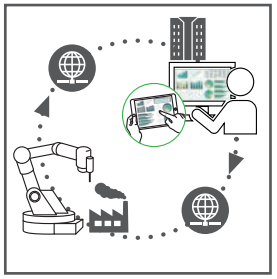
Remote Monitoring
Network monitoring
system









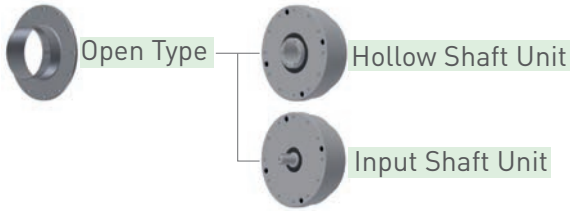


Configuration

Explore our versatile product lineup, designed to meet your needs with a range of sizes that offer the perfect fit for every situation.

WPU	Z	—	35	—	50	—	SRH	—	Customize spec.
Series name	Type		Size		Ratio		Code		

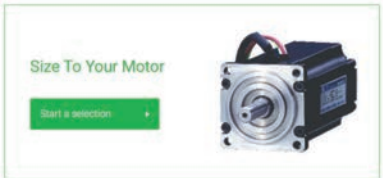
WP Series	35	42	50	63	80	50	80	100	120	160	SRJ	BD: 2ch type (Functional safety)	*Planning to certify with unit type	: When customized

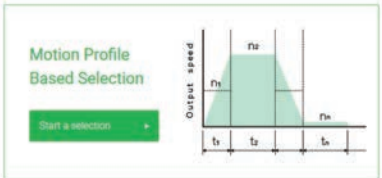


Sizes

Servo Reducer Selection Tool

The easy way for product selection!





WPC SERIES

Component Sub-assembly

The core strain wave gear elements without any supplemental components that provide additional bearing support, the structure for containment, and specialized input or output configurations.

Series Features

- Simplest and most flexible design option
- Cost effectiv e at high volumes
- Allows complete integration into equipment
- Most compact of all series
- High torque option available

Frame Sizes	35, 42, 50, 63, 80
Reduction Ratios	50, 80, 100, 120, 160
Max. Output Torque	12 Nm - 484 Nm
Form Factors	Cup, Hat, Flat

WPS SERIES

Simple Contained Assembly

The core strain wave gear elements, with additional cross roller bearing support is included within this assembly. No housing is provided for containment, requiring the designer to integrate into their equipment substructure.

Series Features

- Self-supported output section
- Versatile to allow for total integration
- Variety of output mounting options
- Compact design
- High torque option available

Frame Sizes	35, 42, 50, 63, 80, 100
Reduction Ratios	50, 80, 100, 120, 160
Max. Output Torque	12 Nm - 841 Nm
Form Factors	Hat, Flat

100 Frame size has “Hat form” only

WPU SERIES

Complete Unit Assembly

The core strain wave gear elements and cross roller bearing completely contained within a substructure. Also included is an output flange to enable a variety of mounting configurations. The Complete Unit Assembly would be partially integrated into machinery.

Series Features

- Simplified configuration for installation
- A stand-alone structurally rigid assembly
- Self-supported output section
- Hollow, solid or flange input
- High torque option available

Frame Sizes	35, 42, 50, 63, 80, 100
Reduction Ratios	50, 80, 100, 120, 160
Max. Torque Output	12 Nm - 841 Nm
Form Factors	Cup, Hollow, Input Shaft, Flat

100 Frame size has “Hollow and Input Shaft form” only.

WPG SERIES

Gearhead

The series combine the accuracy and torque-to-weight ratio of WPU high torque strain wave units with the modularity and ease of installation of VR planetary products. This results in a compact, versatile, zero backlash gearhead available in 5 sizes with ratios up to 160:1 in a single stage.

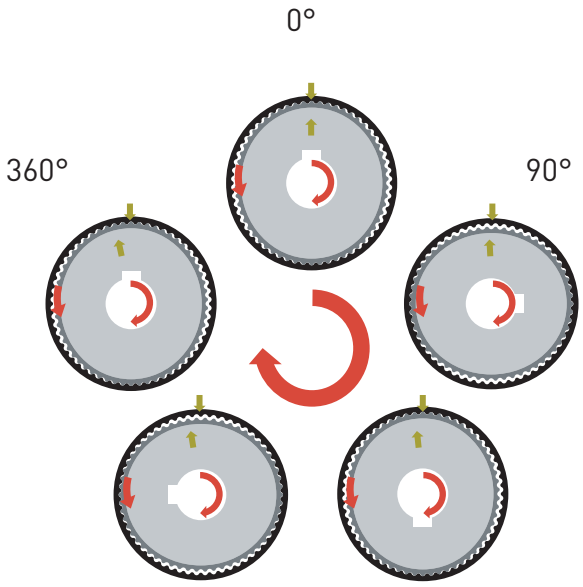
Series Features

- Direct motor installation
- Lightweight and compact
- Various sizes and ratios

Frame Sizes	35, 42, 50, 63, 80
Reduction Ratios	50, 80, 100, 120, 160
Max. Torque Output	12 Nm - 484 Nm
Form Factors	Cup

