

# PHFR

The PHFR Precision Round mounting flange, caged precision class helical planetary speed reducer in a right-angle housing through sizes 255. ISO-9409 flange output, high torque capacity, quiet operation with backlash as low as  $<2$  arc-min. This gearbox provide a wide range of performance levels to high positioning accuracy and motion control applications, particularly when high precision and high torsional rigidity are required. Taper roller bearings with bending moment load capacity up to 6500 N.m, and axial load capacity up to 21850 N. The PHFR is specially well suited to work with pinion and rack for linear operation. Commonly adapted in metal cutting machines, wood processing equipment, machine centers and highly dynamic motion control systems. In-line configuration (PHF series) is also available with max. Frame size 255 mm.

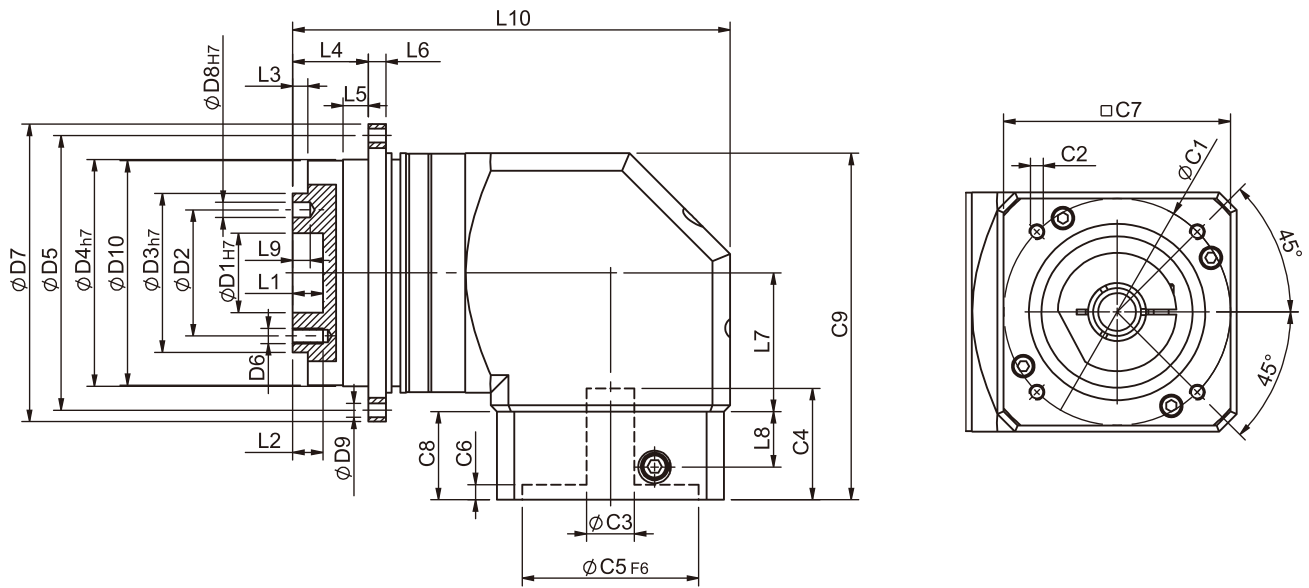


Frame Size (mm)	42, 60, 90, 115, 142, 200, 255
Ratio	3 : 1 - 200 : 1
Nominal Input Speed (rpm)	2,000 - 5,000
Max Input Speed (rpm)	4,000 - 10,000
Backlash (arc-min)	1 Stage : 2 - 7 2 Stages : 4 - 9
Noise Level (dBA / 1m)	62 - 74

## Features

- ▶ ISO 9409 Flange Output.
- ▶ 3 levels of backlash, 7 frame sizes from 42-255 mm.
- ▶ Premium and precision gear design, ratios from 3-200:1.
- ▶ One-piece planet carrier/output shaft, high rigidity and radial load capacity.
- ▶ Hardened and ground gearing, high wear resistance and impact toughness.
- ▶ One-piece ring gear/housing, high precision and torque output.
- ▶ Planets with full needle bearing support.
- ▶ IP65 enclosure and synthetic lubricant, maintenance-free service life.

