

FUJI LOW-VOLTAGE INDUCTION MOTORS

» 3 Phase Premium Efficiency Motor [IE3 class] 2, 4, 6P Output: 45 to 375 kW

» 3 Phase Standard Efficiency Motor [IE1 class] 2, 4P Output: 400 to 450 kW 8P Output: 30 to 250 kW



IE3
Class

MILU1
SERIES
PREMIUM EFFICIENCY MOTOR



[FRAME NUMBER]

225S-355K

BRIGHTEN FUTURE WITH TECHNICAL BREAKTHROUGH.

FUJI LOW-VOLTAGE THREE - PHASE INDUCTION MOTOR

FEATURES
[PREMIUM EFFICIENCY MOTOR]

High efficiency

Top-runner standards achieved

*Equivalent to efficiency class IE3 of JIS C 4034-30:2011

ALL PREMIUM

[FRAME NUMBER]

225S-355K

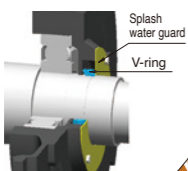
Energy saving

Running cost greatly decreased

Improved workability

Terminal box mounted at the top
Easy to change cable outlet direction

Outdoor structure



Outdoor type

Global standard protection rating: IP55

Easy maintenance

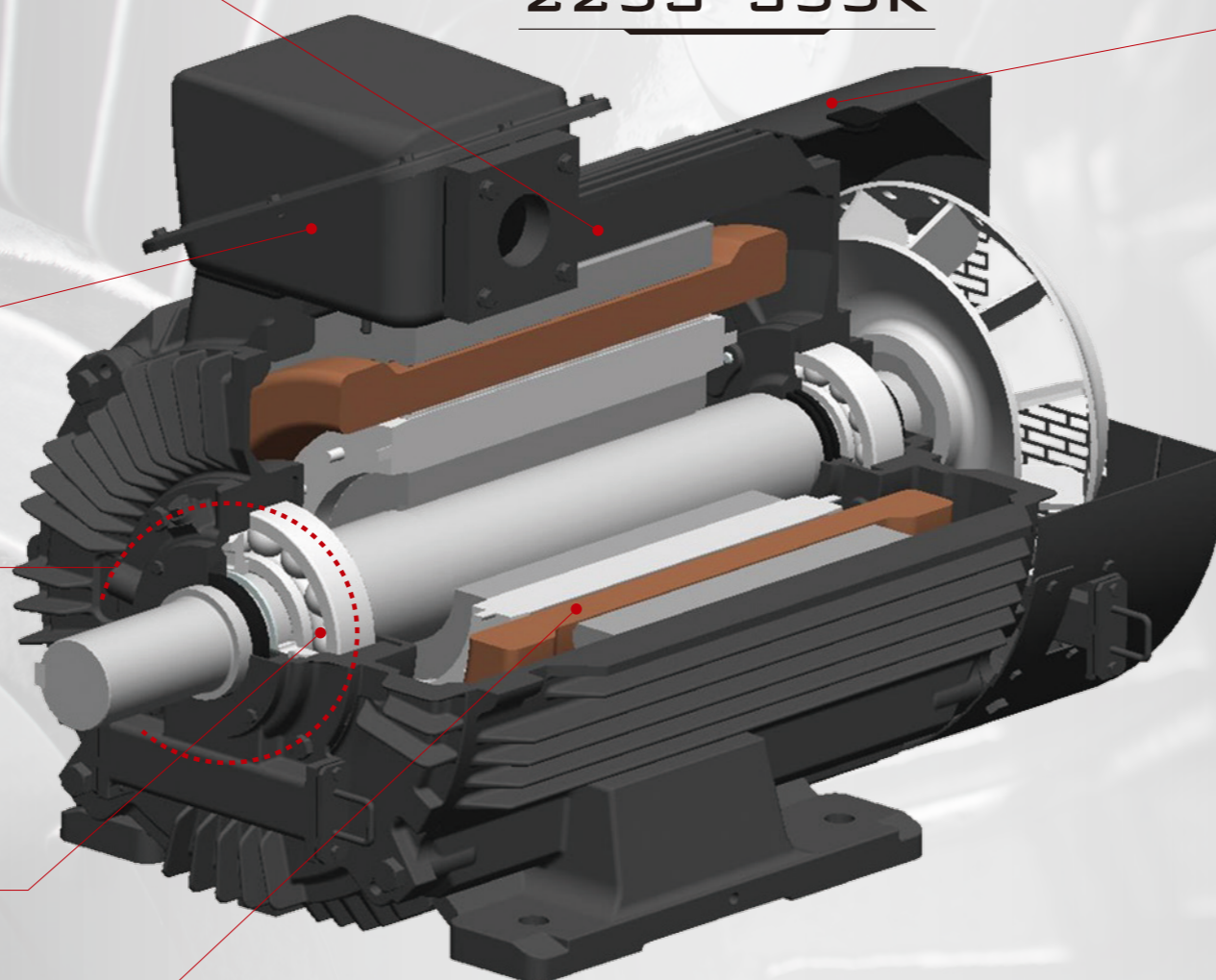
Grease filling method adopted
No need for bearing replacement

*Frame size 225S or larger

Long service life

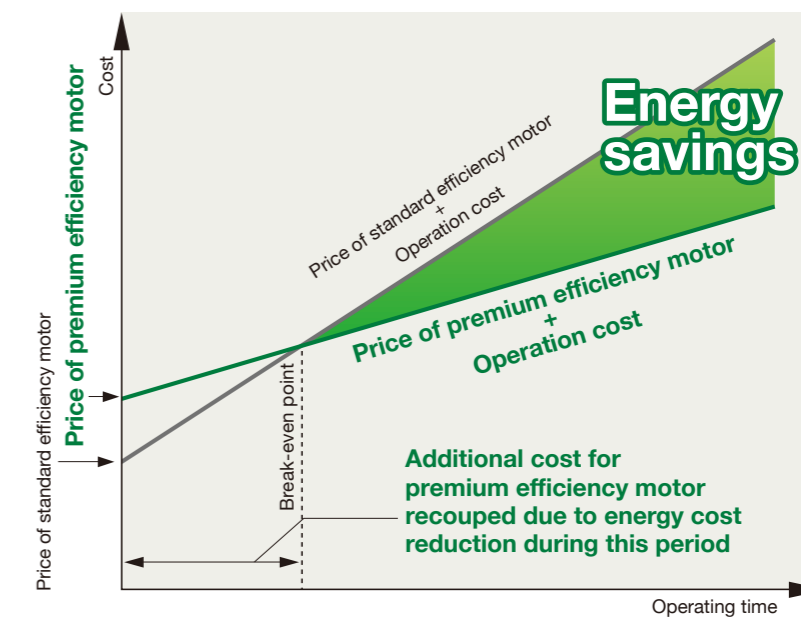
Longer service life for insulation system

*Comparison with conventional products of Fuji



Premium efficiency motors have higher efficiency than standard efficiency motors and offer a higher energy-saving effect with longer-hour applications, improving economic efficiency.

Energy-saving effect



Options

Grounding ring

Destructive shaft voltages can occur in rare instances when operating the motor with an inverter due to bearing grease, wiring, and operating conditions. As a countermeasure, the motor can be ordered with a maintenance-free grounding ring (AEGIS® SGR). Please request this option when ordering.