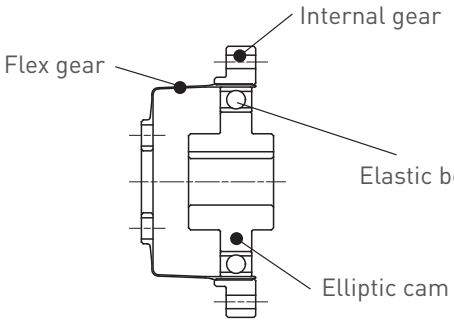
Reduction Mechanism

- Flex gear and elastic bearing take elliptic shape with the cam inserted.
- Flex gear and internal gear are engaged at both ends of the long axis of the ellipse in a stable manner.
- With the internal gear fixed, when the cam (input) is rotated clockwise, the flex gear (output) rotates counterclockwise. And its rotational speed is determined by the tooth count differential between two gears.

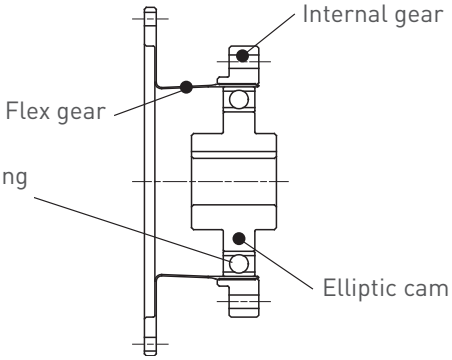


Parts Name

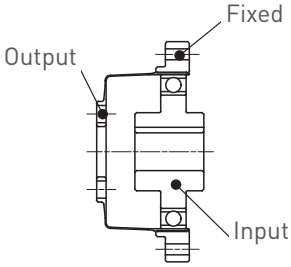
Closed type



Open type

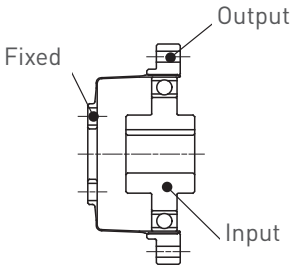


Reduction Ratio



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

* The input and output rotation directions are opposite.



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

* The input and output rotation directions are same.

R represents the 'Ratio' figure in the specifications table on the next page.

Reducer Model Nomenclature

WP	C	—	35	—	50	—	CR	—	**
Series name	Type		Size		Ratio		Code		Specifications

WP Series	**C:** Component type **S:** Simple unit type **U:** Unit type Input shaft unit Hollow unit	**35** **42** **50** **63** **80**	**50** **80** **100** **120** **160**	**CR** **SR** **SRH** **SRJ**	Input shaft diameter, etc.

For the code details, please check the Dimensions Table.

