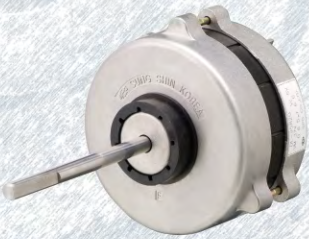
21C, for World geared motor!

BLDC MOTOR



SPG Co., Ltd.

SPG MOTOR

(ENGLISH)

SPG, Leading specialist in field of power transmissions

21C, for World geared motor!

COMPANY HISTORY

Mar. 91	Founded Mung-Jin Electronics, Co., Ltd
May. 91	AC / DC Geared Motor produced
May. 92	R&D center approved (Ministry of Science and Technology, Korea Industrial Technology Promotion Association)
Jan. 93	Selected to be a participant in the ELECTRO-21 PROJECT (Ministry of Commerce, Industry and Energy)
Feb. 93	Selected to be an excellent minor enterprise in technology direction. (Ministry of Science and Technology)
Jan. 94	Standard Geared Motor produced
Jun. 94	Converted into a corporate body as SUNGSHIN P & IND, Co., Ltd
Dec. 94	Awarded the new technique's industry gold prize in a In-cheon.
Jul. 96	EM Mark Certified
Oct. 96	UL Mark Certified
Jan. 97	CE Mark Certified
Jul. 98	Selected to be a venture business (Incheon Small and Medium Business Administration)
Jan. 99	ISO 9002 Authentication Certified
Jan. 00	Converted into a corporate body as SPG, Co., Ltd
Jan. 00	ISO 9001 Authentication Certified
May. 00	TUV Mark Certified
Nov. 01	Awarded the "5 Million Dollars Export Prize" (Ministry of Commerce, Industry and Energy)
Jan. 02	ISO 14001 Authentication Certified (BVQI)
Apr. 02	Founded the R&D center in the SPG, Co., Ltd
Apr. 02	NT(New Technique) Mark Authentication Certified (Ministry of Commerce, Industry and Energy, Technical Standard Chief)
Jul. 02	KOSDAQ Registrated
Nov. 02	Awarded the president prize in the new technique enterprise of merit.
Dec. 02	Selected to be first line production in worldwide
Oct. 03	CCC Authentication Certified
Nov. 03	Established second plant (Completion)
Dec. 03	Established a local subsidiary(SPG USA, Inc) in USA region
May. 04	Established a local subsidiary(SPG company) in China region
Nov. 04	Awarded the "10 Million Dollars Export Prize" (Ministry of Commerce, Industry and Energy)
Dec. 04	Awarded "industry and peace prize for united part" (In-cheon)
May. 05	Acquired by transfer the BLDC motor sales part. (SUNGSHIN P & IND, Co., Ltd -> SPG, Co., Ltd)
Jul. 06	Established a local subsidiary(SPG MOTOR(SUZHOU) COMMERCE AND TRADE CO.,LTD) in China region

BLDC MOTOR

Coding System

DC BRUSHLESS MOTOR

DL – 88 4 30 LG I A

- DL : DC Input DC Brushless (ADL : AC Input DC Brushless)
- 88 : Stator core Diameter
- 4 : Magnet pole
- 30 : Stack
- LG : Company
- I : SET Ex) I : Air Conditioner for Interior, O : Air Conditioner for Exterior, W : Washing, E : Refrigerator evaporator, P : Printer
- A : SERIAL NO

Exception				
	7806	7	⇨	Stator Diameter (ø76)
	89812	89	⇨	Stator Diameter (ø88)
	82412	82	⇨	Stator Diameter (ø83)
	5905	59	⇨	Stator Diameter (ø58)

DC BRUSHLESS GEARED MOTOR

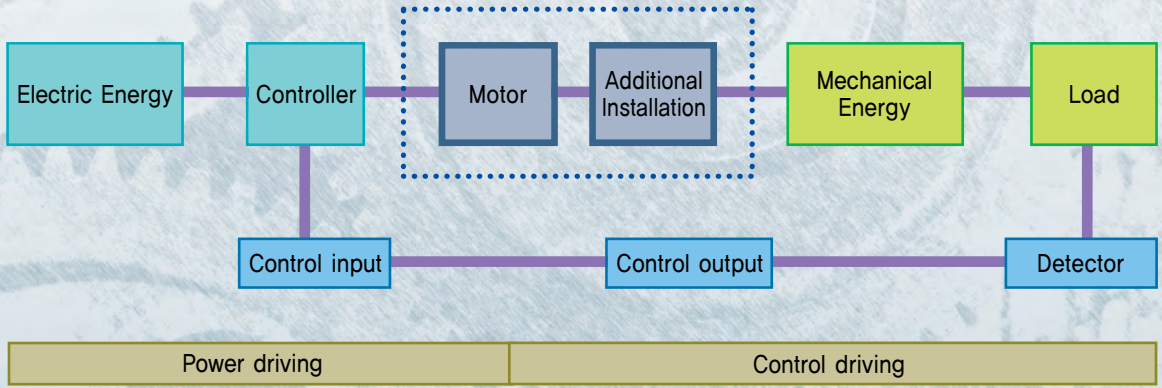
DLG – 45 8 13 KX P A

- DLG : DC Input DC Brushless (ADL : AC Input DC Brushless)
- 45 : Stator core Diameter
- 8 : Magnet pole
- 13 : Stack
- KX : Company
- P : SET Ex) W : Washing, E : Refrigerator evaporator, P : Printer
- A : SERIAL NO

Motor definition

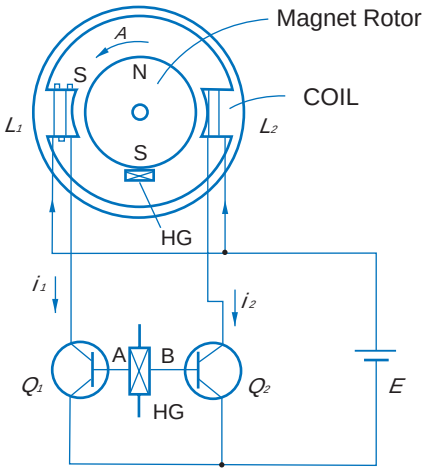
(1) Motor definition : Electric Energy conversion to Mechanical Energy By magnetic field effect, electric energy converted to rotation or linear movement . Energy conversion device.

(2) Motor Function : Function to convert Electric Energy to Mechanical Energy Output Control With the controller, torque converted.



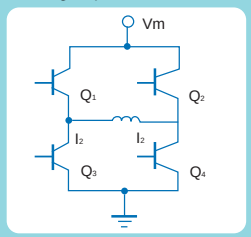
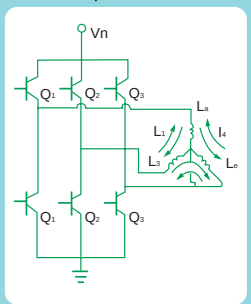
BLDC Motor driving method

For the reference of using Hall Sensor, maximummagnet flux move to S-pole of Rotor magnet and output generated to A side then TR Q_1 electrified, Coil L_1 being Magnetization, it send the electricity to i_1 direction. By Flaming's Rule , S-pole form in right side of L_1, Rotor magnet 's S-pole push and N-pole pull 180 degree rotation, so S-pole of Magnet become more distance as well as magnetic flux sensing being gone.(No out-put of A and B). However in case of N-pole getting closed to Hall Sensor by magnet inertia, N-pole having maximum magnetization, it make B side power, TR Q_2 electrified and Coil L_2 magnetization.
And Current flow to i_2 side, S-pole form in left side of L_2, finally S-pole of Rotor magnet push and N-pole pull 360 degree rotation.

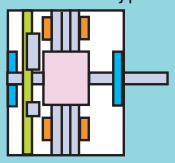
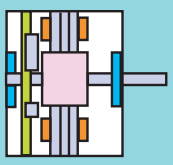
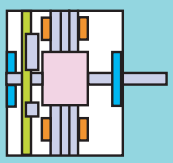


BLDC Motor Category

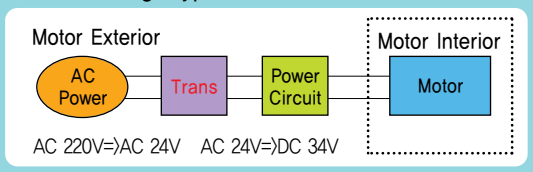
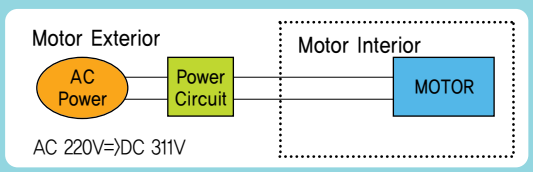
1) Classification by Driving Method

Classification	Circuit composition	Strong Point	Weak Point
(1) Single phase 	Switching 2 TR operation 1 Sensor or 2 Sensors Twice Slot Simple Circuit composition	Simple Circuit composition-Low Cost	Caulking torque high. Efficiency low. Starting torque low. Disadvantage for Noise and Vibration. Fluctuation range of rotation high. Disadvantage on low driving.
(2) Three phase 	Switchin 6 TR operation 2 Sensors or 3 sensors Three times of Slot Complicated circuit	Caulking torque low. Efficiency high. Starting torque high. Advantage for Noise and Vibration. Fluctuation range of rotation low. Advantage on low driving. Miniaturization. Variety range of counter-measure of control specification.	Complicated circuit-High Cost

2) Classification by driving circuit position

Classification	Hall sensor	Drive circuit	Lead wire
(1) Circuit built-in type 	Interior disposition	Interior disposition	* Single phase : Basic double line + α (VM, Gnd) * Three phase : Basic triple line + α (VM, Vc, Gnd) * Connection of interior pcb pattern
(2) Circuit exterior type 	Interior disposition	Exterior disposition	* Exterior : Basic 8 lines (Vc,Gnd,W1,W2,W3, H1,H2,H3)
(3) Circuit exterior type 	None	Exterior disposition	* Exterior : Basic triple line + α (W1,W2,W3)

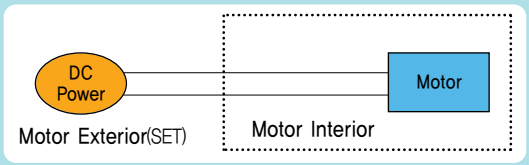
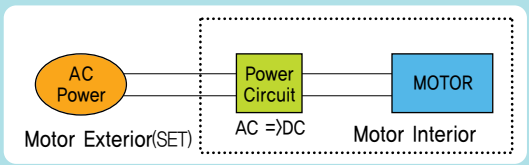
3) Classification by DC input voltage

Classification	Characteristic
(1) DC low-voltage type 	* Motor driving power(DC power) to be supplied to Motor input part directly, VM power under 60V. * Voltage range : Generally 10~60V
(2) DC high-voltage type 	* Motor driving power(DC power) to be supplied to Motor input part directly, VM power over 60V * Voltage range : Generally 60~350V * High drive composition cost, high wiring labor cost

■ DC power specification

Classification	VM	Vc	Gnd	Vsp	Etc
Classification	24V Variable	12V fix	-	-	FG, CW/CCW
Application(High-voltage)	140/310V Variable	15V fix	-	0 ~ 6V	FG, CW/CCW
Application(High-Voltage / Control)	140/310V Variable	15V fix	-	0 ~ 6V	FG, CW/CCW
Power supply sequence	3	2	1	4	

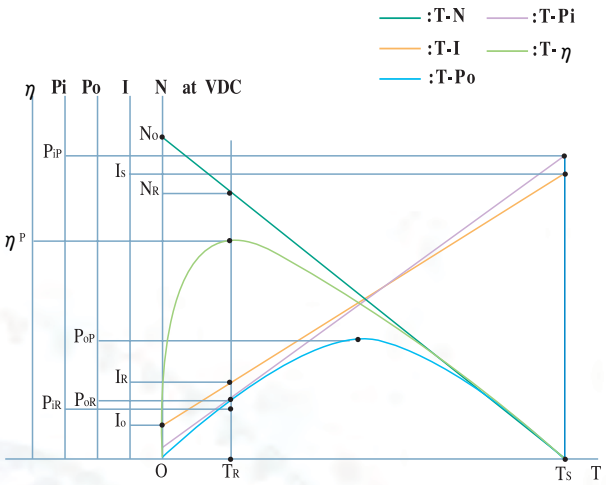
4) Classification by Input Power

Classification	Characteristic
(1) DC/DC 	* Motor driving power(DC power) to be supplied to Motor input part directly : Single phase, three phase * In this case, AC powerRectification(Stabilization), power factor)DC power
(2) AC/DC 	* AC power supplying to Motor input part and power rectified by DC, DC power move the motor : Single phase, three phase * In this case, Set supplied by AC power Inside of Motor, Rectification(Stabilization), power factor) DC power

