

CITIZEN

Brushless Motors

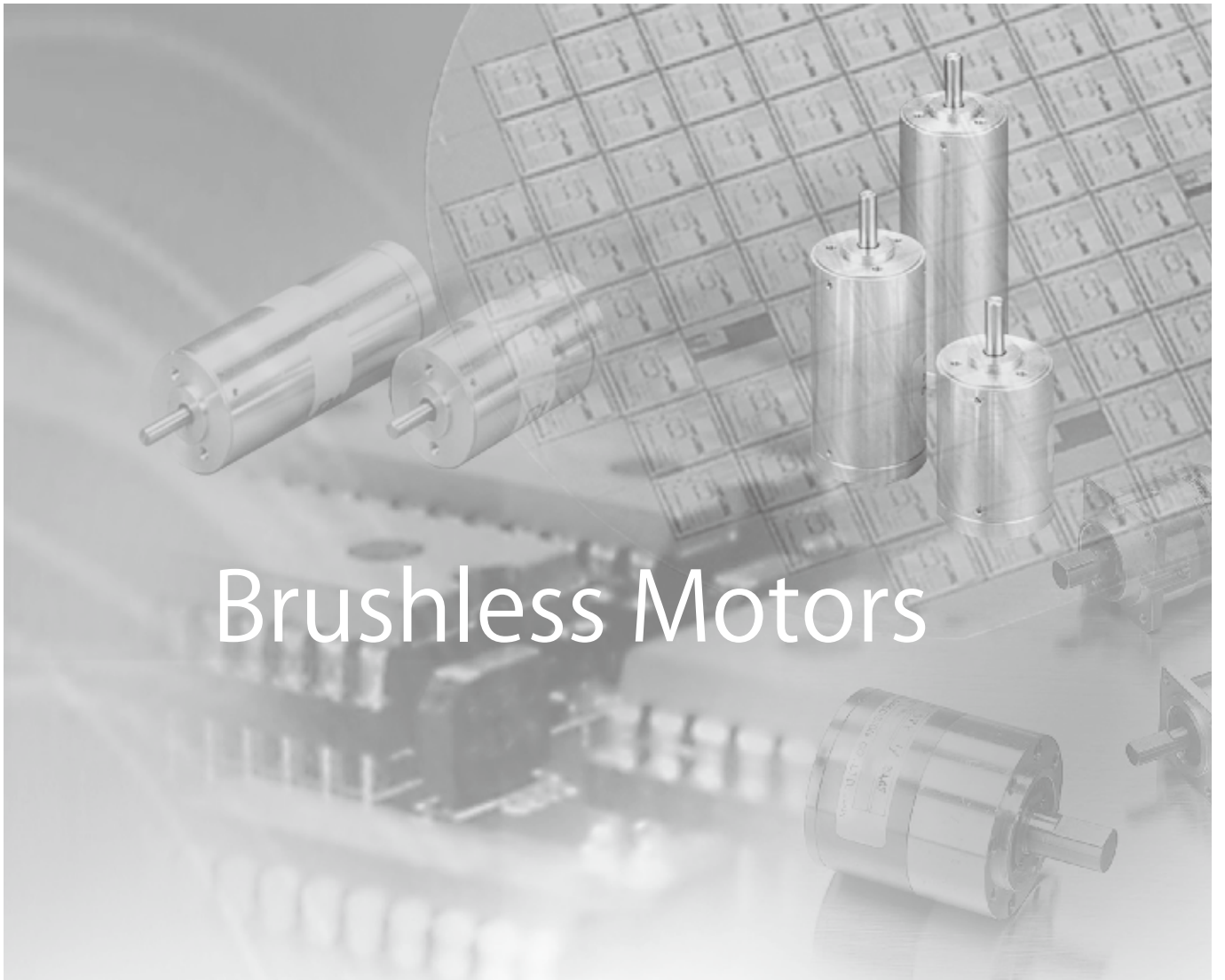


Brushless Motors

- BD-16 Series
- BD-18 Series
- BD-22 Series
- BD-26 Series
- BD-30 Series

CITIZEN CHIBA PRECISION CO., LTD.

<https://ccj.citizen.co.jp/en>



Brushless Motors

CITIZEN CHIBA PRECISION's Brushless Motors use neodymium (NdFeB) magnets to achieve high output.

Unlike DC motors (motors with brushes), they are brushless and have longer life than ever before.

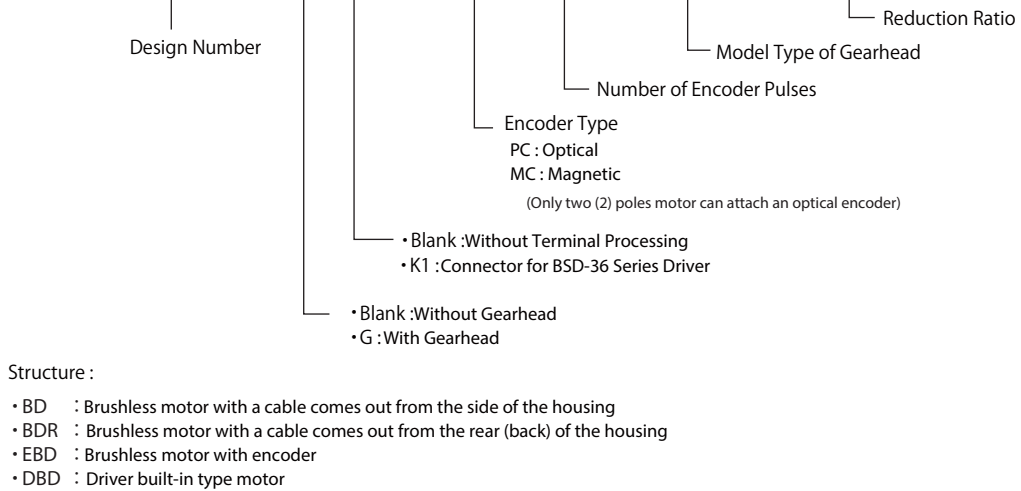
By adopting Citizen Chiba Precision's original coreless winding, smooth rotation from low speed to high speed can be obtained.



Brushless Motors

Model Number

EBD - 183801 GK1 - MC 512 ZJP 1/144



Features

High Output

Our brushless motors are specially designed to maximize the output per unit volume by adopting neodymium (NdFeB) magnet to the rotor and by maximizing copper wire windings in the stator.

Long Life

Because of the brushless structure, the life of the ball bearings is the only factor that affects the life of the motor.

Smooth Rotation

By adopting our unique slotless structured wire winding, smooth rotation can be obtained from low speed to high speed.

Low Heating

By adopting a thin electromagnetic steel plate with excellent high frequency characteristics, our brushless motors have low heat generation and low iron loss at high-speed rotation.

Variety of Models

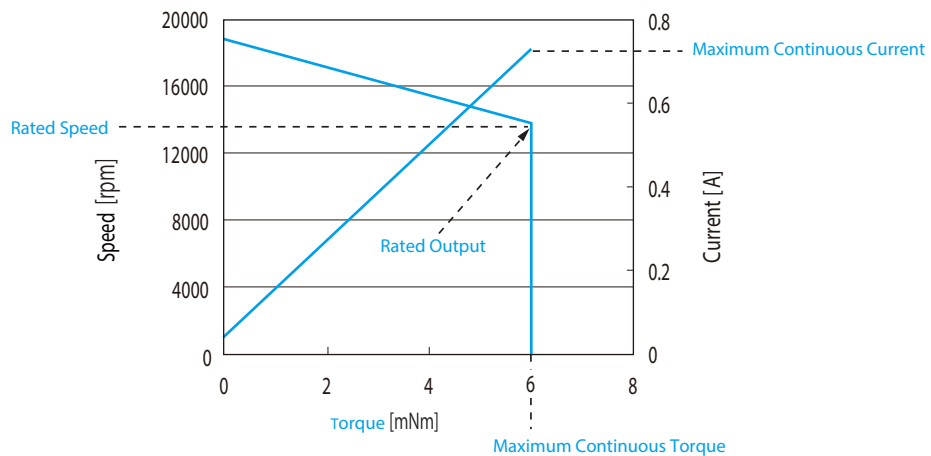
The total of 40 models are available in $\varnothing 16$, $\varnothing 18$, $\varnothing 22$, $\varnothing 26$, and $\varnothing 30$.

Custom Design Order

We are happy to customize our motors to meet the requirements of our customers. For example, we can design them for the use in vacuum environment and clean room with countermeasured materials for dust or gas generation.

Data

BD-183801 ← Model Number

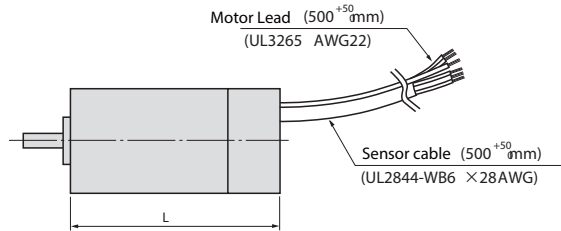


- **Maximum Continuous Current [A]**: This is the maximum current value that can be continuously supplied to the motor while aluminum board is attached to the motor flange in ambient temperature 25°C.
- **Rated Speed [rpm]**: This is the maximum speed within the maximum continuous torque.
- **Rated Output [W]**: This is the maximum output which can output continuously.
- **Maximum Continuous Torque [mNm(gf·cm)]**: This is the maximum torque which can drive continuously in ambient temperature 25°C.

Cable Option

■ We can design the cable to come out from the rear (back) of the motor housing

With our standard product, the cable which comes out from the side of housing can be designed to come out from the opposite side of the output shaft (back of the housing). However, the total length of the motor will be slightly different and it is not available for EBD (Encoder Type).



■ Connector Terminal Processing

Standard models have no connector terminal processing. However connector terminal processing for our standard driver is available as an option.

- Dedicated connectors are enclosed when a customer ordered our driver.
K1 : Connector for BSD-36 Series Driver
- The output terminals of the encoder is connectorized as standard.

Encoder

A magnetic encoder or a high resolution optical encoder can be attached to our Brushless Motors (BD Series).

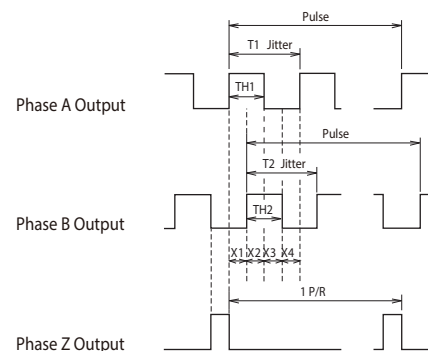
■ Magnetic Encoder

Magnetic Encoder, MC512, can be attached to all models.

● Encoder Specifications

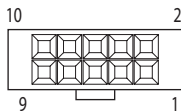
Encoder Type		Magnetic Incremental
Power Source Voltage	V cc	DC + 5V ±7%
Consumption Current	mA	50
Output Voltage	V out	High ≥ 4.6V Low ≤ 0.4V
Maximum Output Current	mA	± 1.5
Number of Channels	ch	3 (A、B、Z)
Maximum Frequency Response	kHz	700
Output Circuit	—	It can be used for both differential voltage output and TTL output
Output Pulse	Pulse/ Rev	512

● Waveform of Encoder Output



● Outline Drawing of Connector

Connector, XG4M-1030, made by Omron or equivalent product



● Pin Sequence

Pin No.	Function	Pin No.	Function
1	NC	6	V out A
2	V cc	7	V out B
3	GND	8	V out B
4	NC	9	V out Z
5	V out A	10	V out Z

● Characteristic Calculation Formula

$$\text{Duty Ratio of Phase A, B} = (TH1 / T1 - TH2 / T2) \times 100$$

$$\text{Phase Difference Phase A, B} = (X1 \sim X4 / T1) \times 100$$

$$\text{Jitter of Phase A, B} = (T1 \div \text{Ideal Value}, T2 \div \text{Ideal Value}) \times 100$$

Dividing ideal value is set to 100%.

■ High Resolution Optical Encoder

High Resolution Optical encoder, PC1000 or PC2000, can be attached to two (2) poles Brushless Motors, BD Series, as shown below (No 4 poles).

Please see the specification of PC1000 on page 6 (BD-16 Series), and PC2000 on page 22, 24, 26 (BD-30 Series).

● The Combination of Brushless Motor and High Resolution Optical Encoder

Name of the Series	PC1000 (1000 puls e/ Rev)	PC2000 (2000 puls e/ Rev)
BD-16 Series (2 Poles)	○	×
BD-18 Series (2 Poles)	*○ (Please ask our sales representatives)	×
BD-22 Series (2 Poles)	*○ (Please ask our sales representatives)	×
BD-26 Series (2 Poles)	*○ (Please ask our sales representatives)	*○ (Please ask our sales representatives)
BD-30 Series (2 Poles)	*○ (Please ask our sales representatives)	○

*○ : These are custom products. Please ask our sales representatives or authorized distributor for detail.

Brushless Motors Contents

■ Brushless Motors

● BD-16 Series

BD-1651 ** 5~6

● BD-18 Series

BD-1838 ** 7~8

BD-1854 ** 9~10

● BD-22 Series

BD-2237 ** 11~12

BD-2253 ** 13~14

● BD-26 Series

BD-2626 ** 15~16

BD-2650 ** 17~18

BD-2664 ** 19~20

● BD-30 Series

BD-3040 ** 21~22

BD-3055 ** 23~24

BD-3070 ** 25~26

■ Planetary Gearheads

● ZJP Series · ZMP Series 27

● ZAP Series · ZFP Series 28

■ Drivers

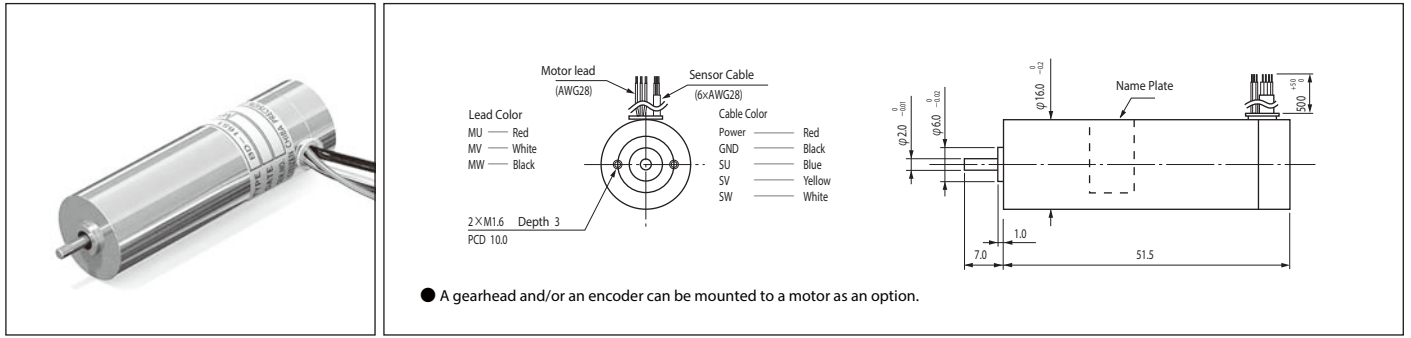
● BSD-36 Series 29~30

■ Cautions for Handling 31

■ Models for Special Environments 32

BD-1651** (Product Size: $\phi 16 \times 51$ mm)

(Unit: mm)

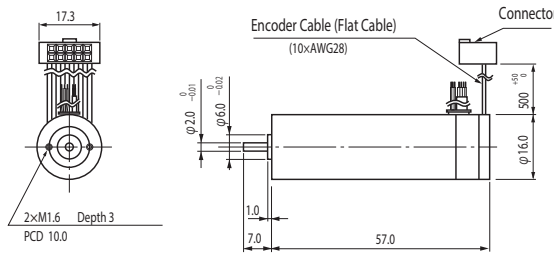


Example of Combination

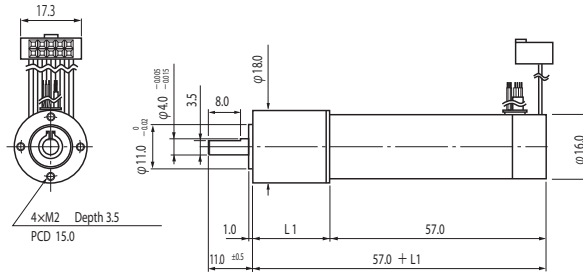
*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

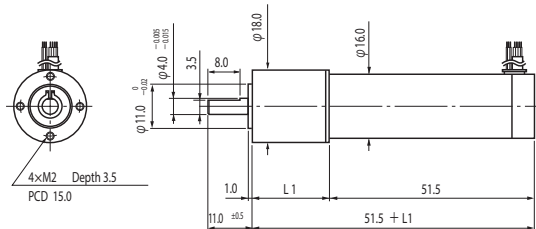
With Encoder EBD-1651**



With Encoder + Gearhead EBD-1651**G-MC512 ZJP 1 / xxx



With Gearhead BD-1651**G ZJP 1 / xxx



Specifications

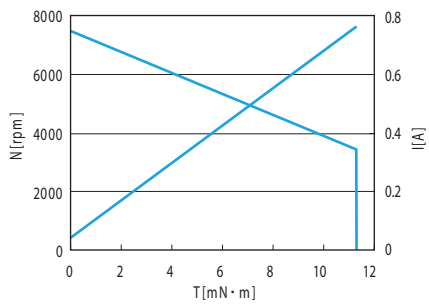
Items		BD-165101	BD-165141	BD-165142	
Number of Poles	Pole	2	4	4	
Power Source Voltage	V	12 ± 5 %	12 ± 5 %	24 ± 5 %	
Resistance	Ω	7	2.2	7.7	
Torque Constant	mN · m/A	15.2	9.3	18.2	
Back-EMF Constant	V/K rpm	1.59	0.98	1.91	
No Load Speed (*1)	rpm	7500	12200	12600	
Maximum Continuous Current (*1)	A	0.76	1.17	0.6	
Maximum Continuous Torque (*1)	mN · m	11.3	10.1	10.1	
Rated Speed (*1)	rpm	3480	8500	9600	
Rated Output (*1)	W	4.1	9.0	10.2	
Rotor Inertia	$g \cdot cm^2$	1.1	1.1	1.1	
Weight	g	60	60	60	
Driver	Standard	BSD-36-**** (Maximum Speed)	0512- Δ 014 (5000 rpm)	0512- Δ 0AD (5000 rpm)	1024- Δ 0AD (5000 rpm)

*1: This value depends on the specification of driver and encoder.