Availability

Ratio matrix

Frame size \ Ratio	50	80	100	120	160
35					
42					
50					
63					
80					
100					

Reducer Specifications

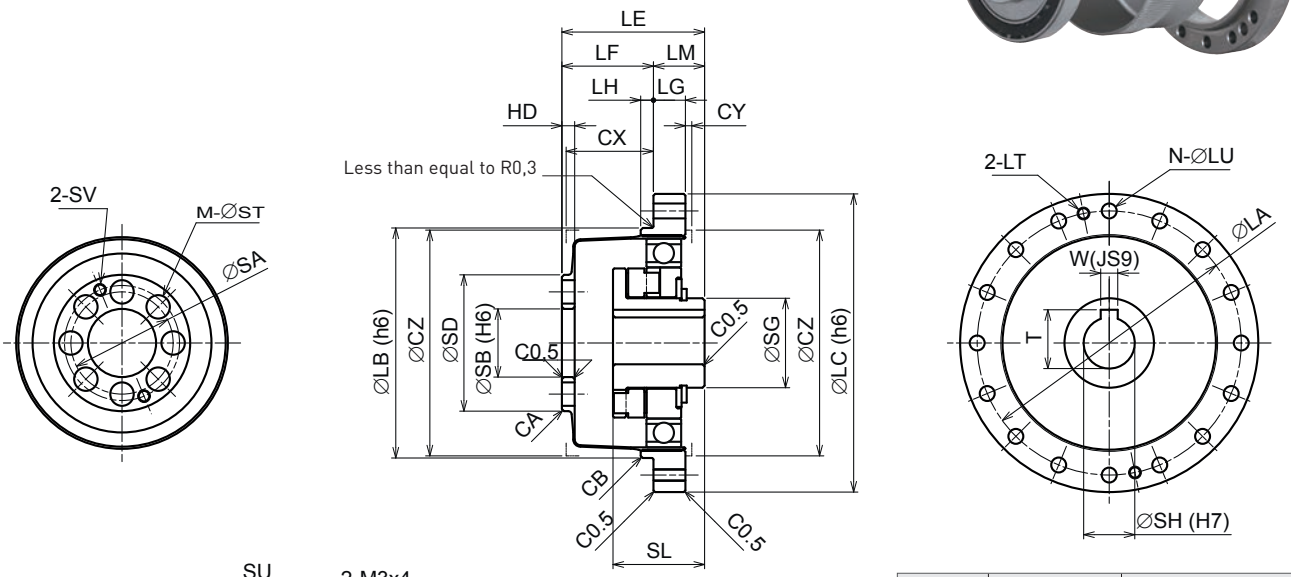
Size	Ratio R*1	Nominal output torque *2 [Nm]	Maximum output torque *3 [Nm]	Emergency stop torque *4 [Nm]	Nominal input speed *5 [r/min]	Maximum input speed *6 [r/min]	Life cycle *7 [hours]
35	50	7	23	46	3000	8500	10000
	80	10	30	61			
	100	10	36	70			
42	50	21	44	91	3000	7300	
	80	29	56	113			
	100	31	70	143			
	120	31	70	112			
50	50	33	73	127	3000	6500	
	80	44	96	165			
	100	52	107	191			
	120	52	113	191			
	160	52	120	191			
63	50	51	127	242	3000	5600	
	80	82	178	332			
	100	87	204	369			
	120	87	217	395			
	160	87	229	408			
80	50	99	281	497	3000	4800	
	80	153	395	738			
	100	178	433	841			
	120	178	459	892			
	160	178	484	892			
NEW! **100**	50	178	523	892	3000	4000	
	80	268	675	1,270			
	100	345	738	1,400			
	120	382	802	1,530			
	160	382	841	1,530			

*1 Reduction ratio is to be calculated by the formula in the previous page, using R value in this table.
*2 The maximum allowable value at the input rotation speed of 2000r/min
*3 The maximum torque when starting and stopping.
*4 The maximum torque when it receives shock.
*5 The maximum average input speed.
*6 The maximum input speed.
*7 The life time at the input rotation speed of 2000 r/min and nominal output torque.

Dimensions Table

Closed Type, Component

[WPC-□-□-CR]



Input shaft for 35+42

Size	Weight	Moment of inertia
	kg	$\times 10^{-4}$ kgm^2
35	0,10	0,0362
42	0,17	0,0831
50	0,26	0,190
63	0,43	0,414
80	0,91	1,54

[mm]

Size	LA	LB	LC	N	LU	LT	LE	LF	LG	LH	LM	SG	SH	SL	W
35	44	38	50	8	3,5	M3	28,5	17,5	6	2	11	14	6	18,5	-
42	54	48	60	16	3,5	M3	32,5	20	6,5	2,5	12,5	18	8	20,7	-
50	62	54	70	16	3,5	M3	33,5	21,5	7,5	3	12	21	12	21,5	4
63	75	67	85	16	4,5	M4	37	24	10	3	13	26	14	21,6	5
80	100	90	110	16	5,5	M5	44	28	14	3	16	26	14	23,6	5

Size	T	SU	SA	SB	SD	M	ST	SV	HD	CA	CB	CX	CY	CZ
35	-	2,5	17	11	23	6	4,5	M3	2,4	C0.3	C0.3	17,1	1	38
42	-	3	19	10	27,2	6	5,5	M3	3	C0.5	C0.3	19	1	45
50	13,8	-	24	16	32	8	5,5	M3	3	C0.5	C0.3	20,5	1,5	53
63	16,3	-	30	20	40	8	6,5	M4	3	C0.5	C0.3	23	1,5	66
80	16,3	-	40	26	52	8	8,8	M5	3,2	C0.5	C0.5	26,8	1,5	86

