![Fuji Electric logo] **Fuji Electric**

Innovating Energy Technology

Fuji Electric synchronous motors & inverters

Synchronous drive systems
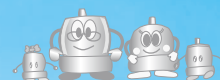
Challenge *to* Tomorrow

Ecology!

For the

FUTURE

FUJI SYNCHRONOUS DRIVE SYSTEM

For further energy saving and space saving, please consider whether to introduce the
"Next-generation Synchronous Drive System" combining various
synchronous motors and dedicated inverters FRENIC-MEGA GX Series.

Standard type | Sensorless
Standard type | With sensor

GNB2 SERIES **GNF2** SERIES

High-efficiency type | Sensorless
GNP1 SERIES

Super high-efficiency type | Sensorless
GNS1 SERIES

Drive inverters
FRENIC-MEGA G2 SERIES

Always advancing — to a future with unimaginable possibilities

Ecology!

For the
FUTURE
FUJI SYNCHRONOUS DRIVE SYSTEM

CONTENTS

Next generation synchronous drive systems for more energy savings and space savings

A synchronous motor is a motor that incorporates a permanent magnet in the rotor. A synchronous motor differs from induction motors and top runner motors in that there is no flow of secondary current, because the magnetic flux is generated from the permanent magnet, thus resulting in a higher level of efficiency with significant loss reduction in a smaller size with a lighter weight. We have a three-model series including a standard type, high-efficiency type and super high-efficiency type.

Achieve greater energy and space savings by deploying our next-generation synchronous drive systems that combine various FRENIC-MEGA (G2) Series inverters and synchronous motors.

▶ Main models

Standard type | Sensorless
GNB2 SERIES

The motor efficiency is equivalent to IE3 (premium efficiency), and the motor frame number of frames 1 to 3 is lower than that of induction motors for a more compact and lightweight size.

| Stock mode | 200 V class | Output 5.5 to 37 kW, number of poles: 6, 1800 min^{-1} |
| | 400 V class | Output 5.5 to 90 kW, number of poles: 6, 1800 min^{-1} |

Standard type | With sensor
GNF2 SERIES

Based on a standard type sensorless synchronous motor and equipped with a pulse encoder (pulse generator or PG), enabling a high speed control range of 1:1000.

| Stock mode | 200 V class | Output 5.5 to 45 kW, number of poles: 6, 1500 min^{-1} |
| | 400 V class | Output 5.5 to 90 kW, number of poles: 6, 1500 min^{-1} |

High-efficiency type | Sensorless
GNP1 SERIES

The motor efficiency is equivalent to IE4 (super premium efficiency), and this series features reduced weight while maintaining the same mounting dimensions as induction motors, enabling smooth replacement.

| Stock mode | 200 to 400 V class combined use | Output 5.5 to 55 kW, number of poles: 6, 1800 min^{-1} |
| | 400 V class | Output 75, 90 kW, number of poles: 6, 1800 min^{-1} |

Super high-efficiency type | Sensorless
GNS1 SERIES

The motor efficiency is approximately 1.0% higher than IE4 (super premium efficiency), and the same mounting dimensions as induction motors enables smooth replacement.

Note: All models in this series are built-to-order products

Drive inverters
FRENIC-MEGA G2 SERIES

These are advanced high-performance multifunctional inverters.
They come with a new auto-tuning function that enables multidrive operation using various synchronous motors.

▶ Inverter application list and model variations

Motor output [kW]	Inverter application (basic type)			
	3-phase 200 V series		3-phase 400 V series	
	HHD spec	HND spec	HHD spec	HND spec
5.5	FRN5.5G2S-2J		FRN5.5G2S-4J	
7.5	FRN7.5G2S-2J	FRN5.5G2S-2J	FRN7.5G2S-4J	FRN5.5G2S-4J
11	FRN11G2S-2J	FRN7.5G2S-2J	FRN11G2S-4J	FRN7.5G2S-4J
15	FRN15G2S-2J	FRN11G2S-2J	FRN15G2S-4J	FRN11G2S-4J
18.5	FRN18.5G2S-2J	FRN15G2S-2J	FRN18.5G2S-4J	FRN15G2S-4J
22	FRN22G2S-2J	FRN18.5G2S-2J	FRN22G2S-4J	FRN18.5G2S-4J
30	FRN30G2S-2J	FRN22G2S-2J	FRN30G2S-4J	FRN22G2S-4J
37	FRN37G2S-2J	FRN30G2S-2J	FRN37G2S-4J	FRN30G2S-4J
45	FRN45G2S-2J	FRN37G2S-2J	FRN45G2S-4J	FRN37G2S-4J
55	FRN55G2S-2J	FRN45G2S-2J	FRN55G2S-4J	FRN45G2S-4J
75	FRN75G2S-2J	FRN55G2S-2J	FRN75G2S-4J	FRN55G2S-4J
90	FRN90G2S-2J	FRN75G2S-2J	FRN90G2S-4J	FRN75G2S-4J
110		FRN90G2S-2J	FRN110G2S-4J	FRN90G2S-4J
132			FRN132G2S-4J	FRN110G2S-4J
160			FRN160G2S-4J	FRN132G2S-4J
200			FRN200G2S-4J	FRN160G2S-4J
220			FRN220G2S-4J	FRN200G2S-4J
250			FRN280G2S-4J	FRN220G2S-4J
280			FRN280G2S-4J	FRN220G2S-4J
300			FRN315G2S-4J	FRN280G2S-4J
315			FRN315G2S-4J	FRN280G2S-4J

Note 1: There are two types of inverter specifications available: High carrier frequency Heavy Duty (HHD, for heavy load) and High carrier frequency Normal Duty (HND, for light load).

HHD spec	200%-3sec · 150%-1min
HND spec	120%-1min

Note 2: In addition to the above models, types with built-in electromagnetic compatibility (EMC) filters and built-in DC reactors are also available.

Motor type

GNB, F, P	GN P □ 13 3 A
GNS	GN S □ 16 5 A - N 2 1

Series name
Synchronous motor

Series No.

Cooling structure

B	Standard totally enclosed fan-cooled sensorless model
F	Standard totally enclosed separately fan-cooled sensor model
P	High-efficiency totally enclosed fan-cooled sensorless model
S	Super high-efficiency totally enclosed fan-cooled sensorless model

Frame size

11	112
13	132
16	160
18	180
20	200
22	225
25	250
28	280
31	315

Classification of motor length

Mounting method

A	Indoor horizontal-mount, leg-mounted IMB3 (F11)
B	Outdoor horizontal-mount, leg-mounted IMB3 (F11)
C	Indoor vertical-mount, facing down, flange-mounted IMV1 (L52)
D	Outdoor vertical-mount, facing down, flange-mounted IMV1 (L52)
Z	Other

Base rotor speed [min⁻¹]

1	1800

Input power source

2	3-phase 200 V class
4	3-phase 400 V class

Sensor option

N	Without sensor
S	With sensor

Inverter type

FRN 5.5 G2 1 S - 2 J

Series name
FRENIC

Applicable motor output

5.5	5.5kW
'	'
315	315kW

High Performance Multifunctional type

Series No.

Construction

S	Standard type (basic type)
E	Built-in EMC filter type
H	Built-in DC reactor type
P	Built-in Zero-phase reactor type

Input power source

2	3-phase 200 V
4	3-phase 400 V

Destination

J	Japan

▶ Application examples

Fans

Water Pumps

Compressors

Machine tools

Press machines

Printers

Winding machines

Mixers

Slicers

Noodle making machines

Elevators

Commercial washing machines

Synchronous motors

High-efficiency type | Sensorless
GNP1 SERIES

Super high-efficiency type | Sensorless
GNS1 SERIES

Standard type | Sensorless
GNB2 SERIES

Standard type | With sensor
GNF2 SERIES

Three-model standard, high-efficiency and super high-efficiency type series to choose from!

High efficiency & Energy saving

▶ **Standard type**   Motor efficiency* is same level as IE3 (premium efficiency)!

▶ **High-efficiency type**   Motor efficiency* is same level as IE4 (super premium efficiency)!

▶ **Super high-efficiency type**   Motor efficiency* is higher level than IE4 (super premium efficiency)!

* IE3 is based on the efficiency class regulations of IEC 60034-30, and IE4 on IEC 60034-31.

Comparison of motor efficiency values

[Rotor speed: 1800 min^{-1}]

Efficiency value [%] (vertical axis: 85 to 98)
Output [kW] (horizontal axis: 5.5, 7.5, 11, 15, 18.5, 22, 30, 37, 45, 55, 75, 90, 110, 132, 160)

◆ Super high-efficiency type synchronous motors
▲ High-efficiency type synchronous motors
■ Standard type synchronous motors
■ Top Runner motors
● Conventional induction motors
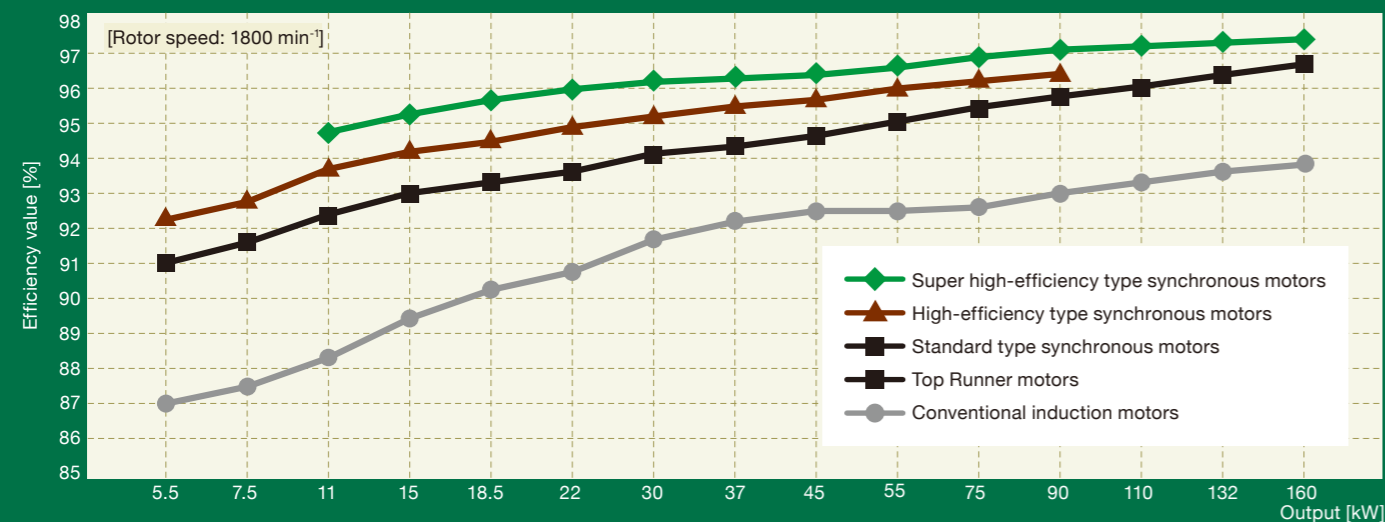
Note 1: The induction motor efficiency values provided above are based on the values of JIS C 4210.
Note 2: The standard type synchronous motor efficiency values provided above are based on the IE3 class values of the IEC 60034-30 regulations.
Note 3: The high-efficiency type synchronous motor efficiency values provided above are based on the IE4 class values of the IEC 60034-31 regulations.

▶ **Further energy savings through combined operation!**

A synchronous motor and FRENIC-MEGA (G2) Series inverter, equipped with our unique energy-saving control technology, can be combined to achieve further high-efficiency operation while reducing power loss.

Reference
Note that for a new installation the initial investment costs are slightly higher (compared solely with the cost of an induction motor + inverter set), but the extremely low running cost of the combination allows the additional cost incurred when adopting it to be recovered in a short time.

Energy saving effect (calculation example)
When the annual operation time is 4,000 h/year for totally enclosed fan-cooled type, 22 kW, 1800 min^{-1}, 220 V-60 Hz, 100% load factor

■ **Annual power consumption**

Power consumption [1,000 kWh]
Induction motor | Standard type synchronous motor (Top Runner motor) | High-efficiency type synchronous motor | Super high-efficiency type synchronous motor
↓3.1 [1,000 kWh]   ↓4.3 [1,000 kWh]   ↓5.4 [1,000 kWh]

■ **Annual electricity charges**

Electricity charge [1,000 yen]
Induction motor | Standard type synchronous motor (Top Runner motor) | High-efficiency type synchronous motor | Super high-efficiency type synchronous motor
↓43 [1,000 yen/year]   ↓60 [1,000 yen/year]   ↓76 [1,000 yen/year]

■ **CO_2 emissions**

Emissions [t]
Induction motor | Standard type synchronous motor (Top Runner motor) | High-efficiency type synchronous motor | Super high-efficiency type synchronous motor
↓1.7   ↓2.4   ↓3.0

Note 1: The electricity charge is 14 yen/kWh   Note 2: The CO_2 conversion is 0.555 kg CO_2/kWh   Note 3: The induction motor efficiency values are based on the values of JIS C 4210.
Note 4: The standard type synchronous motor efficiency values are based on the IE3 class values of the IEC 60034-30 regulations.
Note 5: The high-efficiency type synchronous motor efficiency values are based on the IE4 class values of the IEC 60034-31 regulations.

GNB2 SERIES
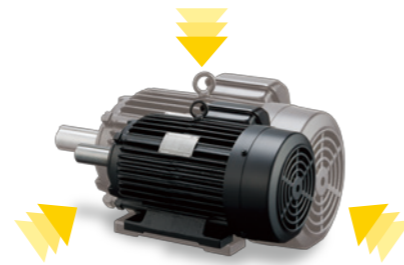
Compact and lightweight

▶ **Volume ratio: On average 35% improvement, Mass ratio: On average 40% improvement!**
(in-company comparison)

The motor frame number of frames 1 to 3 is lower than that of induction motors. Machinery can be made compact and space-saving.

