

**NARA DRIVE**

# Precision Planetary Gearhead



**NARA DRIVE**  
[www.naradr.com](http://www.naradr.com)

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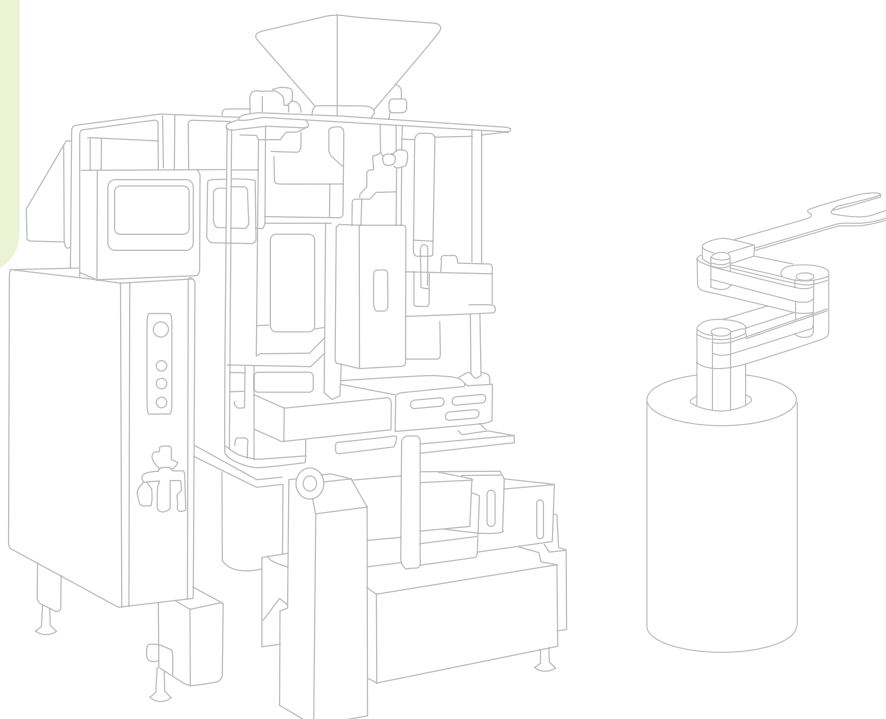
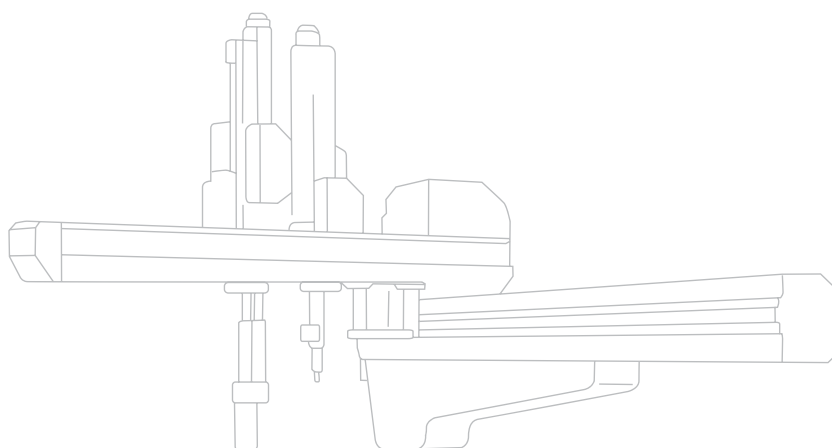
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**This is a Planetary Gearhead of high precision and high strength for servo motors, which is widely applicable to machinery and equipment in a variety of areas.**

Using a helical gear, it has a much higher contact ratio of gear than spur gear, and it has a high torque and is capable of running in smooth and low noise manners.

### Application

- ▶ Gantry robot
- ▶ Printing Machine
- ▶ Belt conveyor
- ▶ Liquid crystal glass transfer robot
- ▶ Semiconductor manufacturing Machine
- ▶ Cutting & welding Machine
- ▶ Machine tools
- ▶ Loader shaft drive
- ▶ Pillow packing Machine
- ▶ Woodworking Machine
- ▶ Laser machining apparatus
- ▶ Medical equipment (Computed Tomography)
- ▶ Surveillance camera
- ▶ Bending Machine
- ▶ Measuring equipment
- ▶ Turret head



## Product series



### NP series

- Helical gear of low noise and high efficiency
- Direct coupled precision gearhead



### NPR series

- Helical gear of low noise and high efficiency
- Angle type precision gearhead (Space-saving)



### NF series

- Helical gear of low noise and high efficiency
- Flange type precision gearhead



### NFR series

- Helical gear of low noise and high efficiency
- Flange angle type precision gearhead (Space-saving)

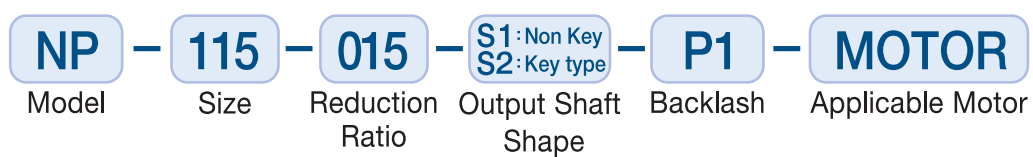


## NP series

- Use of Low noise and High Efficiency Helical Gear
- Direct coupled Precision Gearhead



### ■ Type Denotation



## ■ Features



### Low Noise

A helical gear is integral to this Planetary Gearheads, which enables low noise and smooth rotation.

### High Strength

Ring gear is directly machined to output casing, which enables a compact size, high torque, and high Strength.

### High Precision

A high precision of 3-arc minute or 5-arc minute backlash enables a precise position control and ensures maximum performance of Servo Motors.

### Long Life

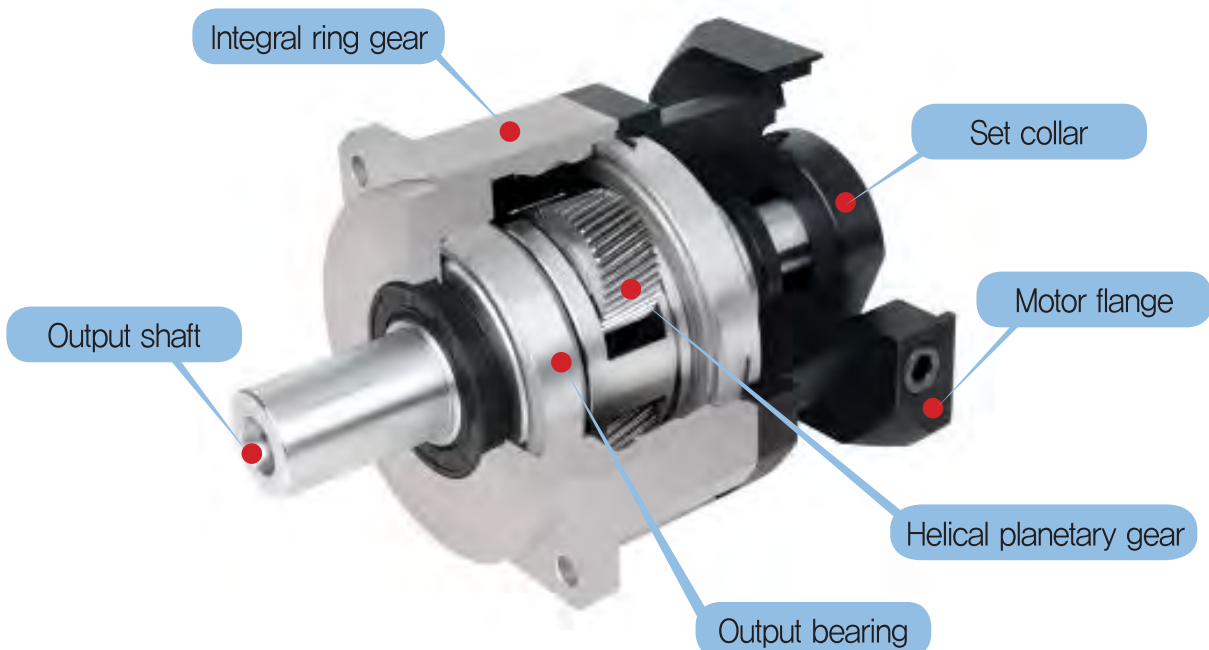
A long lifetime, and maintenance free.

### Easy Mounting

It is simple and easy to install a motor and a gearhead with set collar and bush corresponding to the output shaft of all kinds of Servo Motors.

### Helical Gear

The use of helical gear enables a much higher contact ratio of gear than spur gear, and it has a high torque and is capable of running in smooth and low noise manners.





## Specifications

NP series

Model No	Unit	Stage	Ratio <sup>1)</sup>	NP042	NP060	NP060A	NP090	NP090A	NP115	NP142	NP180	NP220	
Nominal Output Torque (T <sub>2N</sub> )	Nm	1	3	20	55	-	130	-	208	342	588	1140	
			4	19	50	-	140	-	290	542	1050	1700	
			5	22	60	-	160	-	330	650	1200	2000	
			6	20	55	-	150	-	310	600	1100	1900	
			7	19	50	-	140	-	300	550	1100	1800	
			8	17	45	-	120	-	260	500	1000	1600	
			9	14	40	-	100	-	230	450	900	1500	
			10	14	40	-	100	-	230	450	900	1500	
			2	15	20	55	55	130	130	208	342	588	1140
				20	19	50	50	140	140	290	542	1050	1700
		25		22	60	60	160	160	330	650	1200	2000	
		30		20	55	55	150	150	310	600	1100	1900	
		35		19	50	50	140	140	300	550	1100	1800	
		40		17	45	45	120	120	260	500	1000	1600	
		45		14	40	40	100	100	230	450	900	1500	
		50		22	60	60	160	160	330	650	1200	2000	
		60		20	55	55	150	150	310	600	1100	1900	
		70		19	50	50	140	140	300	550	1100	1800	
		80	17	45	45	120	120	260	500	1000	1600		
		90	14	40	40	100	100	230	450	900	1500		
100	14	40	40	100	100	230	450	900	1500				
Emergency Stop Torque <sup>4)</sup> (T <sub>2NOT</sub> )	Nm	1,2	3~100	3-times of Nominal Output Torque (T <sub>2N</sub> )									
Nominal Input Speed (n <sub>1N</sub> )	rpm	1,2	3~100	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	2,000	
Max Input Speed (n <sub>1max</sub> )	rpm	1,2	3~100	6,000	6,000	6,000	5,000	5,000	5,000	5,000	5,000	4,000	
Precision Backlash (P1 grade)	arcmin	1	3~10	≤3	≤3	-	≤3	-	≤3	≤3	≤3	≤3	
		2	15~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	
Low Backlash (P2 grade)	arcmin	1	3~10	≤5	≤5	-	≤5	-	≤5	≤5	≤5	≤5	
		2	15~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	
Standard Backlash (P3 grade)	arcmin	1	3~10	≤8	≤8	-	≤8	-	≤8	≤8	≤8	≤8	
		2	15~100	≤10	≤10	≤10	≤10	≤10	≤10	≤10	≤10	≤10	
Max. Radial Load <sup>2)</sup> (F <sub>R</sub> )	N	1,2	3~100	710	1,210	1,210	2,710	2,710	5,490	7,710	12,260	27,140	
Max. Axial Load <sup>2)</sup> (F <sub>A</sub> )	N	1,2	3~100	470	770	770	1,550	1,550	3,200	4,830	7,110	13,560	
Lifetime (Lh)	hr	1,2	3~100	20,000 <sup>5)</sup>									
Noise Level (n <sub>1</sub> =3000rpm, No Load) <sup>6)</sup>	dB(A)	1,2	3~100	≤56	≤58	≤58	≤60	≤60	≤63	≤65	≤67	≤70	
Efficiency (η)	%	1	3~10	≥97									
		2	15~100	≥94									
Weight	kg	1	3~10	0,56	1,4	-	3,7	-	8,0	14,5	28,4	49	
		2	15~100	0,84	1,5	2,0	4,1	5,4	8,9	17,8	33,6	59	
Operating Temperature <sup>3)</sup>	°C	1,2	3~100	-10°C ~ +90°C									
Lubrication		1,2	3~100	Grease									
Degree of Protection		1,2	3~100	IP65									
Mounting Position		1,2	3~100	All directions									

### Symbol Description

- 1) Ratio = Input speed / Output speed
- 2) When the output speed 100 rpm, load on the output shaft center.
- 3) Working Temperature: -10 ~ +90°C, Ambient Temperature: 0~40°C
- 4) Max. Output Torque T<sub>2B</sub> = 60% of T<sub>2NOT</sub>
- 5) For a continuous operation, please contact with NARA DRIVE before choosing it (S1-Mode operation for electrical machine).
- 6) n<sub>1</sub> : Input speed

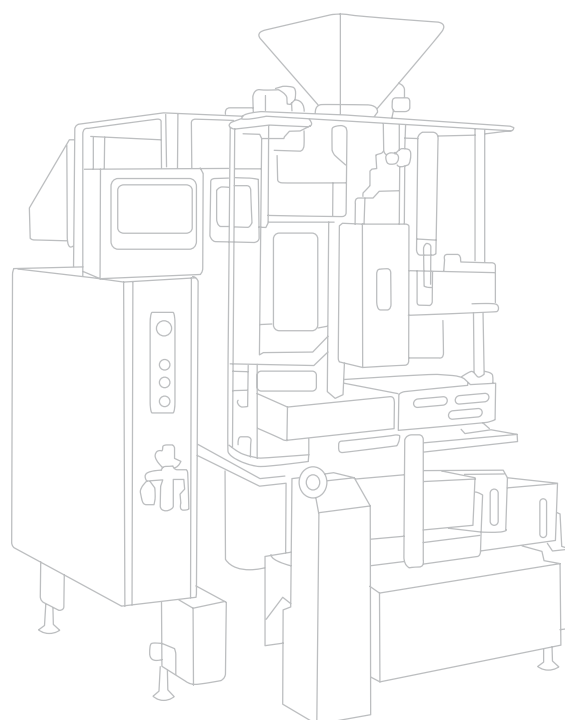
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## ■ Inertias



