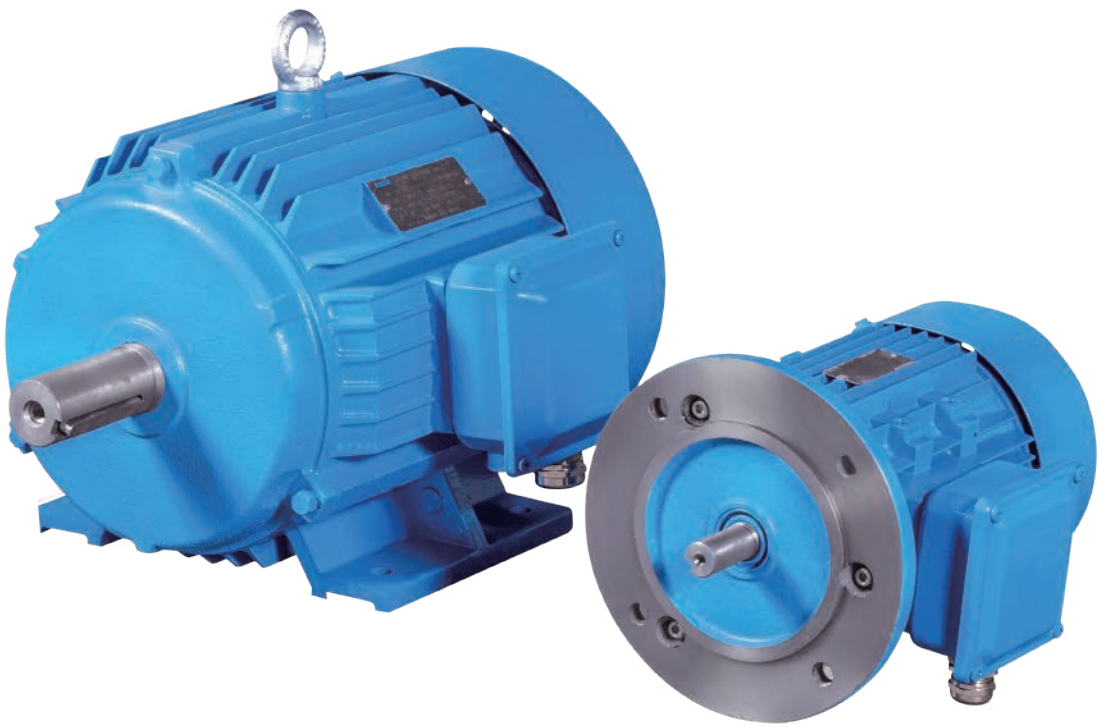
BONENG

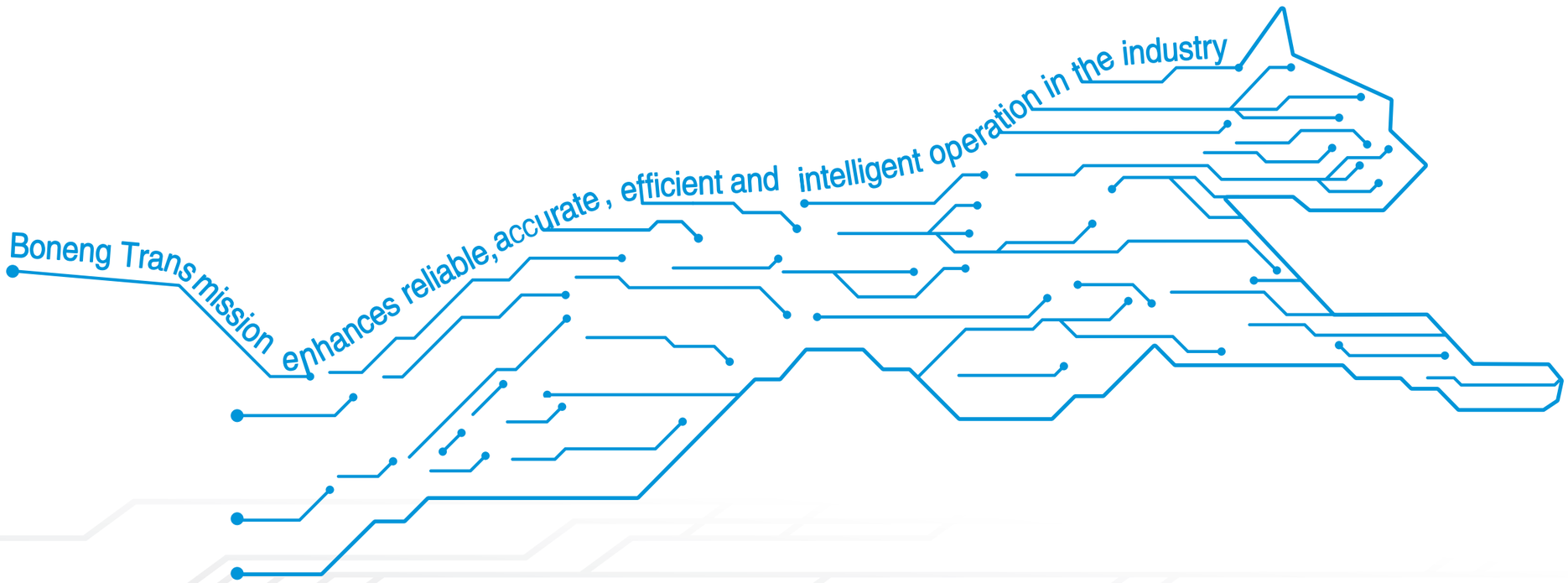


MA Three-Phase Asynchronous Motor NEMA Efficiency

Power: 0.12kW~90kW; Frame Size: 63~280

Modified date 11/2022
Selection Sample C05.0033-EN

Boneng Transmission



Controller/ Drive/ Motor/ Gearmotor/ Gearbox

Notes:

- The structure scheme,appearance diagram and other attached diagrams in sample are examples,there is no strict proportion requirement.(The unmarked dimension units are mm).
- The marked weight is average value, it has no constraint force.

⚠The following items must be strictly observed:

- To prevent accidents,all the rotation parts are added with protective covers by the purchaser according to the safety regulations of the nation and region.
- The instruction book must be read carefully before the test run.

Contents

1 Overview

BONENG NEMA efficiency three–phase asynchronous motor is a universal closed–fan cooling or forced–cooled three–phase asynchronous motor,the standard protection class IP55,the design and production in line with NEMA MG1,IEC60034–30–1 IE3 standards,production meets UL,CSA,IEC,GB and other relevant standards.Apply to continuous work system (S1),constant speed or speed within a certain range of frequency control applications,but also to meet most of the intermittent work (S2–S10),constant speed or speed within a certain range of frequency control applications.

1.1 Technical Design

- Frame material：H63–100：Die–casting aluminum；
  H112–280：grey cast iron；
- Rated power：0.12 kW–90 kW。
- Number of motor poles：4
- Motor efficiency：Meet the NEMA MG1,IEC 60034–30–1 IE3 efficiency level.
- Standard mounting structure：IMB3,IMB5,IMB14B,IM B35,IMB34B,etc.
- Motor Degree of Protection：Protection class IP55.
- Motor Insulation class：Insulation system designed according to the temperature level of 155 ℃ (F), by 130℃ (B) temperature level assessment, H–class insulation (optional)；The temperature rise limits are as follows (resistance method).

