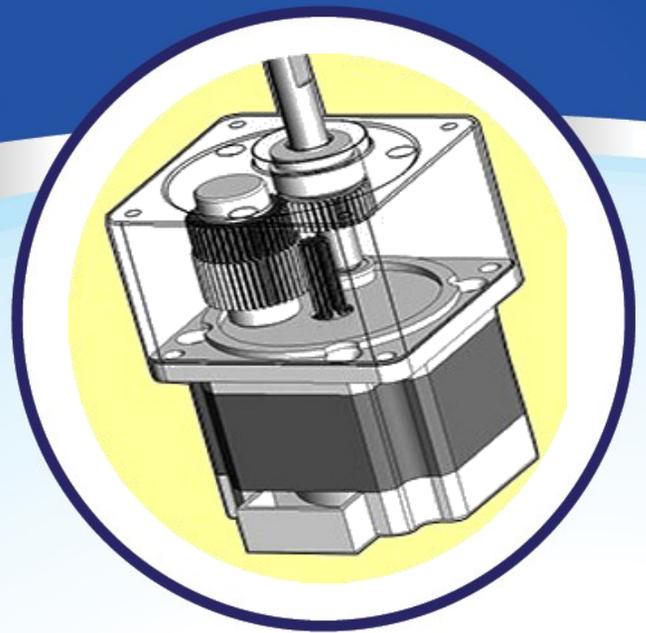


MOTORS & PUMPS Catalog

Edition No.
ENN110625



IN THIS CATALOG:

- * DC BRUSHLESS MOTOR
- * DC BRUSHED MOTORS
- * SRVO MOTORS
- * VIBRATION MOTORS
- * DC STEPPER MOTORS
- * PERISTALTIC PUMPS
- * DIAPHRAGM PUMPS
- * MICRO PUMPS

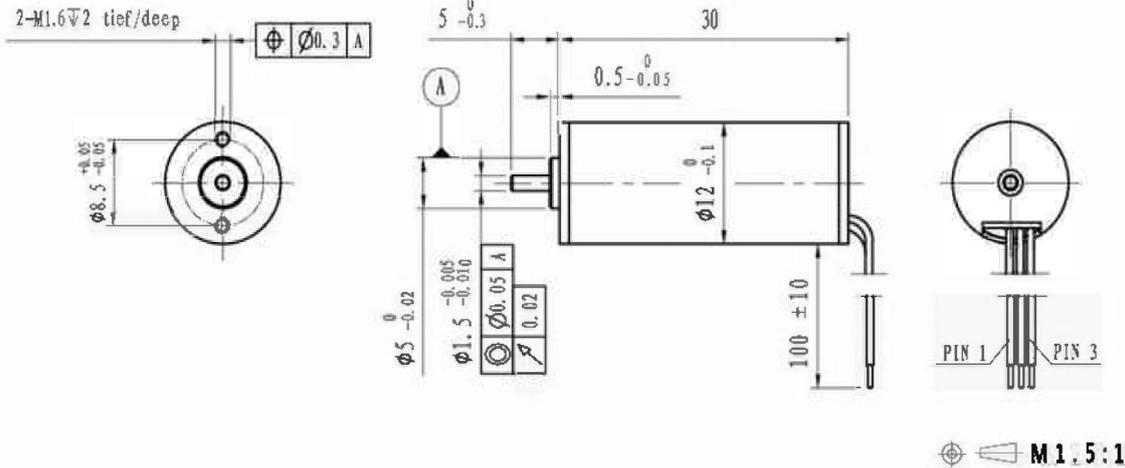
RANGE

UP TO 150MM DIA	SLOTLESS MOTORS	CORELESS MOTORS	MEDICAL MOTORS
UP TO 48VDC	WARM GEAR MOTORS	GEAR MOTORS	PANCAKE MOTORS
VACUM PUMPS	INOX PUMPS	SINGLE USE PUMPS	AIR PUMPS
MICRO MOTORS	PLANETARY GEARS	SOLONOIDS	ACTUATORS
MULTI-PHASE BLDC	INNER ROTOR BLDC	CONTROLLERS	SENSORED BLDC



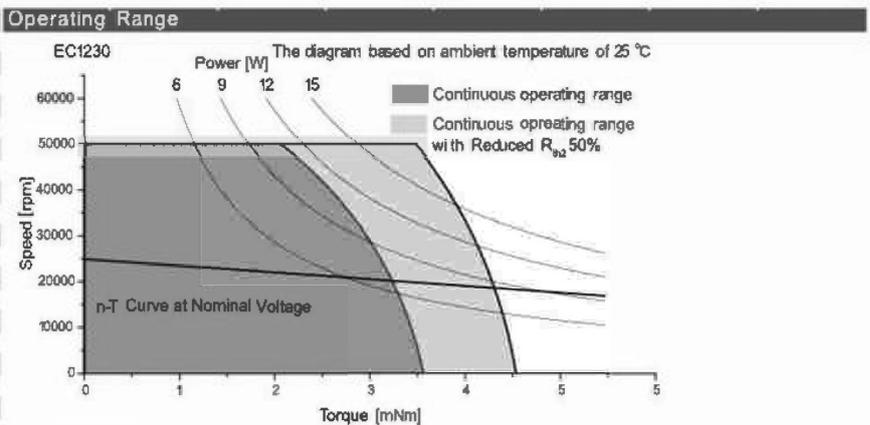
12mm Slotless BLDC motor 6, 9 & 12 volt

P/N: MFU-3311-S006 / S009 / S012



Sensorless					
Motor data					
Values at nominal voltage					
1	Nominal voltage	V	6	9	12
2	No load speed	rpm	25310	25100	24930
3	No load current	mA	122	90	72
4	Nominal speed	rpm	20719	20565	20449
5	Nominal torque	mNm	3	3	3
6	Nominal current	A	1.47	0.98	0.74
7	Stall torque	mNm	16.5	16.6	16.7
8	Stall current	A	7.55	5.03	3.77
9	Max. efficiency	%	76.2	75	74.3
10	Terminal resistance	Ω	0.8	1.79	3.18
11	Terminal inductance	mH	0.02	0.04	0.06
12	Torque constant	mNm/A	2.23	3.36	4.51
13	Speed constant	rpm/V	4288	2840	2118
14	Speed/torque gradient	rpm/mNm	1530	1512	1494
15	Mechanical time constant	ms	5.1	5.1	5.0
16	Rotor Inertia	gcm ²	0.32	0.32	0.32

17	Thermal resistance housing-ambient	28.4 K/W
18	Thermal resistance winding-housing	7.1 K/W
19	Thermal time constant winding	4 s
20	Thermal time constant motor	240 s
21	Ambient temperature	-30...+100 °C
22	Max. permissible winding temperature	+125 °C
23	Max. permissible speed	50000 rpm
24	Axial play at axial load <0.6 N	0 mm
	> 0.6 N	max. 0.3 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	0.3
27	Max. force for press fits (static) (static, shaft supported)	11N / 200N
28	Max. radial loading, 5mm from flange	4.3N
29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	16.3 g