Model No	Unit	Stage	Ratio	NP042	NP060	NP060A	NP090	NP090A	NP115	NP142	NP180	NP220
Mass Moments of Inertia (J)	kg-cm <sup>2</sup>	1	3	0.050	0.260	-	1.373	-	5.576	14.4	42.3	93.4
			4	0.041	0.212	-	1.009	-	4.359	10.9	31.6	65.3
			5	0.037	0.193	-	0.874	-	3.853	9.4	27.1	54.0
			6	0.035	0.181	-	0.800	-	3.613	8.8	24.9	49.0
			7	0.034	0.177	-	0.771	-	3.507	8.5	23.4	45.7
			8	0.033	0.173	-	0.742	-	3.404	8.2	22.7	43.7
			9	0.032	0.170	-	0.725	-	3.340	8.0	22.2	42.3
			10	0.032	0.169	-	0.720	-	3.322	7.9	22.2	41.8
		2	15	0.037	0.040	0.196	0.218	0.891	0.963	4.1	10.2	28.8
			20	0.037	0.039	0.194	0.203	0.879	0.915	4.0	9.8	27.7
			25	0.037	0.038	0.193	0.198	0.875	0.895	3.9	9.6	27.3
			30	0.036	0.037	0.193	0.195	0.872	0.886	3.9	9.5	27.1
			35	0.036	0.037	0.193	0.194	0.871	0.882	3.9	9.5	26.9
			40	0.036	0.037	0.193	0.193	0.870	0.878	3.9	9.4	26.9
			45	0.036	0.037	0.192	0.192	0.869	0.875	3.8	9.4	26.8
			50	0.032	0.032	0.169	0.171	0.720	0.725	3.3	8.0	22.3
			60	0.032	0.032	0.169	0.170	0.720	0.723	3.3	7.9	22.2
			70	0.032	0.032	0.169	0.170	0.719	0.722	3.3	7.9	22.2
			80	0.032	0.032	0.169	0.170	0.719	0.721	3.3	7.9	22.2
			90	0.032	0.032	0.169	0.170	0.719	0.720	3.3	7.9	22.2
100	0.032	0.032	0.169	0.170	0.719	0.720	3.3	7.9	22.2			

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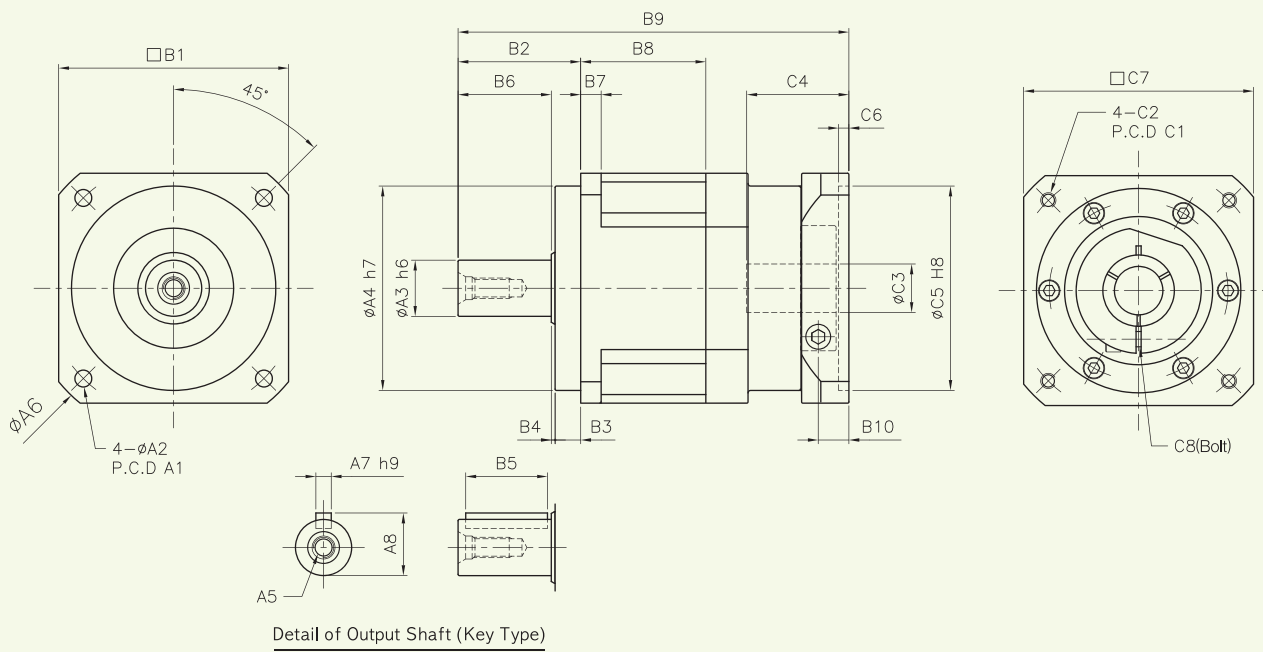




## ■ Dimensions

1-stage reducer, Reduction ratio (i) = 3,4,5,6,7,8,9,10

NP series



Unit : mm

CODE	MODEL	NP042	NP060	NP090	NP115	NP142	NP180	NP220
A	A1	50	70	100	130	165	215	250
	A2	3,4	5,5	6,6	9	11	13	17
	A3	13	16	22	32	40	55	75
	A4	35	50	80	110	130	160	180
	A5	M4 X P0,7	M5 X P0,8	M8 X P1,25	M12 X P1,75	M16 X P2,0	M20 x P2,5	M20 x P2,5
	A6	56	80	116	152	185	240	292
	A7	5	5	6	10	12	16	20
	A8	15	18	24,5	35	43	59	79,5
B	B1	42	60	90	115	142	180	220
	B2	26	37	48	65	97	105	138
	B3	5,5	7	10	12	15	20	30
	B4	1	1,5	1,5	2	3	3	3
	B5	16	25	32	40	65	70	90
	B6	19,5	28,5	36,5	51	79	82	105
	B7	4	6	8	10	12	15	20
	B8	31,5	41	49	66	79	94	103
	B9*	99	132	153	213	267	322	406
	B10*	9	14	12	15	17,5	22,5	53,5
C	C1*	46	70	100	130	165	215	235
	C2*	M4 X P0,7	M5 X P0,8	M6	M8	M10	M12	M12
	C3*	≤11(12)	≤14(16)	≤19(22,24)	≤28(32)	≤38	≤48	≤55
	C4*	25	34	40	50	60	85	116
	C5*	30	50	80	110	130	180	200
	C6*	3,5	8	4	5	6	6	6
	C7*	42	60	90	115	142	190	220
	C8*	M3 X P0,5	M5 X P0,8	M6	M8	M10	M10	M12

1. The size in ( ) is customized. 2. The \* size may depend on motors.

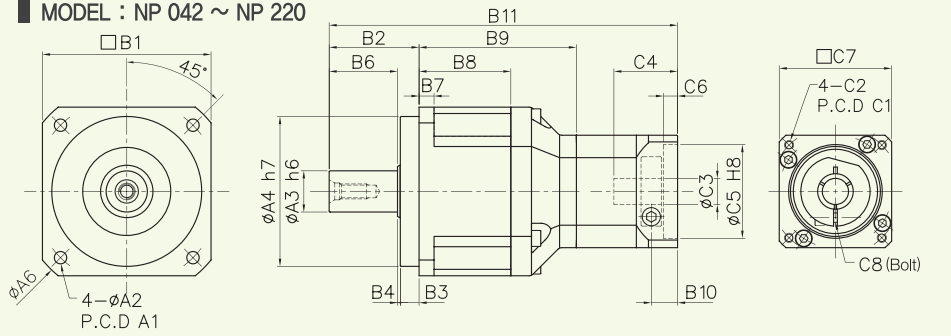
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## ■ Dimensions

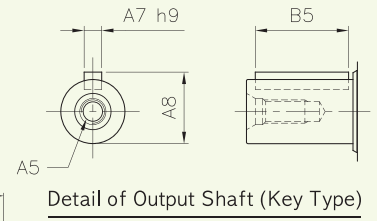
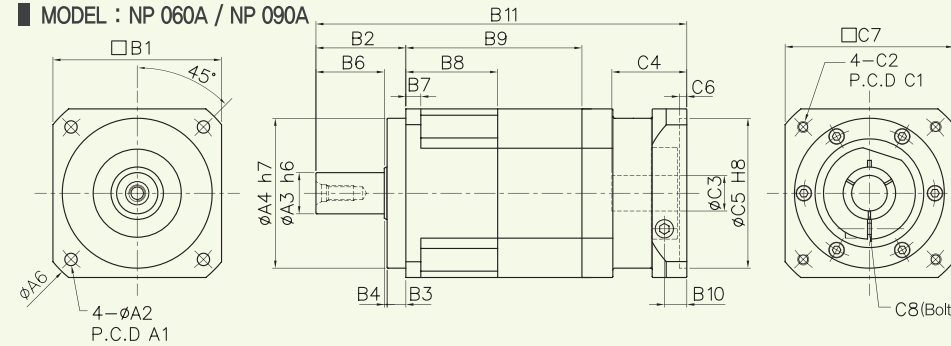
2-stage reducer, Reduction ratio (i) = 15,20,25,30,35,40,45,50,60,70,80,90,100



### ■ MODEL : NP 042 ~ NP 220



### ■ MODEL : NP 060A / NP 090A



Unit : mm

CODE	MODEL	NP042	NP060	NP060A	NP090	NP090A	NP115	NP142	NP180	NP220
A	A1	50	70		100		130	165	215	250
	A2	3,4	5,5		6,6		9	11	13	17
	A3	13	16		22		32	40	55	75
	A4	35	50		80		110	130	160	180
	A5	M4 X P0,7	M5 X P0,8		M8 X P1,25		M12 X P1,75	M16 X P2,0	M20 X P2,5	M20 X P2,5
	A6	56	80		116		152	185	240	292
	A7	5	5		6		10	12	16	20
	A8	15	18		24,5		35	43	59	79,5
B	B1	42	60		90		115	142	180	220
	B2	26	37		48		65	97	105	138
	B3	5,5	7		10		12	15	20	30
	B4	1	1,5		1,5		2	3	3	3
	B5	16	25		32		40	65	70	90
	B6	19,5	28,5		36,5		51	79	82	105
	B7	4	6		8		10	12	15	20
	B8	31,5	41		49		66	79	94	103
	B9	61,5	67,5	75	84	94	107	138	159	185
	B10*	9	9	14	14	12	12	15	17,5	22,5
	B11*	129	146	166	186	198	228	317	355	446
C	C1*	46	46	70	70	100	100	130	165	215
	C2*	M4 X P0,7	M4 X P0,7	M6 X P0,8	M6 X P0,8	M8	M8	M8	M10	M12
	C3*	≤11(12)	≤11(12)	≤14(16)	≤14(16)	≤19(22,24)	≤19(22,24)	≤28(32)	≤38	≤48
	C4*	25	25	34	34	40	40	50	60	85
	C5*	30	30	50	50	80	80	110	130	180
	C6*	3,5	3,5	8	8	4	4	5	6	6
	C7*	42	42	60	60	90	90	115	142	190
	C8*	M3 X P0,5	M3 X P0,5	M5 X P0,8	M5 X P0,8	M6	M6	M8	M10	M10

1. The size in ( ) is customized. 2. The \* size may depend on motors.

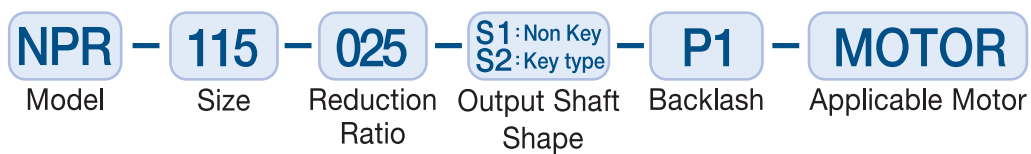
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## NPR series

- Low noise and High efficiency Helical Gear
- Angle type Precision Gearhead (Space-saving)



### ■ Type Denotation







## ■ Features

### Low Noise

A helical gear is integral to this Planetary Gearheads, which enables low noise and smooth rotation.

### High Strength

Ring gear is directly machined to output casing, which enables a compact size, high torque, and high Strength.

### High Precision

A high precision of 4-arc minute or 7-arc minute backlash enables a precise position control and ensures maximum performance of Servo Motors.

### Long Life

A long lifetime, and maintenance free.

### Easy Mounting

It is simple and easy to install a motor and a gearhead with set collar and bush corresponding to the output shaft of all kinds of Servo Motors.

### Helical Gear

The use of helical gear enables a much higher contact ratio of gear than spur gear, and it has a high torque and is capable of running in smooth and low noise manners.