Strong and weak point of BLDC Motor

Classification	AC MOTOR	BLDC MOTOR
Rpm	No available rpm performance on condition by over synchronous speed * 2 Pole, 60Hz : 3600 rpm Instability motor driving level condition by low driving	Available Rpm performance over synchronous speed * No limitation of Pole and frequency Stable driving performance under low-speed.
Control performance	The Performance is not in proportion * Phase control, Tap Control, etc Needed additional rpm control function (FG)	Relative performance-Good condition of control capability * Voltage control and Current control, etc No Needed additional rpm control function (FG)
Efficiency	Average 10~50%	Average 40~60%
Drive circuit	Not necessary	Necessary(Driving circuit)
Starting specification	T-N-I curve, Driving performance is relatively low.	Linear characteristic of T-N-I, Good condition of driving performance
Configuration	Relatively large dimension on same performance	Compact possible
Cost	Low	High

BLDC Motor Characteristic curve



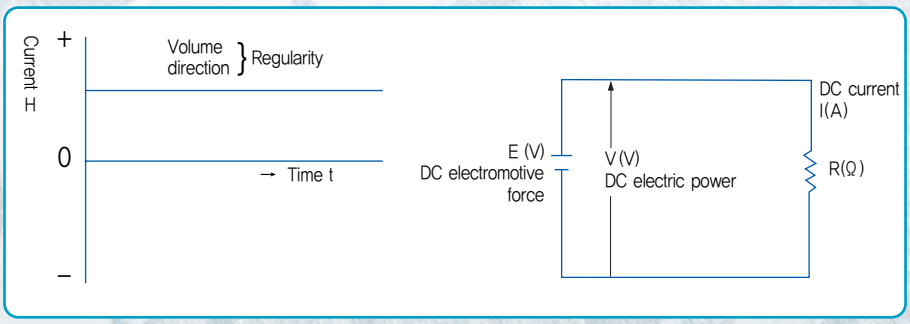
N : Revolution(rpm)	No : No load revolution(rpm)
	NR : Rated load(peak efficiency)revolution(rpm)
T : Torque(kg.cm)	TR : Rated load(peak efficiency)Torque(kg · cm)
	TS : Locking Torque(kg · cm)
I : Current(A)	Io : No load current(A)
	IR : Rated load(peak efficiency)current(A)
	IS : Locking Torque(A)
Po : Output(W)	POP : Peak output(W)
	POR : Rated load(peak efficiency)output(W)
Pi : Input(W)	PiP : Peak input(W)
	PiR : Rated load(peak efficiency)input(W)
η : Efficiency(%)	ηP : Peak efficiency(rated load)
$Po=N\times T\times 1.027\times 10^{-2}$	$P_{OP} = (T_S/2)\times(N_O/2)\times 1.027\times 10^{-2}$
	$P_{OR} = T_R\times N_R\times 1.027\times 10^{-2}$
$Pi=I\times V$	$P_{iP} = I_S\times V$
	$P_{iR} = I_R\times V$
$\eta=Po/Pi\times 100$	$\eta_P = P_{OR}/P_{iR}\times 100$

BLDC Motor-Related Terms

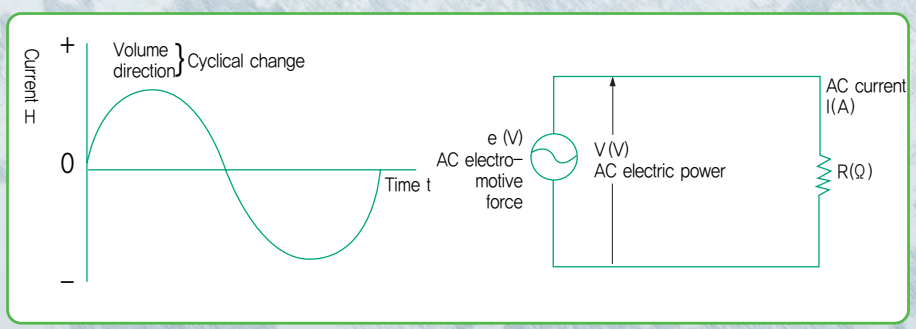
(1) Rated Voltage : Real voltage to motor driving, specified performance range
Voltage increase and decrease affect on the temperature increase and torque decrease

(2) DC(Direct Current) & AC(Alternate Current)

a. DC (Direct Current) : Stable DC volume and direction on time



b. AC(Alternate Current) : Cyclical change of AC volume and direction on time



(3) Rating : The specified requirements and the limit under rating design condition.
a. Continuous Rating : Continuous operation under the specified conditions.
b. Intermittent Rating : Specified period of time under the specified conditions.
c. Interactive Rating : Cyclic operations of stopping and running with certain load.

(4) Torque : Turning Effect
a. Starting Torque : Torque of motor starting
b. Stalling Torque : Maximum Torque under by rated motor condition
c. Rated Torque : Continuous torque having the rated out-put under by motor rated condition.

(5) Torque constant : No magnetic flux change during motor rotation in case of using permanent magnet.
Torque is in proportion to only Input current. $T = Kt \times I$
Kt(Numerical formula) is torque constant.

(6) Reversible electromotive force constant : Reversible Electromotive force(E) is in proportion to Motor rotation speed (W),
But inverse proportion to Terminal voltage(V)
The formula $E = Ke \times \omega$ (Ke : Reversible electromotive constant)

(7) Speed
a. Synchronous speed : Motor speed(An alternating current) designed by pole number and Electricity frequency.
$Ns = (120 \times f) / P$ Ns : Synchronous speed (rpm) f : Electricity frequency (Hz) P : Pole
b. No-Load rotation speed : Under condition of No-Load is imposed on the output axis.
c. Rated rotation speed : Motor rotation with rated output.

(8) Output : Motor capability to rotation by unit period.(The power originated by shaft)
a. 1 [W] = 1 [J/s] = 1 [N · m/s] = 1/9.8 [kgf · m/s], 1HP : 746W
b. Torque T [N · m] = (Po×9.8) / (N×1.027)
b. Rated Output : The rated Voltage of Motor, rated frequency, rated rpm, rated torque on the condition of the optimized specification

(9) Input : Input (Voltage × Current) is total amount of electric energy and loss needed to motor running. (W : Watt)
a. In case of direct current : $Pi = V \times I$ [W]
b. In case of single-phase current : $Pi = V \times I \times \cos \Phi$ [W]
c. In case of three-phase current : $Pi = \sqrt{3} \times V \times I \times \cos \Phi$ [W]

(10) Efficiency : The ratio of Input and Output Efficiency(%) = (Output / Input)×100, Efficiency(%) = {(Input − Loss) / Input}×100,
Efficiency(%) = {Output / (Output + Loss)}×100

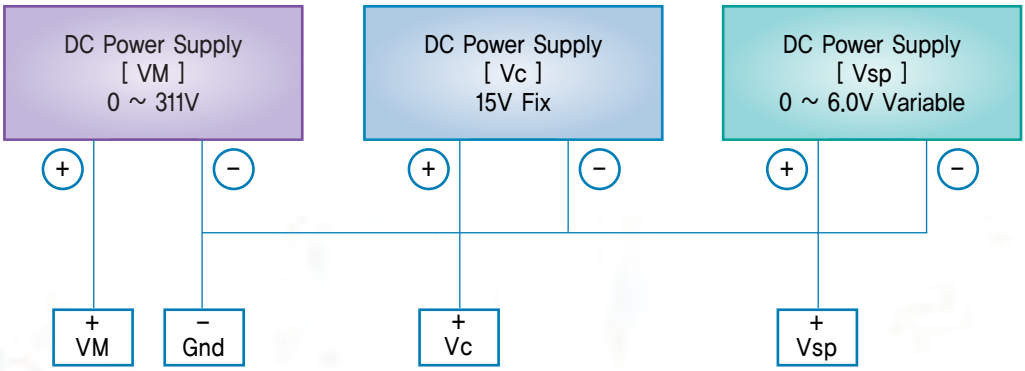
(11) Loss : Inefficiency factor being changed by heat, vibration and noise
a. Mechanical reason
- Coil damage : Coil Heat loss by Coil resistance
- Core damage : Hysteresis loss and over current loss.
- Mechanical loss : Friction loss (Bearing and Shaft, etc) and windage (Friction loss of rotation object in air)

a. Loss by Load and No-Load
★No - Load loss : Current loss under by no-load (Core and mechanical)
- Core loss : Loss by fixed iron core
- Eddy Current Loss
- Coil damage : Loss of wiring resistance between fixture and rotor- Heat loss (I^2×R)
- Mechanical loss : Friction and windage

★Load loss : Heat loss by coil demage

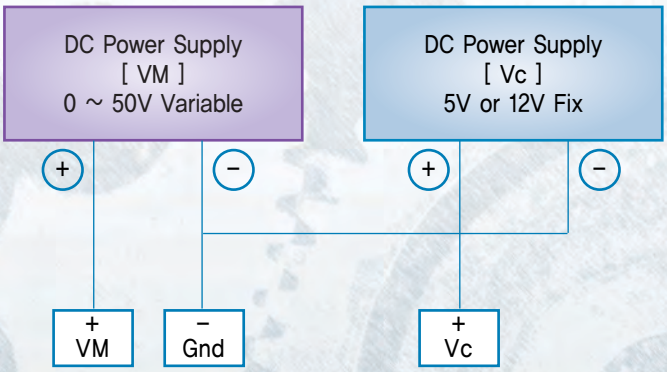
Test Method(General Specification) of BLDC Motor

1. High-Voltage application (Air-conditioner/Air-purifier/Pump)



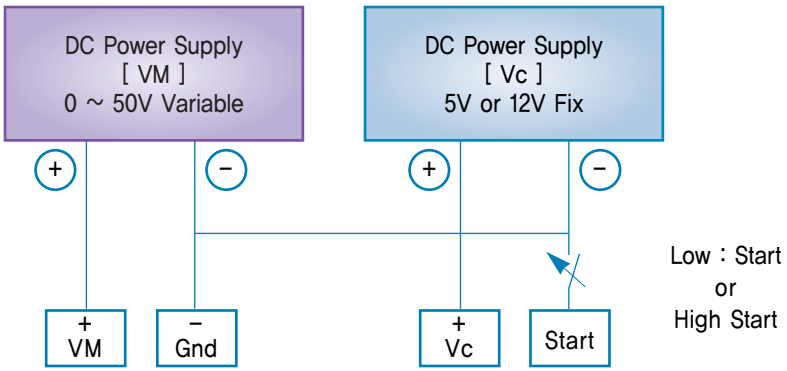
① Ground of VM,Vc and Vsp DC power supply make in common with
② The Control lever of DC Power supply for VM,Vc,Vsp adjust 0(V)
③ DC Power supply for VM and Vc powered on.
④ The control lever of DC supply for Vcc adjust 15V.
⑤ The control lever of DC Power supply for VM adjust 311V .
⑥ The voltage is adjusted by the control lever for Vsp.

2. Low-Voltage application (Air-conditioner/Gas Boiler etc.)



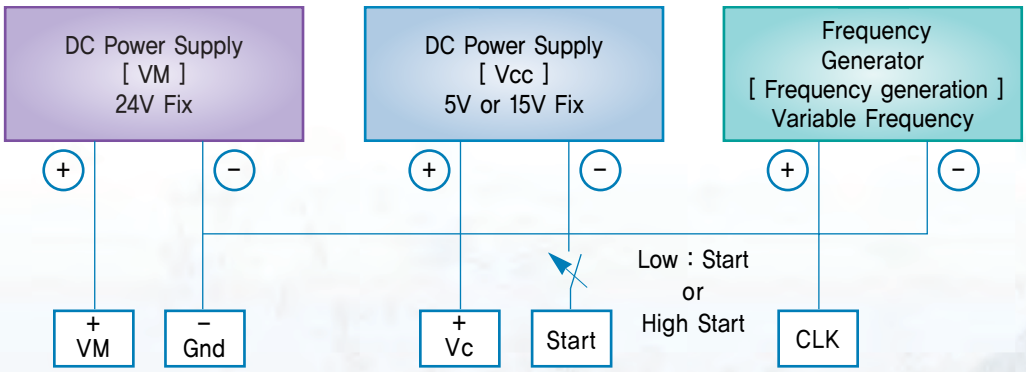
① Ground of VM,Vc DC power supply make in common with.
② The Control lever of DC Power supply for VM,Vc adjust 0(V).
③ DC Power supply for VM and Vc powered on.
④ The control lever of DC Power supply for Vcc adjust 12/5V.
⑤ The control lever of DC POWER SUPPLY for VM adjust Rated Voltage.