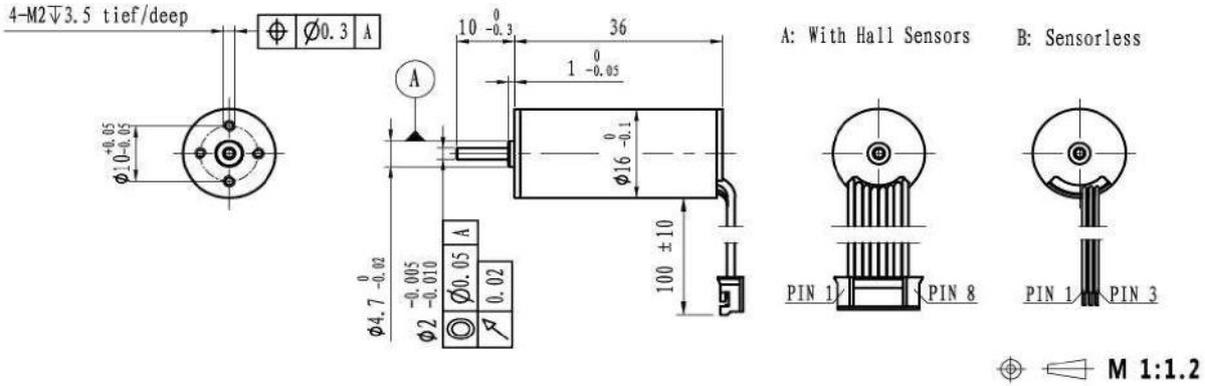


Connection	Configuration
Conection Pin 1 Motor winding MA AWG28 yellow Pin 2 Motor winding MB AWG28 green Pin 3 Motor winding MC AWG28 blue	Performance: Customized in the continuous operating range Ball bearing: Preload Flange: Standard frange front&back/customize the frange Shaft: Length/Diameter/Cut face/double shaft/hollow shaft Leadwire: PVC/Silicon/Teflon/UL No/Dimension/length Connector: JST/MOLEX/TE

16mm Slotless BLDC motor

6, 9, 12 & 24 volt

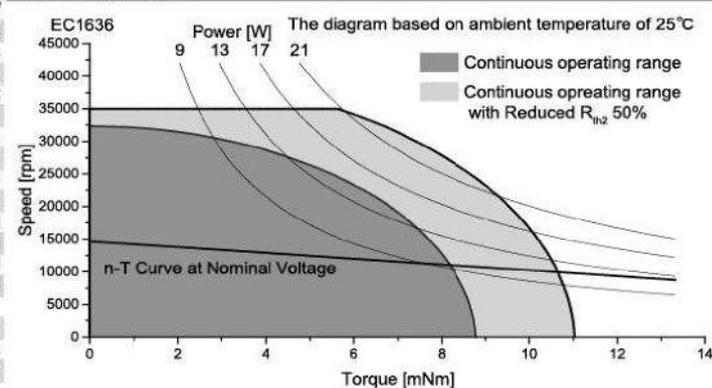
P/N: MFU-3333-S006 / S009 / S012 / S024



	Sensorless	With hall sensor					
Motor data							
Values at nominal voltage							
1	Nominal voltage	V	6	9	12	24	
2	No load speed	rpm	13835	14533	14460	14668	
3	No load current	mA	150	110	70	50	
4	Nominal speed	rpm	11412	11930	11615	12005	
5	Nominal torque	mNm	6	6	6	6	
6	Nominal current	A	1.62	1.14	0.84	0.44	
7	Stall torque	mNm	34.3	33.5	30.5	33	
8	Stall current	A	8.57	5.88	3.99	2.21	
9	Max. efficiency	%	75.3	74.5	75.3	72.2	
10	Terminal resistance	Ω	0.7	1.53	3.01	10.8	
11	Terminal inductance	mH	0.04	0.08	0.15	0.81	
12	Torque constant	mNm/A	4.07	5.8	7.79	15.3	
13	Speed constant	rpm/V	2347	1646	1227	625	
14	Speed/torque gradient	rpm/mNm	404	434	474	444	
15	Mechanical time constant	ms	2.6	2.8	3.1	2.9	
16	Rotor inertia	gcm ²	0.62	0.62	0.62	0.62	

17	Thermal resistance housing-ambient	17.1 K/W
18	Thermal resistance winding-housing	5.3 K/W
19	Thermal time constant winding	6 s
20	Thermal time constant motor	252 s
21	Ambient temperature	-30...+100°C
22	Max. permissible winding temperature	+150°C
23	Max. permissible speed	35000 rpm
24	Axial play at axial load <1.8 N	0 mm
	>1.8 N	max. 0.3 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	1.3 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	350 N
28	Max. radial loading, 5mm from flange	5 N
29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	32 g

Operating Range



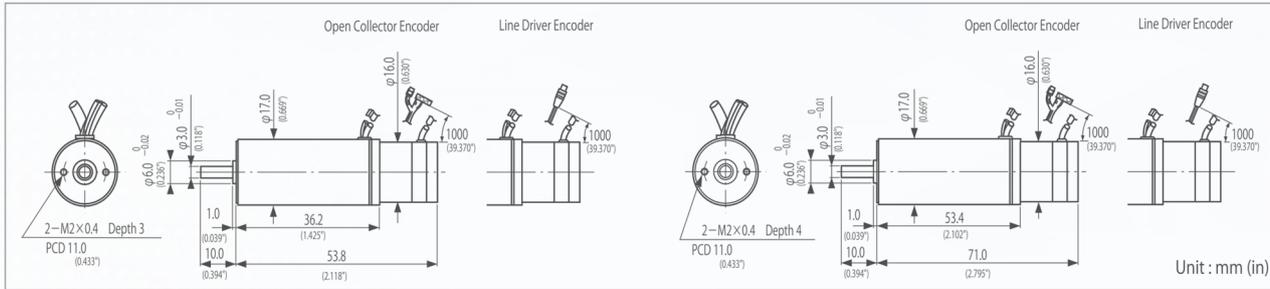
Connection

Connection A (Sensor)		PVC	
Pin 1	Vhall 3-18 VDC	AWG26	black
Pin 2	Hall sensor HA	AWG26	black
Pin 3	Hall sensor HB	AWG26	black
Pin 4	Hall sensor HC	AWG26	black
Pin 5	GND	AWG26	black
Pin 6	Motor winding MA	AWG26	black
Pin 7	Motor winding MB	AWG26	black
Pin 8	Motor winding MC	AWG26	black
Connector: JST PH2.0-8P			

Connection B (Sensorless)		PVC	
Pin 1	Motor winding MA	AWG26	yellow
Pin 2	Motor winding MB	AWG26	green
Pin 3	Motor winding MC	AWG26	blue

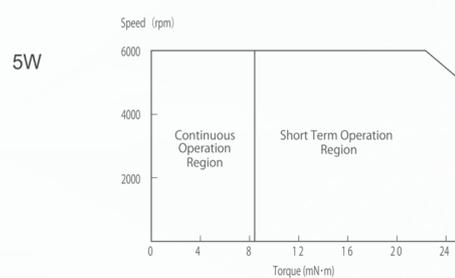
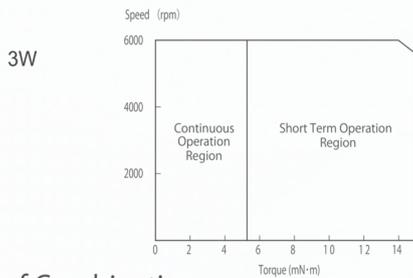
Configuration

Performance: Customized in the continuous operating range
 Ball bearing: Preload
 Flange: Standard frange front&back/customize the frange
 Shaft: Length/Diameter/Cut face/double shaft/hollow shaft
 Leadwire: PVC/Silicon/Teflon/UL No/Dimension/length
 Connector: JST/MOLEX/TE

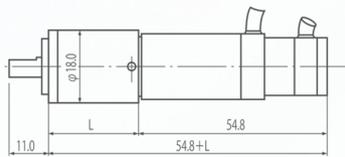
COMPACT AC SERVO MOTOR
17mm
P/N: MKC-1730-S000

Specifications

Items	W	3.0	5.0	
Rated Output				
Rated Torque	mN·m (gf·cm) oz·in	4.90 50 0.69	8.14 83 1.15	
Rated Speed	rpm	6000		
Peak Torque	mN·m (gf·cm)	14.7 (150)		24.5 (250)
Power Rate	w/s	220		330
Torque Constant	mN·m/A	16.2		23.9
EMF Constant	V/krpm	1.7		2.5
Number of Poles	—	2		
Rotor Inertia (GD ² /4)	g·cm ²	1.1		2.0
Winding Insulation Class	—	Class F		
Encoder	P/R	Incremental Photo Encoder		400 or 1000
Operating Ambient Temperature / Humidity	—	0~40°C / Below 85% RH without condensation		
Storage Temperature / Humidity	—	-20~60°C / Below 85% RH without condensation		
Weight	g	80		105

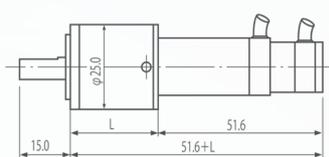
*Note : The above values are the specifications when an aluminum heat-sink (57×57×5t) is attached to the motor flange.