## Specifications

NPR series

Model No	Unit	Stage	Ratio <sup>1)</sup>	NPR042	NPR060	NPR090	NPR115	NPR142	NPR180	NPR220
Nominal Output Torque (T <sub>2N</sub> )	Nm	1	3	9	36	90	195	342	588	1140
			4	12	48	120	260	520	1040	1680
			5	15	60	150	325	650	1200	2000
			6	18	55	150	310	600	1100	1900
			7	19	50	140	300	550	1100	1800
			8	17	45	120	260	500	1000	1600
			9	14	40	100	230	450	900	1500
			10	14	40	100	230	450	900	1500
			12	18	55	150	310	600	1100	1900
			14	19	42	140	300	550	1100	1800
		16	17	45	120	260	500	1000	1600	
		18	14	40	100	230	450	900	1500	
		20	14	40	100	230	450	900	1500	
		25	15	60	150	325	650	1200	2000	
		30	20	55	150	310	600	1100	1900	
		35	19	50	140	300	550	1100	1800	
		40	17	45	120	260	500	1000	1600	
		45	14	40	100	230	450	900	1500	
		2	50	14	60	100	230	650	1200	2000
			60	20	55	150	310	600	1100	1900
70	19		50	140	300	550	1100	1800		
80	17		45	120	260	500	1000	1600		
90	14		40	100	230	450	900	1500		
100	14		40	100	230	450	900	1500		
120	20		55	150	310	600	1100	1900		
140	19		42	140	300	550	1100	1800		
160	17		45	120	260	500	1000	1600		
180	14		40	100	230	450	900	1500		
200	14	40	100	230	450	900	1500			
Emergency Stop Torque <sup>4)</sup> (T <sub>2NOT</sub> )	Nm	1,2	3~200	3-times of Nominal Output Torque (T <sub>2N</sub> )						
Nominal Input Speed (n <sub>1N</sub> )	rpm	1,2	3~200	3,000	3,000	3,000	3,000	3,000	3,000	2,000
Max Input Speed (n <sub>1max</sub> )	rpm	1,2	3~200	6,000	6,000	5,000	5,000	5,000	5,000	4,000
Precision Backlash (P1 grade)	arcmin	1	3~20	≤4	≤4	≤4	≤4	≤4	≤4	≤4
		2	25~200	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Low Backlash (P2 grade)	arcmin	1	3~20	≤6	≤6	≤6	≤6	≤6	≤6	≤6
		2	25~200	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Standard Backlash (P3 grade)	arcmin	1	3~200	≤10	≤10	≤10	≤10	≤10	≤10	≤10
		2	3~200	≤12	≤12	≤12	≤12	≤12	≤12	≤12
Max. Radial Load <sup>2)</sup> (F <sub>R</sub> )	N	1,2	3~200	710	1,210	2,710	5,490	7,710	12,260	27,140
Max. Axial Load <sup>2)</sup> (F <sub>A</sub> )	N	1,2	3~200	470	770	1,550	3,200	4,830	7,110	13,560
Lifetime (Lh)	hr	1,2	3~200	20,000 <sup>5)</sup>						
Noise Level (n <sub>1</sub> =3000rpm, No Load) <sup>6)</sup>	dB(A)	1,2	3~200	≤65	≤68	≤70	≤72	≤74	≤76	≤78
Efficiency (η)	%	1	3~20	≤95						
		2	25~200	≤92						
Weight	kg	1	3~20	0,95	2,26	6,7	12,4	24	47	82
		2	25~200	1,22	1,85	5,0	11,7	22,5	43	78
Operating Temperature <sup>3)</sup>	°C	1,2	3~200	-10°C ~ +90°C						
Lubrication		1,2	3~200	Grease						
Degree of Protection		1,2	3~200	IP65						
Mounting Position		1,2	3~200	All directions						

### Symbol Description

- 1) Ratio = Input speed / Output speed
- 2) When the output speed 100 rpm, load on the output shaft center.
- 3) Working Temperature: -10 ~ +90°C, Ambient Temperature: 0~40°C
- 4) Max. Output Torque T<sub>2B</sub> = 60% of T<sub>2NOT</sub>
- 5) For a continuous operation, please contact with NARA DRIVE before choosing it (S1-Mode operation for electrical machine).
- 6) n<sub>1</sub> : Input speed

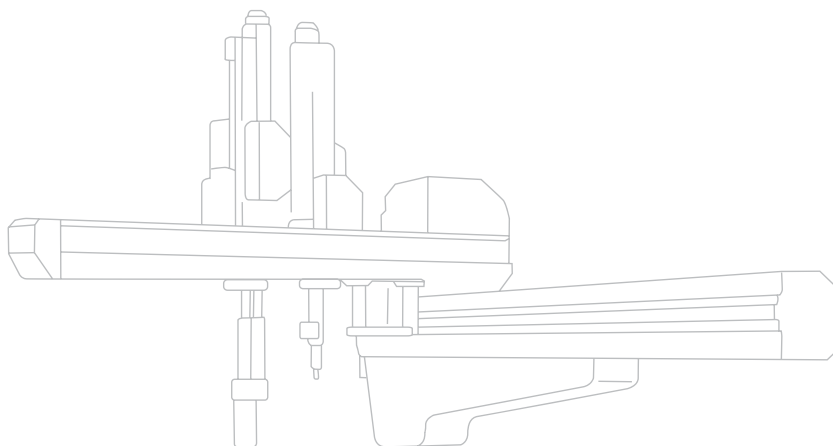
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## ■ Inertias



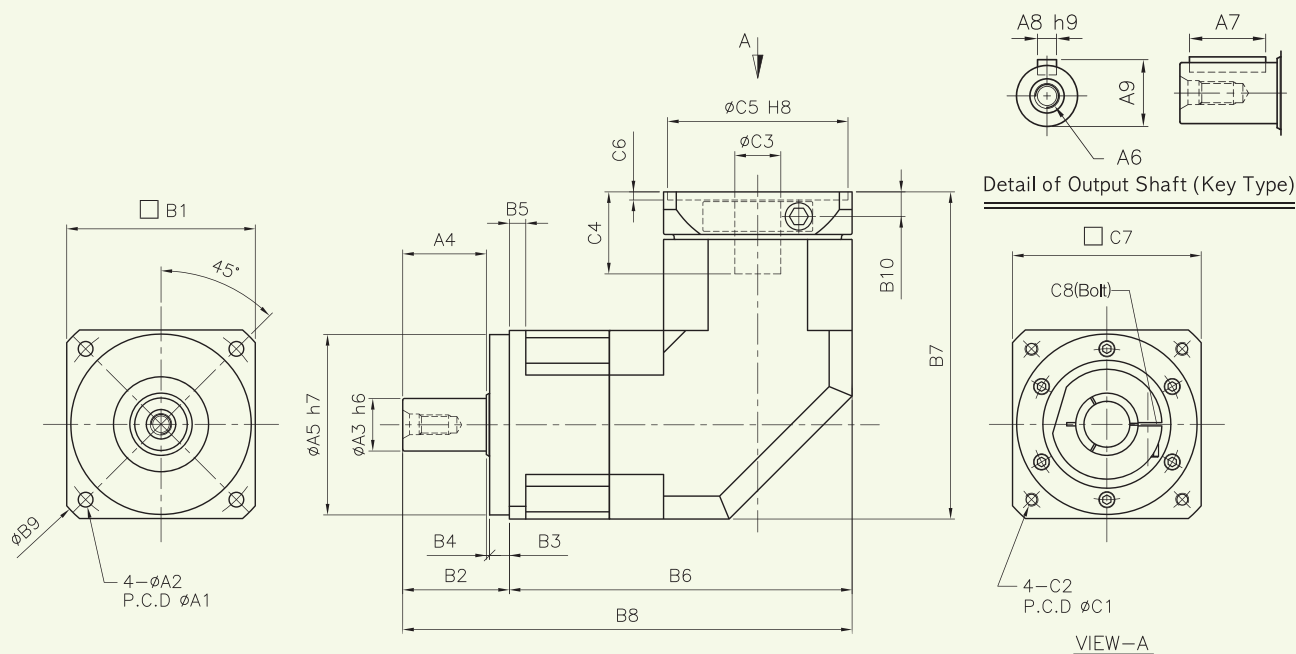
Model No	Unit	Stage	Ratio	NPR042	NPR060	NPR090	NPR115	NPR142	NPR180	NPR220
Mass Moments of Inertia (J)	kg·cm <sup>2</sup>	1	3	0,080	0,399	2,505	7,762	22,8	72,0	188,0
			4	0,071	0,352	2,145	6,556	19,3	61,3	160,0
			5	0,068	0,333	2,002	6,050	17,9	56,8	148,8
			6	0,064	0,321	1,928	5,810	17,2	54,6	143,7
			7	0,064	0,317	1,899	5,704	16,9	53,2	140,4
			8	0,063	0,313	1,872	5,599	16,6	52,4	138,4
			9	0,062	0,310	1,854	5,535	16,4	51,9	137,0
			10	0,062	0,309	1,849	5,517	16,3	51,9	136,5
			12	0,049	0,238	1,206	3,992	10,3	29,4	69,9
			14	0,048	0,237	1,199	3,965	10,2	29,1	69,1
		16	0,048	0,236	1,192	3,939	10,2	28,9	68,6	
		18	0,048	0,235	1,187	3,923	10,1	28,8	68,3	
		20	0,048	0,235	1,186	3,918	10,1	28,8	68,1	
		25	0,066	0,069	0,338	2,024	6,1	18,0	57,0	
		30	0,066	0,067	0,335	2,014	6,1	17,9	56,8	
		35	0,066	0,067	0,334	2,010	6,1	17,9	56,6	
		40	0,066	0,067	0,333	2,006	6,1	17,9	56,6	
		45	0,066	0,067	0,332	2,004	6,0	17,8	56,5	
		50	0,062	0,062	0,311	1,855	5,5	16,4	52,0	
		60	0,062	0,062	0,310	1,852	5,5	16,4	51,9	
70	0,062	0,062	0,310	1,851	5,5	16,4	51,9			
80	0,062	0,062	0,309	1,850	5,5	16,3	51,9			
90	0,062	0,062	0,309	1,850	5,5	16,3	51,9			
100	0,062	0,062	0,309	1,849	5,5	16,3	51,9			
120	0,048	0,048	0,235	1,187	3,9	10,1	28,8			
140	0,048	0,048	0,235	1,187	3,9	10,1	28,8			
160	0,048	0,048	0,235	1,186	3,9	10,1	28,8			
180	0,048	0,048	0,235	1,186	3,9	10,1	28,8			
200	0,048	0,048	0,235	1,186	3,9	10,1	28,8			

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## ■ Dimensions

1-stage reducer, Reduction ratio (i) = 3,4,5,6,7,8,9,10,12,14,16,18,20



Unit : mm

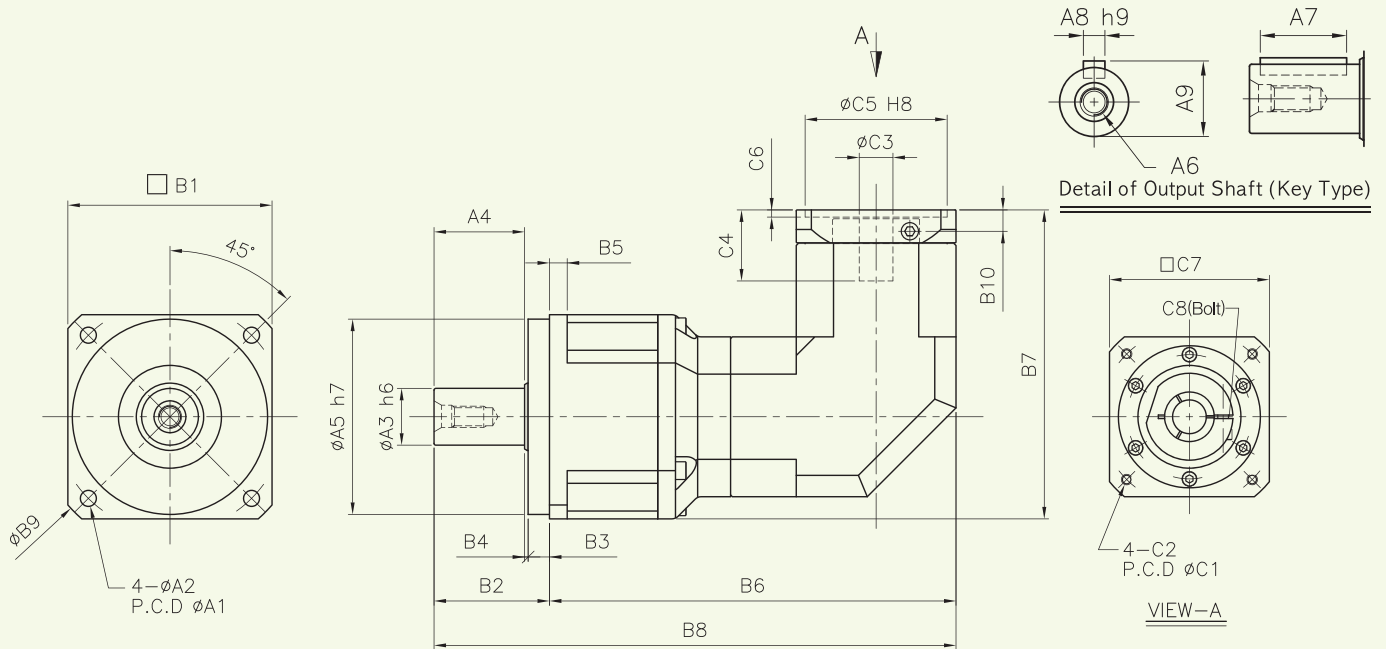
CODE	MODEL	NPR042	NPR060	NPR090	NPR115	NPR142	NPR180	NPR220
A	A1	50	70	100	130	165	215	250
	A2	3,4	5,5	6,6	9	11	13	17
	A3	13	16	22	32	40	55	75
	A4	19,5	28,5	36,5	51	79	82	105
	A5	35	50	80	110	130	160	180
	A6	M4xP0,7	M5xP0,8	M8	M12	M16	M20	M20
	A7	16	25	32	40	65	70	90
	A8	5	5	6	10	12	16	20
	A9	15	18	24,5	35	43	59	79,5
B	B1	42	60	90	115	142	180	220
	B2	26	37	48	65	97	105	138
	B3	5,5	7	10	12	15	20	30
	B4	1	1,5	1,5	2	3	3	3
	B5	4	6	8	10	12	15	20
	B6	107,5	136,5	182,5	222	265,5	328,5	385,2
	B7 *	87,5	116,5	161	196,5	245	310	393
	B8	111,5	173,5	230,5	287	362,5	433,5	523,2
	B9	56	80	116	152	185	240	292
	B10 *	9	14	12	15	17,5	22,5	53,5
C	C1 *	46	70	100	130	165	215	235
	C2 *	M4xP0,7	M5xP0,8	M6	M8	M10	M12	M12
	C3 *	≤11(12)	≤14(16)	≤19(22,24)	≤28(32)	≤38	≤48	≤55
	C4 *	25	34	40	50	60	85	116
	C5 *	30	50	80	110	130	180	200
	C6 *	3,5	8	4	5	6	6	6
	C7 *	42	60	90	115	142	190	220
	C8 *	M3xP0,5	M5xP0,8	M6	M8	M10	M10	M12