3. Fax machine application (Interior oscillation)



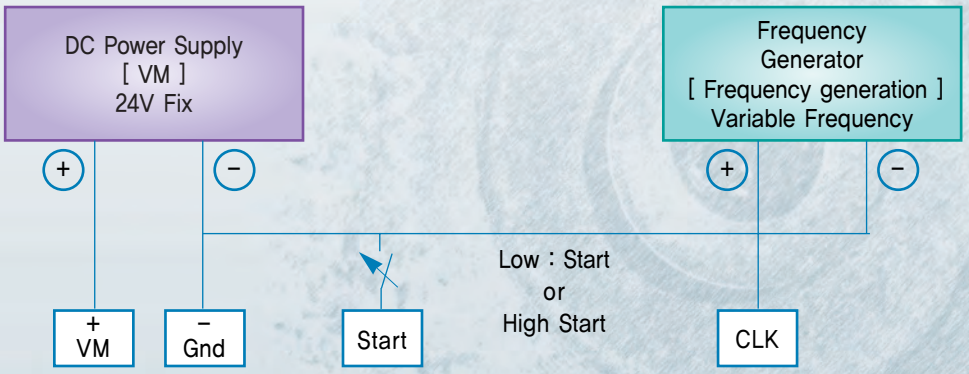
① Ground of VM, Vc DC Power Supply make in common with..
② The Control lever of DC Power Supply for VM, Vc adjust 0(V).
③ DC Power supply for VM and Vc powered on.
④ The control lever of DC Supply for Vcc adjust 5V.
⑤ The control lever of DC Power Supply for VM adjust rated voltage.

4. Fax machine application (Exterior oscillation)



① Ground of VM, Vc DC Power Supplyand Frequency generator make in common with.
② The Control lever of DC Power Supply for VM, Vc adjust 0(V).
③ DC Power Supply for VM, Vc and Frequency generator powered on.
④ The control lever of DC Supply for Vcc adjust 5V.
⑤ The control lever of DC Power Supply for VM adjust 24V.
⑥ Adjust the frequency and voltage by the control lever of Frequency generator.

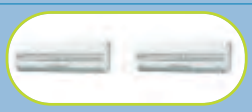
5. Fax machine application (Exterior oscillation 2)



① Ground of VM DC Power Supply and Frequency generator make in common with.
② The Control lever of DC Power Supply for VM adjust 0(V).
③ DC Power Supply for VM and Frequency generator powered on.
④ The control lever of DC Supply for VM adjust 24V.
⑤ Adjust the frequency and voltage by the control lever of Frequency generator.

BLDC Motor Application

1) Air-Conditioner

Type	Application	Motor Category	Classification
Wall-mounted type 	Indoor : Cooling Ventilation	AC Condenser DC Input Bldc	Efficiency Control Cost
Frame type 		AC Condenser DC Input Bldc	Efficiency Control Cost
Package 	Indoor : Comp cooling 	AC Condenser DC Input Bldc	Efficiency Control Cost
Multi 		AC Condenser DC Input Bldc	Efficiency Control Cost
System 		AC Condenser DC Input Bldc	Efficiency Control Cost
Wrac 	Indoor/ Outdoor Mono type	AC Condenser	Cost

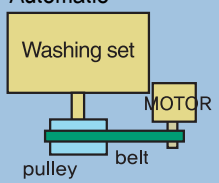
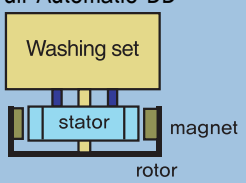
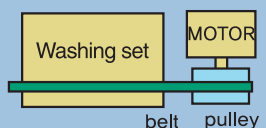
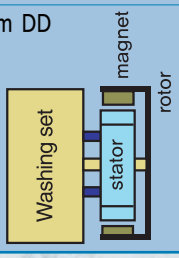
2) Air-Purifier

Type		Application	Motor Category	Classification
Stand Alone type	Built In type			
		Ventilation : Filter Transmission Gas Flow & wind pressure	AC Condenser DC Input Bldc	Efficiency Control LOW Speed

3) Gas Boiler

Type	Application	Motor Category	Classification
Charging / Exhaust 	Disposal gas discharge Proportion Control : Gas quantity &Temperature& Wind quantity	AC Condenser DC Input Bldc	Control Variable step control Stability
Hot Water 			

4) Washing Machine

Type		Motor	Others
Washing set and Dry set		AC Condenser	
Full Automatic 	Full Automatic DD 	AC Condenser AC three phase Motor DC Input Bldc (By Inner&Outer Rotor)	Control 
Drum 	Drum DD 	AC Condenser AC three phase Motor DC Input Bldc (By Inner&Outer Rotor) AC Universer Motor	Control 

5) Copy Machine / Printer

Category	Application	Motor	others
Ink Jet Printer 	For main drum operation	PM Step Motor HB Step Motor	20 PPM MAX.
LBP Printer 	For main drum operation	PM Step Motor HB Step Motor DC Input Bldc	20 PPM MAX. High speed Colar => Multiple motor application 1. HP 2. CANON 3. SS & LEXMARK
Copy Machine 	For main drum operation STEP and Cooling Loading Fan and variety of acces-sories	PM Step Motor HB Step Motor DC Input Bldc	CPM High speed Digital Multiple Machinery fax, copy, scan, Printer

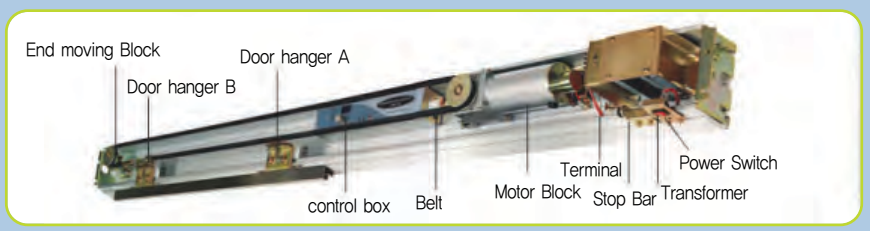
6) Others : Medical machine / Massage / Bending machine / others









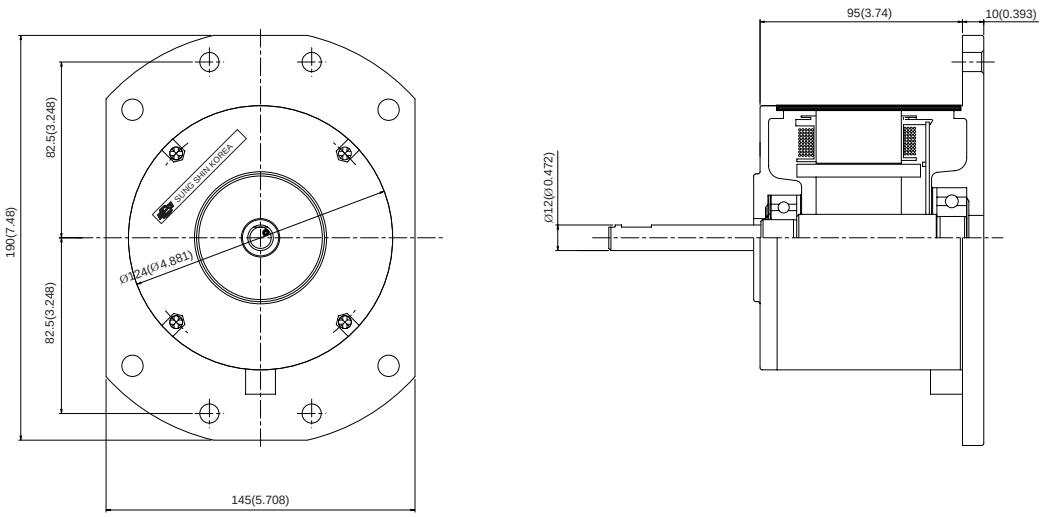


DL-12A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

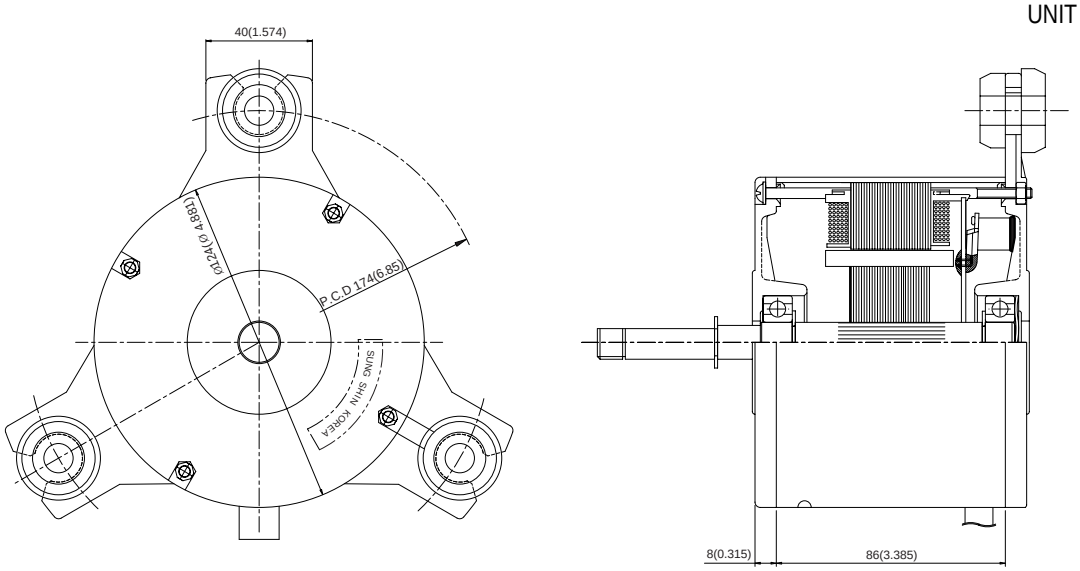
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-12830	DC 380	-	7	0.686	1020	100	73	E	External	-
DL-12840	DC 380	-	10	0.98	1180	150	121	E	External	-
DL-12840	DC 380	-	19	1.86	1180	280	230	E	External	-

DL-12B

SPG Co., Ltd.

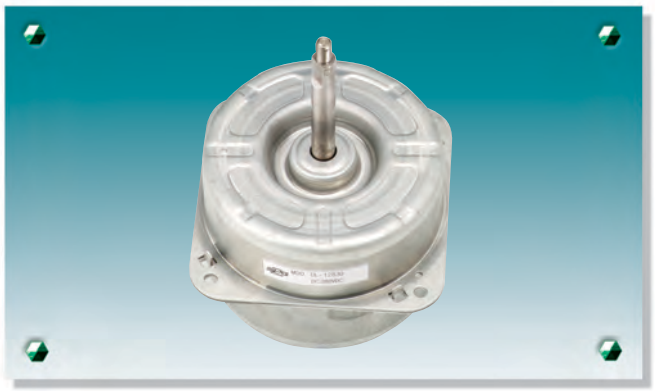
■ DIMENSION

UNIT : mm[inch]



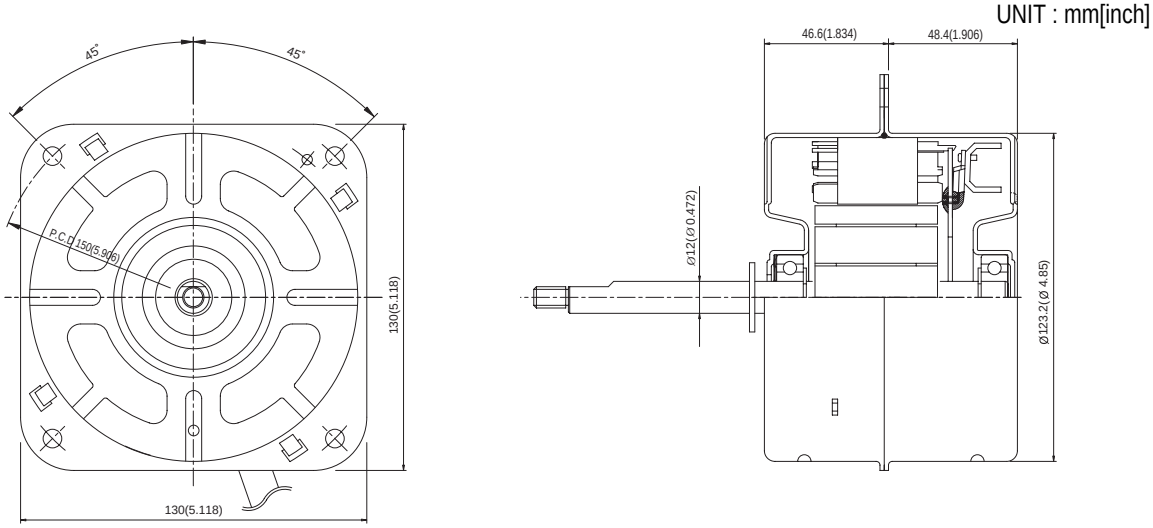
■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-12830	DC 311	-	14	1.37	650	120	93	E	Internal	-
DL-12830	DC 311	-	11.65	1.14	700	110	84	E	Internal	-
DL-12840	DC 311	-	16	1.57	900	180	148	E	Internal	-



■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

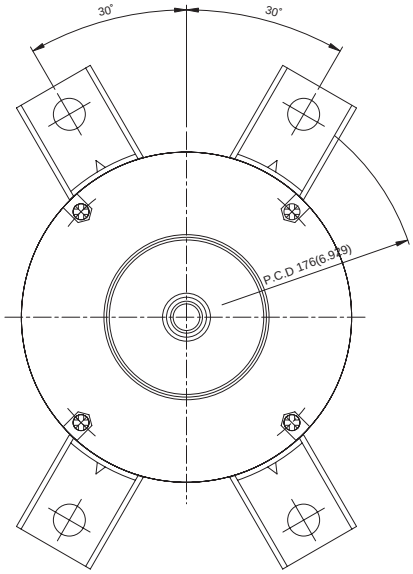
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-12830	DC 280	-	7	0.69	650	60	47	E	Internal	-

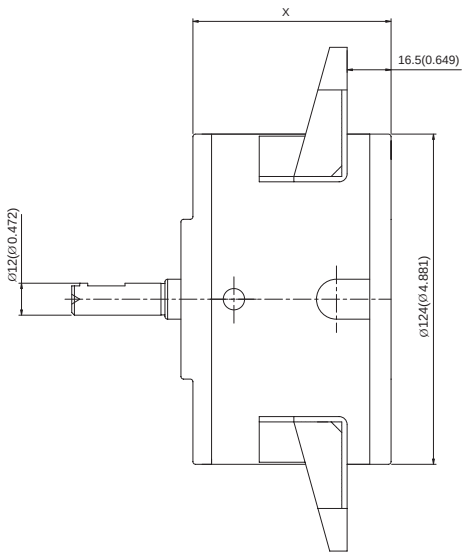
DL-12D

SPG Co., Ltd.