Basic Characteristics (at DC 24V)

Example of Combination

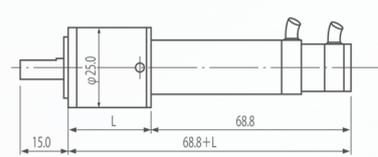
Gearhead + Motor + Encoder

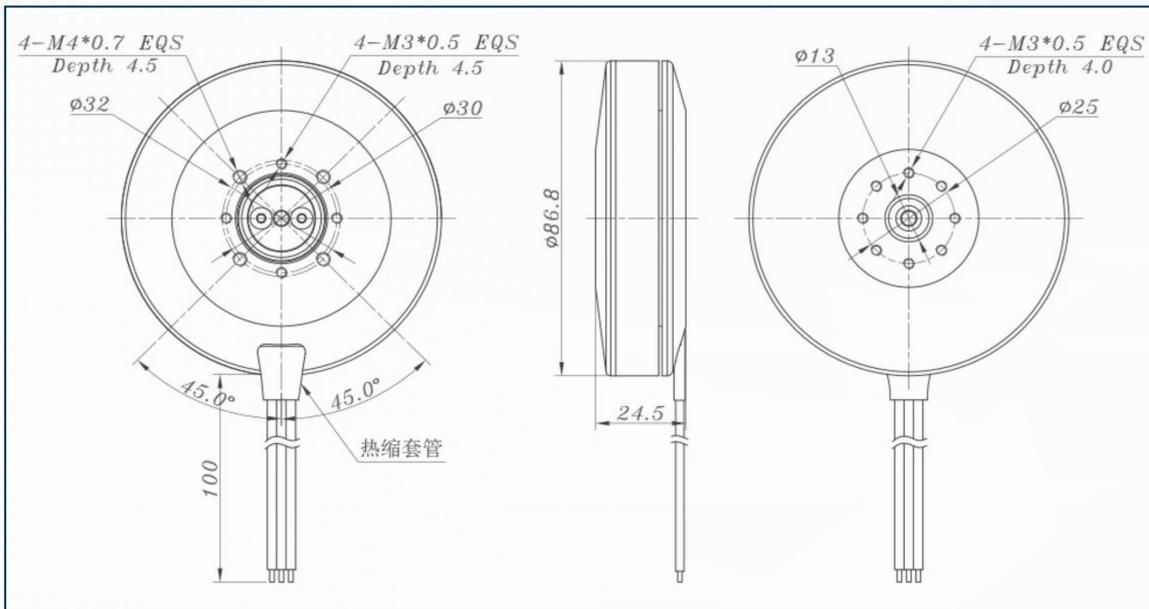


Gearhead + Motor + Encoder



Gearhead + Motor + Encoder




BLDC MOTOR FOR DRONES
88.6mm
P/N: MFN-3240-S000


Motor / KV	KV85	KV90	KV100	KV115	KV135	KV150	KV190
Stator/Rotor Poles	36N42P	36N42P	36N42P	36N42P	36N42P	36N42P	36N42P
Internal resistance	168m Ω	149m Ω	138m Ω	106m Ω	76m Ω	63m Ω	42m Ω
Motor size	Length: 31mm	Length: 31mm	Length: 31mm	Length: 31mm	Length: 31mm	Length: 31mm	Length: 31mm
Shaft diameter	87mm	87mm	87mm	87mm	87mm	87mm	87mm
AWG	No data	No data	No data	No data	No data	No data	No data
Motor weight(wire included)	283g	283g	283g	283g	283g	283g	283g
Rated operational voltage	12S	12s	12s	8-12s	6-8s	No data	6s
No-load current	0.42V	0.38A	0.41A	0.5A	0.6A	0.69A	0.95A
Maximum continuous power	1248W	1440W	1680W	974.4W	1414W	850W	1450W
Maximum continuous current	26A/30s	30A/30s	35A/30s	29A/30s	42A/30s	34A/30s	58A/30s
ESC recommended use	40A	40A	40A	40A	40-60A	40A	60-80A


MINI DC SERVO MOTOR
P/N: MNA-4760-S000

12V 60kg.cm Serial Control RS485 Servo

1. Apply Environmental Condition

No.	Item	Specification
1-1	Storage Temperature Range1-2	-30°C ~80°C
	Operating Temperature Range	-20°C ~80°C

2. Standard Test Environment

No.	Item	Specification
2-1	Temperature range2-2	25°C ±5°C
	Humidity range	65%±10%

3. Mechanical Specification

No.	Item	Specification
3-1	Size	A: 62mm B: 34mm C: 40mm
3-2	Weight	180g
3-3	Gear type	Steel Gear(Gear Ratio 253:1)
3-6	Limit angle3-7 轴承	No Limiter
3.7	Bearing	2 Ball bearings
3-8	Horn gear spline3-9	15T(OD7.6mm)
3.9	Horn type	Aluminium
3-10	Case	Aluminium
3-11	Connector wire3-12	150mm ±5 mm(5264-4P)
3.12	Motor	coreless motor
3-13	防水性能 Splash water resistance	NO

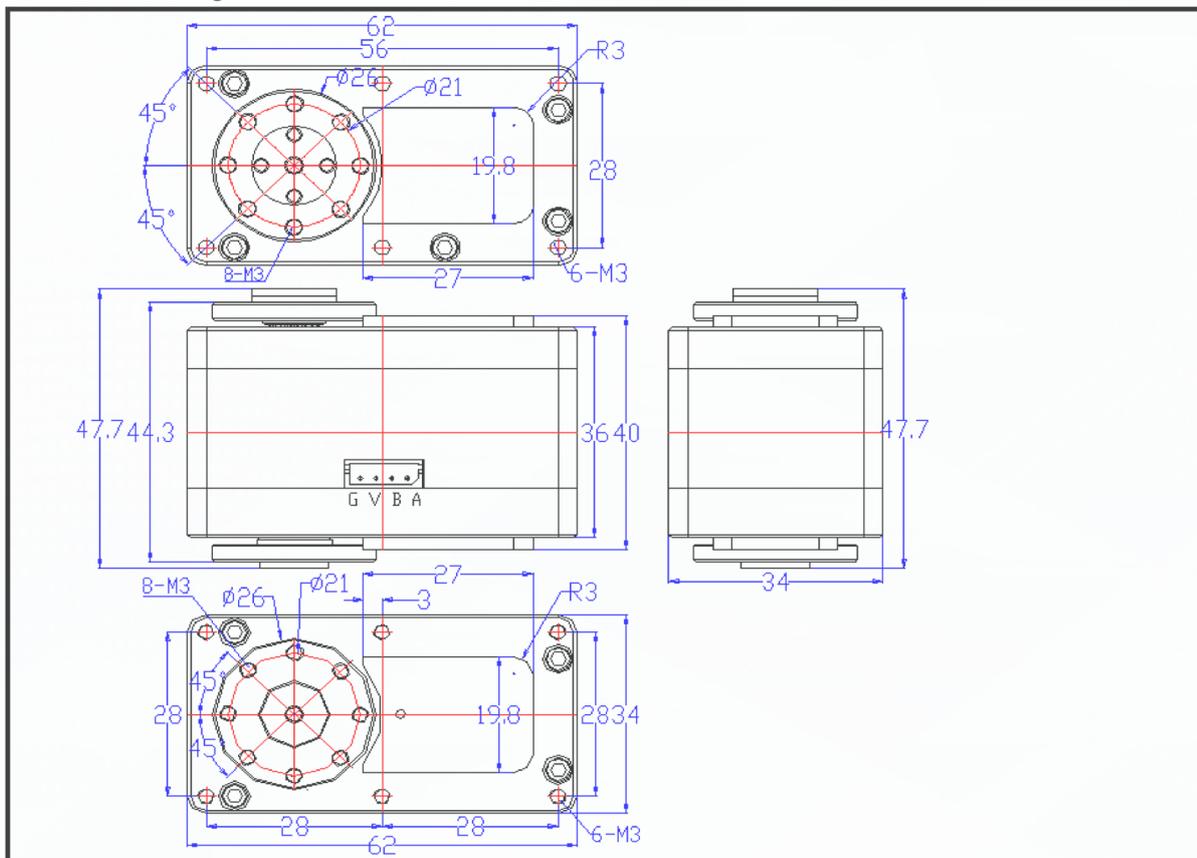
4. Electrical Specification (Function of the Performance)