1. The size in ( ) is customized. 2. The \* size may depend on motors.

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## ■ Dimensions

2-stage reducer, Reduction ratio (i) = 25,30,35,40,45,50,60,70,80,90,100,120,140,160,180,200



Unit : mm

CODE	MODEL	NPR042	NPR060	NPR090	NPR115	NPR142	NPR180	NPR220
A	A1	50	70	100	130	165	215	250
	A2	3,4	5,5	6,6	9	11	13	17
	A3	13	16	22	32	40	55	75
	A4	19,5	28,5	36,5	51	79	82	105
	A5	35	50	80	110	130	160	180
	A6	M4xP0,7	M5xP0,8	M8	M12	M16	M20	M20
	A7	16	25	32	40	65	70	90
	A8	5	5	6	10	12	16	20
	A9	15	18	24,5	35	43	59	79,5
B	B1	42	60	90	115	142	180	220
	B2	26	37	48	65	97	105	138
	B3	5,5	7	10	12	15	20	30
	B4	1	1,5	1,5	2	3	3	3
	B5	4	6	8	10	12	15	20
	B6	137,5	143,5	179	240,5	294	345,5	419,5
	B7 *	87,5	96,5	131,5	173,5	210	264	330
	B8	141,5	180,5	227	305,5	391	450,5	557,5
	B9	56	80	116	152	185	240	292
	B10 *	9	9	14	12	15	17,5	22,5
C	C1 *	46	46	70	100	130	165	215
	C2 *	M4xP0,7	M4xP0,7	M5xP0,8	M6	M8	M10	M12
	C3 *	$\leq 11(12)$	$\leq 11(12)$	$\leq 14(16)$	$\leq 19(22,24)$	$\leq 28(32)$	$\leq 38$	$\leq 48$
	C4 *	25	25	34	40	50	60	85
	C5 *	30	30	50	80	110	130	180
	C6 *	3,5	3,5	8	4	5	6	6
	C7 *	42	42	60	90	115	142	190
	C8 *	M3xP0,5	M3xP0,5	M5xP0,8	M6	M8	M10	M10

1. The size in ( ) is customized. 2. The \* size may depend on motors.

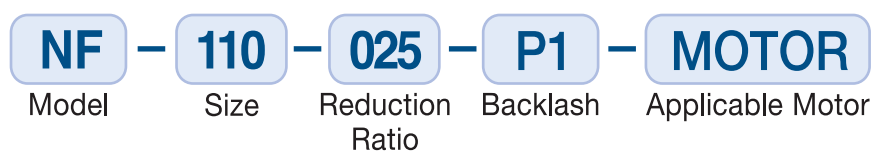
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**NF series**

- Low noise and High efficiency Helical Gear
- Flange type Precision Gearhead



■ Type Denotation





## ■ Features

### Low Noise

A helical gear is integral to this Planetary Gearheads, which enables low noise and smooth rotation.

### High Strength

Ring gear is directly machined to output casing, which enables a compact size, high torque, and high Strength.

### High Precision

A high precision of 3-arc minute or 5-arc minute backlash enables a precise position control and ensures maximum performance of Servo Motors.

### Long Life

A long lifetime, and maintenance free.

### Easy Mounting

It is simple and easy to install a motor and a gearhead with set collar and bush corresponding to the output shaft of all kinds of Servo Motors.

### Helical Gear

The use of helical gear enables a much higher contact ratio of gear than spur gear, and it has a high torque and is capable of running in smooth and low noise manners.







## Specifications

NF series

Model No	Unit	Stage	Ratio <sup>1)</sup>	NF047	NF064	NF090	NF110	NF140	NF200	NF255		
Nominal Output Torque (T <sub>2N</sub> )	Nm	1	4	14	50	130	270	500	1050	1600		
			5	22	60	140	330	650	1200	2000		
			7	19	50	140	300	550	1100	1800		
			10	14	40	100	230	450	900	1500		
		2	20	14	50	130	270	500	1050	1600		
			25	22	60	140	330	650	1200	2000		
			35	19	50	140	300	550	1100	1800		
			40	14	50	130	270	500	1050	1600		
			50	22	60	140	330	650	1200	2000		
			70	19	50	140	300	550	1100	1800		
			100	14	40	100	230	450	900	1500		
			Emergency Stop Torque <sup>4)</sup> (T <sub>2NOT</sub> )	Nm	1,2	4~100	3-times of Nominal Output Torque (T <sub>2N</sub> )					
		Nominal Input Speed (n <sub>1N</sub> )	rpm	1,2	4~100	3,000	3,000	3,000	3,000	3,000	3,000	2,000
		Max Input Speed (n <sub>1max</sub> )	rpm	1,2	4~100	6,000	6,000	5,000	5,000	5,000	5,000	4,000
Precision Backlash (P1 grade)	arcmin	1	4~10	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3		
		2	20~100	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5		
Low Backlash (P2 grade)	arcmin	1	4~10	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5		
		2	20~100	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7		
Max. Axial Load <sup>2)</sup> (F <sub>A</sub> )	N	1,2	4~100	1,040	1,120	3,470	5,110	6,880	13,180	17,050		
Lifetime (Lh)	hr	1,2	4~100	20,000 <sup>5)</sup>								
Noise Level (n <sub>1</sub> =3000rpm, No Load) <sup>6)</sup>	dB(A)	1,2	4~100	≤ 56	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	≤ 70		
Efficiency (η)	%	1	4~10	≤ 97								
		2	20~100	≤ 94								
Weight	kg	1	4~10	0,7	1,4	3,5	6,9	14,5	30,5	53		
		2	20~100	1,0	1,6	3,7	8,0	16,3	34,5	64		
Operating Temperature <sup>3)</sup>	°C	1,2	4~100	-10°C ~ +90°C								
Lubrication		1,2	4~100	Grease								
Degree of Protection		1,2	4~100	IP65								
Mounting Position		1,2	4~100	All directions								

### Symbol Description

- 1) Ratio = Input speed / Output speed
- 2) When the output speed 100 rpm, max. axial load on output shaft,
- 3) Working Temperature: -10 ~ +90°C, Ambient Temperature: 0~40°C
- 4) Max. Output Torque T<sub>2B</sub> = 60% of T<sub>2NOT</sub>
- 5) For a continuous operation, please contact with NARA DRIVE before choosing it (S1-Mode operation for electrical machine).
- 6) n<sub>1</sub> : Input speed

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## Inertias

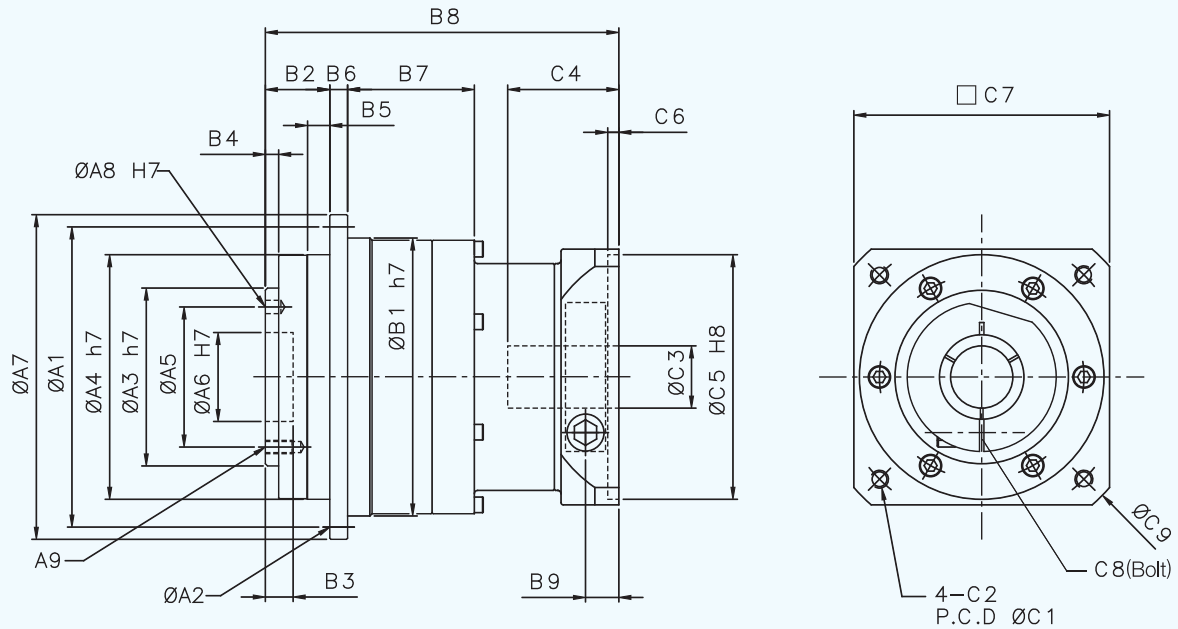
Model No	Unit	Stage	Ratio	NF047	NF064	NF090	NF110	NF140	NF200	NF255
Mass Moments of Inertia (J <sub>i</sub> )	kg-cm <sup>2</sup>	1	4	0,045	0,263	1,089	4,786	12,0	39,2	78,9
			5	0,041	0,244	0,954	4,280	10,5	34,7	67,6
			7	0,036	0,199	0,851	3,780	9,3	27,7	53,3
			10	0,034	0,185	0,773	3,520	8,5	24,6	46,2
		2	20	0,038	0,041	0,215	0,955	4,2	10,4	28,7
			25	0,038	0,040	0,210	0,935	4,1	10,2	28,3
			35	0,038	0,039	0,206	0,915	4,0	10,0	27,7
			40	0,038	0,039	0,205	0,911	4,0	9,9	27,7
			50	0,033	0,034	0,181	0,756	3,5	8,4	22,9
			70	0,033	0,033	0,180	0,751	3,5	8,3	22,8
			100	0,033	0,033	0,179	0,748	3,5	8,3	22,7

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## ■ Dimensions

1-stage reducer, Reduction ratio (i) = 4,5,7,10



Unit : mm

CODE	MODEL	NF047	NF064	NF090	NF110	NF140	NF200	NF255
A	A1	67	79	109	135	168	233	280
	A2	8-3,4	8-4,5	8-5,5	8-5,5	12-6,6	12-9,0	16-13,5
	A3	28	40	63	80	100	160	180
	A4	47	64	90	110	140	200	255
	A5	20	31,5	50	63	80	125	140
	A6	12	20	31,5	40	50	80	100
	A7	72	86	118	146	179	247	300
	A8	Ø3xDP4	Ø5xDP6	Ø6xDP7	Ø6xDP7	Ø8xDP7	Ø10xDP10	Ø12xDP10
	A9	4-M3xP0,5xDP6,5	7-M5xP0,8xDP10	7-M6xDP12	11-M6xDP12	11-M8xDP16	11-M10xDP20	12-M16xDP26
B	B1	60	70	98	125	156	212	255
	B2	19,5	19,5	30	29	38	50	66
	B3	4,5	8,5	12,5	12,5	12,5	16,5	20,5
	B4	3	3	6	6	6	8	12
	B5	7	7	10	10	14,6	15	20
	B6	4	4	7	8	10	12	18
	B7	20	32,5	42,5	57	56	80	77
	B8*	77	98	120	159	177,5	230	297
	B9*	9	14	12	15	17,5	22,5	53,5
C	C1*	46	70	100	130	165	215	235
	C2*	M4xP0,7	M5xP0,8	M6	M8	M10	M12	M12
	C3*	≤11(12)	≤14(16)	≤19(22,24)	≤28(32)	≤38	≤48	≤55
	C4*	25	34	40	50	60	85	116
	C5*	30	50	80	110	130	180	200
	C6*	3,5	8	4	5	6	6	6
	C7*	42	60	90	115	142	190	220
	C8*	M3xP0,5	M5xP0,8	M6	M8	M10	M10	M10
	C9*	56	80	116	152	186	242	262

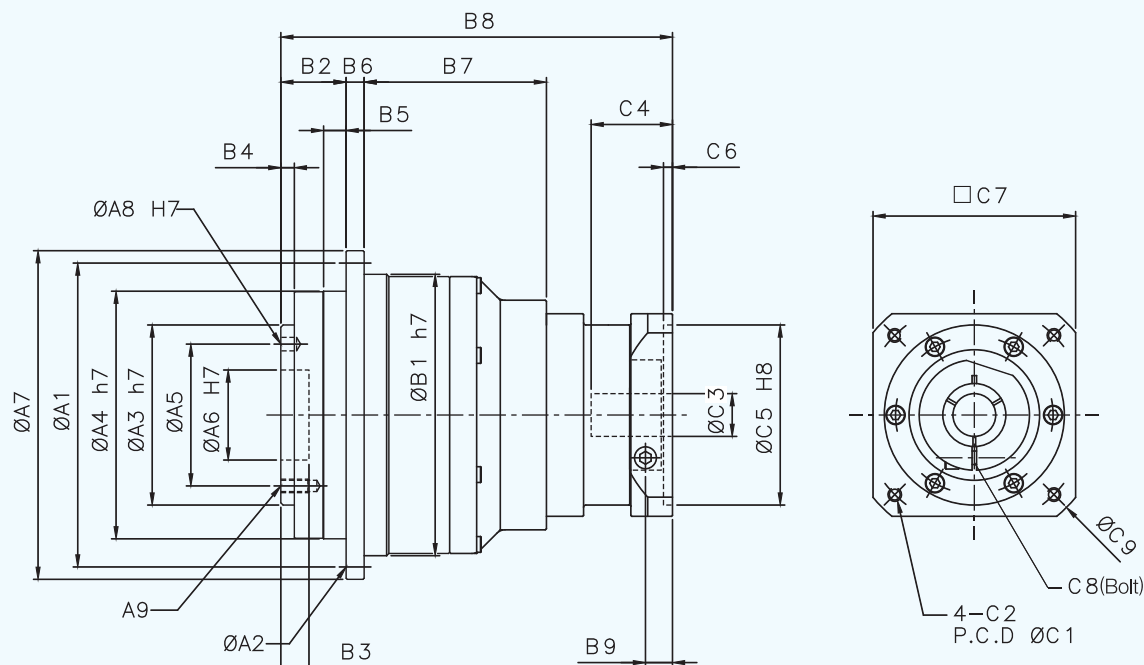
1. The size in ( ) is customized. 2. The \* size may depend on motors.