■ DIMENSION

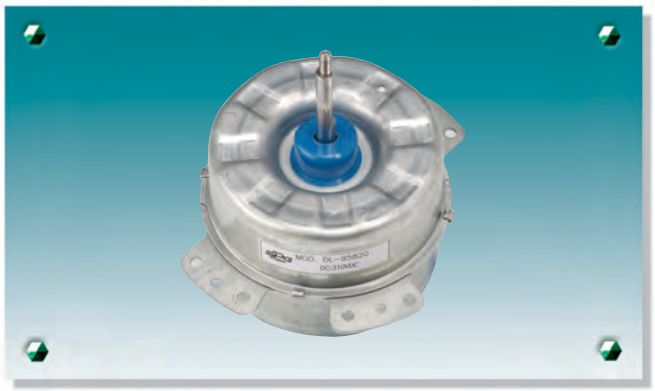
UNIT : mm[inch]





■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(RPM)	(Wi)	(Wo)			
DL-12830	DC 380	-	7	0.686	1020	100	73	E	External	74.4(2.929)
DL-12840	DC 380	-	10	0.98	1180	150	121	E	External	84.4(3.323)
DL-12840	DC 380	-	19	1.86	1180	280	230	E	External	84.4(3.323)

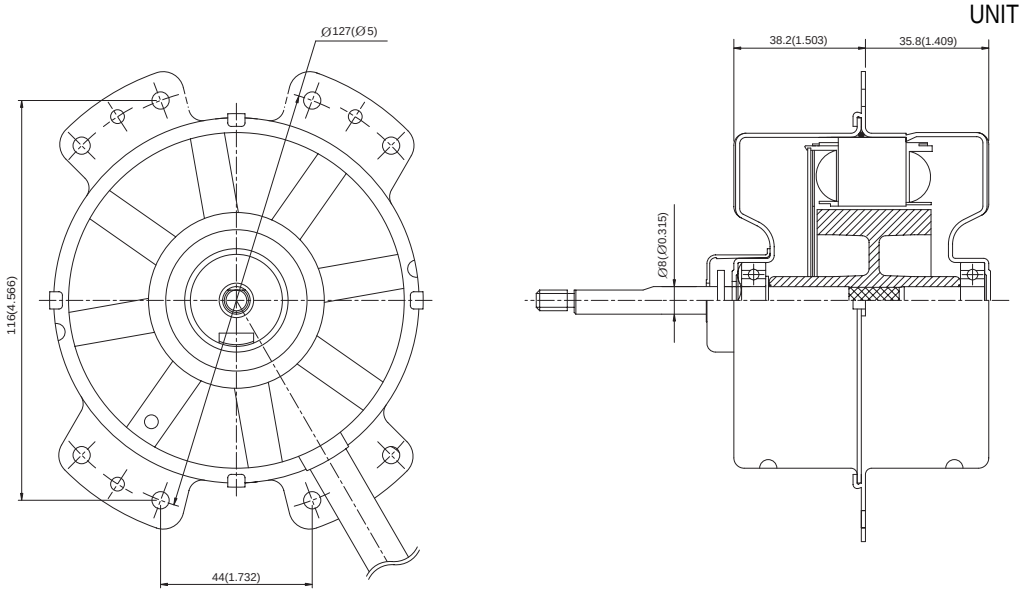


DL-95A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

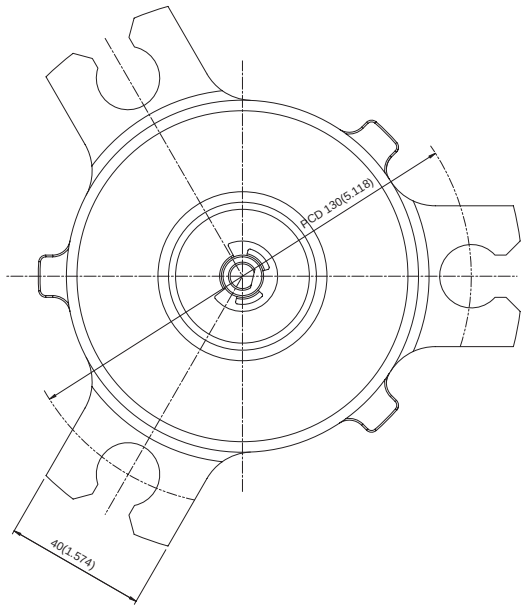
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-95820	DC 310	-	5.5	0.54	1080	82	61	E	Internal	-

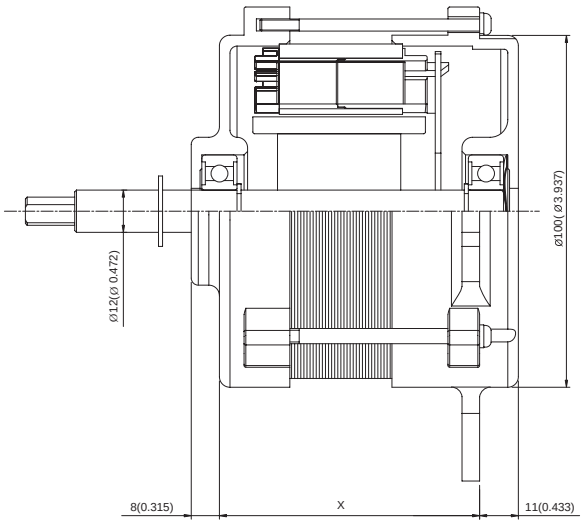
DL-95B

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]





■ CHARACTERISTIC

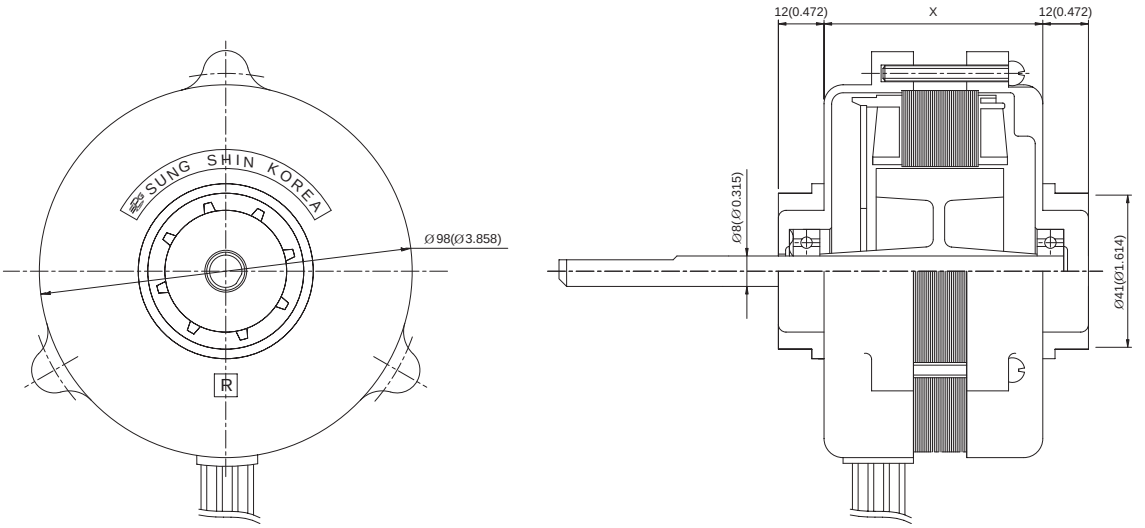
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-95820	DC 310	-	5.5	0.54	1080	82	61	E	Internal	58.4(2.299)
DL-95835	DC 310	-	11	1.08	700	110	79	E	Internal	73.9(2.909)
DL-95835	DC 310	-	14	1.37	650	145	92	E	Internal	73.9(2.909)

DL-95C

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

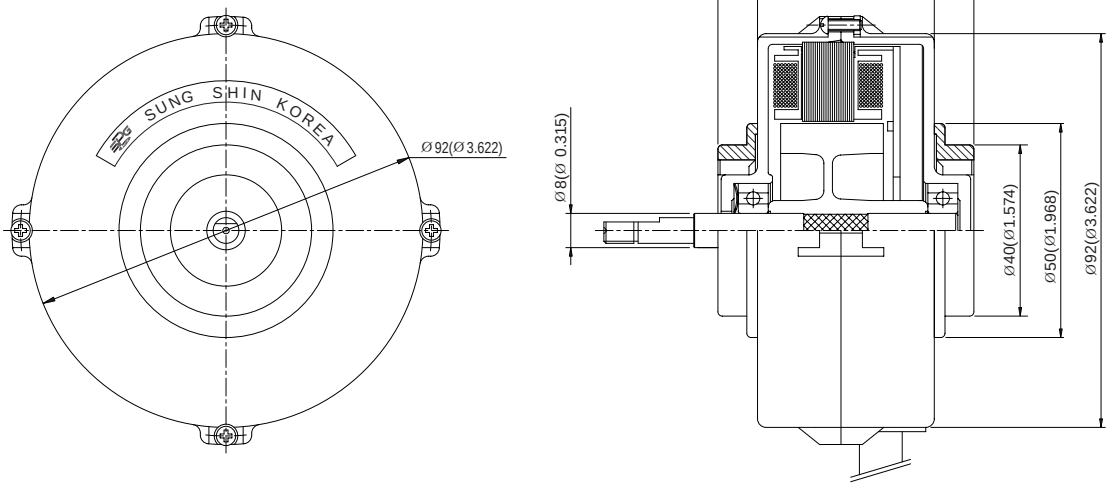
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-95820	DC 37	-	2.85	0.28	1370	54	39	E	Internal	57.5(2.263)
DL-95820	DC 310	-	5.5	0.54	1080	82	61	E	Internal	57.5(2.263)
DL-95835	DC 310	-	11	1.08	700	110	79	E	Internal	72.5(2.854)

DL-89A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



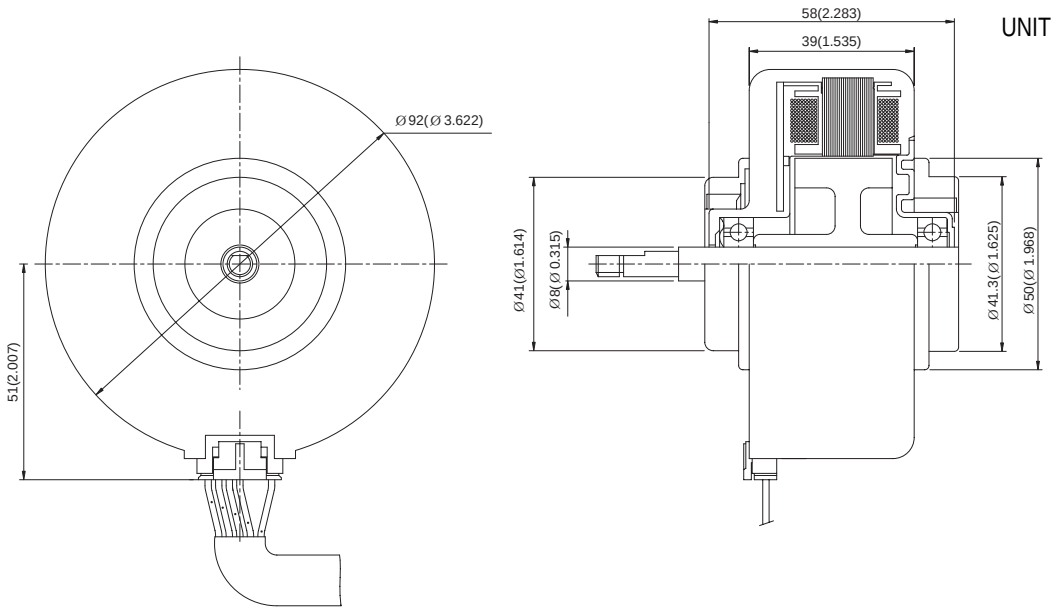
■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-89812	DC 36	-	4.2	0.41	540	40	24	E	Internal	-
DL-89812	DC 36	-	3.2	0.31	610	33	20	E	Internal	-
DL-89812	DC 310	-	2.0	0.2	2100	60	44	E	Internal	-

DL-89B

SPG Co., Ltd.