High power factor

▶ **Reduces the power receiving equipment capacity!**

In addition to high efficiency, the higher power factor than the induction motor can lower current capacity of the equipment.

High efficiency and energy savings

▶ **Motor efficiency same level as IE3 (premium efficiency)!**

Note: IE3 is an efficiency class based on IEC 60034-30.

Maintenance friendly

▶ **Easy bearing replacement!**

A structure that facilitates bearing replacement work without taking out the rotor improves on-site replacement and work efficiency.

Torque characteristics

- - - Short-time rating (1 minute)
—— Continuous rating

Rated output 5.5 to 15 kW / Rated output 18.5 to 90 kW / Rated output 110 to 200 kW / Rated output 220 to 315 kW

▶ Product specifications

Rated output [kW]		5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Base rotor speed [min⁻¹]		1800											
Rated torque [N·m]		29.2	39.8	58.3	79.5	98.1	117	159	196	239	292	398	477
Type		GNB2114A	GNB2115A	GNB2117A	GNB2118A	GNB2136A	GNB2137A	GNB2139A	GNB2165A	GNB2167A	GNB2185A	GNB2187A	GNB2207A
Center height [mm] (induction motor)		112 (132)		112 (160)		132 (180)			160 (200)		180 (225)	180 (250)	200 (250)
Rated current value (secondary side) [A]	200V	20	29	42	57	70	80	108	144	160	200	270	316
	400V	10	15	21	29	35	40	54	72	80	100	135	158
Moment of inertia [kg·m²]		0.014	0.018	0.021	0.029	0.049	0.065	0.081	0.153	0.191	0.325	0.432	0.721
Number of poles		6P											
Protective structure (protection method)		Totally enclosed fan-cooled type (IP44)											
Mounting method		Leg mounting type (IMB3)											
Overload capacity		120% for 1 minute				150% for 1 minute							
Time rating		S1 (continuous)											
Insulation thermal class		155(F)											
Direction of rotation		Direction is counterclockwise (CCW) as seen from the operation side											
Noise (at 1 m) [dB (A)]		70 or less						80 or less					
Vibration (p-p) [μm]		10 or less											
Vibration resistance [m/s²]		6.86(0.7G)											
Installation location		Indoor, altitude of 1000 m or less											
Ambient temperature, humidity		−10 to +40°C, 90% RH or less (noncondensing)											
Color of coating		Munsell N1.2											

| Inventory | 200 V class | ◎(GNB1010) | (GNB1011) | ◎(GNB1012) | ◎(GNB1013) | ◎(GNB1014) | ◎(GNB1015) | ◎(GNB1016) | ◎(GNB1017) | | | | |
| | 400 V class | ◎(GNB1020) | (GNB1021) | ◎(GNB1022) | ◎(GNB1023) | ◎(GNB1024) | ◎(GNB1025) | ◎(GNB1026) | ◎(GNB1027) | ◎(GNB1028) | ◎(GNB1029) | ◎(GNB1030) | ◎(GNB1031) |

Note 1: In the inventory row above ◎(part number code): Standard inventory product, and ☐: Built-to-order product.
Note 2: Special-purpose motors with base rotor speeds of 1000, 1200, 1500, 3000, and 3600 min⁻¹ can also be manufactured. Note 3: Contact us when switching from commercial operation.
Note 4: Flange mounting type can be manufactured for motor frame numbers of 160 and below. Note 5: Contact us if you require a special-purpose motor with a rated output of 3.7 kW or less, or a motor over 315 kW.
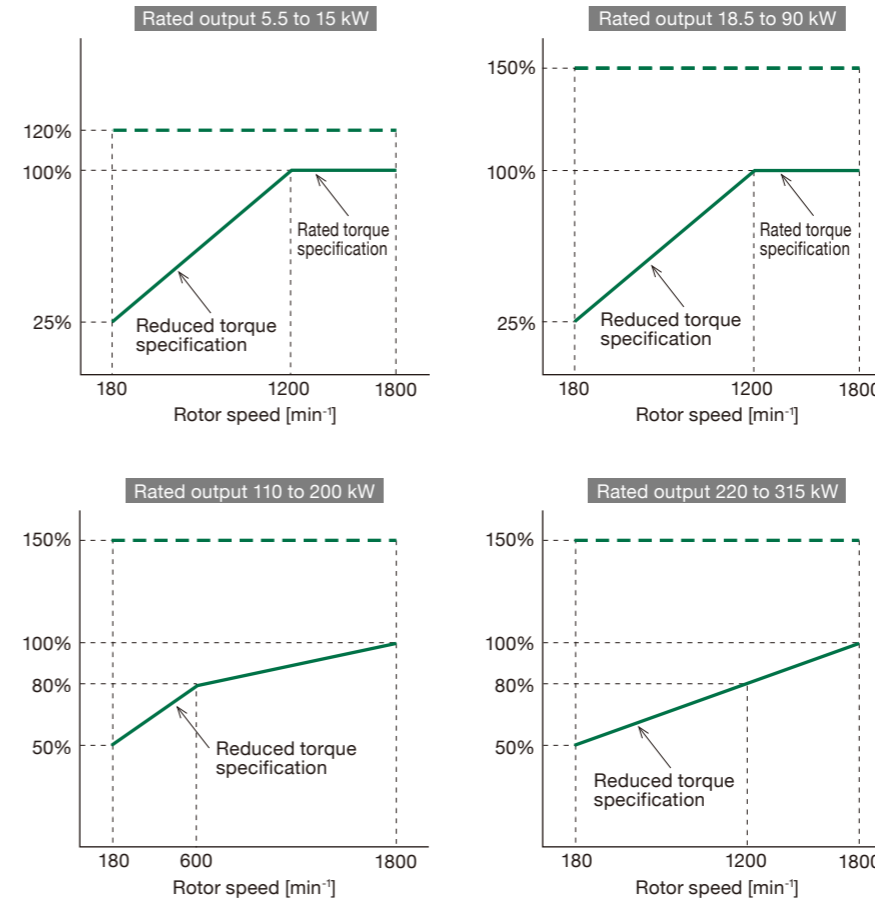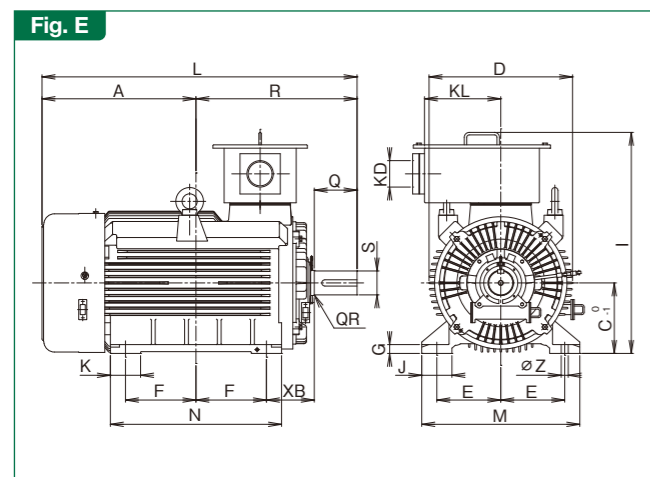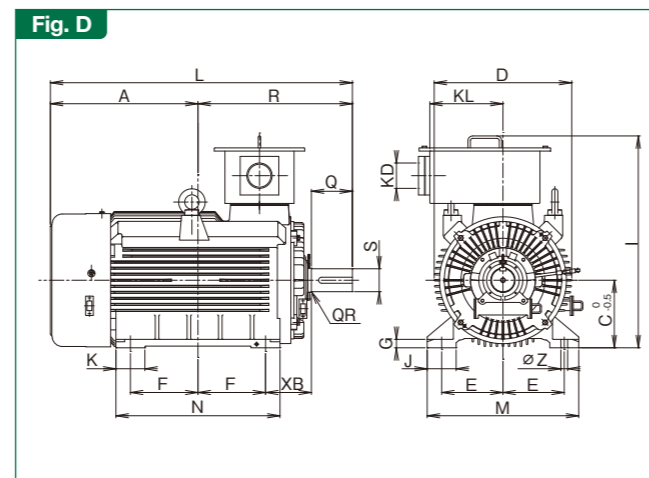
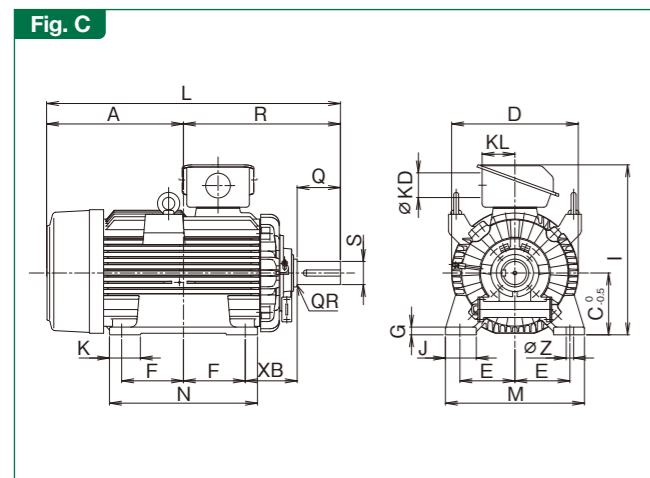| Rated output [kW]		110	132	160	200	220	250	280	300	315
Base rotor speed [min⁻¹]		1800								
Rated torque [N·m]		583	700	848	1061	1167	1326	1485	1591	1671
Type		GNB2222B	GNB2224B	GNB2252B	GNB2254B	GNB2256B	GNB228FB	GNB228GB	GNB228HB	
Center height [mm] (induction motor)		225 (280)		250 (315)			280 (315)		280 (355)	
Rated current value (secondary side) [A]	200V	–	–	–	–	–	–	–	–	–
	400V	190	223	273	336	376	440	465	520	545
Moment of inertia [kg·m²]		0.792	0.898	1.72	2.00	2.26	2.86	3.19	3.54	3.54
Number of poles		6P								
Protective structure (protection method)		Totally enclosed fan-cooled type (IP54)								
Mounting method		Leg mounting type (IMB3)								
Overload capacity		150% for 1 minute								
Time rating		S1 (continuous)								
Insulation thermal class		155(F)								
Direction of rotation		Direction is counterclockwise (CCW) as seen from the operation side								
Noise (at 1 m) [dB (A)]		90 or less								
Vibration (p-p) [μm]		10 or less								
Vibration resistance [m/s²]		6.86(0.7G)								
Installation location		Outdoor, altitude of 1000 m or less								
Ambient temperature, humidity		−10 to +40°C, 90% RH or less (noncondensing)								
Color of coating		Munsell N1.2								

| Inventory | 200 V class | | | | | | | | | |
| | 400 V class | | | | | | | | | |

Note 1: In the inventory row above ◎(part number code): Standard inventory product, and ☐: Built-to-order product.
Note 2: Special-purpose motors with base rotor speeds of 1000, 1200, 1500, 3000, and 3600 min⁻¹ can also be manufactured. Note 3: Contact us when switching from commercial operation.
Note 4: Flange mounting type can be manufactured for motor frame numbers of 160 and below. Note 5: Contact us if you require a special-purpose motor with a rated output of 3.7 kW or less, or a motor over 315 kW.

Fig. A

Fig. B

Fig. C

Fig. D

Fig. E

Shaft end detail

(Unit: mm)

Rated output [kW]	Type	Frame size	Figure	A	C	D	E	F	G	I	J	K	KD	KL	L	M	N	R	XB	Z	Q	QR	S	T	U	W	Y	Mass (approx) [kg]
5.5	GNB2114A	112Mh	A	191	112	236	95	70	14	270	40	50	34	200	411	224	175	220	70	12	80	0.5	38k6	8	5	10	M10×20	41
7.5	GNB2115A			191	112	236	95	70	14	270	40	50	34	200	411	224	175	220	70	12	80	0.5	38k6	8	5	10	M10×20	45
11	GNB2117A	112Jh		236	112	236	95	100	18	270	55	50	48	235	554	228	238	318	108	14.5	110	1	42k6	8	5	12	M10×20	58
15	GNB2118A			236	112	236	95	100	18	270	55	50	48	235	554	228	238	318	108	14.5	110	1	42k6	8	5	12	M10×20	65
18.5	GNB2136A	132Lh		244.5	132	273	108	101.5	20	311	45	50	48	247	564	250	238	319.5	108	14.5	110	1.5	48k6	9	5.5	14	M10×20	86
22	GNB2137A			244.5	132	273	108	101.5	20	311	45	50	48	247	564	250	238	319.5	108	14.5	110	1.5	48k6	9	5.5	14	M10×20	99
30	GNB2139A	132Hh		283	132	273	108	140	20	311	45	50	60	247	641	250	313	358	108	14.5	110	1.5	55m6	10	6	16	M10×20	116
37	GNB2165A	160Lg	B	294	160	321	139.5	127	20	376	75	75	80	320	669	350	300	375	108	18.5	140	2	60m6	11	7	18	M12×25	162
45	GNB2167A	160Jg		324.5	160	321	139.5	157.5	20	376	75	75	80	320	730	350	370	405.5	108	18.5	140	2	60m6	11	7	18	M12×25	183
55	GNB2185A	180Lg		317.5	180	377	159	139.5	25	428	80	85	80	356	718	390	330	400.5	121	18.5	140	2	65m6	11	7	18	M12×25	225
75	GNB2187A	180Jg		383.5	180	377	159	177.5	25	428	100	100	80	356	869	420	450	485.5	168	24	140	2	75m6	12	7.5	20	M12×25	297
90	GNB2207A	200Jg		443	200	410	178	200	25	549	100	100	80	107	951	450	479	508	168	24	140	2	75m6	12	7.5	20	M12×25	385
110	GNB2222B	225Kg	C	480	225	446	203	200	28	628	100	120	G3½	170	1018	506	526	538	168	24	170	1	85m6	14	9	22	M20×35	450
132	GNB2224B			480	225	446	203	200	28	628	100	120	G3½	170	1018	506	526	538	168	24	170	1	85m6	14	9	22	M20×35	480
160	GNB2252B	250Kg		537	250	508	228.5	225	32	763	100	120	G4	231	1122	557	577	585	190	24	170	1	95m6	14	9	25	M20×35	630
200	GNB2254B	250Hg	D	582	250	508	228.5	280	32	763	100	120	G4	231	1222	557	677	640	190	24	170	1	95m6	14	9	25	M20×35	720
220	GNB2256B			582	250	508	228.5	280	32	763	100	120	G4	231	1222	557	677	640	190	24	170	1	95m6	14	9	25	M20×35	770
250	GNB228FB	280Jf	E	612	280	570	254	280	35	878	120	120	*	350	1252	628	680	640	190	28	170	1	95m6	14	9	25	M20×35	970
280	GNB228GB			612	280	570	254	280	35	878	120	120	*	350	1252	628	680	640	190	28	170	1	95m6	14	9	25	M20×35	1030
300	GNB228HB			612	280	570	254	280	35	878	120	120	*	350	1252	628	680	640	190	28	170	1	95m6	14	9	25	M20×35	1080
315	GNB228HB			612	280	570	254	280	35	878	120	120	*	350	1252	628	680	640	190	28	170	1	95m6	14	9	25	M20×35	1080

Note 1: Models with a rated output of 110 kW or greater are models with an outdoor specification. In addition, these are direct-connection only models. Contact us for information on non-direct connection specifications.
Note 2: Contact us regarding KD dimensions (marked with ∗) for a rated output of 250 to 315 kW.