• Since specifications in this catalogue are subject to change without any notice for improvement of products, please contact with



## ■ Dimensions

2-stage reducer, Reduction ratio (i) = 20,25,35,40,50,70,100



Unit : mm

CODE	MODEL	NF047	NF064	NF090	NF110	NF140	NF200	NF255
A	A1	67	79	109	135	168	233	280
	A2	8-3,4	8-4,5	8-5,5	8-5,5	12-6,6	12-9,0	16-13,5
	A3	28	40	63	80	100	160	180
	A4	47	64	90	110	140	200	255
	A5	20	31,5	50	63	80	125	140
	A6	12	20	31,5	40	50	80	100
	A7	72	86	118	146	179	247	300
	A8	Ø3xDP4	Ø5xDP6	Ø6xDP7	Ø6xDP7	Ø8xDP7	Ø10xDP10	Ø12xDP10
	A9	4-M3xP0,5xDP6,5	7-M5xP0,8xDP10	7-M6xDP12	11-M6xDP12	11-M8xDP16	11-M10xDP20	12-M16xDP26
B	B1	60	70	98	125	156	212	255
	B2	19,5	19,5	30	29	38	50	66
	B3	4,5	8,5	12,5	12,5	12,5	16,5	20,5
	B4	3	3	6	6	6	8	12
	B5	7	7	10	10	14,6	15	20
	B6	4	4	7	8	10	12	18
	B7	42	47	62	81	97,5	110	130
	B8*	107	112	153	174	227,5	263	337
	B9*	9	9	14	12	15	17,5	22,5
C	C1*	46	46	70	100	130	165	215
	C2*	M4xP0,7	M4xP0,7	M5xP0,8	M6	M8	M10	M12
	C3*	≤11(12)	≤11(12)	≤14(16)	≤19(22,24)	≤28(32)	≤38	≤48
	C4*	25	25	34	40	50	60	85
	C5*	30	30	50	80	110	130	180
	C6*	3,5	3,5	8	4	5	6	6
	C7*	42	42	60	90	115	142	190
	C8*	M3xP0,5	M3xP0,5	M5xP0,8	M6	M8	M10	M10
	C9*	56	56	80	116	152	186	242

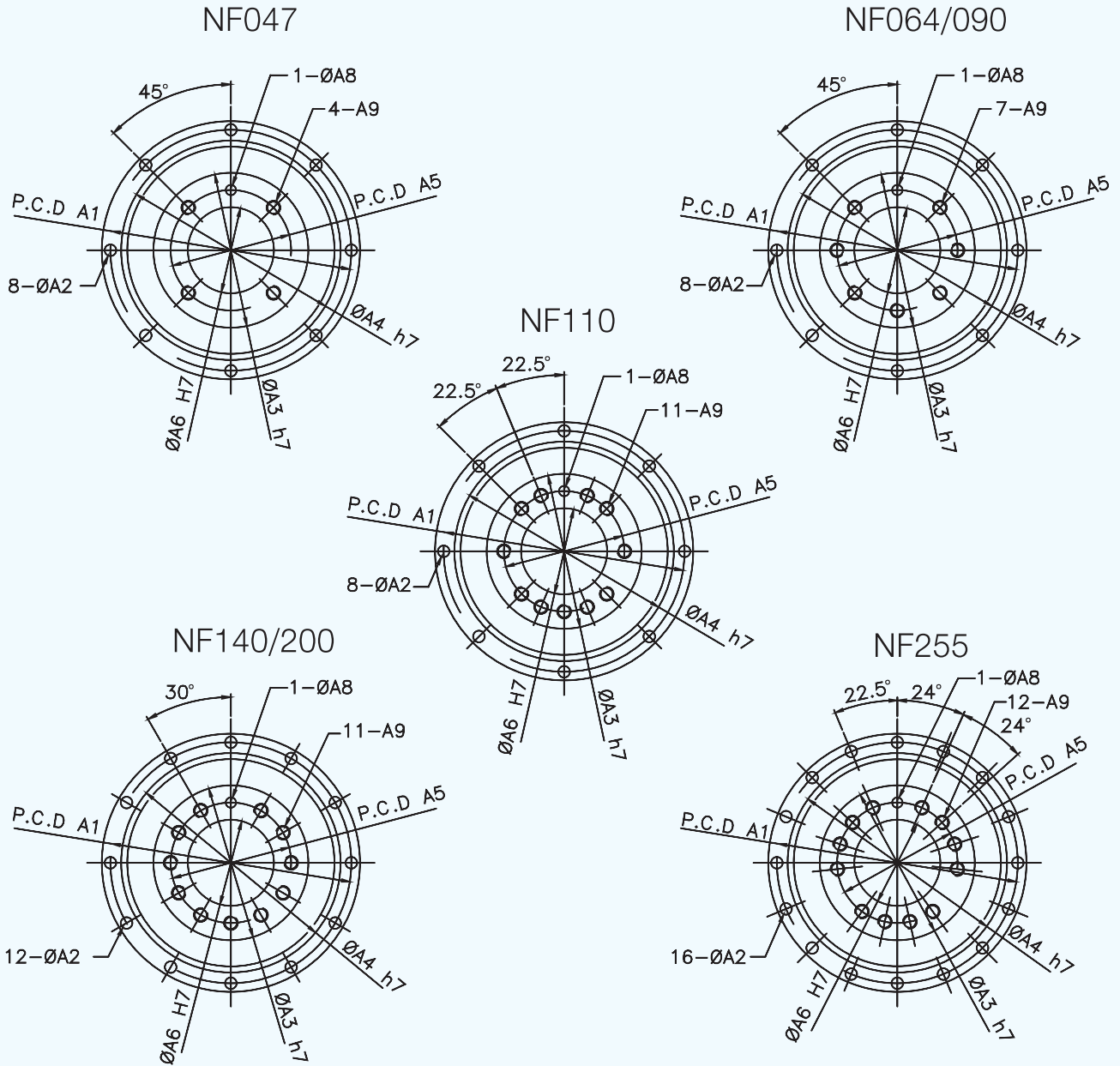
1. The size in ( ) is customized. 2. The \* size may depend on motors.

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## ■ Dimensions

### ■ Flange



Unit : mm

CODE	NF047	NF064	NF090	NF110	NF140	NF200	NF255
A1	67	79	109	135	168	233	280
A2	3,4	4,5	5,5	5,5	6,6	9,0	13,5
A3	28	40	63	80	100	160	180
A4	47	64	90	110	140	200	255
A5	20	31,5	50	63	80	125	140
A6	12	20	31,5	40	50	80	100
A8	3xDP4	5xDP6	6xDP7	6xDP7	8xDP7	10xDP10	12xDP10
A9	M3xP0,5xDP6,5	M5xP0,8xDP10	M6xDP12	M6xDP12	M8xDP16	M10xDP20	M16xDP26

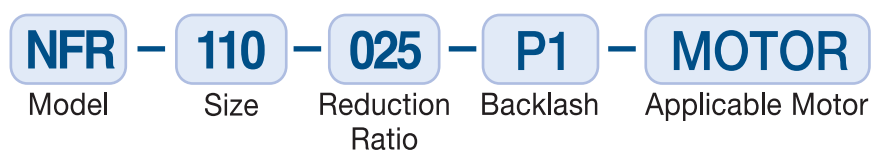
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## NFR series

- Low noise and High efficiency Helical Gear
- Flange angle type Precision Gearhead (Space-saving)



### ■ Type Denotation





## ■ Features

### Low Noise

A helical gear is integral to this Planetary Gearheads, which enables low noise and smooth rotation.

### High Strength

Ring gear is directly machined to output casing, which enables a compact size, high torque, and high Strength.

### High Precision

A high precision of 4-arc minute or 7-arc minute backlash enables a precise position control and ensures maximum performance of Servo Motors.

### Long Life

A long lifetime, and maintenance free.

### Easy Mounting

It is simple and easy to install a motor and a gearhead with set collar and bush corresponding to the output shaft of all kinds of Servo Motors.

### Helical Gear

The use of helical gear enables a much higher contact ratio of gear than spur gear, and it has a high torque and is capable of running in smooth and low noise manners.





## Specifications

NFR series

Model No	Unit	Stage	Ratio <sup>1)</sup>	NFR047	NFR064	NFR090	NFR110	NFR140	NFR200	NFR255
Nominal Output Torque (T <sub>2N</sub> )	Nm	1	4	12	48	120	260	500	1040	1600
			5	15	60	150	325	650	1200	2000
			7	19	50	140	300	550	1100	1800
			10	14	40	100	230	450	900	1500
			14	19	42	140	300	550	1100	1800
			20	14	40	100	230	450	900	1500
		2	25	15	60	150	325	650	1200	2000
			35	19	50	140	300	550	1100	1800
			40	14	45	120	260	500	1000	1600
			50	14	60	100	230	650	1200	2000
			70	19	50	140	300	550	1100	1800
			100	14	40	100	230	450	900	1500
			140	19	42	140	300	550	1100	1800
			200	14	40	100	230	450	900	1500
Emergency Stop Torque <sup>4)</sup> (T <sub>2NOT</sub> )	Nm	1,2	4~200	3-times of Nominal Output Torque (T <sub>2N</sub> )						
Nominal Input Speed (n <sub>1N</sub> )	rpm	1,2	4~200	3,000	3,000	3,000	3,000	3,000	3,000	2,000
Max Input Speed (n <sub>1max</sub> )	rpm	1,2	4~200	6,000	6,000	5,000	5,000	5,000	5,000	4,000
Precision Backlash (P1 grade)	arcmin	1	4~20	≤4	≤4	≤4	≤4	≤4	≤4	≤4
		2	25~200	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Low Backlash (P2 grade)	arcmin	1	4~20	≤6	≤6	≤6	≤6	≤6	≤6	≤6
		2	25~200	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Max. Axial Load <sup>2)</sup> (F <sub>A</sub> )	N	1,2	4~200	1,040	1,120	3,470	5,110	6,880	13,180	17,050
Lifetime (Lh)	hr	1,2	4~200	20,000 <sup>5)</sup>						
Noise Level (n <sub>1</sub> =3000rpm, No Load) <sup>6)</sup>	dB(A)	1,2	4~200	≤65	≤68	≤70	≤72	≤74	≤76	≤78
Efficiency (η)	%	1	4~20	≤95						
		2	25~200	≤92						
Weight	kg	1	4~20	1,21	2,28	6,68	11,6	23	49	88
		2	25~200	1,39	1,93	4,88	11	21	44	83
Operating Temperature <sup>3)</sup>	°C	1,2	4~200	-10°C ~ +90°C						
Lubrication		1,2	4~200	Grease						
Degree of Protection		1,2	4~200	IP65						
Mounting Position		1,2	4~200	All directions						

### Symbol Description

- 1) Ratio = Input speed / Output speed
  - 2) When the output speed 100 rpm, max, axial load on output shaft,
  - 3) Working Temperature: -10 ~ +90°C, Ambient Temperature: 0~40°C
  - 4) Max. Output Torque T<sub>2B</sub> = 60% of T<sub>2NOT</sub>
  - 5) For a continuous operation, please contact with
  - 6) n<sub>1</sub> : Input speed
- NARA DRIVE before choosing it (S1-Mode operation for electrical machine),

• Since specifications in this catalogue are subject to change without any notice for improvement of products, please contact with NARA DRIVE previously when deciding to choose products,

## Inertias

Model No	Unit	Stage	Ratio	NFR047	NFR064	NFR090	NFR110	NFR140	NFR200	NFR255
Mass Moments of Inertia (J)	kg·cm <sup>2</sup>	1	4	0,074	0,382	2,225	6,984	20,4	68,9	173,7
			5	0,071	0,363	2,082	6,478	19,0	64,4	162,5
			7	0,066	0,339	1,979	5,976	17,7	57,4	148,0
			10	0,064	0,325	1,902	5,715	16,9	54,3	140,9
			14	0,050	0,249	1,239	4,127	10,7	30,5	71,8
			20	0,049	0,246	1,220	4,061	10,5	29,8	70,0
		2	25	0,068	0,279	0,349	2,064	6,3	18,6	58,0
			35	0,067	0,277	0,345	2,044	6,2	18,4	57,4
			40	0,067	0,277	0,344	2,040	6,2	18,4	57,4
			50	0,063	0,272	0,321	1,885	5,7	16,8	52,6
			70	0,063	0,272	0,320	1,880	5,7	16,7	52,5
			100	0,063	0,272	0,319	1,878	5,6	16,7	52,4
			140	0,049	0,258	0,244	1,215	4,0	10,5	29,3
			200	0,049	0,258	0,244	1,214	4,0	10,5	29,3