■ DIMENSION



■ CHARACTERISTIC

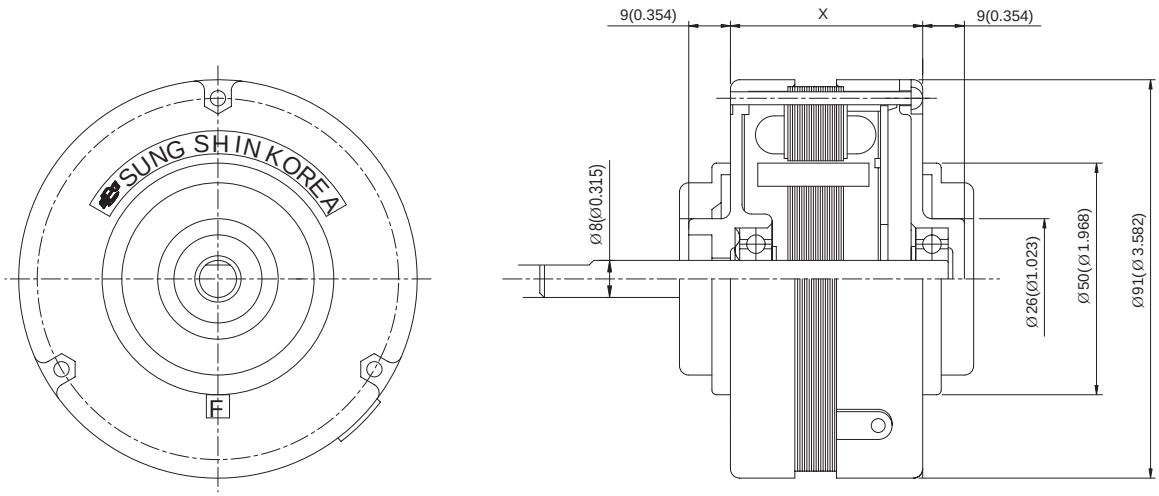
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-89812	DC 160	-	3.7	0.36	588	40	23	E	Internal	-
DL-89812	DC 280	-	3.6	0.35	700	40	26	E	Internal	-
DL-89812	DC 310	-	4	0.39	980	60	40	E	Internal	-

DL-88A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]

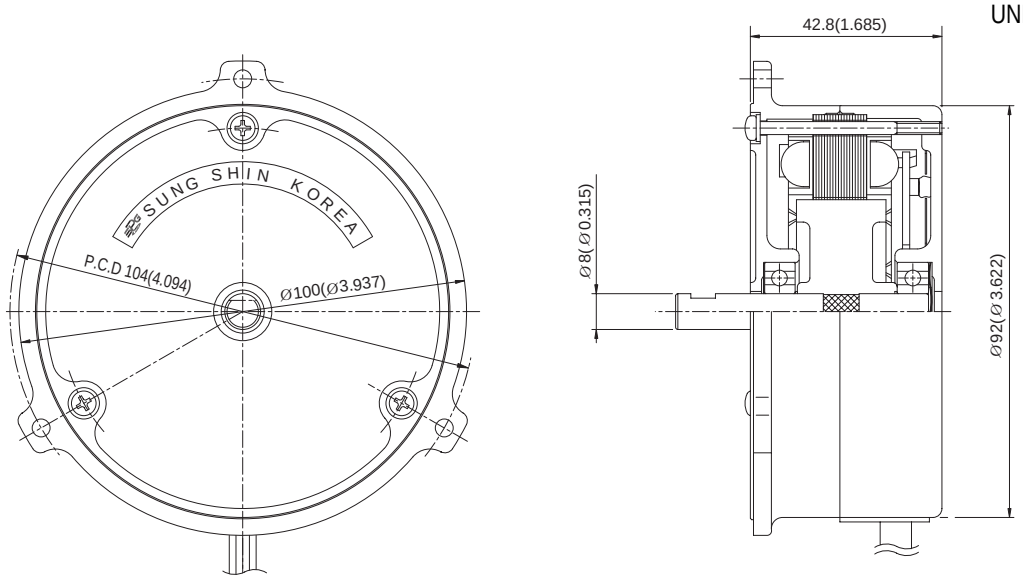


■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-88412	DC 24	-	0.55	0.054	1200	10	6.8	E	Internal	41.5(1.633)
DL-88412	DC 36	-	1.1	0.108	1250	28	15	E	Internal	41.5(1.633)
DL-88430	DC 36	-	2.84	0.28	1200	54	40	E	Internal	59.5(2.342)
DL-88430	DC 40	-	3.0	0.294	1440	65	45	E	Internal	59.5(2.342)

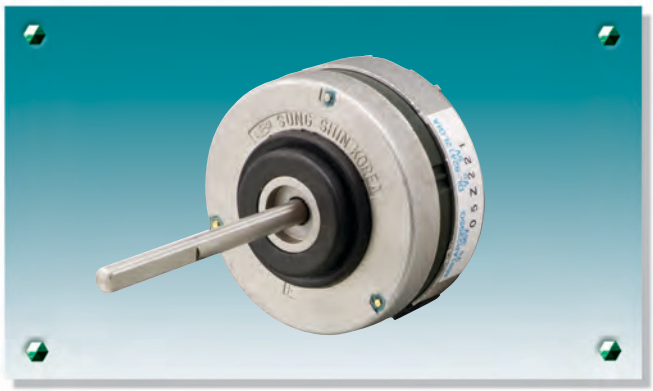
■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-88412	DC 28	-	0.4	0.039	2840	18	11.5	E	Internal	-
DL-88412	DC 43	-	0.9	0.088	4270	60	40	E	Internal	-

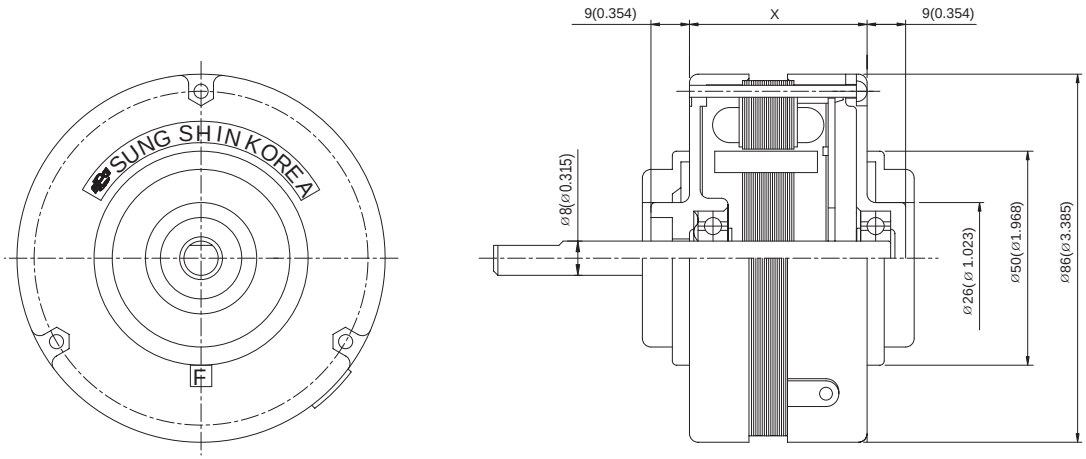


DL-82A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]

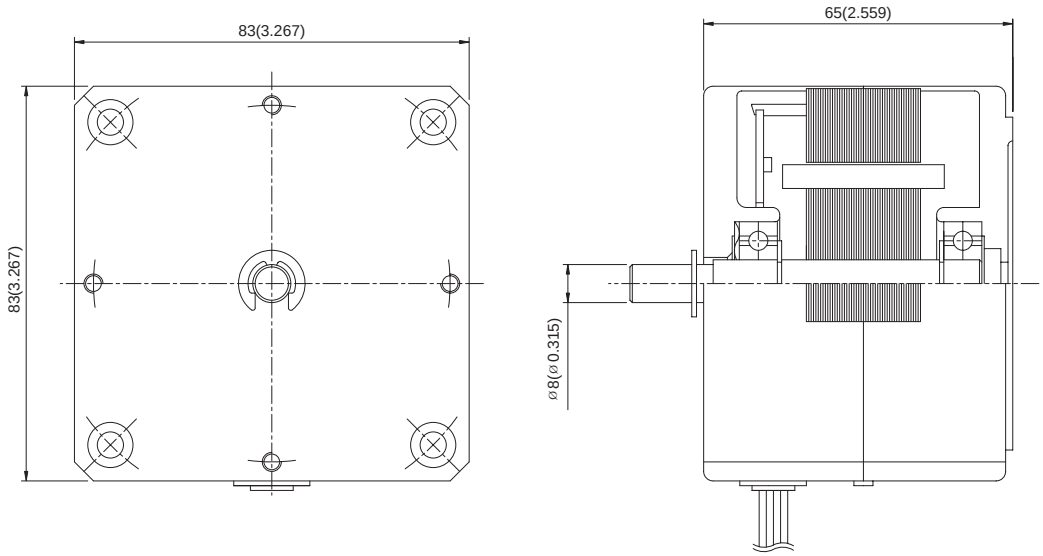


■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-82412	DC 36	-	1.1	0.108	1250	28	15	E	Internal	41.5(1.633)
DL-82412	DC 36	-	1.1	0.108	1460	32	16.5	E	Internal	41.5(1.633)
DL-82424	DC 40	-	2.2	0.147	1250	50	28	E	Internal	53.5(2.106)

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

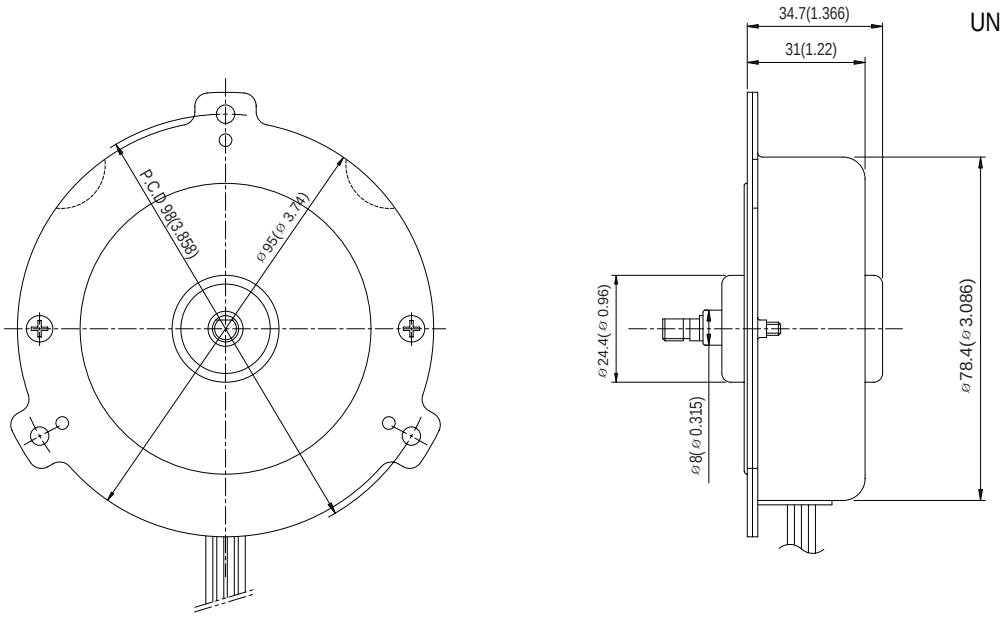
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-82424	DC 40	-	1.5	0.147	2780	80	42	E	External	-

DL-78A

SPG Co., Ltd.