Supports advanced speed control

▶ Capable of PG vector control!

It is suitable for applications such as printing machines and press machines.
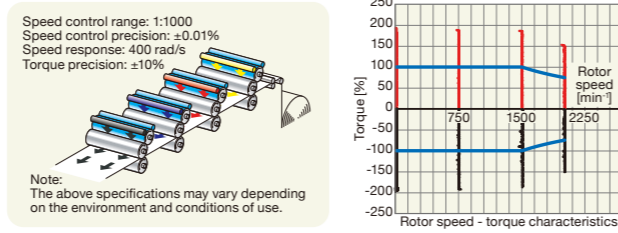
Speed control range: 1:1000
Speed control precision: ±0.01%
Speed response: 400 rad/s
Torque precision: ±10%

Note:
The above specifications may vary depending on the environment and conditions of use.

Rotor speed - torque characteristics

Note: A PMPG feedback card is necessary for inverter optional accessories.

Compact and lightweight

▶ Volume ratio: On average 35% improvement, Mass ratio: On average 40% improvement! (in-company comparison)

The motor frame number of frames 1 to 3 is lower than that of induction motors. Machinery can be made compact and space-saving.

High efficiency and energy savings

▶ Motor efficiency same level as IE3 (premium efficiency)!

Note: IE3 is an efficiency class based on IEC 60034-30.

High power factor

▶ Reduces the power receiving equipment capacity!

In addition to high efficiency, the higher power factor than the induction motor can lower current capacity of the equipment.

Torque characteristics

- - - Short-time rating (1 minute)
—— Continuous rating

▶ Product specifications

Rated output [kW]	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Base rotor speed [min⁻¹]	1500											
Maximum speed [min⁻¹]	2000											
Rated torque [N·m]	35.0	47.7	70.0	95.5	118	140	191	235	286	350	477	573
Type	GNF2114A	GNF2115A	GNF2117A	GNF2118A	GNF2136A	GNF2137A	GNF2139A	GNF2165A	GNF2167A	GNF2185A	GNF2187A	GNF2207A
Center height [mm] (induction motor)	112 (132)		112 (160)		132 (180)			160 (200)		180 (225)	180 (250)	200 (250)
Rated current value (secondary side) [A] 200V	20	29	42	57	71	82	113	140	165	200	270	316
400V	10	15	21	29	36	41	57	70	83	100	135	158
Moment of inertia [kg·m²]	0.018	0.021	0.027	0.036	0.065	0.070	0.090	0.153	0.191	0.350	0.467	0.805
Number of poles	6P											
Protective structure (protection method)	Totally enclosed separately ventilated (IP44), Ventilation direction: Exhaust from the anti-operation side to the operation side											
Mounting method	Leg mounting type (IMB3)											
Overload capacity	150% for 1 minute											
Time rating	S1 (continuous)											
Insulation thermal class	155(F)											
Direction of rotation	Direction is counterclockwise (CCW) as seen from the operation side											
Internal parts Encoder	1024P/R, DC5V, signal A·Ā·B·B̄(B proceeds 90° CCW as seen from the operation side)·Z·Z̄, U·Ū·V·V̄·W·W̄ Line driver output											
Thermistor	NTC thermistor 1											
Noise (at 1 m) [dB (A)]	80 or less											
Vibration (p-p) [µm]	10 or less											
Vibration resistance [m/s²]	6.86(0.7G)											
Installation location	Indoor, altitude of 1000 m or less											
Ambient temperature, humidity	−10 to +40°C, 90% RH or less (noncondensing)											
Color of coating	Munsell N1.2											

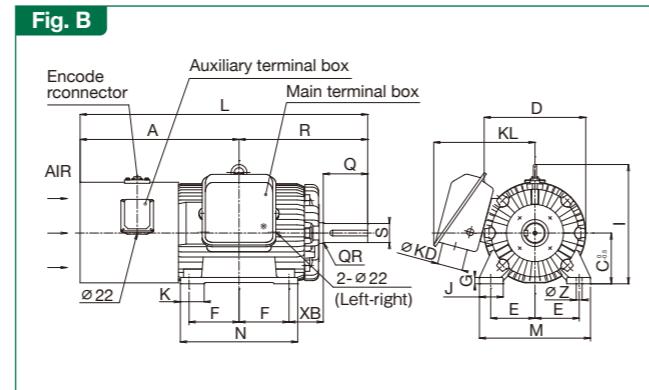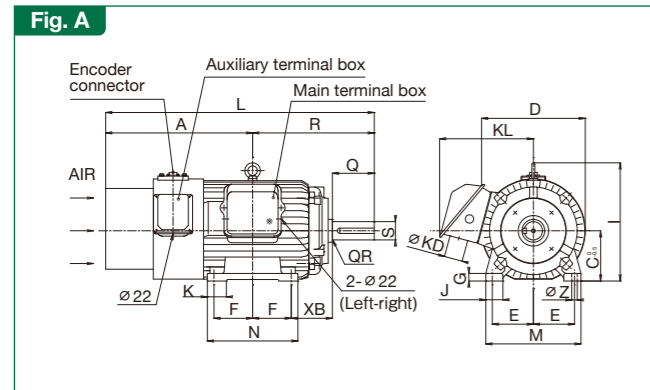| Inventory	200 V class	⊚(GNF1010)	⊚(GNF1011)	⊚(GNF1012)	⊚(GNF1013)	⊚(GNF1014)	⊚(GNF1015)	⊚(GNF1016)	⊚(GNF1017)	⊚(GNF1018)			
	400 V class	⊚(GNF1020)	⊚(GNF1021)	⊚(GNF1022)	⊚(GNF1023)	⊚(GNF1024)	⊚(GNF1025)	⊚(GNF1026)	⊚(GNF1027)	⊚(GNF1028)	⊚(GNF1029)	⊚(GNF1030)	⊚(GNF1031)

Note 1: In the inventory row above ⊚(part number code): Standard inventory product, and ☐: Built-to-order product.
Note 2: Contact us if a special-purpose motor other than the base rotor speed of 1500 min⁻¹ is required.   Note 3: Contact us when switching from commercial operation.
Note 4: Contact us if you require a special-purpose motor with a rated output of 3.7 kW or less, or a motor over 280 kW.

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Rated output [kW]	110	132	160	200	220	250	280
Base rotor speed [min⁻¹]	1500						
Maximum speed [min⁻¹]	2000						
Rated torque [N·m]	700	840	1018	1273	1400	1591	1782
Type	GNF2224B	GNF2226B	GNF2254B	GNF2256B	GNF228FB	GNF228GB	GNF228HB
Center height [mm] (induction motor)	225 (280)		250 (280)*		280 (315)		280 (355)
Rated current value (secondary side) [A] 200V	–	–	–	–	–	–	–
400V	198	232	273	340	390	445	475
Moment of inertia [kg·m²]	0.882	0.994	1.96	2.22	2.79	3.12	3.47
Number of poles	6P						
Protective structure (protection method)	Totally enclosed separately ventilated (IP54), Ventilation direction: Exhaust from the anti-operation side to the operation side						
Mounting method	Leg mounting type (IMB3)						
Overload capacity	150% for 1 minute						
Time rating	S1 (continuous)						
Insulation thermal class	155(F)						
Direction of rotation	Direction is counterclockwise (CCW) as seen from the operation side						
Internal parts Encoder	1024P/R, DC5V, signal A·Ā·B·B̄(B proceeds 90° CCW as seen from the operation side)·Z·Z̄, U·Ū·V·V̄·W·W̄ Line driver output						
Thermistor	NTC thermistors 2						
Noise (at 1 m) [dB (A)]	90 or less						
Vibration (p-p) [µm]	10 or less						
Vibration resistance [m/s²]	6.86(0.7G)						
Installation location	Outdoor, altitude of 1000 m or less						
Ambient temperature, humidity	−10 to +40°C, 90% RH or less (noncondensing)						
Color of coating	Munsell N1.2						

Inventory	200 V class							
	400 V class							

Note 1: In the inventory row above ⊚(part number code): Standard inventory product, and ☐: Built-to-order product.
Note 2: Contact us if a special-purpose motor other than the base rotor speed of 1500 min⁻¹ is required.   Note 3: Contact us when switching from commercial operation.
Note 4: Contact us if you require a special-purpose motor with a rated output of 3.7 kW or less, or a motor over 280 kW.
Note 5: Contact us if there is a reduced torque load, as sensorless functionality is also available.   Note 6: The induction motors marked with * are part of our MVK series.

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(Unit: mm)

Fig. A

Fig. B

Fig. C

Fig. D

Fig. E

Fig. F

Shaft end detail

Rated output [kW]	Type	Frame size	Figure	Dimensions																		Shaft end							Mass (approx) [kg]
				A	C	D	E	F	G	I	J	K	KD	KL	L	M	N	R	XB	Z	Q	QR	S	T	U	W	Y	
5.5	GNF2114A	112Mh		335.5	112	235	95	70	14	270	40	50	34	200	555.5	224	175	220	70	12	80	0.5	38k6	8	5	10	M10×20	51
7.5	GNF2115A			335.5	112	235	95	70	14	270	40	50	34	200	555.5	224	175	220	70	12	80	0.5	38k6	8	5	10	M10×20	55
11	GNF2117A	112Jh	A	380.5	112	235	95	100	18	270	55	50	48	235	698.5	228	238	318	108	14.5	110	1	42k6	8	5	12	M10×20	69
15	GNF2118A			380.5	112	235	95	100	18	270	55	50	48	235	698.5	228	238	318	108	14.5	110	1	42k6	8	5	12	M10×20	78
18.5	GNF2136A	132Lh		386	132	272	108	101.5	20	311	45	50	48	247	705.5	250	238	319.5	108	14.5	110	1.5	48k6	9	5.5	14	M10×20	100
22	GNF2137A			386	132	272	108	101.5	20	311	45	50	48	247	705.5	250	238	319.5	108	14.5	110	1.5	48k6	9	5.5	14	M10×20	106
30	GNF2139A	132Hh		424.5	132	272	108	140	20	311	45	50	60	247	782.5	250	313	358	108	14.5	110	1.5	55m6	10	6	16	M10×20	127
37	GNF2165A	160Lg		470.5	160	319	139.5	127	20	376	75	75	80	320	845.5	350	300	375	108	18.5	140	2	60m6	11	7	18	M12×25	170
45	GNF2167A	160Jg	B	501	160	319	139.5	157.5	20	376	75	75	80	320	906.5	350	370	405.5	108	18.5	140	2	60m6	11	7	18	M12×25	192
55	GNF2185A	180Lg		510	180	375	159	139.5	25	428	80	85	80	356	910.5	390	330	400.5	121	18.5	140	2	65m6	11	7	18	M12×25	247
75	GNF2187A	180Jg	C	576	180	375	159	177.5	25	428	100	100	80	356	1061.5	420	450	485.5	168	24	140	2	75m6	12	7.5	20	M12×25	325
90	GNF2207A	200Jg		618.5	200	410	178	200	25	549	100	100	80	107	1126.5	450	479	508	168	24	140	2	75m6	12	7.5	20	M12×25	420
110	GNF2224B	225Kg	D	711	225	446	203	200	28	628	100	120	80	142	1249	506	526	538	168	24	170	1	85m6	14	9	22	M20×35	520
132	GNF2226B	225Hg		761	225	446	203	250	28	628	100	120	80	142	1349	506	626	588	168	24	170	1	85m6	14	9	22	M20×35	580
160	GNF2254B	250Hg	E	829	250	508	228.5	280	32	763	100	120	80	203	1469	557	677	640	190	24	170	1	95m6	14	9	25	M20×35	760
200	GNF2256B			829	250	508	228.5	280	32	763	100	120	80	203	1469	557	677	640	190	24	170	1	95m6	14	9	25	M20×35	810
220	GNF228FB	280Jf	F	881	280	570	254	280	35	878	120	120	102	303	1521	628	680	640	190	28	170	1	95m6	14	9	25	M20×35	1000
250	GNF228GB			881	280	570	254	280	35	878	120	120	102	303	1521	628	680	640	190	28	170	1	95m6	14	9	25	M20×35	1050
280	GNF228HB			881	280	570	254	280	35	878	120	120	102	303	1521	628	680	640	190	28	170	1	95m6	14	9	25	M20×35	1100

Note: Models with an output of 110 kW or higher are direct-connection only models. Contact us for information on non-direct connection specifications.