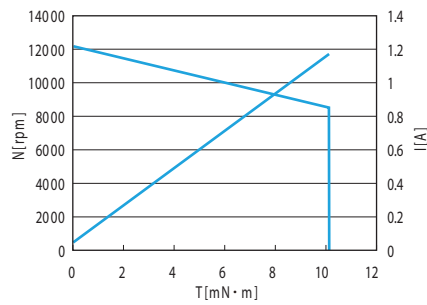
*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

Data

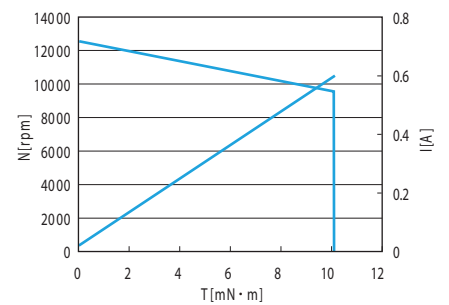
● BD-165101



● BD-165141



● BD-165142



- The 'Data' above indicate the specifications while aluminum board (size : 57 * 57 * 5t) is attached to the motor flange.
- Please see Page 2 for more details about 'Data'.

Rated Specifications of Geared Motors

● BD-165101

ZJP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.036	0.054	0.116	0.174	0.260	0.369	0.553	0.580	0.580	1.186	1.200	1.200	1.200	1.200
Rated Speed	rpm	870	580	218	145	97	54	36	24	16	14	9	6	4	3	
Rated Output	W	3.3	3.3	2.6	2.6	2.6	2.1	2.1	1.5	1.0	1.7	1.1	0.8	0.5	0.3	
Length L1	mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5	

● BD-165141

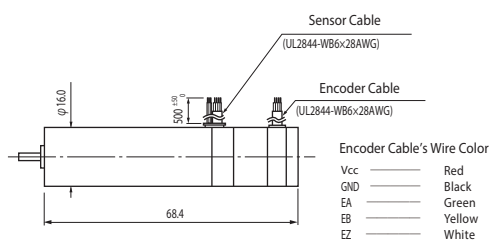
ZJP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.032	0.048	0.103	0.155	0.233	0.330	0.494	0.580	0.580	1.060	1.200	1.200	1.200	1.200
Rated Speed	rpm	1182	788	296	197	131	72	48	41	39	18	16	15	10	7	
Rated Output	W	4.0	4.0	3.2	3.2	3.2	2.5	2.5	2.5	2.4	2.0	2.0	1.9	1.2	0.8	
Length L1	mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5	

● BD-165142

ZJP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.032	0.048	0.103	0.155	0.233	0.330	0.494	0.580	0.580	1.060	1.200	1.200	1.200	1.200
Rated Speed	rpm	1182	788	296	197	131	72	48	41	41	18	16	16	11	7	
Rated Output	W	4.0	4.0	3.2	3.2	3.2	2.5	2.5	2.5	2.5	2.0	2.0	2.0	1.4	0.9	
Length L1	mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5	

- *1 : If using reduction ratio marked with an asterisk (*), please make sure not to exceed the allowable output torque of the gearhead.
- *2 : These are the values in uniform load.

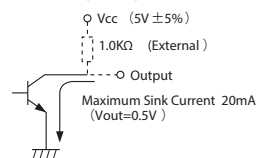
● With High Resolution Optical Encoder EBD-165101-PC1000



Encoder Specifications

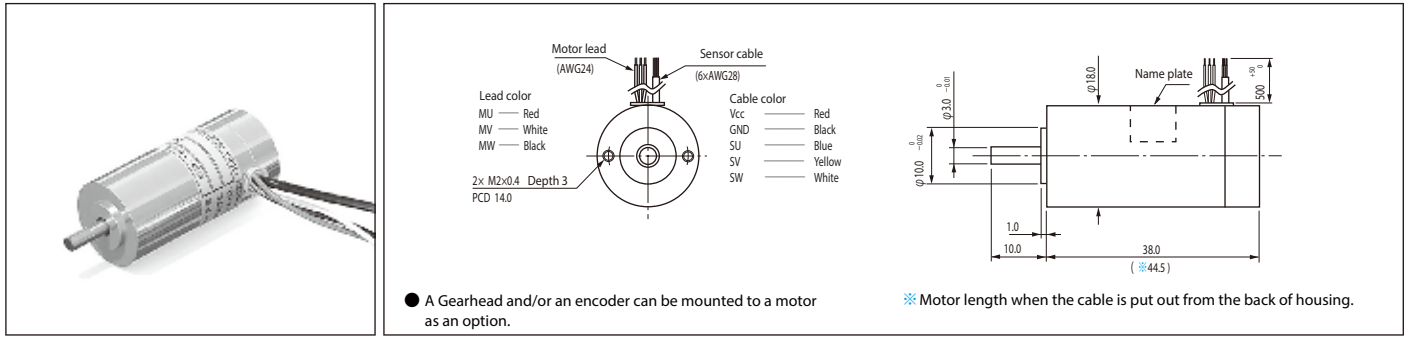
Encoder Type		Optical Incremental
Power Source Voltage	Vcc	DC + 5V ± 5%
Consumption Current	mA	60 (max.)
Output Voltage	V	High ≥ 4.0(min.) Low ≤ 0.5(max.)
Number of Channels	ch	3
Maximum Frequency Response	kHz	100
Number of Output Pulses	Pulse/ Rev	1000

Encoder Output Specifications



BD-1838** (Product Size: $\phi 18 \times 38$ mm)

(Unit : mm)

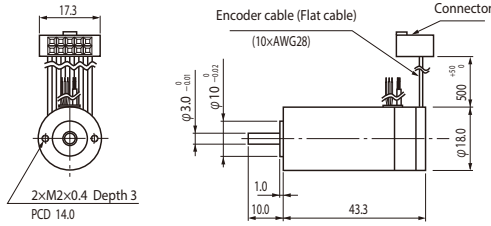


Example of Combination

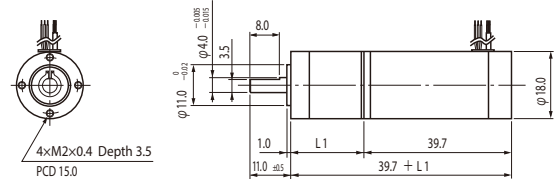
*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

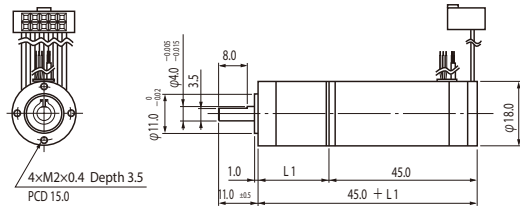
With Encoder EBD-1838** -MC512



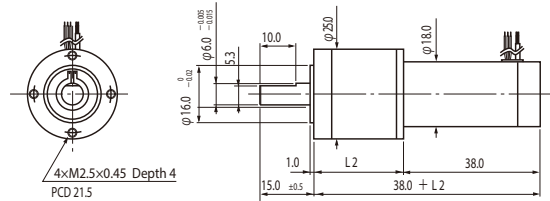
With Gearhead BD-1838** G ZJP 1 / xxx



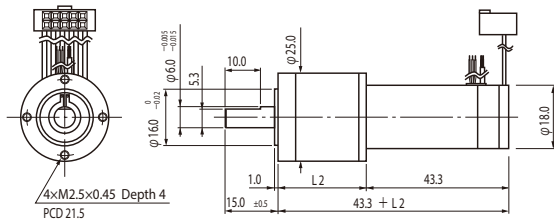
With Encoder + Gearhead EBD-1838** G-MC512 ZJP 1 / xxx



BD-1838** G ZMP 1 / xxx



EBD-1838** G-MC512 ZMP 1 / xxx



Specifications

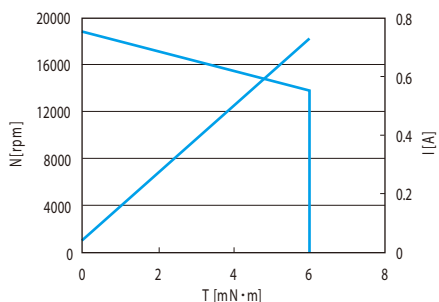
Items		BD-183801	BD-183841	BD-183842	
Number of Poles	Pole	2	4	4	
Power Source Voltage	V	24 ± 5%	12 ± 5%	24 ± 5%	
Resistance	Ω	8.2	2.5	11.2	
Torque Constant	mN·m/A	12.3	8.3	18.2	
Back-EMF Constant	V/K rpm	1.29	0.87	1.9	
No Load Speed (*1)	rpm	18900	13700	12600	
Maximum Continuous Current (*1)	A	0.73	1.18	0.49	
Maximum Continuous Torque (*1)	mN·m	6	9.2	7.9	
Rated Speed (*1)	rpm	13800	9000	9400	
Rated Output (*1)	W	8.7	8.7	7.8	
Rotor Inertia	g·cm ²	1.1	1.1	1.1	
Weight	g	60	60	60	
Driver	Standard	BSD-36-**** (Maximum Speed)	1024- Δ 000 (5000 rpm)	0512- Δ 0AD (5000 rpm)	1024- Δ 0AD (5000 rpm)

*1: This value depends on the specification of driver and encoder.

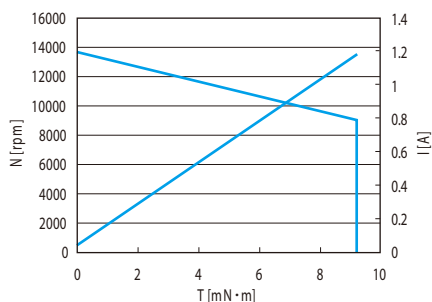
*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

Data

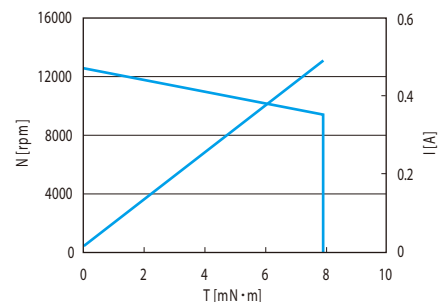
● BD-183801



● BD-183841



● BD-183842



- The 'Data' above indicate the specifications while aluminum board (size : 57 * 57 * 5t) is attached to the motor flange.
- Please see Page 2 for more details about 'Data'.
- Gearhead and/or encoder can be mounted to the motor as an option. Please see the specifications below for more information.

Rated Specifications of Geared Motors

● BD-183801

ZJP	Reduction Ratio		4	6	16	24	36	64	96	144	※216	256	384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.019	0.029	0.061	0.092	0.138	0.196	0.294	0.441	0.580	0.630	0.945	1.200	1.200	1.200
	Rated Speed	rpm	1990	1327	497	332	221	122	81	54	41	30	20	16	12	8
	Rated Output	W	4.0	4.0	3.2	3.2	3.2	2.5	2.5	2.5	2.5	2.0	2.0	2.0	1.5	1.0
Length L1		mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5
ZMP	Reduction Ratio		4	6	16	24	36	64	96	144	216	256	384	576	864	※1296
	Maximum Continuous Torque	N·m	0.020	0.031	0.069	0.104	0.156	0.234	0.351	0.527	0.791	0.799	1.198	1.797	2.696	3.000
	Rated Speed	rpm	2500	1667	625	417	278	156	104	69	46	39	26	17	12	8
	Rated Output	W	5.3	5.3	4.5	4.5	4.5	3.8	3.8	3.8	3.8	3.3	3.3	3.3	3.3	2.4
Length L2		mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6

● BD-183841

ZJP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.029	0.044	0.094	0.141	0.212	0.300	0.450	0.580	0.580	0.966	1.200	1.200	1.200	1.200
	Rated Speed	rpm	1298	865	324	216	144	80	53	41	41	20	16	16	10	7
	Rated Output	W	4.0	4.0	3.2	3.2	3.2	2.5	2.5	2.5	2.5	2.0	2.0	2.0	1.3	0.9
Length L1		mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5
ZMP	Reduction Ratio		4	6	16	24	36	64	96	144	※216	256	384	576	※864	※1296
	Maximum Continuous Torque	N·m	0.031	0.047	0.106	0.159	0.238	0.359	0.539	0.808	1.200	1.225	1.837	2.756	3.000	3.000
	Rated Speed	rpm	2250	1500	541	360	240	133	89	59	40	31	21	14	10	7
	Rated Output	W	7.4	7.4	6.0	6.0	6.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	3.3	2.2
Length L2		mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6

● BD-183842

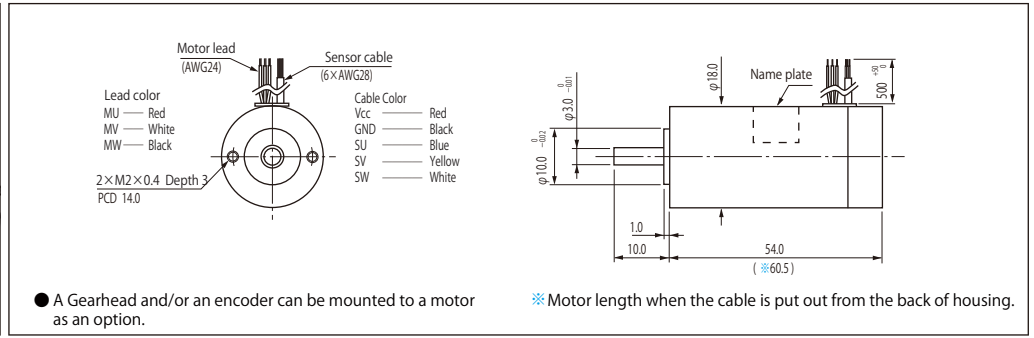
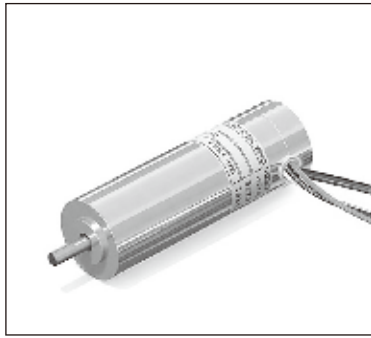
ZJP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.025	0.038	0.081	0.121	0.182	0.258	0.387	0.580	0.580	0.829	1.200	1.200	1.200	1.200
	Rated Speed	rpm	1511	1007	378	252	168	93	62	41	41	23	16	16	11	7
	Rated Output	W	4.0	4.0	3.2	3.2	3.2	2.5	2.5	2.5	2.5	2.0	2.0	2.0	1.4	0.9
Length L1		mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5
ZMP	Reduction Ratio		4	6	16	24	36	64	96	144	216	256	384	576	※864	※1296
	Maximum Continuous Torque	N·m	0.027	0.040	0.091	0.137	0.205	0.308	0.463	0.694	1.041	1.052	1.577	2.366	3.000	3.000
	Rated Speed	rpm	2350	1567	588	392	261	147	98	65	44	36	24	16	11	7
	Rated Output	W	6.6	6.6	5.6	5.6	5.6	4.7	4.7	4.7	4.7	4.0	4.0	4.0	3.4	2.3
Length L2		mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6

1 : If using Reduction ratio marked with an asterisk (), please make sure not to exceed the allowable output torque of the gearhead.

*2 : These are the values in uniform load.

BD-1854** (Product Size: $\phi 18 \times 54$ mm)

(Unit : mm)



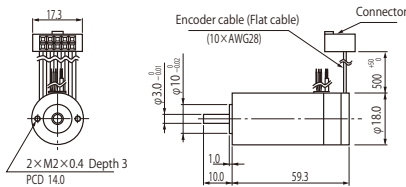
Example of Combination

*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

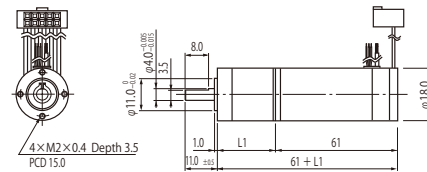
With Encoder

EBD-1854** - MC512



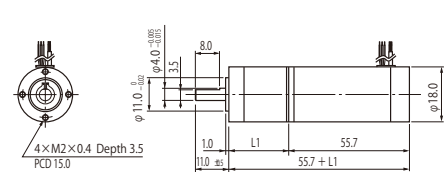
With Encoder + Gearhead

EBD-1854** G-MC512 ZJP 1 / xxx

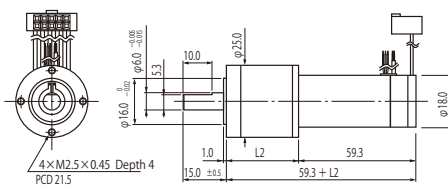


With Gearhead

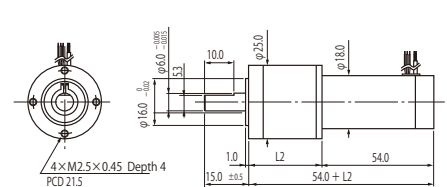
BD-1854** G ZJP 1 / xxx



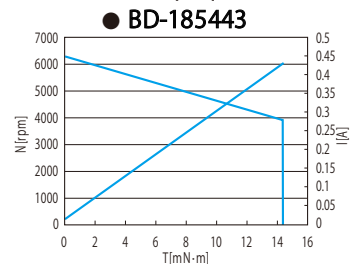
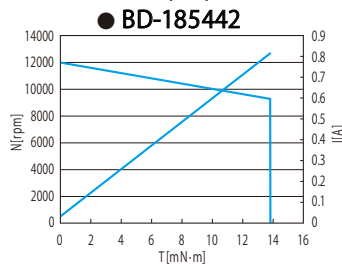
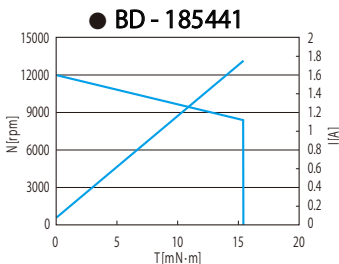
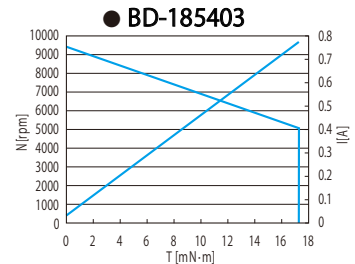
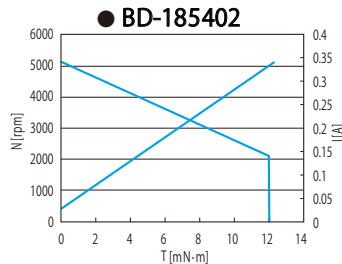
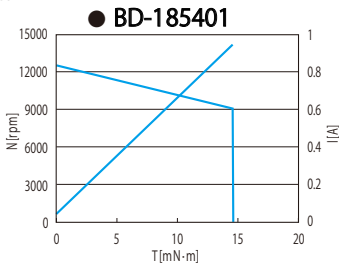
EBD-1854** G-MC512 ZMP 1 / xxx



BD-1854** G ZMP 1 / xxx



Data



● The 'Data' above indicate the specifications while aluminum board (size : 57 * 57 * 5t) is attached to the motor flange.