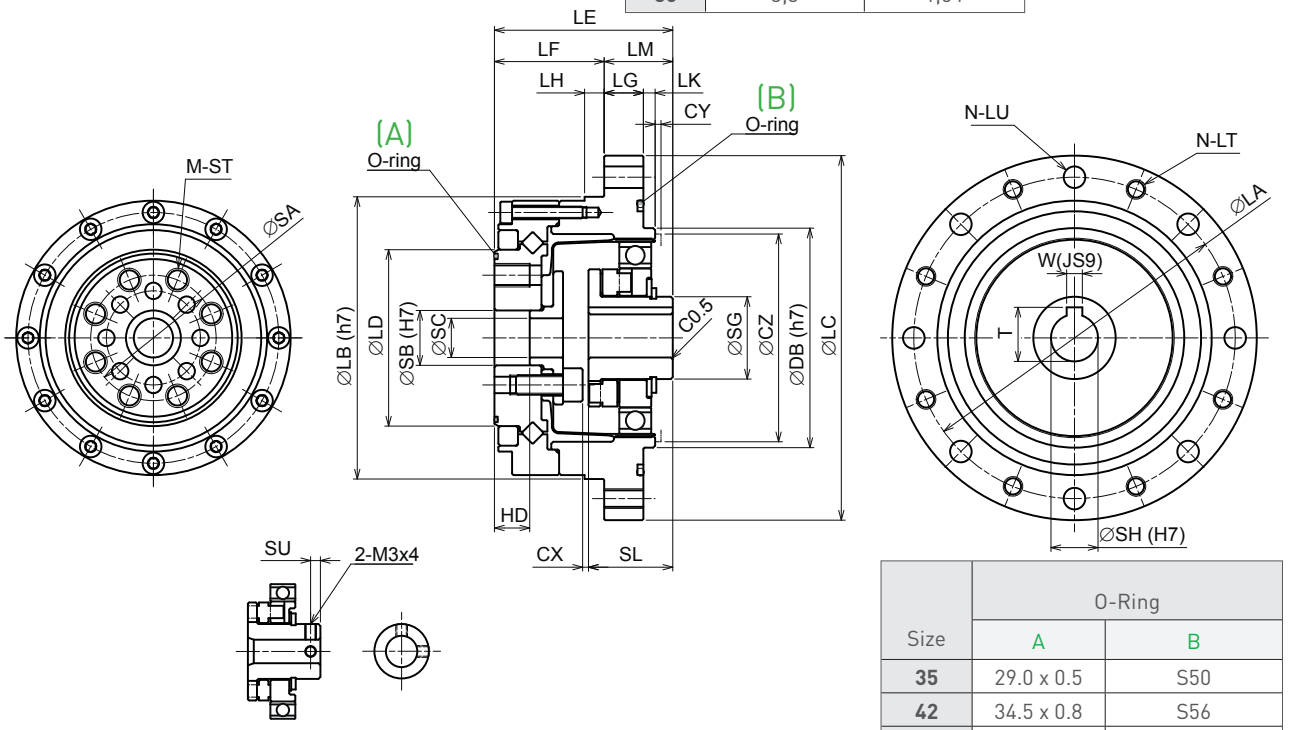
*1 For details in the input section, please check the drawings.
*2 Inner dimensions of CX, CY, CZ are recommended dimensions.

Dimensions Table

Closed Type, Unit

[WPU-□-□-CR]

Size	Weight	Moment of inertia
	kg	$\times 10^{-4}$ kgm^2
35	0,50	0,0362
42	0,68	0,0831
50	0,95	0,190
63	1,5	0,414
80	3,3	1,54



Input shaft for 35+42

Size	O-Ring	
	A	B
35	29.0 x 0.5	S50
42	34.5 x 0.8	S56
50	40.64 x 1.14	S67
63	53.29 x 0.99	S80
80	S71	S105

[mm]

Size	LA	LB	LC	LD	N	LT	LU	LE	LF	LG	LH	LK	LM	DB	SG
35	65	56	73	31	8	M4	4,5	41	27	7	3,5	2	14	38	14
42	71	63	79	38	8	M4	4,5	45	29	8	4	2	16	48	18
50	82	72	93	45	8	M5	5,5	45,5	28	10	5	3	17,5	56	21
63	96	86	107	58	10	M5	5,5	52	36	10	5	3	16	67	26
80	125	113	138	78	12	M6	6,5	62	45	12	5	3	17	90	26

Size	SH	SL	W	T	SU	SA	SB	SC	M	ST	HD	CX	CY	CZ
35	6	18,5	-	-	2,5	23	11	8	6	M4×8	9,5	1,6	1	38
42	8	20,7	-	-	3	27	10	7	6	M5×8	9,5	1,3	1	45
50	12	21,5	4	13,8	-	32	14	10	8	M6×9	9	1,5	1,5	53
63	14	21,6	5	16,3	-	42	20	15	8	M8×10	12	3,4	1,5	66
80	14	23,6	5	16,3	-	55	26	20	8	M10×12	15	5,2	1,5	86