● **Connector specifications for encoder connection** (Manufacturer: Japan Aviation Electronics Industry, Ltd.)

Motor type	Motor mounted receptacle	Customer prepared product	
		Straight plug	Angle plug
	Type	Type	Type
GNF2	JN2AW15PL1 (15-pole receptacle)	JN2DW15SL1 (15-pole straight plug)	JN2FW15SL1 (15-pole angle plug)
	Motor mounted receptacle application terminal	Recommended terminal (solder connection)	
	Type	Terminal type (Note 2)	Maximum applicable wire size
	JN1-22-26P (crimp type pin)	JN1-22-22F-PKG100	AWG20 (coating diameter φ1.5 mm or less)

● **Terminal array diagram**

Plug-side connector No. array diagram

Connector No.	Name plate description symbols	Encoder signals
1	+5V	DC+5V
2	0V	0V
3	A	A
4	Ā	Anot
5	B	B
6	B̄	Bnot
7	Z	Z
8	Z̄	Znot
9	U	U
10	Ū	Unot
11	V	V
12	V̄	Vnot
13	W	W
14	W̄	Wnot
15	–	–

Note 1: PG shielded cable with the following specifications is recommended.

Type	Twisted shield pair cable (cable diameter: about φ10)
Number of cores	14 cores or more
Cable diameter	0.2 mm² to 0.3 mm²
Coating outer diameter	φ1.5 or less

Note 2: Contact terminal type PKG includes 100 loose terminals.
Note 3: Connection with the contact terminal should be soldered.
Note 4: Customers can contact us when it is difficult for them to make the preparations. We can provide different options. (Specify the plug type and cable length.)

Easy replacement and light weight

▶ **Same mounting dimensions as an induction motor, and lightweight!**

Same mounting dimensions as an induction motor, while achieving a lightweight structure. Smooth replacement is possible.

Note: The overall length of the 75 and 90 kW types is longer.
For more information, see the external dimensions on pages 20 and 21.

High power factor

▶ **Possible to further reduce the power receiving equipment capacity!**

In addition to high efficiency, the higher power factor than induction motors and standard type synchronous motors can greatly reduce the current capacity of the equipment.

High efficiency and energy savings

▶ **Motor efficiency same level as IE4 (super premium efficiency)!**

Note: IE4 is an efficiency class based on IEC 60034-31.

Maintenance friendly

▶ **Easy bearing replacement!**

The bearings can be replaced without taking out the rotor in the same manner as the standard type synchronous motor. In addition, replacement can also be done on site, making it possible to improve work efficiency.

Torque characteristics

- - - Short-time rating (1 minute)
— Continuous rating

Reduced torque specification

Rated torque specification
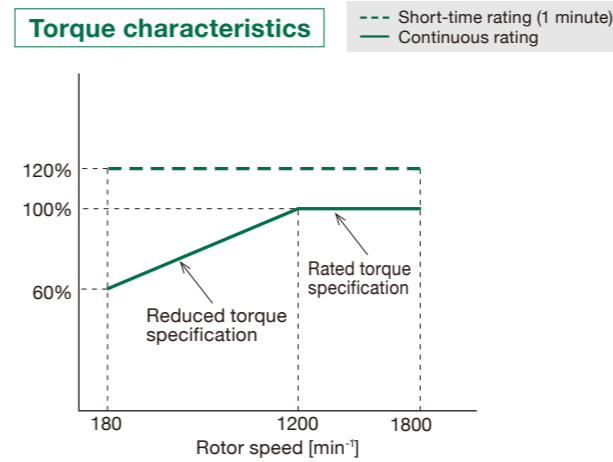
Rotor speed [min⁻¹]

▶ Product specifications

Rated output [kW]		5.5	7.5	11	15	18.5	22	30	37
Base rotor speed [min⁻¹]		1800							
Rated torque [N·m]		29.2	39.8	58.3	79.5	98.1	117	159	196
Type		GNP1133B	GNP1135B	GNP1165B	GNP1167B	GNP1184B	GNP1185B	GNP1187B	GNP1205B
Frame size		132S	132M	160M	160L	180M		180L	200L
Rated current value (secondary side) [A]	200V	20	26	40	54	64	78	106	130
	400V	10	13	20	27	32	39	53	65
Moment of inertia [kg·m²]		0.014	0.018	0.022	0.027	0.049	0.054	0.127	0.153
Number of poles		6P							
Protective structure (protection method)		Totally enclosed fan-cooled type (IP54)							
Mounting method		Leg mounting type (IMB3)							
Overload capacity		120% for 1 minute							
Time rating		S1 (continuous)							
Insulation thermal class		155(F)							
Direction of rotation		Direction is counterclockwise (CCW) as seen from the operation side							
Noise (at 1 m) [dB (A)]		70 or less							70 or less
Vibration (p-p) [μm]		10 or less							
Vibration resistance [m/s²]		6.86(0.7G)							
Installation location		Outdoor, altitude of 1000 m or less							
Ambient temperature, humidity		−10 to +40°C, 90% RH or less (noncondensing)							
Color of coating		Munsell 5YR3/2							
Inventory	For both 200 to 400 V classes	◎(GNP2020)	◎(GNP2021)	◎(GNP2022)	◎(GNP2023)	◎(GNP2024)	◎(GNP2025)	◎(GNP2026)	◎(GNP2027)
	400 V class	–	–	–	–	–	–	–	–

Note 1: In the inventory row above ◎(part number code) : Standard inventory product.   Note 2: Contact us if a dedicated motor other than the base rotor speed of 1800 min⁻¹ is required.
Note 3: Contact us when switching from commercial operation.   Note 4: Contact us if you require a special-purpose motor with a rated output of 3.7 kW or less.
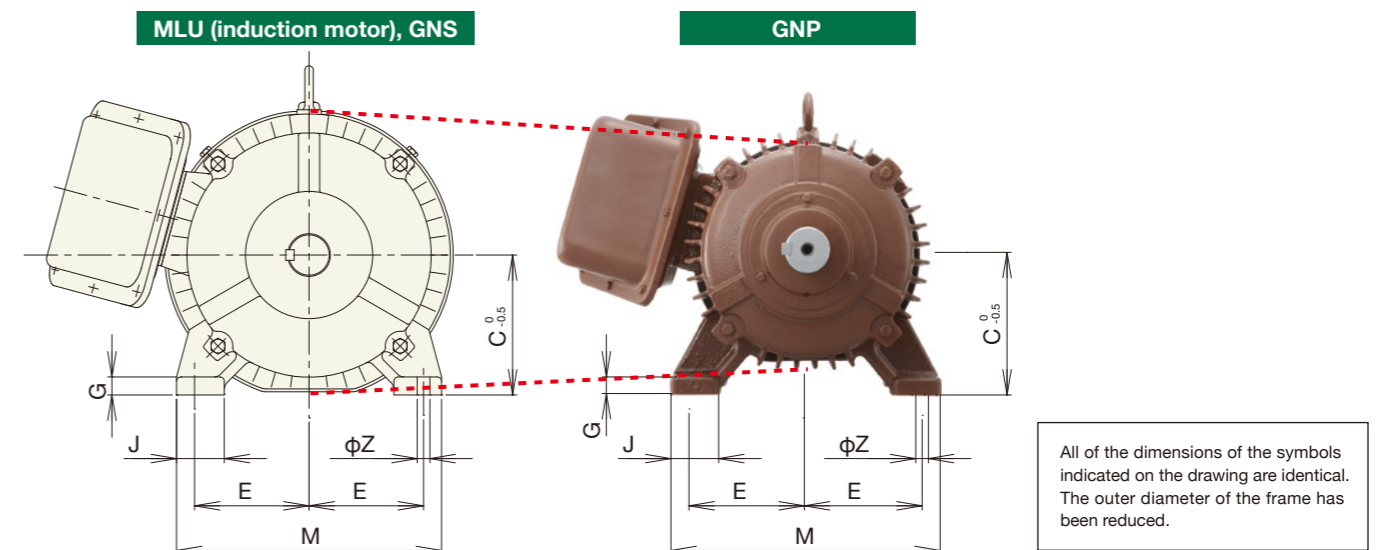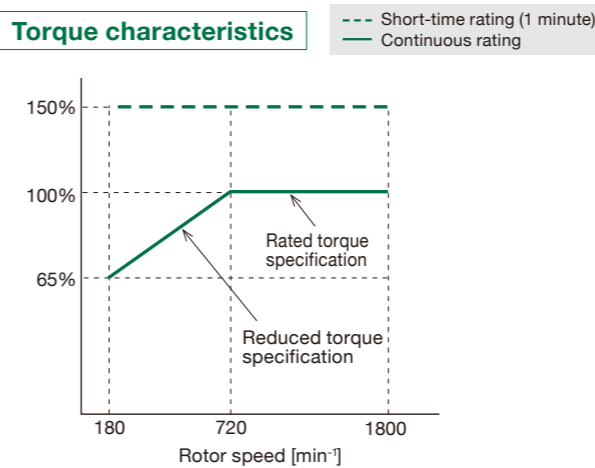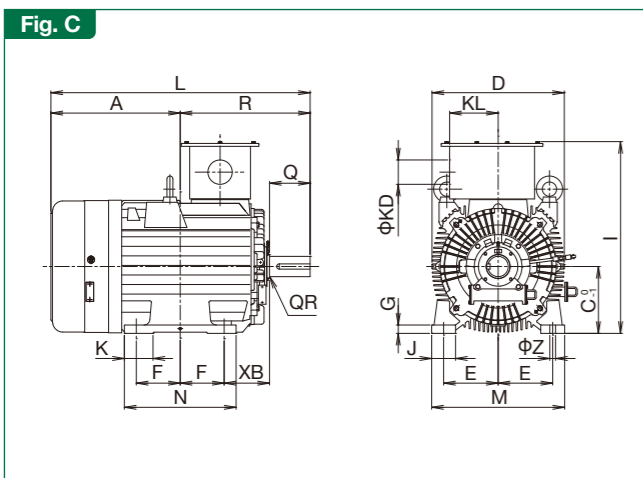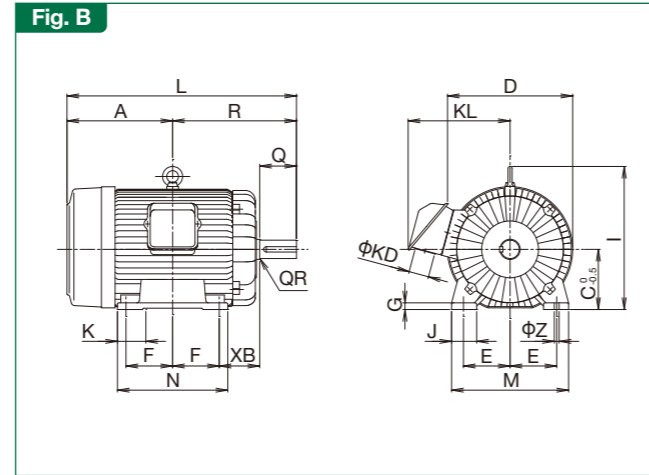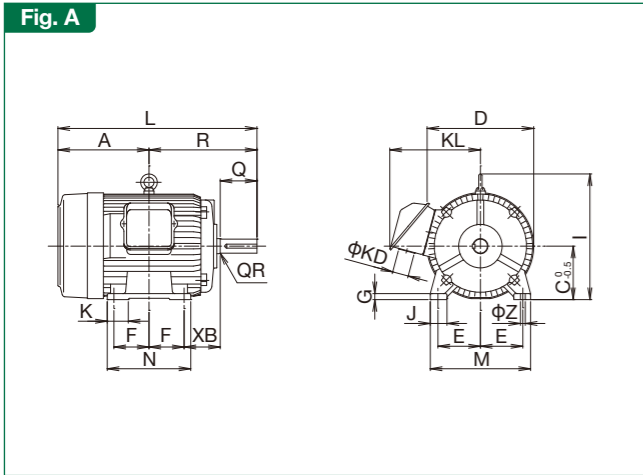Note 5: The above frame number is the same as the induction motor.

Rated output [kW]		45	55	75	90
Base rotor speed [min⁻¹]		1800			
Rated torque [N·m]		239	292	398	478
Type		GNP1207B	GNP1221B	GNP1250B	GNP1254B
Frame size		200L	225S	250S	250M
Rated current value (secondary side) [A]	200V	158	196	–	–
	400V	79	98	124	150
Moment of inertia [kg·m²]		0.350	0.434	0.577	0.721
Number of poles		6P			
Protective structure (protection method)		Totally enclosed fan-cooled type (IP54)			
Mounting method		Leg mounting type (IMB3)			
Overload capacity		120% for 1 minute			
Time rating		S1 (continuous)			
Insulation thermal class		155(F)			
Direction of rotation		Direction is counterclockwise (CCW) as seen from the operation side			
Noise (at 1 m) [dB (A)]		75 or less		85 or less	
Vibration (p-p) [μm]		10 or less			
Vibration resistance [m/s²]		6.86(0.7G)			
Installation location		Outdoor, altitude of 1000 m or less			
Ambient temperature, humidity		−10 to +40°C, 90% RH or less (noncondensing)			
Color of coating		Munsell 5YR3/2			
Inventory	For both 200 to 400 V classes	◎(GNP2028)	◎(GNP2029)	–	–
	400 V class	–	–	◎(GNP1020)	◎(GNP1021)

Note 1: In the inventory row above ◎(part number code) : Standard inventory product.   Note 2: Contact us if a dedicated motor other than the base rotor speed of 1800 min⁻¹ is required.
Note 3: Contact us when switching from commercial operation.   Note 4: Contact us if you require a special-purpose motor with a rated output of 3.7 kW or less.
Note 5: The above frame number is the same as the induction motor.