● Please see Page 2 for more details about 'Data'.

● Gearhead and/or encoder can be mounted to the motor as an option. Please see the specifications below for more information.

Specifications

Items		BD-185401	BD-185402	BD-185403	BD-185441	BD-185442	BD-185443	
Number of Poles	Pole	2	2	2	4	4	4	
Power Source Voltage	V	$24 \pm 5\%$	$24 \pm 5\%$	$24 \pm 5\%$	$12 \pm 5\%$	$24 \pm 5\%$	$24 \pm 5\%$	
Resistance	Ω	6.7	45.8	12.6	1.35	5.1	19.1	
Torque Constant	mN·m/A	19.2	42.3	26.5	9.6	19.1	36.4	
Back-EMF Constant	V/K rpm	2.01	4.43	2.78	1	2	3.81	
No Load Speed (*1)	rpm	12500	5100	9400	12000	12000	6300	
Maximum Continuous Current (*1)	A	0.95	0.34	0.76	1.75	0.82	0.43	
Maximum Continuous Torque (*1)	mN·m	14.6	12.1	17.1	15.4	13.8	14.4	
Rated Speed (*1)	rpm	9100	2100	5100	8400	9300	3900	
Rated Output (*1)	W	13.9	2.7	9.1	13.5	13.4	5.9	
Rotor Inertia	$g \cdot cm^2$	1.8	1.8	1.8	2.0	2.0	2.0	
Weight	g	80	80	80	80	80	80	
Driver	Standard	BSD-36-*** (Maximum Speed)	1024- Δ 001 (5000 rpm) (*2)	1024- Δ 002 (5000 rpm)	1024- Δ 003 (5000 rpm)	0512- Δ 0A1 (5000 rpm)	1024- Δ 0A2 (5000 rpm)	1024- Δ 0A3 (5000 rpm)

*1: This value depends on the specification of driver and encoder.

*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

Rated Specifications of Geared Motors

● BD - 185401

ZJP	Reduction Ratio		4	6	16	24	※36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.047	0.070	0.150	0.224	0.270	0.477	0.580	0.580	0.580	1.200	1.200	1.200	1.200	1.200
	Rated Speed	rpm	818	545	204	136	113	50	41	41	41	16	16	16	11	7
	Rated Output	W	4.0	4.0	3.2	3.2	3.2	2.5	2.5	2.5	2.5	2.0	2.0	2.0	1.3	0.9
	Length L1	mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5
ZMP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.050	0.074	0.168	0.252	0.378	0.570	0.855	1.200	1.200	1.944	2.915	3.000	3.000	3.000
	Rated Speed	rpm	1539	1026	341	227	151	84	56	40	40	20	13	13	11	7
	Rated Output	W	8.0	8.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	3.3	2.2
	Length L2	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6

● BD - 185402

ZJP	Reduction Ratio		4	6	16	24	※36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.039	0.058	0.124	0.186	0.270	0.395	0.580	0.580	0.580	1.200	1.200	1.200	1.200	1.200
	Rated Speed	rpm	525	350	131	88	58	33	22	15	10	8	5	4	2	2
	Rated Output	W	2.1	2.1	1.7	1.7	1.6	1.4	1.3	0.9	0.6	1.0	0.7	0.5	0.3	0.2
	Length L1	mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5
ZMP	Reduction Ratio		4	6	16	24	36	64	96	144	※216	256	384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.041	0.062	0.139	0.209	0.314	0.472	0.709	1.063	1.200	1.611	2.416	3.000	3.000	3.000
	Rated Speed	rpm	525	350	131	88	58	33	22	15	10	8	5	4	2	2
	Rated Output	W	2.3	2.3	1.9	1.9	1.9	1.6	1.6	1.6	1.2	1.4	1.4	1.1	0.8	0.5
	Length L2	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6

● BD - 185403

ZJP	Reduction Ratio		4	6	16	24	※36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.055	0.082	0.175	0.263	0.270	0.558	0.580	0.580	0.580	1.200	1.200	1.200	1.200	1.200
	Rated Speed	rpm	698	465	175	116	113	43	41	35	24	16	13	9	6	4
	Rated Output	W	4.0	4.0	3.2	3.2	3.2	2.5	2.5	2.2	1.4	2.0	1.7	1.1	0.7	0.5
	Length L1	mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5
ZMP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.058	0.087	0.197	0.295	0.443	0.668	1.001	1.200	1.200	2.276	3.000	3.000	3.000	3.000
	Rated Speed	rpm	1275	850	291	194	129	72	48	35	24	17	13	9	6	4
	Rated Output	W	7.8	7.8	6.0	6.0	6.0	5.0	5.0	4.4	3.0	4.0	4.0	2.8	1.9	1.2
	Length L2	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6

● BD - 185441

ZJP	Reduction Ratio		4	6	16	24	36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.049	0.074	0.158	0.237	0.270	0.503	0.580	0.580	0.580	1.200	1.200	1.200	1.200	1.200
	Rated Speed	rpm	775	517	194	129	113	48	41	41	39	16	16	15	10	6
	Rated Output	W	4.0	4.0	3.2	3.2	3.2	2.5	2.5	2.5	2.4	2.0	2.0	1.8	1.2	0.8
	Length L1	mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5
ZMP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.052	0.079	0.177	0.266	0.399	0.601	0.902	1.200	1.200	2.050	3.000	3.000	3.000	3.000
	Rated Speed	rpm	1459	973	323	215	144	79	53	40	39	19	13	13	10	6
	Rated Output	W	8.0	8.0	6.0	6.0	6.0	5.0	5.0	5.0	4.9	4.0	4.0	4.0	3.1	2.0
	Length L2	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6

● BD - 185442

ZJP	Reduction Ratio		4	6	16	24	36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.044	0.066	0.141	0.212	0.270	0.450	0.580	0.580	0.580	1.200	1.200	1.200	1.200	1.200
	Rated Speed	rpm	865	577	216	144	113	53	41	41	41	16	16	16	11	7
	Rated Output	W	4.0	4.0	3.2	3.2	3.2	2.5	2.5	2.5	2.5	2.0	2.0	2.0	1.4	0.9
	Length L1	mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5
ZMP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.047	0.070	0.159	0.238	0.358	0.539	0.808	1.200	1.200	1.837	2.756	3.000	3.000	3.000
	Rated Speed	rpm	1628	1086	360	240	160	89	59	40	40	21	14	13	11	7
	Rated Output	W	8.0	8.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	3.4	2.3
	Length L2	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6

● BD-185443

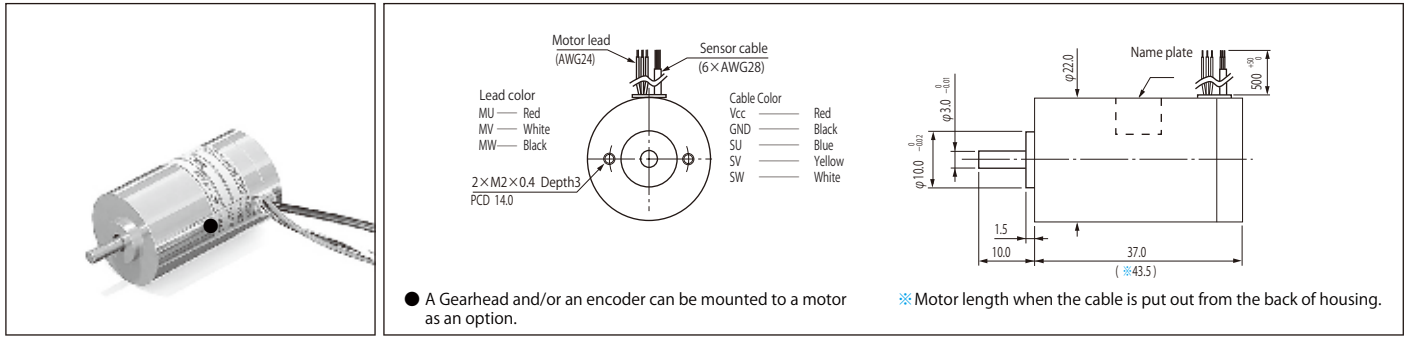
ZJP	Reduction Ratio		4	6	16	24	※36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.046	0.069	0.147	0.221	0.270	0.470	0.580	0.580	0.580	1.200	1.200	1.200	1.200	1.200
	Rated Speed	rpm	829	553	207	138	108	51	41	27	18	15	10	7	5	3
	Rated Output	W	4.0	4.0	3.2	3.2	3.1	2.5	2.5	1.6	1.1	1.9	1.3	0.9	0.6	0.4
	Length L1	mm	19.4	19.4	22.9	22.9	22.9	28.2	28.2	28.2	28.2	33.5	33.5	33.5	33.5	33.5
ZMP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.049	0.073	0.166	0.249	0.373	0.562	0.843	1.200	1.200	1.917	2.875	3.000	3.000	3.000
	Rated Speed	rpm	975	650	244	163	108	61	41	27	18	15	10	7	5	3
	Rated Output	W	5.0	5.0	4.2	4.2	4.2	3.6	3.6	3.4	2.3	3.1	3.1	2.1	1.4	0.9
	Length L2	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6

1 : If using reduction ratio marked with an asterisk (), please make sure not to exceed the allowable output torque of the gearhead.

*2 : These are the values in uniform load.

BD-2237** (Product Size: $\phi 22 \times 37$ mm)

(Unit : mm)



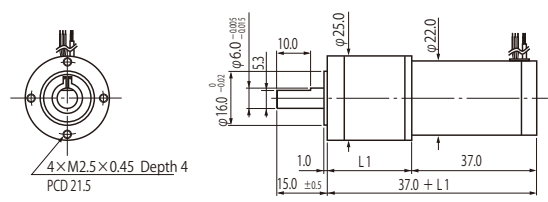
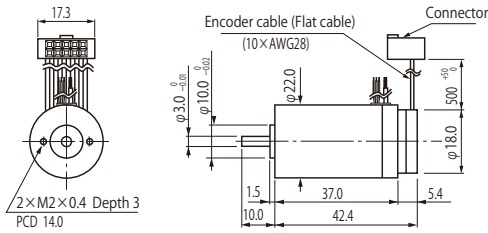
Example of Combination

*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

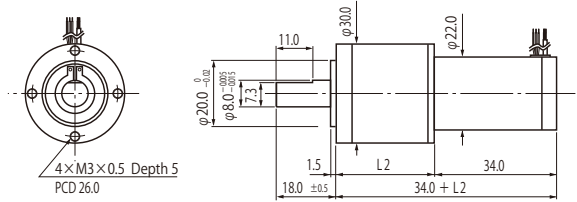
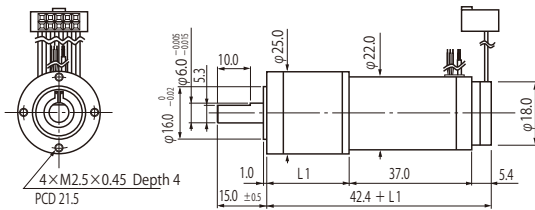
With Encoder EBD-2237** -MC512

With Gearhead BD-2237**G ZMP 1 / xxx

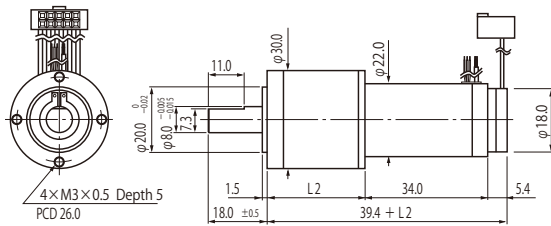


With Encoder + Gearhead EBD-2237**G-MC512 ZAP 1 / xxx

BD-2237**G ZAP 1 / xxx



EBD-2237**G-MC512 ZAP 1 / xxx



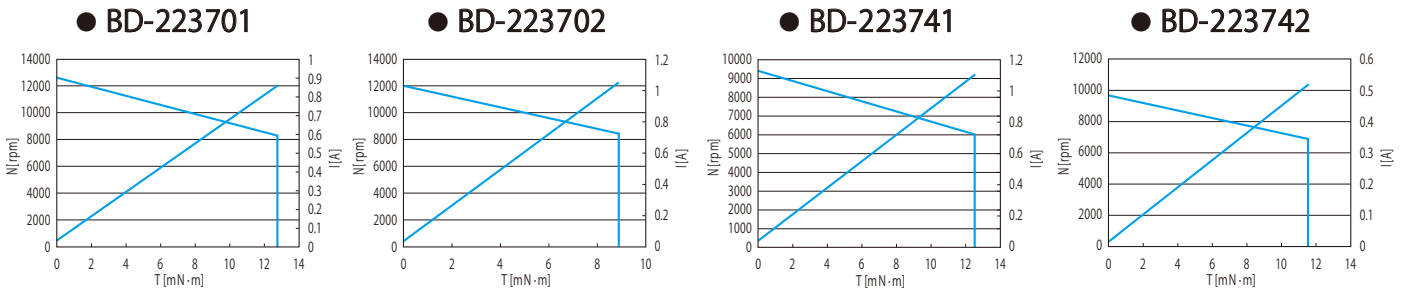
Specifications

Items			BD-223701	BD-223702	BD-223741	BD-223742
Number of Poles	Pole		2	2	4	4
Power Source Voltage	V		24 \pm 5%	12 \pm 5%	12 \pm 5%	24 \pm 5%
Resistance	Ω		9	2.65	3	10.9
Torque Constant	mN·m/A		19.1	9.55	12.2	23.6
Back-EMF Constant	V/K rpm		2	1	1.28	2.47
No Load Speed (*1)	rpm		12600	12000	9400	9700
Maximum Continuous Current (*1)	A		0.86	1.05	1.1	0.52
Maximum Continuous Torque (*1)	mN·m		12.8	8.9	12.5	11.5
Rated Speed (*1)	rpm		8300	8450	6000	6900
Rated Output (*1)	W		11.1	7.9	7.9	8.3
Rotor Inertia	g·cm ²		2.1	2.1	2.1	2.1
Weight	g		80	80	80	80
Driver	Standard	BSD-36-**** (Maximum Speed)	1024- Δ 006 (5000 rpm)	0512- Δ 016 (5000 rpm)	0512- Δ 0AF (5000 rpm)	1024- Δ 0A6 (5000 rpm)

*1: This value depends on the specification of driver and encoder.

*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

■ Data



- The 'Data' above indicate the specifications while aluminum board (size : 57 * 57 * 5t) is attached to the motor flange.
- Please see Page 2 for more details about 'Data'.
- Gearhead and/or encoder can be mounted to the motor as an option. Please see the specifications below for more information.

■ Rated Specifications of Geared Motors

● BD-223701

	Reduction Ratio															
		4	6	16	24	36	64	96	144	※216	256	384	※576	※864	※1296	
ZMP	Maximum Continuous Torque	N·m	0.042	0.065	0.147	0.221	0.332	0.500	0.750	1.124	1.200	1.704	2.556	3.000	3.000	3.000
	Rated Speed	rpm	1756	1170	389	259	173	96	64	42	38	22	15	13	10	6
	Rated Output	W	8.0	8.0	6.0	6.0	6.0	5.0	5.0	5.0	4.8	4.0	4.0	4.0	3.0	2.0
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Maximum Continuous Torque	N·m	0.044	0.065	0.147	0.221	0.332	0.500	0.750	1.124	1.687	1.704	2.556	3.834	4.800	4.800
	Rated Speed	rpm	2075	1383	519	346	231	130	86	58	38	32	22	14	10	6
	Rated Output	W	9.5	9.5	8.0	8.0	8.0	6.8	6.8	6.8	6.8	5.8	5.8	5.8	4.8	3.2
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● BD-223702

	Reduction Ratio															
		4	6	16	24	36	64	96	144	216	256	384	576	※864	※1296	
ZMP	Maximum Continuous Torque	N·m	0.030	0.045	0.103	0.154	0.231	0.347	0.521	0.782	1.173	1.185	1.777	2.666	3.000	3.000
	Rated Speed	rpm	2113	1408	528	352	235	132	88	59	39	32	21	14	10	7
	Rated Output	W	6.7	6.7	5.7	5.7	5.7	4.8	4.8	4.8	4.8	4.0	4.0	4.0	3.1	2.0
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Maximum Continuous Torque	N·m	0.030	0.045	0.103	0.154	0.231	0.347	0.521	0.782	1.173	1.185	1.777	2.666	3.999	4.800
	Rated Speed	rpm	2113	1408	528	352	235	132	88	59	39	33	22	15	10	7
	Rated Output	W	6.7	6.7	5.7	5.7	5.7	4.8	4.8	4.8	4.8	4.1	4.1	4.1	4.1	3.3
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● BD-223741

	Reduction Ratio															
		4	6	16	24	36	64	96	144	※216	256	384	※576	※864	※1296	
ZMP	Maximum Continuous Torque	N·m	0.043	0.064	0.144	0.216	0.324	0.488	0.732	1.098	1.200	1.664	2.496	3.000	3.000	3.000
	Rated Speed	rpm	1500	1000	375	250	167	94	63	42	28	23	15	10	7	5
	Rated Output	W	6.7	6.7	5.7	5.7	5.7	4.8	4.8	4.8	3.5	4.0	4.0	3.3	2.2	1.5
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Maximum Continuous Torque	N·m	0.043	0.064	0.144	0.216	0.324	0.488	0.732	1.098	1.647	1.664	2.496	3.744	4.800	4.800
	Rated Speed	rpm	1500	1000	375	250	167	94	63	42	28	23	16	10	7	5
	Rated Output	W	6.7	6.7	5.7	5.7	5.7	4.8	4.8	4.8	4.8	4.1	4.1	4.1	3.5	2.3
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● BD-223742

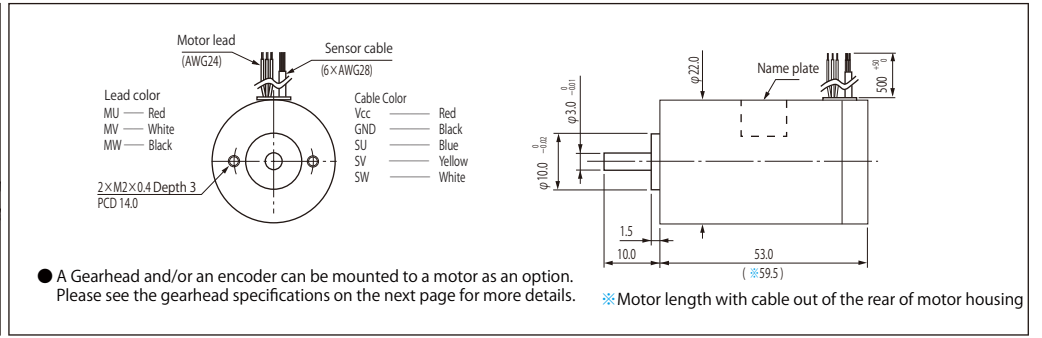
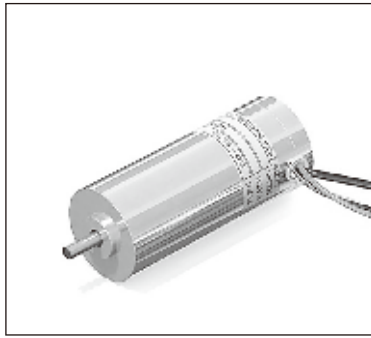
	Reduction Ratio															
		4	6	16	24	36	64	96	144	※216	256	384	※576	※864	※1296	
ZMP	Maximum Continuous Torque	N·m	0.039	0.059	0.132	0.199	0.298	0.449	0.673	1.010	1.220	1.531	2.296	3.000	3.000	3.000
	Rated Speed	rpm	1725	1150	431	288	192	106	71	47	32	25	17	12	8	5
	Rated Output	W	7.1	7.1	6.0	6.0	6.0	5.0	5.0	5.0	4.0	4.0	4.0	3.8	2.5	1.7
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Maximum Continuous Torque	N·m	0.039	0.059	0.132	0.199	0.298	0.449	0.673	1.010	1.515	1.531	2.296	3.444	4.800	4.800
	Rated Speed	rpm	1725	1150	431	288	192	108	72	48	32	27	18	12	8	5
	Rated Output	W	7.1	7.1	6.0	6.0	6.0	5.1	5.1	5.1	5.1	4.3	4.3	4.3	4.0	2.7
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

1 : If using Reduction ratio marked with an asterisk (), please make sure not to exceed the allowable output torque of the gearhead.

