

TOSHIBA

Leading Innovation >>>

Low Voltage Three-Phase Squirrel-cage Induction Motor

TOSHIBA Top Runner Motor

Premium Gold Motor

PGM Premium
Gold Motor

Premium Efficiency for the Green Earth

High efficiency technology of TOSHIBA Motor for over 120-year-old brings more value to industrial products and terrestrial environment.



High efficiency technology inherited from the past created Premium Gold Motor (PGM)

In 1978, 83 years after Toshiba introduced the first domestic induction motor in 1895, we introduced a pioneering high efficiency motor, "Gold Motor." Since then, we have continued to comply many high efficiency motor regulations. Now, we have introduced a new era, premium efficiency motor, "Premium Gold Motor (PGM)" complied with the Top runner scheme.

- 1982 : JEM (Japan Electrical Manufacturers) -TR137 "Totally Enclosed Energy Saving Motors" was enacted.
- 1997 : Energy Policy Act took effect in the US.
- Jul. 2000 : JIS C 4212 "High Efficiency Low Voltage Three Phase Induction Motor" was enacted.
- Dec. 2010 : Energy Independence and Security Act (EISA) took effect.
- Jun. 2011 : EU Regulations (No. 640/2009) took effect.
- Sept. 2012 : China Energy Efficiency Goal Code of Practice (GB3 class) was revised.
- Oct. 2013 : A part of "Energy Saving Act" was revised in Japan.
- Non. 2013 : "Manufacturers' Criteria Regarding Improvement of AC Motors" was enacted by the notice of Ministry of Economy, Trade and Industry.
- Apr. 2015 : Top Runner scheme starts.

Meet the Top runner scheme and comply with IE3 of Japan's three ratings

PGM satisfies targeted standards of Energy Saving Act to start in 2015. PGM also achieved efficiency level IE3 (premium efficiency) set by JIS C 4034-30:2011 for 200V-50Hz, 200/220V-60Hz (as well as 400V class) in Japan.

230V-60Hz as standard to satisfy US high efficiency regulation

4 ratings (200V-50Hz, 200/220/230V-60Hz) are available as standard; 3 ratings for Japan (200V-50Hz, 200/220V-60Hz), 230V-60Hz for US. 230V-60Hz for US complies with Energy Independence and Security Act (EISA) and is certified by Conformity Certification No. (CC No.).

*Not satisfy UL standard.

Compatible with Toshiba standard efficiency motors in the same frame size

PGM has the same frame size as our standard efficiency motors. It is easy to replace existing standard motor with PGM. The total length of PGM is almost the same as that of the standard efficiency motors.

High Reliability regarding the Characteristics and Performance

Our IE3 motor manufacture plants in Vietnam obtained accreditation by NVLAP and are certified as motor efficiency test shop by NIST, a US institution leading high efficiency motors. Conformity Certification No. (CC No.) by DOE is given only to the test results conducted in certified test shop.

*NIST : National Institute of Standards and Technology
*NVLAP : National Voluntary Laboratory Accreditation Program
*DOE : the United States Department of Energy

Apply Insulation Class 155 (F) (Temperature Rise B) for All Models, Improve Reliability

Insulation class 155 (F) is applied to all models to hold temperature rise under B rise, which further improves reliability of insulation.

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Premium Gold Motor could make great contribution to protect the Green Earth.

**Reduces loss by 30~40% compared to our standard efficiency motors,
and increase energy saving effect**

PGM can recover the price gap of initial purchase cost between PGM and standard efficiency motor for a short period of time because of 30~40% loss reduction. PGM improved energy saving effects because of much lower running cost than that of the existing high efficiency motor (Gold Motor).

*This is a result of a trial comparison between our standard efficiency motors and our premium gold motor at rated output power. Loss reduction rate and payback period will depend on the usage condition.

Calculating electricity cost

The following calculation formula indicates annual electricity cost saved by use of PGM.
(Unit: Japanese Yen per year)

$$S = W \times C \times N$$

W = Input power difference between standard efficiency motor and PGM (kW)
(Please see Performance Data for your reference)

C = Electric utility rate (Yen/kWh)
*Electric utility rate includes basic rate, taxes, etc., depending on contracted amount of electricity.

N = annual operation time (h/year)

<Example>
4poles-3.7kW-200V-50Hz, Operation hours 5,000h/year, Electricity rate 16yen/kWh
W=0.363kW (from the table below), C=16yen/kWh, N=5,000h/year

Saved Electricity Rate $S=W \times C \times N = 0.363 \times 16 \times 5,000 = 29,040$ yen

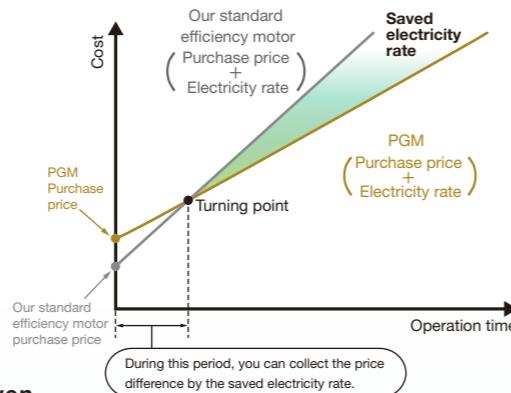
*This is just a calculation and not guaranteed. Saved electricity rate will differ by the calculation terms.

Calculating payback period

The following calculation formula indicates payback period of the price gap initially purchased between PGM and standard efficiency motor.

$$\text{Payback Period (year)} = \frac{[\text{purchase cost of PGM (yen)}] - [\text{purchase cost of our standard efficiency motor (yen)}]}{\text{saved electric utility rate (yen / year)}}$$

Output (kW)	Voltage [V]	Frequency [Hz]	Input power difference between standard efficiency motor and PGM [kW] (at 100% load)		
			2-Pole	4-Pole	6-Pole
0.75	200	50	0.040	0.047	0.116
	200	60	0.060	0.047	0.112
1.5	220	60	0.066	0.048	0.090
	200	50	0.111	0.136	0.307
2.2	200	60	0.082	0.106	0.273
	220	60	0.089	0.095	0.229
3.7	200	50	0.143	0.236	0.478
	200	60	0.129	0.201	0.460
5.5	220	60	0.156	0.156	0.362
	200	50	0.265	0.363	0.455
7.5	200	60	0.309	0.355	0.497
	220	60	0.336	0.295	0.411
11	200	50	0.491	1.090	0.271
	200	60	0.384	0.797	0.678
15	200	60	0.514	0.647	0.639
	220	60	0.490	1.210	0.257
18.5	200	50	0.464	0.794	0.608
	200	60	0.404	0.791	0.636
22	200	60	0.465	0.695	0.631
	220	60	1.110	0.810	0.590
22	200	60	1.150	0.832	0.563
	220	60	1.330	0.714	0.577



**More energy saving
with variable speed drive**

In addition to energy saving effect at a low speed with VARIABLE SPEED DRIVE, PGM itself further improves energy saving effect.

Allowable torque is improved compared to our standard efficiency motors by loss reduction.

*Allowable torque for 4-Pole or 6-Pole motors: 100% of constant torque operation in 1:10 (6~60Hz); in case of Vector control, 100% of constant torque operation in 1:20 (3~60Hz).

Top mounted terminal box available

To meet the various needs of consumers, top mounted terminal box for motors of frame size 90L or above is available. Upper mounted terminal box shortens overall width of the motors.



Low Noise Levels

Low noise levels with appropriate cooling performance are achieved pursuing appropriate shapes of fans and fan covers by using fluid dynamics.

Even 2-Pole – 60Hz motors satisfy low noise level of less than 80 dB (A).

**Support additional options & comply
with overseas efficiency regulations.**

Additional options—position of terminal box, rotational direction, shaft end screw, mounting direction (shaft up, shaft down, horizontal shaft), corrosion proof, frame earth terminal, etc.—are available. PGM also satisfy overseas regulations.
(Please refer to page 27 for details)

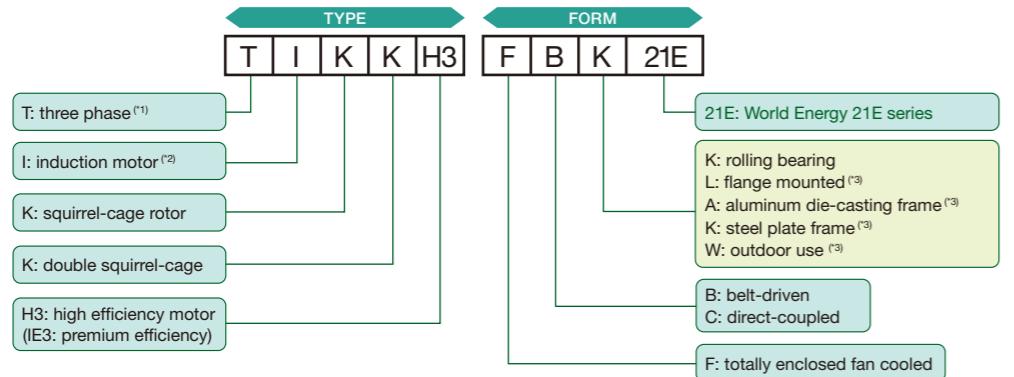
**IP55 degree of protection for outdoor use.
Improved environmental durability.**

PGM for outdoor use have IP55 degree of protection as standard to improve environmental durability. IP55 has better degree of protection from solid objects and water than existing IP44.

TYPE & FORM (Model Number)

Model number of Toshiba three phase motors is classified as follows;

- TYPE···shows electrical features: number of phases, structure of rotors, etc.
- FORM···shows mechanical features: enclosure, drive system, etc.



(*1) "T" is excluded if its capacity is 15kW or less.

(*2) "I" is excluded if its capacity 15kW or more.

(*3) "L", "A", "K", "W" are added after "K" (rolling bearing).

List of Models

Enclosure / Construction		Totally Enclosed Fan Cooled (TEFC)											
Installation		Indoor						Outdoor					
Mounting		Foot mounted			Flange/shaft down mounting			Foot mounted			Flange/shaft down mounting		
FORM code		FCKK21E, FBKK21E, FCKA21E, FBKA21E, FCK21E, FBK21E			FCKLK21E, FCKLA21E, FCKL21E			FCKKW21E, FBKKW21E, FCKAW21E, FBKAW21E, FCKW21E			FCKLKW21E, FCKLAW21E, FCKLW21E		
Voltage													
Poles		2	4	6	2	4	6	2	4	6	2	4	6
Output (kW)	0.75	●★	●★	●★	●	●	●	●★	●★	●	●	●	●
	1.5	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	2.2	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	3.7	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	5.5	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	7.5	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	11	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	15	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	18.5	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	22	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	30	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	37	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	45	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	55	●★■	●★■	—	●	●	—	●★	●★	—	●	●	—
Voltage		400V class											
Poles		2	4	6	2	4	6	2	4	6	2	4	6
Output (kW)	0.75	●★	●★	●★	●	●	●	●★	●★	●	●	●	●
	1.5	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	2.2	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	3.7	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	5.5	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	7.5	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	11	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	15	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	18.5	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	22	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	30	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	37	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	45	●★■	●★■	●★■	●	●	●	●★	●★	●	●	●	●
	55	●★■	●★■	—	●	●	—	●★	●★	—	●	●	—

● means make-to-stock production models for 200V class. (200/200/220/230V-50/60/60Hz)

● means make-to-stock production models for 400V class. (400/400/440/460V-50/60/60/60Hz)

400V class's make-to-stock (MTS) models have stronger insulation for inverters use.

● stands for MTS models, common for 200V class/400V class.

(200/400/200/400/220/440/230/460V-50/60/60/60/60/60Hz)

★ means make-to-stock production models for 200V class with an opposite (right-hand) terminal box. (200/200/220/230V-50/60/60Hz)

★ means make-to-stock production models for 400V class with an opposite (right-hand) terminal box. (400/400/440/460V-50/60/60Hz)

★ means make-to-order models.

● means make-to-stock production models for 200V class/400V class. (200/400/200/400/220/440/230/460V-50/60/60/60/60/60/60Hz)

★ stands for opposite sided terminal box's MTS models, common for 200V class/400V class.

(200/400/200/400/220/440/230/460V-50/50/60/60/60/60/60/60Hz)

● means make-to-stock production models for 200V class with top mounted terminal box.

(200/200/220/230V-50/60/60Hz)

■ means make-to-stock production models for 400V class with top mounted terminal box.

(400/400/440/460V-50/60/60Hz)

■ stands for upper frame installation terminal box's MTS models, common for 200V class/400V class. (200/400/200/400/220/440/230/460V-50/60/60/60/60/60/60Hz)

● means make-to-order models.