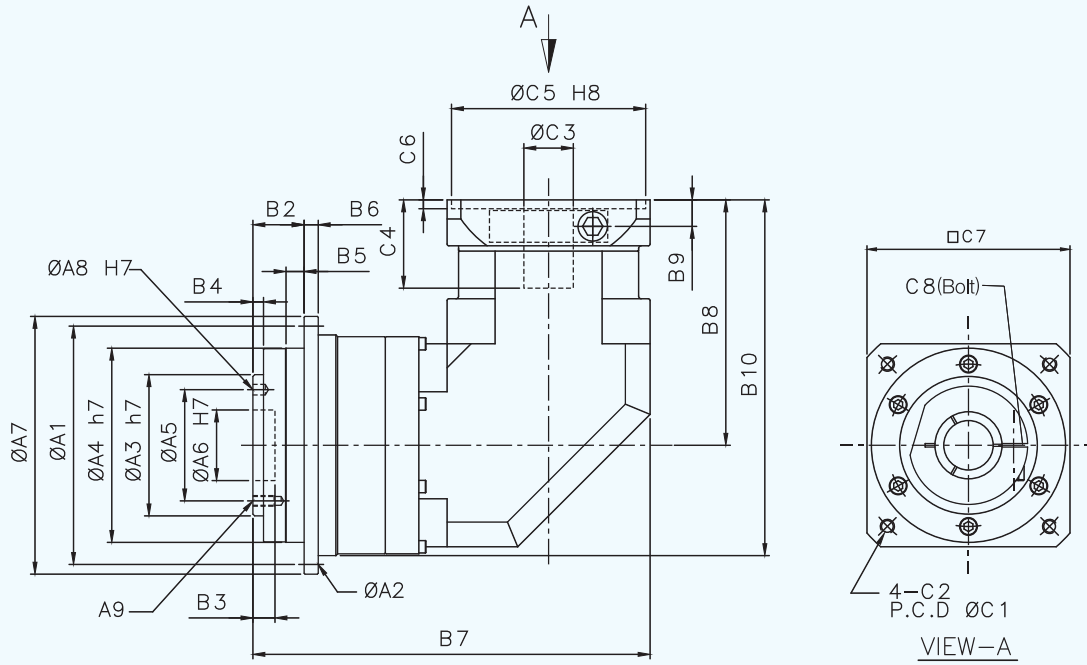
• Since specifications in this catalogue are subject to change without any notice for improvement of products, please contact with NARA DRIVE previously when deciding to choose products,





## ■ Dimensions

1-stage reducer, Reduction ratio (i) = 4,5,7,10,14,20



Unit : mm

CODE	MODEL	NFR047	NFR064	NFR090	NFR110	NFR140	NFR200	NFR255
A	A1	67	79	109	135	168	233	280
	A2	8-3,4	8-4,5	8-5,5	8-5,5	12-6,6	12-9,0	16-13,5
	A3	28	40	63	80	100	160	180
	A4	47	64	90	110	140	200	255
	A5	20	31,5	50	63	80	125	140
	A6	12	20	31,5	40	50	80	100
	A7	72	86	118	146	179	247	300
	A8	∅3xDP4	∅5xDP6	∅6xDP7	∅6xDP7	∅8xDP7	∅10xDP10	∅12xDP10
	A9	4-M3xP0,5xDP6,5	7-M5xP0,8xDP10	7-M6xDP12	11-M6xDP12	11-M8xDP16	11-M10xDP20	12-M16xDP26
B	B2	19,5	19,5	30	29	38	50	66
	B3	4,5	8,5	12,5	12,5	12,5	16,5	20,5
	B4	3	3	6	6	6	8	12
	B5	7	7	10	10	14,6	15	20
	B6	4	4	7	8	10	12	18
	B7	89,5	139,5	197,5	233	273	341,5	414,2
	B8*	66,5	86,5	116	139	174	220	283
	B9*	9	14	12	15	17,5	22,5	53,5
	B10*	96,5	121,5	165	201,5	252	310	393
C	C1*	46	70	100	130	165	215	235
	C2*	M4xP0,7	M5xP0,8	M6	M8	M10	M12	M12
	C3*	≤11(12)	≤14(16)	≤19(22,24)	≤28(32)	≤38	≤48	≤55
	C4*	25	34	40	50	60	85	116
	C5*	30	50	80	110	130	180	200
	C6*	3,5	8	4	5	6	6	6
	C7*	42	60	90	115	142	190	220
	C8*	M3xP0,5	M5xP0,8	M6	M8	M10	M10	M10

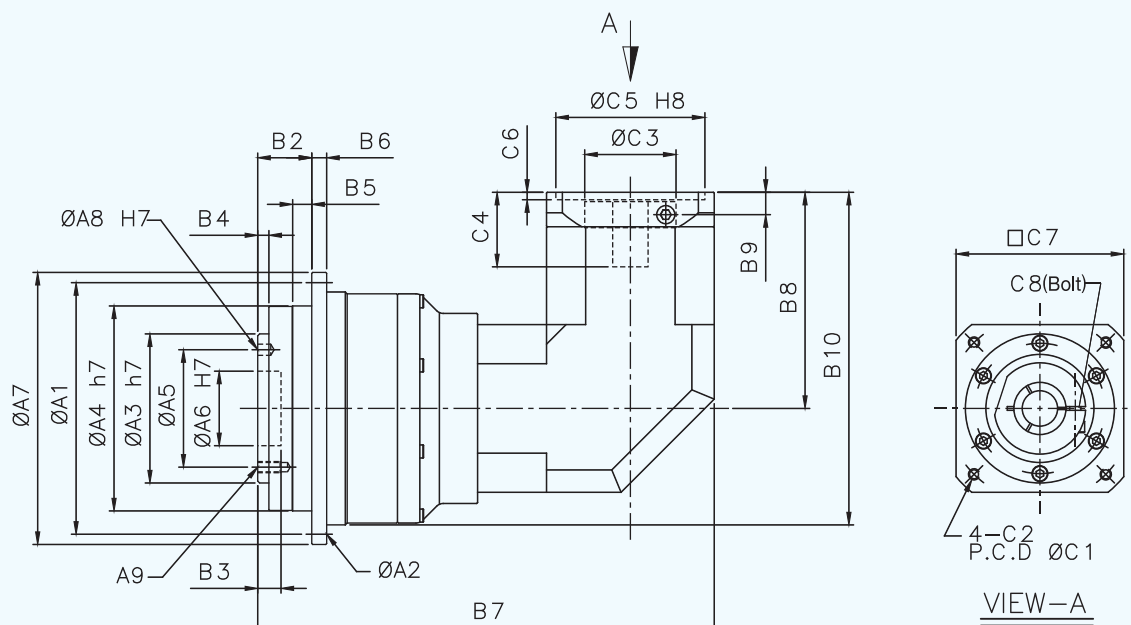
1. The size in ( ) is customized. 2. The \* size may depend on motors.

• Since specifications in this catalogue are subject to change without any notice for improvement of products, please contact with



## ■ Dimensions

2-stage reducer, Reduction ratio (i) = 25,35,40,50,70,100,140,200



NFR series

Unit : mm

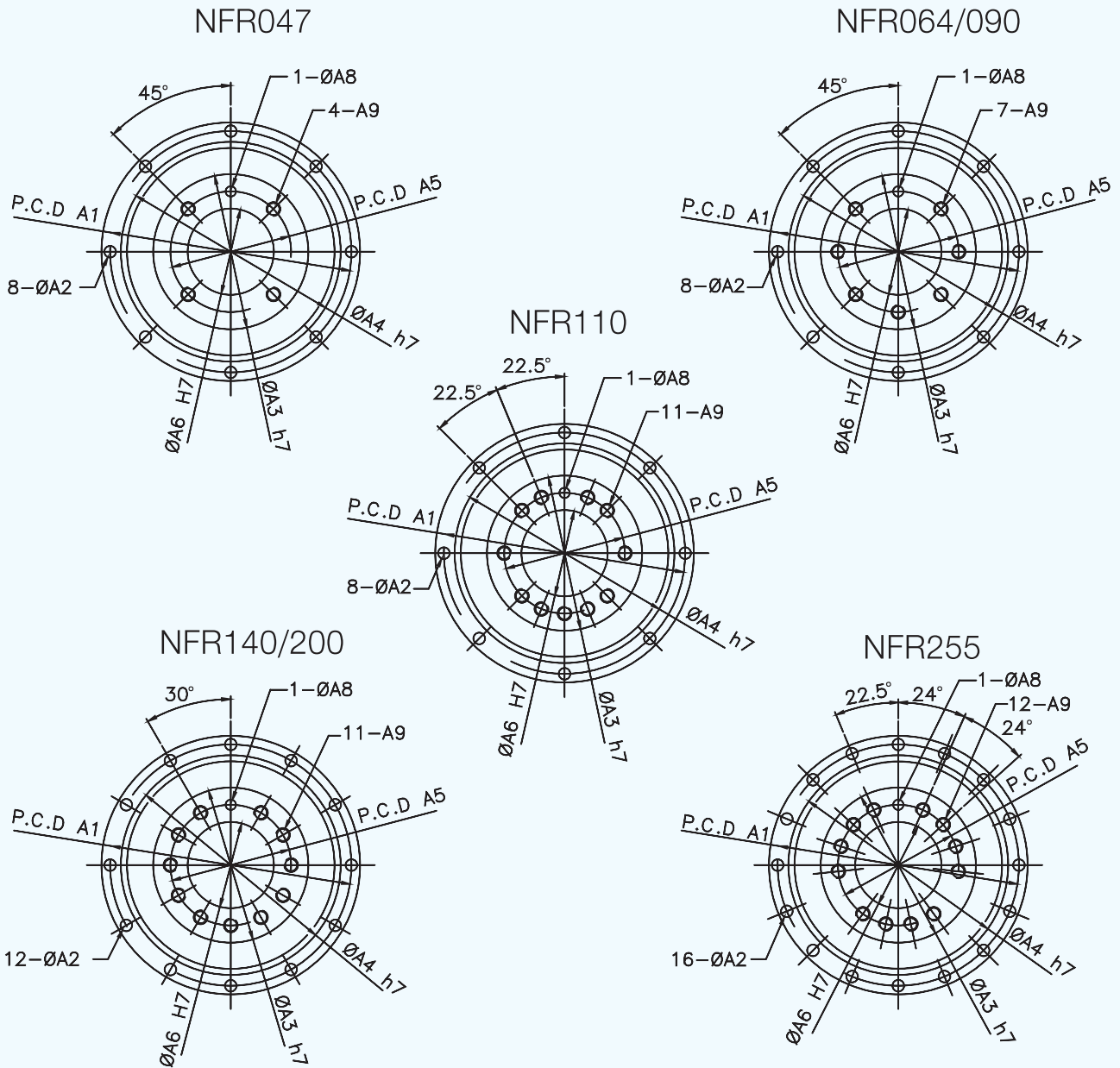
CODE	MODEL	NFR047	NFR064	NFR090	NFR110	NFR140	NFR200	NFR255
A	A1	67	79	109	135	168	233	280
	A2	8-3,4	8-4,5	8-5,5	8-5,5	12-6,6	12-9,0	16-13,5
	A3	28	40	63	80	100	160	180
	A4	47	64	90	110	140	200	255
	A5	20	31,5	50	63	80	125	140
	A6	12	20	31,5	40	50	80	100
	A7	72	86	118	146	179	247	300
	A8	Ø3xDP4	Ø5xDP6	Ø6xDP7	Ø6xDP7	Ø8xDP7	Ø10xDP10	Ø12xDP10
	A9	4-M3xP0,5xDP6,5	7-M5xP0,8xDP10	7-M6xDP12	11-M6xDP12	11-M8xDP16	11-M10xDP20	12-M16xDP26
B	B2	19,5	19,5	30	29	38	50	66
	B3	4,5	8,5	12,5	12,5	12,5	16,5	20,5
	B4	3	3	6	6	6	8	12
	B5	7	7	10	10	14,6	15	20
	B6	4	4	7	8	10	12	18
	B7	119,5	146,5	193	251,5	301,5	358,5	448,5
	B8*	66,5	66,5	86,5	116	139	174	220
	B9*	9	9	14	12	15	17,5	22,5
	B10*	96,5	101,5	135,5	178,5	217	280	347,5
C	C1*	46	46	70	100	130	165	215
	C2*	M4xP0,7	M4xP0,7	M5xP0,8	M6	M8	M10	M12
	C3*	≤11(12)	≤11(12)	≤14(16)	≤19(22,24)	≤28(32)	≤38	≤48
	C4*	25	25	34	40	50	60	85
	C5*	30	30	50	80	110	130	180
	C6*	3,5	3,5	8	4	5	6	6
	C7*	42	42	60	90	115	142	190
	C8*	M3xP0,5	M3xP0,5	M5xP0,8	M6	M8	M10	M10

1. The size in ( ) is customized. 2. The \* size may depend on motors.

• Since specifications in this catalogue are subject to change without any notice for improvement of products, please contact with NARA DRIVE previously when deciding to choose products.

