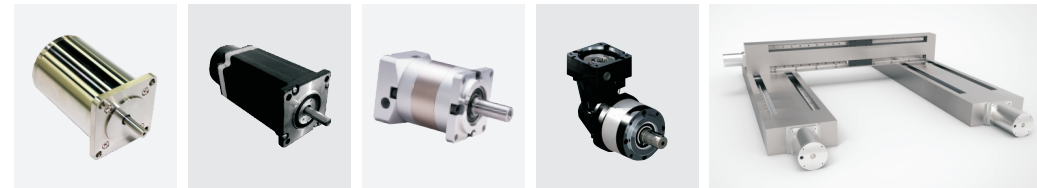


Edition: V1.0, Jan 2021

2021~2022

PRODUCT CATALOG

motor, gearbox and more



M&D Automation Co., Ltd.
www.motiondriver.com

📍 F9, BLD2, 219 Tianfu Three St., Hitech Dist., Chengdu 610041, China.
📞 Mobile&WhatsApp: 0086-15828126585 ✉ andyliu@motiondriver.com



Company Profile

M&D Automation Co., Ltd is a trading company established in 2017.

We do not manufacture any product.

Our mission is to introducing selected China-made industrial motion parts to the world. "Low-cost" and "low-quality" are not our philosophy. We believe the good quality products with the reasonable prices exist. But they are really difficult to find. M&D is able to save our customer's time cost to find them and supply door-to-door.

With company founder's more than 15-year business and cross-cultural communication experience, M&D understands overseas customer's requirement much deeper than others, responses customer's inquiry quicker than others as well.

Strategic Partners

General motor manufacturing

Changzhou Chuangyi Electrical Appliance Co., Ltd.

www.cy00motor.com

General driver manufacturing

Shenzhen DVS Mechatronics Co., Ltd.

www.dvsjd.com

Vacuum product manufacturing

DDon Automation Co., Ltd.

www.ddrobot.cn



M&D Automation Co., Ltd.
www.motiondriver.com

F9, BLD2, 219 Tianfu Three St., Hitech Dist., Chengdu 610041, China.
Mobile&WhatsApp: 0086-15828126585 andyliu@motiondriver.com

Table of Contents

Group 1 – Special

1.1 Harsh Stepper Motor/Drive/Planetary Gearbox in Vacuum, Extreme Temperature, Radiation environment	page 1 ~ 9
1.2 IP67 Stainless Steel Motor/Gearbox	page 10 ~ 12
1.3 BLDC Motor in Max 200 °C Oil	page 13
1.4 Submersible IP68 Stepper/BLDC Motor	page 14 ~ 15
1.5 Compact Drive-integrated BLDC Motor	page 16

Group 2 – General

2.1 Stepper Motor & Drive Selection Guide	page 17 ~ 20
2.2 AC Servo Motor & Drive Selection Guide	page 21 ~ 23
2.3 Planetary Gearbox	page 24 ~ 26

Group 3 – Others

3.1 Linear Actuator	page 27 ~ 29
3.2 Linear Axis/Module	page 30
3.3 Cycloidal Reducer	page 31 ~ 32

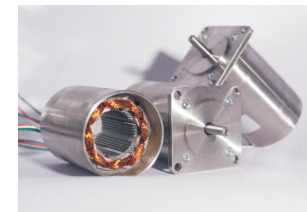
What is vacuum stepper motor?

Features

- ▲ Ambient temperature range -196°C ~ +300°C
- ▲ Vacuum class up to 10⁻⁷Pa
- ▲ Anti-radiation 10⁷Gy
- ▲ Stainless steel housing

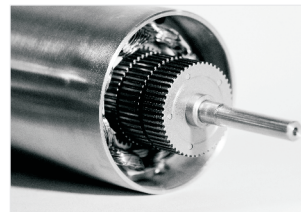
Applications

- ▲ Aerospace simulation
- ▲ Bio-medicals
- ▲ Optical instrument
- ▲ Defense weapon



Structure

Vacuum class requires stainless steel in housing, flanges and shafts.



Outgassing

Some components are made outgassing to suit low rate application.



Adhesives

Special formula allows motors meet requirements of strength, ductility, heat conduction and low outgassing rate.



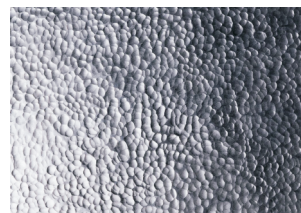
Bearings

Special lubrication allows bearing working under a extreme environment.



Cryo-treatment

Some components are treated at very deep temperature to enable more reliable and durable in life time.



Cleanliness

Not only in the manufacturing process, but also in the packaging and handling.

Conversion of Pressure Units

	Pa	bar	mbar	μbar	Torr (mmHg)	Micron (mTorr)	atm	PSI
Pa	1	10 ⁻⁵	10 ⁻²	10	7.5*10 ⁻³	7.5	9.87*10 ⁻⁶	1.45*10 ⁻⁴
bar	10 ⁵	1	10 ⁻³	10 ⁶	750.06	7.5*10 ⁵	0.987	14.5
mbar	10 ²	10 ⁻³	1	1000	0.75	750.06	9.87*10 ⁻⁴	1.45*10 ⁻²
μbar	10 ⁻¹	10 ⁻⁶	10 ⁻³	1	7.5*10 ⁻⁴	0.75	9.87*10 ⁻⁷	1.45*10 ⁻⁵
Torr (mmHg)	1.33*10 ²	1.33*10 ⁻³	1.33	1333.2	1	10 ³	1.32*10 ⁻³	1.93*10 ⁻²
Micron (mTorr)	0.133	1.33*10 ⁻⁶	1.33*10 ⁻³	1.3332	10 ⁻³	1	1.32*10 ⁻⁶	1.93*10 ⁻⁵
atm	1.01*10 ⁵	1.01	1013.3	1.01*10 ⁶	760	7.6*10 ⁵	1	14.696
PSI	6.89*10 ³	6.89*10 ⁻²	68.948	6.89*10 ⁴	51.715	5.17*10 ⁴	6.81*10 ⁻²	1

Model Designation

HS	57	86	SHT	SZ
Vacuum Stepper Series	Flange Size (mm) 28/42/57/86	Body L (mm) 51/48/86/128	Vacuum Class	Optional FK (resolver) BK (brake) SZ (double shaft) RA (anti-radiation) TS (temp. sensor)

Vacuum Classes

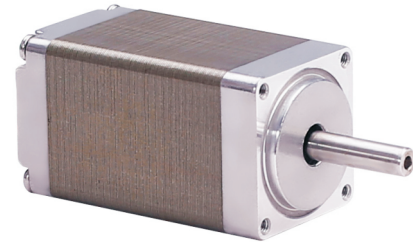
Code	Ambient Temperature (°C)	Baked Housing Rated Temp. (°C)	Baked Housing Max Temp. (°C)	Vacuum (Pa)	Resolver (FK)	Double-shaft (SZ)	Temp Sensor	Anti-radiation (RA)
VHT1	-20 ~ +200	+200	+220	10 ⁻⁵	Optional	Optional	Optional	Optional
VHT2	-20 ~ +160	+160	+180	10 ⁻⁵				-
SHT	-20 ~ +200	+200	+220	10 ⁻³				-
HT	-20 ~ +150	+150	+170	10 ⁻³				-
VTL1	-20 ~ +100	+130	+150	10 ⁻¹				-
VTL2	-40 ~ +100	+130	+150	10 ⁻¹				-
VTL3	-60 ~ +100	+130	+150	10 ⁻¹				-
LT	-100 ~ +40	+100	+120	10 ⁻⁷				-
SLT	-196 ~ +40	+100	+120	10 ⁻⁷				Optional
L*H*	Customized	+300	+350	10 ⁻⁷	Optional			

○ After reaching the max temperature, the motor should be run again when the housing temperature is at the ambient.

The max temperature on the surface of motor housing lasts 5-minute.

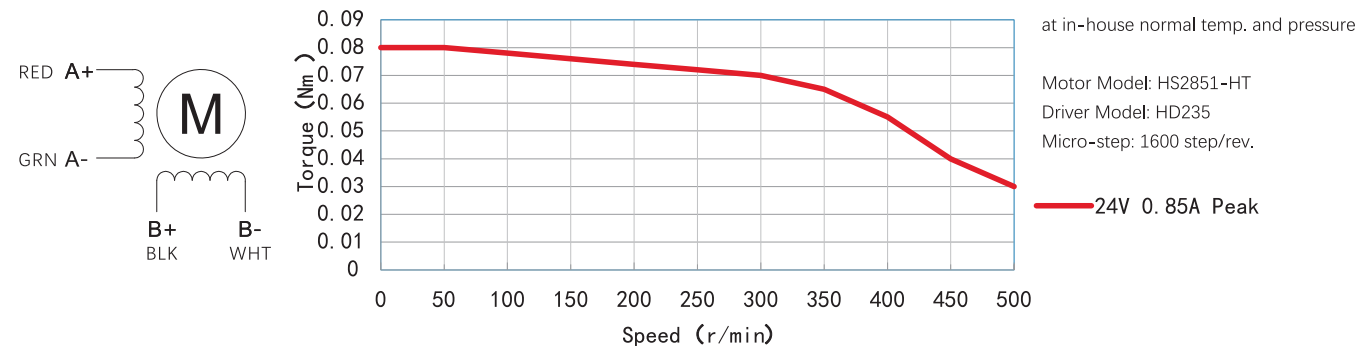
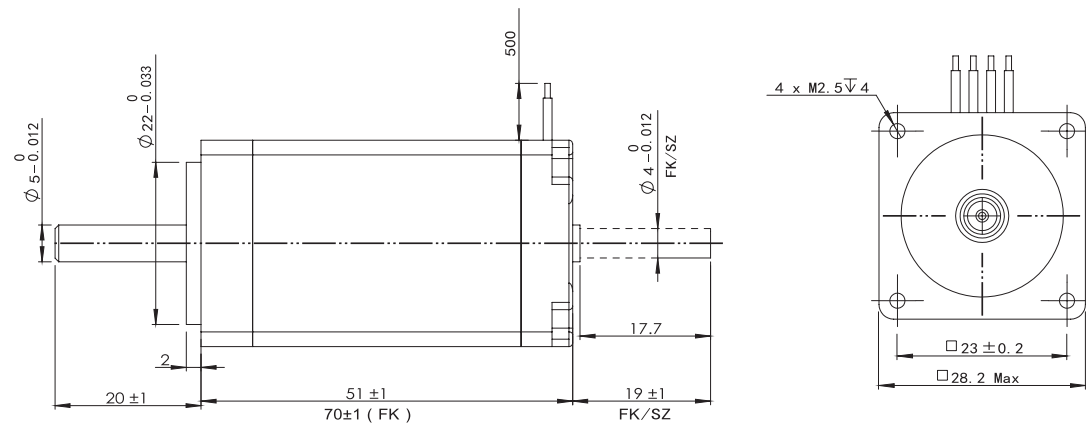
HS2851

2-phase Vacuum Stepper Motor



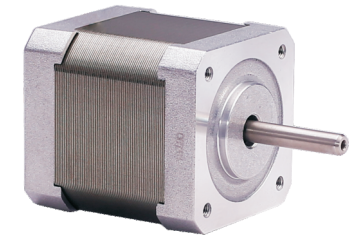
Step Angle	1.8°
Step Angle Accuracy	±5%(full step,no load)
Resistance Accuracy	±5%
Inductance Accuracy	±10%
Temperature Rise	80°C Max.(rated current,2phase on)
Insulation Resistance	100MΩMin.,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max.(450g-load)
Shaft Axial Play	0.08Max.(450g-load)
Max. Radial Force	10N(20mm from the flange)
Max. Axial Force	5N