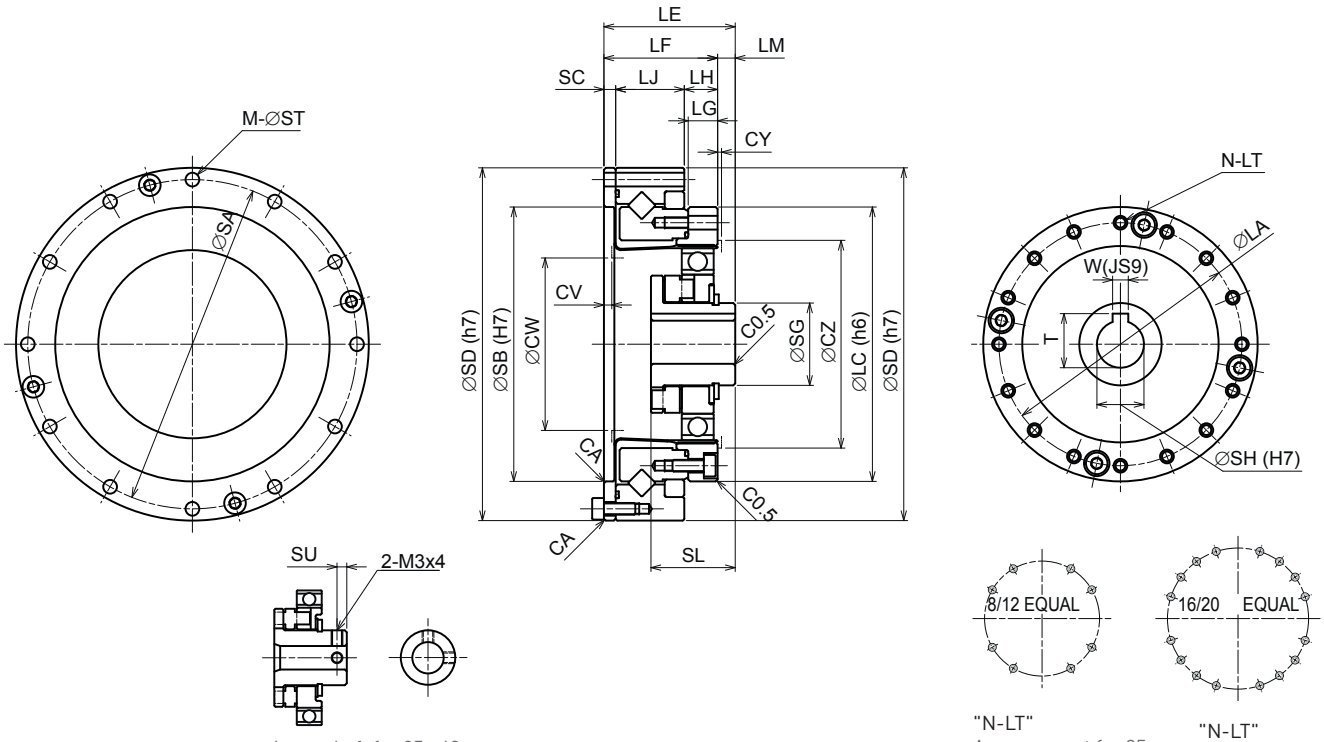
*1 For details in the input section, please check the drawings.
*2 Inner dimensions of CY, CZ are recommended dimensions.

Dimensions Table

Open type, Simple unit

[WPS-□-□-SR]

Size	Weight	Moment of inertia
	kg	$\times 10^{-4}$ kgm^2
35	0,39	0,0362
42	0,55	0,0831
50	0,79	0,190
63	1,3	0,414
80	2,7	1,54



Input shaft for 35+42

"N-LT"
Arrangement for 35

"N-LT"
Arrangement for 42

[mm]

Size	LA	LC	LE	LF	LG	LH	LJ	LM	SG	SH	SL	W	T	SU	SA	SB
35	44	50	28,5	23,5	6	7	14,1	5	14	6	18,5	-	-	2,5	64	48
42	54	60	32,5	26,5	6,5	7,5	16	6	18	8	20,7	-	-	3	74	60
50	62	70	33,5	29	7,5	8,5	17,5	4,5	21	12	21,5	4	13,8	-	84	70
63	77	85	37	34	10	12	18,7	3	26	14	21,6	5	16,3	-	102	88
80	100	110	44	42	14	15	23,4	2	26	14	23,6	5	16,3	-	132	114

Size	SC	SD	M	ST	CA	CY	CZ	CV	CW	N	LT
35	2,4	70	8	3,5	C0.4	1	38	1,7	31	8	M3×5, ∅3,5×6
42	3	80	12	3,5	C0.4	1	45	2,1	38	16	M3×6, ∅3,5×6,5
50	3	90	12	3,5	C0.4	1,5	53	2	45	16	M3×6, ∅3,5×7,5
63	3,3	110	12	4,5	C0.4	1,5	66	2	56	16	M4×7, ∅4,5×10
80	3,6	142	12	5,5	C0.4	1,5	86	2	73	16	M5×8, ∅5,5×14

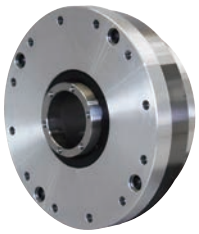
*1 For details in the input section, please check the drawings.
*2 Inner dimensions of CV, CW, CY, CZ are recommended dimensions.