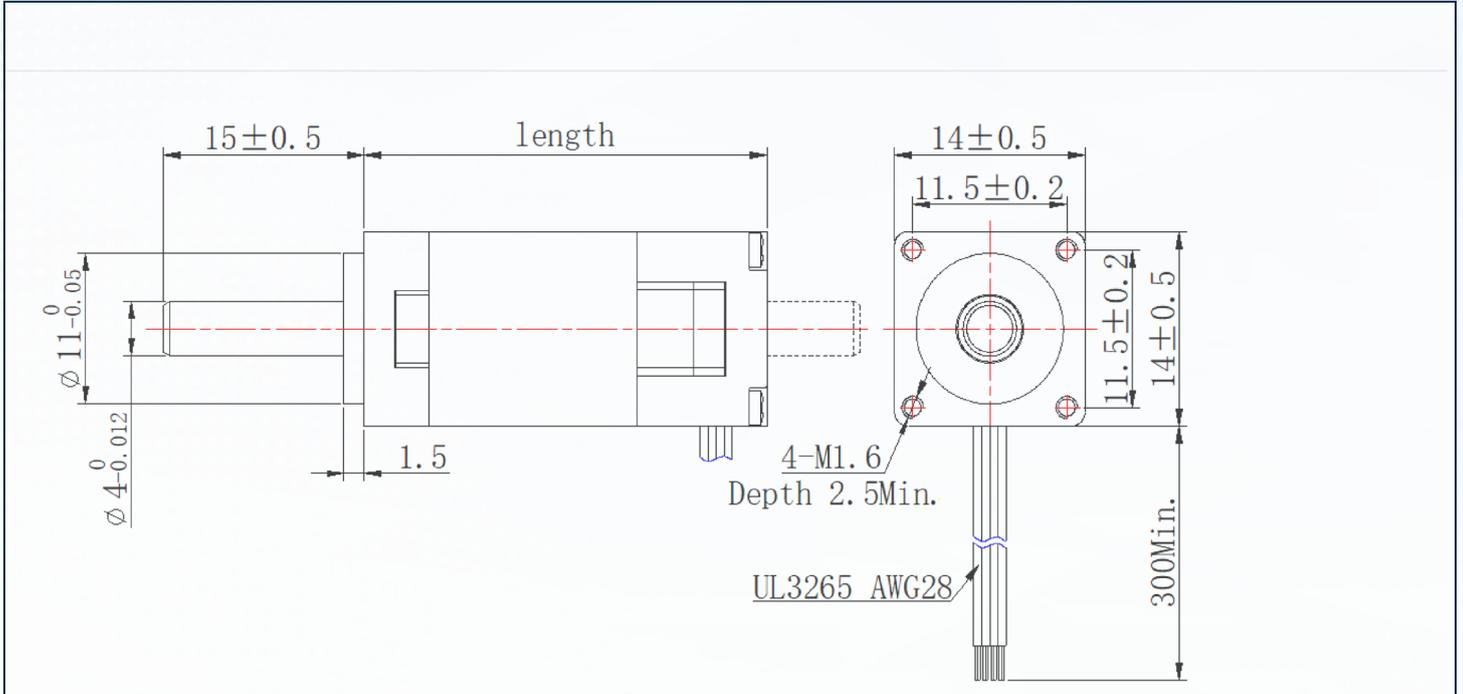
No.	Operating Voltage Range	12V	
4-1*	Idle current(at stopped)	40mA	
4-2*	No load speed	0.286sec/60degree	35RPM
4-3*	Runnig current(at no load)	200 mA	
4-4	Peak stall torque	60kg.cm	
		834.7oz.in	
4-5	Stall current	2600 mA	
4-6	Rated Load	20kg.cm≤	
4-7	Rated current	800mA≤	
4-8	KM	16kg.cm/A	
4-9	Terminal resistance	3.13Ω	

Note: "*"definition is average value when the servo runing with no load

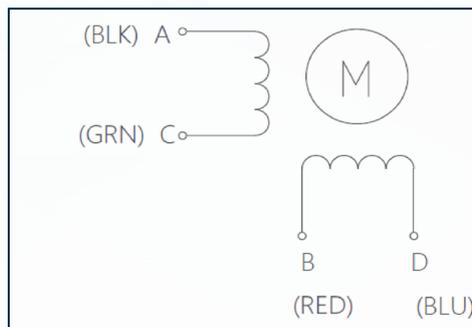

5. Control Specification:

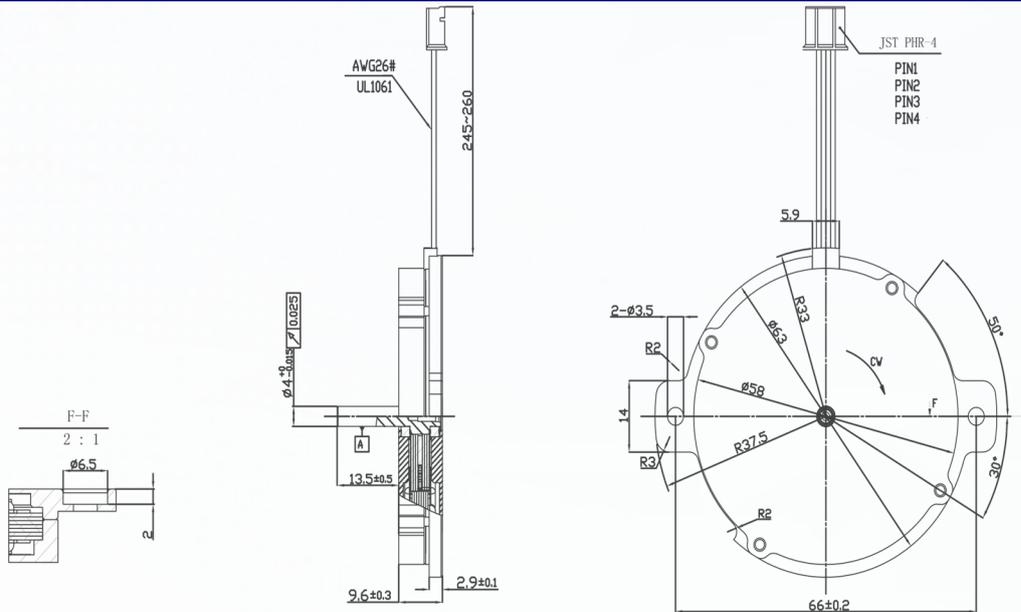
No.	Item	Specification
5-1	Command signal	Bus Packet Communication RS485
5-2	Protocol Type	Half duplex Asynchronous Serial Communication
5-3	ID range	0-253
5-4	Communication Speed	38400bps ~ 1 Mbps
5-5	Running degree	360° (when 0~4096)
5-6	Feedback	Load, Position, Speed, Input Voltage, Current, Temperature
5-7	Position Sensor (Resolution)	12Bits Magnetic Coding (360° /4096)