Standard Specifications

Item		Descriptions																																		
1	Pole Output range (kW)	2-Pole: 0.75~55kW, 4-Pole: 0.75~55kW, 6-Pole: 0.75~45kW																																		
2	Rated Voltage Rated Frequency	200/200/220/230V-50/60/60Hz 400/400/440/460V-50/60/60/60Hz Single rating is available (600V or less) 45kW and 55kW are common for 200V class/400V class, and have stronger insulation for inverters use.																																		
3	Enclosure/ FORM code	<table border="1"> <tr> <td>Enclosure</td> <td>Degree of protection</td> <td>Cooling method</td> <td>Mounting ¹</td> <td>FORM code</td> <td>FORM code</td> </tr> <tr> <td>IP44 (Indoor)</td> <td></td> <td></td> <td>Foot mounted IMB3</td> <td>FCKK21E FCKA21E FCK21E</td> <td>FBKK21E FBKA21E FBK21E</td> </tr> <tr> <td>IP55 (Outdoor)</td> <td></td> <td></td> <td>Shaft down flange mounted IMV1</td> <td>FCKLK21E FCKLA21E FCKL21E</td> <td>—</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Foot mounted IMB3</td> <td>FCKKW21E FCKAW21E FCKW21E</td> <td>FBKKW21E FBKAW21E FBK21E</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Shaft down flange mounted IMV1</td> <td>FCKLK21E FCKLA21E FCKLW21E</td> <td>—</td> </tr> </table>					Enclosure	Degree of protection	Cooling method	Mounting ¹	FORM code	FORM code	IP44 (Indoor)			Foot mounted IMB3	FCKK21E FCKA21E FCK21E	FBKK21E FBKA21E FBK21E	IP55 (Outdoor)			Shaft down flange mounted IMV1	FCKLK21E FCKLA21E FCKL21E	—				Foot mounted IMB3	FCKKW21E FCKAW21E FCKW21E	FBKKW21E FBKAW21E FBK21E				Shaft down flange mounted IMV1	FCKLK21E FCKLA21E FCKLW21E	—
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			Shaft down flange mounted IMV1	FCKLK21E FCKLA21E FCKLW21E	—																															
4	Thermal class	155 (F)																																		
5	Temperature rise	80K (130 (B) Rise)																																		
6	Time rating	S1 (continuous duty)																																		
7	Rotational direction	Counterclockwise as viewed from drive end.																																		
8	Ambient condition	<table border="1"> <tr> <td>Ambient temperature</td> <td>-30~40°C (operating temperature range)</td> </tr> <tr> <td>Ambient humidity</td> <td>Up to 100% (no condensation)</td> </tr> <tr> <td>Altitude</td> <td>1000m or below</td> </tr> <tr> <td>Atmosphere</td> <td>No corrosive, explosive gas or steam</td> </tr> </table>						Ambient temperature	-30~40°C (operating temperature range)	Ambient humidity	Up to 100% (no condensation)	Altitude	1000m or below	Atmosphere	No corrosive, explosive gas or steam																					
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Indoor Use/Totally Enclosed Fan Cooled/ Foot Mounted 0.75kW~55kW

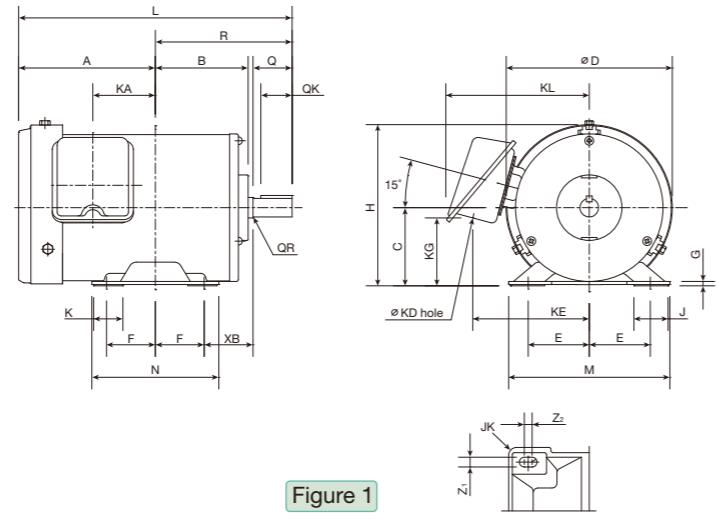


Figure 1

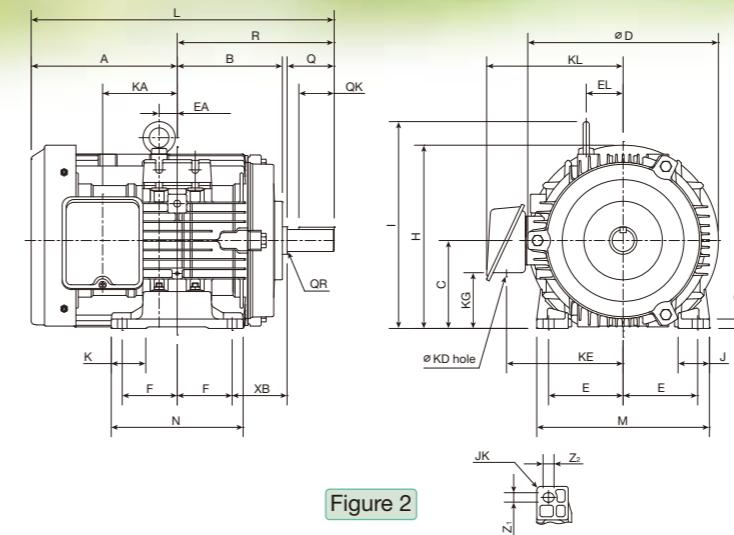


Figure 2

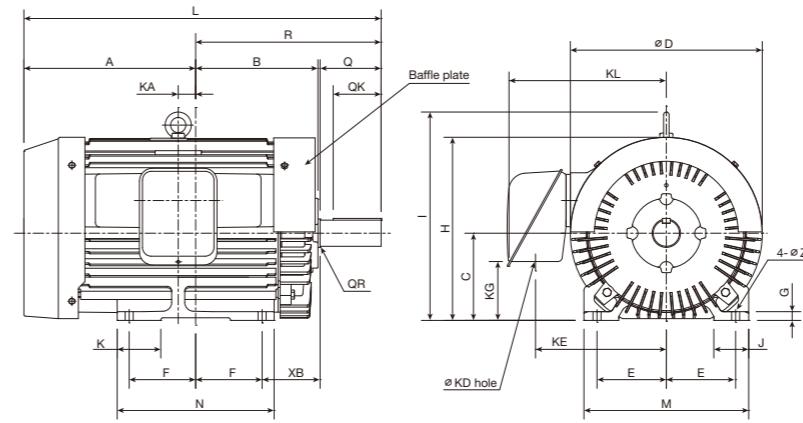
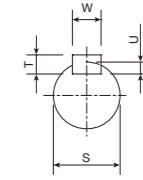


Figure 3

Shared Shaft End



TYPE & FORM	Frame size	Output (kW)		Figure No.	Dimensions (mm)																		Bearing No.								Approx. weight (kg)				Frame size					
		2-Pole	4-Pole		A	B	C	D	E	F	G	H	I	J	K	L	M	N	R	Z (Z ₁ ×Z ₂)	XB	JK	EA	EL	Terminal box					2-Pole	Over 4poles	2-Pole	4-Pole	6-Pole						
IKH3-FCKK21E/FBKK21E	80M	0.75	—	—	122	95	80	170	62.5	50	4.5	165	—	35	30	262	165	130	140	10×8	50	8	—	—	46	22	121	69	146	40	32	0.5	19	6	6	3.5	80M			
		—	0.75	—	140	—	—	—	—	—	—	—	—	—	—	280	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
Up to 3.7kW IKH3-FCKA21E/FBKA21E	90L	1.5	1.5	0.75	154.5	113.5	90	202	70	62.5	10	191	—	40	40	323	176	149	168.5	10×12	56	5	—	—	70	27	129.5	49	156	50	40	0.5	24	8	7	4	90L			
		2.2	—	—	178	128	100	202	80	70	12	201	239.5	40	46	371	200	168	193	12×14	63	5	—	—	22	37.5	93.5	27	129.5	59	156	60	45	0.5	28	8	7	4		
Up to 11kW IKKH3-FCKA21E/FBKA21E	100L	—	2.2	—	207	128	100	202	80	70	12	201	239.5	40	46	400	200	168	193	12×14	63	5	—	—	23	47	95	27	148.5	71	175	60	45	1.5	28	8	7	4	100L	
		—	—	1.5	186	134	112	243	95	70	12	233.5	263.5	40	44	386	220	168	200	12×14	70	5	—	—	24	61	85	35	181.5	67	212	80	63	0.5	38	10	8	5		
Up to 11kW IKKH3-FCKA21E/FBKA21E	112M	3.7	3.7	—	219	134	112	243	95	70	12	233.5	263.5	40	44	419	220	168	200	12×14	70	5	—	—	24	61	104	35	181.5	67	212	80	63	0.5	38	10	8	5	112M	
		—	—	2.2	210.5	152	132	285	108	70	15	274.5	313	50	50	449.5	260	175	239	12×14	89	5	—	—	24	61	126	52	226.5	70	279.5	110	90	2	42	12	8	5		
15kW and over TKKH3-FCKA21E/FBKA21E	132M	5.5	5.5	3.7	229.5	171	132	285	108	89	15	274.5	313	50	50	487.5	260	213	258	12×14	89	5	—	—	24	61	104	35	181.5	67	212	80	63	0.5	38	10	8	5	132M	
		7.5	—	5.5	230.5	171	132	285	108	89	15	274.5	313	50	50	487.5	260	213	258	12×14	89	5	—	—	22	54	126	52	226.5	70	279.5	110	90	2	42	12	8	5		
160M	11	11	7.5	230.5	290	206	160	324	127	105	18	322	365.5	60	60	613	308	250	323	14.5×18.5	108	5	—	—	22	54	104	52	226.5	70	279.5	110	90	2	42	12	8	5	160M	
	15	—	—	230.5	268	228	160	324	127	127	18	322	365.5	60	60	613	308	294	345	14.5×18.5	108	5	—	—	22	54	104	52	226.5	70	279.5	110	90	2	42	12	8	5		
TKKH3-FCK21E/FB21E	160L	18.5	15	11	230.5	268	228	160	324	127	127	18	322	365.5	60	60	613	308	294	345	14.5×18.5	108	5	—	—	22	54	104	52	226.5	70	279.5	110	90	2	42	12	8	5	160L
		22	18.5	22	287	236.5	180	391	139.5	120.5	20	375.5	434	60	82.5	638.5	324	286	351.5	14.5	121	—	—	—	—	91	280	105	345	110	90	0.5	48	14	9	5.5				
TKKH3-FCK21E/FB21E	180L	30	30	18.5	346	255.5	180	391	139.5	139.5	20	375.5	434	60	82.5	716.5	324	324	370.5	14.5	121	—	—	—	—	20	91	280	105	345	110	90	1.5	55	16	10	6	180L		
		37	—	—	346	280.5	200	441	159	152.5	20	420	478	80	100	789.5	378	360	395.5	18.5	133	—	—	—	—	40	91	300	135	365	110	90	1.5	55	16	10	6			
TKKH3-FCK21E/FB21E	200L	45	—	—	346	280.5	200	441	159	152.5	20	420	478	80	100	789.5	378	360	395.5	18.5	133	—	—	—	—	40	91	300	135	365	110	90	1.5	55	16	10	6	200L		
		—	45	37	346	280.5	200	441	159	152.5	20	420	478	80	100	789.5	378	360	395.5	18.5	133	—	—	—	—	40	91	300	135	365	110	90	1.5	55	16	10	6			
TKKH3-FCK21E/FB21E	225S	55	—	—	346	280.5	200	441	159	152.5	20	420	478	80	120	783	413	366	402	18.5	149	—	—	—	—	19	9													