Model	Rated Current (A)	Peak Current (A)	Holding Torque (Nm)	Resistance (Ω)	Inductance (mH)	Rotor Inertia (gcm ²)	Net Weight (kg)	Driver
HS2851	0.60	0.85	0.12	8.8	9.2	18	0.20/0.26 (FK)	HD235



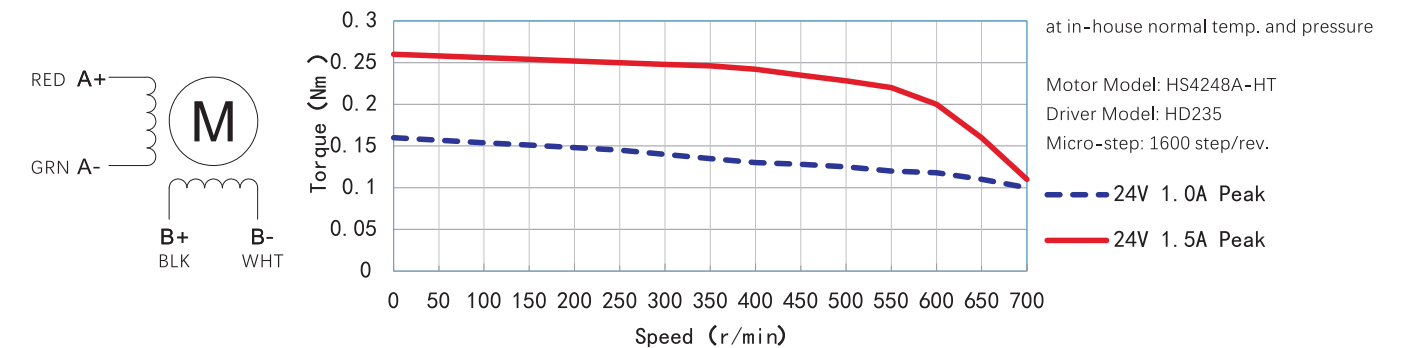
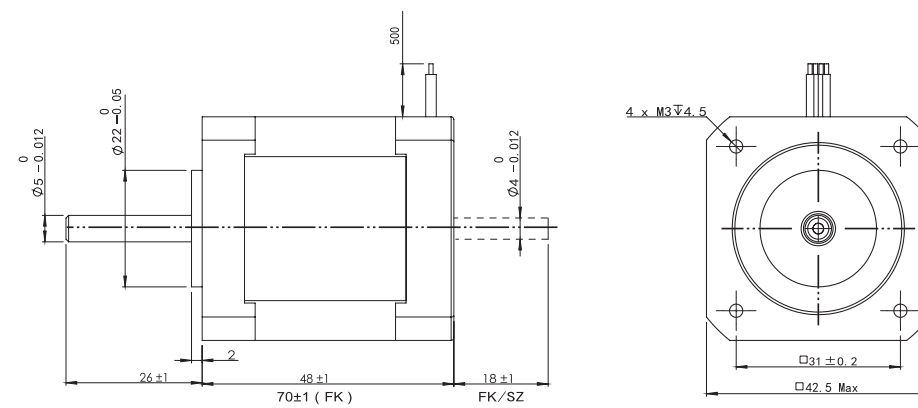
HS4248

2-phase Vacuum Stepper Motor



Step Angle	1.8°
Step Angle Accuracy	±5%(full step,no load)
Resistance Accuracy	±5%
Inductance Accuracy	±10%
Temperature Rise	80°C Max.(rated current,2phase on)
Insulation Resistance	100MΩMin.,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max.(450g-load)
Shaft Axial Play	0.08Max.(450g-load)
Max. Radial Force	28N(20mm from the flange)
Max. Axial Force	10N

Model	Rated Current (A)	Peak Current (A)	Holding Torque (Nm)	Resistance (Ω)	Inductance (mH)	Rotor Inertia (gcm ²)	Net Weight (kg)	Driver
HS4248	1.1	1.5	0.3	1.8	2.5	68	0.38/0.6 (FK)	HD235



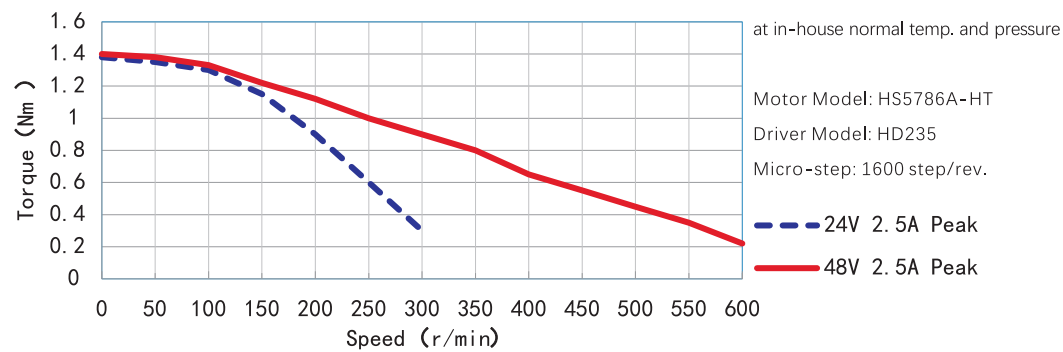
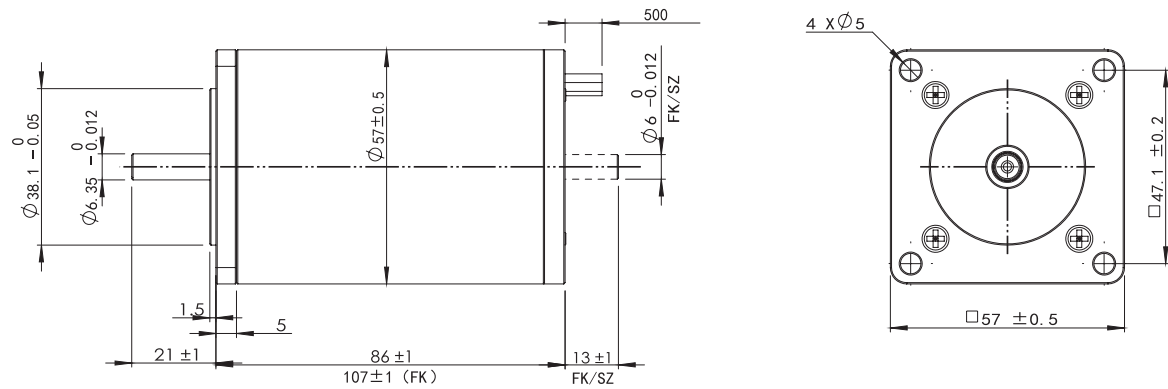
HS5786

2-phase Vacuum Stepper Motor



Step Angle	1.8°
Step Angle Accuracy	±5%(full step,no load)
Resistance Accuracy	±5%
Inductance Accuracy	±10%
Temperature Rise	80°C Max.(rated current,2phase on)
Insulation Resistance	100MΩMin.,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max.(450g-load)
Shaft Axial Play	0.08Max.(450g-load)
Max. Radial Force	75N(20mm from the flange)
Max. Axial Force	15N

Model	Rated Current (A)	Peak Current (A)	Holding Torque (Nm)	Resistance (Ω)	Inductance (mH)	Rotor Inertia (gcm ²)	Net Weight (kg)	Driver
HS5786	1.8	2.5	0.8	1.3	2.7	350	1.2/1.5 (FK)	HD235



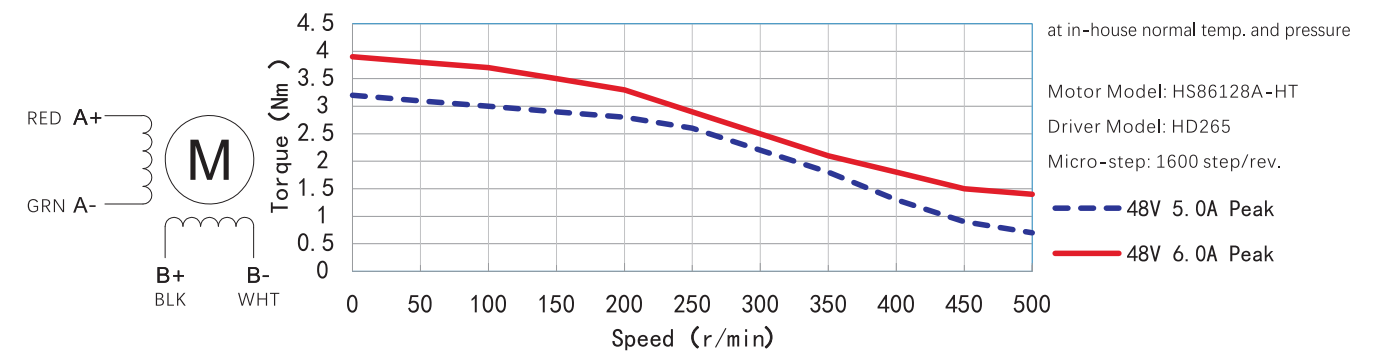
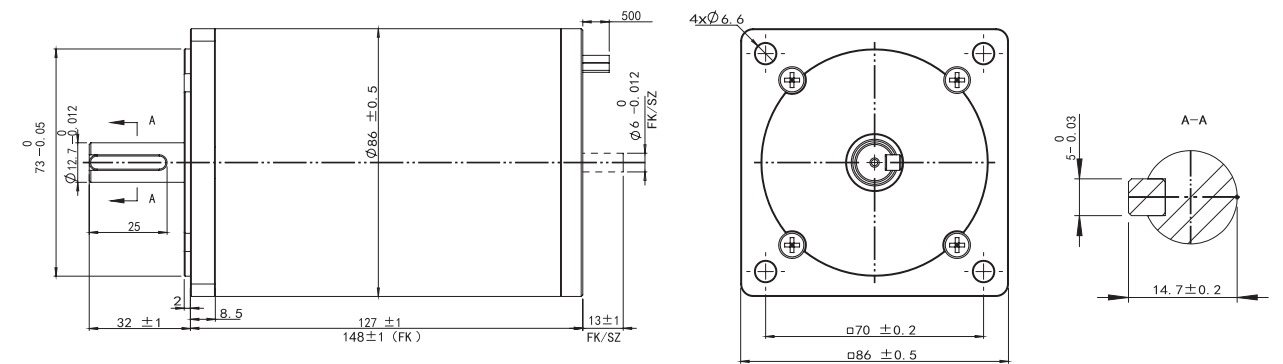
HS86128

2-phase Vacuum Stepper Motor



Step Angle	1.8°
Step Angle Accuracy	±5%(full step,no load)
Resistance Accuracy	±5%
Inductance Accuracy	±10%
Temperature Rise	80°C Max.(rated current,2phase on)
Insulation Resistance	100MΩMin.,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max.(450g-load)
Shaft Axial Play	0.08Max.(450g-load)
Max. Radial Force	220N(20mm from the flange)
Max. Axial Force	60N

Model	Rated Current (A)	Peak Current (A)	Holding Torque (Nm)	Resistance (Ω)	Inductance (mH)	Rotor Inertia (gcm ²)	Net Weight (kg)	Driver
HS86128	4.2	6.0	4.5	0.6	2.8	2700	4.5/4.8 (FK)	HD265