## ■ Dimensions

### ■ Flange



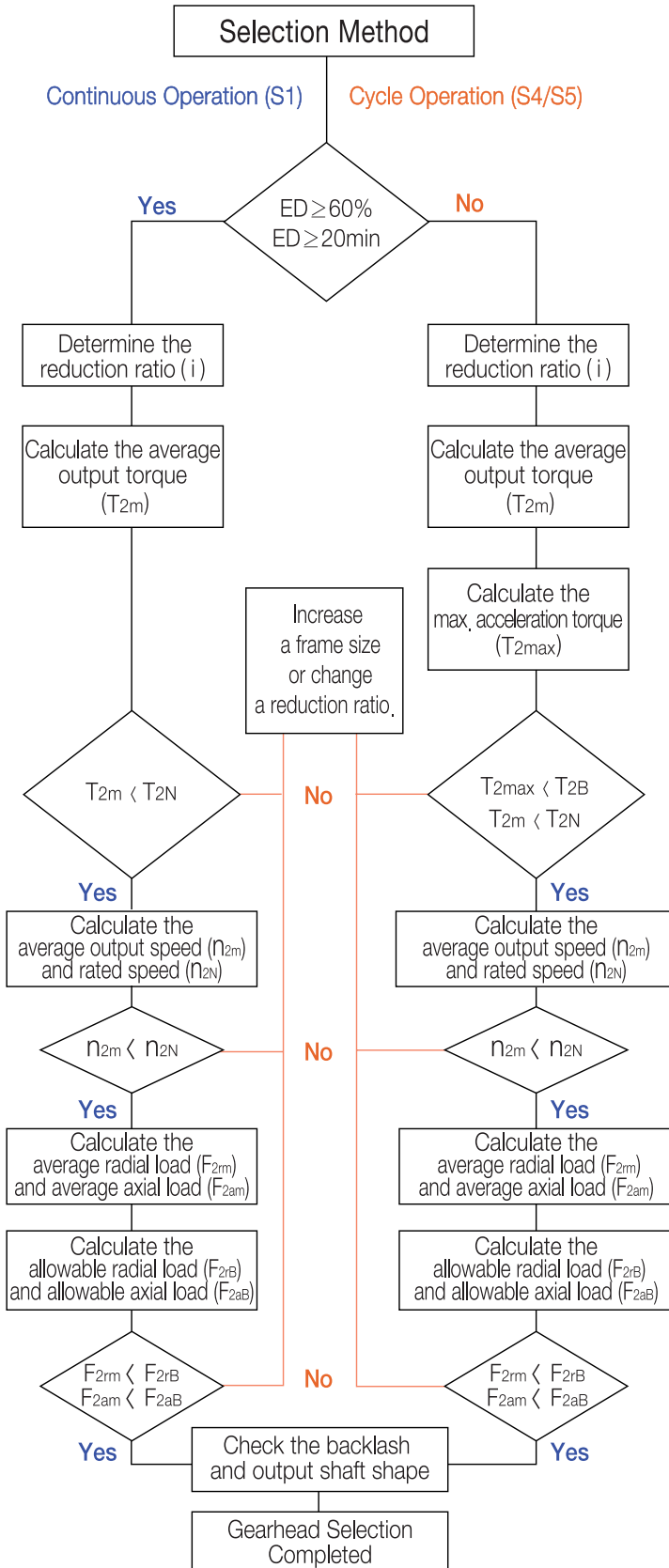
Unit : mm

CODE	NFR047	NFR064	NFR090	NFR110	NFR140	NFR200	NFR255
A1	67	79	109	135	168	233	280
A2	3,4	4,5	5,5	5,5	6,6	9,0	13,5
A3	28	40	63	80	100	160	180
A4	47	64	90	110	140	200	255
A5	20	31,5	50	63	80	125	140
A6	12	20	31,5	40	50	80	100
A8	3xDP4	5xDP6	6xDP7	6xDP7	8xDP7	10xDP10	12xDP10
A9	M3xP0,5xDP6,5	M5xP0,8xDP10	M6xDP12	M6xDP12	M8xDP16	M10xDP20	M16xDP26

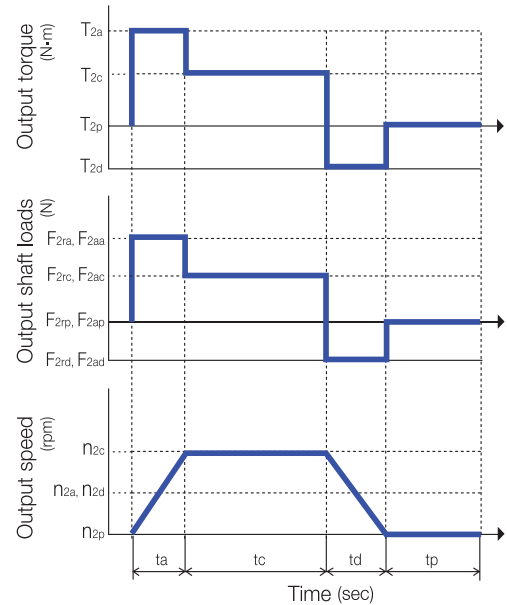
• Since specifications in this catalogue are subject to change without any notice for improvement of products, please contact with NARA DRIVE previously when deciding to choose products,

# How to Select a Gearhead

## Selection Chart



## Load Pattern



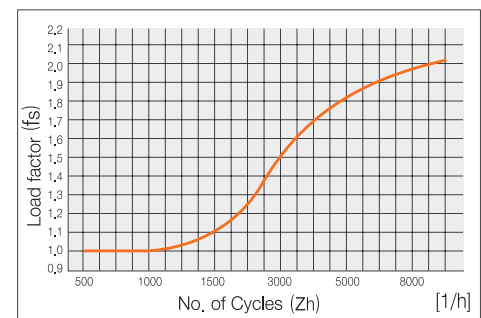
- Average output torque ( $T_{2m}$ )

$$T_{2m} = 3 \sqrt{\frac{n_{2a} \times t_a \times T_{2a}^3 + n_{2c} \times t_c \times T_{2c}^3 + n_{2d} \times t_d \times T_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

- Max. acceleration torque ( $T_{2max}$ )

$$T_{2max} = T_{1BMot} \times i \times f_s \times \eta$$

$T_{1BMot}$ : Motor's max. torque  
 $i$ : Reduction ratio  
 $f_s$ : Load factor  
 $\eta$ : Reducer's efficiency



- Average output speed ( $n_{2m}$ )

$$n_{2a} = n_{2d} = 1/2 \times n_{2c}$$

$$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$$

- Rated speed ( $n_{2N}$ )

$$n_{2N} = \frac{n_{1N}}{i}$$

- Average radial load ( $F_{2rm}$ )

$$F_{2rm} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2ra}^3 + n_{2c} \times t_c \times F_{2rc}^3 + n_{2d} \times t_d \times F_{2rd}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

- Average axial load ( $F_{2am}$ )

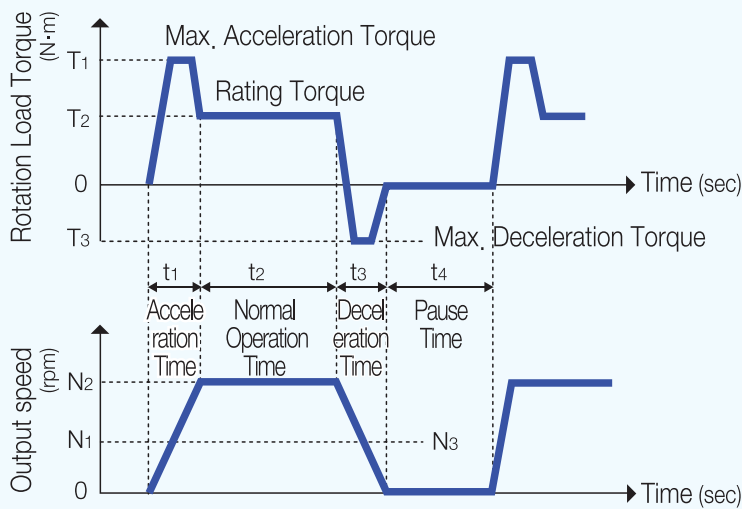
$$F_{2am} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2aa}^3 + n_{2c} \times t_c \times F_{2ac}^3 + n_{2d} \times t_d \times F_{2ad}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

How to Select a Reducer

## ■ Load Cycle(ED)

When installing a Gearhead on equipment for operation, its load condition varies by each equipment. To determine operating conditions when selecting a Gearhead based on load patterns, please to refer to the following calculation formula.

### ■ Load Cycle Chart



#### ① ED : Duty Cycle

$$ED (\%) = \frac{(t_1 + t_2 + t_3)}{(t_1 + t_2 + t_3 + t_4)} \times 100 [\%] \quad ED (\text{sec}) = t_1 + t_2 + t_3 [\text{sec}]$$

#### ② Zh : Number of Cycle

$$Zh = \frac{3,600[\text{s/h}]}{(t_1 + t_2 + t_3 + t_4)} \quad [1/\text{h}]$$

#### ③ i : Reduction ratio

$$i = \frac{\text{Max. Input Speed}(\text{rpm})}{\text{Max. Output Speed}(\text{rpm})}$$

#### ④ Operating Condition

- Continuous Operation(S1) : ED(%) > 60% or ED(sec) > 20min
- Cycle Operation(S4/S5) : ED(%) ≤ 60% and ED(sec) ≤ 20min

# Life of Gearhead

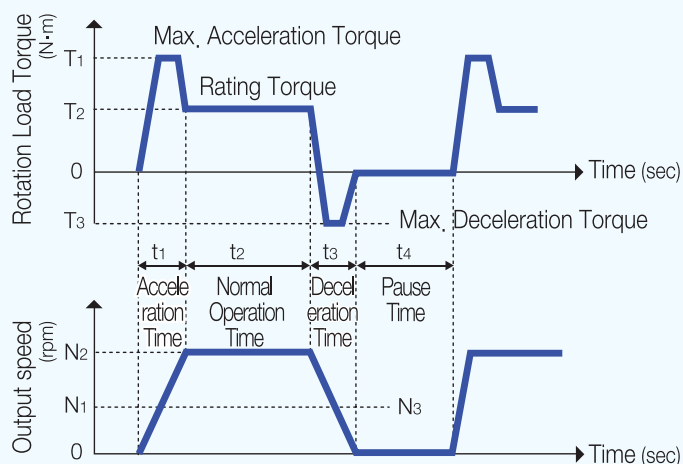
## Life of Gearhead(hr)

When installing a reducer on equipment for operation, its load condition varies by each equipment. To find out its lifetime, please refer to the following calculation formula.

$$L_{h10} = *20,000 \times \frac{N_o}{N_m} \times \left(\frac{T_o}{T_m}\right)^3$$

- L<sub>h10</sub>** : Calculated life of Gearhead (hr)
- N<sub>m</sub>** : Average output speed (rpm)
- N<sub>o</sub>** : Rated output speed (rpm)
- T<sub>m</sub>** : Average load torque (N·m)
- T<sub>o</sub>** : Rated output torque (N·m)
- \* For continuous operation(S1) : 10,000hrs

### Load Cycle Time Chart



① N<sub>m</sub> = Average output speed (rpm)

$$N_m = \frac{t_1 \times |N_1| + \dots + t_n \times |N_n|}{t_1 + \dots + t_n}$$

② T<sub>m</sub> = Average load torque (N·m)

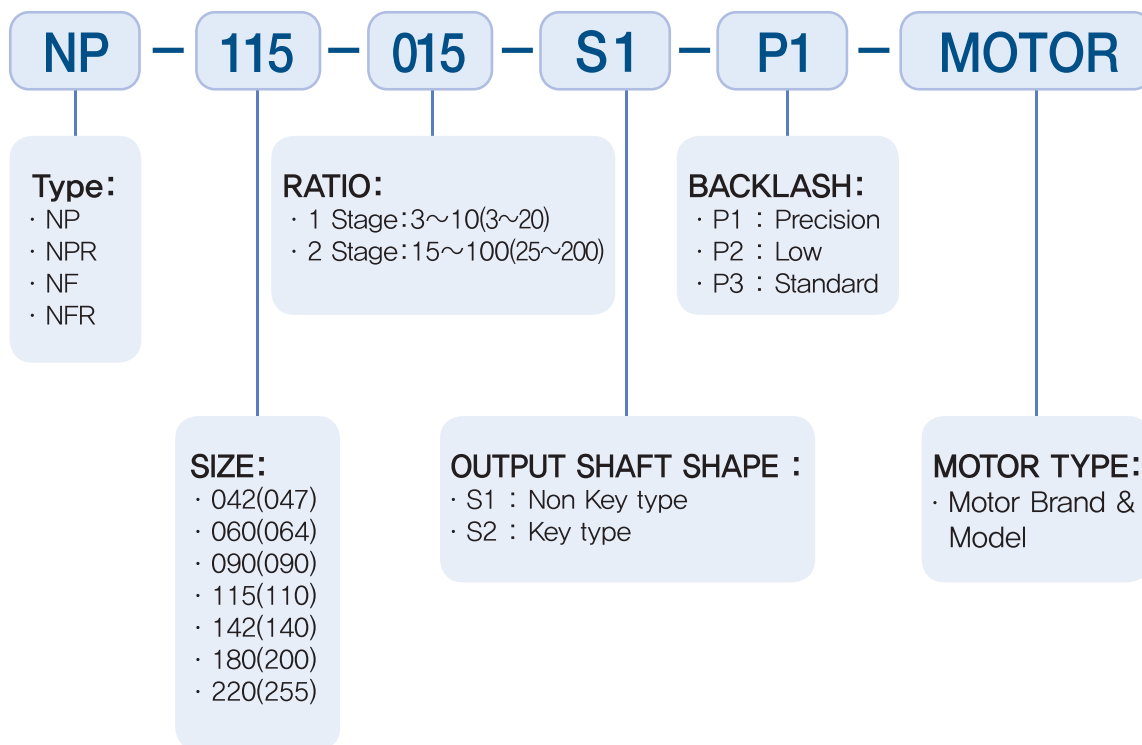
$$T_m = \sqrt[3]{\frac{t_1 \times |N_1| \times |T_1|^3 + \dots + t_n \times |N_n| \times |T_n|^3}{t_1 \times |N_1| + \dots + t_n \times |N_n|}}$$

(For Ball Bearing)