■ DIMENSION

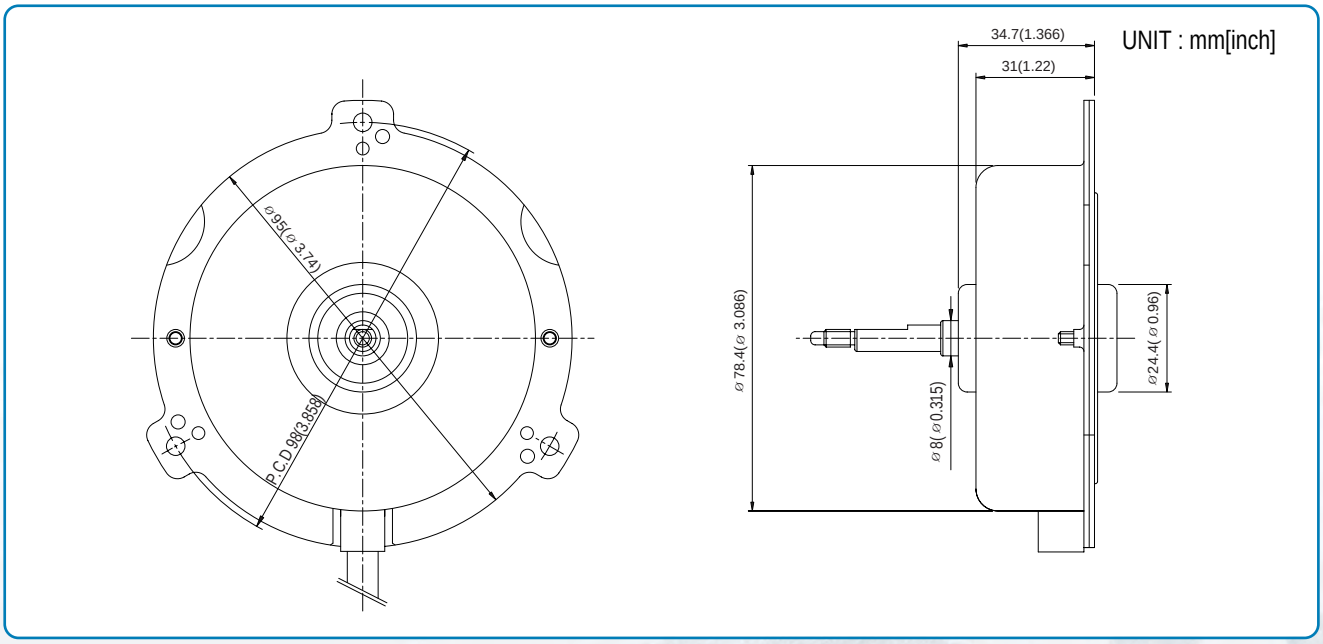
UNIT : mm[inch]



■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-7806	DC 43	-	0.52	0.051	5200	52	27.7	E	Internal	-

■ DIMENSION



■ CHARACTERISTIC

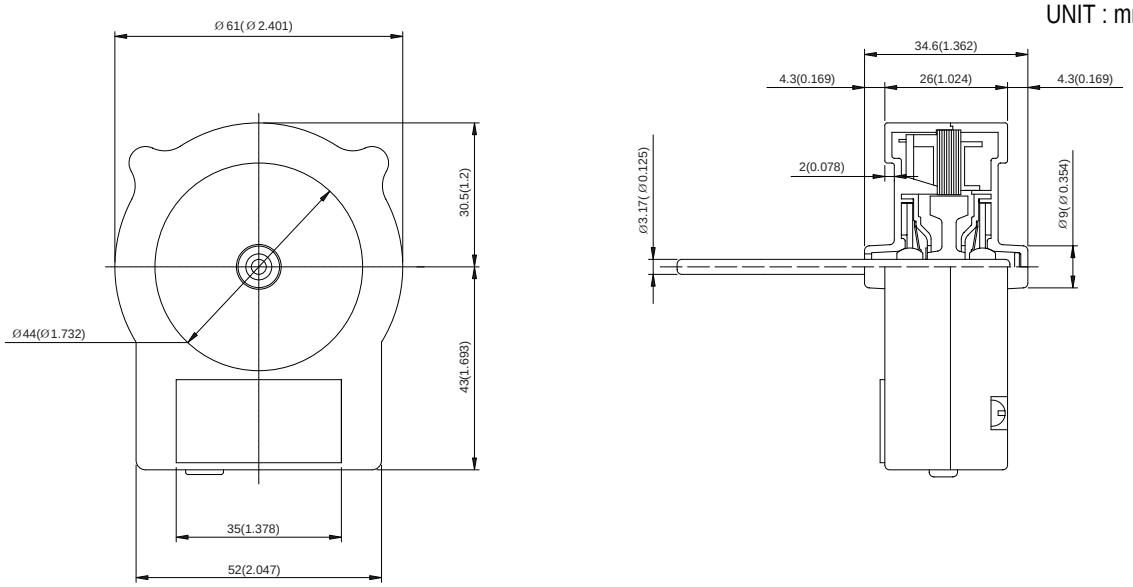
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-7806	DC 22	-	0.55	0.054	2300	26.4	13	E	External	-
DL-7806	DC 26	-	0.6	0.059	2800	39.2	17.2	E	External	-
DL-7806	DC 30	-	0.35	0.034	3600	36	12.9	E	External	-

DL-59A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

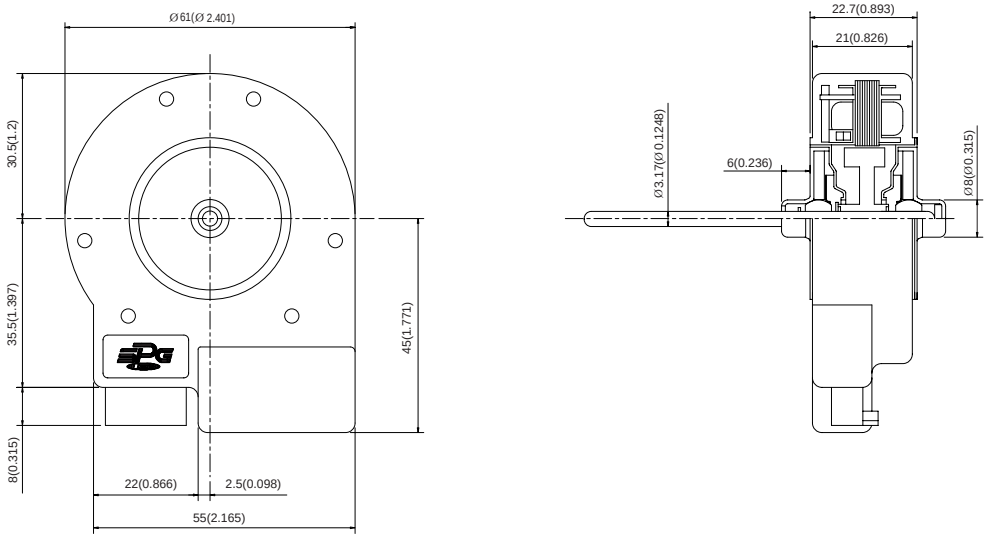
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-5965	DC 13	,-	0.18	0.0176	1420	4	2.63	A	Internal	-
DL-5965	DC 13	-	0.105	0.0103	1150	1.8	1.24	A	Internal	-

DL-59B

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

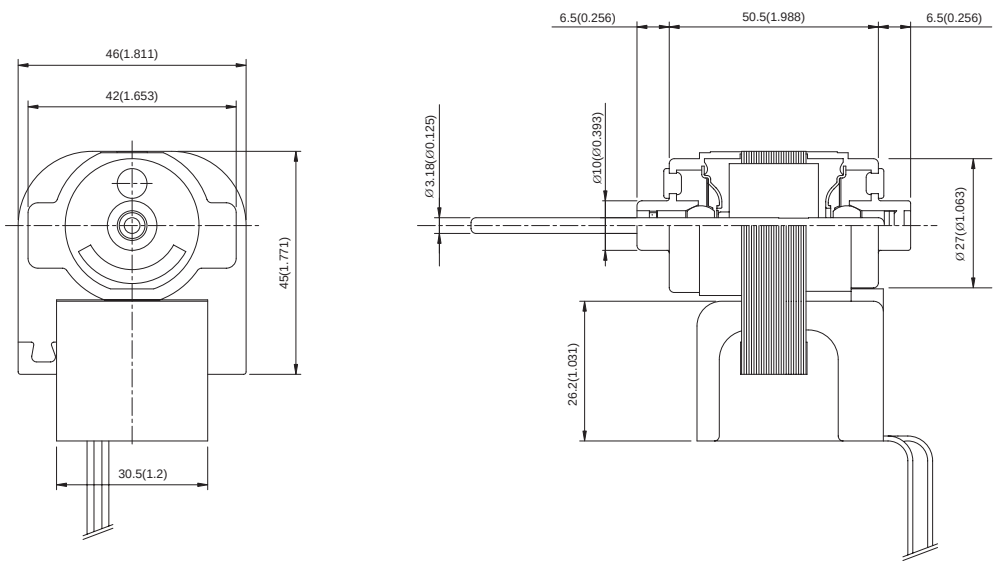
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-5905	DC 12	-	0.058	0.0057	2770	3	1.65	A	Internal	-
DL-5905	DC 12	-	0.075	0.0074	1600	2.82	1.23	A	Internal	-

DL-22A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

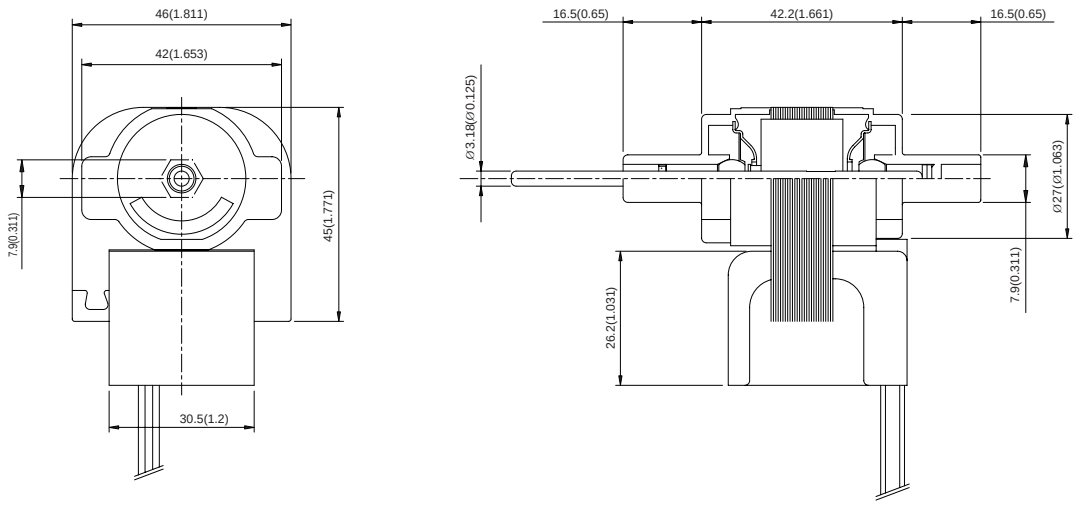
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-2213	DC 10	-	0.018	0.00176	1500	1.2	0.8	A	Internal	-
DL-2213	DC 12	-	0.046	0.0045	2200	2.5	1.0	A	Internal	-

DL-22B

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

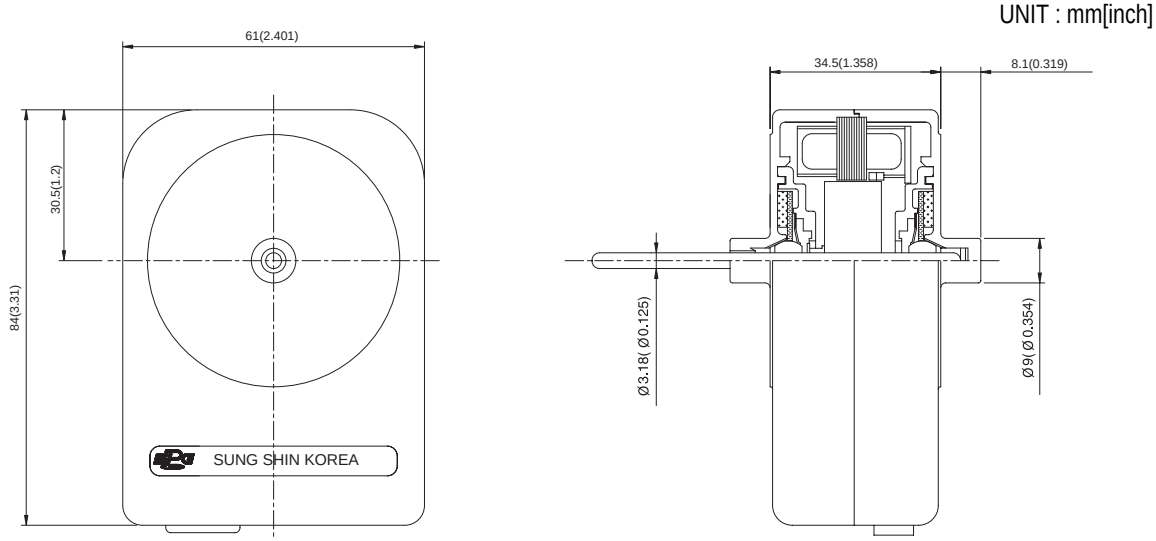
Type	Voltage	Frequency	Torque		Speed	Input	Output	Ins. Class	Of Drive	X
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DL-2213	DC 12	-	0.054	0.0053	3000	4.5	1.66	A	Internal	-