**Indoor Use/Totally
Enclosed Fan Cooled/
Foot Mounted
(top mounted terminal box)
0.75kW~55kW**

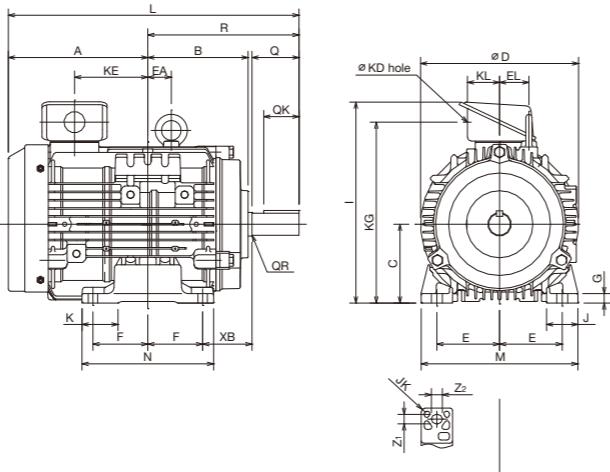
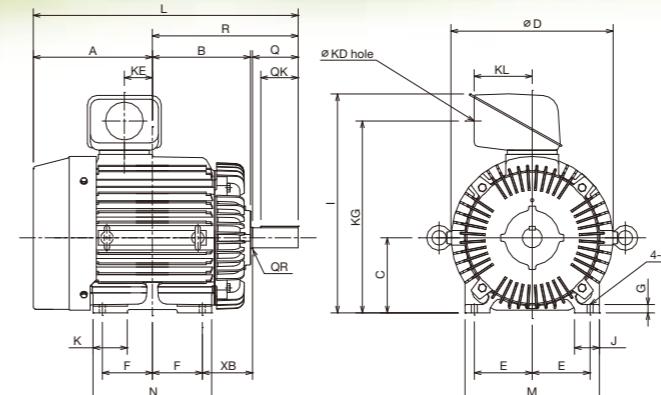
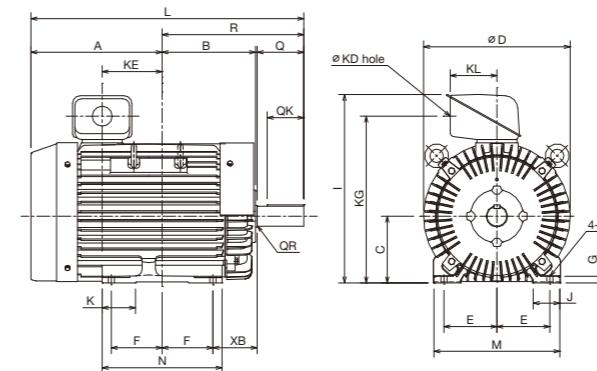


Figure 1



Figure



Figure

TYPE & FORM	Frame size	Output (kW)			Figure No.	Dimensions (mm)																			Bearing No.										Approx. weight (kg)			Frame size									
						A	B	C	D	E	F	G	I	J	K	L	M	N	R	Z (Z ₁ ×Z ₂)	XB	JK	Terminal box		Shaft end					2-Pole		Over 4poles															
		2-Pole	4-Pole	6-Pole																								Drive end	Non drive end	Drive end	Non drive end	2-Pole	4-Pole	6-Pole													
Up to 3.7kW IKH3- FCKA21E/ FBKA21E	90L	1.5 2.2	1.5	0.75	1	154.5	113.5	90	202	70	62.5	10	246	40	40	323	176	149	168.5	10×12	56	5			—	—	27	70	219.5	41	50	40	0.5	24	8	7	4	6205C3	6205C3	6205C3	6205C3	18 22	21	18	90L		
	100L	—	2.2	—		178	128	100	202	80	70	12	256	40	46	371 400	200	168	193	12×14	63	5			—	37.5	27	93.5	229.5	41	60	45	0.5	28	8	7	4	—	—	6206C3	6205C3	—	29	—	32	100L	
	112M	3.7 —	3.7	—		186	134	112	243	95	70	12	287	40	44	386 419	220	168	200	12×14	70	5			—	47	27	95	260.5	41	60	45	1.5	28	8	7	4	6207C3	6206C3	6207C3	6206C3	33 —	39	—	112M		
	132S	5.5 7.5	5.5	3.7		210.5	152	132	285	108	70	15	344	50	50	449.5	260	175	239	12×14	89	5			43.5	56.5	35	85	313.5	65	80	63	0.5	38	10	8	5	6308C3	6208C3	6308C3	6208C3	55 59	60	59	132S		
	132M	—	7.5	5.5		229.5	171	132	285	108	89	15	344	50	50	487.5	260	213	258	12×14	89	5			26.5	56.5	35	104	313.5	65	80	63	0.5	38	10	8	5	—	—			—	71	74	132M		
	160M	11 15	11	7.5		290	206	160	324	127	105	18	439.5	60	60	613	308	250	323	14.5×18.5	108	5			—2	—	52	126	386.5	90	110	90	2	42	12	8	5	6310C3	6208C3	6310C3	6208C3	92 103	102	96	160M		
	160L	18.5	15	11		268	228	160	324	127	127	18	439.5	60	60	613	308	294	345	14.5×18.5	108	—			20	—	52	104	386.5	90	110	90	2	42	12	8	5	116	119	116	160L	116	119	116	160L		
TKKH3- FCK21E/ FBK21E	180M	22	18.5 22	15	2	287	236.5	180	391	139.5	120.5	20	525	60	82.5	638.5	324	286	351.5	14.5	121	—			—	—	91	67.5	460	140	110	90	0.5	48	14	9	5.5	6212C3	6310C3	6310C3	6310C3	195 190	185	175	180M		
	180L	30	30	18.5 22		346	255.5	180	391	139.5	139.5	20	525	60	82.5	716.5	324	324	370.5	14.5	121	—			—	—	91	126.5	460	140	110	90	1.5	55	16	10	6	6212C3	6310C3	6312C3	6310C3	235	235	215 230	180L		
	200L	37 45	—	—		394	280.5	200	441	159	152.5	20	565	80	100	789.5	378	360	395.5			18.5	133	—			—	—	91	180	500	140	110	90	1.5	55	16	10	6	6312C3	6312C3	—	—	330 340	—	—	200L
		— 45	37 37	30 37		381	287	225	484	178	143	22	665	80	120	783	413	366	402 432	18.5	149	—			—	—	91	158	568	125	110	90	1.5	55	16	10	6	6312C3	6312C3	—	—	335 370	345	350	225S		
	225S	55 —	—	—		813	—	55	45	—	—	—	—	—	—	783	413	366	402 432	18.5	149	—			—	—	91	158	568	125	140	110	1.5	65	18	11	7	—	—	6315C3	6312C3	—	435	420	225S		

(1) Tolerance of "C" dimensions is 0 ~ -0.5.

(2) Tolerance of "S" is defined by JIS B 0401(dimENSIONAL TOLERANCE); ø19~28mm: j6, ø38~48mm: k6, ø55mm or longer: m6.

(3) Shaft end key and keyway follow parallel key and keyway of JIS B 1301. Dimensional tolerances of the keyway is standard type (N9).

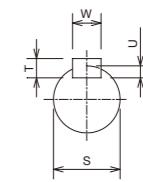
(4) The followings are standard drive systems; 2-Pole, direct-coupled, 4-Pole, belt-driven. Please contact us for more information about belt application.

(5) Sealed ball bearing is equipped as standard.

(6) Frame size 90L or less motors are not equipped with eye bolts.

(7) The following models are not equipped with baffle plate; 2-Pole: 22, 30kW, 4-Pole: 18.5, 22, 30, 37, 45kW, 6-Pole: 15, 18.5, 22, 30, 45kW.

Shared Shaft End



Indoor Use/Totally Enclosed Fan Cooled/Foot Mounted (terminal box on the opposite side) 0.75kW~55kW

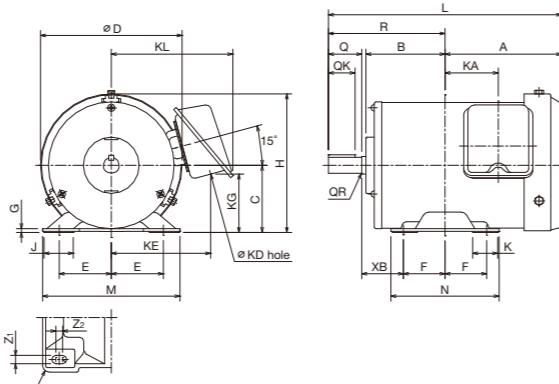


Figure 1

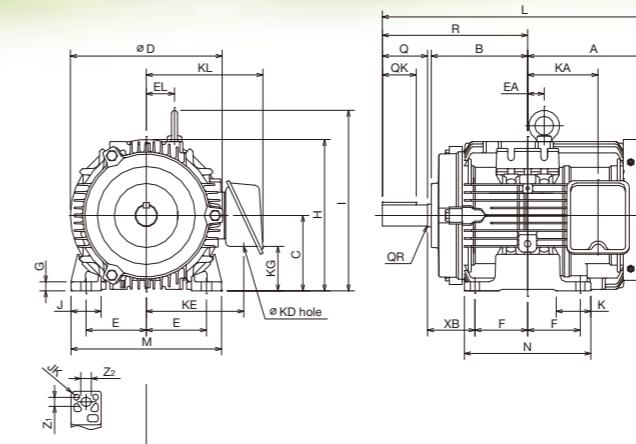


Figure 2

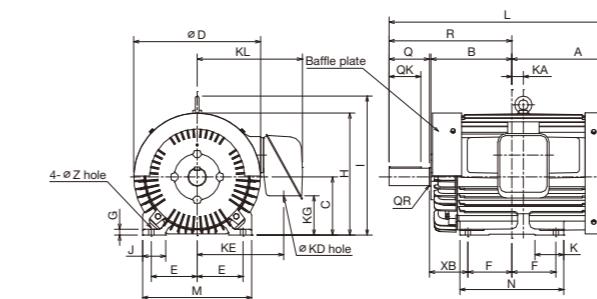
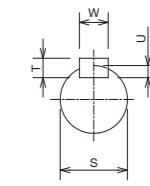


Figure 3

Shared Shaft End



TYPE & FORM	Frame size	Output (kW)		Figure No.	Dimensions (mm)																		Bearing No.										Frame size															
		2-Pole	4-Pole		A	B	C	D	E	F	G	H	I	J	K	L	M	N	R	Z (Z _x × Z _y)	XB	JK	EA	EL	Terminal box					2-Pole		Over 4poles																
IKH3-FCKK21E/FBKK21E	80M	0.75	—	1	122	95	80	170	62.5	50	4.5	165	—	35	30	262	165	130	140	10×8	50	8	—	—	46	22	121	69	146	40	32	0.5	19	6	6	3.5	6204C3	6204C3	—	—	11.5	—	—	80M				
		—	0.75		140		—	—	—	—	—	—	—	—	—	—	280	—	—	—	—	—	—	—	64	—	—	—	6204C3	6204C3	—	15.5	—	—	—	80M												
Up to 3.7kW IKH3-FCKA21E/FBKA21E	90L	1.5	1.5	1.5	1.5	154.5	113.5	90	202	70	62.5	10	191	—	40	40	323	176	149	168.5	10×12	56	5	—	—	70	27	129.5	49	156	50	40	0.5	24	8	7	4	6205C3	6205C3	6205C3	6205C3	18	22	21	18	90L		
		2.2	—		—		128	100	202	80	70	12	201	239.5	40	46	371	200	168	193	12×14	63	5	—	—	22	37.5	93.5	27	129.5	59	156	60	45	0.5	28	8	7	4	—	—	—	—	29	—	32	100L	
Up to 11kW IKKH3-FCKA21E/FBKA21E	100L	—	2.2	2.2	—	154.5	113.5	90	202	70	62.5	10	191	—	40	40	323	176	149	168.5	10×12	56	5	—	—	70	27	129.5	49	156	50	40	0.5	24	8	7	4	6205C3	6205C3	6205C3	6205C3	18	22	21	18	90L		
		—	—		—		128	100	202	80	70	12	201	239.5	40	46	371		200	168	193	12×14	63	5	—	—	22	37.5	93.5	27	129.5	59	156	60	45	0.5	28	8	7	4	—	—	—	—	29	—	32	100L
Up to 11kW IKKH3-FCKA21E/FBKA21E	112M	3.7	3.7	3.7	—	154.5	113.5	112	243	95	70	12	233.5	263.5	40	44	386	220	168	200	12×14	70	5	—	—	23	47	95	27	148.5	71	175	60	45	1.5	28	8	7	4	6207C3	6206C3	6207C3	6206C3	33	—	39	—	112M
		—	—		—		134	112	243	95	70	12	233.5	263.5	40	44	386		220	168	200	12×14	70	5	—	—	24	61	85	35	181.5	67	212	80	63	0.5	38	10	8	5	6308C3	6208C3	6308C3	6208C3	55	—	60	59
15kW and over TKKH3-FCKA21E/FBKA21E	132S	5.5	5.5	5.5	5.5	154.5	113.5	132	285	108	70	15	274.5	313	50	50	449.5	220	175	239	12×14	89	5	—	—	24	61	85	35	181.5	67	212	80	63	0.5	38	10	8	5	6308C3	6208C3	6308C3	6208C3	55	—	60	59	132S
		7.5	—		—		171	132	285	108	89	15	274.5	313	50	50	487.5		260	213	258	12×14	89	5	—	—	24	61	104	35	181.5	67	212	80	63	0.5	38	10	8	5	—	—	—	—	71	—	74	132M
160M	160L	11	11	11	7.5	154.5	113.5	160	324	127	105	18	322	365.5	60	60	613	308	250	323	14.5×18.5	108	5	—	—	22	54	126	52	226.5	70	279.5	110	90	2	42	12	8	5	6310C3	6208C3	6310C3	6208C3	92	—	102	96	160M
		15	—		—		228	160	324	127	127	18	322	365.5	60	60	613	308	294	345	14.5×18.5	108	5	—	—	54	104	52	226.5	70	279.5	110	90	2	42	12	8	5	6310C3	6208C3	6310C3	6208C3	116	—	119	116	160L	
TKKH3-FCK21E/FBK21E	180M	22	18.5	18.5	15	154.5	236.5	180	391	139.5	120.5	20	375.5	434	60	82.5	638.5	324	286	351.5	14.5	121	—	—	—	—	91	280	105	345	110	90	0.5	48	14	9	5.5	6212C3	6310C3	6310C3	6310C3	190	—	180	170	180M		
		—	22		—		287	236.5	180	391	139.5	120.5	20	375.5	434	60	82.5	638.5	324	286	351.5	14.5	121	—	—	—	—	91	280	105	345	110	90	0.5	48	14	9	5.5	6212C3	6310C3	6310C3	6310C3	185	—	230	220	180L	
TKKH3-FCK21E/FBK21E	180L	30	30	18.5	22	154.5	255.5	180	391	139.5	139.5	20	375.5	434	60	82.5	716.5	324	324</td																													