Insulation class	Temperature rise level（K）		
	Thermometer method	Resistance method	Embedded thermometer method
B	70	80	85
F	85	100	105
H	105	125	130

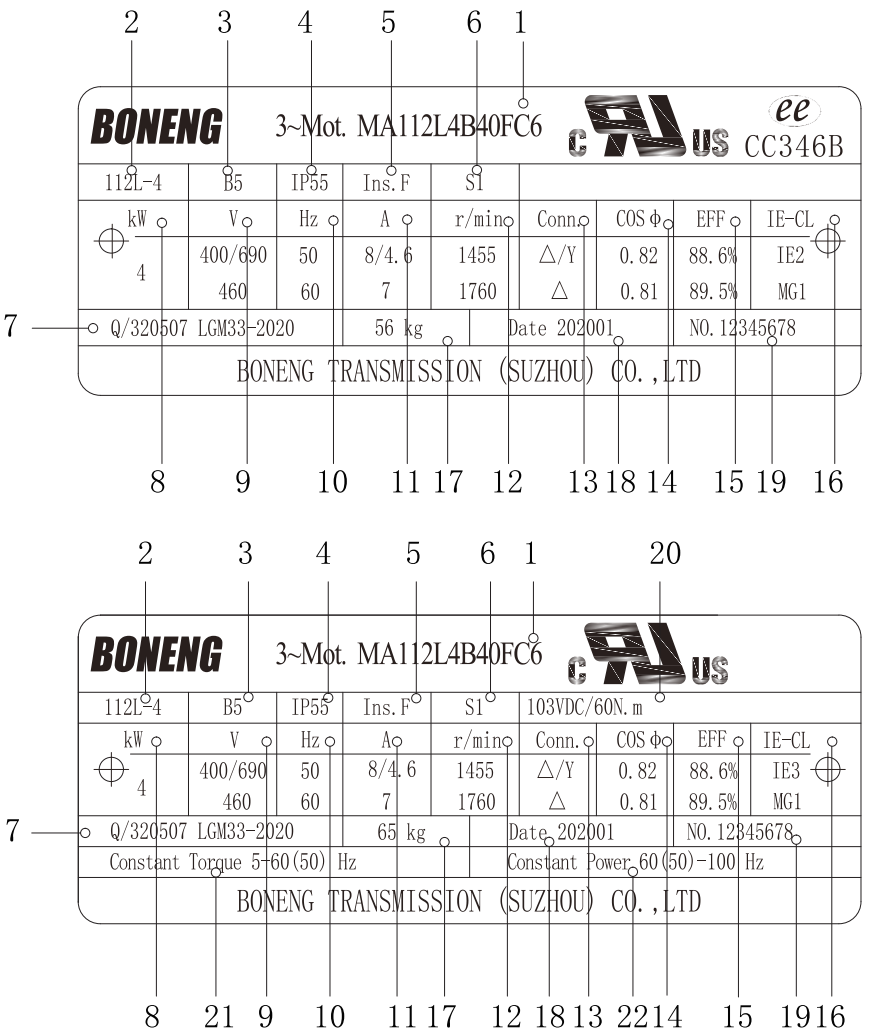
- Motor thermal protection：Optional PTC thermistor, thermal switch or PT100 temperature sensor for winding protection.
- Motor terminal box：From the motor tail,the standard position of the terminal box is on the left side of the frame,with the cable entry facing down. Terminal box location and cable entry can be selected according to the customer requirements.
- Motor terminal box cable entry：Motor cable entry H63–100 for one, H112–315 for two.
- Motor cooling method:Motor cooling is radial–flow fans cooled and provide the motor that independently drives fan for forced cooling and natural cooling.

1.2 Operating environment

- Motor standard operating environment
  - Operating altitude does not 1000m above sea level;
  - Allowable working environment temperature –20℃–40℃;
  - Permitted relative humidity:
    –20℃≤T≤20℃：100%
    20℃＜T≤30℃：95%
    30℃＜T≤40℃：55%
- For higher ambient temperatures and / or locations 1000 m above sea level, the specified motor output must be reduced by using the factor K_{HT}. The allowable power value:P_N’ ： P_N’ = $P_N \cdot K_{HT}$
  Factor K_{HT} for different side altitudes and / or ambient temperature

Ambient temperature / Altitude above sea level	＜30℃	30～40℃	45℃	50℃	55℃	60℃
1000 m	1.07	1	0.96	0.92	0.87	0.82
1500 m	1.04	0.97	0.93	0.89	0.84	0.79
2000 m	1	0.94	0.9	0.86	0.82	0.77
2500 m	0.96	0.9	0.86	0.83	0.78	0.74
3000 m	0.92	0.86	0.82	0.79	0.75	0.7
3500 m	0.88	0.82	0.79	0.75	0.71	0.67
4000 m	0.82	0.77	0.74	0.71	0.67	0.63

1.3 Nameplate information



1. Motor type (specification)
2.Frame size
3. Type of construction
4. Degree of protection
5. Insulation Class
6. Duty
7. Enterprise standard
8. Rated power
9. Rated voltage
10. Rated frequency
11. Rated current
12. Rated speed
13. Winding connections
14. Power factor
15. Efficiency
16. Energy efficiency class
17. Weight
18. Date of manufacture
19. Number of manufacture
20. Braking voltage / torque
21. Constant torque Range
22. Constant power Range

1.4 Motor Energy Efficiency

According to standard NEMA MG1 and IEC60034-30-1

Power	IE3-60Hz				MG1-60Hz			
	4P		6P		4P		6P	
	Nominal efficiency	Minimun efficiency	Nominal efficiency	Minimun efficiency	Nominal efficiency	Minimun efficiency	Nominal efficiency	Minimun efficiency
0.12	66	60.90	64	58.60	/	/	/	/
0.18	69.5	64.93	67.5	62.63	/	/	/	/
0.25	73.4	69.41	71.4	67.11	/	/	/	/
0.37	78.2	74.93	75.3	71.60	/	/	/	/
0.55	81.1	78.27	81.7	78.96	/	/	/	/
0.75	85.5	83.33	82.5	79.88	85.5	82.5	82.5	80
1.1	86.5	84.48	87.5	85.63	86.5	84	87.5	85.5
1.5	86.5	84.48	88.5	86.78	86.5	84	88.5	86.5
2.2	89.5	87.93	89.5	87.93	89.5	87.5	89.5	87.5
3.7	89.5	87.93	89.5	87.93	89.5	87.5	89.5	87.5
5.5	91.7	90.46	91	89.65	91.7	90.2	91	89.5
7.5	91.7	90.46	91	89.65	91.7	90.2	91	89.5
11	92.4	91.26	91.7	90.46	92.4	91	91.7	90.2
15	93	91.95	91.7	90.46	93	91.7	91.7	90.2
18.5	93.6	92.64	93	91.95	93.6	92.4	93	91.7
22	93.6	92.64	93	91.95	93.6	92.4	93	91.7
30	94.1	93.22	94.1	93.22	94.1	93	94.1	93
37	94.5	93.68	94.1	93.22	94.5	93.6	94.1	93
45	95	94.25	94.5	93.68	95	94.1	94.5	93.6
55	95.4	94.71	94.5	93.68	95.4	94.5	94.5	93.6
75	95.4	94.71	95	94.25	95.4	94.5	95	94.1
90	95.4	94.71	95	94.25	95.4	94.5	95	94.1
110	95.8	95.17	95.8	95.17	95.8	95	95.8	95
150	96.2	95.63	95.8	95.17	96.2	95.4	95.8	95
185	96.2	95.82	95.8	95.38	96.2	95.4	95.8	95
220	96.2	95.82	95.8	95.38	96.2	95.4	95.8	95
250	96.2	95.82	95.8	95.38	96.2	95.4	95.8	95
280	96.2	95.82	95.8	95.38	96.2	95.4	/	/
300	96.2	95.82	95.8	95.38	96.2	95.4	/	/
315	96.2	95.82	95.8	95.38	96.2	95.4	/	/
335	96.2	95.82	95.8	95.38	96.2	95.4	/	/
355	96.2	95.82	95.8	95.38	96.2	95	/	/
375	96.2	95.82	95.8	95.38	96.2	95	/	/
400	96.2	95.82	95.8	95.38	96.2	95	/	/
>400~1000	96.2	95.82	95.8	95.38	/	/	/	/

2 Mechanical design

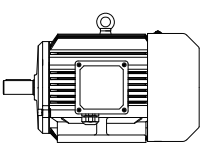
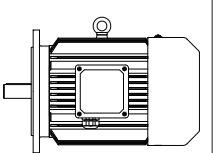
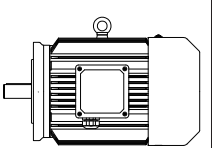
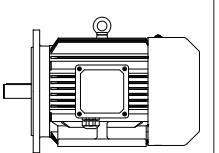
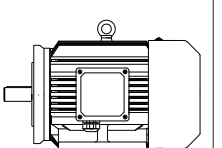
2.1 Terminal box

• The terminal box is self-rotating by 4x90 ° , allowing cables to enter in all directions. 63-80 motor terminal box has one cable entry using gland seal, 90-280 motor terminal box has two cable entries, one of the cable entry with gland seal, the other cable entry using plug seal.