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STANDARD SPECIFICATION

Outdoor

	Premium efficiency	Standard efficiency		
	Totally-enclosed fan-cooled type		Totally-enclosed fan-cooled type	
Housing structure	Totally-enclosed fan-cooled type		Totally-enclosed fan-cooled type	
Type	MLU1		MLA9	
Number of poles	2P, 4P, 6P		2P, 4P	8P
Output	45 to 375 kW		400 to 450kW	30 to 250kW
Frame size	225S to 355K		355K	225S to 355K
^{*1} Rated voltage and rated frequency	200/200 V and 400/400 V-50/60Hz		200/220 V and 400/440 V-50/60 Hz	
Time rating	S1 (continuous)		S1 (continuous)	
Protection rating	IP55		IP44	
^{*2} Starting method	45 to 55 kW: λ - Δ starting 75 kW or larger: Direct-on-line starting		Direct-on-line starting	30 to 55 kW: λ - Δ starting 75 kW or larger: Direct-on-line starting
^{*3} Thermal class	155 (F)		155 (F)	
Direction of rotation	CCW (counterclockwise as seen from load)		CCW (counterclockwise as seen from load)	
Ambient conditions	Temperature	-30°C to +40°C		-20°C to +40°C
	Humidity	100% RH max. (no condensation)		95% RH max. (no condensation)
	Altitude	1,000 m max.		1,000 m max.
	Other	No corrosive or explosive gas or vapor		No corrosive or explosive gas or vapor
Terminal box	Mounting position (leg mounting type)	—	225S	250S or larger
	Port orientation (leg mounting type)	Top side	Top side	Left side as seen from load
	Material	Leftward as seen from load	Leftward as seen from load	Downward
Lead wire	System	Steel plate		Steel plate
	^{*4} No. of wires	Lug system	Lug system	Lug system
Standard	Applicable	Munsell N1.2 (black)		Munsell N5 (gray)
	Efficiency	JIS C 4213		JIS, JEC, JEM
		JIS C 4034-30:2011 (IE3-equivalent)		—

Note 1) The manufacturable range is up to 600 V.
 Note 2) Rated voltage and rated frequency (*1): output 132 kW or less: dual voltage, output over 132 kW: Single voltage specification (with 4P)
 Note 3) The starting method (*2) is based on 4P.
 Note 4) Temperature rise for insulation class (*3): frame size 225S: *B* rise
 Note 5) No. of lead wires (*4): Fuji's standard value For made-to-order products, specify the starting method and no. of lead wires.
 Note 6) If you wish to export products (motors as they are or installed in machines, equipment, etc.) to foreign countries, please contact us separately to obtain information about the high-efficiency regulations enforced and implemented in the respective countries.

MODEL LIST

2, 4, 6P

MLU7044 For products with stock indication, please provide the part number code when placing orders.
 Part number code Stock indication In stock (200-400/200-400, 220-440 V)
 *Those without a stock indication are made to order.

Frame size	Type	Output [kW]			Thermal class
		2P	4P	6P	
Premium efficiency	225S	MLU1220	55 MLU7044	—	155 (F)
		MLU122N	—	55 MLU7045 MLU7046	
	250S	MLU1250	75	—	
		MLU125E	—	75	
	250M	MLU1252	90	—	
		MLU125F	—	90	
	280S	MLU1280	110	—	
		MLU128E	—	110	
	280M	MLU1282	132	—	
		MLU128F	—	132	
	280L	MLU1284	160	160	
		MLU1286	200	200	
315L	MLU1314	220,250	220,250		
	MLU1316	300	300		
	MLU1350	315	315		
	MLU1352	355	355,375		
355K*	MLU1354	375	—		
	MLU1356	—	355,375		
	MLA9354	400	400		
Standard efficiency	355K*	MLA9356	450	450	155 (F)

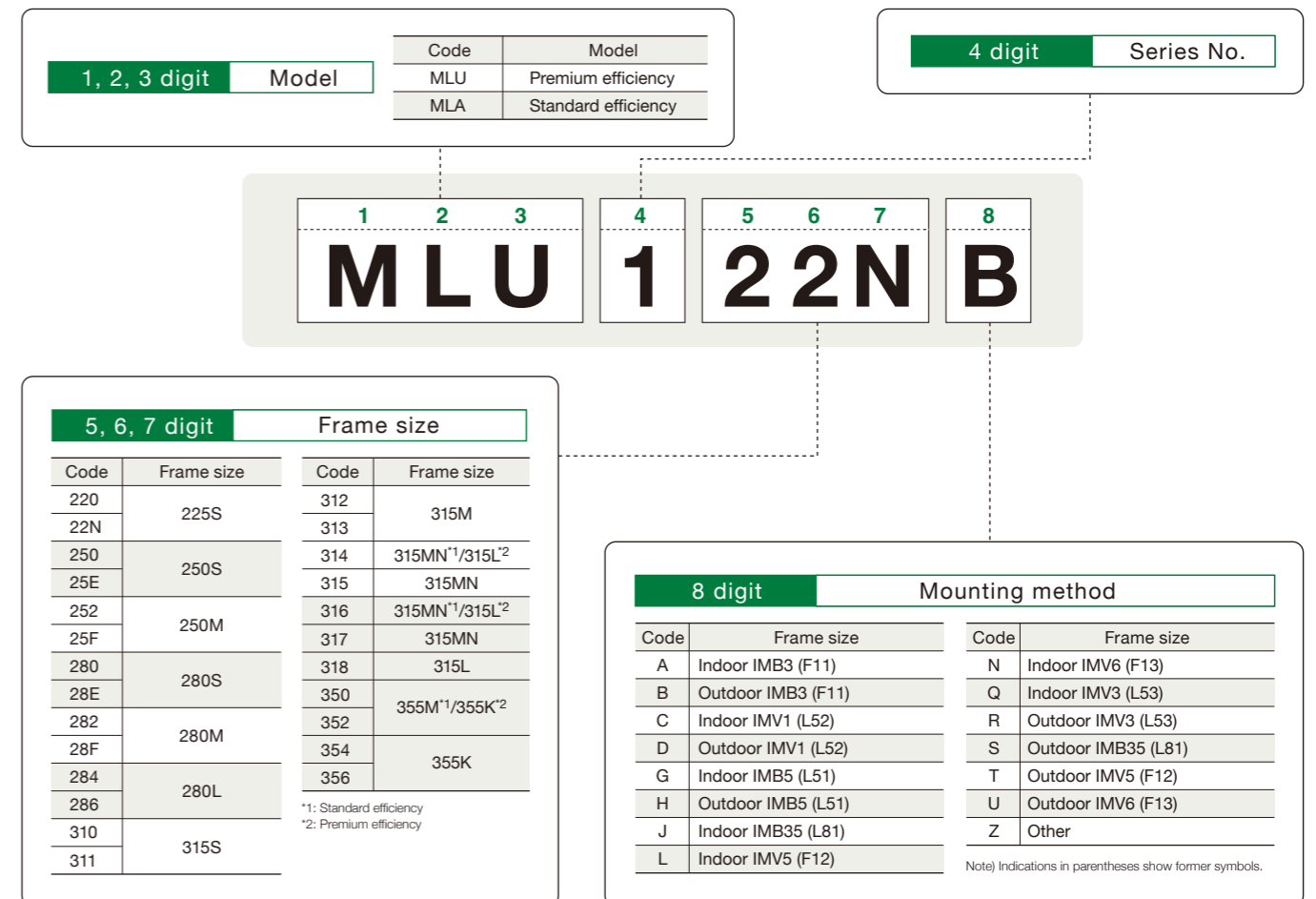
Note) The frame sizes marked with an asterisk (*) indicate Fuji's own designations.