*2 : These are the values in uniform load.

BD-2253** (Product Size : $\phi 22 \times 53$ mm)

(Unit : mm)



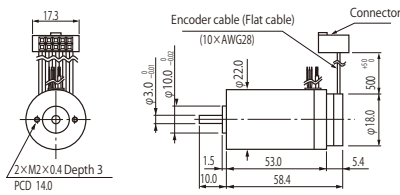
Example of Combination

*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

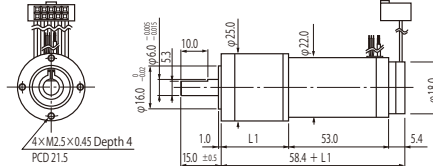
With Encoder

EBD-2253** -MC512



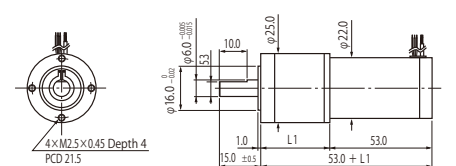
With Encoder + Gearhead

EBD-2253** G-MC512 ZMP 1 / xxx



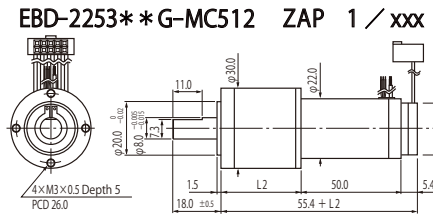
With Gearhead

BD-2253** G ZMP 1 / xxx

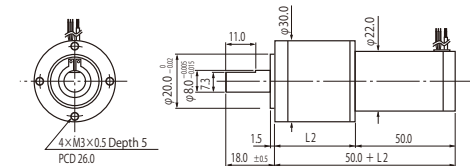


With Encoder

EBD-2253** G-MC512 ZAP 1 / xxx

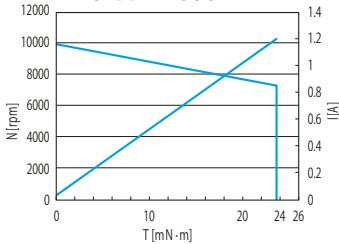


BD-2253** G ZAP 1 / xxx

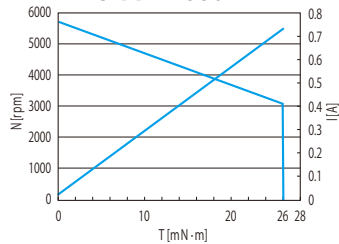


Data

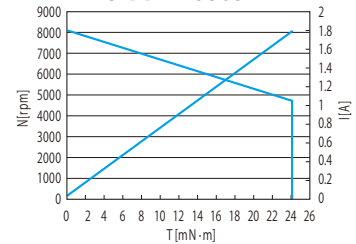
BD-225301



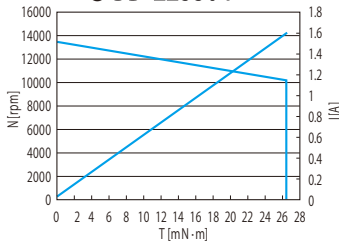
BD-225302



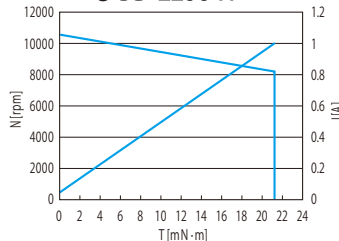
BD-225303



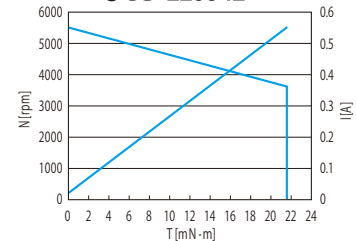
BD-225304



BD-225341



BD-225342



● The 'Data' above indicate the specifications while aluminum board (size : 57 * 57 * 5t) is attached to the motor flange.

● Please see Page 2 for more details about 'Data'.

● Gearhead and/or encoder can be mounted to the motor as an option. Please see the specifications below for more information.

Specifications

Items		BD-225301	BD-225302	BD-225303	BD-225304	BD-225341	BD-225342	
Number of Poles	Pole	2	2	2	2	4	4	
Power Source Voltage	V	24 ± 5%	24 ± 5%	12 ± 5%	24 ± 5%	24 ± 5%	24 ± 5%	
Resistance	Ω	4.3	14.4	1.8	2.5	3.7	13.2	
Torque Constant	mN·m/A	23.9	42.3	14.1	17.1	21.6	40.9	
Back-EMF Constant	V/K rpm	2.5	4.4	1.48	1.8	2.3	4.28	
No Load Speed (*1)	rpm	9900	5700	8100	13500	10600	5500	
Maximum Continuous Current (*1)	A	1.2	0.73	1.8	1.6	1	0.55	
Maximum Continuous Torque (*1)	mN·m	23.7	26.1	24.1	26.5	21.2	21.5	
Rated Speed (*1)	rpm	7300	3100	4700	10200	8200	3600	
Rated Output (*1)	W	18.1	8.5	11.9	28.3	18.2	8.1	
Rotor Inertia	g·cm ²	3.7	3.7	3.7	3.7	3.7	3.7	
Weight	g	110	110	110	110	110	110	
Driver	Standard	BSD-36-**** (Maximum Speed)	1024-△005 (*2) (5000 rpm)	1024-△004 (5000 rpm)	0512-△017 (5000 rpm)	1024-△018 (5000 rpm)	1024-△0A5 (5000 rpm)	1024-△0A4 (5000 rpm)

*1: This value depends on the specification of driver and encoder.

*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

Rated Specifications of Geared Motors

● BD-225301

ZMP	Reduction Ratio		4	6	16	24	※36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.081	0.121	0.273	0.410	0.600	0.925	1.200	1.200	1.200	3.000	3.000	3.000	3.000	3.000
	Rated Speed	rpm	948	632	210	140	96	52	40	40	34	13	13	13	8	6
	Rated Output	W	8.0	8.0	6.0	6.0	6.0	5.0	5.0	5.0	4.2	4.0	4.0	4.0	2.7	1.8
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.081	0.121	0.273	0.410	0.614	0.925	1.388	2.000	2.000	3.155	4.732	4.800	4.800	4.800
	Rated Speed	rpm	1541	1027	350	233	155	83	55	38	34	20	13	13	8	6
	Rated Output	W	13.0	13.0	10.0	10.0	10.0	8.0	8.0	8.0	7.0	6.5	6.5	6.4	4.2	2.8
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● BD-225302

ZMP	Reduction Ratio		4	6	16	24	36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.089	0.133	0.301	0.451	0.600	1.019	1.200	1.200	1.200	3.000	3.000	3.000	3.000	3.000
	Rated Speed	rpm	775	517	191	127	86	47	32	22	14	12	8	5	4	2
	Rated Output	W	7.2	7.2	6.0	6.0	5.4	5.0	4.1	2.7	1.8	3.8	2.5	1.7	1.1	0.8
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.089	0.133	0.301	0.451	0.677	1.019	1.528	2.000	2.000	3.474	4.800	4.800	4.800	4.800
	Rated Speed	rpm	775	517	194	129	86	48	32	22	14	12	8	5	4	2
	Rated Output	W	7.2	7.2	6.1	6.1	6.1	5.2	5.2	4.5	3.0	4.4	4.1	2.7	1.8	1.2
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● BD-225303

ZMP	Reduction Ratio		4	6	16	24	※36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.082	0.123	0.278	0.416	0.600	0.941	1.200	1.200	1.200	3.000	3.000	3.000	3.000	3.000
	Rated Speed	rpm	932	622	206	138	96	51	40	33	22	13	12	8	5	4
	Rated Output	W	8.0	8.0	6.0	6.0	6.0	5.0	5.0	4.1	2.7	4.0	3.8	2.6	1.7	1.1
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.082	0.123	0.278	0.416	0.625	0.941	1.411	2.000	2.000	3.208	4.800	4.800	4.800	4.800
	Rated Speed	rpm	1175	783	294	196	131	73	49	33	22	18	12	8	5	4
	Rated Output	W	10.1	10.1	8.5	8.5	8.5	7.2	7.2	6.8	4.6	6.2	6.2	4.1	2.7	1.8
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● BD-225304

ZMP	Reduction Ratio		4	6	16	24	※36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.090	0.135	0.305	0.458	0.600	1.035	1.200	1.200	1.200	3.000	3.000	3.000	3.000	3.000
	Rated Speed	rpm	848	565	188	125	96	46	40	40	40	13	13	13	11	8
	Rated Output	W	8.0	8.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	3.5	2.4
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.090	0.135	0.305	0.458	0.687	1.035	1.552	2.000	2.000	3.528	4.800	4.800	4.800	4.800
	Rated Speed	rpm	1378	919	313	209	139	74	49	38	38	18	13	13	11	8
	Rated Output	W	13.0	13.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0	6.5	6.5	6.5	5.5	4.0
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● BD-225341

ZMP	Reduction Ratio		4	6	16	24	36	64	※96	※144	※216	256	※384	※576	※864	1296
	Maximum Continuous Torque	N·m	0.072	0.108	0.244	0.366	0.550	0.828	1.200	1.200	1.200	2.822	3.000	3.000	3.000	3.000
	Rated Speed	rpm	1060	707	235	156	104	58	40	40	38	14	13	13	9	6
	Rated Output	W	8.0	8.0	6.0	6.0	6.0	5.0	5.0	5.0	4.8	4.0	4.0	4.0	3.0	2.0
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Reduction Ratio		4	6	16	24	36	64	96	144	※216	256	384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.072	0.108	0.244	0.366	0.550	0.828	1.241	1.862	2.000	2.822	4.233	4.800	4.800	4.800
	Rated Speed	rpm	1723	1148	391	261	174	92	62	41	38	22	15	13	9	6
	Rated Output	W	13.0	13.0	10.0	10.0	10.0	8.0	8.0	8.0	7.9	6.5	6.5	6.5	4.8	3.2
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● BD-225342

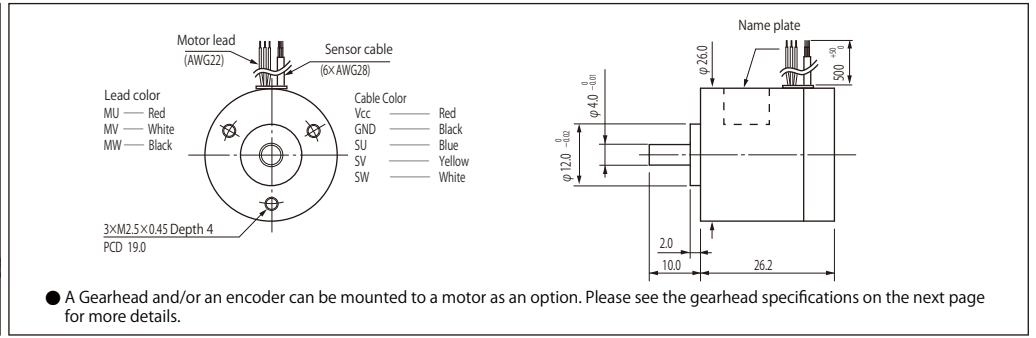
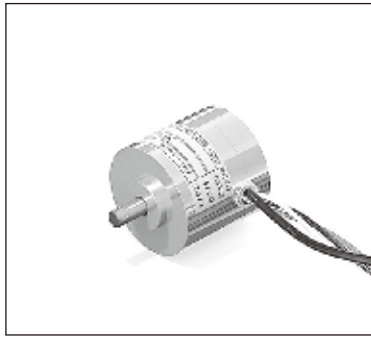
ZMP	Reduction Ratio		4	6	16	24	36	64	※96	※144	※216	256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.073	0.110	0.248	0.372	0.557	0.839	1.200	1.200	1.200	2.862	3.000	3.000	3.000	3.000
	Rated Speed	rpm	900	600	225	150	100	56	38	25	17	13	9		4	3
	Rated Output	W	6.9	6.9	5.8	5.8	5.8	4.9	4.7	3.1	2.1	4.0	2.9	2.0	1.3	0.9
	Length L1	mm	24.7	24.7	29.6	29.6	29.6	37.1	37.1	37.1	37.1	44.6	44.6	44.6	44.6	44.6
ZAP	Reduction Ratio		4	6	16	24	36	64	96	144	※216	256	384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.073	0.110	0.248	0.372	0.557	0.839	1.259	1.889	2.000	2.862	4.293	4.800	4.800	4.800
	Rated Speed	rpm	900	600	225	150	100	56	38	25	17	14	9		4	3
	Rated Output	W	6.9	6.9	5.8	5.8	5.8	4.9	4.9	4.9	3.5	4.2	4.2	3.1	2.1	1.4
	Length L2	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

1 : If using Reduction ratio marked with an asterisk (), please make sure not to exceed the allowable output torque of the gearhead.

*2 : These are the values in uniform load.

BD-2626 * * (Product Size : $\phi 26 \times 26$ mm)

(Unit : mm)

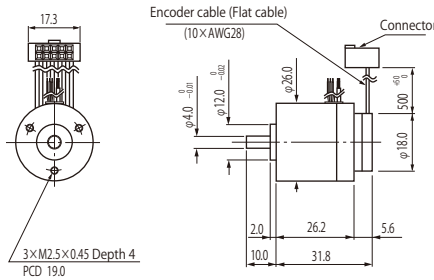


Example of Combination

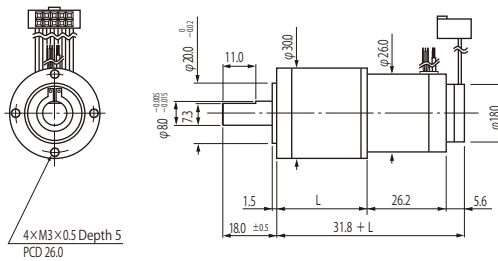
*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

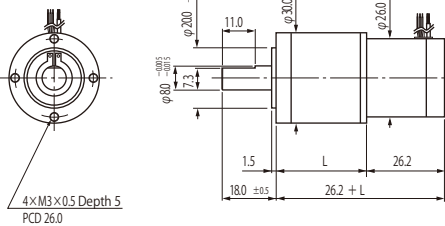
With Encoder EBD-2626 * * -MC512



With Encoder + Gearhead EBD-2626 * * G-MC512 ZAP 1 / xxx



With gearhead BD-2626 * * G ZAP 1 / xxx



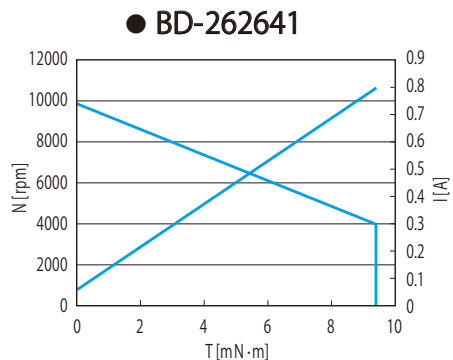
Specifications

Items		BD-262641	
Number of Poles	Pole	4	
Power Source Voltage	V	$12 \pm 5\%$	
Resistance	Ω	6.3	
Torque Constant	mN·m/A	11.8	
Back-EMF Constant	V/K rpm	1.23	
No Load Speed (*1)	rpm	9800	
Maximum Continuous Current (*1)	A	0.8	
Maximum Continuous Torque (*1)	mN·m	9.4	
Rated Speed (*1)	rpm	4000	
Rated Output (*1)	W	3.9	
Rotor Inertia	$g \cdot cm^2$	2.8	
Weight	g	70	
Driver	Standard	BSD-36-**** (Maximum Speed)	(*2) 0512-△0B1 (5000 rpm)

*1: This value depends on the specification of driver and encoder.

*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

■ Data



- The 'Data' above indicate the specifications while aluminum board (size : 71 * 71 * 5t) is attached to the motor flange.
- Please see Page 2 for more details about 'Data' .
- Gearhead and/or encoder can be mounted to the motor as an option. Please see the specifications below for more information.