• Motor terminal box technical parameters see the table below:

Frame size	Numbers of main terminals	Contact screw thread	Outer cable diameter (mm)	Cable entry size (gland +screwed plug)
63	6	M4	9~15	M25×1.5
71				
80				
90	6	M4	9~15	M25×1.5+M25×1.5
100	6	M4	9~15	
112	6	M5	14~20	M30×2+M30×2
132				
160	6	M6	18~24	M36×2+M36×2
180				
200	6	M8	24~32	M48×2+M48×2
225				
250	6	M10	37~44	M64×2+M64×2
280				

2.2 Type of construction

Basic construction	Frame with feet	Cover with flange	Cover with small flange	Cover with flange , Frame with feet	Cover with small flange , Frame with feet
Frame size	63-280	63-280	71-132	63-280	71-132
Mounting type	IMB3	IMB5	IMB14B	IMB35	IMB34B
Diagram					

2.3 Motor shaft end thread

Frame size	Drive end	Non-drive end
63	CM4L10/7.4	CM4L10/7.4
71	CM5L10/8.8	CM5L10/8.8
80	CM6L12/10.5	CM8L12/13.2
90	CM8L12/13.2	
100	CM10L15/16.3	
112		
132	CM12L20/19.8	CM10L15/16.3
160	CM16L25/25.3	CM16L25/25.3
180		
200-280	CM20L30/31.3	CM20L30/31.3

2.4 Bearing

BONENG motor is using deep groove ball bearings for the standard configuration, these bearings are sealed.Bearing specifications are as follows:

Frame size	Standard motor bearing specifications	
	Drive end	Non-drive end
63	6201-2Z/C3	6201-2Z/C3
71	6202-2Z/C3	6202-2Z/C3
80	6204-2Z/C3	6204-2Z/C3
90	6205-2Z/C3	6304-2Z/C3
100	6206-2Z/C3	6206-2Z/C3
112	6306-2Z/C3	6206-2Z/C3
132	6308-2Z/C3	6208-2Z/C3
160	6309-2Z/C3	6209-2Z/C3
180	6311-2Z/C3	6211-2Z/C3
200	6312-2Z/C3	6212-2Z/C3
225	6313-2Z/C3	6312-2Z/C3
250	6314-2Z/C3	6314-2Z/C3
280	6317-2Z/C3	6316-2Z/C3

Bearing life

The nominal bearing life can be calculated according to the standard calculation procedures specified in ISO 281. If the motor is operated under the conditions specified in this catalog, 90% or more of the bearings will reach the nominal life. Generally, the service life of a bearing depends on the bearing specification, bearing loaded, operating conditions, rotational speed, and grease life. When the motor is installed horizontally and without axial force, the bearing life of the motor can reach at least 40,000 hours. In the case of maximum allowable load, the life of the motor is at least 20,000 hours. The bearing life here refers to the normal operation of the motor at 60Hz.

When the motor is operating under abnormal conditions, the bearing life will be shortened. Such as the following situations:

- When the motor speed is higher than the rated speed, due to increased vibration of the motor, making the bearing subjected to additional radial and axial forces, resulting in reduced life expectancy;
- When the environment or equipment and other factors lead to increased vibration of the motor, the bearing will therefore be subjected to additional radial and axial forces, resulting in reduced life expectancy;
- When the ambient temperature increases 10 ℃,grease life and relubrication time will be cut in half.

2.5 Noise

Motor noise is divided into N level (general level), R level (first level), S level (excellent level) and E level (low noise level) four levels . R is lower than the level N level 5dB, S level is lower than the level N 10dB, E level lower than the level N 15dB. BONENG general series of motor noise values are lower than the N–class noise level.

◆ The noise value of A weighted sound power level measured when the motor synchronous speed is 1800r/min at no load:

Motor Power (KW)	Sound power level dB(A)
0.12	52
0.18	52
0.25	55
0.37	55
0.55	58
0.75	58
1.1	61
1.5	61
2.2	64
3	64
4	65
5.5	71
7.5	71
11	75
15	75
18.5	76
22	76
30	79
37	81
45	81
55	83
75	86
90	86

◆ A weighted sound power level noise increase measured when the motor synchronous speed is 1800r/min at load:

Motor Power (KW)	Sound power level dB(A)
≤11	5
>11～37	4
≥37～90	3

2.6 Vibration

Motor vibration levels are divided into N level (conventional level), R level (lower level) and S level (special level). BONENG motor rotors are half-key balancing, in line with N class IEC60034-14 vibration level. For applications requiring lower vibrations, we can offer motors with lower R or S vibration requirements.

Vibration level	Speed (r/min)	Frame size		
		63-132	160-225	250-280
N	600-3600	1.8mm/s	2.8 mm/s	3.5 mm/s
R	600-1800	0.71 mm/s	1.12 mm/s	1.8 mm/s
	>1800-3600	1.12 mm/s	1.8 mm/s	2.8 mm/s
S	600-1800	0.45 mm/s	0.71 mm/s	1.12 mm/s
	>1800-3600	0.71 mm/s	1.12 mm/s	1.8 mm/s

3 Electrical design

3.1 Voltage/Frequency

Voltage and frequency variations classifies into class A and class B. BOENNG NEMA motors are rated for class A and class B torque. In class A, the temperature is about 10 K higher than during normal operation.

Voltage/frequency deviation	Class A	Class B
Voltage deviation	±5%	±10%
Frequency deviation	±2%	+3%/-5%

3.2 Electrical parameter tolerances

- Efficiency η:Sees in 1.4 motor energy efficiency
- Power factor: (1 – cos ϕ) / 6
  Minimum absolute value:0.02
  maximum absolute value:0.07
- Slip rate: ± 20 % (When motor power <1kW,deviation ± 30% is allowed)
- Locked-rotor motor current: +20 %
- Locked-rotor torque: -15 %-+25 %
- Maximum torque: -10 %
- Rotational inertia: ± 10 %

3.3 Overload

BONENG NEMA motors can withstand 1.5 times the rated current at rated voltage and frequency for 2 minutes without damage.

3.4 Insulation system

BONENG NEMA efficiency motors insulation system with reliability, durability and long life, impact resistance and strong features. Motors standard design temperature is class F (155 ℃), optional temperature class H (180 ℃).

3.5 Duty

The duty is a description of some of the column load conditions that the motor is subjected to, including starting, electric brake, no-load, downtime , power-off, duration and sequencing. Work system is divided into 10 categories, see the table below:

Duty	Meaning
S1	Continuous duty: Constant load operation, the motor reaches the state of thermal stability.
S2	Short-time duty: constant load for a predetermined limited time, and then stop the motor until it returns to ambient temperature.
S3	Intermittent periodic duty :start-up process has no effect on temperature rise. Run in the same series of work cycles.
S4-S10	Intermittent duty: Start-up process has an impact on temperature rise, operation consists of a series of the same cycle, each cycle includes the dead load section and no-load and energy-cut section. It can use load continuation cdf and start and stop every hour to describe.

3.6 Load factor

Load continuity is the ratio of load duration to duty cycle duration. The duty cycle time is the sum of the running time plus the break time. Cdf= sum of one cycle run time / work cycle time * 100%. Our NEMA series motor work system are S1, if S1 working system motor use at S2 or S3 working system, allowing the output power should be the product of the rated power and power growth factor K. The growth factors are as follow:

Duty			Power growth factor K
S2	operation hours	60 mim	1.1
		30 min	1.2
		10 min	1.4
S3	load factor (cdf)	60%	1.1
		40%	1.15
		25%	1.3
		15%	1.4
S4-S10	In order to determine the rated power and working system, it is necessary to give start and stop numbers per hour, start and stop mode, load time, brake type, braking time and no-load power-off time.		Please consult separately

3.7 Degree of protection

BONENG NEMA motor protection strict implementation of IEC60034–5 related standards, our production of the motor protection is IP55 as a standard configuration, according to customer needs we can also provide a higher degree of protection of the motor.