Indoor Use/ Totally Enclosed Fan Cooled/ Flange Mounted 0.75kW~55kW

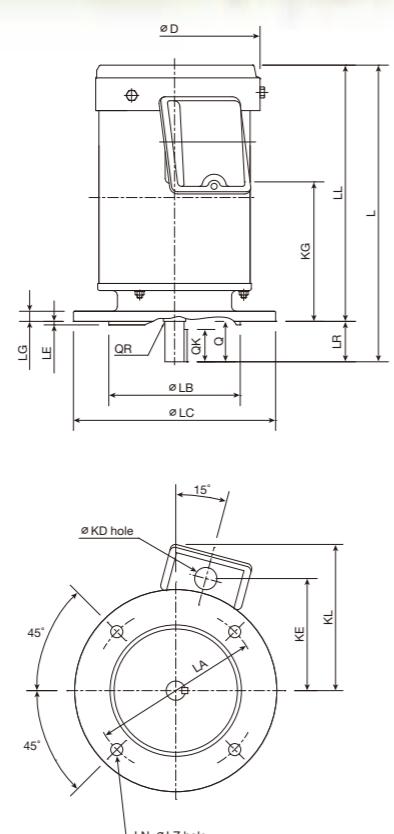


Figure 1

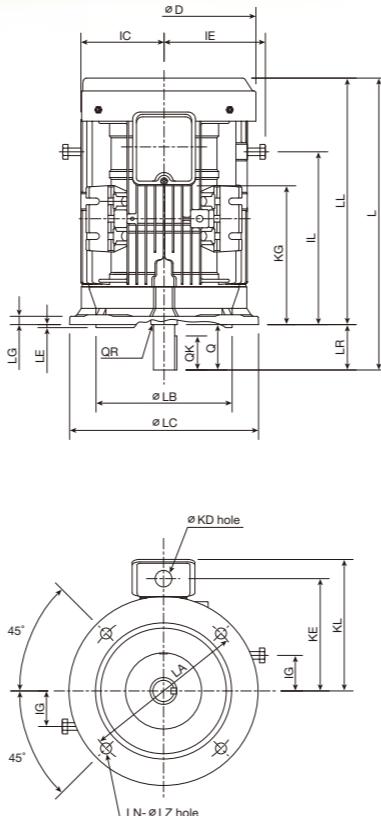


Figure 2

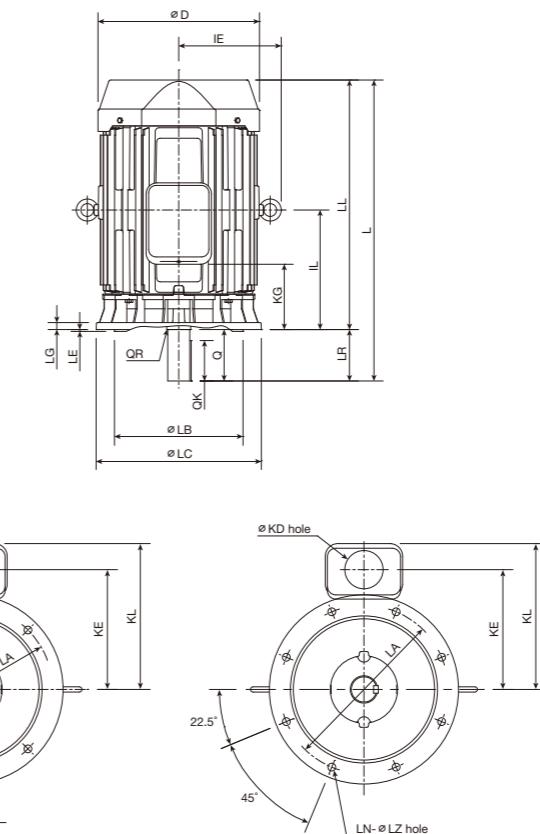


Figure 3 a

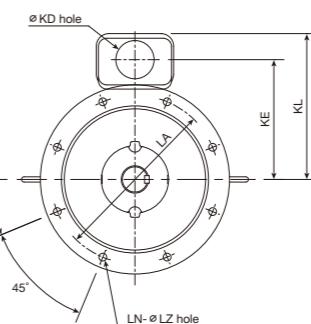
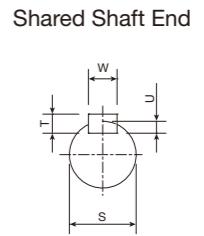


Figure 3 b



TYPE & FORM	Flange size	Output (kW)			Frame size	Figure No.	Dimensions (mm)										Bearing No.								Approx. weight (kg)	Flange size															
		2-Pole	4-Pole	6-Pole			D	IE	IC	IG	IL	L	LL	LR	KD	KE	KG	KL	LA	LB	LC	LE	LG	LN	LZ	Q	QK	QR	S	W	T	U									
IKH3-FCKLK21E	FF165	0.75	—	—	80M	1	170	—	—	—	—	275.5	235.5	40	22	108	118.5 136.5	145	165	130	200	3.5	10	4	12	40	32	0.5	19	6	6	3.5	6204C3	6204C3	—	—	13	—	FF165		
		—	0.75	—			—	—	—	—	—	293.5	253.5		—	—		—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	17	—						
Up to 3.7kW IKH3-FCKLA21E	FF165	1.5	1.5	0.75	90L	202	—	88.5	—	—	—	323	273	50	27	129.5	147.5	156	165	130	200	3.5	10	4	12	50	40	0.5	24	8	7	4	6205C3	6205C3	6205C3	6205C3	19	22	19	FF165	
		2.2	—	—			—	—	—	—	352	302	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	23	—	—										
Up to 11kW IKKH3-FCKLA21E	FF215	—	2.2	—	100L	202	122	98	37.5	224	371	311	60	27	129.5	185.5	156	215	180	250	4	16	4	14.5	60	45	0.5	28	8	7	4	6206C3	6206C3	6206C3	6206C3	—	32	—	FF215		
		3.7	3.7	—			—	—	—	—	400	340		—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	35	—	—									
15kW and over TKKH3-FCKLA21E	FF215	—	—	2.2	112M	243	134	110	47	228.5	386	326	60	27	148.5	194	175	215	180	250	4	13	4	14.5	60	45	1.5	28	8	7	4	6207C3	6207C3	6206C3	6206C3	35	41	—	FF215		
		5.5	5.5	3.7			285	155	130	61	252.5	449.5	369.5	80	35	181.5	179	212	265	230	300	4	12	4	14.5	80	63	0.5	38	10	8	5	6308C3	6208C3	6308C3	6208C3	58	63	62	FF265	
FF265	7.5	—	7.5	5.5	132S	285	155	130	61	202	487.5	407.5	60	35	181.5	217	212	265	230	300	4	12	4	14.5	80	63	0.5	38	10	8	5	—	—	6308C3	6208C3	6308C3	6208C3	62	—	74	FF265
		—	7.5	5.5			285	155	130	61	324	179.5	154.5	235	613	503	110	52	226.5	252	279.5	300	250	350	5	14	4	18.5	110	90	2	42	12	8	5	6310C3	6208C3	6310C3	6208C3	97	108
FF300	11	11	7.5	—	160M	324	179.5	154.5	54	235	613	503	110	52	226.5	252	279.5	300	250	350	5	14	4	18.5	110	90	2	42	12	8	5	6310C3	6208C3	6310C3	6208C3	121	124	121			
		15	—	—			324	179.5	154.5	54	235	613	503	110	52	226.5	252	279.5	300	250	350	5	14	4	18.5	110	90	2	42	12	8	5	6310C3	6208C3	6310C3	6208C3	121	124	121	FF300	
TKKH3-FCKL21E	FF350	22	18.5	15	180M	391	255	—	—	241.5	638.5	528.5	40	91	280	101.5	345	350	300	400	5	15	4	18.5	110	90	0.5	48	14	9	5.5	6212C3	6310C3	6310C3	6212C3	200	190	180	FF350		
		22	—	—			391	255	—	—	280.5	716.5	606.5	110	91	280	140.5	345	350	300	400	5	15	4	18.5	110	90	1.5	55	16	10	6	6212C3	6312C3	6312C3	6212C3	240	240	220	FF350	
FF400	37	—	—	—	200L	441	279	—	—	325.5	789.5	679.5	91	300	185.5	365	400	350	450	5	19	8	18.5	110	90	1.5	55	16	10	6	6312C3	6312C3	6312C3	6313C3	325	335	—	FF400			
		45	—	—			441	279	—	—	325.5	819.5	140	91	300	185.5	365	400	350	450	5	19	8	18.5	140	110	1.5	60	18	11	7	—	—	330	340	345					
FF500	55	—	—	—	225S	484	311	—	—	325.5	797.5	687.5	140	91	343	200.5	440	500	450	550	5	22	8	18.5	110	90	1.5	55	16	10	6	6312C3	6312C3								

Outdoor Use/ Totally Enclosed Fan Cooled/ Foot Mounted 0.75kW~55kW

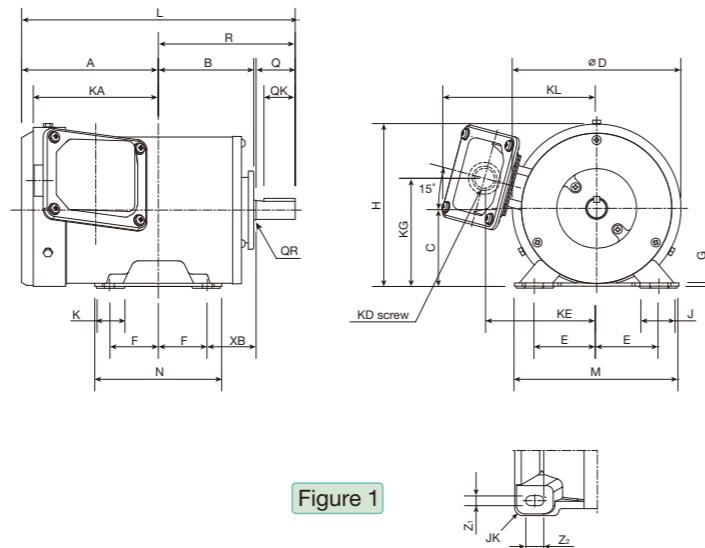


Figure 1

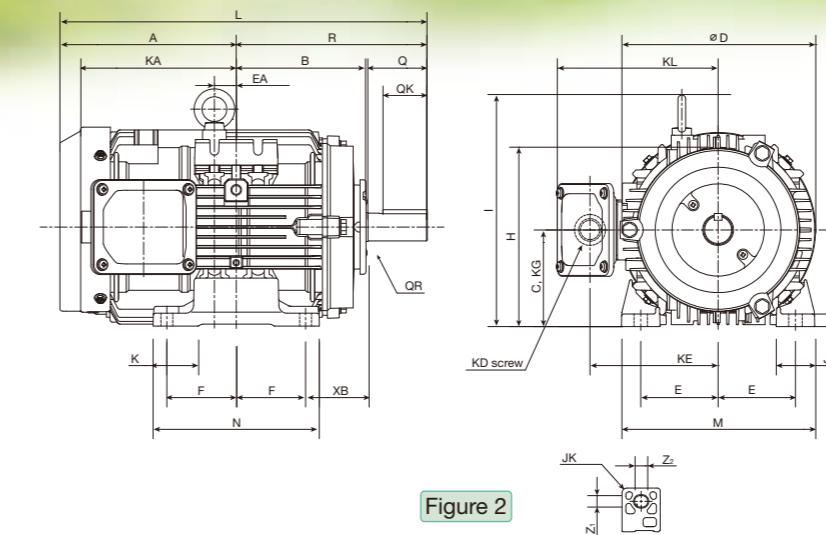


Figure 2

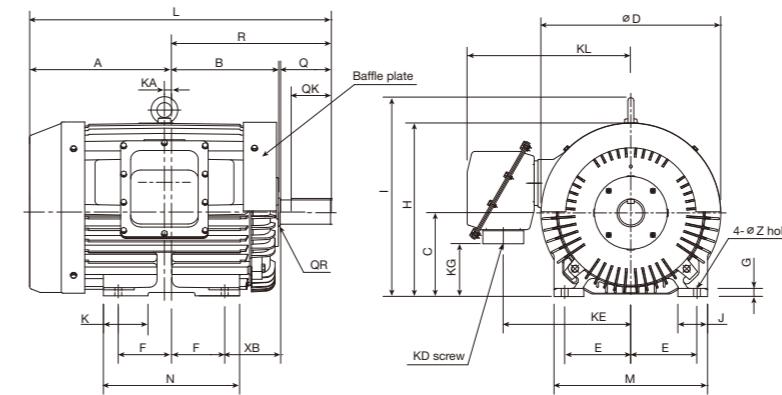
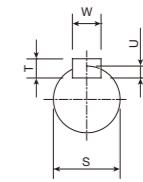