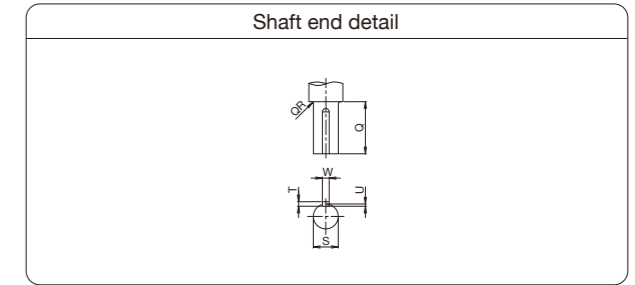
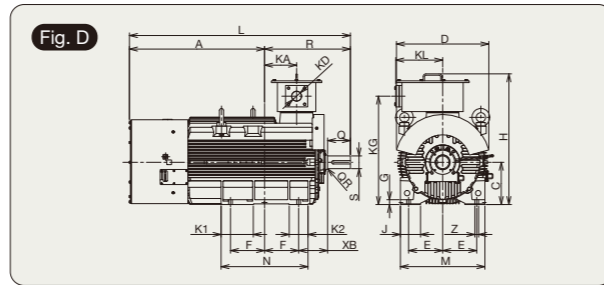
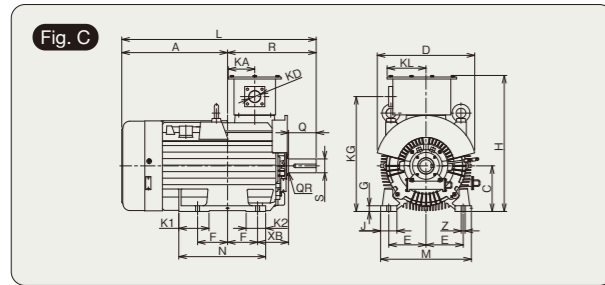
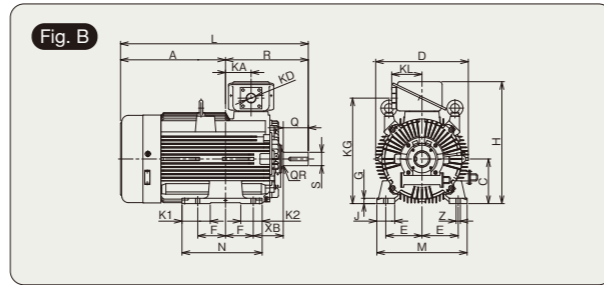
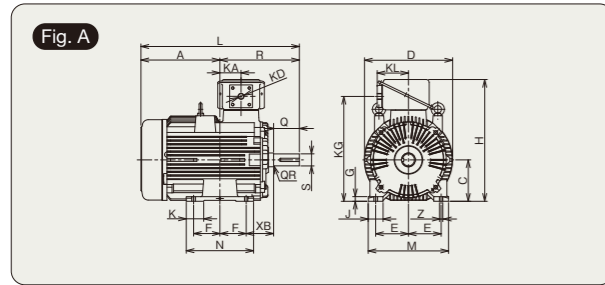
8P

Frame size	Type	Output [kW]	Thermal class	
		8P		
Standard efficiency	225S	MLA9221	30	155 (F)
	250S	MLA9250	37	
		MLA9251	37	
	250M	MLA9252	45	
		MLA9253	45	
	280S	MLA9280	55	
		MLA9281	55	
	280M	MLA9282	75	
		MLA9283	75	
	315S	MLA9310	90	
		MLA9311	90	
	315M	MLA9312	110	
		MLA9313	110	
	315MN*	MLA9314	132	
		MLA9315	132	
		MLA9316	150	
	315L	MLA9317	150	
		MLA9318	160	
355M*	MLA9350	185		
	MLA9352	200		
355K*	MLA9354	220		
	MLA9356	250		

Note) The frame sizes marked with an asterisk (*) indicate Fuji's own designations.

TYPE NUMBER NOMENCLATURE



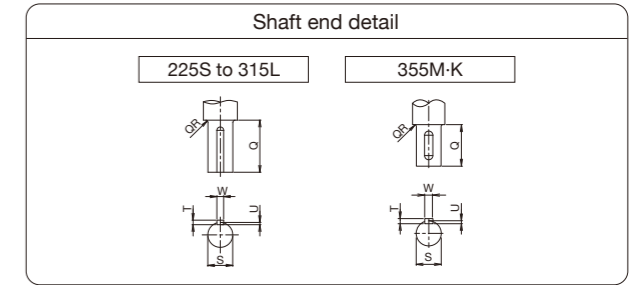
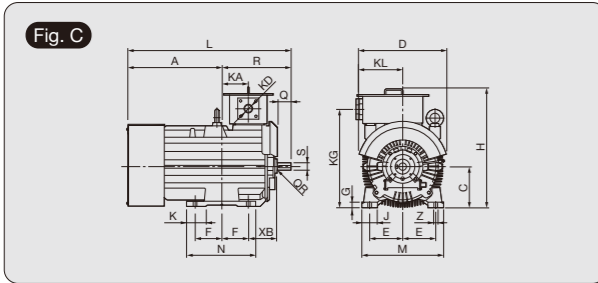
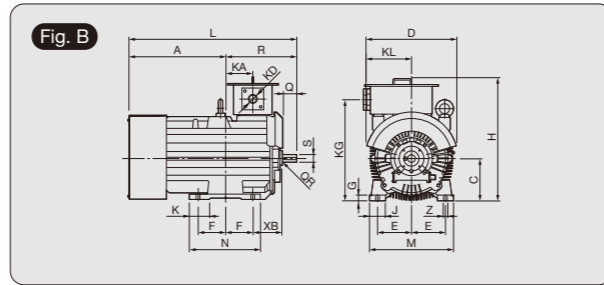
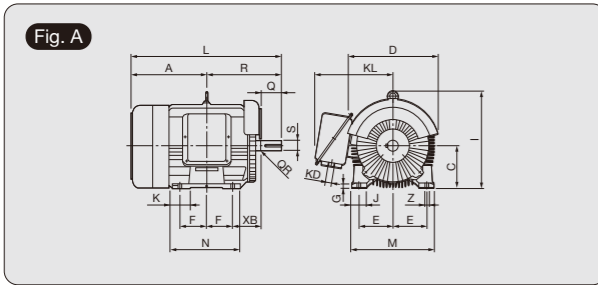