■ Rated Specifications of Geared Motors

● BD-262641

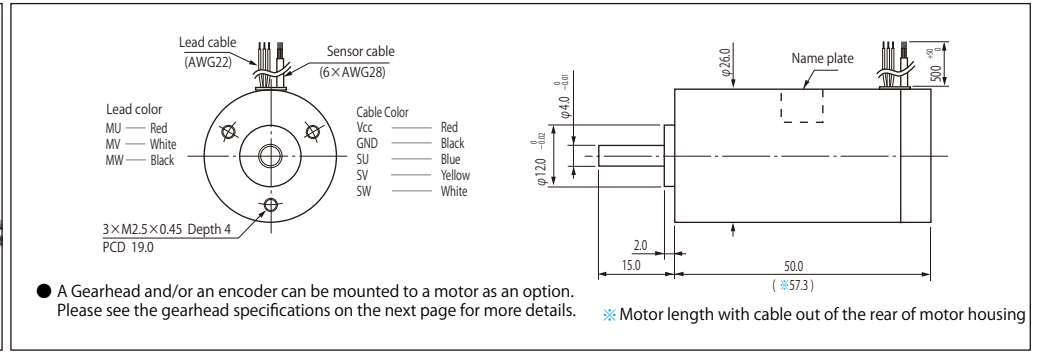
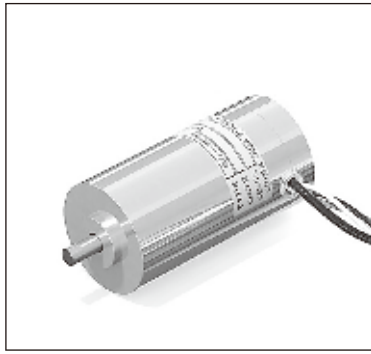
ZAP	Reduction Ratio		4	6	16	24	36	64	96	144	216	256	384	576	864	※1296
	Maximum Continuous Torque	N·m	0.032	0.048	0.108	0.162	0.244	0.367	0.550	0.826	1.239	1.251	1.877	2.815	4.223	4.800
Rated Speed	rpm	1000	667	250	167	111	63	42	28	19	16	10	7	5	3	
Rated Output	W	3.3	3.3	2.8	2.8	2.8	2.4	2.4	2.4	2.4	2.0	2.0	2.0	2.0	1.6	
Length L	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7	

1 : If using Reduction ratio marked with an asterisk (), please make sure not to exceed the allowable output torque of the gearhead.

*2 : These are the values in uniform load.

BD-2650 * * (Product Size : $\phi 26 \times 50$ mm)

(Unit : mm)

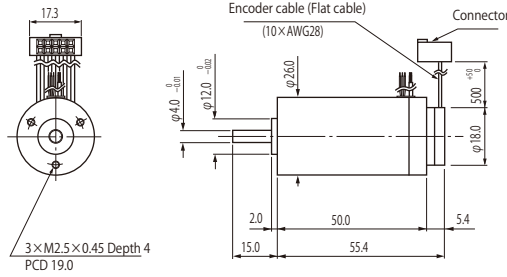


Example of Combination

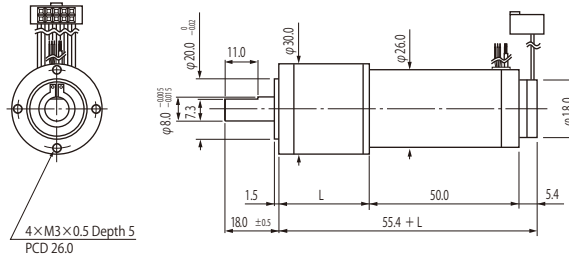
*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

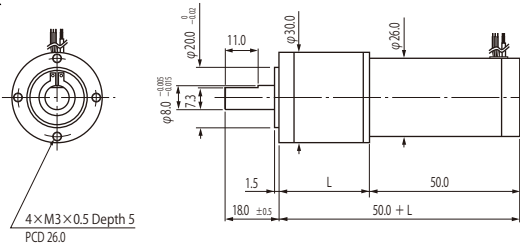
With Encoder EBD-2650* * -MC512



With Encoder + Gearhead EBD-2650* * G-MC512 ZAP 1 / xxx



With Gearhead BD-2650* * G ZAP 1 / xxx



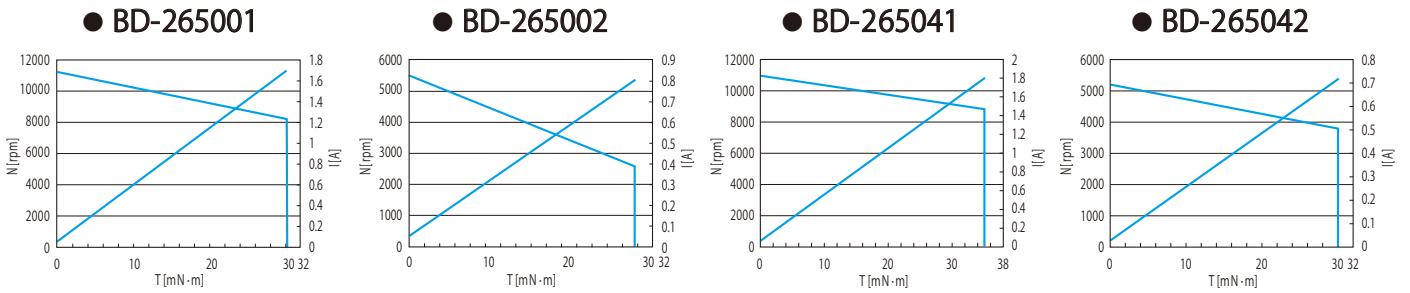
Specifications

Items		BD-265001	BD-265002	BD-265041	BD-265042	
Number of Poles	Pole	2	2	4	4	
Power Source Voltage	V	24±5%	24±5%	24±5%	24±5%	
Resistance	Ω	3.1	13.7	1.7	7.2	
Torque Constant	mN·m/A	21.2	43.7	20.3	43.6	
Back-EMF Constant	V/K rpm	2.22	4.58	2.12	4.57	
No Load Speed (*1)	rpm	11200	5500	11000	5200	
Maximum Continuous Current (*1)	A	1.7	0.8	1.8	0.72	
Maximum Continuous Torque (*1)	mN·m	30.2	29.7	35.1	30	
Rated Speed (*1)	rpm	8300	2600	8800	3800	
Rated Output (*1)	W	26.2	8.1	32.3	11.9	
Rotor Inertia	g·cm ²	7.0	7.0	7.2	7.2	
Weight	g	140	140	140	140	
Driver	Standard	BSD-36-**** (Maximum Speed)	(*) 1024-△007 (5000 rpm)	1024-△008 (5000 rpm)	1024-△0A7 (5000 rpm)	1024-△0A8 (5000 rpm)

*1: This value depends on the specification of driver and encoder.

*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

■ Data



- The 'Data' above indicate the specifications while aluminum board (size : 71 * 71 * 5t) is attached to the motor flange.
- Please see Page 2 for more details about 'Data'.
- Gearhead and/or encoder can be mounted to the motor as an option. Please see the specifications below for more information.

■ Rated Specifications of Geared Motors

● BD-265001

ZAP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	1296
	Maximum Continuous Torque	N·m	0.103	0.154	0.348	0.522	0.783	1.179	1.769	2.000	2.000	4.020	4.800	4.800	4.800	4.800
Rated Speed	rpm	1209	806	275	183	122	65	43	38	38	15	13	13	10	6	
Rated Output	W	13.0	13.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0	6.5	6.5	6.5	4.8	3.2	
Length L	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7	

● BD-265002

ZAP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	1296
	Maximum Continuous Torque	N·m	0.101	0.151	0.342	0.513	0.770	1.159	1.739	2.000	2.000	3.954	4.800	4.800	4.800	4.800
Rated Speed	rpm	650	433	163	108	72	41	27	18	12	10	7	5	3	2	
Rated Output	W	6.9	6.9	5.8	5.8	5.8	4.9	4.9	3.8	2.5	4.2	3.4	2.3	1.5	1.0	
Length L	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7	

● BD-265041

ZAP	Reduction Ratio		4	6	16	24	36	64	※96	※144	※216	256	※384	※576	※864	1296
	Maximum Continuous Torque	N·m	0.119	0.179	0.404	0.607	0.910	1.370	2.000	2.000	2.000	4.673	4.800	4.800	4.800	4.800
Rated Speed	rpm	1040	694	236	157	105	56	38	38	38	13	13	13	10	7	
Rated Output	W	13.0	13.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0	6.5	6.5	6.5	5.1	3.4	
Length L	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7	

● BD-265042

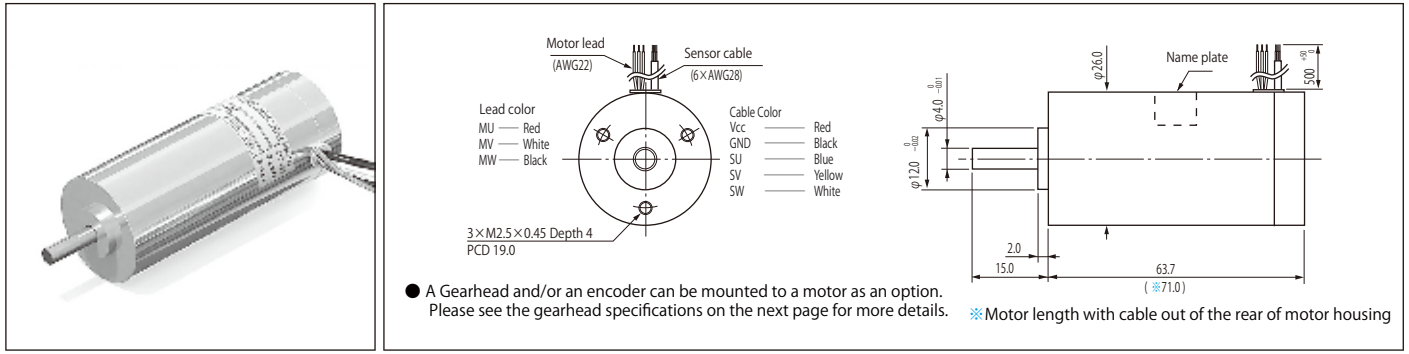
ZAP	Reduction Ratio		4	6	16	24	36	64	96	※144	※216	256	※384	※576	※864	1296
	Maximum Continuous Torque	N·m	0.102	0.153	0.346	0.518	0.778	1.171	1.757	2.000	2.000	3.994	4.800	4.800	4.800	4.800
Rated Speed	rpm	950	633	238	158	106	59	40	26	18	15	10	7			3
Rated Output	W	10.1	10.1	8.6	8.6	8.6	7.3	7.3	5.5	3.7	6.2	5.0	3.3	2.2	1.5	
Length L	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7	

1 : If using Reduction ratio marked with an asterisk (), please make sure not to exceed the allowable output torque of the gearhead.

*2 : These are the values in uniform load.

BD-2664 * * (Product Size : $\phi 26 \times 64$ mm)

(Unit : mm)



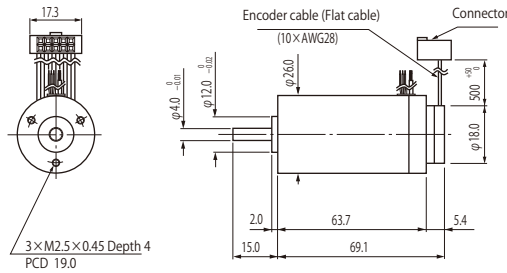
Example of Combination

*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

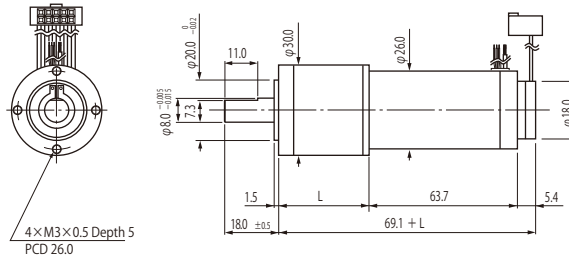
With Encoder

EBD-2664 * * -MC512



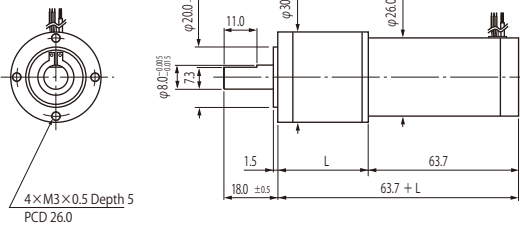
With Encoder + Gearhead

EBD-2664 * * G-MC512 ZAP 1 / xxx



With Gearhead

BD-2664 * * G ZAP 1 / xxx



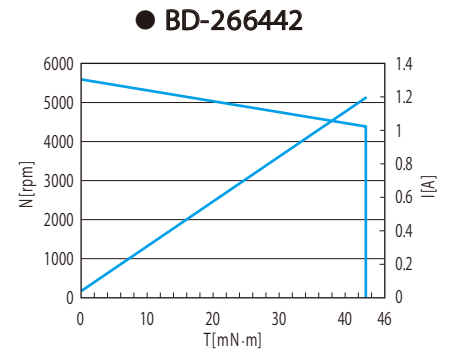
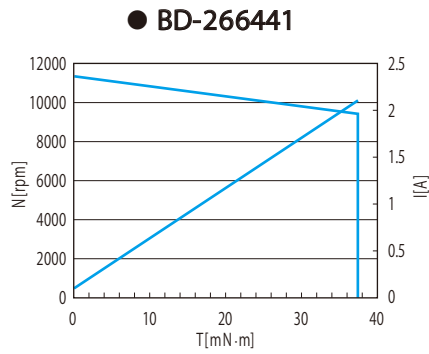
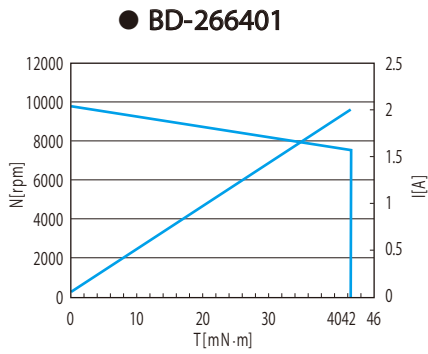
Specifications

Items			BD-266401	BD-266441	BD-266442
Number of Poles	Pole		2	4	4
Power Source Voltage	V		24 ± 5%	24 ± 5%	24 ± 5%
Resistance	Ω		1.9	1.1	3.8
Torque Constant	mN·m/A		25.2	20.3	40.6
Back-EMF Constant	V/K rpm		2.64	2.13	4.26
No Load Speed (*1)	rpm		9800	11300	5600
Maximum Continuous Current (*1)	A		2	2.1	1.2
Maximum Continuous Torque (*1)	mN·m		42.5	37.4	43.1
Rated Speed (*1)	rpm		7600	9400	4400
Rated Output (*1)	W		33.8	36.8	19.9
Rotor Inertia	g·cm ²		10.3	10.3	10.3
Weight	g		190	190	190
Driver	Standard	BSD-36-**** (Maximum Speed)	(*) 1024- Δ 009 (5000 rpm)	1024- Δ 0A9 (5000 rpm)	1024- Δ 0B0 (5000 rpm)

*1: This value depends on the specification of driver and encoder.

*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

Data



- The 'Data' above indicate the specifications while aluminum board (size : 71 * 71 * 5t) is attached to the motor flange.
- Please see Page 2 for more details about 'Data'.
- Gearhead and/or encoder can be mounted to the motor as an option. Please see the specifications below for more information.

Rated Specifications of Geared Motors

● **BD-266401**

ZAP	Reduction Ratio		4	6	16	24	※36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.145	0.217	0.490	0.734	1.000	1.659	2.000	2.000	2.000	4.800	4.800	4.800	4.800	4.800
Rated Speed	rpm	859	573	195	130	96	46	38	38	35	13	13	13	13	9	6
Rated Output	W	13.0	13.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0	7.4	6.5	6.5	6.5	4.4	2.9
Length L	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● **BD-266441**

ZAP	Reduction Ratio		4	6	16	24	36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.127	0.191	0.431	0.646	0.969	1.460	2.000	2.000	2.000	4.800	4.800	4.800	4.800	4.800
Rated Speed	rpm	976	651	222	148	99	52	38	38	38	13	13	13	13	11	7
Rated Output	W	13.0	13.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	6.5	6.5	6.5	5.5	3.6
Length L	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

● **BD-266442**

ZAP	Reduction Ratio		4	6	16	24	※36	64	※96	※144	※216	※256	※384	※576	※864	※1296
	Maximum Continuous Torque	N·m	0.147	0.220	0.497	0.745	1.000	1.683	2.000	2.000	2.000	4.800	4.800	4.800	4.800	4.800
Rated Speed	rpm	847	565	192	128	96	45	38	31	20	13	11	11	8	5	3
Rated Output	W	13.0	13.0	10.0	10.0	10.0	8.0	8.0	6.4	4.3	6.5	5.8	3.8	3.8	2.6	1.7
Length L	mm	29.9	29.9	35.3	35.3	35.3	44.0	44.0	44.0	44.0	44.0	52.7	52.7	52.7	52.7	52.7

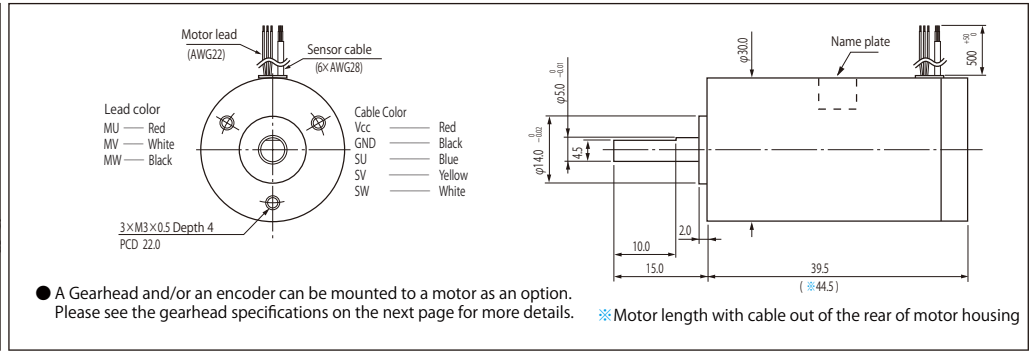
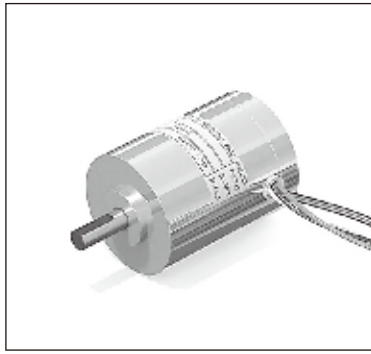
1 : If using Reduction ratio marked with an asterisk (), please make sure not to exceed the allowable output torque of the gearhead.