6. The Drawings


MINI STEPPER MOTOR
14mm
P/N: MSR-2360-S000

General specification

Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	$\pm 5\%$ full step, no load
Radial Play	0.02mm@450 g
Axial Play	0.08mm@450 g
Max. radial force	3.9N 20mm from the flange




ULTRA SLIM MOTOR
66mm
P/N: MRR-2381-S000

SPECIFICATION

STEP ANGLE	1.8°/full step		
STEP ANGLE ACCURACY	±5%		
NUMBER OF PHASE	2		
RATED VOLTAGE	3.8 VDC		
RATED CURRENT	1.0 A		
RESISTANCE/PHASE	3.8±10% ohms@20°C		
INDUCTANCE/PHASE	2.0±20% mH@1kHz		
HOLDING TORQUE	600 g.cm		
PULL OUT TORQUE			
BACK EMF			
DETENT TORQUE			
ROTOR INERTIA	16.0 g.cm ²		
WEIGHT	95 g		
TEMPERATURE RISE	Less than 70K	AXIAL-FORCE	Fa=2N Max.
SOURCE VOLTAGE	24 VDC	DISTANCE	a=5 mm
INSULATION CLASS	E 120°C	RADIAL-FORCE	Fr=10N Max.
DIELECTRIC STRENGTH	500VAC 1MIN		
INSULATION RESISTANCE	100Mohm @500VDC	SHAFT RADIAL PLAY	0.02mm Max. @4N
P CODE	IP30	SHAFT AXIAL PLAY	0.08mm Max. @4N
OPERATION AMBIENT	Ambient temperature:-20...+50°C, humidity Max. 85%(No condensation)		
STORAGE AMBIENT	Ambient temperature:-20...+85°C, humidity Max. 85%(No condensation)		

CW

紅 +A	Step	0	+	-	+	-
藍 -A	1	-	+	+	-	-
綠 +B	2	-	+	-	-	+
黃 -B	3	+	-	-	+	+
	4	+	-	+	-	-

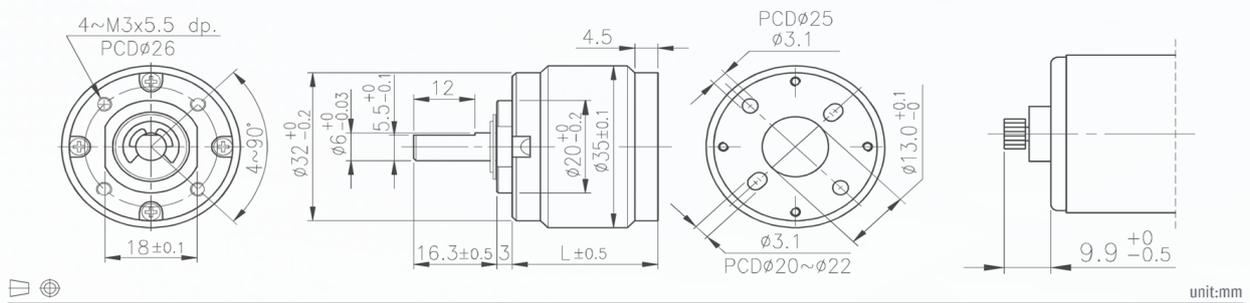
UNLESS OTHERWISE SPECIFIED	DESIGN	DATE	P/N.	TITLE	Specifications
TOLERANCES	CONTR.	CHECK		USED ON	
DECIMALS: .x ±0.5		APPD		DWG NO.	REV
ANGULAR: .xx ±0.25					
.xxx ±0.1	FIRST ANGLE PROJECTION	SCALE	NTS		
UNIT: mm		SHEET	OF		
DO NOT SCALE DRAWING					



PLANETARY GEARBOX

35mm

P/N: MGD-1410S000

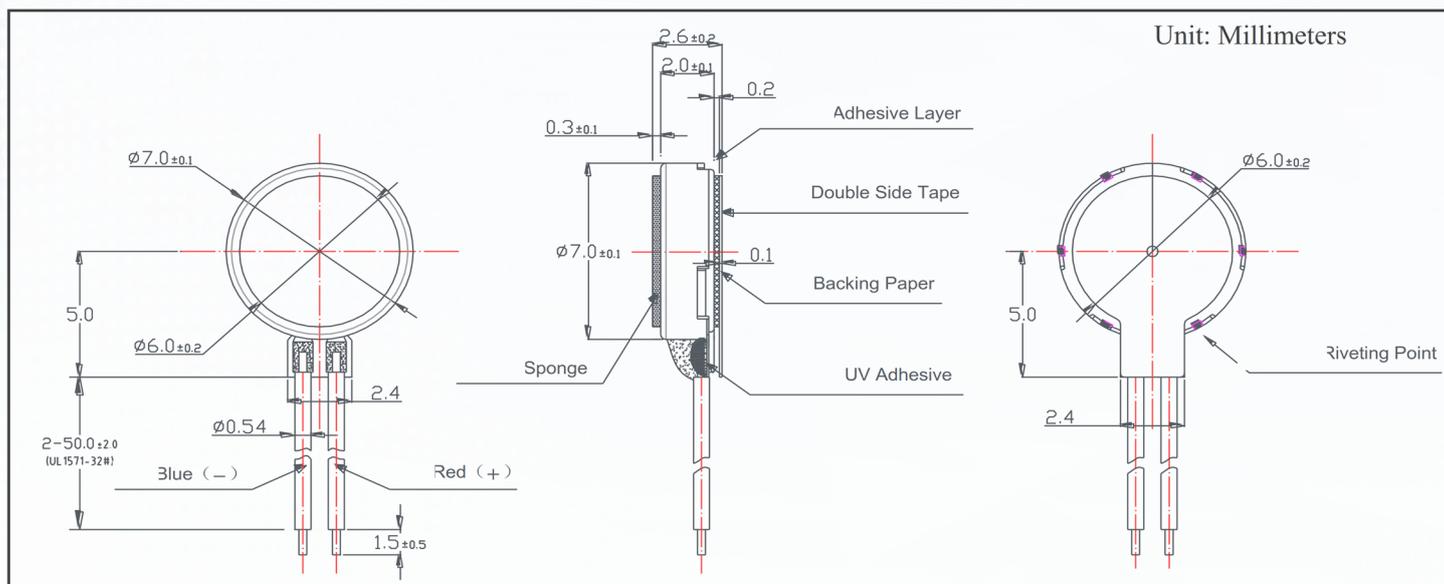


Housing material	Bearing at output	Radial load (10mm from flange)	Shaft axial load	Shaft press fit force, max.	Radial play of shaft	Thrust play of shaft	Backlash, at no-load
Powder Metal	Sleeve bearings	≤ 3 kgf	≤ 2.5 kgf	≤ 10 kgf	≤ 0.08 mm	≤ 0.3 mm	$\leq 2.5^\circ$
Powder Metal	Ball bearings	≤ 3.5 kgf	≤ 2.5 kgf	≤ 10 kgf	≤ 0.05 mm	≤ 0.3 mm	$\leq 2.5^\circ$