IP	First characteristic numeral	Second characteristic numeral
	Protection against solid objects	Protection against liquid
0	No special protection	No special protection
1	Protected against solid objects greater than 50 mm	Protected against dripping water
2	Protected against solid objects greater than 12 mm	Protected against dripping water when tilted up to 15°
3	Protected against solid objects greater than 2.5 mm	Protected against spraying water
4	Protected against solid objects greater than 1 mm	Protected against splashing water
5	Dust-protected	Protected against water jets
6	Dust-tight	Protected against heavy seas
7	/	Protected against the effects of immersion
8	/	Protected against the effects of continuous submersion

4 Options

4.1 Cooling and ventilation

BONENG NEMA motors are equipped with a radial cooling fan as standard and their cooling performance is independent of the direction of rotation of the motor. For some applications, you can consider use separate drive fans such as:

- Motor is running at low speed, separately driven fan is recommended, so that the motor can be used efficiently.
- When the motor is operated at a speed obviously higher than the rated synchronous speed, it is also recommended to use a separate drive fan, which helps to reduce the motor noise.
- Cooling method:
  IC410 motor surface self–cooling
  IC411 motor surface self–fan cooling
  IC416 motor surface independent fan forced cooling
  With independent drive fan, you must select the appropriate fan parameter configuration according to needs.
- Independent fan technical data

Frame size	Type	Voltage(V)	Frequency (Hz)	Power(W)	Current(A)	Speed(r/min)
112	G112A	460	60	50	0.1	2730
132	G132A	460	60	50	0.1	2730
160	G160A	460	60	116	0.2	2730
180	G180A	460	60	120	0.2	1680
200	G200A	460	60	170	0.34	1680
225	G225A	460	60	180	0.4	1680
250	G250A	460	60	270	0.4	1680
280	G280A	460	60	500	0.8	1680

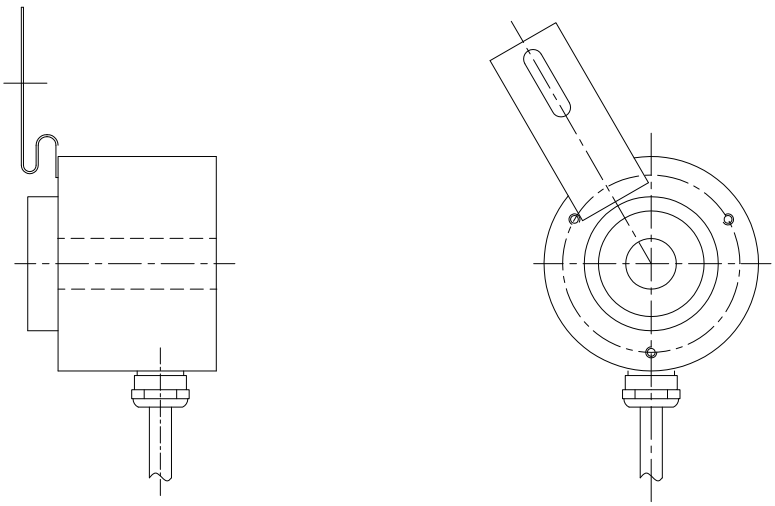
4.2 Encoder

BONENG NEMA motor can be connected with the encoder to achieve speed closed–loop control, the encoder has the characteristics of high resolution ,high control accuracy and reliable operation.

◆ Encoder electrical parameters

Encoder type	High performance encoder with HTL	High performance encoder with TTL
Voltage	10-30V	5-30V
Signal output form	push-pull	RS422
Resolution	1024	1024
Maximum output frequency	300KHz	300KHz
Working temperature	-20℃～70℃	-20℃～70℃
Degree of Protection	IP65	IP65
Output signal	A; A–; B; B–; O; O–; 0V; +V; GND	A; A–; B; B–; O; O–; 0V; +V; GND

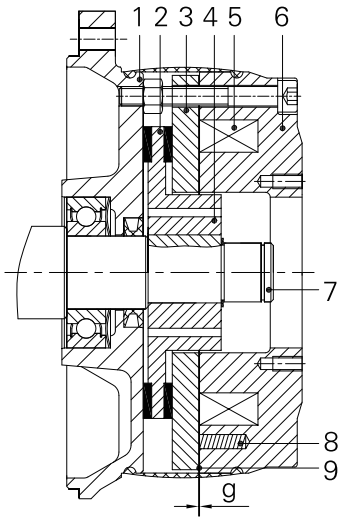
◆ Encoder machine dimension



4.3 Brake

According to user requirements, BONENG NEMA motors can installed an external brake device on the motor back end cover, the brake device is a DC coil excitation disc brake, electromagnetic force generated when the DC coil is energized acts on the spring to release the brake. Brakes are designed for loss of power and meet basic safety requirements. Brake can select mounted manual release handle or release screw to achieve mechanical release. Each brake is equipped with a rectifying device because the brake coil works with direct current. The device is used to change the power frequency current(single phase or two phase)provided by the outside through a simple bridge rectifier structure to the direct current to meet the working needs of brake coil, and supply it to the brake coil. Brakes are controlled by a control system that can be installed in the motor terminal box or in a power distribution cabinet.

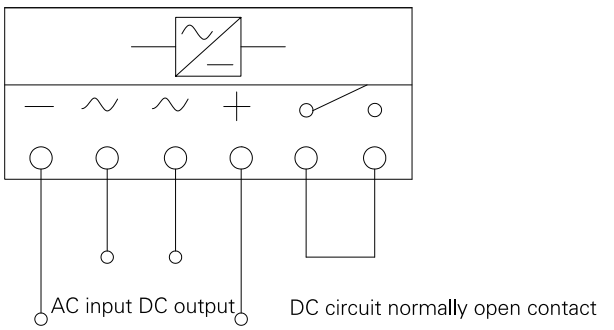
Brake structure principle is as follows:



1、Motor back end cover
2、Brake friction disk
3、Brake armature disks
4、Brake splined hub
5、Brake DC excitation coil
6、Brake stator
7、Motor shaft
8、Brake thrust spring
9、Brake air gap

- Braking fast brake（Preset normally open connacts）

  Using BONENG universal brake motors for applications such as hoisting gear or other applications that require brakes to minimize brake delay after motor has been powered down for immediate braking, BONENG motor to the brake configuration of the rectifier to provide users with a pair of rectifier DC circuit normally open contact, through the normally open contact of the control, you can easily and quickly achieve the rapid braking you want. Rectifier schematic diagram is as follows:



- Brake micro switch

  Brake micro switch provides a group of normally open and a group of normally closed switch signal used to detect the working status of the brake, the micro switch can feed back a switch quantity signal by detecting the working state of the brake. By processing the feedback switch signal, the brake can be effectively prevented from starting without releasing the motor, In this way, the brake working state monitoring and more effective protection of the motor.
- When the motor is selected for brakes, the corresponding accessory code must be selected according to the requirement; Brakes can provide different voltage configurations to meet user needs.
- Brake parameters:

Brake type	BN06	BN10	BN14	BN16	BN18	BN20	BN25	BN30
Brake torque (N.m)	4	16	60	80	150	300	600	1000
Brake power (W)	20	30	50	55	85	100	110	200
Rated gap (mm)	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.6
Maximum gap (mm)	0.5	0.5	0.75	0.75	1	1	1.25	1.5
AC brake voltage (AC-V)	230	230	230	230	230	230	230	230
DC brake voltage (DC-V)	103	103	103	103	103	103	103	103
Fit motor frame size	71	80-90	100-112	132	160	180	200-225	250-280
Brake actuation time (ms)	40	70	190	200	260	340	390	420
Slow brake releasing time (ms)	300	450	570	600	780	1650	2000	3000
Rapid brake releasing time (ms)	30	45	57	60	78	165	230	380

4.4 Motor thermal protection

Motor thermal protection refers to the temperature protection sensor or temperature detection sensor embedded in the motor stator windings or other appropriate place, so that motor will not be damaged due to overheating. Temperature sensor options are as follows:

- PTC thermistor temperature protection

  Three PTC thermistors are connected in series with each resistor buried in the motor three–phase winding end and leads from the terminal box, the user can according to the actual situation connected them to the frequency converter terminal drive or the thermorelay thermal relay to achieve the motor winding overheating protection. At present, the most commonly used motor winding overheating protection is the use of PTC thermistors installed in the motor windings for protection. The winding temperature can be accurately monitored due to the lower thermal capacity of the thermistor and its excellent thermal conductivity around the foot. When the limit temperature is reached (nominal trip temperature), there is a step change in the PTC thermistor resistance. After this change is captured by the trip device, the auxiliary circuit can be disconnected. PTC thermistor itself can't tolerate high current and high voltage, otherwise it will lead to damage to the semiconductor device. PTC thermistor and trip device switching hysteresis effect is small, so you can achieve rapid restart. For heavy load start, high start frequency, large load changes, high ambient temperature or power fluctuations and other applications, we recommended that the motor use this type of protection.

- Thermal switch temperature protection

  3 bimetal switches in series way to each switch are buried in the motor end of the three–phase winding and leads from the terminal box, bimetal switches provide the switch signal, the user can achieve the motor winding overheating protection based on the actual situation in the detection circuit.

- PT100 Thermistor Sensor Temperature Protection

  PT100 thermistor is a high preciseness, high sensitivity sensor with better linear temperature resistance than other resistive sensors with stable performance and high reliability.