*2 : These are the values in uniform load.

BD-30 Series

BD-3040** (Product Size: $\phi 30 \times 40$ mm)

(Unit: mm)

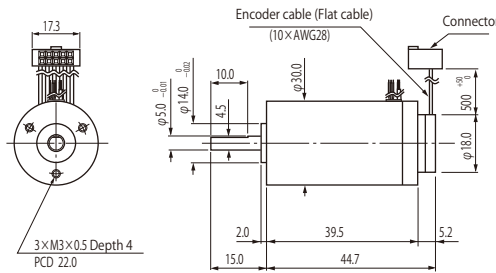


Example of Combination

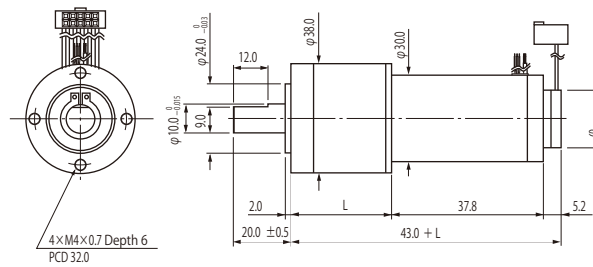
*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

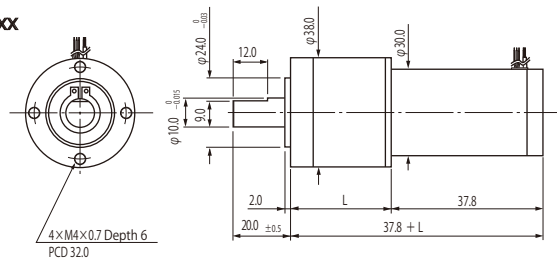
With Encoder EBD-3040** -MC512



With Encoder + Gearhead EBD-3040** G-MC512 ZFP 1 / xxx



With Gearhead BD-3040** G ZFP 1 / xxx



Specifications

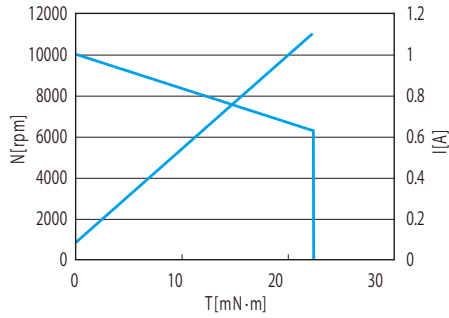
Items			BD-304001	BD-304041
Number of Poles	Pole		2	4
Power Source Voltage	V		24 ± 5%	24 ± 5%
Resistance	Ω		6.4	3.7
Torque Constant	mN·m/A		22.9	29.8
Back-EMF Constant	V/K rpm		2.4	3.12
No Load Speed (*1)	rpm		10000	7700
Maximum Continuous Current (*1)	A		1.1	1
Maximum Continuous Torque (*1)	mN·m		22.3	29.7
Rated Speed (*1)	rpm		6300	5900
Rated Output (*1)	W		14.7	18.3
Rotor Inertia	g·cm ²		8.7	9.3
Weight	g		150	150
Driver	Standard	BSD-36-**** (Maximum Speed)	1024-△015 (5000 rpm)	1024-△0AE (5000 rpm)

*1: This value depends on the specification of driver and encoder.

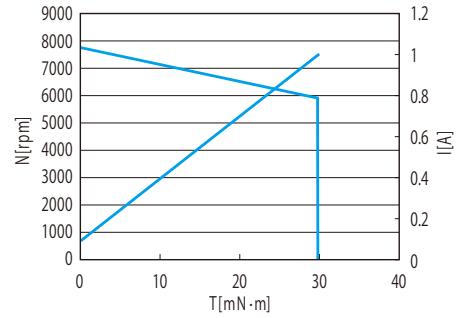
*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

Data

● **BD-304001**



● **BD-304041**



- The 'Data' above indicate the specifications while aluminum board (size : 82 * 82 * 5t) is attached to the motor flange.
- Please see Page 2 for more details about 'Data' .

Rated Specifications of Geared Motors

● **BD-304001**

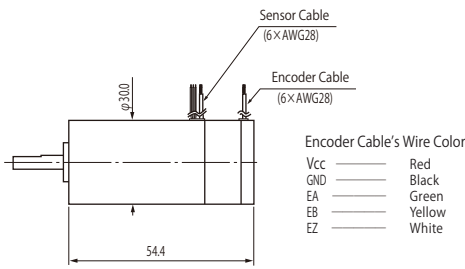
ZFP	Reduction Ratio		5.43	20.73	29.47	79.24	112.52	160.00	302.15	*429.62	*610.82	*868.44
	Maximum Continuous Torque	N·m	0.109	0.374	0.532	1.290	1.832	2.605	4.447	6.323	8.990	10.000
	Rated Speed	rpm	1160	304	214	80	56	39	21	15	10	7
	Rated Output	W	13.2	11.9	11.9	10.7	10.7	10.7	9.7	9.7	9.7	7.6
	Length L	mm	35.2	42.1	42.1	53.4	53.4	53.4	64.7	64.7	64.7	64.7

● **BD-304041**

ZFP	Reduction Ratio		5.43	20.73	29.47	79.24	112.52	160.00	302.15	*429.62	*610.82	*868.44
	Maximum Continuous Torque	N·m	0.145	0.499	0.709	1.718	2.440	3.469	5.923	8.421	10.000	10.000
	Rated Speed	rpm	1053	278	195	72	51	36	19	14	10	7
	Rated Output	W	16.0	14.5	14.5	13.0	13.0	13.0	12.0	12.0	10.1	7.1
	Length L	mm	35.2	42.1	42.1	53.4	53.4	53.4	64.7	64.7	64.7	64.7

- *1 : If using Reduction ratio marked with an asterisk (*), please make sure not to exceed the allowable output torque of the gearhead.
- *2 : These are the values in uniform load.

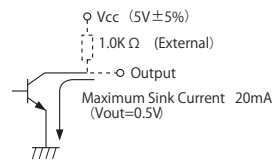
● **With High Resolution Optical Encoder**
EBD-304001-PC2000



Encoder Specifications

Encoder Type		Optical Incremental
Power Source Voltage	V _{cc}	DC + 5V ± 5%
Consumption Current	mA	60 (max.)
Output Voltage	V	High ≥ 4.0(min.) Low ≤ 0.5(max.)
Number of Channels	ch	3
Maximum Frequency Response	kHz	100
Number of Output Pulses	Pulse/ Rev	2000

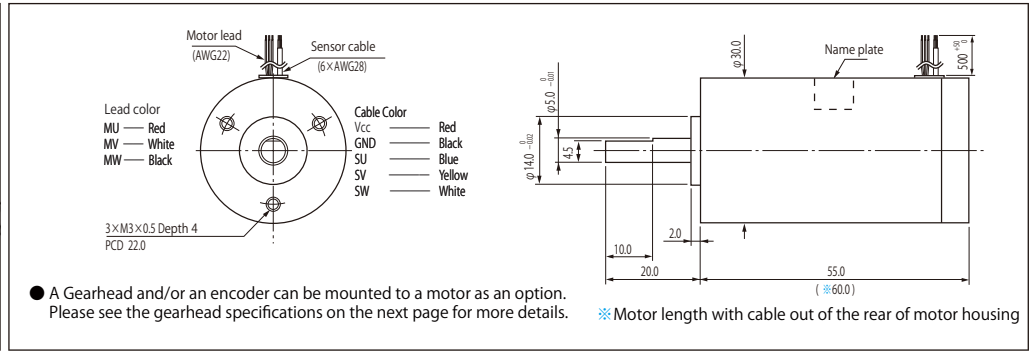
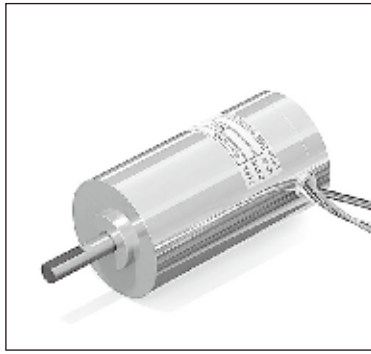
Encoder Output Specifications



BD-30 Series

BD-3055 * * (Product Size : $\phi 30 \times 55$ mm)

(Unit : mm)



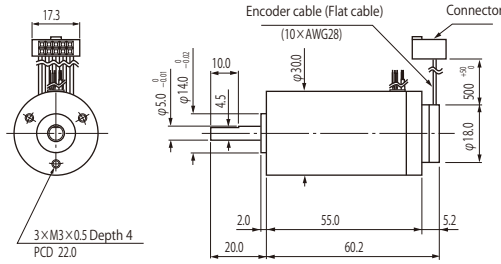
Example of Combination

*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

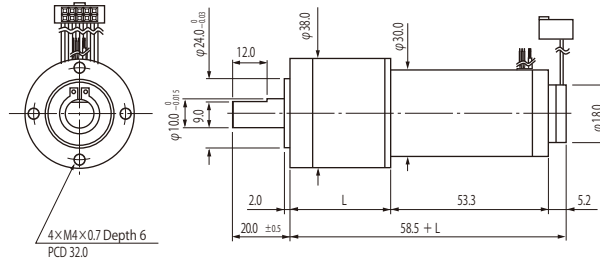
With Encoder

EBD-3055 * * -MC512



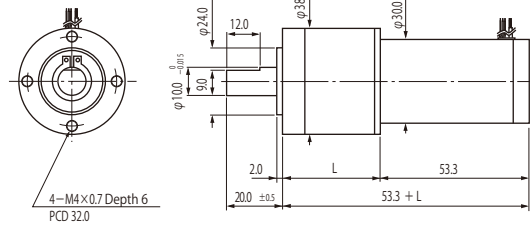
With Encoder + Gearhead

EBD-3055 * * G-MC512 ZFP 1 / xxx



With Gearhead

BD-3055 * * G ZFP 1 / xxx



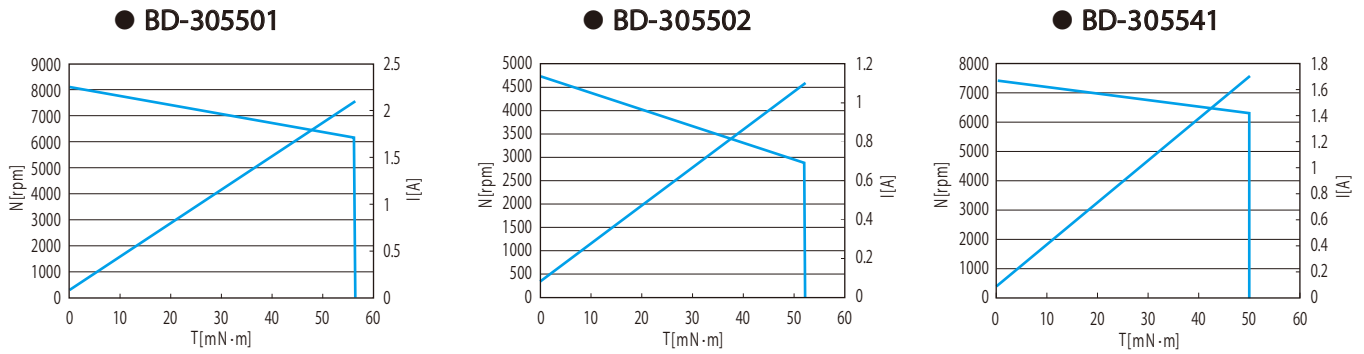
Specifications

Items		BD-305501	BD-305502	BD-305541	
Number of Poles	Pole	2	2	4	
Power Source Voltage	V	24 ± 5%	24 ± 5%	24 ± 5%	
Resistance	Ω	2.1	7.3	1.5	
Torque Constant	mN·m/A	29.5	53.7	30.9	
Back-EMF Constant	V/K rpm	3.09	5.62	3.24	
No Load Speed (*1)	rpm	8100	4700	7400	
Maximum Continuous Current (*1)	A	2.1	1.1	1.7	
Maximum Continuous Torque (*1)	mN·m	56.4	52.3	50.1	
Rated Speed (*1)	rpm	6200	2900	6300	
Rated Output (*1)	W	36.6	15.9	33.0	
Rotor Inertia	g·cm ²	15.5	15.5	16.1	
Weight	g	210	210	210	
Driver	Standard	BSD-36-**** (Maximum Speed)	1024- Δ 010 (5000 rpm)	1024- Δ 011 (4700 rpm)	1024- Δ 0AA (5000 rpm)

*1: This value depends on the specification of driver and encoder.

*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

Data



- The 'Data' above indicate the specifications while aluminum board (size : 82 * 82 * 5t) is attached to the motor flange.
- Please see Page 2 for more details about 'Data'.
- Gearhead and/or encoder can be mounted to the motor as an option. Please see the specifications below for more information.

Rated Specifications of Geared Motors

BD-305501

ZFP	Reduction Ratio		5.43	20.73	29.47	79.24	112.52	160.00	302.15	*429.62	*610.82	*868.44
	Maximum Continuous Torque	N·m	0.276	0.947	1.346	3.262	4.633	6.000	10.000	10.000	10.000	10.000
	Rated Speed	rpm	554	146	103	38	27	21	11	11	10	7
	Rated Output	W	16.0	14.5	14.5	13.0	13.0	13.0	12.0	12.0	10.6	7.5
	Length L	mm	35.2	42.1	42.1	53.4	53.4	53.4	64.7	64.7	64.7	64.7

BD-305502

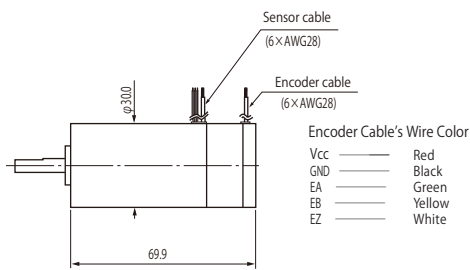
ZFP	Reduction Ratio		5.43	20.73	29.47	79.24	112.52	160.00	302.15	*429.62	*610.82	*868.44
	Maximum Continuous Torque	N·m	0.256	0.878	1.248	3.025	4.296	6.000	10.000	10.000	10.000	10.000
	Rated Speed	rpm	534	140	98	37	26	18	10	7	5	3
	Rated Output	W	14.3	12.9	12.9	11.6	11.6	11.4	10.0	7.1	5.0	3.5
	Length L	mm	35.2	42.1	42.1	53.4	53.4	53.4	64.7	64.7	64.7	64.7

BD-305541

ZFP	Reduction Ratio		5.43	20.73	29.47	79.24	112.52	160.00	302.15	*429.62	*610.82	*868.44
	Maximum Continuous Torque	N·m	0.245	0.841	1.196	2.898	4.115	5.852	9.991	10.000	10.000	10.000
	Rated Speed	rpm	624	165	116	43	30	21	11	11	10	7
	Rated Output	W	16.0	14.5	14.5	13.0	13.0	13.0	12.0	12.0	10.8	7.6
	Length L	mm	35.2	42.1	42.1	53.4	53.4	53.4	64.7	64.7	64.7	64.7

- *1 : If using Reduction ratio marked with an asterisk (*), please make sure not to exceed the allowable output torque of the gearhead.
- *2 : These are the values in uniform load.

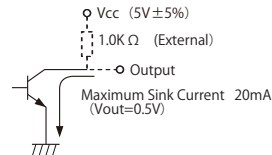
**With High Resolution Optical Encoder
EBD-305501-PC2000**



Encoder Specifications

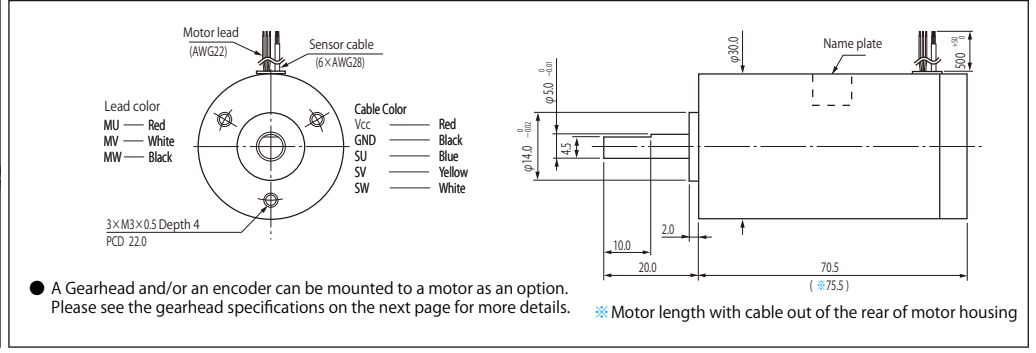
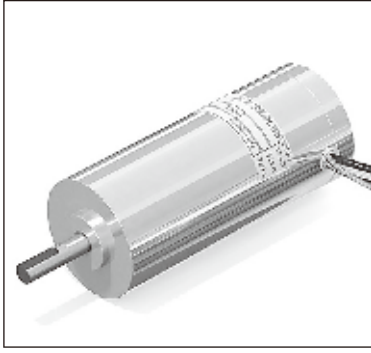
Encoder Type		Optical Incremental
Power Source Voltage	V cc	DC + 5V±5%
Consumption Current	mA	60 (max.)
Output Voltage	V	High ≥ 4.0(min.) Low ≤ 0.5(max.)
Number of Channels	ch	3
Maximum Frequency Response	kHz	100
Pulse Train	Pulse/ Rev	2000

Encoder Output Specifications



BD-3070** (Product Size: $\phi 30 \times 70$ mm)

(Unit: mm)



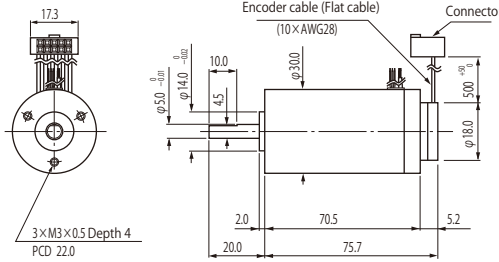
Example of Combination

*Only two (2) poles motor can attach an optical encoder.

● Please see Page 3 for the encoder specifications.