HD235/HD265

High/Low Temp. Stepper Motor Drive

Electrical Tj=25°C

Parameter	Min	Typical	Max	Unit	
Power Supply	11.5	12/24/36/48	50	V	
Output Current (Max)	HD235	0.28	-	3.0	A
	HD265	2.5	-	6.0	A
Signal Frequency	-	-	0.5	MHz	
Voltage (PU+/DR+/EN+)	4.8	5/12/24	25	V	

Operation Environment

Condition	Caution	Avoid dust and corrosive gas/oil
	Ambient Temp	-40°C ~ +85°C
	Humidity	Under 90% RH (no condensation)
	Vibration	5.9m/s2 Max
	Storage Temp	-55°C ~ +95°C

Current Setting

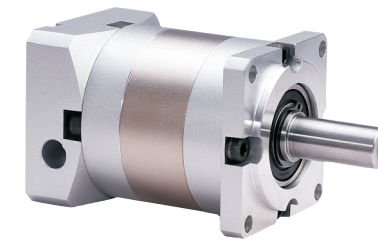
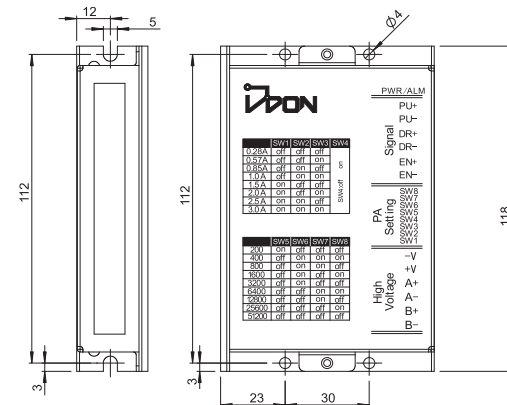
Max Current		SW1	SW2	SW3
HD235	HD265			
0.28A	2.5A	off	off	off
0.57A	3.0A	off	off	on
0.85A	3.5A	off	on	off
1.0A	4.0A	off	on	on
1.5A	4.5A	on	off	off
2.0A	5.0A	on	off	on
2.5A	5.5A	on	on	off
3.0A	6.0A	on	on	on

Micro-step

Step/rev	SW5	SW6	SW7	SW8
200	on	off	off	off
400	off	on	on	on
800	off	on	on	off
1600	off	on	off	on
3200	off	on	off	off
6400	off	off	on	on
12800	off	off	on	off
25600	off	off	off	on
51200	off	off	off	off

Features

- ▲ Ambient Temp. -40°C ~ +85°C
- ▲ Max Freq. 0.5MHz
- ▲ Semi-current (SW4-OFF)
- ▲ Communication Setting



Harsh Planetary Gearbox

In Vacuum, Extreme Temperature, Radiation environment

Model Designation

GP	42	L1	i4	B	F	SHT
Series	Flange (mm)	Stage	Ratio	Interface	Flange Type	Vacuum Class
GP: Coaxial	42/60/90	L1/L2/L3	i3 ~ i200	B: Stepper C: Servo	F: Square Y: Round	
GZ: Right Angle						

Vacuum Classes (see page 01)

Specification

Flange Size	42			60			90		
Stage	L1	L2	L3	L1	L2	L3	L1	L2	L3
Rated Input Speed (r/min)	3000			2500			2500		
Max Input Speed (r/min)	4500			3500			3500		
Backlash (arcmin)	≤20	≤24	≤28	≤14	≤16	≤18	≤8	≤10	≤12
Max Radial Force (N)	185			265			400		
Max Axial Force (N)	150			220			420		
Ratio	4/5/8	16/20/25/32/40/64	80/100/120/160/200	3/4/5/7/10	16/20/25/28/35/40/50/70	64/80/100/125/140/175/200	3/4/5/7/10	12/15/16/20/25/28/35/40/50/70	60/80/100/125/140/160/175/200
Efficiency (%)	≥95	≥92	≥90	≥95	≥92	≥90	≥95	≥92	≥90
Lifetime	5000-hour (continuous)								

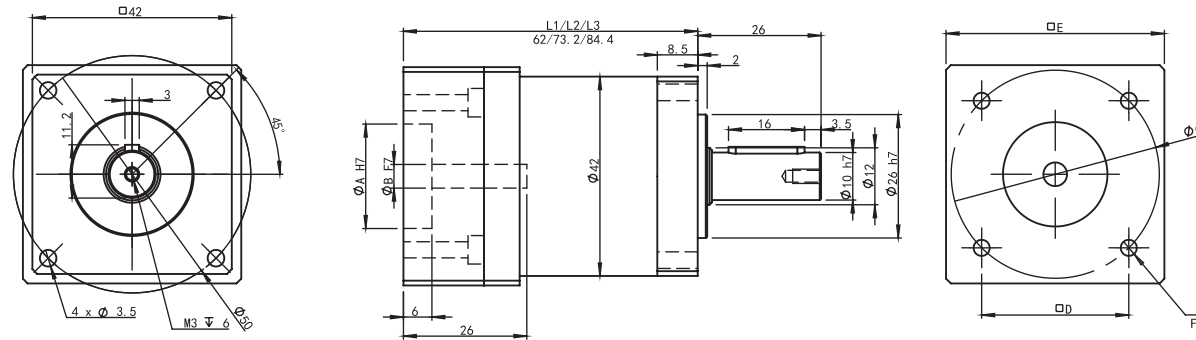
Flange 42 Ratio (i)	4	5	8	16	20	25	64 (2-stage)	64 (3-stage)
Rated Output Torque (Nm)	9	9	7	12	12	10.5	8	15.5
Max Output Torque (Nm)	18	18	14	24	24	21	16	31

Flange 60 Ratio (i)	3	4	5	7	10	12	16	20
Rated Output Torque (Nm)	16.5	27	29.5	19.5	8.5	30	30	30
Max Output Torque (Nm)	33	54	59	39	17	60	60	60

Flange 90 Ratio (i)	3	4	5	7	10	12	16	20
Rated Output Torque (Nm)	60	86	94.5	64	39.5	96	96	96
Max Output Torque (Nm)	120	187	189	128	79	192	192	192

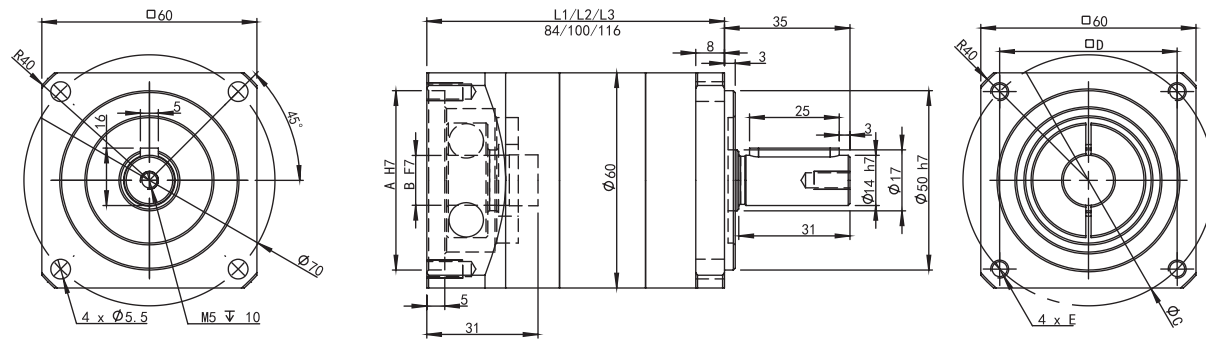
Flange 42

Servo: A=30, B=8, C=45, E=42, F=M3
 Stepper: A=22, B=5, D=31, E=46, F=φ3.4 x 4



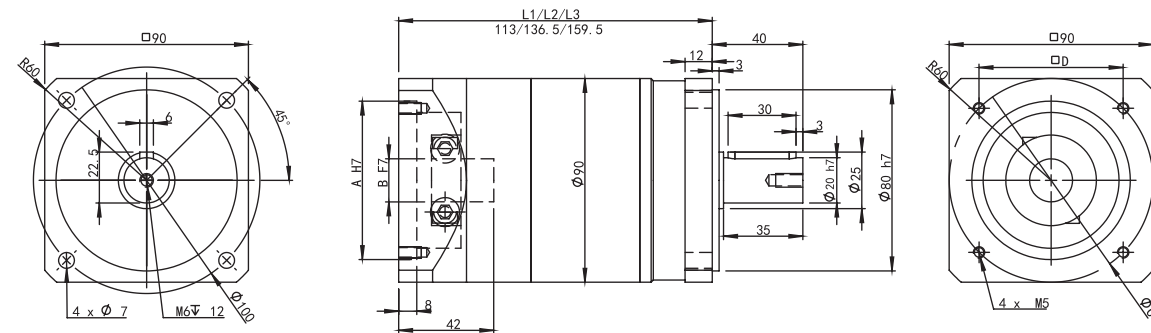
Flange 60

Servo: A=50, B=14, C=70, E=M5
 Stepper: A=38.1, B=6.35, D=47.1, E=M4

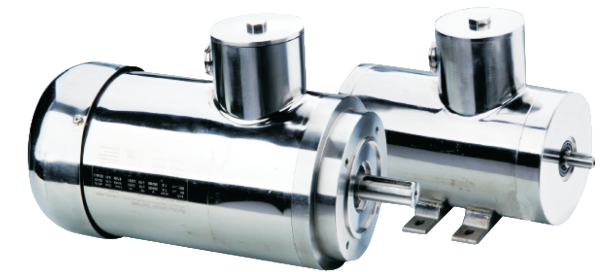


Flange 90

Servo: A=70, B=19, C=90
 Stepper: A=73, B=12.7, D=70



IP67 Stainless Steel Motor



Applications

Food, Beverage and Pharmaceutical production

Features

- ▲ Efficiency complies with IEC60034-30-2008 (IE2) standards
- ▲ Variable speed rated at 20Hz ~ 80Hz
- ▲ Total housing by SUS304 stainless steel (frame, end-shield, fitting-foot, bolt, terminal-box)
- ▲ O-ring secures sealing at two ends of motor and terminal-box
- ▲ Smooth outer surface

NEMA Standard (more specifications and drawings available under request)

No	Power	Frame
1	1/3 ~ 2 HP TEFC, TENV 3-ph	56C Foot (Footless)
2	3 ~ 5 HP TEFC, TENV 3-ph	182TC, 184TC Foot (Footless)
3	7.5 ~ 20 HP TEFC 3-ph	213 ~ 256TC Foot (Footless)
4	1/3 ~ 5 HP JM/JP TEFC, TENV 3-ph	56C ~ 184TC Foot (Footless)
5	7.5 ~ 20 HP JM/JP TEFC 3-ph	213 ~ 256TC Foot (Footless)

IEC Standard (drawings available under request)

No	IEC Frame	Power (Kw)	Bearing (F/R)	Mounting
1	63	0.18	6202/6202	B3/B5/B14/B34/B35
2	71	0.25/0.37	6203/6203	
3	80	0.55/0.75	6204/6204	
4	90	1.1/1.5	6205/6205	
5	100	2.2/3.0	6306/6306	
6	112	4.0	6306/6306	
7	132	5.5/7.5	6308/6208	