Premium efficiency

Frame size	Type	Output [kW]			Drawing No.	A	C	D	E	F	G	H	J	K	K1	K2	KA	KD	KG	KL	L	M	N	R	XB	Z	Shaft end						Bearing				Approximate mass [kg]
		2P	4P	6P																							Operation side		Opposite operation side								
		Q	QR	S																							T	U	W	2P	4P-6P	2P	4P-6P				
225S	1220B	55	—	—	A	429	225	476	178	143	25	662	80	95	—	—	115	G2 1/2	570	170	831	402	402	149	18.5	110	1	55m6	10	6	16	6312ZZC3	—	6312ZZC3	—	400	
	122NB	—	55	45																						—	—	—	—	—	—	—	—	—	—	—	—
250S	1250B	75	—	—	B	578.5	250	519	203	155.5	30	708	100	—	173	135	143.5	G2 1/2	616	170	1012	479	433.5	168	24	110	1	55m6	10	6	16	6314C3	—	6314C3	—	590	
	125EB	—	75	55																						—	—	—	—	—	—	—	—	—	—	—	—
250M	1252B	90	—	—	B	559.5	250	519	203	174.5	30	708	100	—	173	135	162.5	G2 1/2	616	170	1012	479	452.5	168	24	110	1	55m6	10	6	16	6314C3	—	6314C3	—	620	
	125FB	—	90	75																						—	—	—	—	—	—	—	—	—	—	—	—
280S	1280B	110	—	—	C	657	280	628	228.5	184	45	861	160	—	225	225	155.5	G2 1/2	735	230	1141	630	570	484	190	24	110	1	55m6	10	6	16	6314C3	—	*2	—	920
	128EB	—	110	90																							—	—	—	—	—	—	—	—	—	—	—
280M	1282B	132	—	—	C	631.5	280	628	228.5	209.5	45	861	160	—	225	225	181	G2 1/2	735	230	1141	630	570	509.5	190	24	110	1	55m6	10	6	16	6314C3	—	*2	—	940
	128FB	—	132	110																							—	—	—	—	—	—	—	—	—	—	—
280L	1284B	160	—	—	D	842.5	280	628	228.5	228.5	45	909	160	—	210	120	200	G2 1/2	743	460	1371	630	800	528.5	190	24	110	1	55m6	10	6	16	6314C3	6320	*2	NU314	1250
	1286B	200	—	132																							—		—	—	—	—	—	—	—	—	—
315L	1314B	220	—	—	D	1008	315	689	254	254	45	974	150	—	240	140	239	*1	808	460	1618	730	900	610	216	28	140	1	65m6	11	7	18	6314C3	6222	*2	NU314	1300
	1316B	300	—	220																							—	—	—	—	—	—	—	—	—	—	—
355K	1350B	315	—	—	D	987	355	778	305	355	55	1059	190	—	360	250	375	*1	893	460	1736	810	950	749	254	28	140	1	65m6	11	7	18	6316C3	6222	*2	NU314	1550
	1352B	355	—	—																							—	—	—	—	—	—	—	—	—	—	—
355K	1354B	375	—	—	D	987	355	778	305	355	55	1059	190	—	360	250	375	*1	893	460	1736	810	950	749	254	28	140	1	65m6	11	7	18	6316C3	6222	*2	NU314	1600
	1356B	—	—	300,315																							—	—	—	—	—	—	—	—	—	—	—
355K	1356B	—	—	355,375	D	987	355	778	305	355	36	160	—	330	180	375	*1	893	460	1806	730	890	819	254	28	140	2.5	100m6	16	10	28	6316C3	6222	*2	NU314	1700	
	1356B	—	—	355,375																						—	—	—	—	—	—	—	—	—	—	—	—

Note 1) The standard mounting method is IMB3 (F11: frame mounting). Please contact us for other mounting methods.
 Note 2) Dimensional tolerance: height of rotating shaft C ≤ 250 mm: $\frac{0}{-0.05}$ mm, C > 250 mm: $\frac{0}{-0.1}$ mm, shaft end key groove (W) dimensional tolerance: average class (N9).
 Note 3) The 2-pole models are for direct connection only.
 Note 4) Bearing nos. beginning with "63" represent a single row deep groove ball bearing, "NU" a cylindrical roller bearing, "ZZ" a grease-filled shielded ball bearing and "C3" a bearing with the radial gap of C3.

Note 5) *1: Please contact us for the individual dimensions. *2: NU314MCCG50
 Note 6) The dimensions are subject to change. Please request dimensional outline drawings for designing.



Standard efficiency

Frame size	Type	Output [kW]				Drawing No.	A	C	D	E	F	G	H	I	J	K	KA	KD	KG	KL	L	M	N	R	XB	Z	Shaft end						Bearing								Approximate mass [kg]	
		2P	4P	6P	8P																						Operation side		Opposite operation side				Opposite operation side									
		Q	QR	S	T																						U	W	2P	4P	6P	8P	2P	4P	6P	8P						
225S	9221				30	A	406	225	475	178	143	25	-	515	80	95	-	G2 1/2	-	414	838	436	366	432	149	19	140	2	65m6	11	7	18							6315ZZ	6312ZZ	330	
250S	9250				37	B	445.5	250	535	203	155.5	30	673	-	100	120	143	G2 1/2	581	170	909	506	411	463.5	168	24	140	2	75m6	12	7.5	20							6318	6314ZZ	465	
250M	9251				37		464.5	250	535	203	174.5	30	673	-	100	120	162.5	G2 1/2	581	170	947	506	449	482.5	168	24	140	2	75m6	12	7.5	20							6318	6314ZZ	520	
280S	9252				45	B	495	280	605	228.5	184	35	805	-	100	120	167	G2 1/2	675	230	1039	557	468	544	190	24	170	2	85m6	14	9	22								6320	6317	685
280M	9253				45		520.5	280	605	228.5	209.5	35	805	-	100	120	192.5	G2 1/2	675	230	1090	557	519	569.5	190	24	170	2	85m6	14	9	22								6320	6317	740
315S	9280				55	C	713	315	623	254	203	42	917	-	120	145	201	*1	753	350	1302	628	526	589	216	28	170	2	95m6	14	9	25								6322	NU322	1075
315M	9281				55		737.5	315	623	254	228.5	42	917	-	120	145	226.5	*1	753	350	1352	628	577	614.5	216	28	170	2	95m6	14	9	25								6322	NU322	1210
315MN	9282				75	C	737.5	315	623	254	228.5	42	917	-	120	145	226.5	*1	753	350	1452	628	577	614.5	216	28	170	2	95m6	14	9	25								6322	NU322	1255
315L	9283				75		837.5	315	623	254	228.5	42	917	-	120	145	226.5	*1	753	350	1452	628	577	614.5	216	28	170	2	95m6	14	9	25								6322	NU322	1310
355M	9310				90	C	862	315	623	254	254	42	917	-	120	145	252	*1	753	350	1502	628	628	640	216	28	170	2	95m6	14	9	25								6322	NU322	1395
355K	9311				90		847	355	695	305	280	42	998	-	120	145	310	*1	883	460	1591	730	690	744	254	28	210	2.5	100m6	16	10	28								6322	NU322	1585
	9312				110	C	847	355	695	305	280	42	998	-	120	145	310	*1	883	460	1591	730	690	744	254	28	210	2.5	100m6	16	10	28								6322	NU322	1755
	9313				110		884	355	695	305	280	42	998	-	120	145	310	*1	883	460	1633	730	840	749	254	28	140	2	65m6	11	7	18	6216C3	6322	-	6322	NU214C3	NU322	-	NU322	1905	
	9314	400	-	-	-	C	884	355	695	305	355	42	998	-	120	145	385	*1	883	460	1691	730	840	749	254	28	210	2.5	100m6	16	10	28								6322	NU322	2000
	9315	-	400	-	220		884	355	695	305	355	42	998	-	120	145	385	*1	883	460	1691	730	840	749	254	28	210	2.5	100m6	16	10	28								6322	NU322	2000
	9316	450	-	-	-	C	884	355	695	305	355	42	998	-	120	145	385	*1	883	460	1691	730	840	749	254	28	210	2.5	100m6	16	10	28								6322	NU322	2000
	9317	-	450	-	250		872	355	695	305	355	42	998	-	120	145	385	*1	883	460	1691	730	840	749	254	28	210	2.5	100m6	16	10	28								6322	NU322	2000

Note 1) For information on the models indicated by [shaded], refer to "DIMENSIONAL OUTLINE DRAWINGS [Premium Efficiency Motor]" (pages 8 - 9).