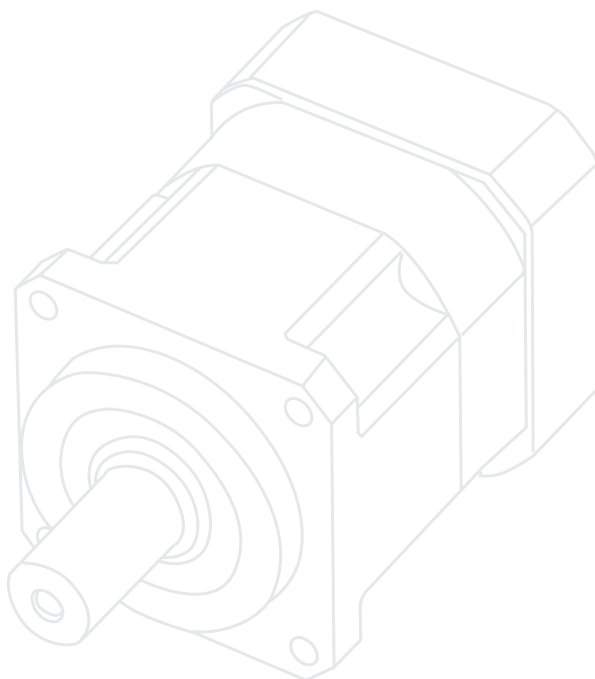
$$T_m = \sqrt[10/3]{\frac{t_1 \times |N_1| \times |T_1|^{10/3} + \dots + t_n \times |N_n| \times |T_n|^{10/3}}{t_1 \times |N_1| + \dots + t_n \times |N_n|}}$$

(For Roller Bearing)

## Type & Symbol



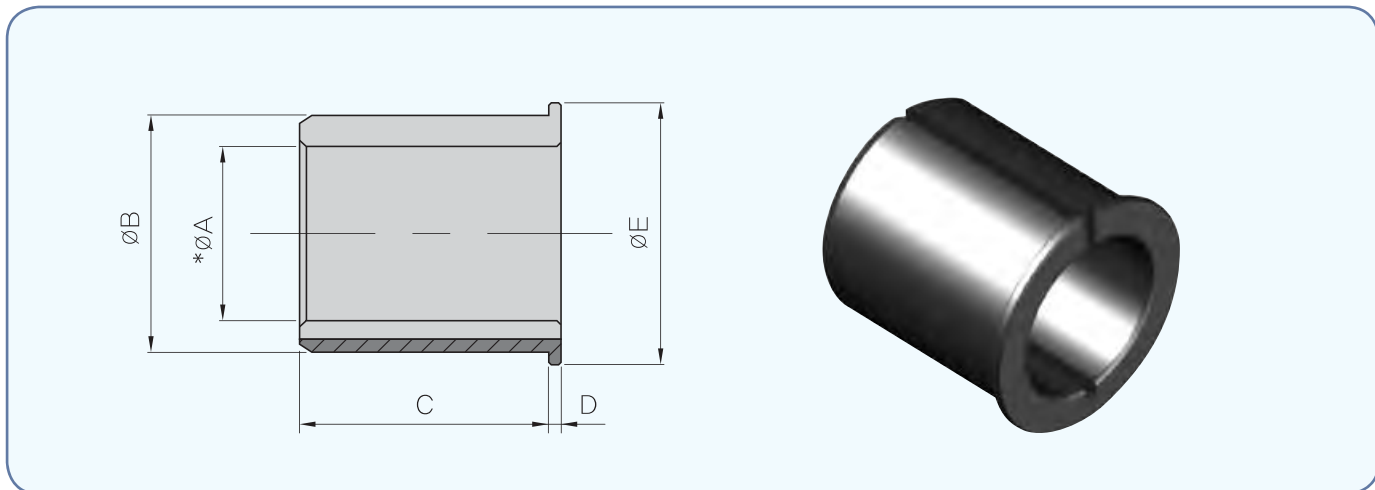
■ How to Order (Example) : NP115-015-S1-P1-HIGEN/FMA-CN06.





# Bushing

## ■ Dimensions



Model	042	060	090	115	142	180	220
*ØA	6,8	8,11	14,16	19,22,24	24,28	35,42	35
ØB	11	14	19	28	38	48	55
C	13,5	15	20	30	39	49	49
D	1	1	1	1	1	1	1
ØE	12	16	21	30	40	50	57

1. \*ØA is an optional size based on a motor shaft. Please designate a size when placing an order.
2. Since sizes in this catalogue are subject to change without any notice for improvement of products, please contact with NARA DRIVE previously when deciding to choose products.

## ■ How to Fasten

- For a correct clamping force, align Bushing and Set Collar in each slot position.
- In case that motor's output shaft is a Flat Shaft, the flat surface of motor's output shaft and the set collar bolt of Gearhead are to be fitted vertically as illustrated in the Figure.

# Simple Selection

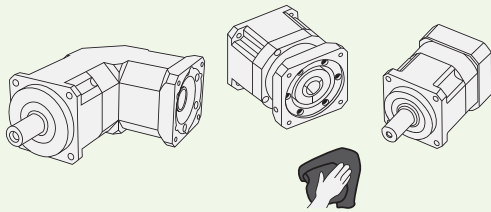
## ■ Based to the motor Shaft

Model Motor shaft (mm) Motor power	042	060 060A	090 090A	115	142	180	220
	6~12	8~16	14~24	19~32	24~38	35~48	35~55
100w	●	●					
200w	●	●					
400w		●	●				
750w			●	●			
1kw			●	●	●		
1,5kw			●	●	●		
2,2kw				●	●		
3,75kw				●	●		
5,5kw					●	●	
7,5kw					●	●	
11kw						●	●
15kw						●	●
22kw						●	●
30kw						●	●

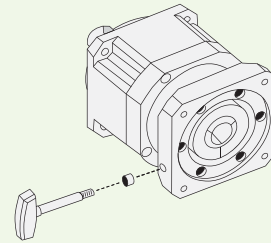
## ■ Classification of Gearheads by Precision

Backlash	Usage	Control Method
<b>Precision:</b> Within 3-arc minute backlash	Machine tool, Peripheral unit of robot, Robot's peripheral unit (Positioner, slider)	Position Control
<b>Low:</b> Within 5-arc minute backlash	Precision conveyor (Transferring, sorting, stacking), Transfer logistics system (AGV, automatic warehouse), Textile machinery, Cutting machine, Printing machine	Speed Control
<b>Standard:</b> Within 8-arc minute backlash	Film winder, Stretcher, Testers, Conveyor, Transfer logistics system, Printing machine, Food processing machinery, Machine tool (ATC, Dividing unit)	Torque Control

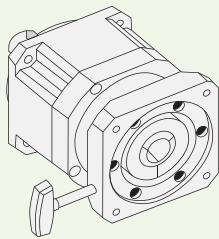
# How to Mount a Motor



1. Check the sizes of motor and reducer once again, and keep the fitting part clean.



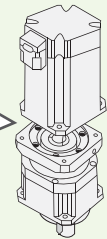
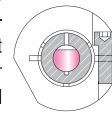
2. Unscrew the screw plug of motor flange. Check the position to loosen set collar bolt.



3. Unfasten set collar bolt only one full turn it.

### ※Correct Fitting Method

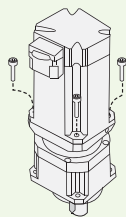
In case that motor's output shaft is a Flat Shaft, the flat surface of motor's output shaft and the set collar bolt of Gearhead are to be fitted vertically as illustrated in the Figure.



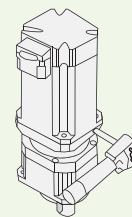
\* It's the best way to mount a motor in a vertical direction.

\* If a key is mounted in motor shaft, remove it.

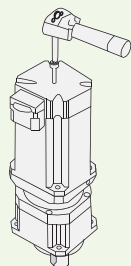
4. Assemble motor shaft and Gearhead input part.  
\* Insert bushing, if necessary.



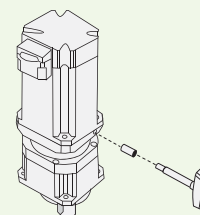
5. The clamping bolts of motor and Gearhead are to be tightened approximated 5% of the required torque.



6. Use torque wrench to fasten the set collar bolt, with its required tightening torque.



7. Use torque wrench to fasten the bolts of motor and Gearhead with required tightening torque.



8. Fasten the screw plug of motor flange.

# Tightening Torque

## ■ Motor / Gearhead Assembly Bolt

Bolt Size	Tightening Torque(N·m)		
	Strength 8.8	Strength 10.9	Strength 12.9
M3 x P0.5	1.1	1.6	1.9
M4 x P0.7	2.6	3.9	4.5
M5 x P0.8	5.2	7.6	8.9
M6	9.0	12.8	15.4
M8	21.6	31.8	37.2
M10	43	63	73
M12	73	108	126
M14	117	172	201
M16	180	264	309

## ■ Set Collar Bolt

Size	No. of Stage	Bolt Size	Tightening Torque(N·m)
NP, NPR 042 NF, NFR 047	1-stage	M3 x P0.5 x 10L	2.1
	2-stage	M3 x P0.5 x 10L	2.1
NP, NPR 060 NF, NFR 064	1-stage	M5 x P0.8 x 15L	10
	2-stage	M3 x P0.5 x 10L	2.1
NP 060A	2-stage	M5 x P0.8 x 15L	10
NP, NPR 090 NF, NFR 090	1-stage	M6 x 15L	17
	2-stage	M5 x P0.8 x 15L	10
NP 090A	2-stage	M6 x 15L	17
NP, NPR 115 NF, NFR 110	1-stage	M8 x 25L	42
	2-stage	M6 x 15L	17
NP, NPR 142 NF, NFR 140	1-stage	M10 x 30L	83
	2-stage	M8 x 25L	42
NP, NPR 180 NF, NFR 200	1-stage	M10 x 35L	83
	2-stage	M10 x 30L	83
NP, NPR 220 NF, NFR 255	1-stage	M12 x 35L	140
	2-stage	M10 x 35L	83

• Since specifications in this catalogue are subject to change without any notice for improvement of products, please contact with NARA DRIVE previously when deciding to choose products.

# Caution & Warranty

## ■ Caution

**Please attention to the handling of products.**

- Do not apply physical impact to products, for example, with hammer and handle products carefully so there is no damage caused by falling.

**Please attention to assembly work when connecting a product to load side directly.**

- When connecting a product to load side (ex: belt, chain) directly, pay attention to the direct connection state such as concentricity, parallelism and tension etc.
- Please attention to the handling of product's corner and keyway of output shaft ; otherwise, it may cause an injury.
- Do not put your hands or other foreign objects into rotating the shaft when the product is being driven ; otherwise it may cause an injury.

**Do not apply any physical impact to products.**

- When assembling a pulley, coupling and key etc.

**Do not exceed the allowable torque.**

- Be careful not to apply in excess of max. allowable torque ; otherwise, it will be troubles caused by bolt loosening, shaking and damage etc.

**Do not disassemble the product.**

- Do not disassemble or reassemble products arbitrarily. In this case, we don't ensure the original performance of products.

**If it feels strange or wrong to use the system, you should stop it immediately.**

- If there is any strange sound, vibration and heat etc, please to stop the system immediately ; otherwise, it may give adverse effect on the system.

## ■ Warranty

The warranty period and coverage of products are as follows :

**1 Warranty Period**

Under the condition that you use products according to operation, assembly and lubrication etc, we ensure warranty period for 12 months after delivery of products or for 2,000 hours of operation, whichever is earlier.

**2 Warranty Coverage**

This Warranty coverage does not included by :

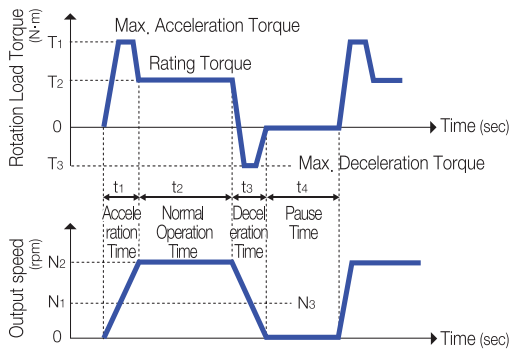
- To connected to other devices or equipment of customers.
- To separated from the devices or equipment.
- Installation.
- Subsidiary work cost.
- Transportation cost.
- Opportunity loss and operation loss of Customers.
- Any other damages.

# How to Place an Order

## Check List for ordering the Gearheads

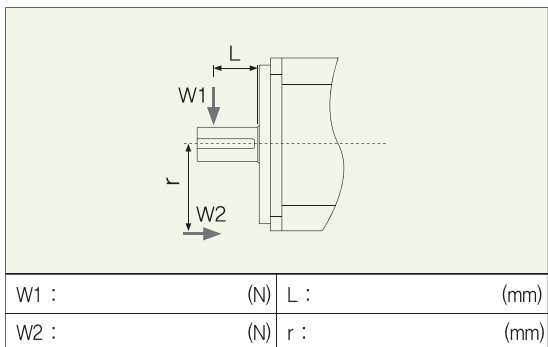
Customer	Company :	Department :	Name :
	TEL :	FAX :	E-mail :
Address			
Place to Use			
Equipment Name			
Usage			
Gearhead Specifications	Reduction ratio (i) =		Backlash: (arc minute)

### 1. Load Condition



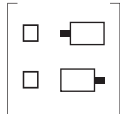
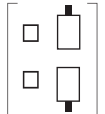
	Max. acceleration	Normal	Max. deceleration	Pause
Load Torque(N·m)	T1	T2	T3	0
Speed(rpm)	N1	N2	N3	0
Time(sec)	t1	t2	t3	t4
Running Time	(Cycle/day)	(Day/year)	(year)	

### 2. Load Condition of Output Shaft



### 3. Mounting Direction

Mark

Horizontal   Vertical 

Outline of mounting

### 4. Input Drive Specifications

Mark

Servo motor  Other( )

Capacity	(W)
Rated Torque	(N·m)
Input Speed	(rpm)
Output Shaft Dimensions	(mm)

### 5. Others

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