Figure 3

Shared Shaft End



TYPE & FORM	Frame size	Output (kW)		Figure No.	Dimensions (mm)																		Bearing No.										Frame size																
		2-Pole	4-Pole		A	B	C	D	E	F	G	H	I	J	K	L	M	N	R	Z (Z ₁ ×Z ₂)	XB	JK	EA	EL	Terminal box					2-Pole		Over 4poles		Frame size															
IKH3-FCKW21E/FBKW21E	80M	0.75	—	—	122	98	80	170	62.5	50	4.5	165	—	35	30	262	165	130	140	10×8	50	8	—	—	109	G3/4 (22)	113	—	158	40	32	0.5	19	6	6	3.5	6204C3	6204C3	—	—	12	—	—	80M					
		—	0.75	—	140											280							127											—	—	6204C3	6204C3	—	16	—	80M								
Up to 3.7kW	90L	1.5	1.5	0.75	154.5	116.5	90	202	70	62.5	10	191	—	40	40	323	176	149	168.5	10×12	56	5	—	—	133	G3/4 (22)	132.5	—	167.5	50	40	0.5	24	8	7	4	6205C3	6205C3	6205C3	6205C3	18.5	23	22	18.5	90L				
IKH3-FCKW21E/FBKW21E	100L	—	2.2	—	178	131	100	202	80	70	12	201	239.5	40	46	371	200	168	193	12×14	63	5	—	—	22	37.5	156.5	G3/4 (22)	132.5	—	167.5	60	45	0.5	28	8	7	4	—	—	6206C3	6206C3	—	30	—	100L			
IKH3-FCKW21E/FBKW21E	112M	—	3.7	—	186	138	112	243	95	70	12	233.5	263.5	40	44	386	220	168	200	12×14	70	5	—	—	23	47	158	G3/4 (22)	151.5	—	186.5	60	45	1.5	28	8	7	4	6207C3	6206C3	6207C3	6206C3	34	40	—	46	112M		
IKK3-FCKW21E/FBKW21E	132S	—	5.5	—	210.5	156	132	285	108	70	15	274.5	313	50	50	449.5	260	175	239	12×14	89	5	—	—	24	61	196	G1 1/2 (42)	201.5	—	263	80	63	0.5	38	10	8	5	6308C3	6208C3	6308C3	6208C3	56	60	61	60	132S		
15kW and over	132M	—	7.5	5.5	229.5	175	132	285	108	89	15	274.5	313	50	50	487.5	260	213	258	12×14	89	5	—	—	24	61	215	G1 1/2 (42)	201.5	—	263	80	63	0.5	38	10	8	5	—	—	6308C3	6208C3	—	72	75	132M			
TKKH3-FCKW21E/FBKW21E	160M	11	11	7.5	290	210	160	324	127	105	18	322	365.5	60	60	613	308	250	323	14.5×18.5	108	5	—	—	22	54	237	G1 1/2 (42)	221.5	—	282.5	110	90	2	42	12	8	5	6310C3	6208C3	6310C3	6208C3	93	104	103	97	160M		
	160L	18.5	15	11	268	232	160	324	127	127	18	322	365.5	60	60	613	308	294	345	14.5×18.5	108	5	—	—	24	61	215	G1 1/2 (42)	221.5	—	282.5	110	90	2	42	12	8	5	6310C3	6208C3	6310C3	6208C3	117	120	117	117	160L		
TKKH3-FCKW21E/FBKW21E	180M	22	18.5	15	287	237.5	180	391	139.5	120.5	20	375.5	434	60	82.5	638.5	324	286	351.5	14.5	121	—	—	—	—	293	82	390	110	90	0.5	48	14	9	5.5	6212C3	6310C3	6310C3	6310C3	195	185	190	175	180M					
	180L	30	30	18.5	346	256.5	180	391	139.5	139.5	20	375.5	434	60	82.5	716.5	324	324	370.5	14.5	121	—	—	—	—	293	82	390	110	90	1.5	55	16	10	6	6212C3	6312C3	6312C3	6312C3	235	235	215	230	180L					
TKKH3-FCKW21E/FBKW21E	200L	37	—	—	394	281.5	200	441	159	152.5	20	420	478	80	100	789.5	378	360	395.5	18.5	133	—	—	—	—	40	G3 (82)	313	112	410	110	90	1.5	55	16	10	6	6312C3	6312C3	6312C3	6312C3	325	335	—	—	200L			
	225S	55	—	—	381	288	225	484	178	143	22	467	535	80	120	783	413	366	402	18.5	149	—	—	—	—	19	G3 (82)	343	142	440	110	90	1.5	55	16	10	6	6312C3	6312C3	6312C3	6312C3	—	—	400	—	—	225S		
	—	55	45	—	—	—	—	—	—	—	—	—	—	—	—	813	—	—	432	18.5	149	—	—	—	—	19	G3 (82)	343	142	440	140	110	1.5	65	18	11	7	—	—	6315C3	6312C3	6312C3	6312C3	—	—	430	415	—	225S

(1) Tolerance of "C" dimensions is 0 ~ -0.5.

(2) Tolerance of "S" is defined by JIS B 0401(dimensional tolerance); ø19~28mm: j6, ø38~48mm: k6, ø55mm or longer: m6.

(3) Shaft end key and keyway follow parallel key and keyway of JIS B 1301. Dimensional tolerance of the keyway is standard type (N9).

(4) The followings are standard drive systems; 2-Pole: direct-coupled, 4-Pole: belt-driven. Please contact us for more information about belt application.

(5) Sealed ball bearing is equipped as standard.

(6) Frame size 90L or less motors are not equipped with eye bolts.

(7) The following models are not equipped with baffle plate; 2-Pole: 22, 30kW, 4-Pole: 18.5, 22, 30, 37, 45kW, 6-Pole: 15, 18.5, 22, 30, 45kW.

Outdoor Use/ Totally Enclosed Fan Cooled/ Flange Mounted 0.75kW~55kW

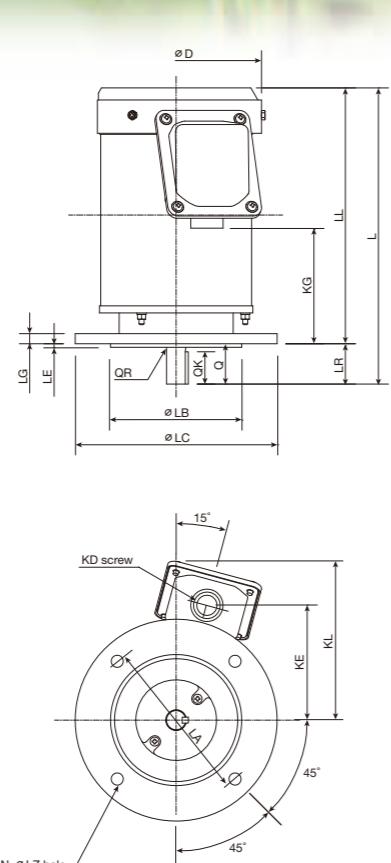


Figure 1

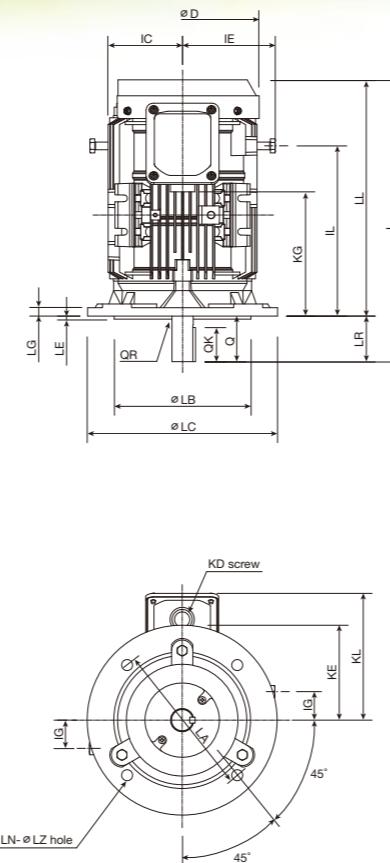


Figure 2

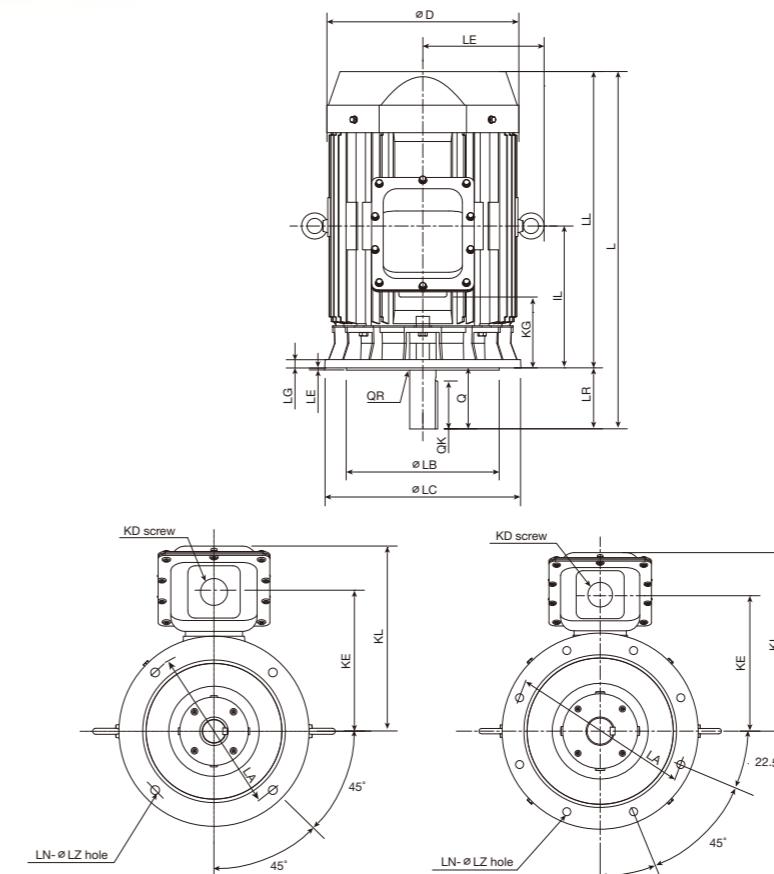


Figure 3 a

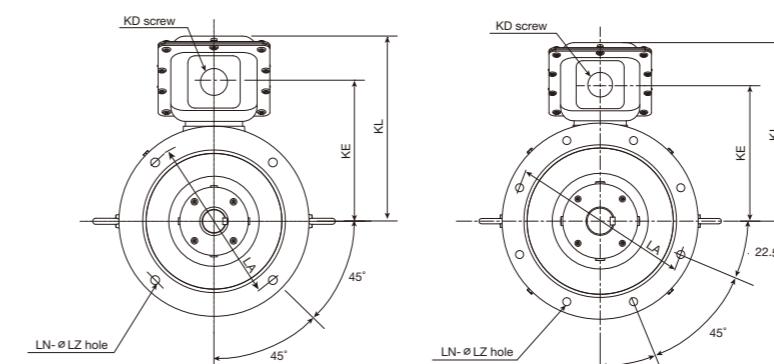
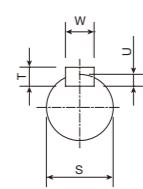