Note 2) The standard mounting method is IMB3 (F11: frame mounting). Please contact us for other mounting methods.

Note 3) Dimensional tolerance: height of rotating shaft C ≤ 250 mm: $\frac{0}{-0.03}$ mm, C > 250 mm: $\frac{0}{-0.04}$ mm, shaft end key groove (W) dimensional tolerance: average class (N9).

Note 4) The 8-pole models indicated by [shaded] are for non-direct connection only. The other models are for direct connection only.

Note 5) The 2-pole models use a fan for one-direction rotation only.

Note 6) Bearing nos. beginning with "63" represent a single row deep groove ball bearing, "NU" a cylindrical roller bearing, "ZZ" a grease-filled shielded ball bearing and "C3" a bearing with the radial gap of C3.

Note 7) *1: Please contact us for the individual dimensions.

Note 8) The dimensions are subject to change. Please request dimensional outline drawings for designing.

CHARACTERISTIC SPECIFICATION

400 V class

Premium efficiency

2P

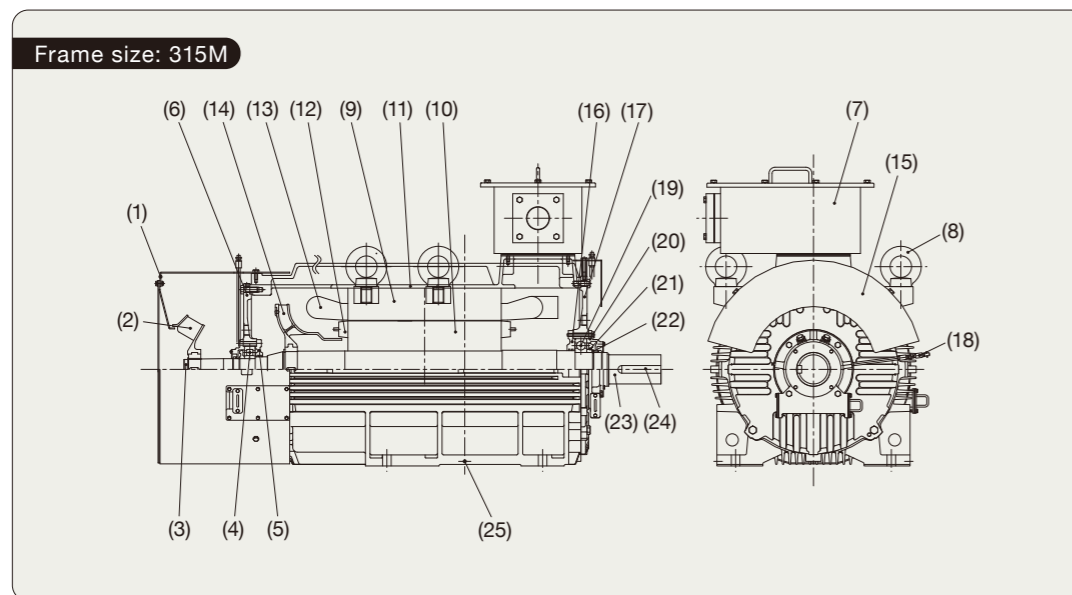
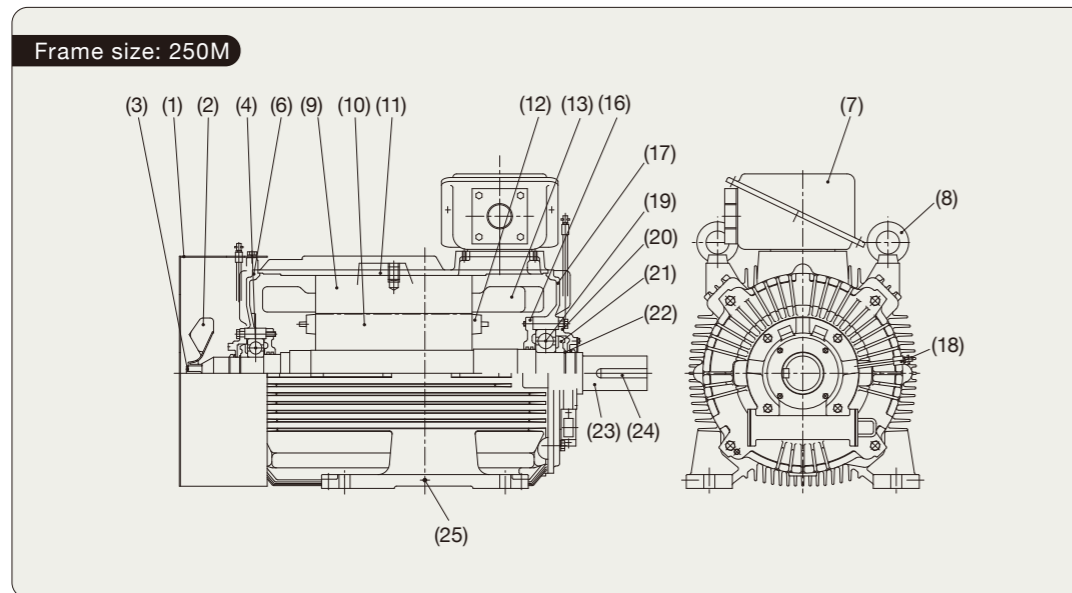
Type	Output [kW]	Voltage [V]	Frequency [Hz]	Rated current [A]	Rated speed [min ⁻¹]	Load characteristic									Efficiency class	Starting current [A]	Starting torque [%]	Maximum torque [%]	Input difference from standard motor[kW] (with 100% load)
						50% load			75% load			100% load							
						Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Efficiency [%]	Power factor [%]					
MLU1220	55	400	50	96	2965	54.6	93.3	77.9	74.5	94.2	84.8	96	94.3	87.7	IE3	864	200	315	2.315
		400	60	94	3560	50.8	91.2	85.7	72	92.4	89.5	94	93.0	90.8	IE2	696	150	260	1.366
		440	60	86	3565	49	91.5	80.5	67	93.2	86.7	86	93.6	89.6	IE3	774	180	320	1.613
MLU1250	75	400	50	126	2975	69.1	93.6	83.7	96.8	94.6	88.7	126	94.8	90.6	IE3	1070	135	281	1.792
		400	60	126	3570	66.8	92.2	87.9	95.4	93.4	91.1	126	93.7	91.7	IE2	882	95	230	1.657
		440	60	115	3575	62.8	92.5	84.7	88.2	93.7	89.3	115	94.2	90.8	IE3	978	120	280	1.904
MLU1252	90	400	50	150	2975	81.8	94.1	84.4	115	95.0	89.3	150	95.1	91.0	IE3	1275	140	275	2.346
		400	60	150	3570	79.2	93.4	87.8	114	94.3	90.9	150	94.5	91.6	IE2	1050	100	230	2.694
		440	60	138	3575	74.8	93.5	84.4	105	94.7	89.1	138	95.0	90.1	IE3	1173	125	275	3.089
MLU1280	110	400	50	188	2975	104	94.2	81.0	145	95.2	86.3	188	95.4	88.6	IE3	1504	122	260	3.230
		400	60	188	3570	100	93.4	85.0	142	94.5	88.7	188	94.7	89.3	IE2	1222	80	210	2.763
		440	60	170	3575	94.1	93.5	82.0	131	94.7	87.3	170	95.2	89.2	IE3	1360	107	255	3.244
MLU1282	132	400	50	228	2975	129	94.5	78.1	177	95.3	84.7	228	95.4	87.6	IE3	1881	142	275	3.114
		400	60	224	3575	120	93.6	84.8	170	94.7	88.8	224	95.1	89.6	IE2	1512	90	225	3.440
		440	60	204	3575	114	93.8	81.0	158	95.0	86.5	204	95.5	88.8	IE3	1683	120	275	3.716
MLU1284	160	400	50	264	2975	142	94.5	86.0	202	95.4	89.9	264	95.6	91.4	IE3	2244	130	275	3.212
		400	60	264	3575	138	93.8	89.2	200	94.7	91.4	264	95.0	92.0	IE2	1848	95	225	2.702
		440	60	240	3575	129	93.8	86.8	183	95.0	90.5	240	95.4	91.6	IE3	2040	117	275	3.408
MLU1286	200	400	50	330	2975	182	94.7	83.7	254	95.5	89.3	330	95.8	91.3	IE3	2805	135	275	3.546
		400	60	330	3575	174	94.2	88.1	250	95.1	91.1	330	95.4	91.6	IE2	2310	100	225	3.349
		440	60	300	3575	163	94.3	85.4	230	95.5	89.6	300	95.8	91.4	IE3	2550	122	275	4.224
MLU1314	220	400	50	352	2970	194	95.8	85.5	274	96.1	90.4	352	95.9	94.1	IE3	2980	120	283	3.892
		400	60	349	3565	186	95.1	89.8	270	95.5	92.4	349	95.4	95.4	IE2	2440	87	232	3.435
		440	60	318	3570	175	95.2	86.7	248	95.8	91.1	318	95.8	94.8	IE3	2710	108	283	4.397
MLU1316	250	400	50	400	2970	220	95.9	85.6	312	96.1	90.3	400	95.9	94.1	IE3	3280	117	272	4.142
		400	60	397	3565	211	95.3	89.7	306	95.6	92.5	397	95.4	95.3	IE2	2650	83	221	3.620
		440	60	362	3570	198	95.4	86.8	282	95.9	91.0	362	95.8	94.6	IE3	2960	104	271	4.432
MLU1350	300	400	50	479	2970	263	96.1	85.7	373	96.3	90.5	479	96.0	94.2	IE3	4010	124	277	4.960
		400	60	474	3565	251	95.5	90.3	365	95.7	93.0	474	95.4	95.8	IE2	3230	88	224	4.344
		440	60	432	3570	236	95.6	87.3	337	96.0	91.2	432	95.9	95.0	IE3	3620	110	275	5.645
MLU1352	355	400	50	507	2975	281	95.3	84.9	396	95.9	89.8	507	96.0	93.4	IE3	4240	104	276	4.153
		400	60	500	3570	267	95.0	89.7	386	95.4	92.6	500	95.4	95.3	IE2	3410	72	224	2.792
		440	60	457	3575	252	95.0	86.4	356	95.7	91.0	457	95.8	94.4	IE3	3810	90	274	4.171
MLU1354	375	400	50	568	2975	315	95.5	85.2	443	96.0	90.3	568	96.0	94.0	IE3	4980	112	288	5.076
		400	60	561	3570	300	94.9	90.0	434	95.5	92.8	561	95.4	95.7	IE2	4010	79	234	3.147
		440	60	513	3575	282	94.9	87.0	400	95.7	91.2	513	95.8	94.8	IE3	4470	98	286	4.304
MLU1354	375	400	50	593	2975	323	95.5	87.7	461	96.0	91.7	593	95.9	95.2	IE3	4960	106	273	4.120
		400	60	592	3570	313	95.0	91.1	456	95.4	93.3	592	95.4	95.8	IE2	4060	78	224	2.488
		440	60	538	3575	292	95.2	88.5	418	95.9	92.1	538	95.8	95.5	IE3	4500	95	273	3.296