(Unit: mm)

Fig. A

Fig. B

Fig. C

Shaft end detail
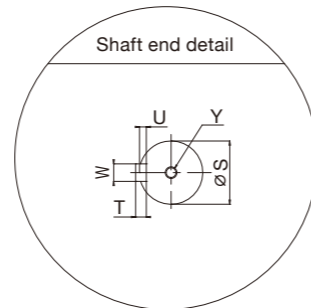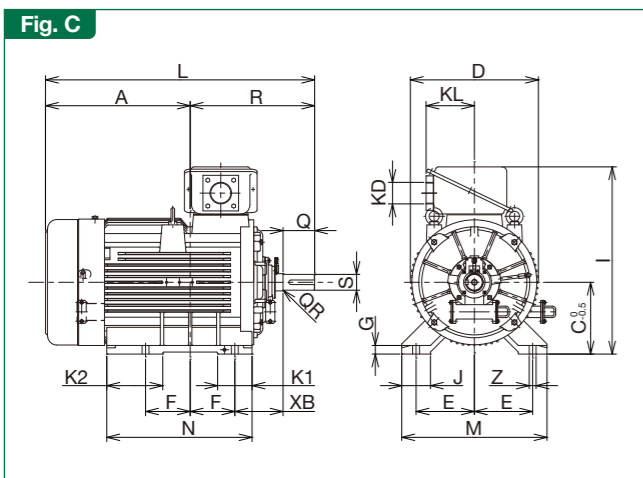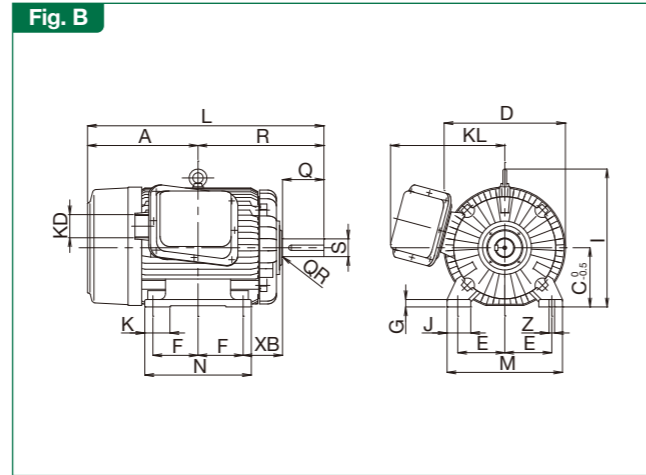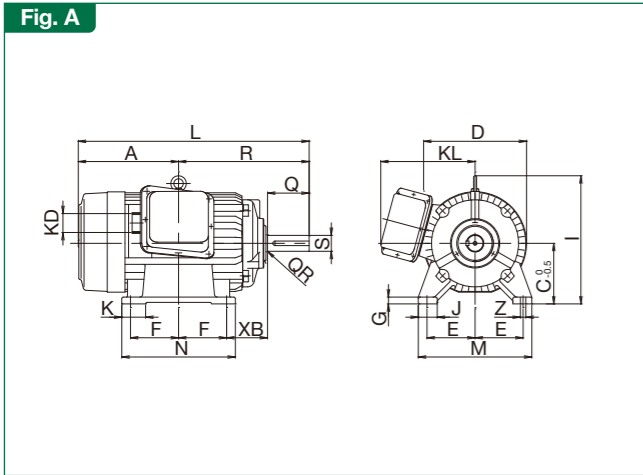
Rated output [kW]	Type	Frame size	Figure	Dimensions																				Shaft end						Mass (approx) [kg]
				A	C	D	E	F	G	I	J	K	K1	K2	KD	KL	L	M	N	R	XB	Z	Q	QR	S	T	U	W	Y	
5.5	GNP1133B	132S	A	208	132	235	108	70	17	290	45	50	–	–	G1¼	237	447	250	180	239	89	12	80	0.5	38k6	8	5	10	M10×20	45
7.5	GNP1135B	132M		227	132	235	108	89	17	290	45	50	–	–	G1¼	237	485	250	212	258	89	12	80	0.5	38k6	8	5	10	M10×20	50
11	GNP1165B	160M		243	160	272	127	105	18	338.5	50	63	–	–	G1½	250	566	300	250	323	108	14.5	110	1	42k6	8	5	12	M10×20	80
15	GNP1167B	160L		265	160	272	127	127	18	338.5	50	63	–	–	G1½	250	610	300	300	345	108	14.5	110	1	42k6	8	5	12	M10×20	90
18.5	GNP1184B	180M	B	274.5	180	319	139.5	120.5	20	396	75	75	–	–	G1½	274	626	350	292	351.5	121	14.5	110	1.5	48k6	9	5.5	14	M10×20	130
22	GNP1185B	180M		274.5	180	319	139.5	120.5	20	396	75	75	–	–	G1½	274	626	350	292	351.5	121	14.5	110	1.5	48k6	9	5.5	14	M10×20	135
30	GNP1187B	180L		316.5	180	375	139.5	139.5	20	428	75	75	–	–	G2	374	687	350	330	370.5	121	14.5	110	1.5	55m6	10	6	16	M10×20	180
37	GNP1205B	200L		342.5	200	375	159	152.5	25	448	80	85	–	–	G2½	374	768	390	360	425.5	133	18.5	140	2	60m6	11	7	18	M12×25	210
45	GNP1207B	200L		373.5	200	410	159	152.5	25	466	80	85	–	–	G2½	387	799	390	360	425.5	133	18.5	140	2	60m6	11	7	18	M12×25	260
55	GNP1221B	225S		395	225	410	178	143	25	491	80	95	–	–	G2½	387	827	436	366	432	149	18.5	140	2	65m6	11	7	18	M12×25	310
75	GNP1250B	250S	C	504.5	250	446	203	155.5	30	652	100	–	120	177	G2½	170	968	506	488	463.5	168	24	140	2	75m6	12	7.5	20	M20×35	430
90	GNP1254B	250M		545.5	250	446	203	174.5	30	652	100	–	120	177	G2½	170	1028	506	526	482.5	168	24	140	2	75m6	12	7.5	20	M20×35	490
Note 3				★		★	★	★		★	★					★		★	★	★	★	★	★	★	★	★	★	★	★	

Note 1: All products in this series are standard inventory products.
Note 2: Models with an output of 75 kW or higher are direct-connection only models. Contact us for information on non-direct connection specifications.
Note 3: ★ = Same output as MLU (induction motors), 4P product, and same dimensions as GNS products that have the same output.

● **GNP dimension comparison**

MLU (induction motor), GNS

GNP

All of the dimensions of the symbols indicated on the drawing are identical. The outer diameter of the frame has been reduced.

Easy replacement

▶ **Same mounting dimensions as an induction motor!**

Supports smooth replacement work via the same frame design as an induction motor.

Note: There are models with longer overall lengths than induction motors.
For more information, see the external dimensions on pages 24 and 25.

High power factor

▶ **Possible to further reduce the power receiving equipment capacity!**

The higher power factor than induction motors and standard and high-efficiency type synchronous motors can greatly reduce the current capacity of the equipment.

High efficiency and energy savings

▶ **Motor efficiency on a greater level than IE4 (super premium efficiency)!**

Note: IE4 is an efficiency class based on IEC 60034-31.

Maintenance friendly

▶ **Easy bearing replacement!**

The bearings can be replaced without taking out the rotor in the same manner as the standard type synchronous motor. In addition, replacement can also be done on site, making it possible to improve work efficiency.

Torque characteristics

--- Short-time rating (1 minute)
— Continuous rating

Rated torque specification

Reduced torque specification

Rotor speed [min⁻¹]

▶ Product specifications

Rated output [kW]		11	15	18.5	22	30	37	45	55
Base rotor speed [min⁻¹]		1800							
Rated torque [N·m]		58	80	98	117	159	196	239	292
Type	200 V class	GNS1163A-N21	GNS1165A-N21	GNS1183A-N21	GNS1185A-N21	GNS1187A-N21	GNS1205A-N21	GNS1206A-N21	GNS1221A-N21
	400 V class	GNS1163A-N41	GNS1165A-N41	GNS1183A-N41	GNS1185A-N41	GNS1187A-N41	GNS1205A-N41	GNS1206A-N41	GNS1221A-N41
Frame size		160M	160L	180M		180L	200L		225S
Rated current value (secondary side) [A]	200V	40	54	64	76	104	130	158	190
	400V	20	27	32	38	52	65	79	95
Moment of inertia [kg·m²]		0.032	0.041	0.076	0.096	0.129	0.285	0.325	0.433
Number of poles		6P							
Protective structure (protection method)		Totally enclosed fan-cooled type (IP44)							
Mounting method		Leg mounting type (IMB3)							
Overload capacity		150% for 1 minute							
Time rating		S1 (continuous)							
Insulation thermal class		155(F)							
Direction of rotation		Direction is counterclockwise (CCW) as seen from the operation side							
Noise (at 1 m) [dB (A)]		75 or less							
Vibration (p-p) [μm]		10 or less							
Vibration resistance [m/s²]		6.86(0.7G)							
Installation location		Indoor, altitude of 1000 m or less							
Ambient temperature, humidity		−10 to +40°C, 90% RH or less (noncondensing)							
Color of coating		Munsell 5G6/4.5							
Inventory	200 V class								
	400 V class								

Note 1: In the inventory row above ☐ : Built-to-order product. Note 2: Contact us if a dedicated motor other than the base rotor speed of 1800 min⁻¹ is required.
Note 3: Contact us when switching from commercial operation. Note 4: Contact us if you require a special-purpose motor with a rated output of 7.5 kW or less.
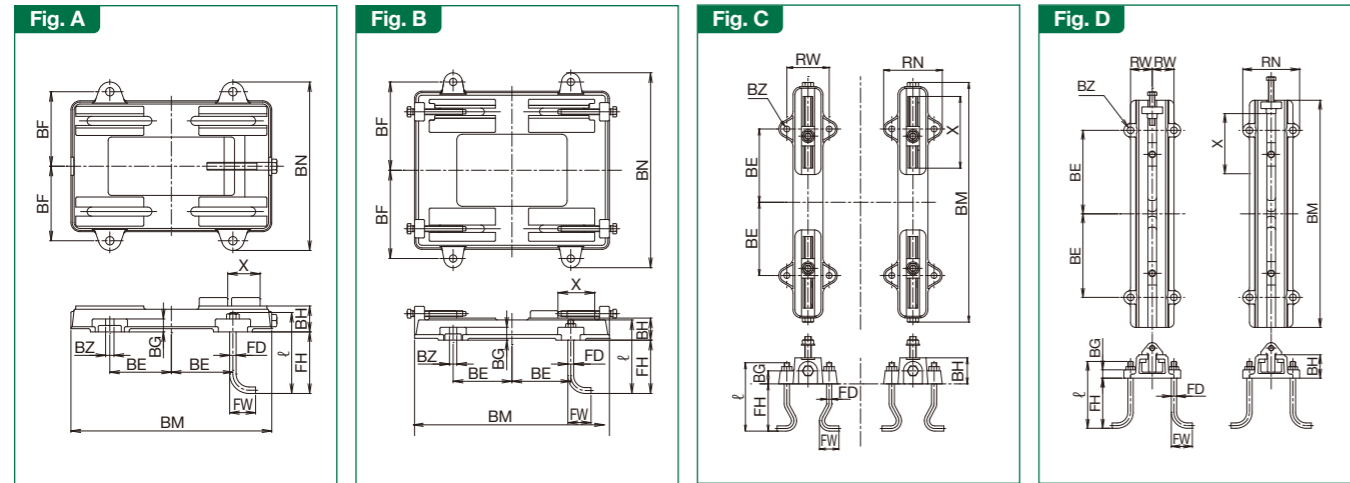Note 5: The above frame number is the same as the induction motor.

Rated output [kW]		75	90	110	132	160	200
Base rotor speed [min⁻¹]		1800					
Rated torque [N·m]		398	477	584	700	849	1061
Type	200 V class	GNS1252A-N21	GNS1254A-N21	–	–	–	–
	400 V class	GNS1252A-N41	GNS1254A-N41	GNS1282B-N41	GNS1284B-N41	GNS1312B-N41	GNS1314B-N41
Frame size		250S	250M	280S	280M	315S	315M
Rated current value (secondary side) [A]	200V	256	324	–	–	–	–
	400V	127	153	186	223	268	331
Moment of inertia [kg·m²]		0.775	0.795	1.60	1.63	2.45	2.51
Number of poles		6P					
Protective structure (protection method)		Totally enclosed fan-cooled type (IP44)		Totally enclosed fan-cooled type (IP54)			
Mounting method		Leg mounting type (IMB3)					
Overload capacity		150% for 1 minute					
Time rating		S1 (continuous)					
Insulation thermal class		155(F)					
Direction of rotation		Direction is counterclockwise (CCW) as seen from the operation side					
Noise (at 1 m) [dB (A)]		85 or less					
Vibration (p-p) [μm]		10 or less					
Vibration resistance [m/s²]		6.86(0.7G)					
Installation location		Indoor, altitude of 1000 m or less		Outdoor, altitude of 1000 m or less			
Ambient temperature, humidity		−10 to +40°C, 90% RH or less (noncondensing)					
Color of coating		Munsell 5G6/4.5					
Inventory	200 V class						
	400 V class						

Note 1: In the inventory row above ☐ : Built-to-order product. Note 2: Contact us if a dedicated motor other than the base rotor speed of 1800 min⁻¹ is required.
Note 3: Contact us when switching from commercial operation. Note 4: Contact us if you require a special-purpose motor with a rated output of 7.5 kW or less.
Note 5: The above frame number is the same as the induction motor.