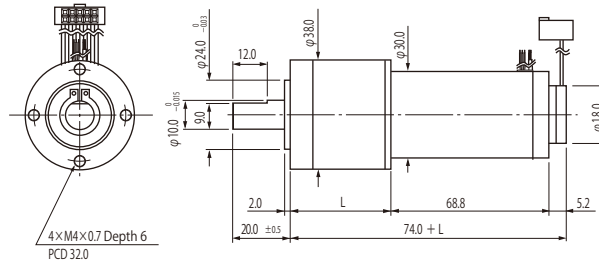
With Encoder

EBD-3070** -MC512



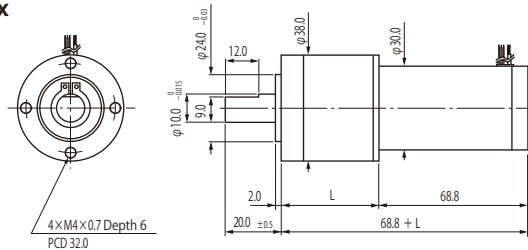
With Encoder + Gearhead

EBD-3070** G-MC512 ZFP 1 / xxx



With Gearhead

BD-3070** G ZFP 1 / xxx



Specifications

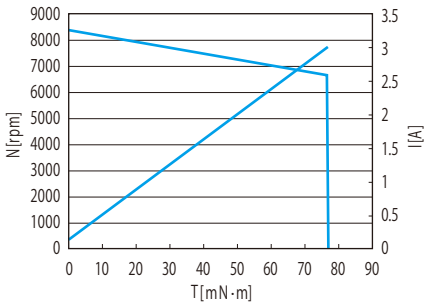
Items		BD-307001	BD-307002	BD-307041	
Number of Poles	Pole	2	2	4	
Power Source Voltage	V	24±5%	24±5%	24±5%	
Resistance	Ω	1.1	2.3	0.9	
Torque Constant	mN·m/A	29.4	41.5	30.1	
Back-EMF Constant	V/K rpm	3.09	4.34	3.15	
No Load Speed (*1)	rpm	8400	5900	7600	
Maximum Continuous Current (*1)	A	3	2	2.8	
Maximum Continuous Torque (*1)	mN·m	76.9	67.2	79.4	
Rated Speed (*1)	rpm	6700	4600	6400	
Rated Output (*1)	W	53.9	32.4	53.2	
Rotor Inertia	g·cm ²	22.3	22.3	22.8	
Weight	g	270	270	270	
Driver	Standard	BSD-36-**** (Maximum Speed)	1024- Δ 012 (5000 rpm)	1024- Δ 013 (5000 rpm)	1024- Δ 0AC (5000 rpm)

*1: This value depends on the specification of driver and encoder.

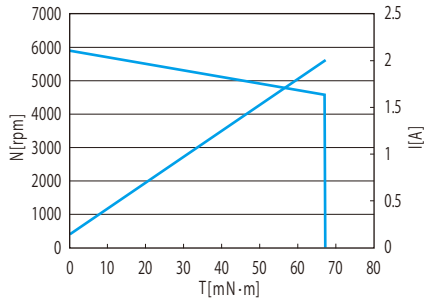
*2: The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm. Please contact our sales representatives or authorized distributors for more details.

Data

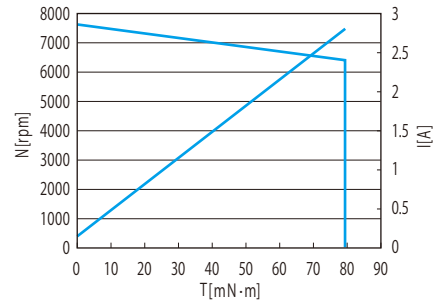
● **BD-307001**



● **BD-307002**



● **BD-307041**



- The 'Data' above indicate the specifications while aluminum board (size : 82 * 82 * 5t) is attached to the motor flange.
- Please see Page 2 for more details about 'Data' .
- Gearhead and/or encoder can be mounted to the motor as an option. Please see the specifications below for more information.

Rated Specifications of Geared Motors

● **BD-307001**

ZFP	Reduction Ratio		5.43	20.73	29.47	79.24	112.52	160.00	302.15	*429.62	*610.82	*868.44
	Maximum Continuous Torque	N·m	0.376	1.291	1.836	4.448	6.000	6.000	10.00	10.00	10.00	10.00
	Rated Speed	rpm	407	107	75	28	21	21	11	11	11	8
	Rated Output	W	16.0	14.5	14.5	13.0	13.0	13.0	12.0	12.0	11.5	8.0
	Length L	mm	35.2	42.1	42.1	53.4	53.4	53.4	64.7	64.7	64.7	64.7

● **BD-307002**

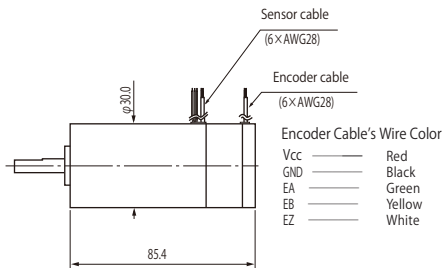
ZFP	Reduction Ratio		5.43	20.73	29.47	79.24	112.52	160.00	302.15	*429.62	*610.82	*868.44
	Maximum Continuous Torque	N·m	0.33	1.13	1.60	3.89	5.52	6.00	10.00	10.00	10.00	10.00
	Rated Speed	rpm	465	123	86	32	22	21	11	11	11	8
	Rated Output	W	16.0	14.5	14.5	13.0	13.0	13.0	12.0	11.2	7.9	5.5
	Length L	mm	35.2	42.1	42.1	53.4	53.4	53.4	64.7	64.7	64.7	64.7

● **BD-307041**

ZFP	Reduction Ratio		5.43	20.73	29.47	79.24	112.52	160.00	302.15	*429.62	*610.82	*868.44
	Maximum Continuous Torque	N·m	0.388	1.333	1.895	4.593	6.000	6.000	10.000	10.000	10.000	10.000
	Rated Speed	rpm	394	104	73	27	21	21	11	11	10	7
	Rated Output	W	16.0	14.5	14.5	13.0	13.0	13.0	12.0	12.0	11.0	7.7
	Length L	mm	35.2	42.1	42.1	53.4	53.4	53.4	64.7	64.7	64.7	64.7

- *1 : If using Reduction ratio marked with an asterisk (*), please make sure not to exceed the allowable output torque of the gearhead.
- *2 : These are the values in uniform load.

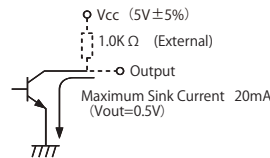
● **With High Resolution Optical Encoder**
EBD-307001-PC2000



■ **Encoder Specifications**

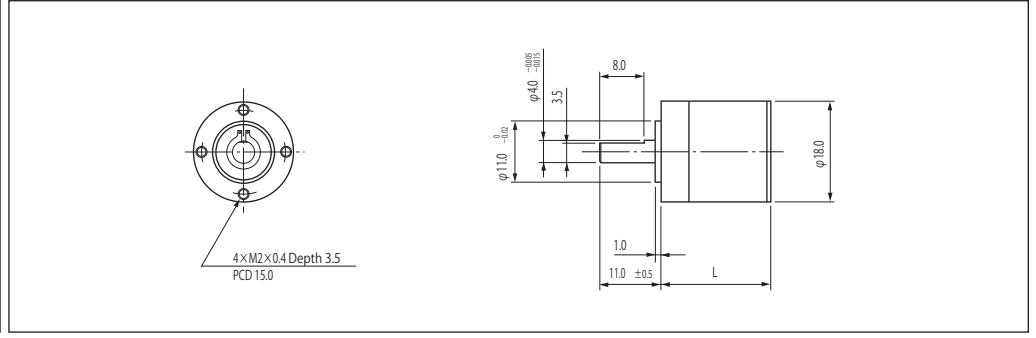
Encoder Type		Optical Incremental
Power Source Voltage	V _{cc}	DC + 5V±5%
Consumption Current	mA	60 (max.)
Output Voltage	V	High ≥ 4.0(min.) Low ≤ 0.5(max.)
Number of Channels	ch	3
Maximum Frequency Response	kHz	100
Pulse Train	Pulse/ Rev	2000

■ **Encoder Output Specifications**



■ ZJP : $\phi 18$

(Unit : mm)

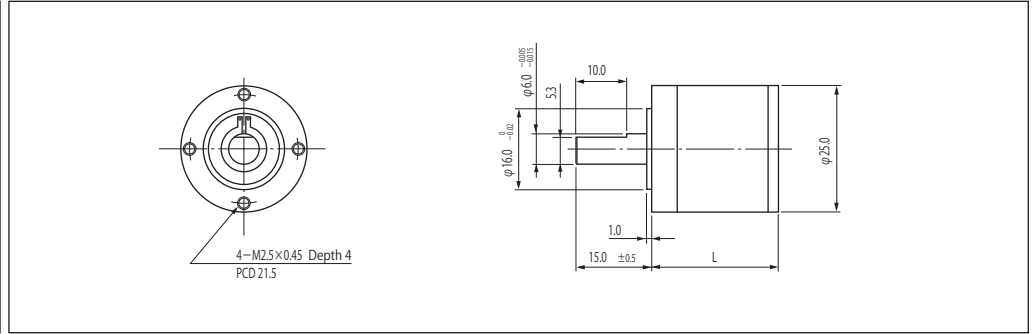


■ Gear Specifications

Reduction Ratio	Allowable Output Torque [N·m(kgf·cm)]	Allowable Output [W]	Maximum Input Speed [rpm]	Efficiency [%]	Allowable Radial Load [N(kgf)]	Allowable Thrust Load [N(kgf)]	Backlash [deg]	Length [mm]	Type of Pinion	Weight [g]	Number of Stages
1 / 4.00	0.13(1.33)	4.0	12000	80	10.0(1.0)	10.0(1.0)	1.5	19.4	A	26	1
1 / 6.00	0.13(1.33)	4.0	12000	80	10.0(1.0)	10.0(1.0)	1.5	19.4	B	26	1
1 / 16.00	0.27(2.75)	3.2	12000	64	11.0(1.1)	15.0(1.5)	1.5	22.9	A	31	2
1 / 24.00	0.27(2.75)	3.2	12000	64	11.0(1.1)	15.0(1.5)	1.5	22.9	B	31	2
1 / 36.00	0.27(2.75)	3.2	12000	64	11.0(1.1)	15.0(1.5)	1.5	22.9	B	31	2
1 / 64.00	0.58(5.92)	2.5	12000	51	12.0(1.2)	30.0(3.0)	1.5	28.2	A	38	3
1 / 96.00	0.58(5.92)	2.5	12000	51	12.0(1.2)	30.0(3.0)	1.5	28.2	B	38	3
1 / 144.00	0.58(5.92)	2.5	12000	51	12.0(1.2)	30.0(3.0)	1.5	28.2	B	38	3
1 / 216.00	0.58(5.92)	2.5	12000	51	12.0(1.2)	30.0(3.0)	1.5	28.2	B	38	3
1 / 256.00	1.20(12.24)	2.0	12000	41	13.0(1.3)	50.0(5.0)	1.5	33.5	A	45	4
1 / 384.00	1.20(12.24)	2.0	12000	41	13.0(1.3)	50.0(5.0)	1.5	33.5	B	45	4
1 / 576.00	1.20(12.24)	2.0	12000	41	13.0(1.3)	50.0(5.0)	1.5	33.5	B	45	4
1 / 864.00	1.20(12.24)	1.5	12000	41	13.0(1.3)	50.0(5.0)	1.5	33.5	B	45	4
1 / 1296.00	1.20(12.24)	1.1	12000	41	13.0(1.3)	50.0(5.0)	1.5	33.5	B	45	4

■ ZMP : $\phi 25$

(Unit : mm)

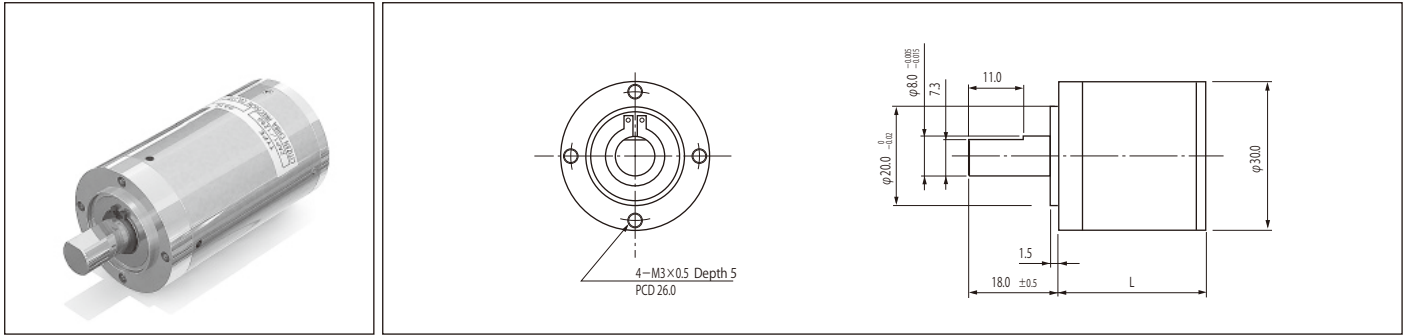


■ Gear Specifications

Reduction Ratio	Allowable Output Torque [N·m(kgf·cm)]	Allowable Output [W]	Maximum Input Speed [rpm]	Efficiency [%]	Allowable Radial Load [N(kgf)]	Allowable Thrust Load [N(kgf)]	Backlash [deg]	Length [mm]	Type of Pinion	Weight [g]	Number of Stages
1 / 4.00	0.25(2.5)	8.0	10000	85	35.0(3.5)	30.0(3.0)	1.5	24.7	A	63	1
1 / 6.00	0.25(2.5)	8.0	10000	85	35.0(3.5)	30.0(3.0)	1.5	24.7	B	63	1
1 / 16.00	0.60(6.1)	6.0	10000	72	40.0(4.0)	50.0(5.1)	1.5	29.6	A	75	2
1 / 24.00	0.60(6.1)	6.0	10000	72	40.0(4.0)	50.0(5.1)	1.5	29.6	B	75	2
1 / 36.00	0.60(6.1)	6.0	10000	72	40.0(4.0)	50.0(5.1)	1.5	29.6	B	75	2
1 / 64.00	1.20(12.2)	5.0	10000	61	50.0(5.1)	90.0(9.1)	1.5	37.1	A	95	3
1 / 96.00	1.20(12.2)	5.0	10000	61	50.0(5.1)	90.0(9.1)	1.5	37.1	B	95	3
1 / 144.00	1.20(12.2)	5.0	10000	61	50.0(5.1)	90.0(9.1)	1.5	37.1	B	95	3
1 / 216.00	1.20(12.2)	5.0	10000	61	50.0(5.1)	90.0(9.1)	1.5	37.1	B	95	3
1 / 256.00	3.00(30.6)	4.0	10000	52	55.0(5.6)	150.0(15.3)	1.5	44.6	A	115	4
1 / 384.00	3.00(30.6)	4.0	10000	52	55.0(5.6)	150.0(15.3)	1.5	44.6	B	115	4
1 / 576.00	3.00(30.6)	4.0	10000	52	55.0(5.6)	150.0(15.3)	1.5	44.6	B	115	4
1 / 864.00	3.00(30.6)	3.5	10000	52	55.0(5.6)	150.0(15.3)	1.5	44.6	B	115	4
1 / 1296.00	3.00(30.6)	2.5	10000	52	55.0(5.6)	150.0(15.3)	1.5	44.6	B	115	4

■ ZAP : $\phi 30$

(Unit : mm)

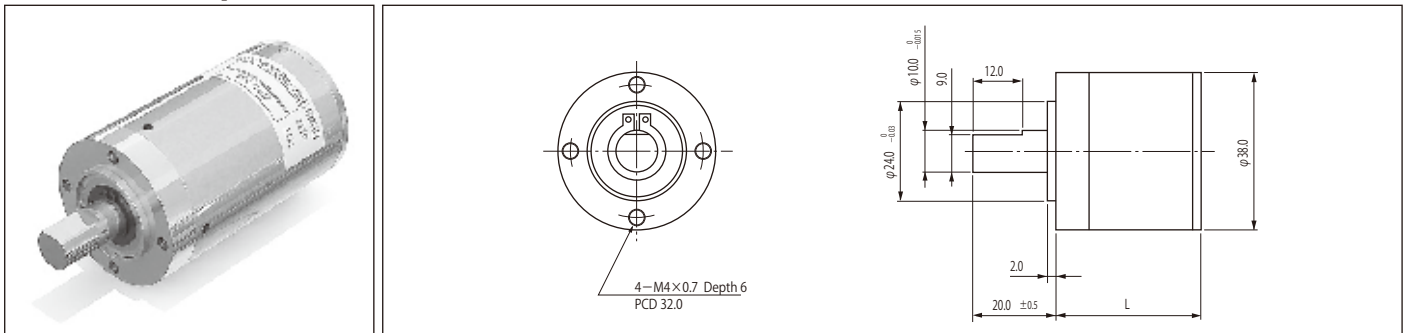


■ Gear Specifications

Reduction Ratio	Allowable Output Torque [N·m(kgf·cm)]	Allowable Output [W]	Maximum Input Speed [rpm]	Efficiency [%]	Allowable Radial Load [N(kgf)]	Allowable Thrust Load [N(kgf)]	Backlash [deg]	Length [mm]	Type of Pinion	Weight [g]	Number of Stages
1 / 4.00	0.4(4.1)	13.0	10000	85	50.0(5.1)	40.0(4.0)	1.5	29.9	A	110	1
1 / 6.00	0.4(4.1)	13.0	10000	85	50.0(5.1)	40.0(4.0)	1.5	29.9	B	110	1
1 / 16.00	1.0(10.2)	10.0	10000	72	55.0(5.6)	70.0(7.1)	1.5	35.3	A	130	2
1 / 24.00	1.0(10.2)	10.0	10000	72	55.0(5.6)	70.0(7.1)	1.5	35.3	B	130	2
1 / 36.00	1.0(10.2)	10.0	10000	72	55.0(5.6)	70.0(7.1)	1.5	35.3	B	130	2
1 / 64.00	2.0(20.4)	8.0	10000	61	65.0(6.6)	120.0(12.2)	1.5	44.0	A	160	3
1 / 96.00	2.0(20.4)	8.0	10000	61	65.0(6.6)	120.0(12.2)	1.5	44.0	B	160	3
1 / 144.00	2.0(20.4)	8.0	10000	61	65.0(6.6)	120.0(12.2)	1.5	44.0	B	160	3
1 / 216.00	2.0(20.4)	8.0	10000	61	65.0(6.6)	120.0(12.2)	1.5	44.0	B	160	3
1 / 256.00	4.8(49.0)	6.5	10000	52	75.0(7.6)	200.0(20.4)	1.5	52.7	A	190	4
1 / 384.00	4.8(49.0)	6.5	10000	52	75.0(7.6)	200.0(20.4)	1.5	52.7	B	190	4
1 / 576.00	4.8(49.0)	6.5	10000	52	75.0(7.6)	200.0(20.4)	1.5	52.7	B	190	4
1 / 864.00	4.8(49.0)	5.5	10000	52	75.0(7.6)	200.0(20.4)	1.5	52.7	B	190	4
1 / 1296.00	4.8(49.0)	4.0	10000	52	75.0(7.6)	200.0(20.4)	1.5	52.7	B	190	4