- Moisture–proof heating protection

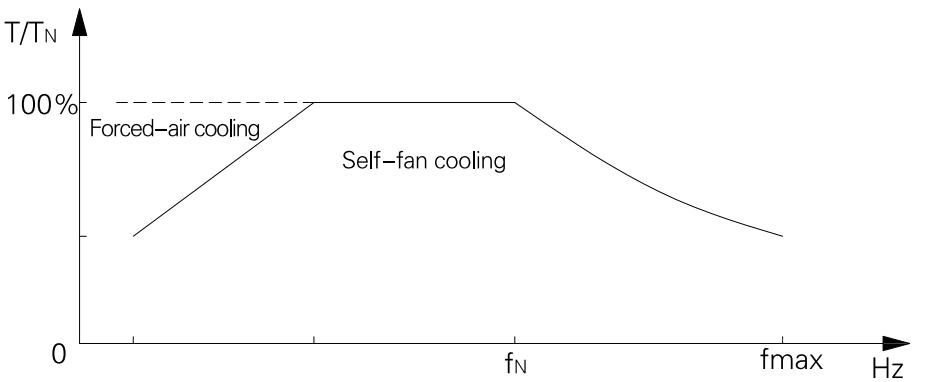
  When the motor is in a harsh environment, such as large humidity or relatively large temperature difference between day and night, the motor winding is likely to condensation phenomenon, which will bring the risk of motor burned. In this case, we advisable to configure the motor windings with moisture–proof heating belt. The motor must be in not working state when the Moisture–proof heating belt is in the working process; when the motor is down, moisture–proof heating belt must be started for the winding heating. Electrical parameters of moisture–proof heating belt are shown in the following table.

Electrical parameters of moisture–proof heating belt

Frame size	Power(W)	Voltage(V)
63～71	10	230
80～90	20	230
100～112	30	230
132～160	40	230
180～200	50	230
225～280	60	230

5 Frequency conversion applications

BONENG NEMA three–phase asynchronous motors are suitable for variable speed, constant speed. The motor can be driven by the inverter with a specific load. The load torque that the motor can withstand at different frequencies is shown in the figure below：



T：Output torque Tn：Rated torque fn：Rated frequency fmax：Maximum frequency

When the load torque is within the allowable torque range , the motor can be cooled by the self–fan ; when the load torque exceeds the allowable torque , the motor needs to be forced to cool . When the motor speed exceeds the rated speed ,the noise and vibration values will increase and the bearing life will be shortened.

The maximum safe speed allowed of the motor is as follows：

Frame size	4-pole	
	Maximum speed (r/min)	Maximum frequency (Hz)
63	3600	120
71	3600	120
80	3600	120
90	3600	120
100	3600	120
112	3600	120
132	2700	90
160	2700	90
180	2700	90
200	2250	75
225	2250	75
250	2250	75
280	2250	75

6 MA motor type designation

MA132L4B55 H C 6 – A 0 N 0 0 – 1 1 1

Cable entry location
1/2/3/4

Terminal box location
1/2/3/4

Mounting position
1/2/3/4/5/6

Degree of protection
0= standard configuration (IP55/F) 1= with rain cover J= with metal joint K= with metal joint and rain cover
4= IP65/with metal joint 5= IP65/with metal joint and rain cover

Thermal protection and heating protection
0= no winding protection 1= thermistor 2= thermoswitch 3= PT100 temperature sensor
4= heating belt 5= thermistor and heating belt 6= thermoswitch and heating belt
7= PT100 temperature sensor and heating belt

Brake
N= no brake A=220–240VAC brake D=220–240VAC brake with handle

Encoder
0= no encoder 4= high–performance TTL encoder (1024P) 1= high–performance HTL encoder (1024P)
2= standard encoder accessories

Cooling method
A= self–fan cooling F= forced–fan cooling (It must be chosen with encoder; otherwise, it is not advised to choose)

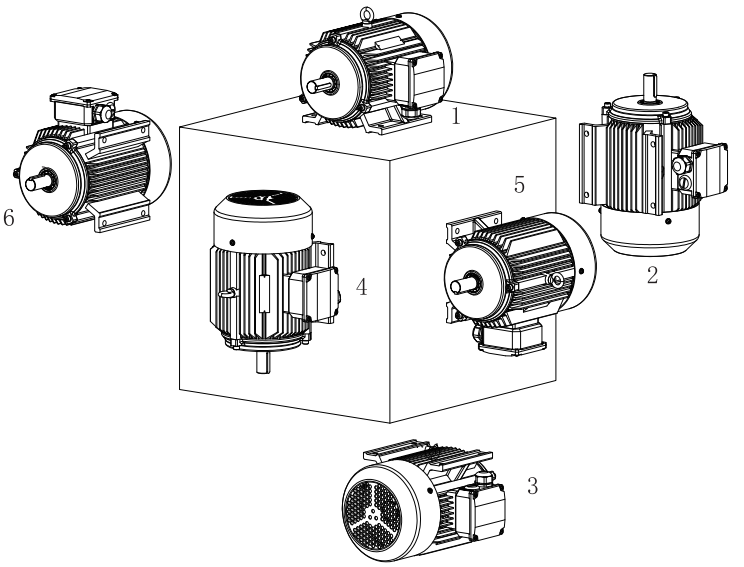
Frequency/ voltage	G=60Hz 230VY 8=60Hz 460VY	Frequency/ voltage	6=60Hz 460V△

Frame material
L=cast–aluminum(frame size≤100) C=cast–iron frame

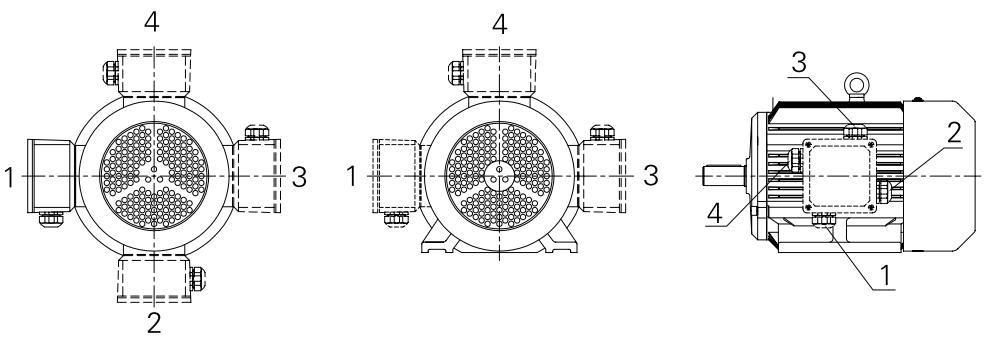
Type of construction	H=B3 foot-mounted F=B5 flange-mounted S=B14B flange-mounted	Type of construction	H=B3 foot-mounted F=B5 flange-mounted S=B14B flange-mounted (frame size≤132)

Power (kW)	MA=MG1 three-phase asynchronous motor with 4 poles	Power (kW)	MA=MG1 three-phase asynchronous motor with 4 poles
0.12	MA063M4**A12**…	4	MA112L4**B40**…
0.18	MA063M4**A18**…	5.5	MA132L4**B55**…
0.25	MA071M4**A25**…	7.5	MA132L4**B75**…
0.37	MA071M4**A37**…	11	MA160M4**C11**…
0.55	MA080M4**A55**…	15	MA160L4**C15**…
0.75	MA080M4**A75**…	18.5	MA180M4**C18**…
1.1	MA090M4**B11**…	22	MA180L4**C22**…
1.5	MA090M4**B15**…	30	MA200M4**C30**…
2.2	MA100M4**B22**…	37	MA225M4**C37**…
3	MA100M4**B30**…	45	MA225M4**C45**…
/	/	55	MA250M4**C55**…
/	/	75	MA280S4**C75**…
/	/	90	MA280M4**C90**…

Motor mounting position:



Motor terminal box and cable entry location(View Angle:motor tail):



Standard color of motor (RAL5015)