Note 1) These characteristic values are based on the dynamometer method (actual load method).
 Note 2) The above current values are for the 400 V type. For the 200 V type, the above value x 2.
 Note 3) These characteristic values are typical ones. They are not guaranteed.

Premium efficiency

4P

Type	Output [kW]	Voltage [V]	Frequency [Hz]	Rated current [A]	Rated speed [min ⁻¹]	Load characteristic									Efficiency class	Starting current [A]	Starting torque [%]	Maximum torque [%]	Input difference from standard motor[kW] (with 100% load)	
						50% load			75% load			100% load								
						Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Efficiency [%]	Power factor [%]	Current [A]	Efficiency [%]	Power factor [%]						
MLU122N	55	400	50	100	1485	62.9	94.2	67.0	80.3	94.9	78.1	100	94.8	83.7	IE3	950	275	355	1.821	
		400	60	94	1780	53.0	95.0	78.8	72.7	95.5	85.8	94.0	95.4	88.5		799	205	290	2.176	
		440	60	88	1785	53.7	94.4	71.2	69.7	95.3	81.5	88.0	95.4	86.0		880	260	355	2.090	
MLU125E	75	400	50	135	1485	78.5	94.6	72.9	106	95.2	80.8	135	95.1	84.3	IE3	1215	260	315	2.277	
		400	60	128	1780	69.3	94.6	82.6	97.6	95.2	87.4	128	95.2	88.8		IE2	1024	200	255	2.348
		440	60	122	1785	69.6	94.3	75.0	94.8	95.2	81.8	122	95.4	84.6		IE3	1159	260	315	2.541
MLU125F	90	400	50	160	1485	93.9	94.7	73.0	125	95.3	81.5	160	95.2	85.3	IE3	1520	270	315	2.185	
		400	60	152	1785	82.3	94.7	83.3	116	95.3	88.1	152	95.2	89.8		IE2	1292	210	260	2.208
		440	60	141	1785	80.8	94.4	77.4	110	95.3	84.7	141	95.4	87.8		IE3	1410	270	320	2.376
MLU128E	110	400	50	190	1490	112	95.0	74.7	149	95.5	83.7	190	95.5	87.5	IE3	1900	230	330	3.219	
		400	60	184	1785	100	94.9	83.7	141	95.5	88.7	184	95.5	90.4		IE2	1564	170	270	3.307
		440	60	172	1790	98.9	94.8	77.0	134	95.6	84.5	172	95.8	87.6		IE3	1720	215	335	3.264
MLU128F	132	400	50	226	1490	130	95.2	77.2	176	95.8	84.8	226	95.8	88.0	IE3	2260	245	335	3.225	
		400	60	220	1785	119	95.3	84.3	168	95.9	88.7	220	95.9	90.3		IE2	1870	185	275	3.355
		440	60	204	1790	115	95.2	78.9	158	96.0	85.6	204	96.2	88.3		IE3	2040	230	340	3.458
MLU1284	160	400	50	280	1485	162	95.8	74.4	218	96.2	82.6	280	96.1	85.8	IE3	2240	125	265	3.549	
		400	60	272	1785	150	95.5	80.6	208	95.9	86.8	272	95.8	88.6		IE2	1768	90	215	3.942
		440	60	250	1785	144	95.5	76.3	196	96.1	83.6	250	96.2	87.3		IE3	2000	115	265	4.205
MLU1286	200	400	50	348	1485	204	95.9	73.8	273	96.3	82.4	348	96.1	86.3	IE3	2854	136	270	3.573	
		400	60	338	1785	185	95.7	81.5	259	96.0	87.1	338	95.8	89.2		IE2	2282	85	215	4.000
		440	60	312	1785	180	95.6	76.3	244	96.2	83.9	312	96.3	87.3		IE3	2558	125	270	4.521
MLU1314	220	400	50	376	1480	230	95.8	72.1	305	96.3	81.1	376	96.2	87.8	IE3					