# PHFR Single Stage Dimensions



## Specifications

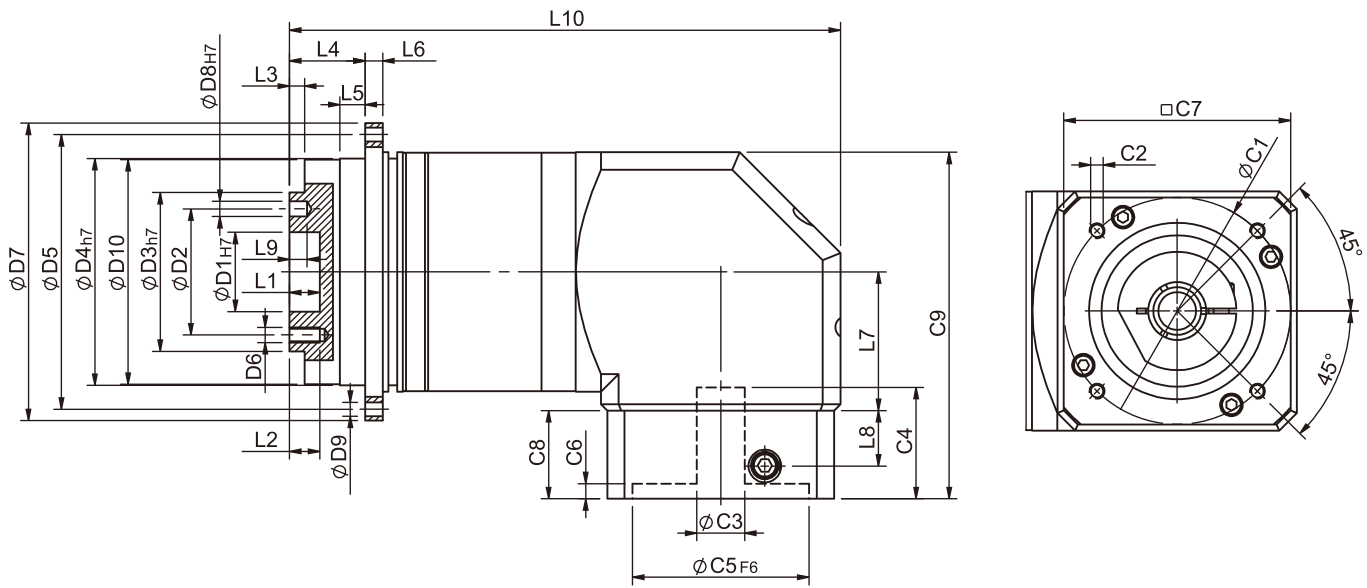
Unit:mm

Dimensions	PHFR42	PHFR60	PHFR90	PHFR115	PHFR142	PHFR200	PHFR255
D1 <sub>H7</sub>	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 <sub>H7</sub>	28	40	63	80	100	160	180
D4 <sub>H7</sub>	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	M3x0.5P	M5x0.8P	M6x1.0P	M6x1.0P	M8x1.25P	M10x1.5P	M16x2.0P
D7	72	86	118	145	179	247	300
D8 <sub>H7</sub>	3	5	6	6	8	10	12
D9	3.4	4.5	5.5	5.5	6.6	9	13.5
D10	46.2	63.2	89.2	109.2	139.2	199.2	254.2
L1	4	8	12	12	12	16	20
L2	6	7.2	12	13.5	16	22.5	30.5
L3	3	3	6	6	6	8	12
L4	19.5	19.5	30	29	38	50	66
L5	7	7	10	10	14.6	15	20
L6	4	4	7	8	10	12	18
L7	32.2	44.8	55	69	71	92.5	92.5
L8	13.5	21.5	22	32	44.7	44	60
L9	4	6	7	7	7	10	10
L10	92.2	128.3	173.6	204.2	250.7	330.7	392.2
C1 <sup>2</sup>	46	70	90	90	145	200	215
C2 <sup>2</sup>	M4x0.7P	M5x0.8P	M6x1.0P	M6x1.0P	M8x1.25P	M12x1.75P	M12x1.75P
C3 <sup>2</sup>	≤8/≤11	≤14/≤19	≤19/≤24	≤24/≤32	≤35	≤50	≤55
C4 <sup>2</sup>	29	34	44	53.5	76.8	78.8	98.7
C5 <sup>2F6</sup>	30	50	70	70	110	114.3	180
C6 <sup>2</sup>	6	5	5	5.5	9	6	6
C7 <sup>2</sup>	42.6	60	90	115	140	180	220
C8 <sup>2</sup>	25	33	35	48	65	65	85
C9 <sup>2</sup>	78.5	112.8	137.5	176.5	225.5	246.5	266.5