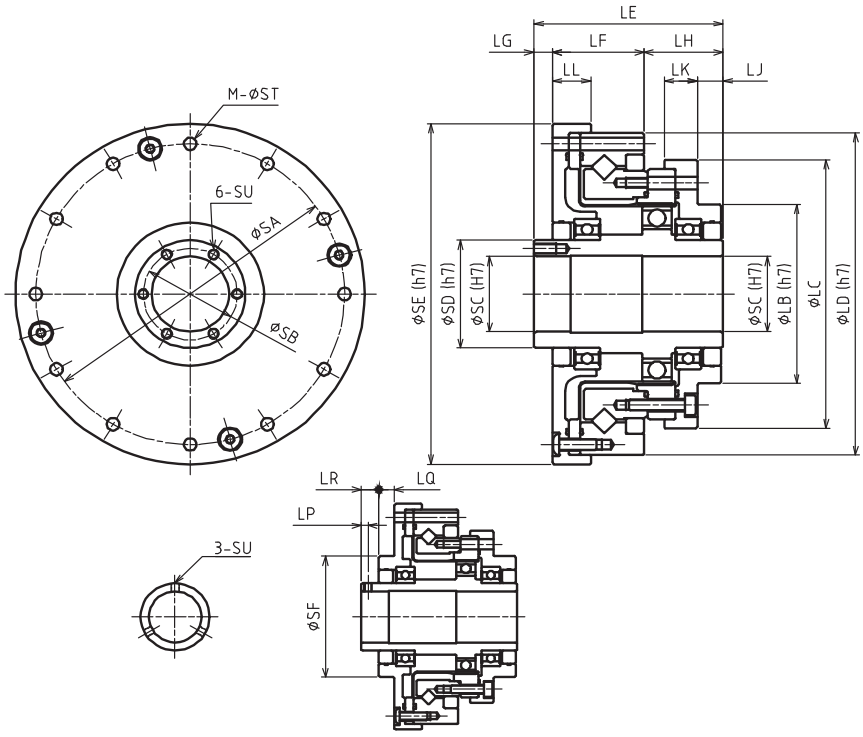
Dimensions Table

Open Type, hollow shaft Unit

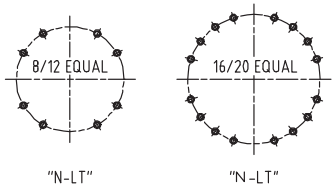
[WPU-□-□-SRH]

Size	Weight	Moment of inertia
	kg	$\times 10^{-4}$ kgm^2
35	0,72	0,0924
42	1,0	0,207
50	1,4	0,408
63	2,1	1,06
80	4,2	2,72





Input shaft for 35+42



Arrangement for 35 Arrangement for 42

[mm]

Size	LA	LB	LC	LD	LE	LF	LG	LH	LJ	LK	LL	LP	LQ	LR
35	44	36	54	70	52,5	20,5	12	20	7,5	8	9	2,5	5,5	6,5
42	54	45	64	80	56,5	23	12	21,5	8,5	8,5	10	2,5	5,5	6,5
50	62	50	75	90	51,5	25	5	21,5	7	9	10,5	-	-	-
63	77	60	90	110	55,5	26	6	23,5	6	8,5	10,5	-	-	-
80	100	85	115	142	65,5	32	7	26,5	5	9,5	12	-	-	-

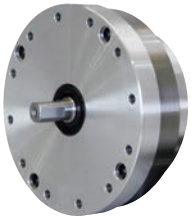
Size	SA	SB	SC	SD	SE	SF	M	ST	SU	N	LT
35	64	-	14	20	74	36	8	3,5	M3	8	M3×5, ∅3,5×11,5
42	74	-	19	25	84	45	12	3,5	M3	16	M3×6, ∅3,5×12
50	84	25,5	21	30	95	-	12	3,5	M3×6	16	M3×6, ∅3,5×13,5
63	102	33,5	29	38	115	-	12	4,5	M3×6	16	M4×7, ∅4,5×15,5
80	132	40,5	36	45	147	-	12	5,5	M3×6	16	M5×8, ∅5,5×20,5