No.	Part name	No.	Part name
(1)	Fan cover	(14)	Internal fan
(2)	External fan	(15)	Air guide
(3)	C-shaped retaining ring for securing external fan	(16)	Inner end cover on operation side
(4)	Bearing opposite operation side	(17)	Bracket on operation side
(5)	Inner end cover opposite operation side	(18)	Grease inlet
(6)	Bracket opposite operation side	(19)	Bearing on operation side
(7)	Terminal box	(20)	Outer end cover on operation side
(8)	Hanger bolt	(21)	Rotating disk
(9)	Stator iron core	(22)	C-shaped retaining ring for shaft
(10)	Rotor iron core	(23)	Shaft
(11)	Stator frame	(24)	Shaft end key
(12)	Rotor conductor	(25)	Grounding screw
(13)	Stator winding		

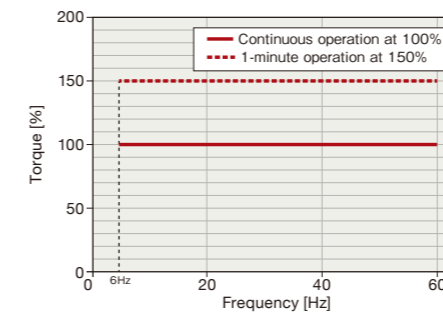
Consider the following points for speed control by using an inverter to drive a premium efficiency motor.

- Increase of the generated loss and starting characteristics
- Decrease of the cooling capacity in a low-speed region
- Bearing service life and mechanical strength in a high-speed region of 60 Hz or higher
- Generation of surge voltage

1. Allowable torque characteristics

The output voltage of an inverter contains a harmonic component. This causes a higher generated loss of the motor than when it is driven by a sine wave as in a commercial power supply, leading to a temperature rise of the motor. Meanwhile, the motor is cooled by its own fan mounted on the shaft. However, the air volume of the fan decreases when the rotational speed is reduced, which causes a decrease in the cooling capacity of the motor. Accordingly, pay attention to the motor temperature when using the product at a low rotational speed.

Fig. 1 Representative 4P models (frame size 225S or larger)



Note 1) The above torque characteristics are based on operation in combination with Fuji inverters.
 Note 2) The torque at 100% is the allowable torque [N·m] when each output is 60 Hz.

2. Starting characteristics

Unlike when using a commercial power supply, inverter driving is restricted by the inverter current. Generally, the starting torque is lower than when driven by a commercial power supply. This torque can be increased to some extent by adjusting the amount of torque boost in the V/F pattern. When an even higher starting torque is required, it is necessary to increase the capacity of the inverter and motor.

3. Noise

- 1) Generally, inverter driving involves higher electromagnetic noise than when using a commercial power supply because of the effect of the inverter. When used at a frequency higher than the commercial frequency, the ventilation sound increases as the rotational speed increases.
- 2) Please contact us for details of noise reduction measures, which include use of a low-noise inverter and provision of a noise-reduction reactor between the inverter and the motor.

4. Vibration

- 1) When the operation frequency for inverter driving is different from the commercial power frequency, resonance with the enclosure is generated at a certain rotational speed band, and this may result in a larger vibration. If this happens, measures such as improving the foundation of the motor installation or of the coupling may be required.
- 2) When used at a frequency higher than the commercial power frequency, vibration increases as the speed increases.

5. High-speed operation

When a motor is driven in a high-speed region of over 60 Hz, the bearing service life may be reduced for reasons such as increased vibration, which limits the maximum speed. In addition, noise, strength, service life, etc. may pose problems with power transmission mechanisms such as the coupling, belt, chain and gear. Please contact their respective manufacturers for details.

6. Surge voltage

When a 400-V-class motor is driven by a PWM inverter that uses a high-speed switching device such as an IGBT, surge voltage may be generated depending on the power voltage, cable length and installation condition. This surge voltage may cause the motor insulation to deteriorate. The maximum value for the motor terminal voltage is 1300 V line voltage. If a surge voltage exceeding this value is generated, reduce the surge voltage by fitting an AC reactor, surge suppression filter, etc. on the inverter output side.

7. Electrolytic corrosion of bearings

When an inverter is used to drive the motor, electrolytic corrosion may be developed on rare occasions depending on the bearing grease, wiring, load and operation conditions. If any measure to deal with electrolytic corrosion is required, please consult us in advance.

[Reference] JEM-TR 169
 Supplement to the application guide for low-voltage three-phase squirrel-cage induction motors for general purposes driven by inverters

To achieve an energy-saving effect by improving the efficiency, which is the biggest feature of premium efficiency motors, it is necessary to study products from various perspectives including their selection, operation and maintenance.

- Motor characteristics (starting current, rotational speed, load factor)
- Motor installation environment (dimensions, mount)
- Peripheral devices (magnetic switch, thermal overload relay)

1. Starting current

Losses of various parts have been reduced as much as possible in order to improve the motor efficiency. For that purpose, the resistance of various parts (winding, rotor) has been reduced, which makes the starting current inclined to be higher than that of conventional standard efficiency motors.

2. Rotational speed

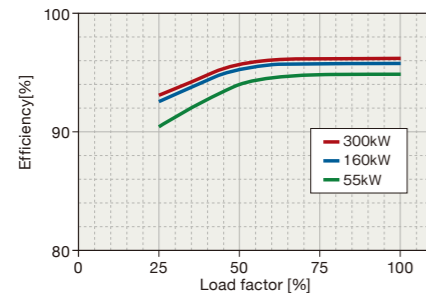
The generated loss of the motor is reduced as compared with conventional standard efficiency motors and the rotational speed is inclined to be slightly higher (slip is inclined to be smaller). For square reduction loads such as pumps and fans, attention must be paid because the power requirement may be increased in proportion to the increase of the rotational speed, leading to increased power consumption.