\* C1~C9 are motor specific dimensions (metric std shown). Size may vary according to motor flange.

\* Specification subject to change without notice.

# PHFR Double Stage Dimensions-1



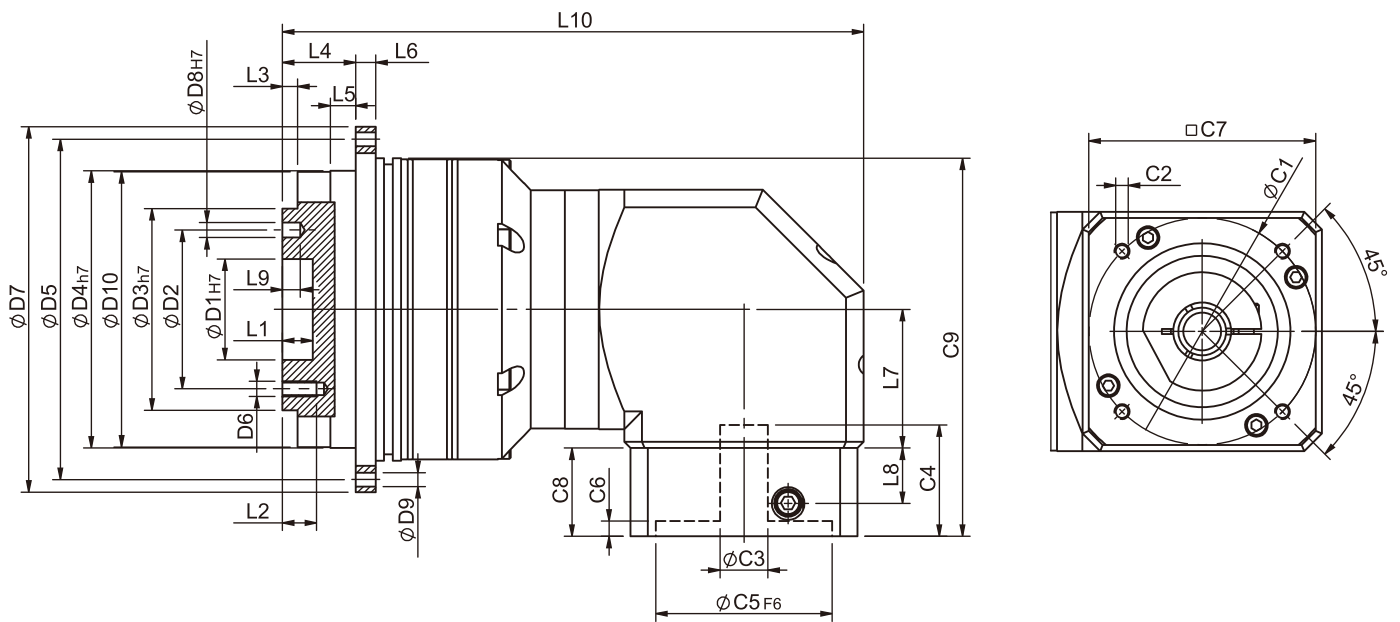
## Specifications

Unit:mm

Dimensions	PHFR42	PHFR60	PHFR90
D1 <sub>H7</sub>	12	20	31.5
D2	20	31.5	50
D3 <sub>H7</sub>	28	40	63
D4 <sub>H7</sub>	47	64	90
D5	67	79	109
D6	M3x0.5P	M5x0.8P	M6x1.0P
D7	72	86	118
D8 <sub>H7</sub>	3	5	6
D9	3.4	4.5	5.5
D10	46.2	63.2	89.2
L1	4	8	12
L2	6	7.2	12
L3	3	3	6
L4	19.5	19.5	30
L5	7	7	10
L6	4	4	7
L7	32.2	44.8	55
L8	13.5	21.5	22
L9	4	6	7
L10	119.9	163.3	218.6
C1 <sup>2</sup>	46	70	90
C2 <sup>2</sup>	M4x0.7P	M5x0.8P	M6x1.0P
C3 <sup>2</sup>	≤8	≤14	≤19/≤24
C4 <sup>2</sup>	29	34	44
C5 <sup>2</sup> <sub>F6</sub>	30	50	70
C6 <sup>2</sup>	6	5	5
C7 <sup>2</sup>	42.6	60	90
C8 <sup>2</sup>	25	33	35
C9 <sup>2</sup>	78.5	112.8	137.5

\* C1~C9 are motor specific dimensions (metric std shown). Size may vary according to motor flange.  
\* Specification subject to change without notice.