7 MA motor selection technical data

60Hz 230V 4P–1800r/min S1

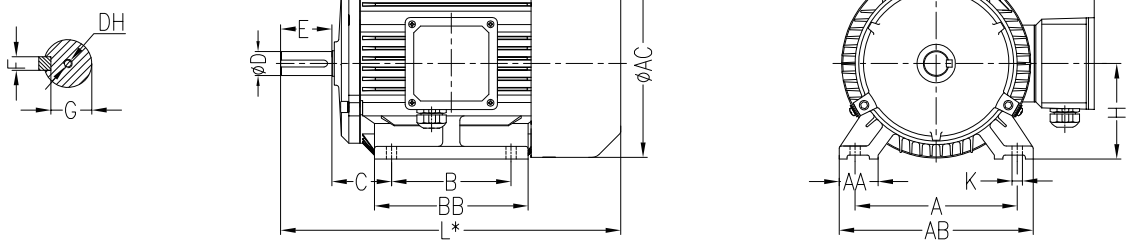
Frame size	P_N (kW)	U_N (V)	F_N (Hz)	Conn.	n_N (r/min)	T_N (N.m)	IE-CL	η(%)	COSΦ	I_N(A)	Tst/TN	Tmax/TN	Ist/IN	LwdB (A)	J (kg.m^2)
063M	0.12	230	60	Y	1680	0.7	IE3	66	0.63	0.75	3.1	3.5	4.2	53	0.00034
063M	0.18	230	60	Y	1685	1	IE3	69.5	0.66	1.05	3.1	3.5	4.5	53	0.00041
071M	0.25	230	60	Y	1695	1.4	IE3	73.4	0.7	1.3	3.1	3.3	5	53	0.00062
071M	0.37	230	60	Y	1695	2.1	IE3	78.2	0.71	1.8	3.2	3.3	5.3	53	0.00074
080M	0.55	230	60	Y	1740	3	IE3	82.5	0.73	2.5	2.9	3.2	6.7	56	0.00181
080M	0.75	230	60	Y	1745	4.1	MG1	85.5	0.72	3.1	3.7	3.5	7.9	56	0.00236
090M	1.1	230	60	Y	1750	6	MG1	86.5	0.75	4.4	2.9	3.2	7.5	59	0.00428
090M	1.5	230	60	Y	1745	8.2	MG1	86.5	0.75	5.9	3.4	3.1	7.8	59	0.00428
100M	2.2	230	60	Y	1760	12	MG1	89.5	0.8	8.2	2.6	3.5	8.4	64	0.011
100M	3	230	60	Y	1760	16.3	MG1	89.5	0.81	11.1	2.7	3.2	8.1	64	0.011

60Hz 460V 4P–1800r/min S1

Frame size	PN (kW)	UN (V)	FN (Hz)	Conn.	nN (r/min)	TN (N.m)	IE-CL	η(%)	COSΦ	IN(A)	Tst/TN	Tmax/TN	Ist/IN	LWdB (A)	J (kg.m^2)
063M	0.12	460	60	Y	1680	0.7	IE3	66	0.63	0.4	3.1	3.5	4.2	53	0.00034
063M	0.18	460	60	Y	1685	1	IE3	69.5	0.66	0.5	3.1	3.5	4.5	53	0.00041
071M	0.25	460	60	Y	1695	1.4	IE3	73.4	0.7	0.65	3.1	3.3	5	53	0.00062
071M	0.37	460	60	Y	1695	2.1	IE3	78.2	0.71	0.9	3.3	3.3	5.3	53	0.00074
080M	0.55	460	60	Y	1740	3	IE3	82.5	0.72	1.3	3	3.2	6.8	56	0.00181
080M	0.75	460	60	Y	1745	4.1	MG1	85.5	0.72	1.6	3.7	3.5	7.9	56	0.00236
090M	1.1	460	60	Y	1750	6	MG1	86.5	0.75	2.3	2.9	3.2	7.5	59	0.00428
090M	1.5	460	60	Y	1745	8.2	MG1	86.5	0.75	3	3.4	3.1	7.8	59	0.00428
100M	2.2	460	60	Y	1760	12	MG1	89.5	0.8	4.2	2.6	3.5	8.4	64	0.011
100M	3	460	60	Y	1760	16.3	MG1	89.5	0.81	5.6	2.7	3.2	8.1	64	0.011
112L	4	460	60	△	1760	21.7	MG1	89.5	0.81	7.3	2.4	3.1	7.6	65	0.0143
132L	5.5	460	60	△	1775	29.6	MG1	91.7	0.82	9.4	2.3	3.3	8.9	71	0.0382
132L	7.5	460	60	△	1765	40.6	MG1	91.7	0.84	12.7	2.2	2.8	7.9	71	0.0382
160M	11	460	60	△	1775	59.2	MG1	92.4	0.82	18.5	2.7	3.9	8.6	73	0.095
160L	15	460	60	△	1775	80.7	MG1	93	0.83	25	2.7	3.9	8.8	73	0.12
180M	18.5	460	60	△	1780	99.3	MG1	93.6	0.85	30	2.4	3.5	8.4	76	0.169
180L	22	460	60	△	1780	118	MG1	93.6	0.85	36	2.5	3.6	8.6	76	0.195
200M	30	460	60	△	1780	161	MG1	94.1	0.85	48.5	2.7	3.1	7.2	76	0.317
225M	37	460	60	△	1785	198	MG1	94.5	0.86	59	2.7	3.1	8.2	78	0.555
225M	45	460	60	△	1785	241	MG1	95	0.86	70.5	2.6	2.9	7.8	78	0.636
250M	55	460	60	△	1785	294	MG1	95.4	0.86	86.5	2.5	3	8	79	0.895
280S	75	460	60	△	1790	400	MG1	95.4	0.86	117	3	3.3	8.2	80	1.592
280M	90	460	60	△	1790	480	MG1	95.4	0.86	140	3.2	3.4	8.6	80	1.887

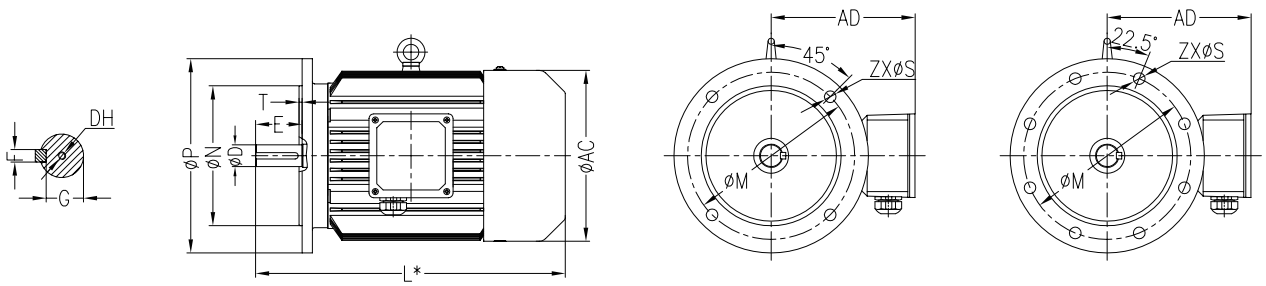
8 MA motor dimensions

B3 mounting construction



Frame size	No. of poles	Dimension (mm)														
		A	B	C	D	E	F	G	H	K	AA	AB	AC	AD	BB	DH
063M	4	100	80	40	11	23	4	8.5	63	7	35	124	124	113	102	CM4L10/7.4
071M	4	112	90	45	14	30	5	11	71	8	39	141	139	123	115	CM5L10/8.8
080M	4	125	100	50	19	40	6	15.5	80	10	40	165	159	167	132	CM6L12/10.5
090M	4	140	100	56	24	50	8	20	90	10	44	180	176	190	160	CM8L12/13.2
090M	4	140	125	56	24	50	8	20	90	10	44	180	176	190	160	CM8L12/13.2
100M	4	160	140	63	28	60	8	24	100	12	48	205	199	200	176	CM10L15/16.3
112L	4	190	140	70	28	60	8	24	112	12	45	230	220	220	180	CM10L15/16.3
132L	4	216	140	89	38	80	10	33	132	12	55	270	259	240	262	CM12L20/19.8
132L	4	216	178	89	38	80	10	33	132	12	55	270	259	240	262	CM12L20/19.8
160M	4	254	210	108	42	110	12	37	160	14.5	65	320	314	285	304	CM16L25/25.3
160L	4	254	254	108	42	110	12	37	160	14.5	65	320	314	285	334	CM16L25/25.3
180M	4	279	241	121	48	110	14	42.5	180	14.5	70	355	356	310	349	CM16L25/25.3
180L	4	279	279	121	48	110	14	42.5	180	14.5	70	355	356	310	397	CM16L25/25.3
200M	4	318	305	133	55	110	16	49	200	18.5	70	395	398	335	369	CM20L30/31.3
225M	4	356	286	149	60	140	18	53	225	18.5	75	435	446	370	393	CM20L30/31.3
225M	4	356	311	149	60	140	18	53	225	18.5	75	435	446	370	393	CM20L30/31.3
250M	4	406	349	168	65	140	18	58	250	24	80	490	485	380	445	CM20L30/31.3
280S	4	457	368	190	75	140	20	67.5	280	24	85	550	547	410	485	CM20L30/31.3
280M	4	457	419	190	75	140	20	67.5	280	24	85	550	547	410	536	CM20L30/31.3