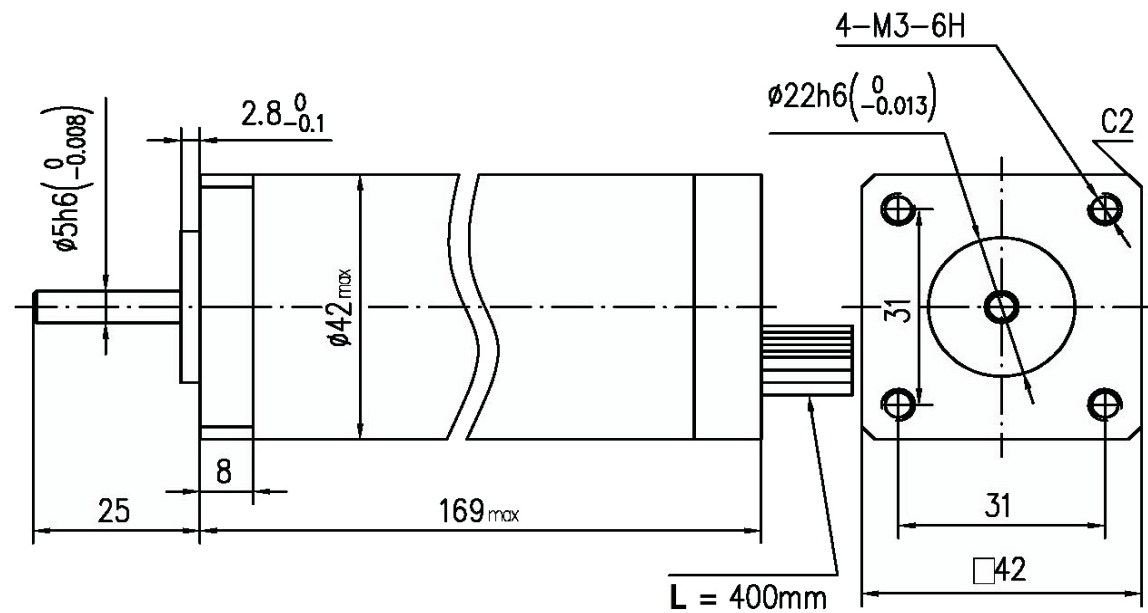
BLDC Motor in Max 200 °C Oil



Application

- ▲ Geophysics
- ▲ Oil Well

Customized specifications are available under request.
Below is one example, GWD450W-36V.

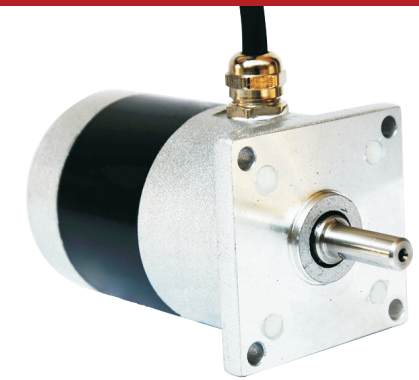


Motor Wiring		
Phase	Colour	Spec
U	RED	3.5mm ²
V	YEL	
W	BLU	
Hall Wiring		
Pin	Colour	Spec
VCC	RED	0.2 mm ²
GND	BLK	
HA	YEL	
HB	GRN	
HC	BLU	

Rate Power 450W
 Rated Voltage DC36V
 Rated Speed 6000rpm
 Rated Torque 0.72Nm
 Rated Current 18A
 Ambient Temp -20°C ~ +200°C
 Weight 1.2Kg

Submersible Stepper Motor

(drawings available under request)



Application

- ▲ Garden Works
- ▲ Fountain
- ▲ Outdoor Machine

Step Angle 1.8°(Flange 57 and 86), 1.2°(Flange 90 and 110)
 Step Accuracy ±5%
 Resistance Accuracy ±10%
 Inductance Accuracy ±20%
 Temp. Rise 80°C Max (rated current)
 Ambient Temp -10°C ~ +50°C
 Dielectric Strength 500VAC for one minute
 Shaft Radial Play 0.06 Max (450 g-load)
 Shaft Axial Play 0.08 Max (450 g-load)
 Insulation Resistance 100MΩMin.500VDC
 Insulation Class B 130°
 Protection IP65 standard, IP68 optional
 Submersible Depth 1-meter (IP65), 3-meter (IP68)

Flange-57 (2-phase)

Model	Holding Torque (Nm)	Rated Current (A)	Resistance (Ω)	Rated Voltage (V)	Inductance (mH)	Weight (Kg)	Body Length (mm)
57BYGH288-3004A	0.6	3.0	0.85	2.55	1.5	1.3	88
57BYGH2108-3004A	2.5	3.0	1.1	3.85	4.5	1.7	108

Flange-86 (2-phase)

Model	Holding Torque (Nm)	Rated Current (A)	Resistance (Ω)	Rated Voltage (V)	Inductance (mH)	Weight (Kg)	Body Length (mm)
86BYGH288-4504A	4	4.5	0.58	2.6	2.1	2.1	88
86BYGH2155-4504A	11	4.5	1.72	7.7	8.5	5.0	155

Flange-90 (3-phase)

Model	Holding Torque (Nm)	Rated Current (A)	Resistance (Ω)	Rated Voltage (V)	Inductance (mH)	Weight (Kg)	Body Length (mm)
90BYGH3162-5003A	11	5	1.8	9.0	4	5.3	162

Flange-110 (3-phase)

Model	Holding Torque (Nm)	Rated Current (A)	Resistance (Ω)	Rated Voltage (V)	Inductance (mH)	Weight (Kg)	Body Length (mm)
110BYGH3230-5003A	22	5	1.4	7.0	21	12	228

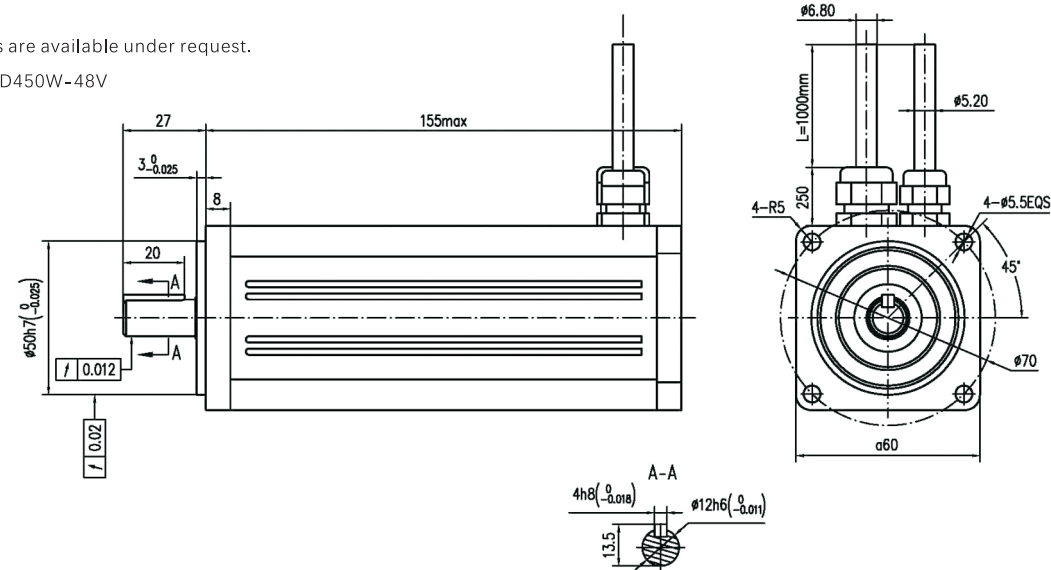
Submersible BLDC Motor

Application

- ▲ Marine Physics
- ▲ Defense
- ▲ Industrial Waste Water Care

Customized specifications are available under request.

Below is one example, SWD450W-48V



Protection Ip68 standard, IP65 optional
 Ocean Max Depth 600-meter (available under request)

Motor Wiring		
Phase	Colour	Spec
U	RED	1.5mm ²
V	BLU	
W	BLK	
Hall Wiring		
Pin	Colour	Spec
VCC	RED	0.12 mm ²
GND	BLK	
HA	BLU	
HB	GRN	
HC	WHT	

Rate Power 450W
 Rated Voltage DC48V
 Rated Speed 3000rpm
 Rated Torque 1.45Nm
 Rated Current 12A
 Ambient Temp -20°C ~ +85°C
 Weight 2.4Kg

Other nano IP68 BLDC motor as below photos, substituting for maxon motor.



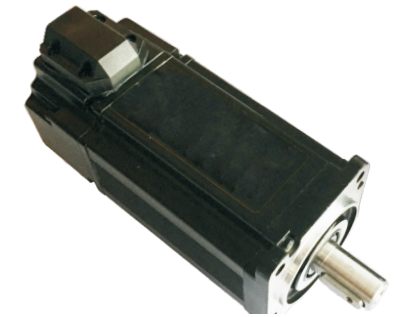
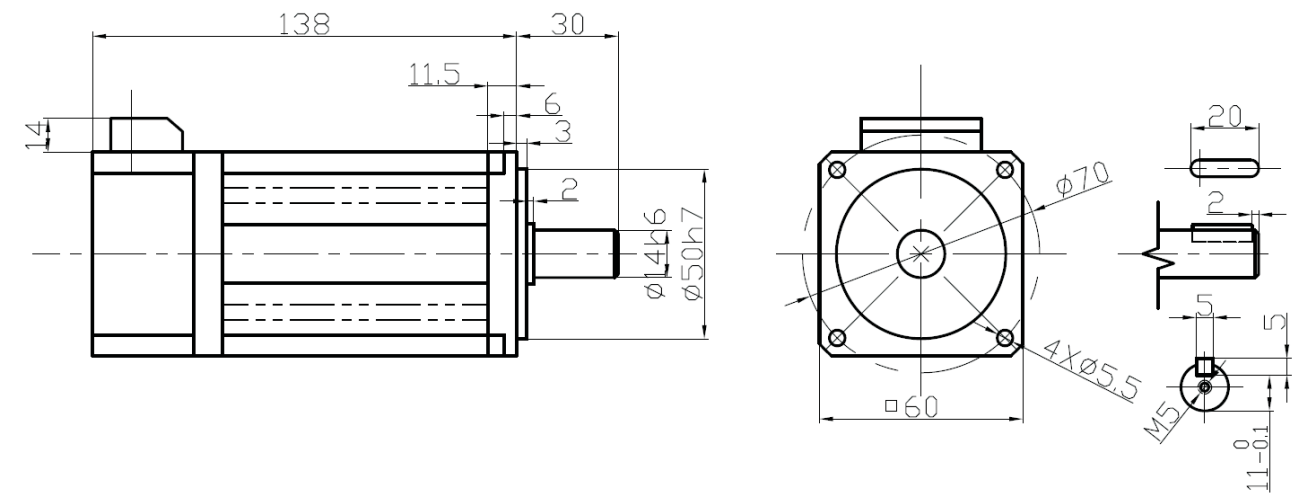
Compact Drive-integrated BLDC Motor

Application

- ▲ Outdoor Mobile Machine
- ▲ Auto Guided Vehicle
- ▲ Compact Device

Covering 100W ~ 750W, majored by flange-60 and flange-80 motors

Below is one example, YKS60-03-30-36-YT-A



Power Supply DC36V
 Rated Power 320W
 Rated Torque 1.2Nm
 Max Torque 2.4Nm
 Rated Current 9A
 Max Current 18A
 Rated Speed 2500rpm
 Max Speed 3000rpm
 Rotor Inertia 0.32Kgcm²
 Counter EMF 8.5V/1000rpm
 Ingress Protection IP65
 Insulation Class F
 Weight 1.5Kg
 Driver Inside Yes
 Ambient Temp -20°C ~ +40°C
 Storage Temp -20°C ~ +65°C
 Humidity ≤90% (no condensation)
 Altitude ≤1000m
 Vibration <5G