(*Square reduction load: load that varies in proportion to the square of the rotational speed)

3. Load factor and efficiency

As shown in Fig. 2, motor efficiency reaches its maximum at a load factor of approximately 75 to 100%. The energy-saving effect can be maximized by selecting so that the motor load factor is between 75 and 100%. If the load factor is extremely low, the motor capacity must be reconsidered. If there is any load variation or rotational speed variation, you are recommended to fit an inverter for optimized control according to the rotational speed and load.

Fig. 2 Graph representing the relationship between the load factor and efficiency (representative model)



Note) Generally, a larger motor capacity offers higher motor efficiency.

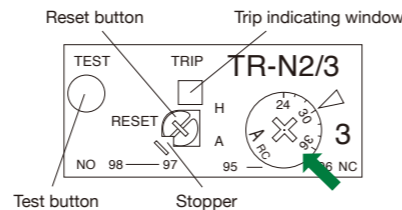
4. Motor peripheral devices

1) The peripheral devices may require reconsideration due to an increase of the magnetic switch, starter or motor starting current. When using devices from other manufacturers for replacement, please contact the respective manufacturers.

2) Thermal overload relay

As with Item 1, the setting of the thermal overload relay shown in Fig. 3 may require reconsideration due to an increase of the starting current.

Fig. 3 Thermal overload relay setting



5. Other

1) Motor mass

To improve efficiency, premium efficiency motors are inclined to be heavier than conventional standard efficiency motors. In particular, when using a motor installed on a moving object or with a mount that is not robust, take appropriate measures separately.

2) Notes on use

The descriptions in this catalog are intended to help the user select a model. In actual use, please read the "Instruction Manual" that comes with the motor carefully to ensure correct use.

3) Star-delta starting

For star-delta starting, be sure to install a model with a magnetic switch (3-contact type) on the primary side.

4) Outdoor type structure

The leg mounting type and flange mounting type have different waterproof structures. Please order a type that is appropriate for the mounting method. For use in an environment subject to explosive gas or dust, choose an explosion-proof type.

1. To place an order, please provide the following information.

For motors of other than the Fuji standard types, you will need to provide details of your requirements.

1	Voltage _____ V Frequency: <input type="checkbox"/> 50Hz, <input type="checkbox"/> 60Hz, <input type="checkbox"/> 50/60Hz Class of rating: <input type="checkbox"/> S1 (Cont. MCR), <input type="checkbox"/> _____ Ambient temperature at altitude up to 1000m: <input type="checkbox"/> 40°C, <input type="checkbox"/> _____ °C,	
2	Rotor: <input type="checkbox"/> Squirrel-cage Enclosure and Degree of protection: <input type="checkbox"/> TEFC, IP55, <input type="checkbox"/> TEFC, IP44, <input type="checkbox"/> _____	
3	Quantity, required x Item No.	x
4	Application	
5	Output	kW
6	No. of poles/Syn. speed	/ min ⁻¹
7	Mounting-Type of construction: IM B 3 (Horizon.), IM V 1 (Verti.)	B3 V1
8	Location-Installation	Indoor Outdoor
9	Insulation class	155(F)
10	Temperature rise limit of winding with resist. method [k]	"B" rise (80) "F" rise (105)
11	Starting method For Star-delta (Δ-Δ) starting: Load torque during run-up assumed as a quadratic function of speed	DOL Δ-Δ
12	Terminal box: (1) <input type="checkbox"/> Flexible leads, <input type="checkbox"/> Fixed terminals, <input type="checkbox"/> _____ (2) Cable entry opening: <input type="checkbox"/> Hole, <input type="checkbox"/> Pipe thread, <input type="checkbox"/> _____ (3) External cable spec: No. of cables & cores, conductor mm ² , Overall dia/inner sheath dia (4) Location of box	<input type="checkbox"/> cable, <input type="checkbox"/> core, <input type="checkbox"/> mm ² _____/____ mm dia Left Right Top
13	Coupling method Beltting data: Belt type-qty. Pulley PD-width [mm] and mass [kg] are required. When the motor's shaft extension is directly mounted on the shaft with the blower's impeller, please provide data of the impeller (including drawings showing size, mass and moment of inertia).	Direct con. single shaft ext.
14	Vertical mounting: Normal/Momentary design ext. thrust force in <input type="checkbox"/> N	Down. Up
15	Bearings: Grease anti-friction	Yes
16	Accessories: <input type="checkbox"/> Shaft ext. key	
17	Painting: <input type="checkbox"/> Fuji std. practice	Yes
18	Characteristics (1): <input type="checkbox"/> Fuji design	Yes
19	Permissible load <input type="checkbox"/> J [kg·m ²]	
20	Direction of rotation: seen from drive end of motor	CCW CW
21	Direction of rotation of motor fan	Bi(both) Uni(one)
22	Fuji motor type/Frame No.	/
23	Applicable standard	
24	Attached dwg No. for reference	
Remarks		

Note: (1) Guaranteed values are subject to tolerances per standards. There are no upper limits on tolerance for locked-rotor torque.

Remarks (1) Test: Characteristics are determined with the Equivalent circuit method. (2) Materials: Japanese standards. (3) Threads and dimensions: Metric.


2. When using the product for any of the following applications, please contact us in advance.

- (1) Use on vital equipment*1 or equipment that may affect human safety and have a serious impact on the maintenance of public functions*2 requires special consideration.*3 Be sure to contact us in advance. Using the product without giving special consideration may lead to serious accidents.
- (2) Notify us in advance when using the product for clean rooms, food processing machines, etc. Use of a standard product as it is without subjecting it to special treatment may result in a leakage of grease or oil through the joint between a bearing shield and frame or shaft penetration. Special consideration is required for use in an environment where oil should be avoided.
- (3) Bearings are not subjected to treatment against electrolytic corrosion. If directly connected with the load, electrolytic corrosion may occur due to the shaft voltage. For use in applications that may involve electrolytic corrosion, measures such as use of isolation coupling are required.

*1: Operating room devices, life-support systems (artificial dialysis, incubators, etc.), toxic and other gas and smoke extraction systems, equipment made compulsory by various laws and regulations such as the Fire Service Act and Building Standards Act, various safety systems and other equivalent systems

*2: Systems for air, train, maritime and other traffic control and equipment to control such systems, systems for controlling nuclear power stations, communication control equipment and other equivalent systems

*3: Have adequate discussions with device designers on the installation, operation and management of the product and construction in advance with regards to a backup system available for use in the event of product failure

 Notes on safety

[1] The descriptions in this catalog are intended for assisting with model selection. Before actual use, read the "Instruction Manual" carefully to ensure correct use.

[2] These products are not designed or manufactured for use in vital devices or systems.

When considering products mentioned in this material for special applications such as nuclear power control, aerospace, medical care or traffic devices or systems for these purposes, inquire our sales representative. For use in any equipment where failure of the products may lead to life-threatening consequences or serious damage, be sure to provide a safety system.

 Notes on adoption of premium efficiency motors

Premium efficiency motors feature lower generated loss and generally have slightly higher rotational speeds than standard efficiency motors. If the load is a pump or blower and a standard efficiency motor is replaced with a premium efficiency motor, the rotational speed is increased, resulting in increased motor output. Despite the high motor efficiency, increased output may cause increased power consumption. The resistance (primary and secondary) has been lowered for reducing copper loss and the starting current is inclined to increase, which may require changing of the breaker.