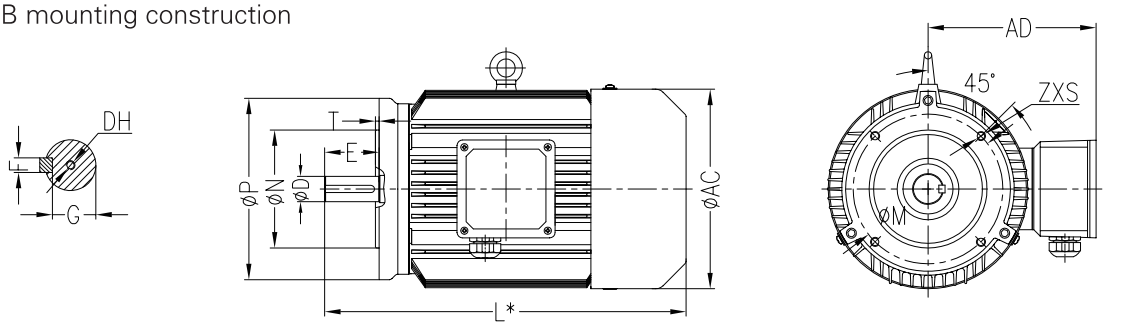
B5 mounting construction



63–200 225–280

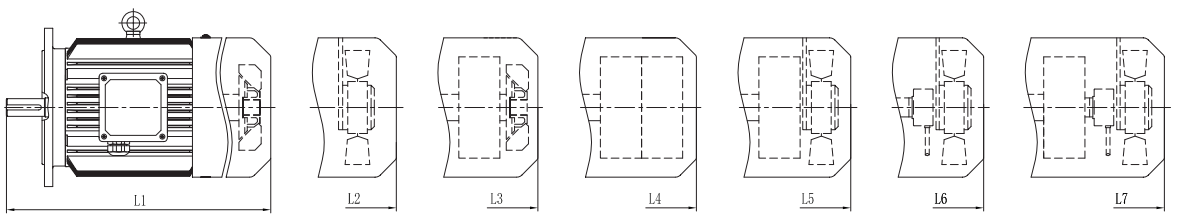
Frame size	No. of poles	Dimension (mm)												
		D	E	F	G	M	N	P	S	T	Z	AC	AD	DH
063M	4	11	23	4	8.5	115	95	140	10	3	4	124	113	CM4L10/7.4
071M	4	14	30	5	11	130	110	160	10	3	4	139	123	CM5L10/8.8
080M	4	19	40	6	15.5	165	130	200	12	3.5	4	159	167	CM6L12/10.5
090M	4	24	50	8	20	165	130	200	12	3.5	4	176	190	CM8L12/13.2
100M	4	28	60	8	24	215	180	250	14.5	4	4	199	200	CM10L15/16.3
112L	4	28	60	8	24	215	180	250	14.5	4	4	220	220	CM10L15/16.3
132L	4	38	80	10	33	265	230	300	14.5	4	4	259	240	CM12L20/19.8
160M	4	42	110	12	37	300	250	350	18.5	5	4	314	285	CM16L25/25.3
160L	4	42	110	12	37	300	250	350	18.5	5	4	314	285	CM16L25/25.3
180M	4	48	110	14	42.5	300	250	350	18.5	5	4	356	310	CM16L25/25.3
180L	4	48	110	14	42.5	300	250	350	18.5	5	4	356	310	CM16L25/25.3
200M	4	55	110	16	49	350	300	400	18.5	5	4	398	335	CM20L30/31.3
225M	4	60	140	18	53	400	350	450	18.5	5	8	446	370	CM20L30/31.3
250M	4	65	140	18	58	500	450	550	18.5	5	8	485	380	CM20L30/31.3
280S	4	75	140	20	67.5	500	450	550	18.5	5	8	547	410	CM20L30/31.3
280M	4	75	140	20	67.5	500	450	550	18.5	5	8	547	410	CM20L30/31.3

B14B mounting construction



Frame size	No. of poles	Dimension (mm)												
		D	E	F	G	M	N	P	S	T	Z	AC	AD	DH
071M	4	14	30	5	11	115	95	140	M8	3	4	139	123	CM5L10/8.8
080M	4	19	40	6	15.5	130	110	160	M8	3.5	4	159	167	CM6L12/10.5
090M	4	24	50	8	20	130	110	160	M8	3.5	4	176	190	CM8L12/13.2
100M	4	28	60	8	24	165	130	200	M10	4	4	199	200	CM10L15/16.3
112L	4	28	60	8	24	165	130	200	M10	4	4	220	220	CM10L15/16.3
132L	4	38	80	10	33	215	180	250	M12	4	4	259	240	CM12L20/19.8

MA motor length and weight

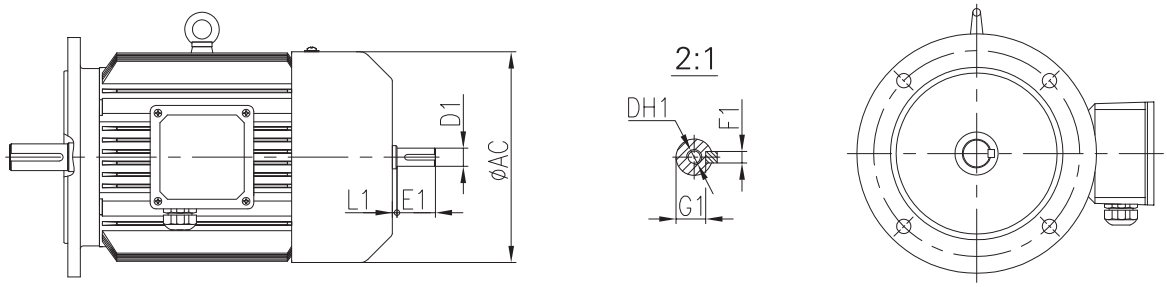


Forced–fan cooling | Brake+Self –fan cooling | Double brake | Brake+Forced –fan cooling | Encoder+Forced –fan cooling | Brake+Encoder+ Forced–fan cooling

Frame size	4-pole power (kW)	Motor length L* (mm)							Motor weight(kg)						
		L1	L2	L3	L4	L5	L6	L7	M1	M2	M3	M4	M5	M6	M7
063M	0.12	215	270	250	/	305	/	/	7	7.5	8.5	/	9	/	/
063M	0.18	215	270	250	/	305	/	/	8	8.5	9.5	/	10	/	/
071M	0.25	244	294	284	/	339	339	379	9	10	10.5	/	11.5	10.5	12.5
071M	0.37	244	294	284	/	339	339	379	10	11	11.5	/	12.5	11.5	13.5
080M	0.55	301	346	361	421	406	406	451	15	16	19	24	20	16.5	21
080M	0.75	301	346	361	421	406	406	451	16	17	20	25	21	17.5	22
090M	1.1	359	404	414	474	464	464	509	23	24	27	32	28	24.5	29
090M	1.5	359	404	414	474	464	464	509	23	24	27	32	28	24.5	29
100M	2.2	409	464	484	544	544	544	589	36	37	44	53	45	38	45
100M	3	409	464	484	544	544	544	589	36	37	44	53	45	38	45
112L	4	472	532	547	607	612	612	652	56	57	64	73	65	58	66
132L	5.5	541	606	621	686	691	691	721	88	90	99	112	101	91	102
132L	7.5	541	606	621	686	691	691	721	88	90	99	112	101	91	102
160M	11	645	695	740	790	795	795	830	129	131	150	172	151	132	152
160L	15	675	725	770	820	825	825	865	161	163	182	204	183	164	184
180M	18.5	706	751	816	871	861	861	901	200	202	232	267	233	203	235
180L	22	754	799	864	920	909	909	949	220	222	252	287	253	223	255
200M	30	797	807	912	927	937	937	987	280	280	330	383	328	281	330
225M	37	869	909	984	/	1024	1024	1064	345	347	395	/	396	349	398
225M	45	869	909	984	/	1024	1024	1064	365	367	415	/	416	369	418
250M	55	964	979	1104	/	1144	1144	1174	470	471	575	/	570	470	572
280S	75	1011	1041	1151	/	1191	1191	1231	630	632	735	/	733	633	735
280M	90	1062	1092	1202	/	1242	1242	1282	710	712	815	/	813	713	815

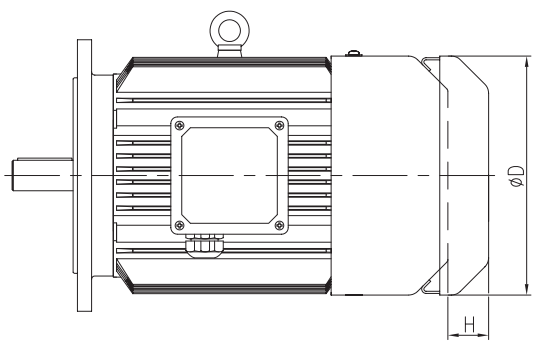
9 Dimensions of motor shaft projecting tail and rainproof cover