No	Definition	Colour	Communication
1	GND	Blue	RS232
2	RS232-R	Red	
3	RS232-T	Black	
4	CANH	Yellow	CAN2.0
5	CANL	Grey	
6	CANGND	White	

Control Cable: 6*0.2mm², L=500mm

No	Definition	Colour	Communication
1	VCC	Red	DC24V +
2	GND	Blue	0V

Power Supply: 2*1.5mm², L=500mm

Stepper Motor & Drive Selection Guide

(hollow-shaft available under request)

CY

57

76

A

(01)

(NB)


Flange Size
Unit:mm
28/42/57/60/86/110/130

Body Length
Unit:mm
32/34/40/42/47/60/65/76/84/102/112/120/150/165/201

Type
A:2-phase Open-loop
B:3-phase Open-loop
C:2-phase Close-loop

Shaft Number
01:Default 1-shaft,not display
02:Customized 2-shaft

Brake
NB: Default no brake,not display
YB: Customized with brake



Series
CY
HS

2-phase Open-loop Stepper Motor Selection Guide

Model	Electrical				Mechanical				Driver Model					
	Holding Torque(Nm)	Rated Voltage(V)	Current Phase(A)	Resistance/Phase(Ω)	Inductance/Phase(mH)	Rotor Inertia (gcm ²)	Flange (mm)	Body Length (mm)		#of Leads*	Shaft Type (mm)	Shaft Dia (mm)	Shaft Length (mm)	Net Weight (kg)
28 Series	CY2832A	0.06	4	0.67	5.6	3.4	8	28.2	32	4	Round	5	20±1	0.11
42 Series	CY2845A	0.1	4.5	0.67	6.8	4.9	12	28.2	45	4	Round	5	20±1	0.14
	CY4234A	0.21	2.76	1.2	2.3	2.5	35	42.3	34	4	Dcut0.5x24	5	26	0.22
	CY4240A	0.3	2	1.2	1.67	3.7	54	42.3	40	4	Dcut0.5x24	5	26	0.3
	CY4247A	0.4	2.02	1.2	1.69	2.6	68	42.3	47	4	Dcut0.5x24	5	26	0.38
	CY4260A	0.6	3.3	1.2	2.75	6.4	102	42.3	60	4	Dcut0.5x24	5	24	0.5
57 Series	CY5741A	0.6	1.8	2	0.89	1.7	120	57	41	4	Dcut0.5x19.5	6.35	20.6	0.5
	CY5756A	1.0	1.2	3	0.39	1.13	300	57	56	4	Dcut0.5x19.5	6.35	20.6	0.68
	CY5765A	1.5	1.3	3	0.42	1.06	400	57	65	4	Dcut0.5x19.5	6.35	20.6	1.08
	CY5776A	1.8	1.7	3	0.55	1.78	480	57	76	4	Dcut0.5x19.5	6.35	20.6	1.2
	CY5784A	2.1	1.9	3	0.62	2.3	530	57	84	4	Dcut0.5x19.5	8.0	20.6	1.25
60 Series	CY57102A	2.4	2.3	3	0.75	2.9	700	57	102	4	Dcut0.5x19.5	8.0	20.6	1.58
	CY57112A	2.6	2.5	3	0.83	3.5	800	57	112	4	Dcut0.5x19.5	8.0	20.6	1.78
	CY6058A	1.6	1.3	3	0.42	2.65	300	60	58	4	Dcut0.5x20	8.0	21	0.85
	CY6065A	2.1	2	3	0.65	1.6	570	60	65	4	Dcut0.5x20	8.0	21	1.0
	CY6078A	2.5	1.5	3	0.5	1.66	620	60	78	4	Dcut0.5x20	8.0	21	1.1
86 Series	CY6084A	3.1	1.9	3	0.63	1.8	840	60	84	4	Dcut0.5x20	8.0	21	1.29
	CY60102A	3.5	2.3	3	0.75	2.4	1000	60	102	4	Dcut0.5x20	8.0	21	1.65
	CY60112A	3.8	4.6	3	1.56	3.9	1200	60	112	4	Dcut0.5x20	8.0	21	1.807
	CY8665A	3.3	4	3	1.3	3.3	1000	86	65	4	Dcut1x25	9.5	32	2.0
	CY8680A	4.5	4	4.4	0.9	3	1400	86	80	4	Dcut1x25	12.7	32	2.5
110 Series	CY8698A	7.5	4.4	4.4	1.0	4.3	2100	86	98	4	Key4x4x25	14	34	3.4
	CY86118A	8.5	6	6	1.3	6.4	2700	86	118	4	Key5x5x25	12.7	32	4.1
	CY86128A	10	6.5	6	1.4	7.3	3200	86	128	4	Key4x4x25	14	34	4.5
	CY86150A	12	7.5	6	1.65	9.7	4000	86	150	4	Key4x4x25	14	34	5.4
	CY86156A	12.5	6.5	6	1.4	9	4000	86	156	4	Key5x5x25	15.875	32	5.8
130 Series	CY11099A	9	2	5.5	0.45	7.5	5500	109.86	99	4	Key4x4x25	16	40	5.5
	CY110115A	12	2.2	6	0.5	8.4	7200	109.86	115	4	Key4x4x25	16	40	6.6
	CY110150A	18	3.5	6.5	0.7	15.5	10900	109.86	150	4	Key4x4x25	16	40	8.6
	CY110165A	22	3.3	6.5	0.75	21	13000	109.86	165	4	Key6x6x25	19	40	9.9
	CY110201A	30	4.4	8	1.0	24	16200	109.86	201	4	Key6x6x25	19	40	12.3

* The default number is in the table. The other number of leads are available under request.
 6-lead: Series 28, 42 and 57.
 8-lead: Series 57, 60 and 86.

3-phase Open-loop Stepper Motor Selection Guide

Model	Electrical					Mechanical					Driver Model		
	Holding Torque(Nm)	Rated Voltage(V)	Current Phase(A)	Resistance/Phase(Ω)	Inductance/Phase(mH)	Rotor Inertia(gcm ²)	Flange (mm)	Body Length (mm)	#of Leads	Shaft Type (mm)		Shaft Dia (mm)	Shaft Length (mm)
56 Series	0.9	1.7	5.6	0.33	0.6	220	57	56	3	Dcut0.5x19	6.35	21	0.75
	1.6	2.6	5.8	0.45	1.04	430	57	78	3	Dcut0.5x19	8	21	1.1
	2	3.2	5.8	0.55	1.5	700	57	102	3	Dcut0.5x19	8	21	1.57
86 Series	5	3.2	5.8	0.55	2.95	2300	86	98	3	Key4x4x25	14	34	2.7
	7.3	4.4	5.8	0.75	5	3400	86	128	3	Key4x4x25	14	34	4.0
	9	5.2	5.8	0.89	6.9	4600	86	150	3	Key4x4x25	14	34	5.1
110 Series	8	9.5	3	3.15	17	9750	110	134	3	Key6x6x25	19	42	7.8
	13	12.6	3	4.2	22	12100	110	162	3	Key6x6x25	19	42	8.3
	16	10.7	5	2.14	17.5	15300	110	194	3	Key6x6x25	19	42	10.5
130 Series	20	9.7	5	1.93	23	18600	110	233	3	Key6x6x25	19	42	12.6
	20	9.5	5	2.3	19	24000	130	187	3	Key6x6x30	19	48	14.5
	30	13.8	5	1.67	28	28900	130	230	3	Key6x6x30	19	48	16.8
	36	13.2	5	1.69	26	34000	130	250	3	Key6x6x30	19	48	18.2
	50	13.3	5	2.8	32	43000	130	290	3	Key6x6x30	19	48	22.0

2&3-phase Open-loop Stepper Driver Selection Guide

Phase	Model	Current(A)	DC/AC	Voltage(V)	Step/rev(ppr)	Approx Net Weight (kg)	Approx Size(mm)	Control Interface	Control Signal
2-Phase	DV422	0.35-1.56	DC	12-36	800-4000	0.1	86x21x56		
	DV566C	1.2-4	DC	20-50	200-40000	0.2	118x75.5x24.3		
	DV860C	2-6	AC18-80V/DC24-110V	20-50	400-40000	0.6	150x97.5x53	Single-ended/Differential	Pul+Dir / CW+CCW
3-Phase	DV378	2.5-6	DC	24-80	400-60000	0.3	136x82x25		
	DV3722B	1.3-7.0	AC	160-270	400-60000	1.7	202x147x78		

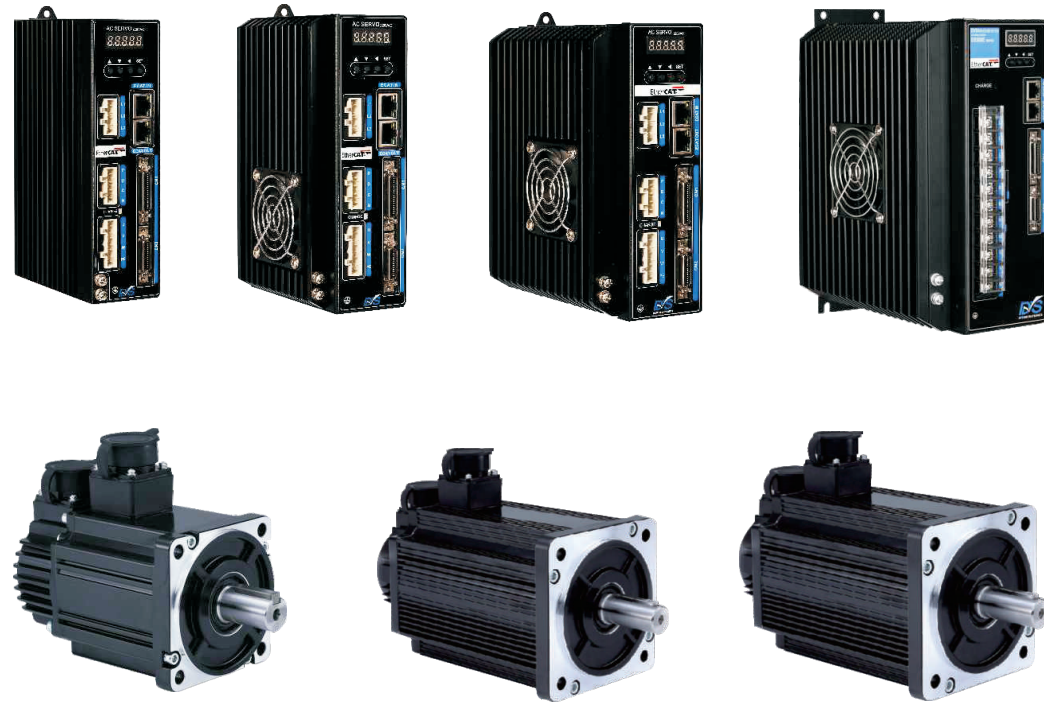
2-phase Close-loop Stepper Motor Selection Guide