■ ZFP : $\phi 38$

(Unit : mm)



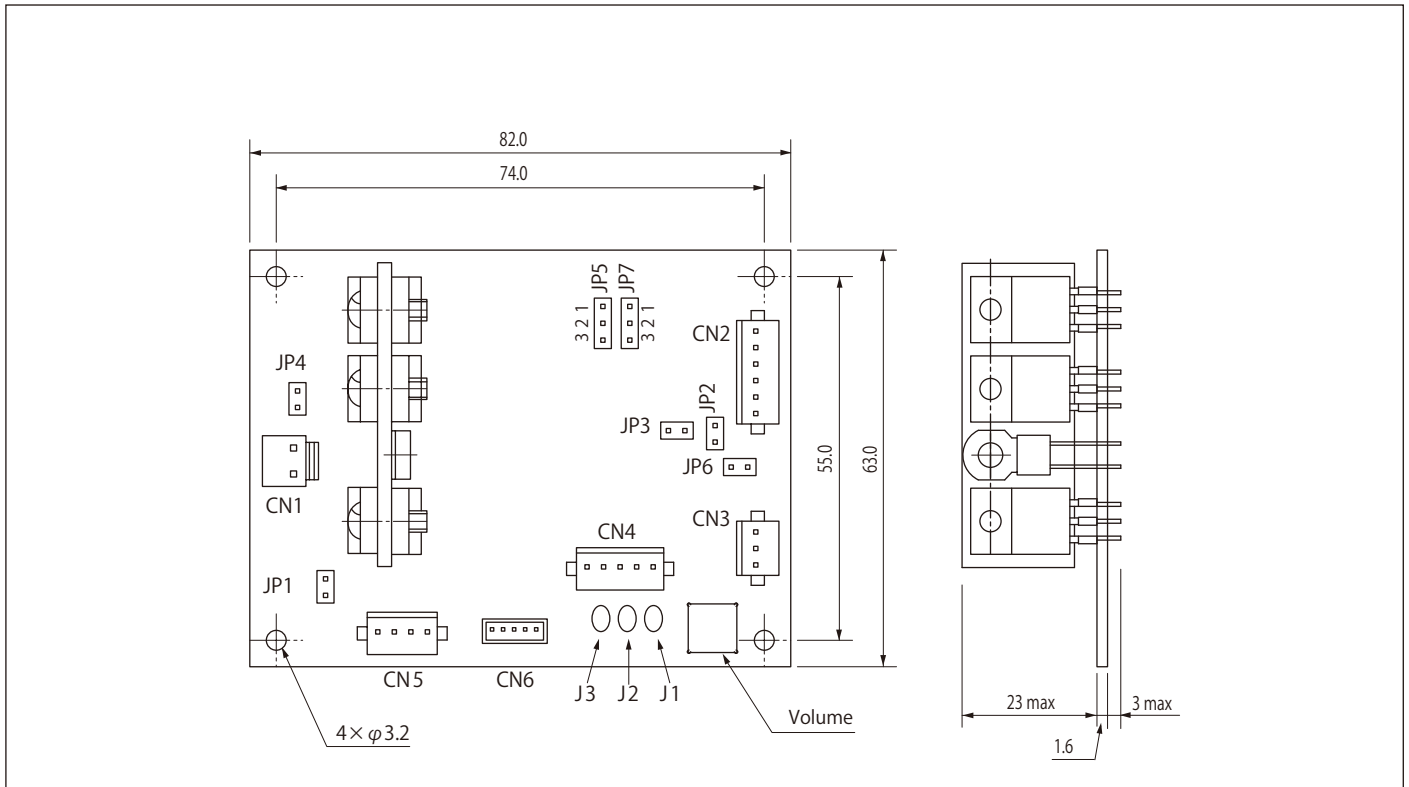
■ Gear Specifications

Reduction Ratio	Allowable Output Torque [N·m(kgf·cm)]	Allowable Output [W]	Maximum Input Speed [rpm]	Efficiency [%]	Allowable Radial Load [N(kgf)]	Allowable Thrust Load [N(kgf)]	Backlash [deg]	Length [mm]	Type of Pinion	Weight [g]	Number of Stages
1 / 5.43	1.5 (15.3)	16.0	7000	90	100.0(10.2)	60.0(6.1)	1.5	35.2	A	190	1
1 / 20.73	3.0 (30.6)	14.5	7000	81	120.0(12.2)	120.0(12.2)	1.5	42.1	A	230	2
1 / 29.47	3.0 (30.6)	14.5	7000	81	120.0(12.2)	120.0(12.2)	1.5	42.1	A	230	2
1 / 79.24	6.0 (61.2)	13.0	7000	73	150.0(15.3)	200.0(20.4)	1.5	53.4	A	290	3
1 / 112.52	6.0 (61.2)	13.0	7000	73	150.0(15.3)	200.0(20.4)	1.5	53.4	A	290	3
1 / 160.00	6.0 (61.2)	13.0	7000	73	150.0(15.3)	200.0(20.4)	1.5	53.4	A	290	3
1 / 302.15	10.0 (102.0)	12.0	7000	66	180.0(18.3)	300.0(30.6)	1.5	64.7	A	350	4
1 / 429.62	10.0 (102.0)	12.0	7000	66	180.0(18.3)	300.0(30.6)	1.5	64.7	A	350	4
1 / 610.82	10.0 (102.0)	11.5	7000	66	180.0(18.3)	300.0(30.6)	1.5	64.7	A	350	4
1 / 868.44	10.0 (102.0)	8.0	7000	66	180.0(18.3)	300.0(30.6)	1.5	64.7	A	350	4

Driver for Brushless Motors

■ BSD-36 Series

3 Phases - 6 Steps - PWM Drive



(Unit : mm)

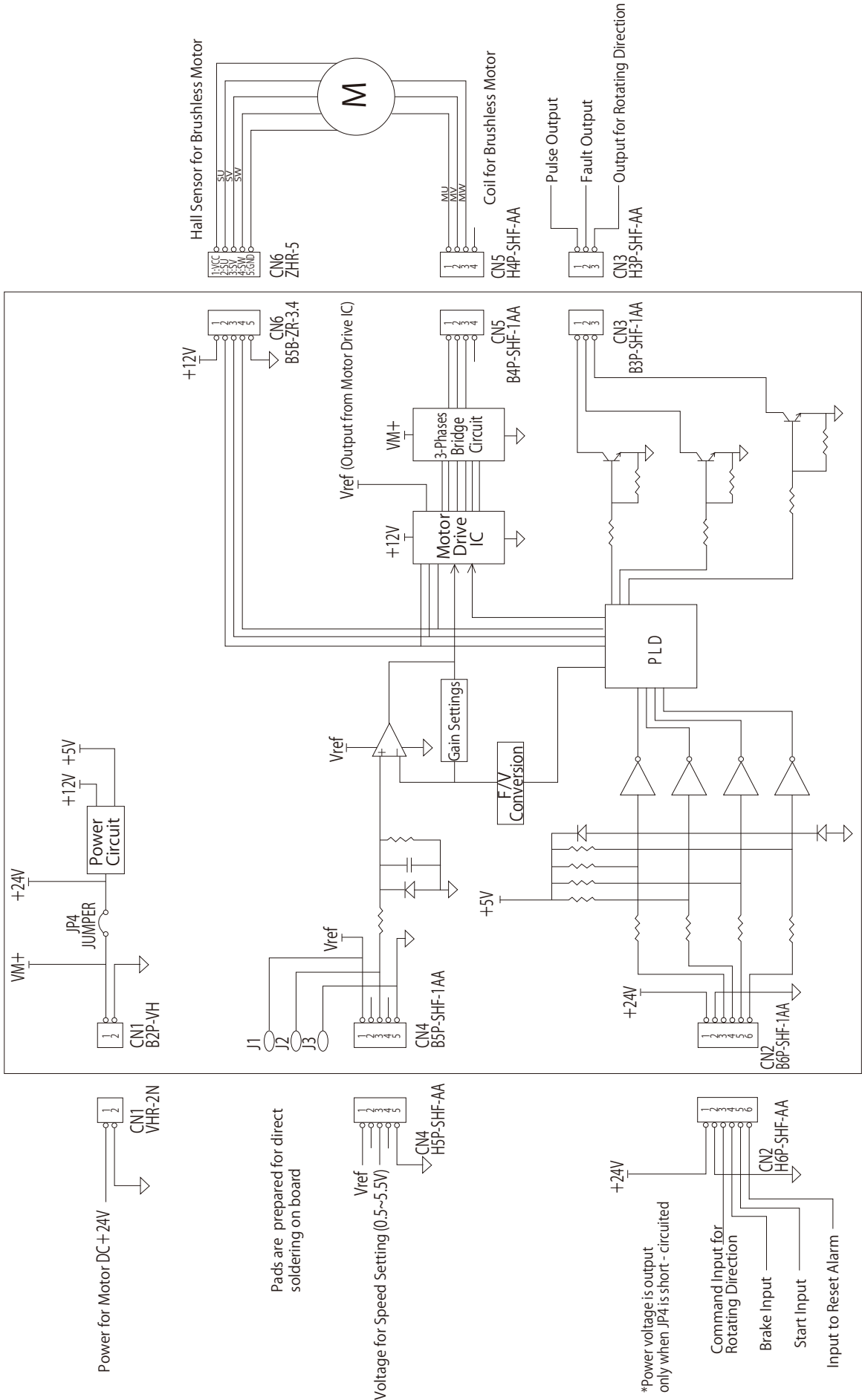
■ Features

- **Low Cost :**
External sensor, such as encoder, is unnecessary.
- **Multiple Speed Setting Methods:**
Speed setting method can be selected from (1) Internal Volume, (2) External Volume, or (3) External Command Voltage.
- **Speed Monitoring:**
Speed monitoring is possible by pulses.

■ Specifications

BSD-36 - * * * * - △ * * * * (Applicable model numbers are listed on each page of motor section) Hall sensor feedback	
Model	The alphabet at △ indicates the interface specification for speed adjustment. Please select one from B, C, and D below : B: Connector Specification which uses connector CN4 C: Board Circuit Specification which inputs direct command by using J1 to J3 on the board D: Adjust the speed by using volume on the board
Input Power Source Voltage	12V or 24V ±5% (According to the voltage of the motor specifications)
Maximum Continuous Current	It has already set according to the motor output
Input Signals	<ul style="list-style-type: none"> • Direction • Brake (3-phases short circuit) • On-Off (motor free) • Alarm Reset • Speed Command 0.5 ~ 5.5V 1000rpm / V*1
Output Signals	<ul style="list-style-type: none"> • Speed Output (Hall Sensor Pulse Output) • Alarm • Direction (High Signal Output at CW)
Ambient Temperature Range	0 ~ 50°C / Below 85% RH without condensation
Storage Condition	- 20 ~ 85°C / Below 85% RH without condensation
Weight	55g

*1 : The maximum speed of the standard type driver, BSD-36 Series, is 5,000 rpm but it can be customized to over 5,000 rpm.
Please contact our sales representatives or authorized distributors for more details.



Power for Motor DC + 24V
 CN1
 VHR-2N

Pads are prepared for direct soldering on board

Vref
 CN4
 H5P-SHF-AA

+24V
 *Power voltage is output only when JP4 is short-circuited
 Command Input for Rotating Direction
 Brake Input
 Start Input
 Input to Reset Alarm
 CN2
 H6P-SHF-AA

Models for Special Environments

Model for Chemical Cleanliness

Model for Clean Room

Model for Vacuum

Based on the standard models, we can customize our products to meet our customers' requirement.

We customize our products not only for general environment but also for special environment such as vacuum environment and clean room which require countermeasures for dust, gas, and/or chemical substance.

Example of Solution for Chemical Cleanliness

- We use the components which emit the limited amount of gas :
 - Change grease of the bearings and gearheads to fluorine grease
 - Use fluorine resin cable and lead wire
 - Use special adhesive
- We can also customize the motor characteristics, shape, design etc. at the same time.

*Caution for Specification Change According to the Components Change

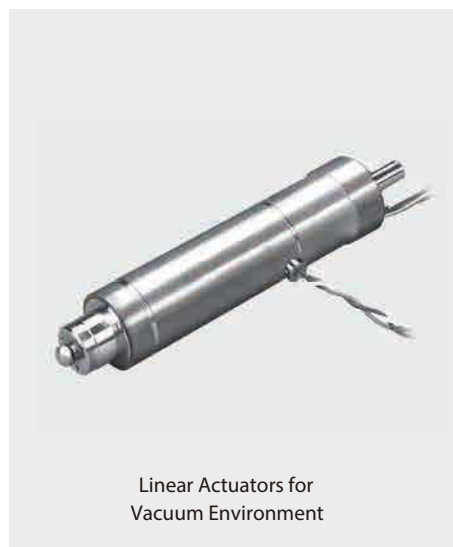
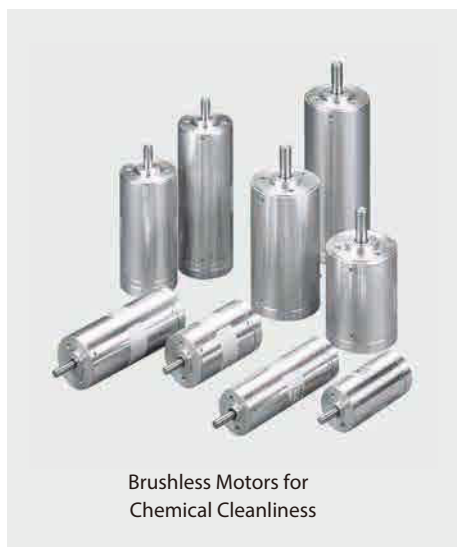
By changing the grease to fluorine type, the characteristics such as increase of current value and decrease of gear's allowable output / torque may change.

And also, bearing life may be significantly shortened by the deterioration in lubricity depending on the grease used.

■ Examples of Application for Chemical Cleanliness

- Semiconductor equipment
- Electron microscope
- Other applications requiring low gas emission

Examples of Customized Product





Cautions for Handling

Motor, Gearhead, Encoder, Driver, and accessories are precision-machined products and it is assumed that all the cautions and warnings listed below are correctly understood and handled.

Please do not install, operate, maintain or inspect the product until you have a full knowledge on the product, safety information and cautions.

The cautions required for safety are as follows:

【Caution when Unpacking】

- When you received the product, please check the package for damage and if it is the product you ordered.

【Cautions for Handling】

1. Be sure to check the wiring before turning on the power. Failure to follow this caution may result in mechanical damage and/or operation error.
2. The cables or lead wires should not be damaged, stressed excessively, loaded heavily, or pinched. Failure to follow this caution may result in malfunction and/or the products would not operate correctly.
3. Since they are small precision products, there are many parts where strength is secured by adhesion. Please handle with care such as do not apply impact or stress to the joints of the gear and encoder. Failure to follow this caution may result in injury and/or malfunction.
4. Please do not apply impact or radial load to the shaft. Also please do not apply thrust load that exceeds the specified value. Failure to follow this caution may result in malfunction.
5. Hall sensor and encoder include semiconductor components. Please process the lead wire in an anti-static environment.
6. When installing the product, please use the specified number of screws by the torque specified in JIS. Please select the screws according to the dimensions shown in the external layout drawings. Failure to follow this caution, such as screws are too long or fixing torque excessive, may result in a malfunction for mechanical parts inside may be deformed or destroyed.
7. Please do not use or store the product in an environment subject to corrosive gas or any other hazardous gas. Also, please keep dust, water or oil out of the product.
8. If smoke, abnormal heat generation, strange odor, abnormal noise, abnormal vibration, etc. occur, please stop operating immediately and turn off the power.

【Product Warranty】

1. Duration of this warranty is one year from the date of delivery. If the customer discovered a defect in material and workmanship within this period, we will repair the product for free only if the customer carry it in or return it to our company address by customer's expense.
Please note that it would take several days to repair.
2. For the defect caused by "misuse" or "mishandling" by any party, or the defect caused later than one year from the date of delivery, the customer is responsible for repairing charges. We will repair the product only if the customer carry it in to our company address or the customer is responsible to all shipping charges.
3. We are not liable to the damages caused while in transit. Please pack the product with sufficient cushioning materials to prevent external vibration.

【Other】

- Information listed above is subject to change without notice.
For further information, please contact our sales representatives or our authorized distributors.

Memo

■ Product Lineup



Coreless DC Motors

Brushless Motors

AC Servomotors

Linear Actuators

Galvanometer Optical Scanners

Gearheads

Tachometer Generator/
Encoder

■ Application for Solution

- Please visit our website for more details.

<https://ccj.citizen.co.jp/case>

■ Semiconductor Equipment :

Lithography Machine / Wafer Inspection System / Turbo Molecular Pumps / Wafer Dicing Machine /
Conveyance System for Semiconductor Factories

■ Medical and Clinical Equipment :

Denture Processing Machine / Down Flow Masks for Virus Protection / OCT / Ultrasonic Diagnostic System /
Lens Edger / Cancer Treatment / Autoclavable Medical Equipment / Robotic Exoskeleton

■ Beauty and Cosmetic Equipment :

Handpieces for Nail Art

■ Measuring and Analyzing Equipment :

LiDAR / Electron Microscope / Confocal Microscope / Railway Track Measuring Device / Surface Roughness Tester

■ Factory Automation and Robots :

Laser Marking Machine / Motors for Robots / Grinding Machine / Optical Disk Equipment

*Technical data and products are subject to change without prior notice. For further information,
please contact our sales representatives or authorized distributors.

CITIZEN

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