Module	No. of teeth	Pressure angle	Hole diameter	Reduction ratio
0.5	11	20°	ϕ 2.28, ϕ 2.48, ϕ 2.98, ϕ 3.16	1/5, 1/19, 1/27, 1/71, 1/100, 1/139, 1/264, 1/516, 1/721
0.5	17	20°	ϕ 2.28, ϕ 2.48, ϕ 2.98, ϕ 3.16	1/4, 1/14, 1/51, 1/189

Reduction ratio	1/4	1/5	1/14	1/19	1/2	1/51	1/71	1/100	1/139	1/189	1/264	1/516	1/721
Rated tolerance torque	2.0	2.0	4.0	4.0	6.0	8.0	8.0	10.0	1.0	12.0	12.0	12.0	12.0
Max momentary tolerance torque	6.0	6.0	12.0	12.0	18.0	24.0	24.0	30.0	30.0	36.0	36.0	36.0	36.0
Efficiency	80%	80%	70%	70%	70%	60%	60%	60%	60%	50%	50%	50%	50%
Length (L)	22.1	22.1	28.5	28.5	28.5	34.9	34.9	34.9	34.9	41.3	41.3	41.3	41.3
Weight (g) /Sleeve bearings	109	109	143	143	143	177	177	177	177	211	211	211	211
Weight (g) /Ball bearings	108	108	142	142	142	176	176	176	176	210	210	210	210

Operating relative humidity 20%~85%RH Operating temperature range -10°C~+60°C


VIBRATION COIN LRA MOTOR
P/N: MHI-1820-S000


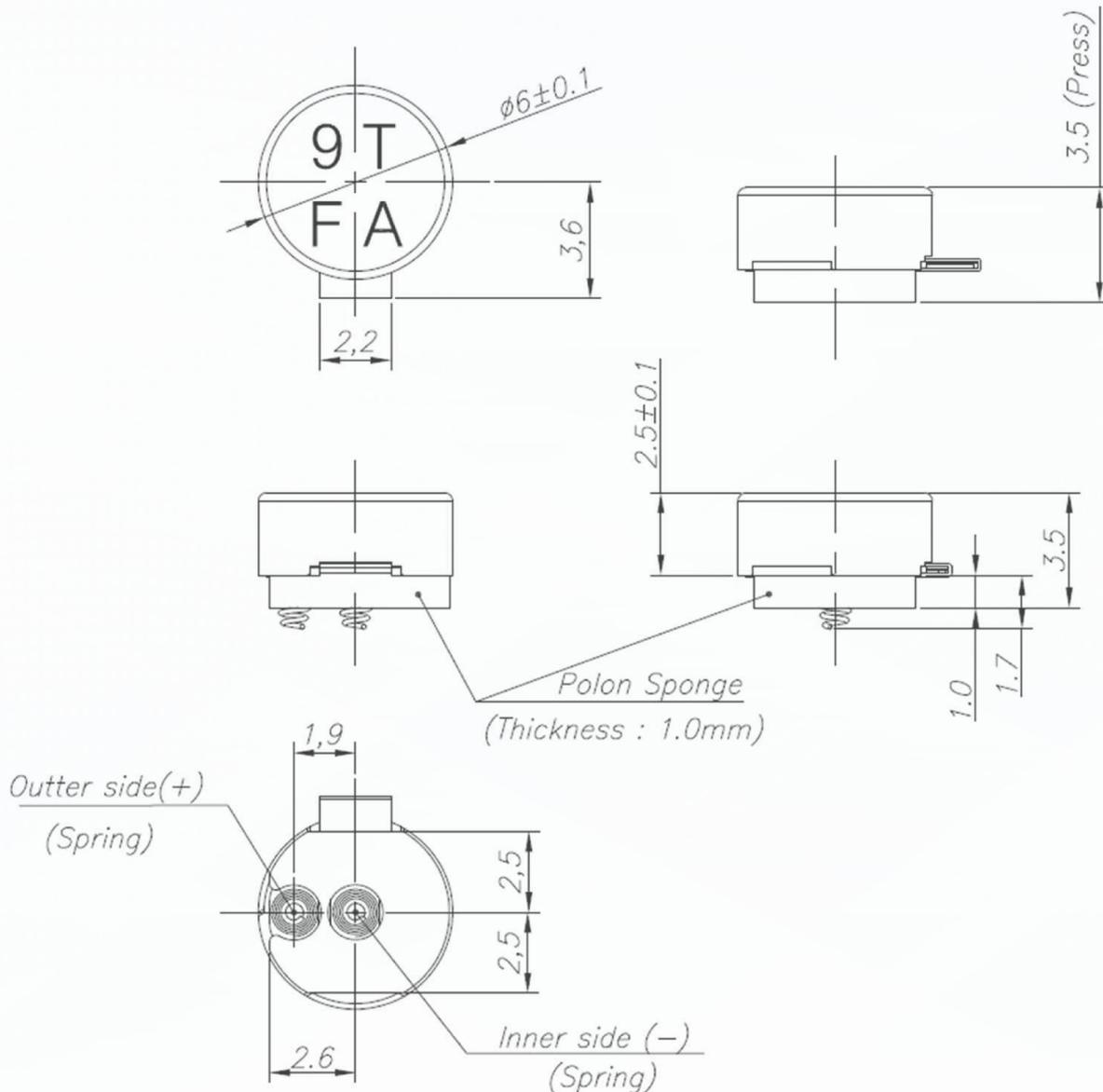
(Electrical Characteristic)

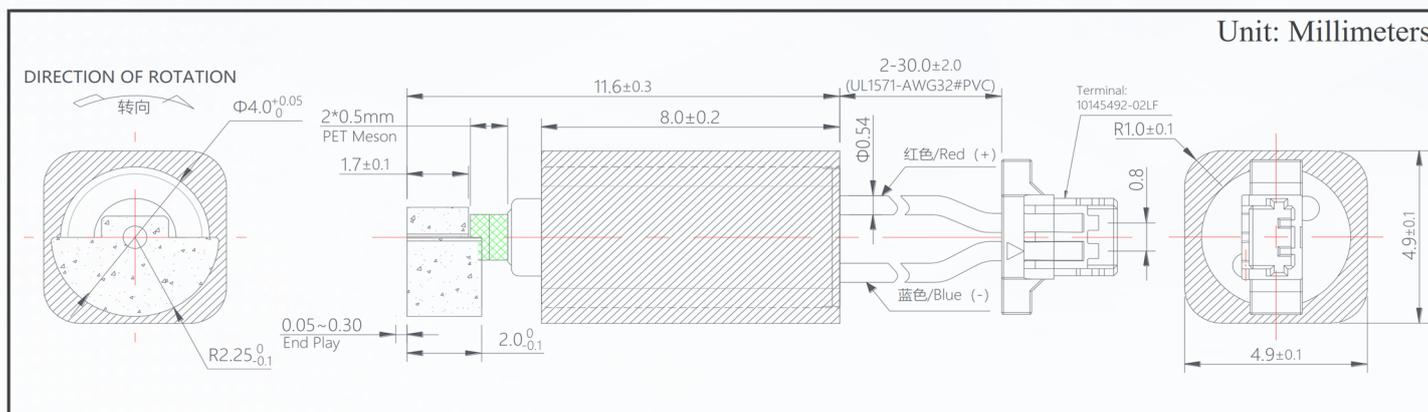
No	(Item)	(Specifications)	(Remark)
1	Model Number	WFCMV0720V3.0S10000L50	
2	定电压 Rated Voltage	3.0V DC	
3	Voltage Range of Use	2.7~3.3V DC	
4	Rotation Direction	/CW or CCW	
5	The Use of Temperature Range	-10℃~50℃ ≤60%RH	
6	Rated Current	≤90mA	At rated voltage and rated load.
7	Rated Speed	10000± 2000 rpm/min	
8	Starting Voltage	≤2.2 V	At rated load any position of load
9	Starting Current	≤120mA	
10	缘电阻 Insulation Resistance		10MΩ At DC 100V between lead wire and case.
11	Coil Resistance	Single phase :30±15% Two phase :56±15%	At 25 °C, Test between the two touch pins
12	Weight	约 0.6g (About 0.6g)	