Figure 3 b

Shared Shaft End



TYPE & FORM	Flange size	Output (kW)			Frame size	Figure No.	Dimensions (mm)										Bearing No.										Approx. weight (kg)	Flange size								
		2-Pole	4-Pole	6-Pole			D	IE	IC	IG	IL	L	LL	LR	KD	KE	KG	KL	LA	LB	LC	LE	LG	LN	LZ	Q	QR	S	W	T	U					
IKH3-FCKLKW21E	FF165	0.75 —	— 0.75	—	80M	1	170	—	—	—	—	275.5 293.5	235.5 253.5	40	G3/4 (22) 114	96.5 114.5	159	165		130	200	3.5	10	4	12	40	32	0.5	19	6	6	3.5	6204C3 —	6204C3 6204C3	— 13.5 17.5	— — FF165
Up to 3.7kW IKH3-FCKLAW21E	FF165	1.5 2.2	1.5 —	0.75	90L	202	—	88.5	—	—	—	323 352	273 302	50	G3/4 (22) 132.5	125.5 168	168	165		130	200	3.5	10	4	12	50	40	0.5	24	8	7	4	6205C3 6205C3	6205C3 6205C3	19.5 24	23 19.5
Up to 11kW IKKH3-FCKLAW21E	FF215	— 3.7	2.2 —	— 1.5	100L	202	122	98	37.5	224	371 400	311 340	60	G3/4 (22) 132.5	163.5 168	168	215		180	250	4	16	4	14.5	60	45	0.5	28	8	7	4	6206C3 6206C3	6206C3 6206C3	— 33 — 36	6206C3 FF215	
15kW and over TKKH3-FCKLAW21E	FF265	5.5 7.5	5.5 —	3.7 2.2	112M	243	134	110	47	228.5	386 419	326 359	60	G3/4 (22) 151.5	172 187	187	215		180	250	4	13	4	14.5	60	45	1.5	28	8	7	4	6207C3 6207C3	6207C3 6207C3	36 — 42 — 48	6207C3 FF215	
TKKH3-FCKLW21E	FF265	—	7.5	5.5	132M	285	155	130	61	252.5	449.5	369.5	80	G1 1/2 (42) 201.5	133	263	265		230	300	4	12	4	14.5	80	63	0.5	38	10	8	5	6308C3 6308C3	6208C3 6308C3	59 63	64 63	
	FF300	11 15	11	7.5	160M	285	155	130	61	202	487.5	407.5	80	G1 1/2 (42) 201.5	171	263	265		230	300	4	12	4	14.5	80	63	0.5	38	10	8	5	6308C3 6308C3	6208C3 6308C3	— 75 78	FF265	
	FF300	18.5	15	11	160L	324	179.5	154.5	54	235	613	503	110	G1 1/2 (42) 221.5	228	282.5	300		250	350	5	14	4	18.5	110	90	2	42	12	8	5	6310C3 6310C3	6208C3 6310C3	98 109	108 102	
	FF300	18.5	15	11	160L	324	179.5	154.5	54	235	613	503	110	G1 1/2 (42) 221.5	228	282.5	300		250	350	5	14	4	18.5	110	90	2	42	12	8	5	6310C3 6310C3	6208C3 6310C3	122	125 122	
TKKH3-FCKLW21E	FF350	22 22	18.5 18.5	15	180M	391	255	—	—	241.5	638.5	528.5	110	G3 (82) 293	78.5	390	350		300	400	5	15	4	18.5	110	90	0.5	48	14	9	5.5	6212C3 6212C3	6310C3 6310C3	205 200	195 185	
	FF350	30	30	18.5 22	180L	391	255	—	—	280.5	716.5	606.5	110	G3 (82) 293	117.5	390	350		300	400	5	15	4	18.5	110	90	1.5	55	16	10	6	6212C3 6212C3	6312C3 6312C3	245 245	225 240	
	FF400	37 45	— 37	— 30	200L	441	279	—	—	325.5	789.5 819.5	679.5 819.5	110 140	G3 (82) 313	162.5	410	400		350	450	5	19	8	18.5	110	90	1.5	55	16	10	6	6312C3 6312C3	6312C3 6312C3	330 340	— —	
	FF500	55	—	—	225S	484	311	—	—	325.5	797.5 827.5	687.5 140	110 140	G3 (82) 343	162.5	440	500		450	550	5	22	8	18.5	110	90	1.5	55	16	10	6	6312C3 6312C3	6312C3 6312C3	— —	415 445	
	FF500	—	55	45	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	430 430	FF500					

(1) Tolerance of "S" is regulated by JIS B 0401(dimensional tolerance); ø19~28mm; j6, ø38~48mm; k6, ø55mm or longer: m6.

(2) Shaft end key and keyway follow parallel key and keyway of JIS B 1301. Dimensional tolerance of the key way is standard type (N9).

(3) Tolerance of "L" dimension is j6 of JIS B 0401.

(4) Sealed ball bearing (greased sealed method) is equipped as standard.

(5) Frame size 90L or less motors are not equipped with eye bolts.

Dimensions of standard terminal box

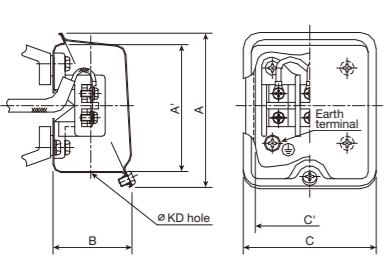


Figure 1

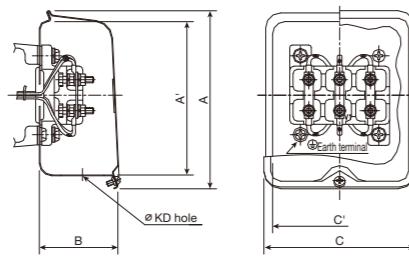


Figure 2

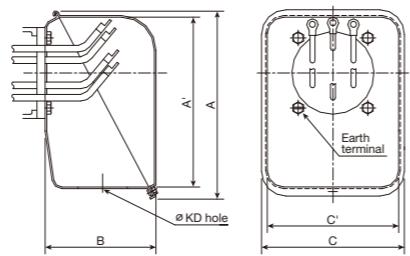


Figure 3

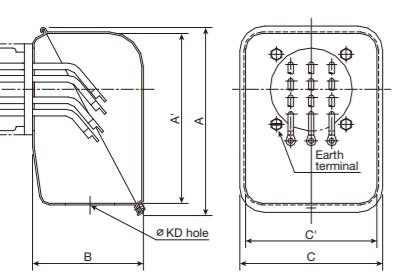


Figure 4

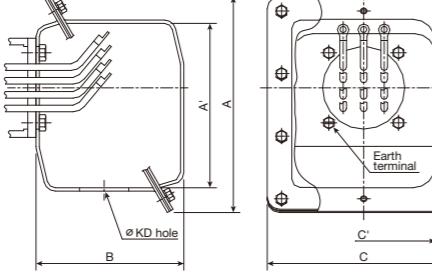


Figure 5

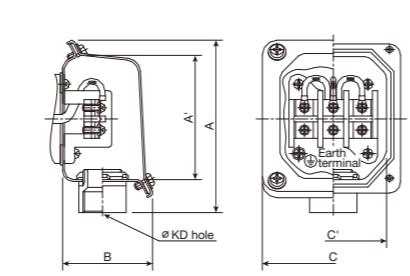


Figure 6

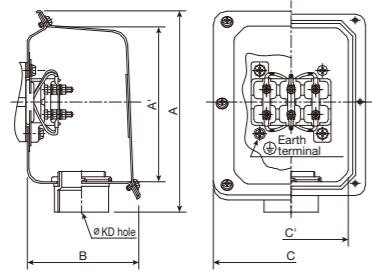


Figure 7

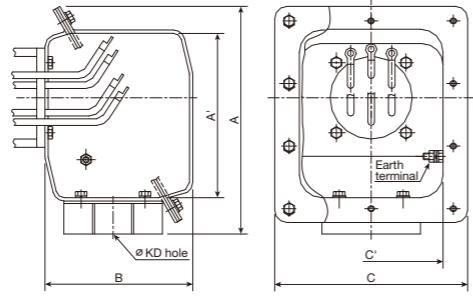


Figure 8

<Indoor use>

Frame size	Figure No.	Standard dimensions (mm)						
		A	A'	B	C	C'	ø KD	Screw size of grounding terminal or crimp type terminal lugs size
80M~112M	1	97	80	50	83	68	22, 27	M5
132S, M	2	143	125	65	123	108	35	M6
160M, L	2	173	150	112	142	123	52	M6
180M	3	225.5	203.5	135	174	160	91	M8
180L~200L	3, 4	225.5	203.5	135	174	160	91	M8 or M8
225S	5	263	201	180	235	175	91	M8

<Outdoor use>

Frame size	Figure No.	Standard dimensions (mm)						
		A	A'	B	C	C'	ø KD	Screw size of grounding terminal or crimp type terminal lugs size
80M~112M	6	116	83	62	96	72	G3/4(22)	M5
132S~160L	7	203	155	116	158	116	G1 1/2(42)	M6
180M~225S	8	278	201	180	235	175	G3(82)	M6 or M8

Wiring

- Please comply with electric installation engineering standards, interior wiring regulations, and regulation by power companies.
If wiring distance is too long, voltage drops greatly and motors may not be able to start operating.
Please ensure voltage drop in wiring is within 2%.
- The followings show standard connections of motor's lead wire.

Number of terminals for lead wire	Connection method of lead wire											
	Frame size 80M~112M	Frame size 132S~160L										
3	<p>Direct-on-line starting</p> <p>Inside wiring</p>	<p>Inside wiring</p> <p>Short-circuit plate</p> <p>Electric power source</p>										
6	<p>Inside wiring</p> <p>Short-circuit plate</p> <p>Electric power source</p>	<p>Frame size Over 180M</p> <p>Wye-delta starting</p> <p>When connected to a wye-delta starter, please take off the short circuit board.</p> <p>(6P-3.7kW is direct-on-line starting.)</p>										
Common for 200V class/400V class		<table border="1"> <thead> <tr> <th>Direct-on-line starting</th> <th>Wye-delta starting</th> </tr> <tr> <th>200V class</th> <th>400V class</th> <th>200V class</th> <th>400V class</th> </tr> </thead> <tbody> <tr> <td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Direct-on-line starting	Wye-delta starting	200V class	400V class	200V class	400V class				
Direct-on-line starting	Wye-delta starting											
200V class	400V class	200V class	400V class									
<p>Marked terminal (Lead wire draw out point)</p>												

- Precautions for use of wye-delta starting

Please ensure turning off power switch in 2 contactors method if using wye-delta starting.

If the switch is turned on, motors keep being supplied with voltage, which may cause deterioration of motor's insulation or burnout.

It doesn't happen in 3 contactors method.

Electrical characteristics (2-Pole)

<200V>

Output [kW]	Voltage [V]	Frequency [Hz]	Rated current [A]	Rated speed [min⁻¹]	Load characteristics										Starting current [A]	Starting torque [%]	Maximum torque [%]	Efficiency level (IE code)					
					50% load			75% load			100% load												
					Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Energy consumption efficiency [%]	Power factor [%]										
0.75	200	50	3.20	2870	2.05	79.6	66.5	2.51	81.4	79.5	3.09	80.8	86.7	20.4	229	301	IE3						
	200	60	3.00	3445	1.75	81.4	75.9	2.29	82.7	85.8	2.94	81.6	90.3	19.0	185	246							
	220	60	2.80	3480	1.80	81.1	67.5	2.23	83.3	79.5	2.75	83.2	86.1	20.9	224	298							
	230	60	2.80	3490	1.85	80.1	63.5	2.23	83.0	76.3	2.69	83.5	83.7	21.9	245	325							
1.5	200	50	6.00	2890	3.47	88.2	70.7	4.57	87.4	81.4	5.81	86.4	86.3	46.0	285	358	IE3						
	200	60	5.80	3460	3.16	86.5	79.2	4.35	86.6	86.2	5.68	85.5	89.2	40.0	224	300							
	220	60	5.40	3485	3.13	86.1	73.0	4.12	87.1	82.2	5.25	86.4	86.7	44.0	271	363							
	230	60	5.20	3495	3.16	85.7	69.5	4.06	87.1	79.8	5.10	86.8	85.2	46.0	296	397							
2.2	200	50	8.60	2875	4.96	89.5	71.6	6.55	89.1	81.7	8.42	87.3	86.4	76.6	330	309	IE3						
	200	60	8.40	3445	4.48	89.1	79.5	6.23	88.4	86.5	8.21	86.6	89.4	68.0	260	262							
	220	60	7.60	3480	4.41	89.0	73.5	5.86	89.3	82.7	7.49	88.4	87.2	74.8	315	317							
	230	60	7.40	3495	4.44	88.5	70.3	5.76	89.2	80.5	7.26	88.7	85.7	78.2	344	346							
3.7	200	50	13.6	2910	7.42	90.1	79.8	10.2	89.9	87.7	13.2	88.7	91.4	112	244	336	IE3						
	200	60	13.2	3490	6.84	90.2	86.6	9.73	89.9	91.6	12.9	88.6	93.4	96.0	197	277							
	220	60	12.2	3515	6.61	90.4	81.3	9.08	90.7	88.4	11.8	90.0	91.5	106	238	335							
	230	60	11.8	3525	6.59	90.0	78.3	8.87	90.6	86.6	11.4	90.2	90.3	110	261	366							
5.5	200	50	20.4	2920	11.3	90.9	77.5	15.3	90.8	85.6	19.8	90.0	89.2	146	282	347	IE3						
	200	60	19.8	3500	10.3	90.5	84.8	14.7	90.3	89.9	19.3	89.5	91.8	123	223	277							
	220	60	18.2	3520	10.1	90.7	78.9	13.7	90.9	87.0	17.7	90.7	90.1	135	270	335							
	230	60	17.6	3530	10.0	90.2	76.2	13.4	90.7	85.3	17.1	90.8	89.0	141	295	366							
7.5	200	50	28.2	2920	16.5	91.3	71.7	21.7	91.4	81.8	27.6	90.7	86.5	218	334	398	IE3						
	200	60	27.0	3505	14.3	91.7	82.6	20.0	91.6	88.8	26.3	90.7	90.8	181	269	326							
	220	60	25.0	3525	14.2	91.3	75.9	19.0	91.8	84.6	24.3	91.5	88.5	199	325	394							
	230	60	24.4	3535	14.4	90.7	71.9	18.8	91.5	82.0	23.7	91.5	86.8	208	356	431							
11	200	50	41.0	2940	22.9	91.9	75.4	30.7	92.2	84.3	39.3	91.9	87.9	282	326	IE3							
	200	60	40.2	3520	20.7	91.4	83.8	29.2	91.6	89.1	38.5	91.0	90.7	236	202	270							
	220	60	36.8	3540	20.2	91.5	78.1	27.3	92.2	85.9	35.4	92.1	88.5	260	244	327							
	230	60	35.6	3545	20.2	91.1	75.0	26.7	92.1	84.1	34.3	92.2	87.4	271	267	357							
15	200	50	56.0	2940	32.3	92.4	72.5	42.8	92.7	81.9	54.5	92.2	86.2	438	268	377	IE3						
	200	60	53.8	3525	28.3	92.2	83.1	39.6	92.5	88.6	52.1	92.0	90.4	364	220	311							
	220	60	49.8	3540	27.8	92.1	76.8	37.5	92.8	84.9	48.2	92.6	88.2	400	266	376							
	230	60	48.2	3550	28.2	91.7	72.8	37.1	92.6	82.2	47.0	92.6	86.5	419	291	411							
18.5	200	50	68.8	2940	39.0	92.8	73.8	52.3	93.2	82.3	67.0	92.6	86.1	580	300	410	IE3						
	200	60	66.8	3525	34.9	92.0	83.3	49.3	92.4	88.0	65.0	91.7	89.6	490	245	334							
	220	60	61.4	3540	34.0	91.9	77.7	46.3	92.7	84.8	59.8	92.5	87.8	539	296	404							
	230	60	59.4	3550	34.3	91.5	74.0	45.6	92.5	82.5	58.2	92.5	86.3	564	324	442							
22	200	50	81.4	2960	47.3	9																	