Super high-efficiency type Sensorless — **GNS1** SERIES

(Unit: mm)

Rated output [kW]	Type	Frame size	Figure	A	C	D	E	F	G	I	J	K	KD	KL	L	M	N	R	XB	Z	Q	QR	S	T	U	W	Mass (approx) [kg]
11	GNS1163A-N21	160M	A	273	160	319	127	105	18	376	50	63	48	272	596	300	250	323	108	14.5	110	1	42k6	8	5	12	95
	GNS1163A-N41	160M		273	160	319	127	105	18	376	50	63	48	272	596	300	250	323	108	14.5	110	1	42k6	8	5	12	95
15	GNS1165A-N21	160L		295	160	319	127	127	18	376	50	63	48	272	640	300	300	345	108	14.5	110	1	42k6	8	5	12	115
	GNS1165A-N41	160L		295	160	319	127	127	18	376	50	63	48	272	640	300	300	345	108	14.5	110	1	42k6	8	5	12	115
18.5	GNS1183A-N21	180M		297.5	180	375	139.5	120.5	20	428	75	75	48	305	649	350	292	351.5	121	14.5	110	1.5	48k6	9	5.5	14	145
	GNS1183A-N41	180M		297.5	180	375	139.5	120.5	20	428	75	75	48	305	649	350	292	351.5	121	14.5	110	1.5	48k6	9	5.5	14	145
22	GNS1185A-N21	180M		297.5	180	375	139.5	120.5	20	428	75	75	48	305	649	350	292	351.5	121	14.5	110	1.5	48k6	9	5.5	14	160
	GNS1185A-N41	180M	B	297.5	180	375	139.5	120.5	20	428	75	75	48	305	649	350	292	351.5	121	14.5	110	1.5	48k6	9	5.5	14	160
30	GNS1187A-N21	180L		316.5	180	375	139.5	139.5	20	428	75	75	60	305	687	350	330	370.5	121	14.5	110	1.5	55m6	10	6	16	180
	GNS1187A-N41	180L		316.5	180	375	139.5	139.5	20	428	75	75	60	305	687	350	330	370.5	121	14.5	110	1.5	55m6	10	6	16	180
37	GNS1205A-N21	200L		373.5	200	410	159	152.5	25	466	80	85	80	364	799	390	360	425.5	133	18.5	140	2	60m6	11	7	18	270
	GNS1205A-N41	200L		373.5	200	410	159	152.5	25	466	80	85	80	364	799	390	360	425.5	133	18.5	140	2	60m6	11	7	18	270
45	GNS1206A-N21	200L		373.5	200	410	159	152.5	25	466	80	85	80	364	799	390	360	425.5	133	18.5	140	2	60m6	11	7	18	270
	GNS1206A-N41	200L		373.5	200	410	159	152.5	25	466	80	85	80	364	799	390	360	425.5	133	18.5	140	2	60m6	11	7	18	270
55	GNS1221A-N21	225S		406	225	442	178	143	25	514	80	95	80	391	838	436	366	432	149	18.5	140	2	65m6	11	7	18	315
	GNS1221A-N41	225S		406	225	442	178	143	25	514	80	95	80	391	838	436	366	432	149	18.5	140	2	65m6	11	7	18	315
75	GNS1252A-N21	250S		509.5	250	494	203	155.5	30	673	100	120	80	142	973	506	411	463.5	168	24	140	2	75m6	12	7.5	20	510
	GNS1252A-N41	250S		509.5	250	494	203	155.5	30	673	100	120	80	142	973	506	411	463.5	168	24	140	2	75m6	12	7.5	20	510
90	GNS1254A-N21	250M		531.5	250	494	203	174.5	30	673	100	120	80	142	1014	506	449	482.5	168	24	140	2	75m6	12	7.5	20	570
	GNS1254A-N41	250M	C	531.5	250	494	203	174.5	30	673	100	120	80	142	1014	506	449	482.5	168	24	140	2	75m6	12	7.5	20	570
110	GNS1282B-N41	280S		542	280	554	228.5	184	35	803	100	120	102	203	1086	557	468	544	190	24	170	2	85m6	14	9	22	730
132	GNS1284B-N41	280M		567.5	280	554	228.5	209.5	35	803	100	120	102	203	1137	557	519	569.5	190	24	170	2	85m6	14	9	22	790
160	GNS1312B-N41	315S		713	315	623	254	203	42	920	120	145	102	303	1302	628	526	589	216	28	170	2	95m6	14	9	25	1220
200	GNS1314B-N41	315M		737.5	315	623	254	228.5	42	920	120	145	102	303	1352	628	577	614.5	216	28	170	2	95m6	14	9	25	1320

Note 1: All products in this series are built-to-order products.
Note 2: Models with an output of 75 kW or higher are direct-connection only models. Contact us for information on non-direct connection specifications.

Fig. A

Fig. B

Fig. C

Shaft end detail

Super high-efficiency type GNS1

Optional accessories

Slide base rails

Fig. A	Fig. B	Fig. C	Fig. D

Dimensions for the standard type GNB and GNF2 series only

(Unit: mm)

Frame size		Type	Part number code	Figure	Dimensions										Foundation bolts			Mass (approx) [kg]
					BE	BF	BG	BH	BM	BN	BZ	RN	RW	X	FD×ℓ	FH	FW	
112Mh	SB	112MH	MXB1100	A	95	115	20	40	310	260	13	–	–	50	M10×125	95	40	3.6
112Jh		112JH	MXB1101		125	165	30	50	370	366	15	–	–	70	M12×160	115	50	9
132Lh		132LH	MXB1102		140	165	30	55	395	370	15	–	–	80	M12×160	115	50	11
132Hh		132HH	MXB1103	B	140	205	30	55	395	450	15	–	–	80	M12×160	115	50	12
160Lg		160LG	MXB1104		160	205	35	60	530	460	20	–	–	100	M16×200	145	63	22
160Jg		160JG	MXB1105		160	230	35	60	530	510	20	–	–	100	M16×200	145	63	23
180Lg		180LG	MXB1106		180	230	30	65	540	510	20	–	–	80	M16×200	150	63	25
180Jg 200Jg	SR	200JG	MXR1100	C	250	–	25	70	680	–	20	170	130	180	M16×200	150	63	2×19

Note 1: Only available for the GNB2 Series (sensorless) and GNF2 Series (with sensor) standard type synchronous motors.
Note 2: The above are all standard inventory products.
Note 3: The paint color is Munsell N1.2 (black).

Dimensions for high-efficiency type GNP1 and super high-efficiency type GNS1 series

(Unit: mm)

Frame size		Type	Part number code	Figure	Dimensions										Foundation bolts			Mass (approx) [kg]
					BE	BF	BG	BH	BM	BN	BZ	RN	RW	X	FD×ℓ	FH	FW	
132S	SB	132S	MXB1066	A	110	120	25	45	350	270	13	–	–	60	M10×125	90	40	4.7
132M		132M	MXB1067		110	140	25	45	350	310	13	–	–	60	M10×125	90	40	5.0
160M		160M	MXB1068		125	165	30	50	440	366	15	–	–	70	M12×160	115	50	8.5
160L		160L	MXB1069		125	185	30	50	440	406	15	–	–	70	M12×160	115	50	9
180M		180M	MXB1070	B	140	185	30	55	495	410	15	–	–	80	M12×160	115	50	11
180L		180L	MXB1071		140	205	30	55	495	450	15	–	–	80	M12×160	115	50	11
200L		200L	MXB1072		160	230	35	60	570	510	20	–	–	100	M16×200	145	63	18
225S		225S	MXB1073		180	230	30	65	580	510	20	–	–	80	M16×200	150	63	25
250S 250M 280S 280M	GS	IVnA	MXR7000	D	300	–	25	70	780	–	20	170	65	240	M16×200	150	63	2×20
315S 315M		Vn	–		400	–	30	80	1040	–	24	240	90	330	M20×400	340	80	2×42

Note 1: Same as the slide base rail products for induction motors.
Note 2: Models with part number codes are standard inventory products.
Note 3: Paint colors are SB type: Munsell N5 (gray), GS type: Munsell N1.2 (black).

Grounding rings

In general, a grounding brush is incorporated in motors with frame numbers of 225 or higher to prevent bearing electric corrosion. The grounding brush is a consumable part and must be replaced periodically. A maintenance-free grounding ring (Aegis® SGR) is also available as an option when it is difficult to replace the grounding brush depending on the installation location or operating conditions.
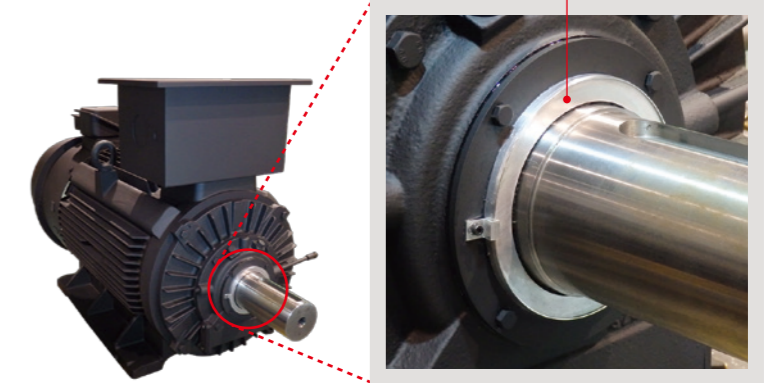
Reference products

Replacement pedestal (for GNB and GNF2 series)

Customers are requested to manufacture the replacement pedestal shown at the right when replacing with a directly connected induction motor.
When the motor is not directly connected, use the optional accessories (slide base rails) and adjust the mounting position and belt length.
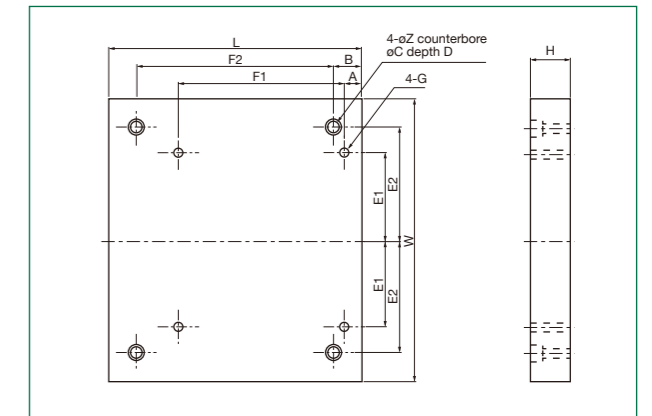
Pedestal dimensions

(Unit: mm)

Frame size	Synchronous motor output [kW]	A	B	E1	E2	F1	F2	L	W	Z	C	D	G	H
132S	5.5	21	40	95	108	140	140	205	260	11	17.5	12	M10	20
132M	7.5	22	41	95	108	140	178	245	260	11	17.5	12	M10	20
160M	11	20	20	95	127	200	210	250	300	13	20	15	M12	48
160L	15	23	23	95	127	200	254	300	300	13	20	15	M12	48
180M	18.5	21.5	34.5	108	139.5	203	241	310	350	13	20	15	M12	48
180M	22	21.5	34.5	108	139.5	203	241	310	350	13	20	15	M12	48
180L	30	17.5	30.5	108	139.5	280	279	340	350	13	20	15	M12	48
200L	37	27.5	52.5	139.5	159	254	305	390	390	18	26	20	M16	40
200L	45	32.5	57.5	139.5	159	315	305	390	390	18	26	20	M16	40
225S	55	29	57	159	178	279	286	370	410	18	26	20	M16	45
250S	75	49.5	49.5	159	203	355	311	455	460	22	32	25	M20	70
250M	90[1]	45.5	64.5	178	203	400	349	490	460	22	32	25	M20	50

*1: 90 kW products are not supported as standard inventory products. Contact us regarding compatibility with the above mentioned dimensions.
*2: Since products rated 110 kW and above are built-to-order products, if a replacement pedestal is required, we can manufacture it if you contact us about this requirement in advance.

Inverters

High Performance Multifunctional Inverters FRENIC-MEGA (G2) Series!

FRENIC-MEGA
G2 SERIES

High basic performance

- Enables vector control with and without sensors
- Improves current and speed response and enhances the speed control range
- Comes with a built-in braking transistor with a capacity up to 75 kW

Various applications

- Comes with a variety of functions suitable for different applications
  (Improves automatic energy-saving operation, braking transistor damage detection, braking signals, etc.)
- Comes with customized logic functions
  (260 programming steps)
- Compatible with network protocols

Easy maintenance

- Improves work efficiency by simplifying wiring and setup
- Enhanced life cycle diagnosis and maintenance functions
  (Cooling capacity reduction, IGBT life expectancy, main circuit capacitor, etc.)
- Achieves long main component life

Environmental resistance

- Improves environmental performance
  (Enhances operating ambient temperature by 55°C, improves PCB coating, etc.)
- Compliant with the revised European RoHS Directive
- Conforms to overseas safety standards

Energy savings by speed control

▶ Optimized for fan and pump applications!

The unit is capable of reducing power consumption via speed control that adjusts discharge pressure, air flow and water volume.

■ Pump operation power consumption comparative example (22 kW)

- Current situation
- Induction motor + inverter
- Standard type synchronous motor + inverter
- High-efficiency type synchronous motor + inverter
- Super high-efficiency type synchronous motor + inverter

Power consumption [1,000 kWh]
120 / 100 / 80 / 60 / 40 / 20 / 0

Flow rate [%]
40 / 60 / 80 / 100
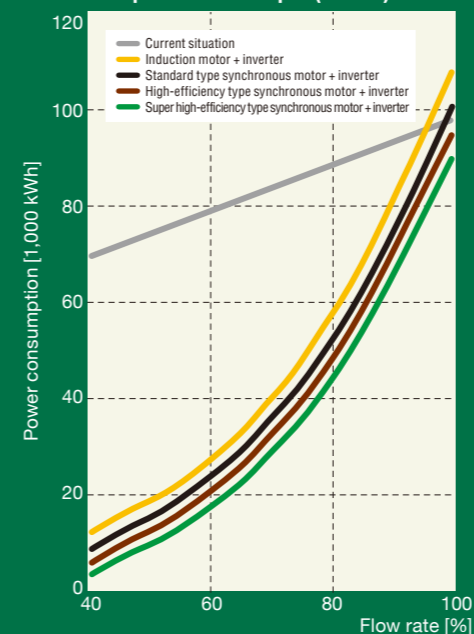
Staged facility upgrade

AFTER

STEP 1 — FRENIC-MEGA (G2) Series

STEP 2 — FRENIC-MEGA (G2) Series

BEFORE
Top Runner motor

Top Runner motor

Standard type synchronous motor OR High-efficiency type synchronous motor OR Super high-efficiency type synchronous motor

PID control

▶ Optimized for fan and pump applications!