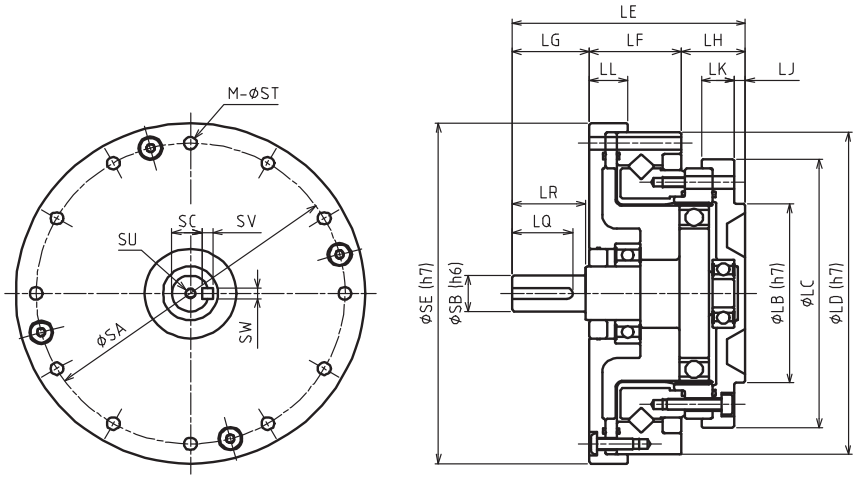
Dimensions Table

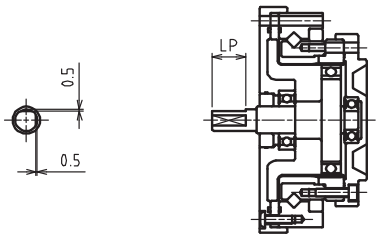
Open type, input shaft Unit

[WPU-□-□-SRJ]

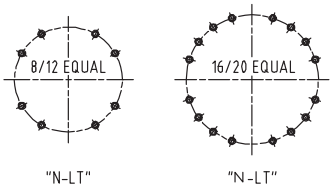
Size	Weight	Moment of inertia
	kg	$\times 10^{-4}$ kgm^2
35	0,65	0,0266
42	0,91	0,0666
50	1,4	0,155
63	2,1	0,382
80	4,1	1,28







Input shaft for 35+42



"N-LT" "N-LT"

Arrangement for 35 Arrangement for 42

[mm]

Size	LA	LB	LC	LD	LE	LF	LG	LH	LJ	LK	LL	LP	LQ	LR
35	44	36	54	70	50,5	20,5	15	15	2,5	8	9	11	-	-
42	54	45	64	80	56	23	17	16	3	8,5	10	12	-	-
50	62	50	75	90	63,5	25	21	17,5	3	9	10,5	-	16,5	20
63	77	60	90	110	72,5	26	26	20,5	3	8,5	10,5	-	22,5	25
80	100	85	115	142	84,5	32	26	26,5	5	9,5	12	-	22,5	25

Size	SA	SB	SC	SE	SV	SW	M	ST	SU	N	LT
35	64	6	-	74	-	-	8	3,5	-	8	M3×5, ∅3,5×11,5
42	74	8	-	84	-	-	12	3,5	-	16	M3×6, ∅3,5×12
50	84	10	8,2	95	3	3	12	3,5	M3×6	16	M3×6, ∅3,5×13,5
63	102	14	11	115	5	5	12	4,5	M5×10	16	M4×7, ∅4,5×15,5
80	132	14	11	147	5	5	12	5,5	M5×10	16	M5×8, ∅5,5×20,5

NIDEC DRIVE TECHNOLOGY CORPORATION

Nidec's factories span the globe, with our gear reducer series manufactured in the Philippines, Japan, China, Germany, Spain, and more. We provide our customers with unique solutions tailored to meet their needs. Experience the power of innovation and reliability with Nidec.

We manufacture and assemble the FLEXWAVE series in-house, using state-of-the-art production equipment, at our Ueda Factory in Japan and our Subic Factory in Philippines. They are then thoroughly tested in accordance with our rigorous quality standards.

JAPAN FACTORY UEDA

PHILIPPINES FACTORY SUBIC

Smart-FLEXWAVE

WP SERIES NEW

The Next
Evolution in
Built-in Multi Sensor
Technology

Features

Multi-sensor Gearbox

Safety Torque Sensor

Small Size Light Weight

Precision Measurement

High Stiffness

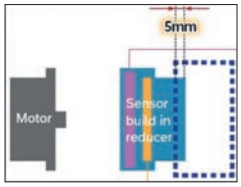
Benefits of Built-in Multi Sensor

Nidec Drive Technology is the world leader in Built-in Multi Sensor. This revolutionary technology has made torque monitoring, Internal temperature sensing, Input shaft rotation angle sensing possible in more places than ever before by making implementation easier and less cumbersome than conventional sensors.

Built-in Multi Sensor

Smart-FLEXWAVE

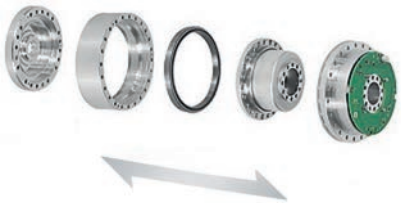
1. Light weight
2. Space saving
3. Cost-effective
4. High rigidity
5. Low influence of crossed axes
6. Increase robot speed
7. Improve position accuracy



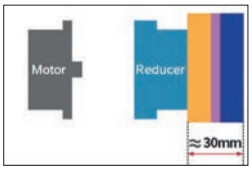
VS

Conventional Gearbox

External Torque Sensor



Cross roller bearing + Circuit board + Torque sensor + Reducer



1. Heavy weight
2. Large size
3. Expensive
4. Reduced rigidity
(cross roller bearing required)

DESCH Nidec
MEMBER OF NIDEC DRIVE TECHNOLOGY

70th Anniversary of
Gearbox Development

Nidec Drive Technology Corporation's history goes back in 1952 when it was established as Shimpo Industrial Corporation. Nidec Drive Technology was the first in the world to develop a mechanical variable speed drive called Ringcone.