Electrical characteristics (4-Pole)

<200V>

Output [kW]	Voltage [V]	Frequency [Hz]	Rated current [A]	Rated speed [min ⁻¹]	Load characteristics								Starting current [A]	Starting torque [%]	Maximum torque [%]	Efficiency level (IE code)				
					50% load			75% load			100% load									
					Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Energy consumption efficiency [%]	Power factor [%]							
0.75	200	50	3.80	1440	2.81	81.4	47.2	3.21	83.2	60.8	3.71	83.4	70.0	27.3	398	499	IE3			
	200	60	3.40	1730	2.34	84.9	54.6	2.79	85.9	67.7	3.36	85.5	75.5	23.8	312	412				
	220	60	3.40	1745	2.49	83.3	47.5	2.85	85.4	60.7	3.31	85.6	69.5	26.2	378	499				
	230	60	3.40	1745	2.58	82.4	44.3	2.89	85.1	57.4	3.29	85.7	66.9	27.4	413	545				
1.5	200	50	6.80	1445	4.62	85.7	54.7	5.52	86.7	67.8	6.65	86.0	75.8	46.6	275	319	IE3			
	200	60	6.40	1740	3.82	87.5	64.7	4.89	87.8	75.6	6.16	86.6	81.2	41.0	215	270				
	220	60	6.00	1750	4.01	86.9	56.4	4.86	88.2	68.9	5.88	87.8	76.3	45.1	260	327				
	230	60	6.00	1755	4.19	85.9	52.3	4.94	87.8	65.2	5.84	87.8	73.4	47.2	284	357				
2.2	200	50	10.6	1460	7.88	86.4	46.7	9.02	88.3	59.8	10.4	88.6	69.1	96.0	410	475	IE3			
	200	60	9.40	1755	6.17	88.6	58.0	7.54	89.8	70.3	9.15	89.7	77.4	81.0	325	386				
	220	60	9.20	1765	6.69	87.5	49.3	7.77	89.5	62.3	9.08	89.9	70.7	89.1	393	467				
	230	60	9.20	1770	7.08	86.6	45.0	8.03	89.1	57.9	9.18	89.9	66.9	93.2	430	510				
3.7	200	50	15.6	1460	10.3	88.9	58.2	12.6	89.8	70.8	15.3	89.4	77.9	134	320	415	IE3			
	200	60	14.6	1755	8.55	90.1	69.4	11.2	90.4	79.2	14.2	89.6	83.6	118	259	358				
	220	60	13.8	1765	8.84	89.7	61.2	11.0	90.7	73.2	13.5	90.5	79.5	130	313	433				
	230	60	13.6	1765	9.24	88.8	56.6	11.2	90.3	69.1	13.4	90.4	76.6	136	343	473				
5.5	200	50	23.4	1465	15.8	89.9	55.9	19.0	91.0	69.0	22.8	90.8	76.6	200	340	403	IE3			
	200	60	21.4	1760	12.9	91.4	67.1	16.6	92.1	77.7	21.0	91.7	82.6	166	279	328				
	220	60	20.6	1765	13.5	90.8	58.9	16.5	92.0	71.3	20.1	92.0	78.2	183	338	397				
	230	60	20.4	1770	14.1	90.1	54.3	16.8	91.7	67.3	20.0	92.0	74.9	191	369	434				
7.5	200	50	30.8	1460	20.1	90.8	59.3	24.7	91.6	71.7	30.2	91.2	78.6	264	345	411	IE3			
	200	60	28.6	1755	16.7	92.0	70.5	22.0	92.3	80.0	28.0	91.7	84.2	218	280	330				
	220	60	27.4	1765	17.2	91.6	62.5	21.6	92.5	74.0	26.6	92.4	80.1	240	339	399				
	230	60	26.6	1770	17.7	91.1	58.2	21.7	92.3	70.4	26.3	92.4	77.5	251	370	436				
11	200	50	46.0	1475	30.7	91.2	56.8	37.2	92.2	69.5	44.9	92.1	76.7	365	316	370	IE3			
	200	60	42.0	1770	24.5	92.1	70.2	32.3	92.7	79.5	41.0	92.4	83.7	302	257	309				
	220	60	40.0	1775	25.6	91.6	61.6	31.9	92.7	73.3	39.1	92.8	79.5	332	374					
	230	60	39.4	1775	26.7	91.0	56.7	32.4	92.5	69.1	38.9	92.8	76.4	347	409					
15	200	50	58.8	1470	37.1	92.8	63.0	46.6	93.4	74.6	57.8	93.1	80.4	484	331	388	IE3			
	200	60	55.6	1760	31.3	93.3	74.1	42.2	93.5	82.3	54.4	93.0	85.6	408	268	322				
	220	60	52.0	1770	31.8	92.9	66.6	41.0	93.5	77.1	51.2	93.4	82.3	449	324	390				
	230	60	50.6	1775	32.6	92.5	62.4	41.0	93.4	73.8	50.3	93.5	80.0	469	354	426				
18.5	200	50	74.0	1475	47.9	92.6	60.2	59.1	93.4	72.6	72.0	93.4	79.4	668	276	381	IE3			
	200	60	69.0	1770	40.1	93.2	71.3	52.8	93.8	80.9	67.0	93.6	85.1	524	193	325				
	220	60	65.0	1775	41.3	92.8	63.4	51.6	93.8	75.3	63.6	93.9	81.3	576	234	393				
	230	60	64.0	1780	42.0	92.4	59.8	51.2	93.7	72.5	62.2	94.0	79.4	603	255	430				
22	200	50	84.0	1470	50.6	93.6	67.1	65.1	93.8	78.0	81.9	93.3	83.1	696	252	336	IE3			
	200	60	80.0	1760	44.3	94.3	75.9	60.4	94.3	83.6	78.5	93.6	86.5	574	185	290				
	220	60	75.0	1770	44.3	94.3	69.1	57.7	94.7	79.2	73.0	94.3	83.9	632	224	351				
	230	60	74.0	1775	44.7	93.8	65.9	56.9	94.5	77.0	71.0	94.3	82.4	660	245	384				
30	200	50	114	1470	70.9	93.9	65.0	89.9	94.4	76.5	112	94.1	82.1	1090	274</td					

Electrical characteristics (6-Pole)

<200V>

Output [kW]	Voltage [V]	Frequency [Hz]	Rated current [A]	Rated speed [min⁻¹]	Load characteristics										Efficiency level (IE code)			
					50% load			75% load			100% load				Starting current [A]	Starting torque [%]	Maximum torque [%]	Efficiency level (IE code)
					Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Energy consumption efficiency [%]	Power factor [%]					
0.75	200	50	4.20	960	2.92	79.8	46.4	3.34	81.9	59.5	3.87	81.9	68.3	24.4	238	350	IE3	
	200	60	3.80	1155	2.41	83.3	54.0	2.90	83.9	66.7	3.52	83.2	74.0	21.0	200	326		
	220	60	3.80	1165	2.58	81.4	47.1	2.96	83.5	59.6	3.44	84.0	68.2	23.1	242	394		
	230	60	3.80	1165	2.69	80.6	43.4	3.03	83.2	56.0	3.46	84.0	64.9	24.2	265	431		
1.5	200	50	7.80	970	5.87	84.8	43.5	6.64	87.0	56.3	7.61	87.2	65.2	61.0	337	495	IE3	
	200	60	7.00	1165	4.82	87.7	51.2	5.71	88.9	64.0	6.82	88.6	71.7	50.0	244	398		
	220	60	7.00	1170	5.19	86.1	44.0	5.89	88.3	56.8	6.76	88.8	65.6	55.0	295	481		
	230	60	7.00	1170	5.41	85.4	40.7	6.05	87.9	53.1	6.83	88.7	62.1	57.5	323	526		
2.2	200	50	10.6	970	7.06	88.7	50.7	8.42	89.7	63.1	10.1	89.3	70.7	84.0	330	538	IE3	
	200	60	10.0	1165	6.04	89.8	58.6	7.56	90.3	69.8	9.38	89.5	75.6	68.0	255	459		
	220	60	9.60	1170	6.29	89.1	51.5	7.51	90.5	63.7	8.97	90.4	71.2	74.8	309	555		
	230	60	9.60	1170	6.48	88.6	48.0	7.57	90.3	60.6	8.90	90.6	68.5	78.2	337	607		
3.7	200	50	16.6	970	11.3	88.7	53.4	13.5	89.6	66.4	16.1	89.3	74.2	123	289	422	IE3	
	200	60	15.6	1165	9.53	90.1	62.2	12.0	90.6	73.5	15.0	90.0	79.3	102	223	348		
	220	60	14.8	1170	9.94	89.5	54.5	12.0	90.7	67.1	14.4	90.6	74.6	112	270	421		
	230	60	14.8	1175	10.3	88.9	50.7	12.1	90.5	63.6	14.3	90.8	71.8	117	295	460		
5.5	200	50	23.8	970	15.5	91.1	56.4	18.9	91.6	68.9	23.0	91.1	75.9	176	250	390	IE3	
	200	60	22.2	1160	13.3	92.2	64.8	17.2	92.2	75.3	21.5	91.7	80.4	145	178	286		
	220	60	21.2	1170	13.7	91.6	57.4	16.8	92.4	69.6	20.5	92.2	76.3	160	215	346		
	230	60	20.8	1175	14.1	91.3	53.7	16.9	92.2	66.4	20.2	92.3	73.9	167	235	378		
7.5	200	50	31.2	965	19.2	91.2	61.8	24.3	91.4	73.1	30.4	90.6	78.6	204	257	292	IE3	
	200	60	30.0	1160	16.7	92.1	70.2	22.4	92.0	78.7	29.0	91.0	82.1	172	205	233		
	220	60	28.0	1170	17.0	91.8	63.1	21.6	92.4	73.9	27.1	91.9	79.1	189	248	282		
	230	60	27.4	1175	17.4	91.2	59.5	21.6	92.1	71.0	26.5	91.9	77.2	198	271	308		
11	200	50	45.4	965	28.0	91.8	61.8	35.4	91.9	73.3	44.1	91.1	79.0	308	268	305	IE3	
	200	60	43.0	1160	24.2	93.0	70.6	32.4	92.8	79.2	41.9	91.7	82.7	260	214	243		
	220	60	40.4	1170	24.6	92.7	63.4	31.3	93.1	74.2	39.2	92.6	79.5	286	321	321		
	230	60	40.0	1175	25.4	91.8	59.2	31.5	92.7	71.0	38.7	92.6	77.1	299	283	321		
15	200	50	62.2	970	38.0	92.1	61.8	48.2	92.2	73.1	60.4	91.2	78.7	360	262	286	IE3	
	200	60	59.4	1160	32.7	93.5	70.8	44.3	93.0	78.9	57.6	91.7	81.9	312	217	236		
	220	60	55.2	1170	33.3	93.0	63.5	42.7	93.3	74.0	53.7	92.6	79.1	343	333	333		
	230	60	54.2	1175	34.2	92.4	59.6	42.6	93.0	71.3	52.6	92.6	77.3	359	287	366		
18.5	200	50	79.2	975	52.1	91.9	55.8	63.3	92.7	68.3	76.6	92.4	75.4	524	303	329	IE3	
	200	60	73.2	1170	42.9	93.3	66.7	55.9	93.6	76.6	70.8	93.0	81.1	450	249	270		
	220	60	69.8	1175	44.8	93.0	58.3	55.2	93.8	70.3	67.6	93.7	76.7	495	301	327		
	230	60	68.8	1180	46.1	92.7	54.3	55.5	93.7	66.9	66.7	93.8	74.2	518	329	357		
22	200	50	91.2	970	57.8	92.8	59.2	71.8	93.2	71.2	88.2	92.9	77.6	592	290	317	IE3	
	200	60	85.6	1165	48.9	93.9	69.2	64.7	93.9	78.4	82.7	93.3	82.3	508	238	259		
	220	60	80.8	1175	50.1	93.7	61.5	63.0	94.2	72.9	77.9	94.0	78.8	559	288	313		
	230	60	78.4	1180	50.8	93.4	58.2	62.5	94.2	70.4	76.1	94.2	77.1	584	315	343		
30	200	50	122	980	79.5	94.2	57.8	98.1	94.6	70.0	120	94.2	76.7</td					