COIN VIBRATION MOTOR
6.0mm
P/N: MHB-1721-S000

Specification

- 1) Rated speed : 18,000 ± 3,500 rpm
- 2) Rated voltage : 3.0V
- 3) Rated current : 90 mA Max
- 4) Locked current : 120 mA Max
- 5) Starting voltage : 2.6 V Max



CYLINDRICAL VIBRATION MOTORS
4.90mm
P/N: MHI-1845-S000


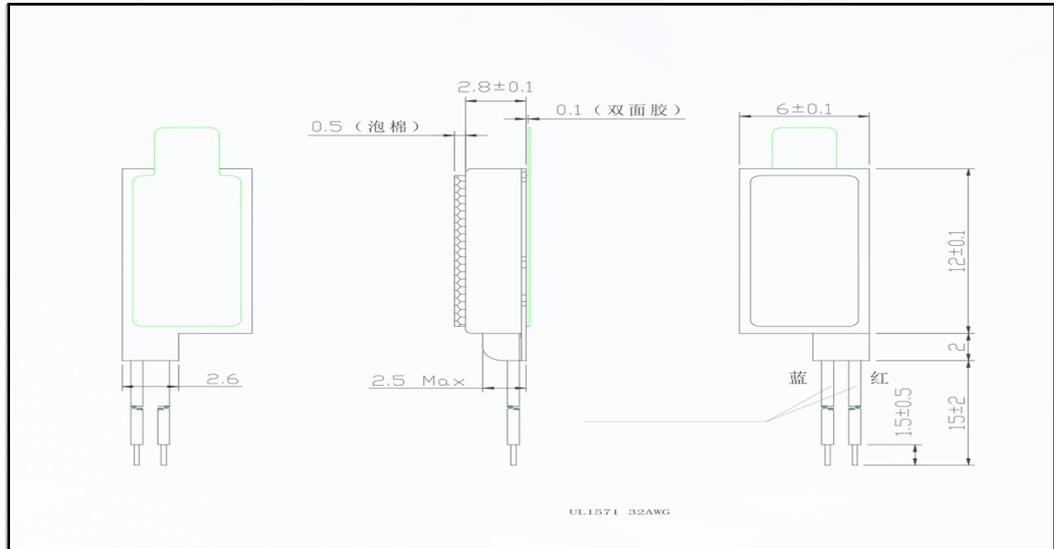
Unit: Millimeters

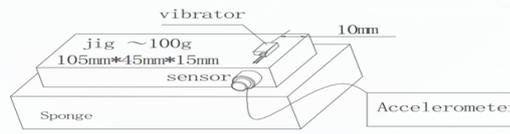
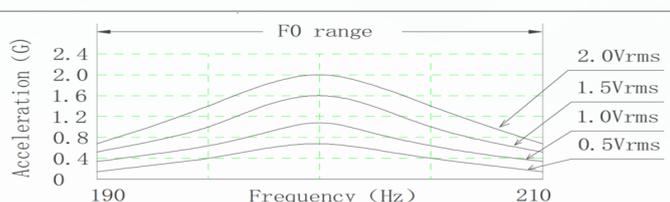
Electrical Characteristic

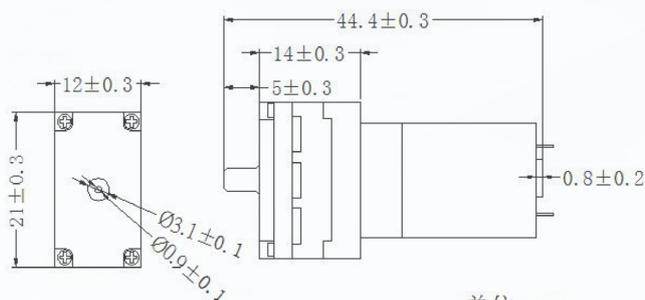
No	Item	Specifications	Remark	
1	Rated Voltage	1.8V DC		
2	Operating Voltage	1.5~3.7V DC		
3	Rotation Direction	CW		
4	Operating Conditions	-10℃~60℃ ≤60%RH		
5	No Load Current	50 mA Max	Nominal: 26mA	Without Counter-Weight
6	No Load Speed	14500 ± 12% Rpm/min	14259rpm	
7	Rated Current	60 mA Max	Nominal: 32mA	With Counter-Weight
8	Rated Speed	9500 ± 2500 Rpm/min	9280rpm	
9	Rated Load	Counter-Weight		
10	Counter-Weight Details	Material	Tungsten Alloy	
		Size	R2.25*L2.0 mm	
		Mass	0.26 g	
		Centroid Radius	0.781 mm	
11	Vibration Acceleration	1.9 m/s ²	with 100g jig	
		0.19 G		
12	Stall Current	44 mA Max	At rated voltage	
13	Starting Voltage	0.8V DC	In any one position, voltage slowly rises	
14	Terminal Resistance	41 ±5%Ω	Measure between two terminals	
15	Insulation Resistance	10MΩ	Measure between the wires and the shell	
16	Appearance	No any damage		
17	Motor Weight	About 0.8g		
18	Clearance between shafts	0.05~0.30mm		

RECTANGULAR X-AXIS LRA
6X12mm
P/N: MHI-6440-S000


Outline drawing



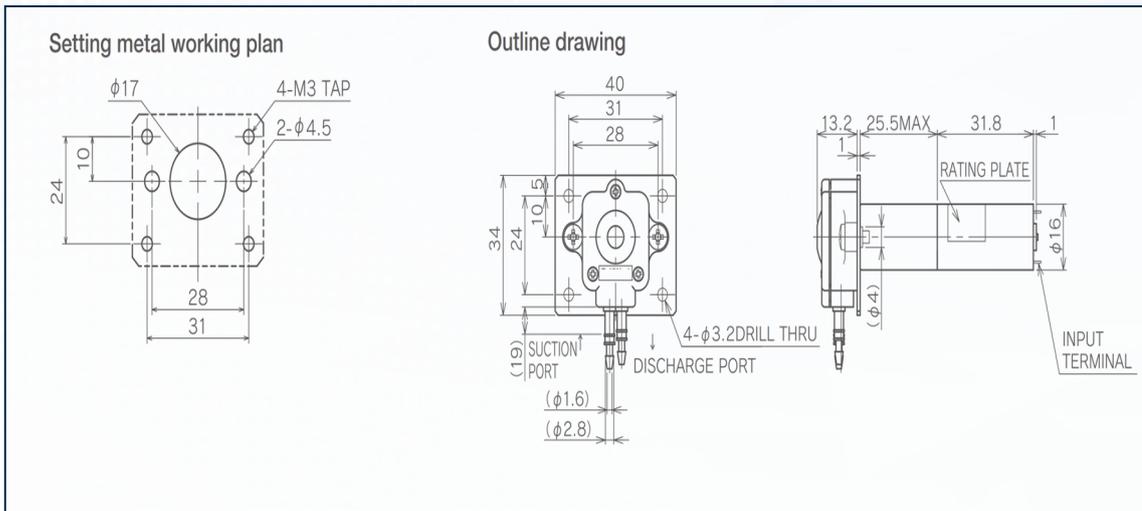
Items	Conditions
Operating temperature Range	-20 Celsius ~ +60 Celsius -20°C~+60°C
Storage temperature Range	-30 Celsius ~ +70 Celsius -30°C~+70°C
Operating humidity Range	Humidity: 10~90%RH 10~90%RH.
Storage humidity Range	Humidity: 5~95%RH 5~95%RH
Measuring conditions	
Items	Conditions
Ambient temperature	20±5°C
Ambient humidity	65 RH±20%
Rated voltage	AC 2.0±0.05 Vrms Sine wave, 200Hz 
Input voltage range	AC 0~2.05 Vrms Sine wave
Measurement reference	Refer to the figure below to fix the vibrator and acceleration sensor, and then input the rated voltage for measurement 
Voltage-Acceleration Characteristics	