Nidec Drive Technology is dedicated to enhancing the smooth operation of industrial machinery and robots, ensuring that your manufacturing facilities work in a way that aligns with high productivity. Our production concept with the focus on innovation is the starting point for the development of high-performance gear reducers. Leveraging our extensive experience in production technologies, we strive to create gear reducers that are both efficient and user-friendly. As we approach our 70th anniversary in development, we have sold our gear reducers to all over the globe. Nidec gear reducers will continue to demonstrate their value and performance in the future.

1952 RINGCONE
Introduction of reducer technology to the world

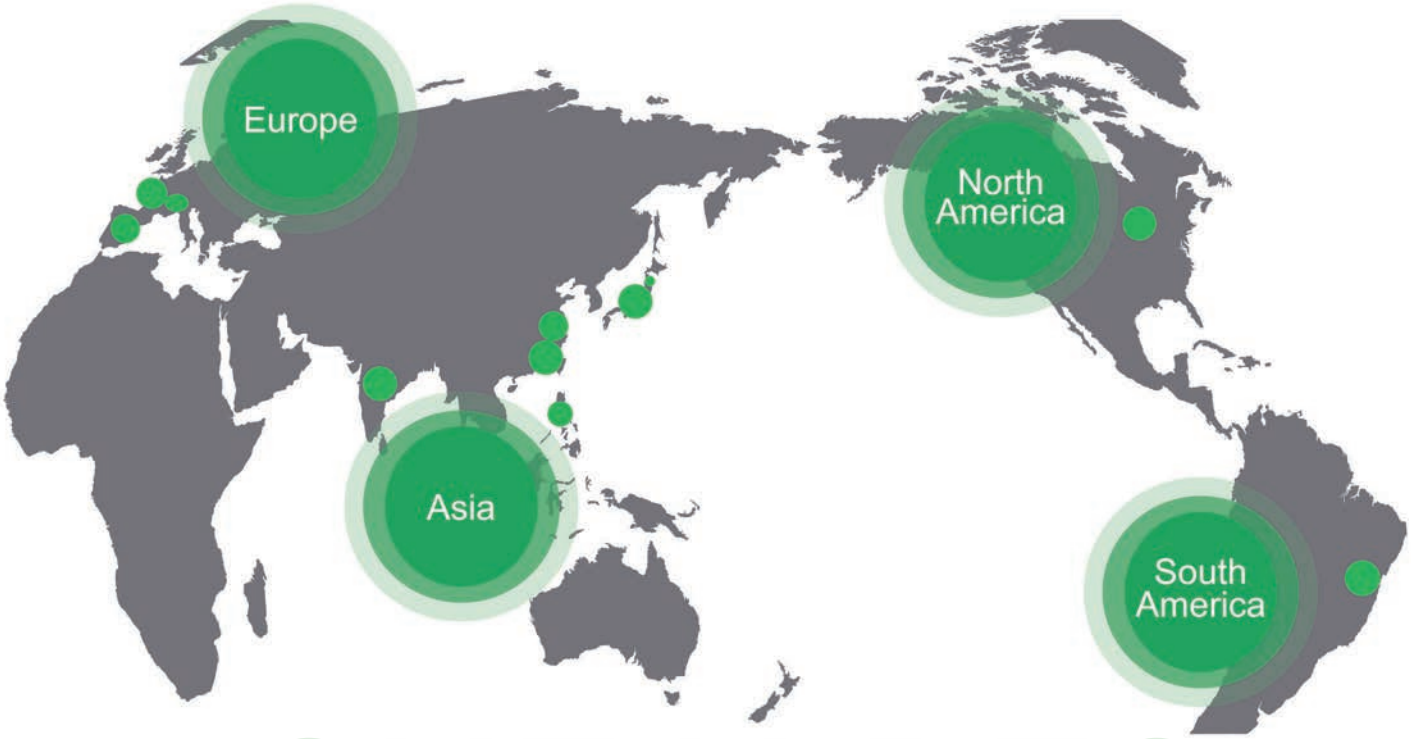
1994 ABLE Planetary Series
Wide range of planetary gearboxes

2015 FLEXWAVE Series
Continuing refinement at high accuracy gearbox

2018~ GRAESSNER & DESCH
Adding right angle & large reducers enhances product versatility.

2022 Smart-FLEXWAVE
Provision of safety and quality in the fields of collaborative robot

2023 KINEX Series
Achievement of the high accuracy for industrial robots



ONE NIDEC

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