Model	Electrical					Mechanical					Driver Model		
	Holding Torque(Nm)	Rated Voltage(V)	Current Phase(A)	Encoder (p/r)	Resistance/Inductance/Phase(Ω) / Phase(mH)	Rotor Inertia (gcm ²)	Flange (mm)	Body Length (mm)	# of Leads	Shaft Type (mm)		Shaft Dia (mm)	Shaft Length (mm)
60 Series	CY6058C	1.7	2.8	5.8	1000Incr	0.48	1.1	300	4	Dcut0.5x25	8	25	0.85
	CY6065C	2.1	3.1	5.8	1000Incr	0.53	1.2	570	4	Dcut0.5x25	8	25	1
	CY6078C	2.3	3.2	5.8	1000Incr	0.56	1.1	620	4	Dcut0.5x25	8	25	1.1
	CY6084C	2.8	2.9	5.8	1000Incr	0.5	1.3	840	4	Dcut0.5x25	8	25	1.3
	CY60102C	4.5	4.4	5.8	1000Incr	0.75	2.4	1000	4	Dcut0.5x25	8	25	1.7
	CY60112C	4.8	4	5.8	1000Incr	0.69	2.11	1200	4	Dcut0.5x25	8	25	1.8
86 Series	CY86127C	5.5	8.7	5.8	1000Incr	1.5	6.9	1370	4	Key3x3x20	10	35	2.3
	CY8680C	5	2.5	6	1000Incr	0.42	2.4	1400	4	Key5x5x25	14	40	2.8
	CY86118C	8.5	3.1	6	1000Incr	0.52	4.16	2100	4	Key5x5x25	14	40	4.5
	CY86128C	10	4.2	6	1000Incr	0.7	7.3	3200	4	Key5x5x25	14	40	5.0
	CY86150C	12.5	4.1	6	1000Incr	0.69	7.2	4000	4	Key5x5x25	14	40	5.9

2-phase close-loop Stepper Driver Selection Guide

Phase	Model	EtherCAT	DC/AC	Voltage(V)	Current(A)	Net Weight(kg)	Approx Size(mm)
2-Phase	DE2608D	NO	AC24-80V/DC36-110V	150X53x97.5	0-6	0.65	150X53x97.5
	DE2608E	YES	AC24-80V/DC36-110V	150X53x97.5	0-6	0.7	150X53x97.5

AC Servo Motor & Drive Selection Guide



	Flange (mm)	40	60	80	90	100	110	130	150	180
	Power (Kw)	0.05 0.1	0.2 0.4 0.6	0.75 1.0	0.75 1.0	1.0 2.0	0.6 0.8 1.2 1.5 1.8	1.0 1.3 1.5 2.0 2.3 2.6 3.8 5.0	3.0 3.6 3.8 4.7 5.5	2.7 2.9 3.0 4.3 4.5 5.5 7.5

Incremental Encoder Selection Guide

Motor				Encoder	Driver	Cable	
Power (Kw)	Model	Flange (mm)	Torque (Nm)		Model	Power	Encoder
0.05	DN40-00130I2-MA	40	0.16	Incremental 2500ppr	DS100S-40		
0.1	DN40-00330I2-MA	40	0.32				
0.2	DN60-00630I2-MA	60	0.637				
0.4	DN60-01330I2-MA	60	1.27				
0.6	DN60-01930I2-MA	60	1.91				
0.4	DN80-01330I2-MA	80	1.27				
0.75	DN80-02430I2-MA	80	2.39				
0.73	DN80-03520I2-MA	80	3.5				
1.0	DN80-04025I2-MA	80	4				
0.75	DN90-02430I2-MA	90	2.4				
0.73	DN90-03520I2-MA	90	3.5		DS200S	PY200-XX-G-N-4PH	
1.0	DN90-04025I2-MA	90	4				
0.6	DN110-02030I2-MH	110	2				
0.8	DN110-04020I2-MH	110	4				
1.2	DN110-04025I2-MH	110	4				
1.5	DN110-10010I2-MH	110	10				
1.2	DN110-04030I2-MH	110	4				
1.8	DN110-06020I2-MH	110	6				
1.0	DN130-05030I2-MH	130	5				
1.3	DN130-06030I2-MH	130	6				
1.5	DN130-05025I2-MH	130	5				
2.0	DN130-06025I2-MH	130	6				
1.0	DN130-10015I2-MH	130	10				
1.5	DN130-07725I2-MH	130	7.7				
2.6	DN130-15015I2-MH	130	15				
2.3	DN130-10025I2-MH	130	10				
3.8	DN130-15025I2-MH	130	15		DS300S/ DS500S		
3.8	DN150-15020I2-MH	150	15				
3.0	DN150-18020I2-MH	150	18				
3.6	DN150-15025I2-MH	150	15		DS500S		
4.7	DN150-23020I2-MH	150	23				
5.5	DN150-27020I2-MH	150	27	DS300S/ DS500S			
2.7	DN180-17215I2-MH	180	17.2				
3.0	DN180-27010I2-MH	180	27				
4.5	DN180-19015I2-MH	180	19				
2.9	DN180-35010I2-MH	180	35				
4.3	DN180-27015I2-MH	180	27		DS500S		
3.7	DN180-21520I2-MH	180	21.5				
5.5	DN180-35015I2-MH	180	35				
7.5	DN180-48015I2-MH	180	48				

Absolute Encoder Selection Guide

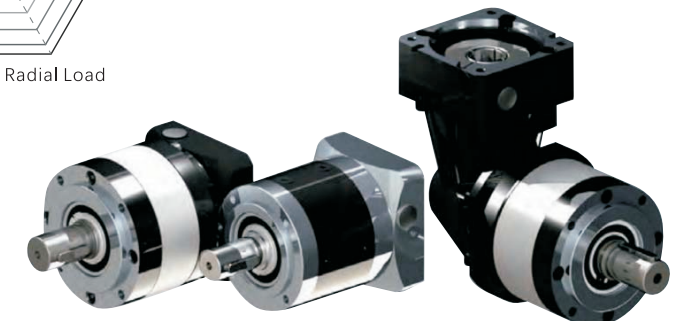
Motor				Driver		Cable	
Power (Kw)	Model	Flange (mm)	Torque (Nm)	Encoder	Pulse-type	EtherCAT-type	Encoder
0.05	DN40-00130A4-MHZ	40	0.16	Absolute 23-bit	DS100H-40	DS100E-40	EH100-XX-G-NA-7PHZ
0.1	DN40-00330A4-MHZ	40	0.32				
0.2	DN60-00630A4-MHZ	60	0.637				
0.4	DN60-01330A4-MHZ	60	1.27				
0.6	DN60-01930A4-MHZ	60	1.91				
0.4	DN80-01330A4-MHZ	80	1.27				
0.75	DN80-02430A4-MHZ	80	2.39				
0.73	DN80-03520A4-MHZ	80	3.5				
1.0	DN80-04025A4-MHZ	80	4				
0.75	DN90-02430A4-MHZ	90	2.4				
0.73	DN90-03520A4-MHZ	90	3.5				
1.0	DN90-04025A4-MHZ	90	4				
0.6	DN110-02030A4-MH	110	2				
0.8	DN110-04020A4-MH	110	4				
1.2	DN110-04025A4-MH	110	4				
1.5	DN110-10010A4-MH	110	10				
1.2	DN110-04030A4-MH	110	4				
1.8	DN110-06020A4-MH	110	6				
1.0	DN130-05030A4-MH	130	5				
1.3	DN130-06030A4-MH	130	6				
1.5	DN130-05025A4-MH	130	5				
2.0	DN130-06025A4-MH	130	6				
1.0	DN130-10015A4-MH	130	10				
1.5	DN130-07725A4-MH	130	7.7				
2.6	DN130-15015A4-MH	130	15				
2.3	DN130-10025A4-MH	130	10				
3.8	DN130-15025A4-MH	130	15				
3.8	DN150-15020A4-MH	150	15				
3.0	DN150-18020A4-MH	150	18				
3.6	DN150-15025A4-MH	150	15				
4.7	DN150-23020A4-MH	150	23				
5.5	DN150-27020A4-MH	150	27				
2.7	DN180-17215A4-MH	180	17.2				
3.0	DN180-27010A4-MH	180	27				
4.5	DN180-19015A4-MH	180	19				
2.9	DN180-35010A4-MH	180	35				
4.3	DN180-27015A4-MH	180	27				
3.7	DN180-21520A4-MH	180	21.5				
5.5	DN180-35015A4-MH	180	35				
7.5	DN180-48015A4-MH	180	48				

Product Series Radar Map

Planetary Gearbox



The most common series PL and WPL refer to page 25 and 26.
Other series specifications and drawings are available under request.



Below is the most common series PL

(drawings available under request)

PL Series (in-line) Datasheet

Specification	Stage/Ratio	PI040	PI060	PI070	PI080	PI120	PI140	PI160	PI200
Rated Output Torque (Nm)	1/3	7.3	18.6	18.6	38	109	231	364	734
	1/4	13.4	34.5	34.5	73	207.5	452	770	1780
	1/5	10	24	24	64	177.5	415	635	1152.5
	1/6	4.7	20	20	55	128	323	432	727
	1/8	4.9	18.5	18.5	59.5	116	216	334.5	609
	1/10	-	14	14	41	65	120	192	375
	2/9	7.3	18.6	18.6	38	109	231	364	743
	2/12	13.4	34.5	34.5	73	207.5	452	770	1780
	2/15	10	24	24	64	177.5	415	635	1152.5
	2/16	13.4	34.5	34.5	73	207.5	452	770	1780
	2/20	13.4	34.5	34.5	73	207.5	452	770	1780
	2/25	10	24	24	64	177.5	415	635	1152.5
	2/30	10	24	24	64	177.5	415	635	1152.5
	2/32	13.4	34.5	34.5	73	207.5	452	770	1780
	2/40	10	24	24	64	177.5	415	635	1152.5
	2/50	10	24	24	64	177.5	415	635	1152.5
	2/64	4.9	18.5	18.5	59.5	116	216	334.5	609
	2/80	4.9	18.5	18.5	59.5	116	216	334.5	609
Rated Input Speed (rpm)		3000	3000	3000	3000	3000	3000	2000	1500
Max Input Speed (rpm)	1&2/-	6000	6000	6000	6000	6000	6000	4000	3000
Backlash (armin)	P1 ^o -1	10	8	8	8	8	8	8	8
	P1-2	12	10	10	10	10	10	10	10
	P2 [#] -1	16	10	10	10	10	10	10	10
	P2-2	18	12	12	12	12	12	12	12
Noise (dB)		58	60	60	60	63	65	65	72
Max Radial Load (N)	1&2/-	220	480	480	900	1850	2000	3600	18000
Max Axial Load (N)		200	600	600	1200	2800	3500	8000	28000
Efficiency (%)	1/-	≥97							
	2/-	≥94							
Ambient Temp(°C)		-15 ~ +40							
Service Life (h)	1&2/-	≥20000							
Lubrication		Synthetic Lubricant (Maintenance Free)							

○ P1: Precision Level 1

P2: Precision Level 2

Stage-3 ratio 100~512 datasheets are available under request.