Capable of constant control of fan and pump discharge pressure, air flow and water volume.

■ Balance free bumpless function
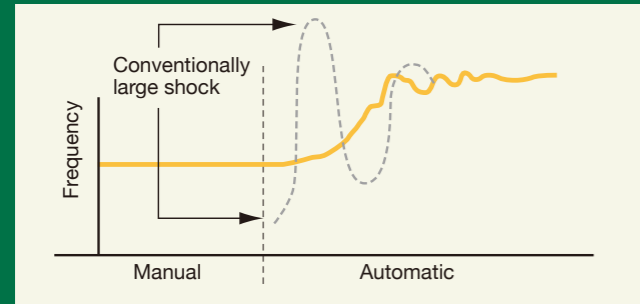
■ Anti-reset windup function
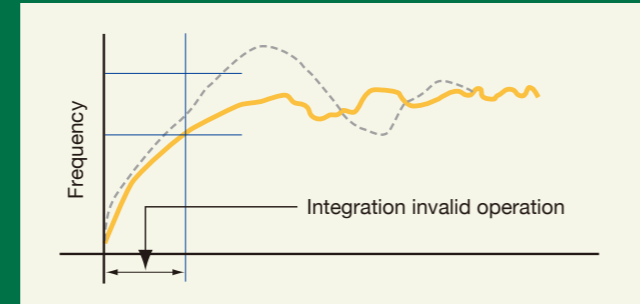
In addition, the unit is equipped with a small water volume stoppage function, making pressurized operation before small water volume stoppage possible.
Constant control of pump discharge pressure: Pressurizes the bladder tank (pressure tank) when implementing small water volume stoppage and extends small water volume stoppage time to greatly improve energy-saving effects.
Note: Contact us for more information.
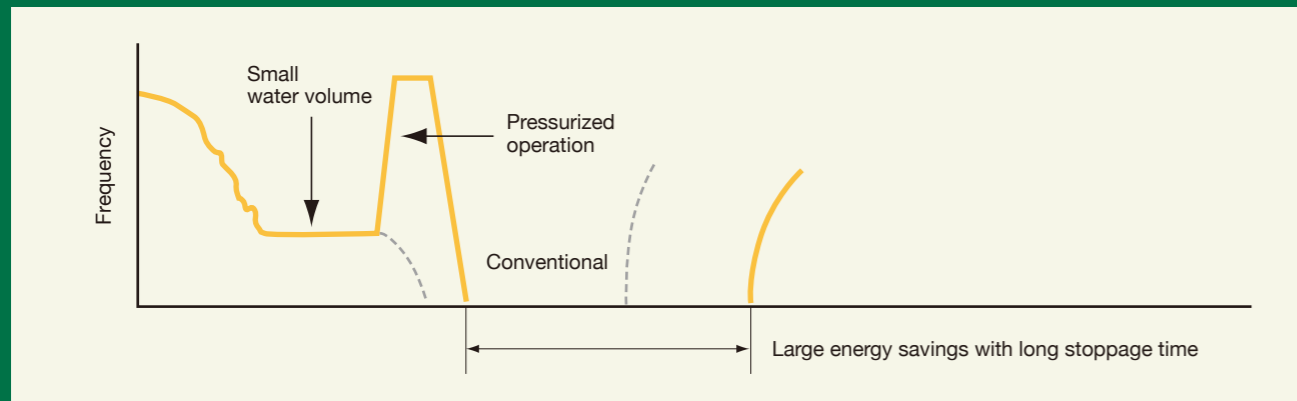
Advanced speed control (using a PMPG interface card)

▶ Capable of a 1:1500 speed control range via sensor equipped vector control!

Suitable for applications such as printing machines and press machines.

Note 1: Enables use of sensor-equipped synchronous motors (GNF Series) by combining with a PMPG interface card.
Note 2: The above specifications may vary depending on the environment and conditions of use.
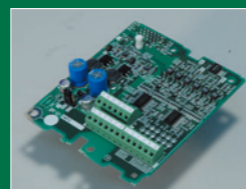
PMPG interface card (optional)

▶ Product specifications

FRENIC-MEGA G2 SERIES

■ Three-phase 200 V series

HHD spec High carrier frequency Heavy Duty(for heavy load)
HND spec High carrier frequency Normal Duty（for light load）

Item			Specification											
Type(FRN□□□G2S-2J)		5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Nominal applied motor*1 [kW]	HHD spec	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
	HND spec	7.5	11	15	18.5	22	30	37	45	55	75	90	110
Output rating — Rated capacity*2 [kVA]	HHD spec	10	14	18	24	28	34	45	55	68	81	109	131
	HND spec	12	17	22	28	33	43	55	68	81	109	131	164
Rated current [A]	HHD spec	27	37	49	63	76	90	119	146	180	215	288	346
	HND spec	31.8	46.2	59.4	74.8	88	115	146	180	215	288	346	432
Overload current rating	HHD spec	150%-1min, 200%-3.0s											
	HND spec	120%-1min											
Input ratings — Main circuit power: Phases, voltage, frequency		Three-phase 200 to 240 V, 50/60 Hz						Three-phase 200 to 230 V, 50/60 Hz					
Voltage, frequency variations		Voltage:+10 to -15% (Voltage unbalance:2% or less*3) Frequency:+5 to -5%											
Required power supply capacity*4(with DCR) [kVA]	HHD spec	7.4	10	15	20	25	30	40	48	58	71	98	116
	HND spec	10	15	20	25	30	40	48	58	71	98	116	143
DC reactor (DCR)	HHD spec	Optional										Optional*5	
	HND spec	Optional										Optional*5	
Protective structure（IEC60529）		IP20 closed type, UL open type						IP00 open type, UL open type / IP55 for the cooling part outside the panel					
Cooling method		Fan cooling											
Mass(aprrox) [kg]		5.8	6.2	5.7	11	11	12	25	31	40	42	60	97

■ Three-phase 400 V series

HHD spec High carrier frequency Heavy Duty(for heavy load)
HND spec High carrier frequency Normal Duty（for light load）

Item										Specification										
Type(FRN□□□G2S-4J)		5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315
Nominal applied motor*1 [kW]	HHD spec	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315
	HND spec	7.5	11	15	18.5	22	30	37	45	55	75	90*6/110	132*6	160*6	200*6	220*6	280*6	315*6	355*6	400*6
Output rating — Rated capacity*2 [kVA]	HHD spec	10	14	18	24	29	34	45	57	69	85	114	137	164	198	247	287	329	396	445
	HND spec	13	17	26	31	34	45	57	69	85	114	165*6	198*6	221*6	275*6	316*6	416*6	464*6	495*6	563*6
Rated current [A]	HHD spec	13.5	18.5	24.5	32	39	45	60	75	91	112	150	180	216	260	325	377	432	520	585
	HND spec	17.5	23	35	41	45	60	75	91	112	150	217	261	290	361	415	547	610	650	740
Overload current rating	HHD spec	150%-1min, 200%-3.0s																		
	HND spec	120%-1min																		
Input ratings — Main circuit power: Phases, voltage, frequency		Three-phase 380 to 480 V, 50/60 Hz																		
Voltage, frequency variations		Voltage:+10 to -15% (Voltage unbalance:2% or less*3) Frequency:+5 to -5%																		
Required power supply capacity*4(with DCR) [kVA]	HHD spec	7.4	10	15	20	25	30	40	48	58	71	96	114	140	165	199	248	271	347	388
	HND spec	10	15	20	25	30	40	48	58	71	96	140	165	199	248	271	347	388	436	489
DC reactor (DCR)	HHD spec	Optional										Optional*5								
	HND spec	Optional										Optional*5								
Protective structure（IEC60529）		IP20 closed type, UL open type									IP00 open type, UL open type / IP55 for the cooling part outside the panel									
Cooling method		Fan cooling																		
Mass(aprrox) [kg]		5.9	6.0	5.7	10	11	11	25	25	28	31	38	60	60	89	89	116	124	221	221

*1 An applicable motor is one of our synchronous motor series (6P).
*2 Rated capacity is calculated by assuming the rated output voltage as 220 V for 200 V series and 440 V for 400 V series.
*3 Voltage unbalance(%) =Max. voltage (V) - Min. voltage (V) / Three-phase average voltage (V) ×67 (IEC 61800-3)
　If this value is 2 to 3%, use an optional AC reactor (ACR).
*4 Required when a DC reactor (DCR) is used.
*5 When using a motor with a rating of 75 kW or more, be sure to use a DC reactor (option).
*6 Supports ROM 0500 or later.

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Item		Explanation	Remarks
Output / Adjustment	Maximum output frequency	5 to 599 Hz variable setting *If it exceeds 599 Hz, it will overspeed trip.	
	Base frequency	5 to 599 Hz variable setting (in conjunction with maximum output frequency)	
	Number of motor poles setting	2 to 128 poles	
	Starting frequency	0.1 to 60.0 Hz variable setting (0.0 Hz when performing speed sensorless vector control/vector control with speed sensor)	
	Carrier frequency	[FRN***G2S/E/H-2J/4J] • 0.75 to 16 kHz variable setting (HHD specification: 0.4 to 55 kW, HND specification: 5.5 to 18.5 kW) • 0.75 to 10 kHz variable setting (HHD specification: 75 to 630 kW, HND specification: 22 to 55 kW) • 0.75 to 6 kHz variable setting (HHD specification: -, HND specification: 75 to 630 kW) [FRN***G2P-2J/4J] • 0.75 to 16 kHz variable setting (HHD specification: 1.5 to 75 kW, HND specification: 1.5 to 22 kW) • 0.75 to 10 kHz variable setting (HHD specification: -, HND specification: 30 to 75 kW) Note) The carrier frequency may automatically lower depending upon the ambient temperature or the output current to protect the inverter. (The automatic lowering function can be disabled.)	
	Output frequency accuracy	• Analog setting : ±0.2% of maximum output frequency (at 25 ±10 °C) (77 ±18 °F) • Keypad setting : ±0.01% of maximum output frequency (at 10 to +50 °C) (14 ±22 °F)	
	Frequency setting resolution	• Analog setting : 1/3000 of maximum output frequency • Keypad setting : 0.01 Hz • Link setting : 1/20000 of maximum output frequency or 0.01 Hz (fixed)	
Induction motor	When performing V/f control with sensor*1 — Speed control Range	• 1:20*1, 1:200*2 (Minimum speed: Nominal speed) • 1:2 (fixed torque area : fixed output area)	
	When performing dynamic torque vector control with sensor*2 — Speed control accuracy	• Analog setting: ±0.2% of maximum output frequency or below (at 25 ±10 °C) • Digital setting: ±0.01% of maximum output frequency or below (at 10 to +50 °C)	
	When performing sensorless vector control — Speed control Range	• 1:200 (Minimum speed: Nominal speed) • 1:2 (fixed torque area : fixed output area)	
	When performing sensorless vector control — Speed control accuracy	• Analog setting: ±0.5% of maximum output frequency or below (at 25 ±10 °C) • Digital setting: ±0.5% of maximum output frequency or below (at 10 to +50 °C)	
	When performing vector control with sensor — Speed control Range	• 1:1500 (Minimum speed: Nominal speed) • 1:16 (fixed torque area : fixed output area)	
	When performing vector control with sensor — Speed control accuracy	• Analog setting: ±0.2% of maximum output frequency or below (at 25 ±10 °C) • Digital setting: ±0.01% of maximum output frequency or below (at 10 to +50 °C)	
Synchronous motors	When performing sensorless vector control — Speed control Range	• 1:10 (Minimum speed: Nominal speed) • 1:2 (Limited by maximum output voltage)	
	When performing sensorless vector control — Speed control accuracy	• Analog setting: ±0.5% of nominal speed or below (at 25 ±10 °C) • Digital setting: ±0.5% of nominal speed or below (at 10 ±+50 °C°C)	
	When performing vector control with sensor — Speed control Range	• 1:1500 (Minimum speed: Nominal speed) • 1:2 (Limited by maximum output voltage)	
	When performing vector control with sensor — Speed control accuracy	• Analog setting: ±0.2% of maximum output frequency (at 25 ±10 °C) • Digital setting: ±0.01% of maximum output frequency (at 10 to +50 °C)	
Control	Control method	• V/f control • Dynamic torque vector control • V/f control with sensor, dynamic torque vector control with sensor • Sensorless vector control • Vector control with sensor • Sensorless vector control (synchronous motors) • Vector control with sensor (synchronous motors)	
	Voltage/frequency characteristics — 200V series	• The base frequency and maximum output frequency are common, and the voltage can be set between 80 and 240 V. • AVR control can be turned ON or OFF. • Non linear V/f setting (3 points): The desired voltage (0 to 240 V) and frequency (0 to 599 Hz) can be set.	
	Voltage/frequency characteristics — 400V series	• The base frequency and maximum output frequency are common, and the voltage can be set between 160 and 500 V. • AVR control can be turned ON or OFF. • Non linear V/f setting (3 points): The desired voltage (0 to 500 V) and frequency (0 to 599 Hz) can be set.	
	Torque boost	• Auto torque boost (for constant torque load) • Manual torque boost: The desired torque boost value (0.0 to 20.0%) can be set. • The applicable load can be selected (for constant torque load, quadratic-torque load)	
	Starting torque (HHD specification)	• FRN0115G2S-2G/FRN0060G2■-4G or below 200% or higher, • FRN0146G2S-2G/FRN0085G2■-4G or above 180% or higher set frequency: 0.3 Hz, when performing V/f control (base frequency: 50 Hz, slip compensation/auto torque boost)	
	Running · operation — Key operation:	Start and stop with [RUN] and [STOP] keys (LED keypad) Start and stop with [FWD], [REV], and [STOP] keys (optional multi-function keypad)	
		External signals: Forward (reverse) rotation, start/stop commands [2-wire/3-wire operable], (digital input) coast to stop command, external alarm, alarm reset, etc.	
		Link operation: Operation through RS-485, field bus communication (option)	
		Run command switching : Remote/local switching, link switching	
		[RUN] key memory : Memorizes the state of the [RUN] key in the event of a power failure during operation using the keypad, and resumes operation after power is restored.	
	Frequency setting	Keypad operation : Using [▲] and [▼] keys	
		External potentiometer: Using external frequency command potentiometer (external resistor of 1 to 5 kΩ, 1/2 W)	
		Analog input : Voltage input (terminal [12], [V2], [C1] (V3 function)) 0 to ±10 VDC (±5 VDC)/0 to ±100% 0 to +10 VDC (+5 VDC)/0 to +100% (+1 to +5 VDC can also be adjusted with bias, analog input gain) Voltage input (terminal [C1] (C1 function)) 4 to 20 mA DC/0 to 100%, 0 to 20 mA DC/0 to 100% 4 to 20 mA DC/-100 to +100%, 0 to 20 mA DC/-100 to +100%	