# PHFR Double Stage Dimensions-2



## Specifications

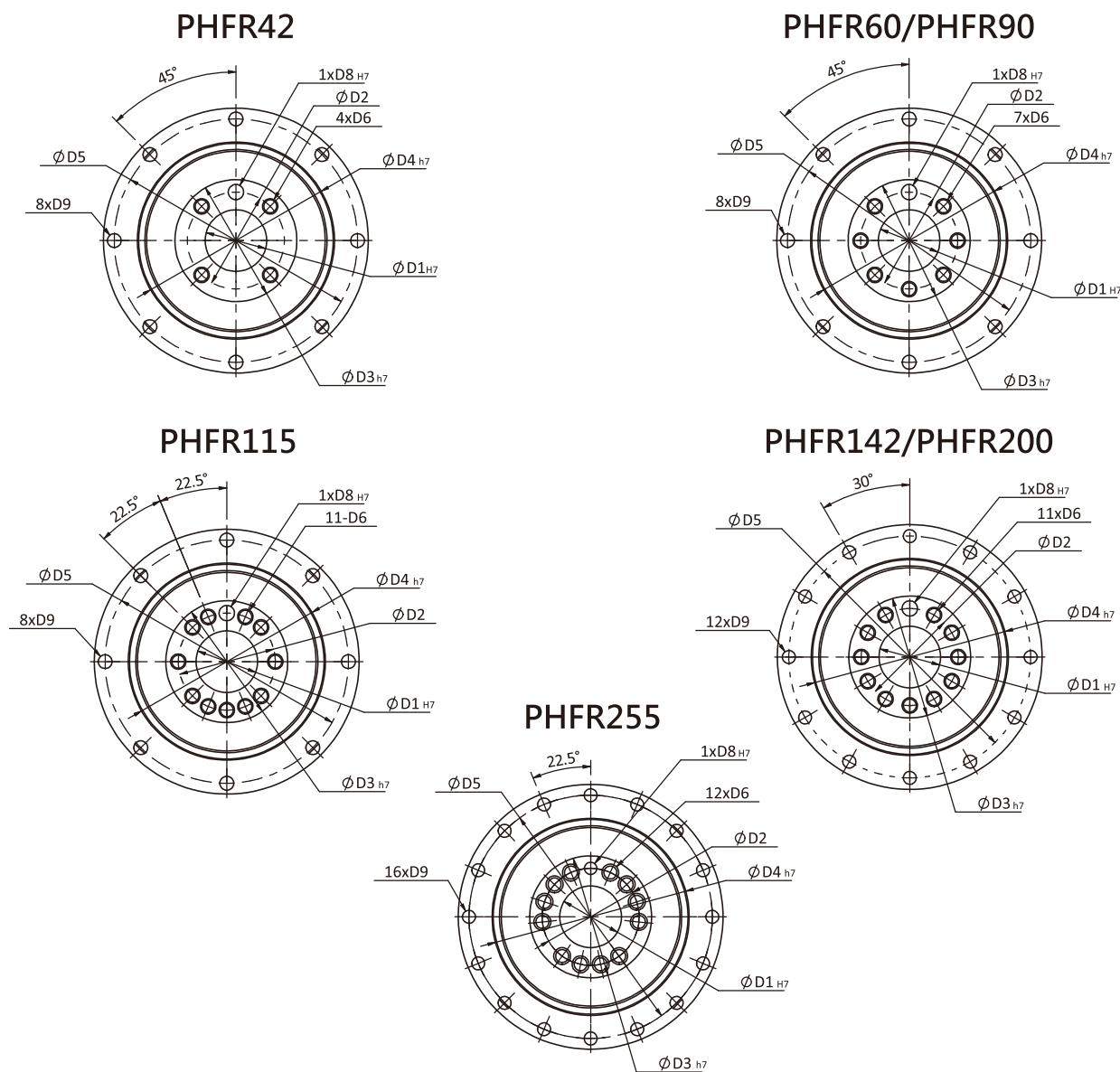
Unit:mm

Dimensions	PHFR60T	PHFR90T	PHFR115T	PHFR142T	PHFR200T	PHFR255T
D1 <sub>h7</sub>	20	31.5	40	50	80	100
D2	31.5	50	63	80	125	140
D3 <sub>h7</sub>	40	63	80	100	160	180
D4 <sub>h7</sub>	64	90	110	140	200	255
D5	79	109	135	168	233	280
D6	M5x0.8P	M6x1.0P	M6x1.0P	M8x1.25P	M10x1.5P	M16x2.0P
D7	86	118	145	179	247	300
D8 <sub>h7</sub>	5	6	6	8	10	12
D9	4.5	5.5	5.5	6.6	9	13.5
D10	63.2	89.2	109.2	139.2	199.2	254.2
L1	8	12	12	12	16	20
L2	7.2	12	13.5	16	22.5	30.5
L3	3	6	6	6	8	12
L4	19.5	30	29	38	50	66
L5	7	10	10	14.6	15	20
L6	4	7	8	10	12	18
L7	32.2	44.8	55	69	71	92.5
L8	13.5	21.5	22	32	44.7	44
L9	6	7	7	7	10	10
L10	130.6	173.8	230.6	270.7	361.4	439.2
C1 <sup>2</sup>	46	70	90	90	145	200
C2 <sup>2</sup>	M4x0.7P	M5x0.8P	M6x1.0P	M6x1.0P	M8x1.25P	M12x1.75P
C3 <sup>2</sup>	≤8/≤11	≤14/≤19	≤19/≤24	≤24/≤32	≤35	≤50
C4 <sup>2</sup>	29	34	44	53.5	76.8	78.8
C5 <sup>2F6</sup>	30	50	70	70	110	114.3
C6 <sup>2</sup>	6	5	5	5.5	9	6
C7 <sup>2</sup>	42.6	60	90	115	140	92.5
C8 <sup>2</sup>	25	33	35	48	65	65
C9 <sup>2</sup>	84.4	125.3	150	176.5	259.5	284

\* C1~C9 are motor specific dimensions (metric std shown). Size may vary according to motor flange.

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# PHFR Flange Dimensions



## Specifications

Unit:mm

Dimensions	PHFR42	PHFR60	PHFR90	PHFR115	PHFR142	PHFR200	PHFR255
D1 <sub>H7</sub>	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 <sub>h7</sub>	28	40	63	80	100	160	180
D4 <sub>h7</sub>	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	M3x0.5P	M5x0.8P	M6x1.0P	M6x1.0P	M8x1.25P	M10x1.5P	M16x2.0P
D8 <sub>H7</sub>	3	5	6	6	8	10	12
D9	3.4	4.5	5.5	5.5	6.6	9	13.5

★ Specification subject to change without notice.