Below is the most common series WPL

(drawings available under request)

WPL Series (right-angle) Datasheet

Specification	Stage/Ratio	WPL040	WPL060	WPL080	WPL090	WPL120	WPL140	WPL160
Rated Output Torque (Nm)	1/3	7.3	18.6	38	38	109	231	364
	1/4	13.4	34.5	73	73	207.5	452	770
	1/5	10	24	64	64	177.5	415	635
	1/6	4.7	20	55	55	128	323	432
	1/8	4.9	18.5	59.5	59.5	116	216	334.5
	1/10	-	14	41	41	65	120	192
	2/9	7.3	18.6	38	38	109	231	364
	2/12	13.4	34.5	73	73	207.5	452	770
	2/15	10	24	64	64	177.5	415	635
	2/16	13.4	34.5	73	73	207.5	452	770
	2/20	13.4	34.5	73	73	207.5	452	770
	2/25	10	24	64	64	177.5	415	635
	2/30	10	24	64	64	177.5	415	635
	2/32	13.4	34.5	73	73	207.5	452	770
	2/40	10	24	64	64	177.5	415	635
	2/50	10	24	64	64	177.5	415	635
	2/64	4.9	18.5	59.5	59.5	116	216	334.5
	2/80	4.9	18.5	59.5	59.5	116	216	334.5
Rated Input Speed (rpm)		3000	3000	3000	3000	3000	3000	2000
Max Input Speed (rpm)	1&2/-	6000	6000	6000	6000	6000	6000	4000
Backlash (armin)	P1 ^o -1	12	10	10	10	10	10	10
	P1-2	14	12	12	12	12	12	12
	P2 [#] -1	18	12	12	12	12	12	12
	P2-2	20	14	14	14	14	14	14
Noise (dB)		60	63	65	65	68	68	70
Max Radial Load (N)	1&2/-	220	480	900	900	1850	2000	3600
Max Axial Load (N)		200	600	1200	1200	2800	3500	8000
Efficiency (%)	1/-	≥95						
	2/-	≥92						
Ambient Temp(°C)		-15 ~ +40						
Service Life (h)	1&2/-	≥20000						
Lubrication		Synthetic Lubricant (Maintenance Free)						

○ P1: Precision Level 1

P2: Precision Level 2

Stage-3 ratio 100~512 datasheets are available under request.

GRA-D6

(drawings available under request)



Features

- ▲ DC Permanent Magnet Motor
- ▲ Max Speed 55mm/s
- ▲ Max Load 2000N
- ▲ Metal Gearbox
- ▲ Aluminum Alloy Outer&inner Housing
- ▲ Powder Metal Gear
- ▲ Hall Sensor and Potentiometer as Optional
- ▲ Ambient Temp. -40°C ~ +65°C
- ▲ IP65 and CE

Parameter

Code	Rated Load (N)	Max Load Current (A)				Free-load Speed (mm/s)	Load Speed (mm/s)
		12V	24V	36V	48V		
A	2000	3.5	2.0	1.5	1.0	1.0	4
B	1600	3.5	2.0	1.5	1.0	1.0	5.5
C	1200	3.5	2.0	1.5	1.0	1.0	8
D	700	3.5	2.0	1.5	1.0	1.0	14
E	300	3.5	2.0	1.5	1.0	1.0	30
F	1200	4.0	2.5	1.5	1.0	1.0	6
G	800	4.0	2.5	1.5	1.0	1.0	8
H	600	4.0	2.5	1.5	1.0	1.0	11
I	400	4.0	2.5	1.5	1.0	1.0	22
J	200	4.0	2.5	1.5	1.0	1.0	45

GRA-D10

(drawings available under request)



Application

Farm/Garden/Ship Ventilation

Features

- ▲ 220V, 50Hz/110V, 60Hz
- ▲ Max Force 5000N
- ▲ Stroke 18", 24", 36", 48"
- ▲ Speed 4.2mm/s
- ▲ 10K Potentiometer
- ▲ Built-in Limit Switch
- ▲ Over-heat Protect
- ▲ Low Noise
- ▲ IP65

Force		Speed		Current	
Push	Pull	No Load	Full Load	No Load	Full Load
5000N	5000N	4.5mm/s	4.2mm/s	0.7A	1.2A

GRA-D8

(drawings available under request)



Features

- ▲ DC Permanent Magnet Motor
- ▲ Compact, Powerful, Durable
- ▲ DC12V
- ▲ Speed 5.5 ~ 42mm/s
- ▲ Max Load 8000N
- ▲ Stroke 30 ~ 900mm
- ▲ Clutch Overload Protect
- ▲ IP65 and CE
- ▲ Potentiometer and Hall Sensor as Optional
- ▲ Adjustable Limit Switch as Optional

Parameter (ACME)

Code	Ratio	Speed (rpm)	Max Load Push/Pull	Speed (mm/s)		Max Load Current (A)			
				No Load	Full Load	12V	24V	36V	48V
A	5:1	4200	2000/2000	35.0	30.0	17.0	8.5	5.0	3.0
B	10:1	4200	3000/3000	22.0	18.5	17.0	8.5	5.0	3.0
C	20:1	4200	4000/4000	17.2	14.5	17.0	9.0	5.0	3.0
D	30:1	4200	5000/5000	12.0	9.5	17.0	9.0	5.0	3.0
E	40:1	4200	6000/6000	8.5	7.0	18.0	9.0	5.0	3.6
F	40:1	4200	7000/7000	5.5	4.0	18.0	9.0	5.0	3.6

Parameter (BALL)

Code	Ratio	Speed (rpm)	Max Load Push/Pull	Speed (mm/s)		Max Load Current (A)			
				No Load	Full Load	12V	24V	36V	48V
G	5:1	4200	2500/2500	42.0	35.0	11.0	5.5	4.0	2.3
H	10:1	4200	3500/3500	28.0	22.0	14.0	5.5	4.0	2.4
I	20:1	4200	4500/4500	21.0	18.0	11.0	6.0	4.0	2.4
J	30:1	4200	6000/6000	11.2	9.8	12.0	6.0	4.0	2.5
K	40:1	4200	8000/8000	8.5	7.0	8.0	6.0	5.0	2.6

GRA-D15

(drawings available under request)



Features

- ▲ Harsh Conditions
- ▲ DC Permanent Magnet Motor
- ▲ Compact, Powerful, Durable
- ▲ Built-in Limit Switch
- ▲ DC24V/12V
- ▲ Max Load 12000N
- ▲ Clutch Overload Protect
- ▲ IP66 and CE
- ▲ Potentiometer and Hall Sensor as Optional
- ▲ Hand Crank as Optional

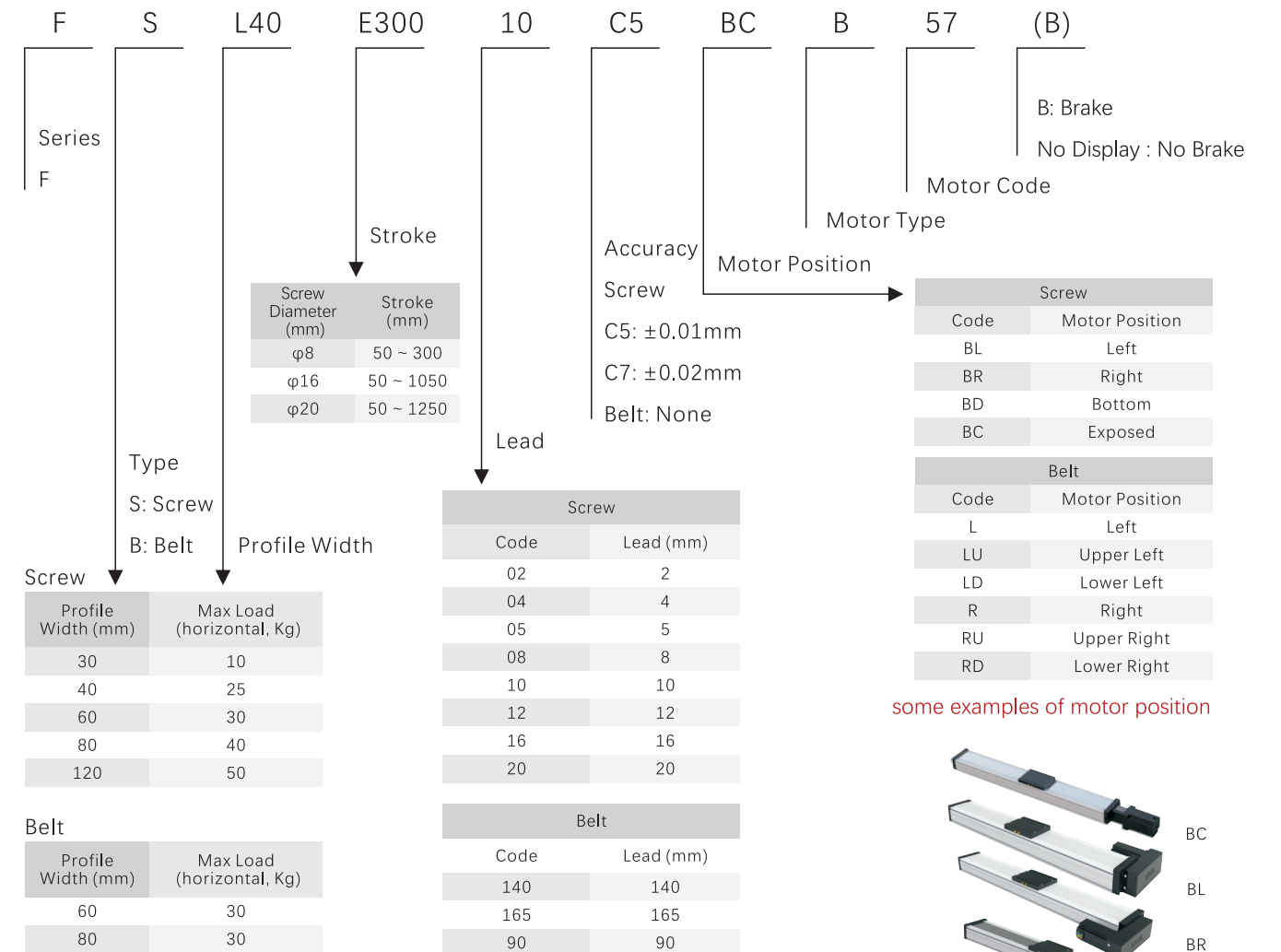
Parameter (ACME)

Code	Gear Ratio	Rated Load (N)	Self-force (N)	Speed (mm/s)		No Load Current (A)		Full Load Current (A)	
				No Load	Full Load	12V	24V	36V	48V
A	40:1	12000	15000	6.5	4.5	4.0	2.4	20.0	10.5
B	30:1	11000	12000	8.5	6	4.0	2.4	20.0	10.5
C	20:1	7500	9000	13	9	4.0	2.4	20.0	10.5
D	40:1	10000	12000	13	7	4.0	2.4	20.0	10.5
E	30:1	7000	8000	17	9.5	4.0	2.4	20.0	10.5
F	20:1	5000	6000	25	14	4.0	2.4	20.0	10.5
G	40:1	6500	8000	20	11	4.0	2.4	20.0	10.5
H	30:1	4500	5500	25	13	4.0	2.4	20.0	10.5
I	20:1	3200	4000	38	24	4.0	2.4	20.0	10.5