ADL-58A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

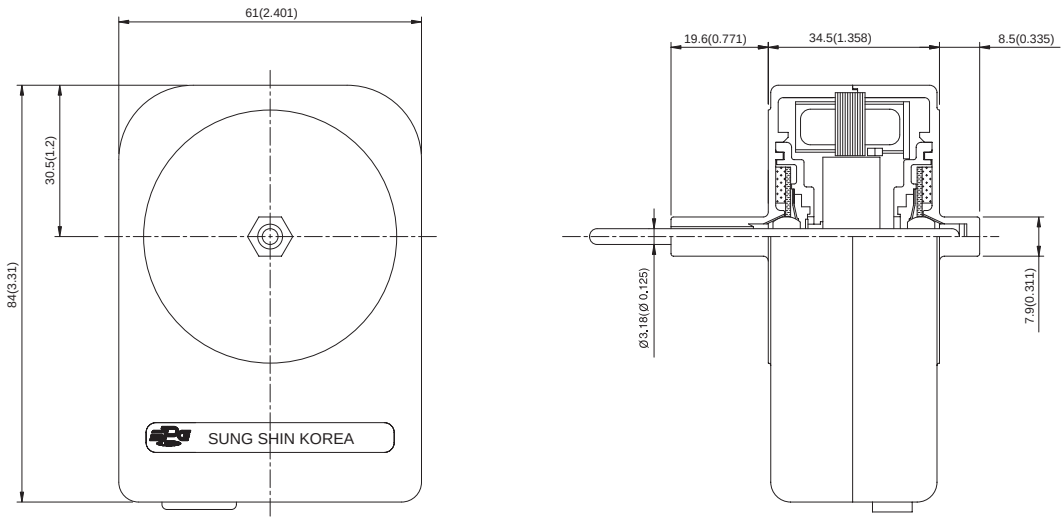
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
ADL-5846	AC 115	60	0.055	0.0054	2700	3.5	1.6	A	Internal	-
ADL-5846	AC 230	50	0.046	0.0045	2500	3.0	1.2	A	Internal	-
DL-5846	DC 12	-	0.045	0.0044	2200	3	1.0	A	Internal	-

ADL-58B

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

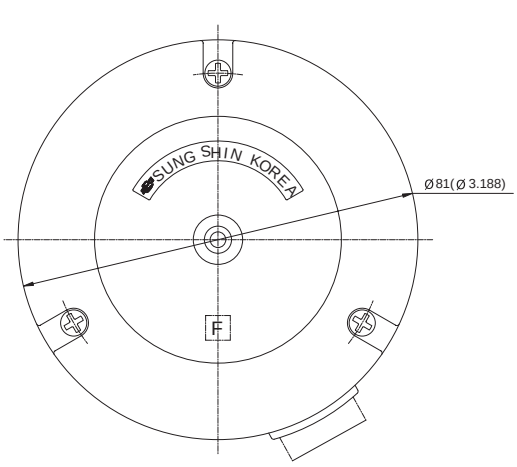
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
ADL-5846	AC115	60	0.052	0.0051	3150	4.5	1.7	A	Internal	-
ADL-5846	AC230	50	0.046	0.0045	2500	3.0	1.2	A	Internal	-

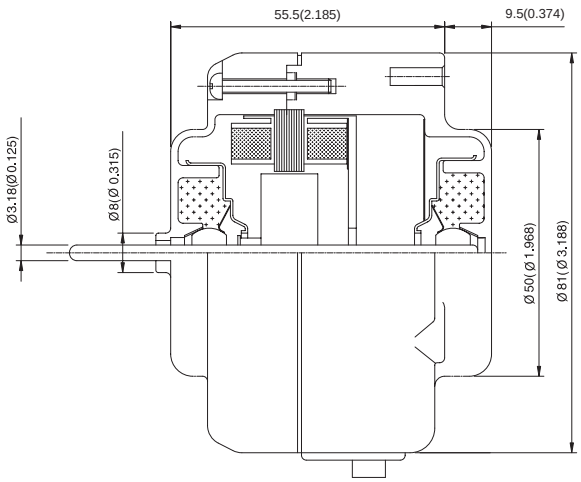
ADL-58C

SPG Co., Ltd.

■ DIMENSION

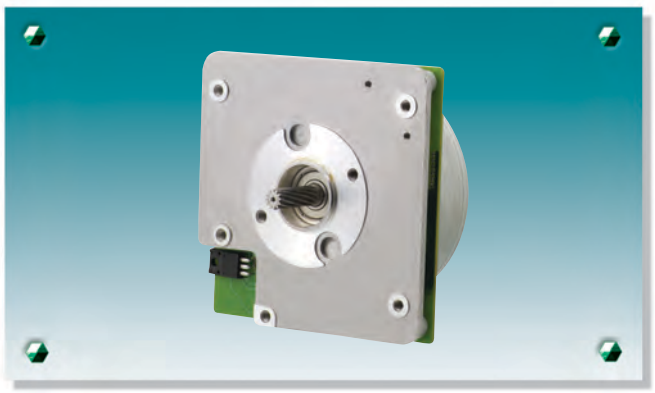
UNIT : mm[inch]





■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DLU-5846	AC 115	60	0.117	0.0115	1200	4.8	2.4	A	Internal	-

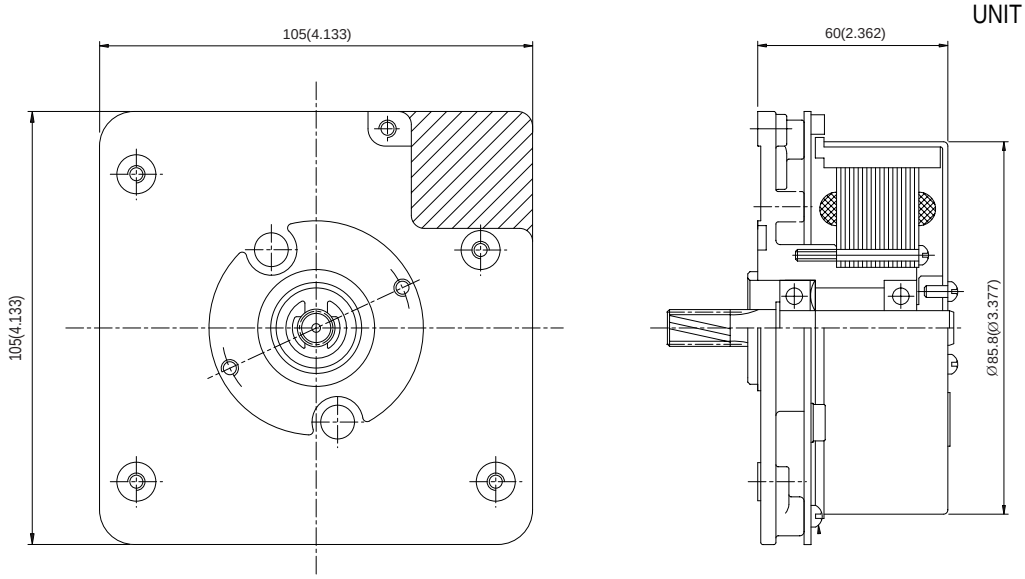


DLG-73A

SPG Co., Ltd.

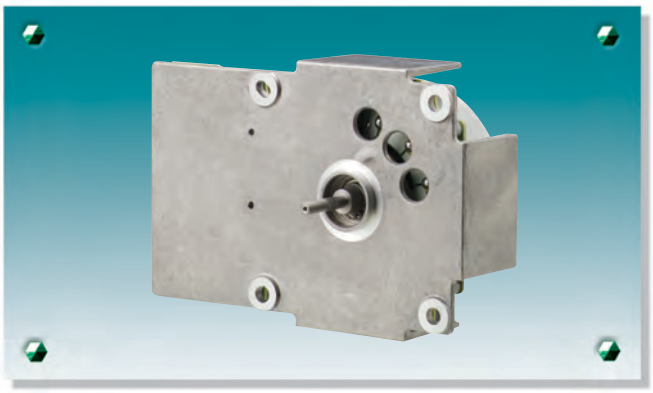
■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DLG-73820	DC 24	-	4.1	0.402	1212.6	60	40	A	Internal	-

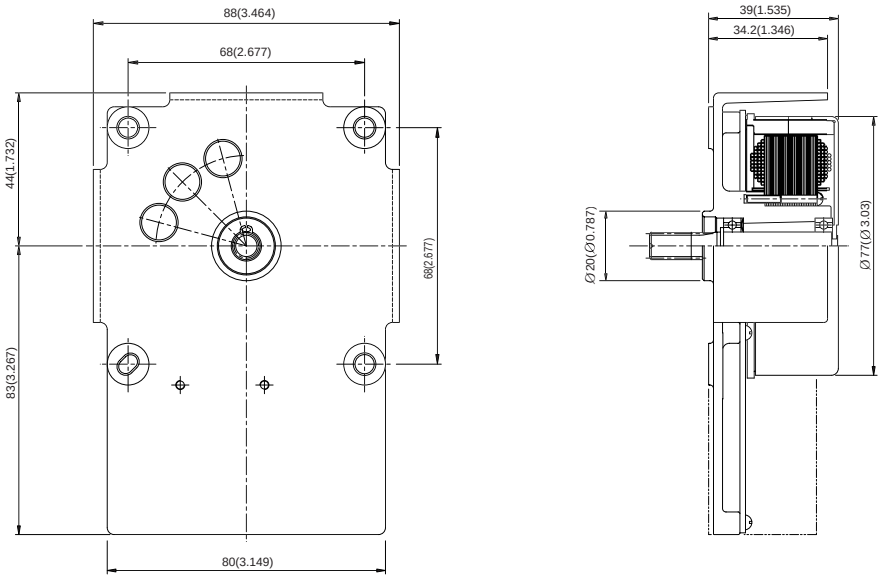


DLG-63A

SPG Co., Ltd.

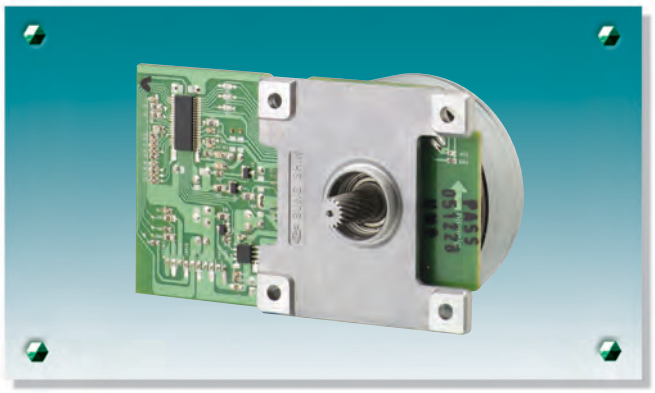
■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DLG-63815	DC 24	-	1.6	0.157	2252	50	37	A	Internal	-
DLG-63815	DC 24	-	2.0	0.196	1694	48	35	A	Internal	-
DLG-63815	DC 24	-	1.68	0.165	2481	58	43	A	Internal	-

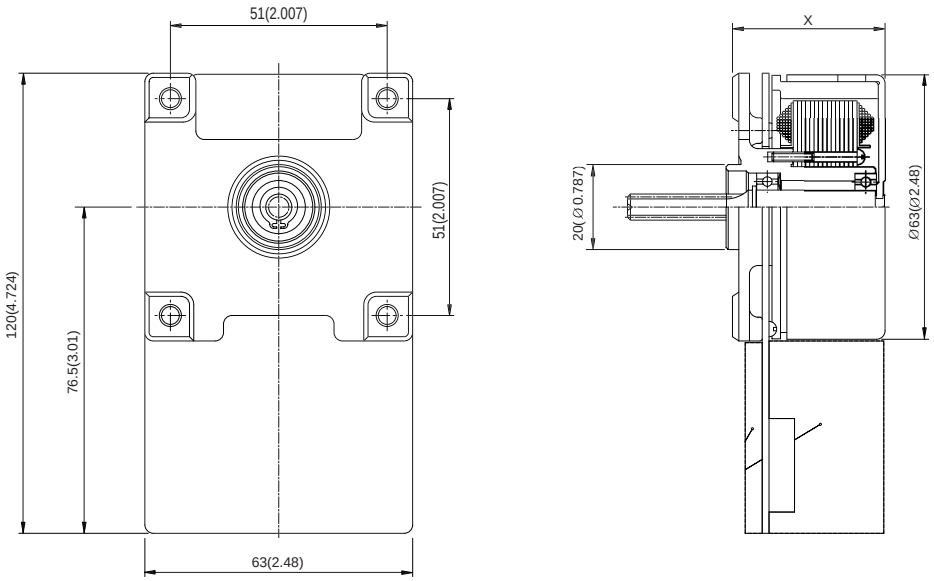


DLG-50A

SPG Co., Ltd.