# PHFR Specifications

Specifications		Stage	Ratio	PHFR42	PHFR60	PHFR90	PHFR115	PHFR142	PHFR200	PHFR255
Nominal Output Torque $T_{2N}$	N•m	1	3	-	40	105	180	340	580	950
			4	16	43	110	240	500	1100	1500
			5	17	50	130	290	600	1200	1800
			7	14	44	125	270	530	1100	1750
			10	17	50	130	260	540	900	1500
			14	14	44	125	270	530	1100	1750
			20	11	37	95	220	430	900	1450
		Stage	Ratio	PHFR42	PHFR60(T)	PHFR90(T)	PHFR115T	PHFR142T	PHFR200T	PHFR255T
		2	15	-	40	105	180	600	1200	2000
			20	16	43	110	240	600	1200	2000
			25	17	50	130	290	600	1200	2000
			30	17	40	105	180	600	1200	2000
			35	17	50	130	290	600	1200	2000
			40	16	43	110	240	600	1200	2000
			50	17	50	130	290	600	1200	2000
			70	14	44	125	270	530	1100	1750
			100	11	37	95	220	430	900	1450
			140	14	44	125	270	530	1100	1750
200	11	37	95	220	430	900	1450			
Emergency Stop Torque $T_{2NOT}$	N•m		(3.0 times of Nominal Output Torque) (*Max. Output Torque $T_{2B}$ =60% of Emergency Stop Torque)							
Nominal Input Speed $n_{1N}$	rpm	1,2	3-200	5000	5000	4000	4000	3000	3000	2000
Max. Input Speed $n_{1max}$	rpm	1,2	3-200	10000	10000	8000	8000	6000	6000	4000
Micro Backlash P0	arcmin	1	3-20	-	-	≤ 3	≤ 2	≤ 2	≤ 2	≤ 2
		2	15-200	-	-	≤ 5	≤ 4	≤ 4	≤ 4	≤ 4
Precision Backlash P1	arcmin	1	3-20	≤ 5	≤ 5	≤ 5	≤ 4	≤ 4	≤ 4	≤ 4
		2	15-200	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7
Standard Backlash P2	arcmin	1	3-20	≤ 7	≤ 7	≤ 7	≤ 6	≤ 6	≤ 6	≤ 6
		2	15-200	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9
Torsional Rigidity	N•m / arcmin	1,2	3-200	6	12	30	80	150	450	1000
Max. Bending Moment $M_{2kB}^1$	N•m	1,2	3-200	43	125	288	503	1470	2950	6500
Max. Axial Load $F_{2aB}^1$	N	1,2	3-200	1015	1340	2868	3890	9850	12560	21850
Operating Temp.	°C		3-200	-10°C ~ +90°C						
Service Life	hr		3-200	20,000 (10,000 Continuous Operation)						
Efficiency	%	1	3-20	≥ 95%						
		2	15-200	≥ 92%						
Weight	kg	1	3-20	1.1	2.3	6.6	13.5	25.1	50	85
		2	15-200	1.6	3.2/2.2	8.6/5.3	14.8	26.7	55	88
Mounting Position	-	1,2	3-200	Any Direction						
Noise Level <sup>2</sup>	dB(A)/1m	1,2	3-200	62	64	66	68	70	72	74
Protection Class	-	1,2	3-200	IP65						
Lubrication	-	1,2	3-200	Synthetic Lubricant						
Inertia (J1)										
Stage	Ratio	unit		PHFR42	PHFR60	PHFR90	PHFR115	PHFR142	PHFR200	PHFR255
1	3/4/5/7/9	kg•cm <sup>2</sup>		0.06	0.40	2.28	6.87	24.2	69.8	138.2
	10/14/20			0.05	0.30	1.45	4.76	14.5	50.3	103.6
2	15/20/25/35			PHFR42	PHFR60(T)	PHFR90(T)	PHFR115T	PHFR142T	PHFR200T	PHFR255T
	Others			0.06	0.40 (0.08)	2.28 (0.72)	3.02	7.83	27.7	80.3
		0.05	0.30 (0.06)	1.45 (0.38)	1.64	5.00	15.9	55.3		

\* 1. Applied to the output shaft center at 100 rpm.

\* 2. Environment noise level 30 dB; distance 1m; measured under free loading with input speed 3000 rpm; ratio = 10 (1-stage) or ratio = 100 (2-stage).

※The above figures/specifications are subject to change without prior notice.

Products due to human error, natural disasters or other factors lead to poor or damaged, will not be covered under warranty.