MICRO AIR PUMP
P/N: MMA-3655-S000


单位: mm

Technical Specification

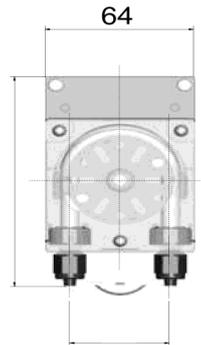
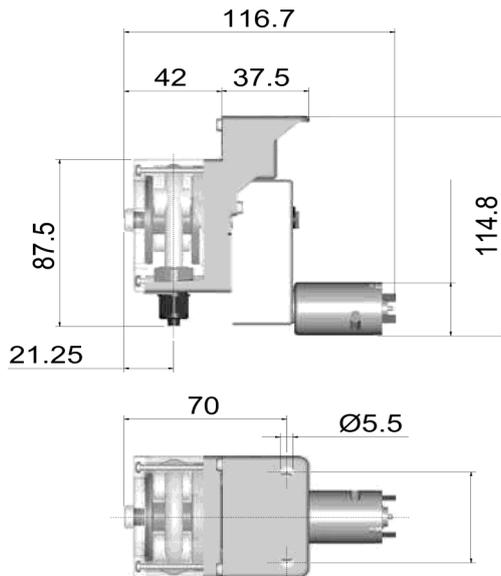
Voltage	DC3.0V	DC6.0V	DC9.0V	
Current	<330mA	<130mA	<100mA	
Air Flow Rate	0.5-1.0LPM			
Pressure	400mmHg			
Leakage	Connected with 100cc container, stop inflation when pressure reach to 280±10mmHg, keep 30s the pressure reduction less than 3mmHg/min			
Media	Air			
Life cycle	Connected with 100cc container, working 10s, stop 5s, lifecycle over 30,000times.			
Working Temperature	5°C ~55°C			
Product N.W	15g			
Packing	Internal Package	114PCS/Pallet	49g	335*250*30mm
	Outer Package	912PCS/CTN	335g	355*275*190mm
Noise	Place the pump under the 5cm sponge pad, away from the noise meter 30cm (<58dB)			
Application	Mainly used for wrist blood pressure monitor, personal medical care device, household appliances and other products.			


TUBE PUMP
16mm MOTOR
P/N: MHI-2520-S000

Characteristics / Specification DC24V

FLOW COVER RANGE	0.9 ~ 11ml/min
FLOW PER ROTATION	0.038ml/r
APPLICABLE TUBE	P-OLEFIN TUBE S-SILICONE TUBE
CONNECTING TUBE	INSIDE DIAMETER: $\phi 2$ mm
DISCHARGE PRESSURE	0.03MPa

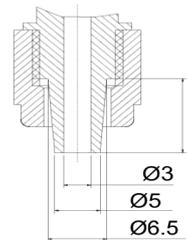
MODEL	FLOW (ml/min)		
HP1 (24V)	0.9	4.4	11
WEIGHT (g)	82	78	78

PERISTALTIC PUMP
64mm
P/N: MPO-4660-S000

DIMENSIONS:


PUSH-ON HOSEBARB	A
ID. 4.8	Ø 6,7
ID. 6,4	Ø 8,7
ID. 8	Ø 10,1

SCREW-FIT HOSEBARB
HOSE MIN Ø 3.2
HOSE MAX Ø 6.4


CHARACTERISTICS

- Power supply DC 12/24 Volt.
- Hosing available in silicone or Santoprene (food applications)
- Adjustable speed or dosing time via trimmer setting

SETTING HOSE
Ø 4,8 X 8
Ø 6,4 X 9,6
Ø 7,5 X 10,7

TECHNICAL DATA

- The RPMs are for reference only, using water.
- Pump injection in-line pressure: approximately 1 bar

24V DC (ml/min)

Ø HOSE	10RPM	25RPM	48RPM
4,8 X 8,0	32	59	125
6,4 X 9,6	44	84	168

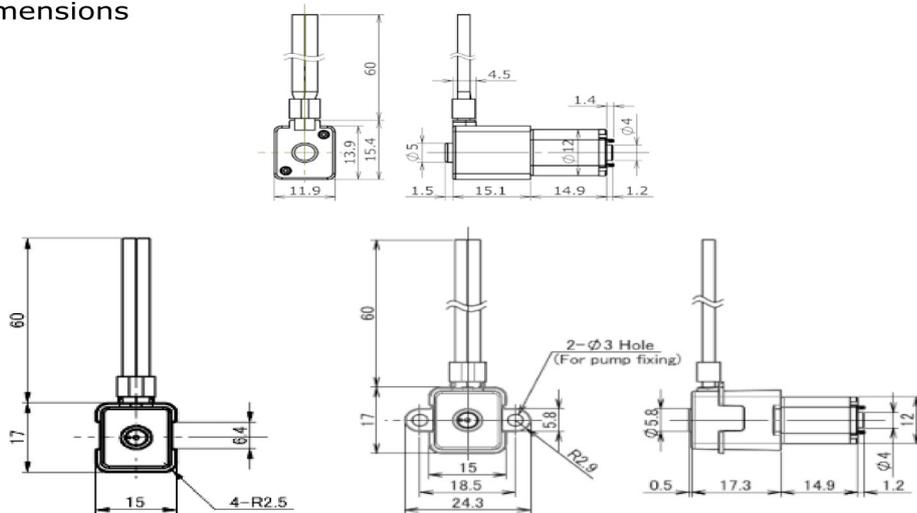
- Variable output flow-range from 10 ml/min to 585 ml/min
- Hoses and barbs are produced in materials suitable to the contact with foods.
- Compliant with RoHS directive 2011/65/EU

ULTRA MINIATURE PUMP
P/N: MPO-1721-S000

Fingertop Size Peristaltic Pump
Features

- Compact dimensions.
- Discharge rates of up to 3.0 mL/min.
- DC motor driven and low power consumption.
Can be operated by batteries 3VDC.
- Easily replaceable pump head .
- Tubing options of Silicone or Tygon®A-60-F or SWFT • Pump head may be sterilized.

※Silicone tubing: Autoclavable one time at 121°C for 25 minutes./Gamma ray sterilization with 25 kGy.
SWFT tubing: Gamma ray sterilization with 25 kGy. (not autoclavable.)

Dimensions

Specifications

Motor	DC Motor	
Rated Voltage	3 VDC	
Power Consumption	< 0.4 W < 0.5 W)	
Weight	11 g	13 g
Pump Head Replacement	Impossible	Possible
Mounting Flange	None (optionally use mounting clip)	Equipped
Discharge Pressure	50 kPa	
Tube Material	Silicone (I.D. 1.5 × O.D. 2.5 mm), Tygon®A-60-F, SWFT (I.D. 1.2 × O.D. 2.5 mm)	Silicone (I.D. 1.5 × O.D. 2.5 mm), SWFT (I.D. 1.2 × O.D. 2.5mm)