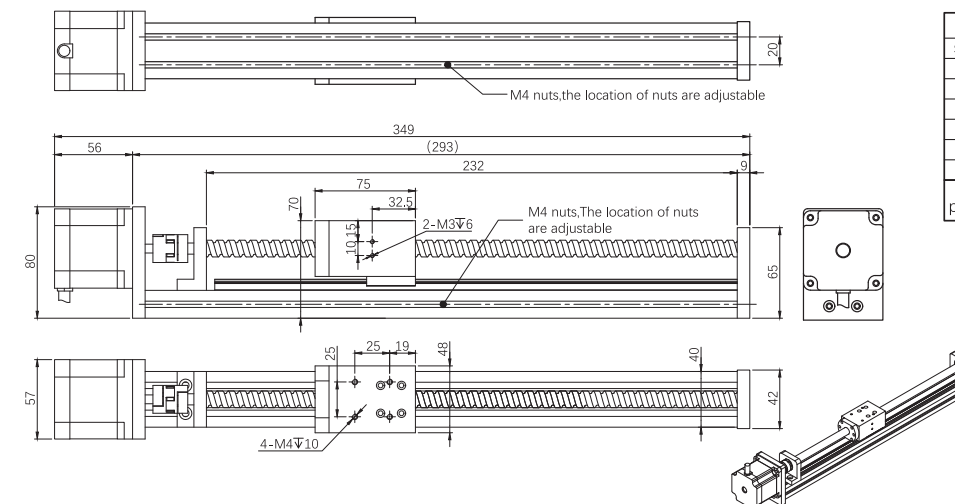
More Linear Actuator Available Under Request

Linear Axis/Module

(drawings available under request)



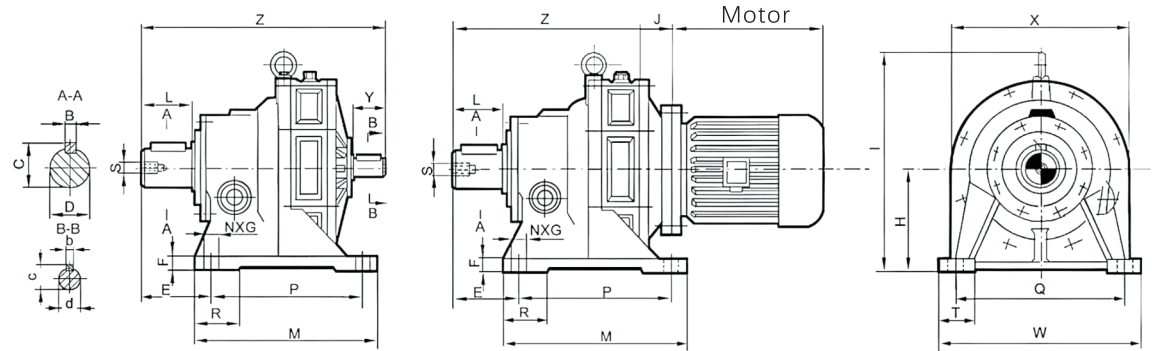
Below is one example of FSL40. Other models are available under request



Technical parameter				
Screw diameter	16 mm	Effective length	150 mm	
Screw lead	05 mm	Life time	10 000 km	
Accuracy	0,05 mm	Max speed (without load)	160 mm/s	
Max push force	376 N	Max horizontal speed (full load)	150 mm/s	
Horizontal load	25 kg	Max vertical speed (full load)	85 mm/s	
Vertical load	15 kg	Rate acceleration	500 mm/s	
Dynamic load	Ma=2,5Nm	Mi=1,3Nm	Mc=1,3Nm	
Motor parameter	Step angle	1.8°	Phase	2
	Rate current	2 A	Holding torque	0,95 Nm

Cycloidal Reducer

Below is about model BW, BWD, XW and XWD (single reduction). Other models refer to page 32.



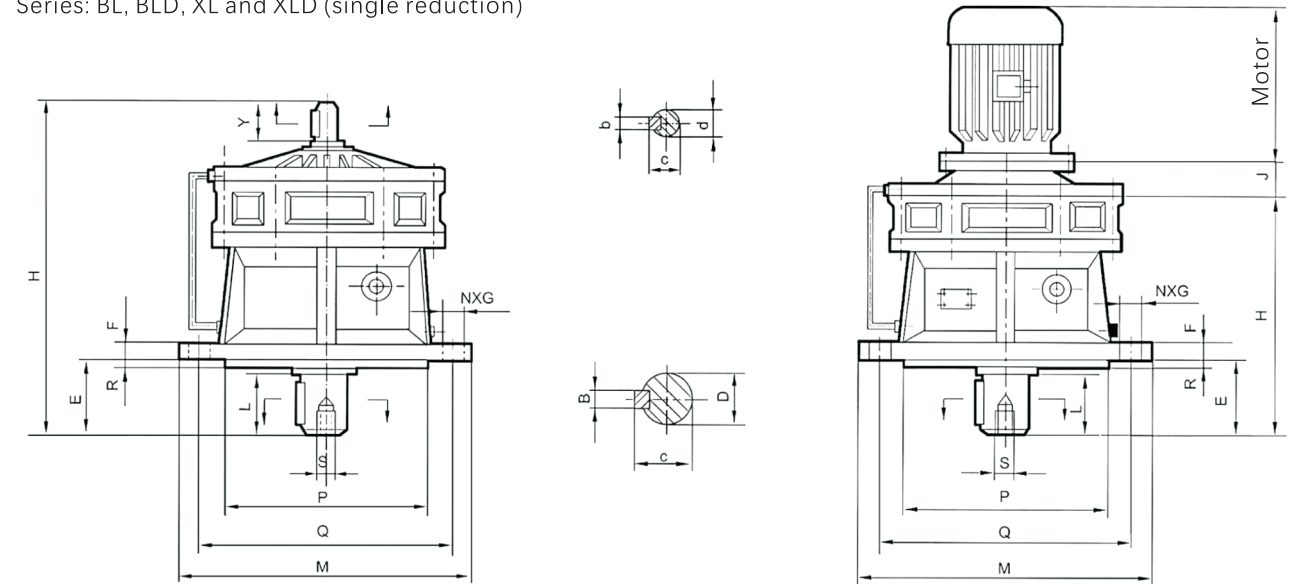
Series: BW and BWD (unit: mm)

Size	Outline				Installation										Shaft						Approx. Net Weight (Kg)				
	M	W	Z		I	X	H	E	F	P	Q	R	S	T	N	G	B	C	D	L		b	c	d	y
09	100	144	192	142	155	140	80	47	12	76	120	-	M5	35	4	11	6	24.5	22	30	5	17	15	22	8.5
0	120	185	214	165	190	168	100	93	15	90	150	-	M8	35	4	11	8	33	30	35	5	17	15	22	15
1	160	280	263	194	250	200	120	125	15	110	240	-	M10	55	4	13	10	38	35	56	6	20.5	18	35	22
2	200	320	320	246	296	240	140	144	20	150	280	65	M10	60	4	13	14	48.5	45	71	6	24.5	22	40	40
3	250	390	390	294	355	300	160	159	25	200	340	100	M12	75	4	17	16	59	55	80	8	33	30	55	73
4	380	400	479	370	430	340	200	155	25	320	340	150	M12	80	4	22	20	74.5	70	102	10	38	35	62	120
5	440	470	564	438	513	400	240	159	32	380	420	-	M16	80	4	22	25	95	90	120	14	48.5	45	70	185
6	520	560	668	528	605	500	280	199	35	440	500	-	M20	90	4	26	28	106	100	139	14	53.5	50	80	380
7	600	690	775	578	706	575	325	230	40	500	630	-	M24	105	6	26	28	116	110	150	16	59	55	90	580
8	810	880	1061	814	880	700	420	324	50	660	800	-	M30	160	6	32	32	137	130	202	20	74.5	70	120	1200
9	1040	1160	1462	1151	1160	1000	540	485	60	840	1050	-	M42	200	6	45	45	190	180	330	25	95	90	150	2500

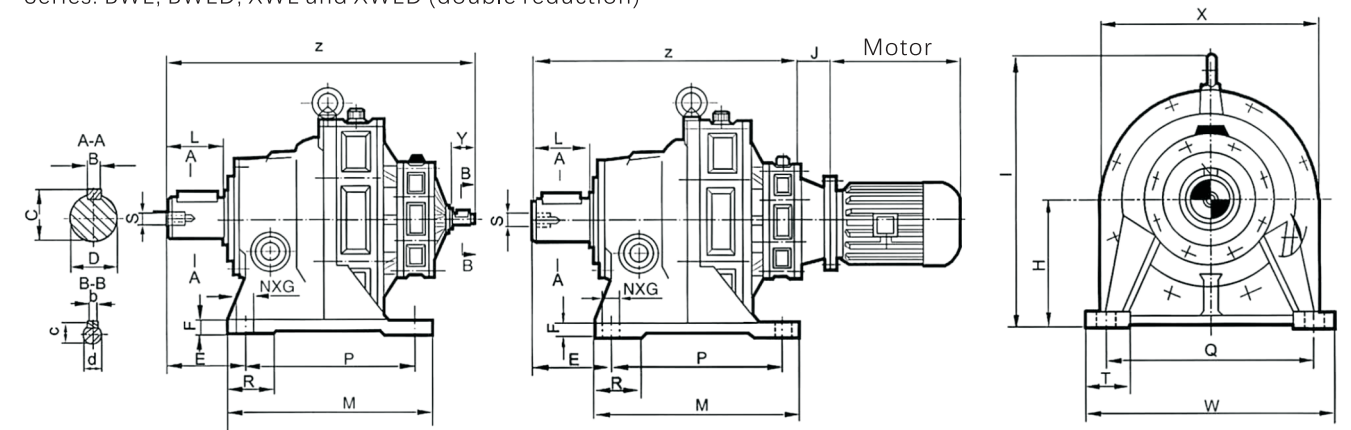
Series: XW and XWD (unit: mm)

Size	Outline				Installation										Shaft						Approx. Net Weight (Kg)				
	M	W	Z		I	X	H	E	F	P	Q	R	S	T	N	G	B	C	D	L		b	c	d	y
1	120	180	197	147	175	140	100	60	12	90	150	-	M5	35	4	12	8	28	25	35	5	17	15	22	8.5
2	120	210	216	164	190	168	100	101	15	90	180	-	M8	45	4	12	8	28	25	34	5	17	15	22	15
3	150	290	263	194	270	200	140	151	20	100	250	-	M10	55	4	16	10	38	35	56	6	20.5	18	35	30
4	195	330	320	246	316	240	150	169	22	145	290	-	M10	65	4	16	14	48.5	45	74	6	24.5	22	40	43
5	260	410	401	305	356	300	160	206	25	150	370	-	M12	75	4	16	16	59	55	91	8	33	30	55	85
6	335	430	466	359	425	340	200	125	30	275	380	-	M12	75	4	22	18	69	65	89	10	38	35	62	125
7	380	470	484	377	484	340	220	145	30	320	420	-	M12	95	4	22	22	85	80	109	12	43	40	65	190
8	440	530	564	438	514	400	250	155	35	380	480	-	M16	120	4	22	25	95	90	120	14	48.5	45	70	240
9	560	620	691	528	614	500	290	186	40	480	560	-	M20	120	4	26	28	106	100	141	14	53.5	50	80	390
10	600	690	775	578	706	575	325	230	40	500	630	-	M24	105	6	26	28	116	110	150	16	59	55	90	580
11	810	880	1061	814	880	700	420	324	50	660	800	-	M30	160	6	32	32	137	130	202	20	74.5	70	120	1200
12	1040	1160	1462	1151	1160	1000	540	485	60	840	1050	-	M42	200	6	45	45	190	180	330	25	95	90	150	2500

Series: BL, BLD, XL and XLD (single reduction)



Series: BWE, BWED, XWE and XWED (double reduction)



Series: BLE, BLEED, XLE and XLED (double reduction)