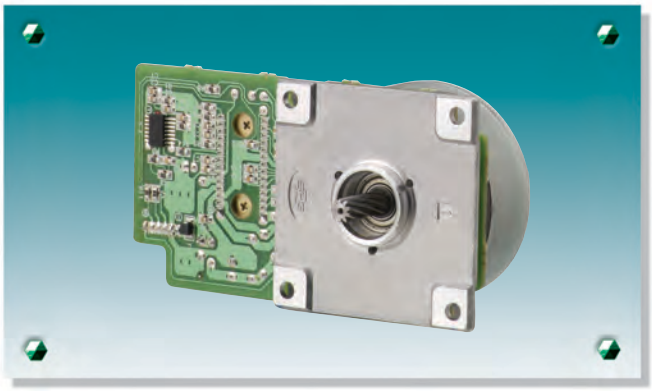
■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DLG-50615	DC 24	-	1.122	0.11	1736	28	20	A	Internal	37(1.456)
DLG-50615	DC 24	-	1.43	0.14	1854	36	27.2	A	Internal	37(1.456)
DLG-50615	DC 24	-	1.5	0.147	1500	40	24	A	Internal	37(1.456)
DLG-50620	DC 24	-	2.0	0.196	1350	54	28	A	Internal	42(1.653)
DLG-50620	DC 24	-	1.4	0.137	2115	46	30	A	Internal	42(1.653)

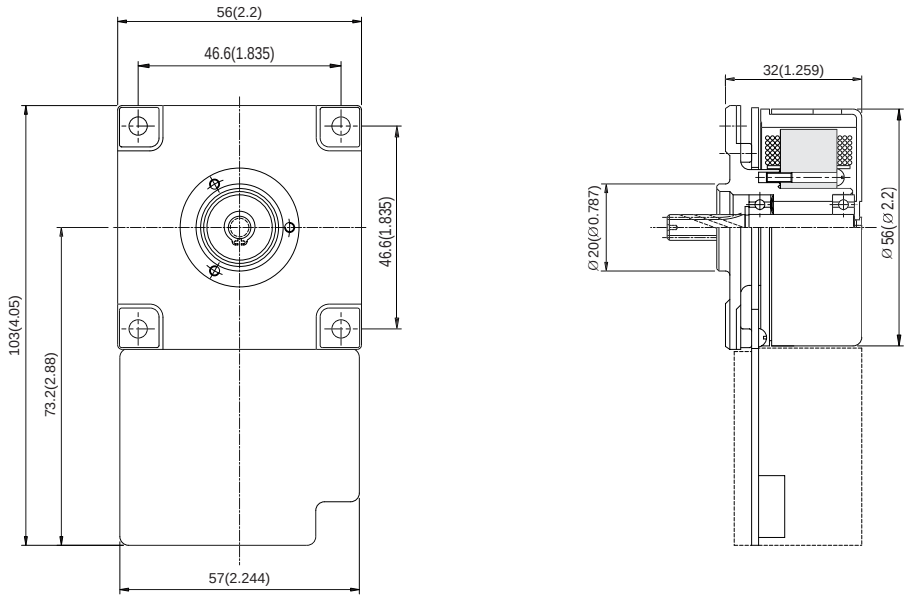


DLG-45A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

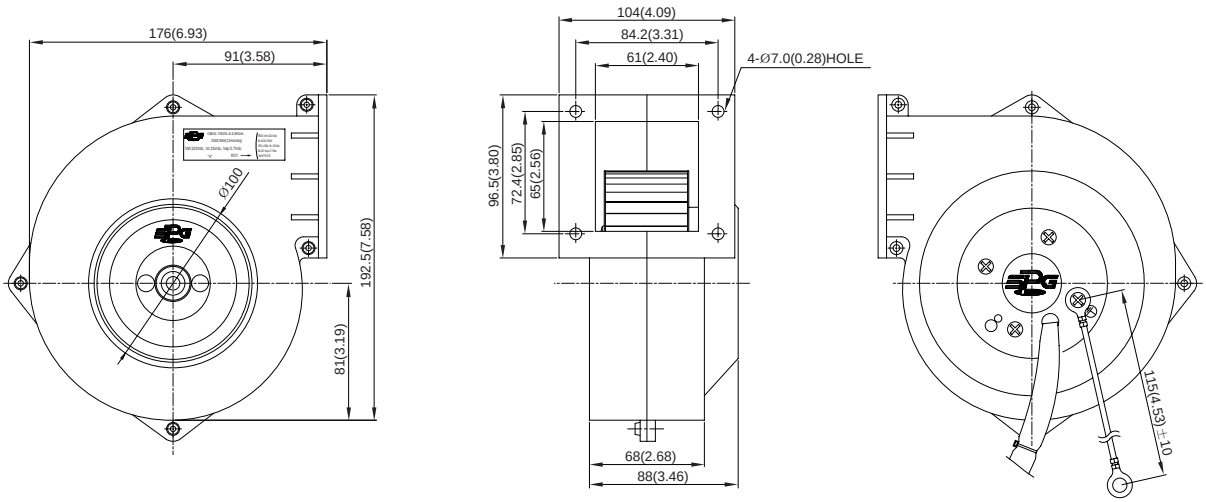
Type	Voltage	Frequency	Load					Ins. Class	P.C.B Of Drive	X
			Torque		Speed	Input	Output			
	(V)	(Hz)	(kg.cm)	(N.m)	(Rpm)	(Wi)	(Wo)			
DLG-45813	DC 24	-	0.816	0.08	973	18	8.2	A	Internal	-
DLG-45813	DC 24	-	1.0	0.098	1809	40	20	A	Internal	-

OBS-7820 -A1350A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

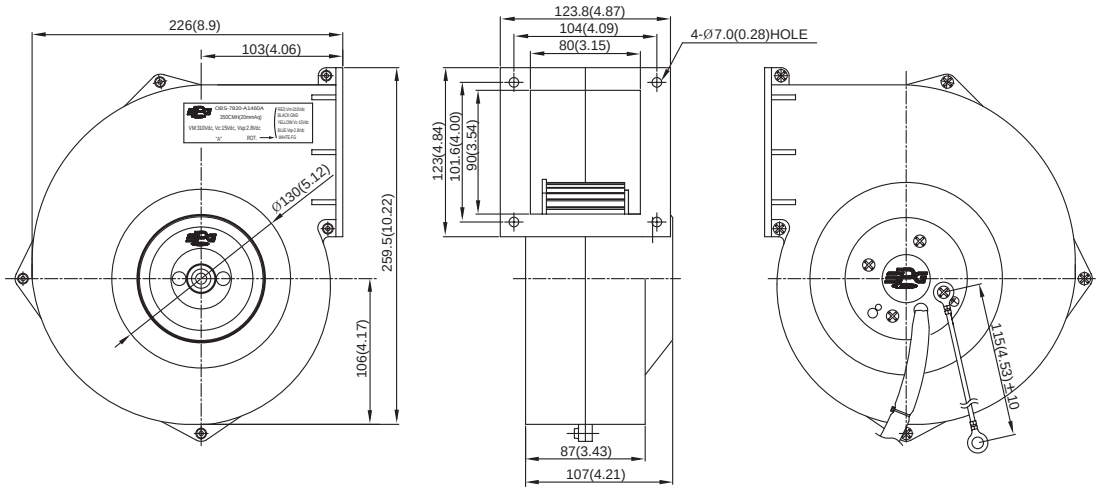
Type	Voltage	Control Voltage	Static Pressure	Volume Flowrate	Speed	Input	Static Pressure	Flowrate	Speed	Ins. Class	P.C.B Of Drive	X
	Vdc	Vdc	mmH2O	CMH	rpm	W	mmH2O	CMH	rpm			
OBS-7820-A1350A	310	2.7	0	195	2346	55.3	12	150	2565	E	Internal	-

OBS-7820 -A1460A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

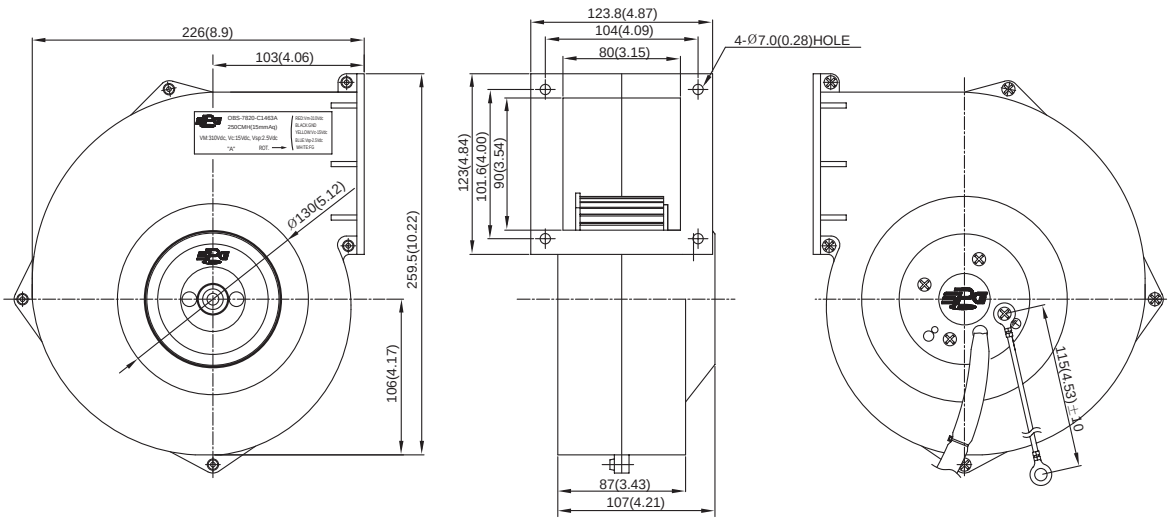
Type	Voltage	Control Voltage	Static Pressure	Volume Flowrate	Speed	Input	Static Pressure	Flowrate	Speed	Ins. Class	P.C.B Of Drive	X
	Vdc	Vdc	mmH2O	rpm	rpm	W	mmH2O	CMH	rpm			
OBS-7820-A1460A	310	2.8	0	499	1598	97.5	20	350	1874	E	Internal	-

OBS-7820 -C1463A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

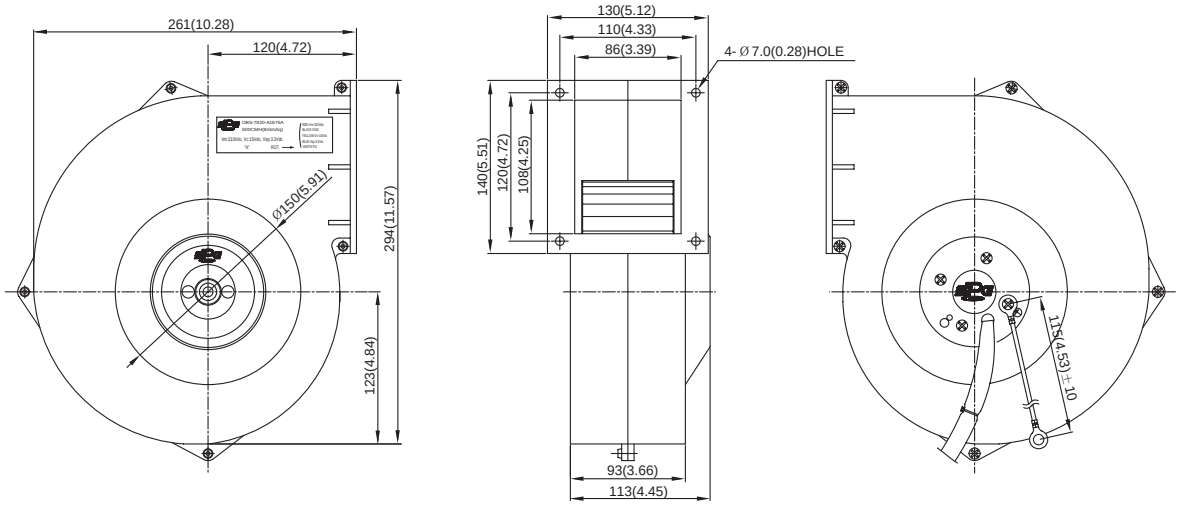
Type	Voltage	Control Voltage	Static Pressure	Volume Flowrate	Speed	Input	Static Pressure	Flowrate	Speed	Ins. Class	P.C.B Of Drive	X
	Vdc	Vdc	mmH2O	rpm	rpm	W	mmH2O	CMH	rpm			
OBS-7820-C1463A	310	2.5	0	390	1687	59.3	15	250	1972	E	Internal	-

OBS-7820 -A1875A

SPG Co., Ltd.

■ DIMENSION

UNIT : mm[inch]



■ CHARACTERISTIC

Type	Voltage	Control Voltage	Static Pressure	Volume Flowrate	Speed	Input	Static Pressure	Flowrate	Speed	Ins. Class	P.C.B Of Drive	X
	Vdc	Vdc	mmH2O	rpm	rpm	W	mmH2O	CMH	rpm			
OBS-7820-A1875A	310	3.3	0	561	1363	108.3	8	480	1537	E	Internal	-

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http://www.spg.co.kr

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