◆ Dimensions of motor shaft projecting tail



Frame size	Dimensions (mm)						
	D1	E1	F1	G1	L1		DH1
80	Please inquire						
90							
100							
112							
132							
160							
180							
200							
225							
250							
280							

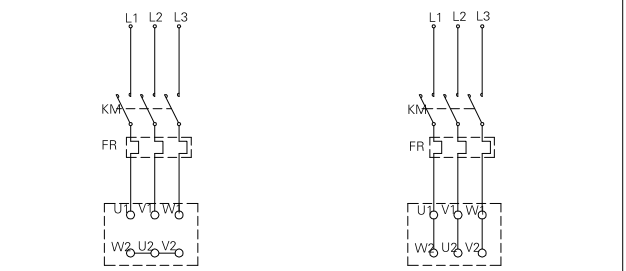
◆ Dimensions of rainproof cover

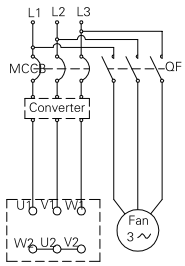


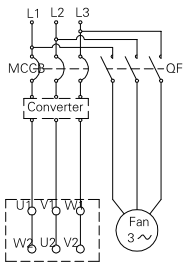
Frame size	H63	H71	H80	H90	H100	H112	H132	H160	H180	H200	H225	H250	H280
D	124	139	159	176	199	220	259	314	356	398	446	485	547
H	25	30	30	35	40	40	40	60	60	70	70	80	80

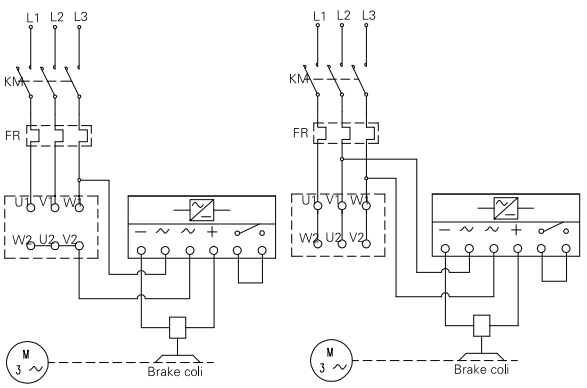
10 Electrical connection schematics

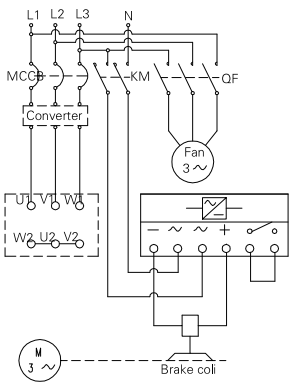
Basic wiring diagram	1）Self-fan cooling motor	2）Forced-fan cooling motor
Slow brake wiring diagram(factory standard)	3）Motor with brake	4）Forced-fan cooling motor with brake
Rapid brake wiring diagram(customer connection)		

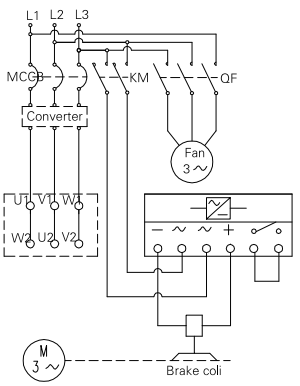


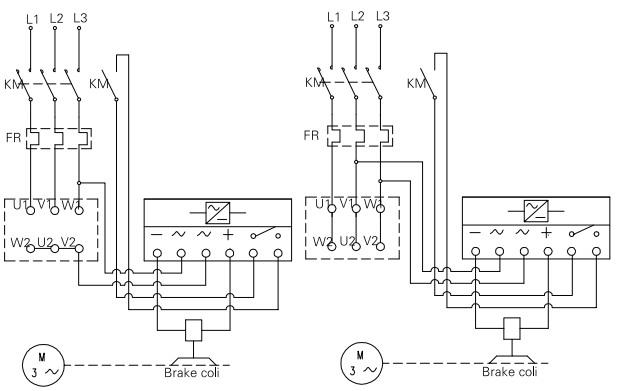


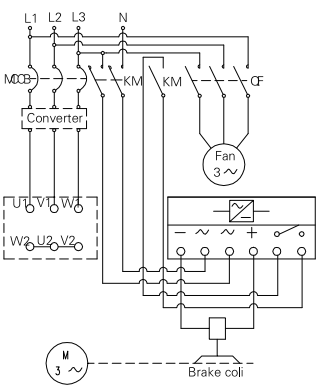


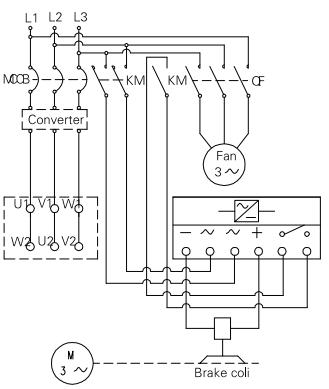












Along with the technology advancedet.,the product of the manual of Boneng will be changed,please forgive.

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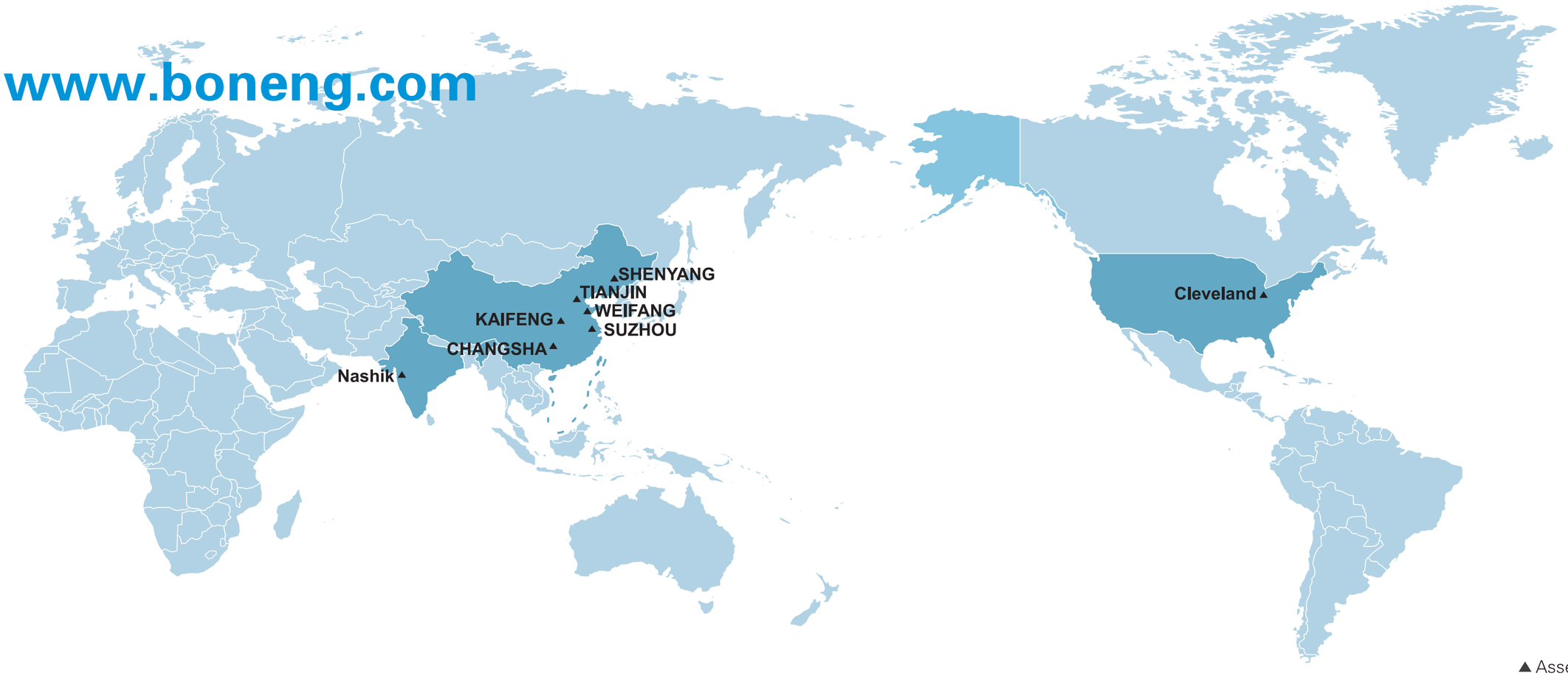

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