Additional options

- Rotational direction: clockwise as viewed from drive end
- Shaft end screw
- Mounting direction: shaft up and horizontal shaft (flange mounted)
- Additional frame earth terminal
- Additional treatment: corrosion proof
- Slide base etc. (Please contact us for more information.)

<Slide base>

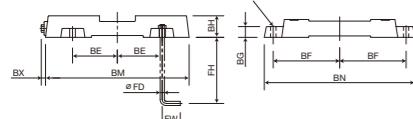


Figure 1

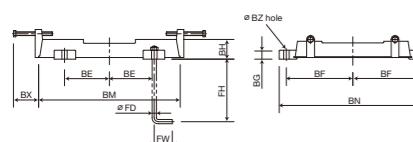


Figure 2

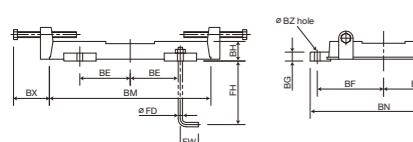


Figure 3

Frame size	Figure No.	Length of base (mm)							Discount moving distance (mm)	Bolt (mm)			Approx. weight (kg)		
		BE	BF	BG	BH	BM	BN	BX		FD	FH	FW			
80M	1	65	90	15	30	210	210	11	13	40	(10)	(70)	(40)	2.0	
90L		70	105	15	30	225	240	12	13	40	(10)	(70)	(40)	2.2	
100L		80	115	20	40	265	260	12	13	50	(10)	(70)	(40)	3.0	
112M		95	115	20	40	285	260	12	13	50	(10)	(70)	(40)	3.5	
132S		110	120	25	45	350	280	13	13	60	(10)	(70)	(40)	5.0	
132M			140			355	318							6.0	
160M				165	30	50	406	380	12	16	70	(12)	(110)	(50)	8.5
160L						185	404	420						10	
*160M	2			165	26	50	406	372	70	16	70	(12)	(110)	(50)	9.0
*160L						185		412							9.5
180M	3			185	25	55	450	410	100	16	80	(12)	(110)	(50)	14
180L						205		450							16
200M	3			210	30	60	520	470	100	19	100	(16)	(170)	(65)	20
200L					230			510							22
225S				217.5	30	60	570	485	150	19	100	(16)	(250)	(65)	23
225M					230			510							25

Note) 1. There are 4 moving discount bolts in figure 2 and 3.
2. No base bolt attached.
3. The () measurement are recommended measurement when base bolts are used.
4. * marks are for totally enclosed fan cooled 160M, 160L only.

Global series

(Please contact us for more information.)

• US series

US series satisfy Premium Efficiency or Energy Efficient of Energy Independence and Security Act (EISA).

The series are certified by Conformity Certification No. (CC No.)

*The series do not satisfy UL standards.

• Chinese series

China series satisfy grade GB3 of CEL-007. (Also compatible with grade GB2 from January 2016)

*The series do not satisfy CCC mark.

• European (EU) Series

Europe (EU) series satisfy Commission Regulation (EC) No. 640/2009.

The series satisfy IE3 Efficiency and also CE Marking.

Country/Region	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
U.S.A	EP Act: The Energy Policy Act EP Act: (-IE2) Regulation			EISA: Energy Independence and Security Act NEMA Premium (-IE3) Regulation						
China	CEL-007: Energy Efficiency Labeling Regulations Old GB2 (Standard efficiency + α, GB18613-2006) Regulations		New GB3 (-IE2, GB18613-2012) Regulations		New GB2 (IE3) Regulations					
Europe (EU)			European Commission Rules IE2 Regulations		IE3 Regulations (over 7.5kW) (over 0.75kW)					

Selection and application of motors for energy saving

To save electricity effectively, it is necessary to consider various perspectives about each item of selection, operation, and maintenance. When selecting motors, first decide voltage, frequency, number of poles, output power, frequency of use, and mounting method.

In addition, it is necessary to decide ambient conditions, connection methods with load, and mechanical options.

Power supply

Motors are designed to have their best performance when operating according to rated voltage and rated frequency displayed on the nameplates. To avoid using in different condition from nameplates leads to an effective energy saving.

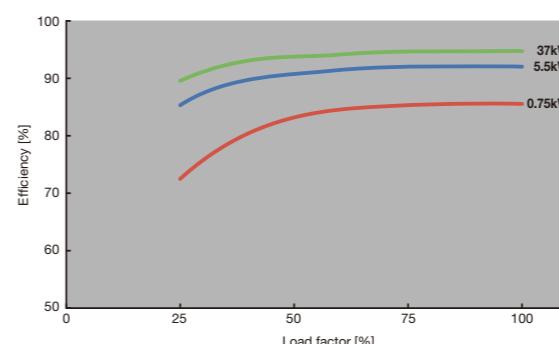
Efficiency of motors

Efficiency of motors is ratio of output to input. When selecting motors, please carefully consider load factor, output power, and number of poles as mentioned below;

1. Load factor and efficiency

As Figure 1 shows, motors generally have maximum efficiency with 75%~100% of load factor. Thus, if the motors are operated in this range, it would save energy the most. If load factor is too low, motors may have to be reconsidered.

Figure 1 Load factor and efficiency



3. Rotational speed and efficiency

Efficiency of motors generally depends also on the speed. If load is fixed, the number of poles and speed will be decided considering the usage of saving electricity, efficiency of deceleration devices, etc.

Also, if motors need to operate in variable speed, VARIABLE SPEED DRIVE is necessary to control operation for various load change.

Precaution when using high efficiency motors

High efficiency motors generally rotate faster than standard efficiency motors because of generated loss reduction.

If standard efficiency motors are replaced by high efficiency motors in pump, fan, etc. applications, the rotational speed becomes faster and the output increases.

Although efficiency of motors is high, power consumption may increase with increased output power.

Also, primary and secondary resistance may be decreased to reduce copper loss, which results in high starting current compare to standard efficiency motors. In that case, breaker may have to be changed.

Toshiba Variable Speed Drive series

Plentiful variations, from simply adjustable speed control to vector control

Notes in case operating motors with variable speed drive (VSD)

Starting characteristics

When a motor is driven by VSD, its operation is restricted by the VSD's overload current rating, so the starting characteristic is different from those obtained from commercial power supply operation.

Although the starting torque is smaller with VSD than with the commercial power supply, a high starting torque can be produced at low speeds by adjusting the V/f pattern torque boost amount or by employing vector control.

(It depends on motor specification and setting of VSD (maximum 200%)), When a larger starting torque is necessary, select VSD with a larger capacity and examine the possibility of increasing the motor capacity.

Noise

(1) The magnetic noise of motor with VSD drives is larger than operated by the commercial supply. Moreover, when the motors are operated over rated speed, the windy noise of the motors increases.

(2) To reduce noise, install noise reduction reactor between VSD and motor or use silent type VSD. Please contact us.

Vibration

(1) Toshiba VSD uses sine wave PWM control and the vibration is small. However, it experiences more vibrations than operated by the commercial power supply.

(2) Vibration may increase by base rigidity and resonance with machine etc. In such case, it may be necessary to take countermeasures mechanically such as change of base and motor coupling, etc.

Gear, belt, chain

(1) When oil lubricated gear use,lubrication may become worst at low speed.

(2) When operating at frequencies exceeding 60 Hz, power transmission mechanisms such as gear, belts and chains, etc., may cause problems such as production of noise, a reduction in strength, or shortening of service life.

(3) When running with VSD, please contact us to confirm if the operating range is tolerance.

Increase of operating frequency

Before setting the maximum frequency to 60Hz or higher, please contact us to confirm that this operating range is tolerance for the motor.

Motor end surge voltage suppression

In the system of operating 400V class high efficiency motor driven by the voltage type PWM VSD using super high-speed switching device (e.g. IGBT), insulation degradation of motor wiring may occur by the cable length, cable installation method and the cable type. In this case, the following countermeasures are suggested.

• In case of normal insulation motor

Suppress the surge voltage by AC reactors or surge suppression filter to keep surge voltage at motor terminal below 850V.

• In case of enhanced insulation type of motor

Permissible surge voltage of motor is 1250V or less. When surge voltage is generated more than 1250V, suppress the surge voltage by AC reactors or surge suppression filter at load side of VSD.

Input voltage

When input voltage becomes remarkably low due to vector control etc., consider using dedicated motor. In case the surge voltage becomes larger than permissive voltage, install AC reactors or surge suppression filter at load side of VSD.

Electric corrosion in the ball bearing

When a motor is driven by a VSD, electric corrosion may happen due to sealed grease condition of bearing, wiring method or operation conditions.

Please contact us if you need any countermeasures. (Countermeasures to motor to prevent electric corrosion are not provided without customer's request.)



Main Specifications Tables

Model	Input voltage class	Capacity range	Overload rating	Machinery specifications		Panel specifications		Control specifications		Functions				
				Set up dial	Easy/Standard set up switch	Local/Remote switch	V/f control	Auto-energy saving control	Sensorless vector control	Sensor vector control	Torque control	Force drive system	Direct on line/Variable speed drive switch	Brake sequence system
VF-nC3	3-phase 200V	0.1~3.7kW	150%-one minute	●	●		●	●	●					
	Single phase 200V	0.1~2.2kW												
	Single phase 100V	0.1~0.75kW												
VF-S15	3-phase 200V	0.2~15kW	150%-one minute	●	●		●	●	●					
	Single phase 200V	0.2~2.2kW												
	3-phase 400V	0.4~15kW												
VF-AS1	3-phase 200V	0.4~132kW	150%-one minute		●		●		●	●				
	3-phase 400V	0.75~500kW												
VF-FS1	3-phase 200V	0.4~30kW	110%-one minute			●	●	●	●					
	3-phase 400V	0.4~30kW												
VF-PS1	3-phase 200V	0.4~90kW	120%-one minute		●	●	●	●	●					
	3-phase 400V	0.75~630kW												

*1: Optional.

Precautions

- * If you are using the motor on equipment that could seriously affect human lives or public functions (such as nuclear power control, traffic machinery, transport machinery, life-support system, chemical plant, various types of safety equipment, etc.), please contact us for consultation.
- * Though Toshiba's motors are made under a strict quality control, due to the environment and conditions, there is a possibility of malfunctioning. Please create a failsafe or back-up system on the equipment design, if there is any possibility of serious damage when the motor's malfunction.
- * The usage environment's limit range is stated in the catalog and manual. Please do not use it out of the usage environment range. It could cause accidents such as injuries and fire.
- * Please read the manual's safety instructions, and use the motor correctly.
- * If the motors are used for personal transports or elevators, please establish a protection device for safety of the equipping side.
- * Contact to your nearest Toshiba representative in advance if you are to use the product in a clean room or for a food product machine. If you use a standard product to which a special treatment has not been made, grease and oil may leach out of the spigot joint and the shaft pass-through part of the bearing bracket and the stator frame. You need to pay attention when using the product in a place where oil should not be spilled.

For further information, please contact your nearest Toshiba Representative. The information in this brochure is subject to change without notice.

TOSHIBA

**Toshiba Industrial Products and
Systems Corporation**

Global Sales Department Motor Drive Division
580, Horikawa-cho, Saiwai-ku,
Kawasaki, Kanagawa 212-0013, Japan
Tel : +81-44-520-0828
Fax : +81-44-520-0508