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Item		Explanation	Remarks
Control	Frequency setting	UP/DOWN operation: Frequency can be increased or decreased while the digital input signal is ON. The frequency recorded with digital input "STZ" can be cleared.	
		Multistep frequency selection: Selectable from 16 different frequencies (step 0 to 15)	
		Pattern operation: The inverter runs automatically according to the previously specified run time, rotation direction, acceleration/deceleration time and reference frequency. Up to 7 stages can be specified.	
		Link operation: Setting through RS-485, field bus communication (option) (built in as standard)	
		Frequency setting switching: Two types of frequency settings can be switched with an external signal (digital input). Remote/local switching, link switching	
		Auxiliary frequency setting: Can be selected by adding and entering the respective terminal [12], [C1], or [V2] inputs.	
		Operation at a specified ratio: The ratio can be set with an analog input signal..	
		Inverse operation: Can be switched from "0 to +10 VDC/0 to 100%" to 10 to 0 VDC/0 to 100%" from an external source. Can be switched from "4 to 20 mA DC/0 to 100%" to "20 to 4 mA DC/0 to 100%" from an external source. Can be switched from "0 to 20 mA DC/0 to 100%" to "20 to 0 mA DC/0 to 100%" from an external source.	
		Pulse train input: Pulse input = terminal [X6], [X7], (standard) forward/reverse pulse, pulse + rotation direction Complementary output: Max. 100 kHz Open collector output: Max. 30 kHz	
		Pulse train input: PG interface option, forward/reverse pulse, pulse + rotation direction (option) Complementary output: Max. 100 kHz Open collector output: Max. 30 kHz	
	Acceleration/ deceleration time	Setting range: Setting range from 0.00 to 6000 s	
		Switching: The four types of acceleration/deceleration time can be set or selected individually (switchable during operation).	
		Acceleration/deceleration pattern: Linear acceleration/Deceleration, S curve acceleration/deceleration (week, random (weak)), curve line acceleration/deceleration (max. acceleration/deceleration at rated output)	
		Deceleration mode (coast to stop): Shutoff of the run command lets the motor coast to a stop.	
		Forcible stop deceleration time: Deceleration stop in exclusive deceleration time by forced stop (STOP). • Dedicated acceleration/deceleration time for jogging: • It is possible to switch between acceleration/deceleration time = 0 with acceleration/deceleration operation cancel "BPS".	
	Frequency limiter (upper limit and lower limit frequencies)	• Specifies the upper and lower frequencies in Hz. • Processing can be selected when the reference frequency is less than the lower limit (F16). (The output frequency will be maintained at the lower limit/motor decelerates and stops.) • Setting is possible with analog input (terminal [12], [C1], [V2], [V3]).	
	Frequency/PID command bias	• Frequency: Set between 0 and ±200% • PID command: Set between 0 to ±100%	
	Analog input	• Gain: Setting range from 0 to 400% • Offset: Setting range from 5.0 to +5.0% • Filter: Setting range from 0.00 to 5.00s	
	Jump frequency	Six operation points and their common jump width (0 to 30.0 Hz) can be set.	
	Ready for jogging	Operation with [RUN] key (LED keypad), [FWD] or [REV] keys (Multi function keypad), or digital contact inputs "FWD" or "REV" (Exclusive acceleration/deceleration time setting, exclusive frequency setting)	
	Restart mode after momentary power failure	• Trip immediately: Trip immediately at the time of power failure. • Trip after recovery from power failure: Coast to a stop at the time of power failure and trip when the power is recovered. • Trip after decelerate to stop: Deceleration stop at power failure, and trip after stoppage • Continue to run: Operation is continued using the load inertia energy. • Start at the frequency selected before momentary power failure: Free run at power failure and start after power recovery at the frequency selected before momentary stop. • Start at starting frequency: Free run at power failure and start at the starting frequency after power recovery. • Start at frequency of power recovery: Free run at power failure, and start after power recovery by searching for the speed.	
	Current limiting — Hardware current limiter	Current is limited with hardware to prevent overcurrent trip due to high-speed load fluctuations or momentary power failure which cannot be handled with software current limiting. (This limiter can be canceled.)	
	Current limiting — Software current limiter	Automatically reduces the frequency so that the output current becomes lower than the preset operation level. (This limiter can be canceled.) The operation can be selected (operation at constant speed only, operation when accelerating and at constant speed).	
	Operation by commercial power supply	• With commercial power selection commands ("SW50", "SW60"), the inverter outputs 50/60 Hz. • Commercial switching sequence built in	
	Slip compensation	Compensates for decrease in speed according to the load.	
	Droop control	Decreases the speed according to the load torque.	
	Torque limit control	• Switchable between 1st and 2nd torque limit values. • Torque limiting/torque current limiting/power limiting for each quadrant • Analog torque limit input	
	PID control	• PID processor for process control/dancer control • Switch normal/inverse operation • Command: Keypad, analog input (terminals 12, C1, V2, V3), multi-stage setting (selectable from 3 options), RS-485 communication, fieldbus communication (optional) • Feedback value: Analog input (terminals 12, C1, V2, V3) • Alarm output (absolute value alarm, deviation alarm) • PID feedback error detection • Sensor input scaling function • Sensor input conversion/calculation function • Low liquid level stop function (pressurized operation possible before low liquid level stop) • Automatic frequency update function for stoppage due to small water quantity • Anti reset wind up function • Output limiter • Integration reset/hold • PID constant auto tuning function for process control PID controlle • Built-in external PID controller: 3 sets	
	Retry	• Automatically releases the trip state and resumes operation up to the set number of times without outputting a batch alarm even if the protective function to be retried is activated. • Can be set up to 20 times (configurable by function code). • Can set the wait time before resetting. • Can set the alarm to be retried	

Item		Explanation	Remarks
Control	Auto search	The motor speed is estimated before startup, and the motor is started without ever stopping the motor while it is idling. (Motor constants must be tuned. Auto tuning (offline))	
	Anti regenerative control (Automatic deceleration)	• If the intermediate DC voltage/torque calculation value reach or exceed the anti regenerative control level when the motor is decelerating, the deceleration time is automatically extended to avoid an overvoltage trip. (Forced deceleration can be set at three or more times the deceleration time.) • If the torque calculation value reaches or exceeds the anti regenerative control level during constant speed operation, overvoltage tripping is avoided by performing control to raise the frequency.	
	Deceleration characteristics (Improvement of braking performance)	• The motor loss is increased during deceleration to reduce the regenerative energy in the inverter to avoid overvoltage trip. • Can be set for use with AVR cancellation	
	Auto energy saving operation	Controls the output voltage to minimize the total sum of the motor loss and inverter loss. (Auto energy saving control can be turned ON and OFF from an external source with a digital input signal.)	
	Overload prevention control	If the surrounding temperature or IGBT junction temperature increases due to overload, the inverter lowers the output frequency to avoid overload.	
	Offline tuning	Tunes the motor while the motor is stopped or running, for setting up motor parameters.	
	Offline tuning	This corrects changes in motor constants caused by temperature rise.	
	Cooling fan ON OFF control	• Detects inverter internal temperature and stops cooling fan when the temperature is low. • Possible to output a fan control signal to an external device.	
	Motor 1 to 4 settings	• Switching is possible between 4 motors. • It is possible to switch between four types of specific function code data (switching is possible while the motor is running.) The following data can be set for motors 1 to 4: base frequency, rated current, torque boost, electronic thermal slip compensation.	
	Universal DI	Transfers the status of an external digital signal connected with the general purpose digital input terminal to the host controller.	
	Universal DO	Outputs a digital command signal sent from the host controller to the general purpose digital output terminal.	
	Universal AO	Outputs an analog command signal sent from the host controller to the analog output terminal.	
	Speed control	• Selectable among the four set of the auto speed regulator (ASR) parameters. • Notch filter for vibration control	
	Line speed control	Regulates the motor speed to keep the peripheral speed constant even if the roll winding diameter changes on machines such as winders and unwinders. Tension can be controlled when used in combination with PID control. (A PG option card is required.)	
	Master follower operation	Two motors can be run synchronously using a pulse generator (PG). (A PG option card is required.)	
	Pre excitation	Excitation is carried out to create the motor flux before starting the motor.	
	Zero speed control	Performs speed control by forcibly setting the speed command to zero.	
	Servo lock	Stops the motor and holds the motor in the stopped position.	
	DC braking	• Applies DC current to the motor at the operation start time or at the time of inverter stop to generate braking torque.	
	Mechanical brake control	• It is possible to output mechanical brake control signals with the brake ON/OFF timing adjusted by the output current, torque commands, output frequency and timer. • The output timing of control signals can be adjusted individually when performing • Errors can be detected with mechanical brake operation check input signals.	
	Torque control	• Analog torque command input • Speed limit function is provided to prevent the motor from becoming out of control. • Torque bias (with analog setting, digital setting) possible	
	Rotation direction limitation	Select either of reverse or forward rotation prevention.	
	Motor condensation prevention	Current flows automatically when the motor is stopped, and the motor temperature is raised to prevent condensation.	
	Customizable logic	It is possible to select or connect digital logic circuits or analog operation circuits with digital/analog I/O signals, configure a simple relay sequence, and operate it freely. (The maximum number of steps is 260)	
	Battery operation	Inverters at which an undervoltage has occurred are run with the battery power. 1.5 to 37 kW (type: 0008 to 0180) (200 V class), 1.5 to 55 kW (type: 0004 to 0179) (400 V class)	
	Overload stop function	When used for hoisting applications, the motor stops if the inverter detects excessive torque during ascent. After the overload is detected, operation is possible only in the descend direction.	
	Load adaptive control function	If the load is lighter than the preset load level, operation can be performed at a frequency that is the set frequency multiplied by a specified ratio / the maximum allowable frequency depending on the load (e.g., vertical transportation machines, conveyors).	
	Position control	•Absolute/relative positioning is possible using a pulse encoder •The stop target position can be set by the user's preferred unit system (using electronic gears) via function code (8 point) communication. •Home return, Preset, Clear function, Teaching function •Position regulator (APR), Position feed forward function •Movable range is settable by overtravel detection and stop function	
	Orientation function	This function makes it possible for rotors such as machine tool spindles and turntables to be positioned. Stop target position can be set by a function code (8 points)	
	Pump control	• Cascade operation (drive motor fixed type: 1+8 units, drive motor circulation type: 4 units (when OPC-RY2 is used)) • Operation time equalization function • Boost function • Bite prevention function • Drought detection function • Auxiliary motor control function • Filter clogging prevention function • Check valve protection function • Large water quantity detection function • High-frequency operation detection function	
	Rotary operation	Inverters can be connected to each other using RTU communication (up to 3 units)	
	Wet bulb temperature estimation control	This function estimates the wet-bulb temperature in the fan control of the cooling tower and controls the fan so that the cooling water is linked with the outside air (wet-bulb) temperature to suppress unnecessary power consumption.	
	Scheduled Operation	By combining with the RTC built into the multifunctional keypad (TP-A2SW), it can run/stop the inverter and output external signals. • Can set 4 timers per week • Can set holidays (20 days per year) • Can correct for daylight saving time (DST)	
	Favorites function code	The function code can be registered in "Favorites" and displayed (Applicable to all function codes).	
	Data initialization	All function codes and limited function codes can be initialized.(Per motor, non-communication-related, customized logic only, Favorites only)	

* For details, refer to the FRENIC-MEGA (G2) User's Manual.

Item		Explanation	Remarks
Control	Simulated operation mode	Sequence check is possible without inverter output.	
	Start check function	To ensure safety, the presence or absence of an operation command is checked at power-on, at alarm reset, and when switching operation command methods. An alarm is displayed if an operation command has been input.	
	Multifunction key	During the operation mode, the multifunction key "M/SHIFT" on LED keypads (TP-E2) can be used as an input method to activate the input terminal function like the X terminal.	
	Traceback	Data (user-selectable) such as frequency, voltage, current, etc., immediately before a trip can be saved and analyzed.	
Display	Running/stopping	Speed monitor (reference frequency, output frequency, motor speed, load shaft speed, line speed, and speed indication percentage), output current [A], output voltage [V], calculated torque [%], power consumption [kW], PID command value, PID feedback value, PID output, load factor [%], motor output [kW], torque current (%), magnetic flux command (%), analog input monitor, input watt hour	
	Inverter lifetime alarm	• It is judged that the life of main circuit capacitors, electrolytic capacitors on PCBs,IGBT or the cooling fan has been reached. • Life alarm information can be output externally. • Ambient temperature: 40 °C Load factor: Inverter rated current of 100% (HHD specification), 80% (HND, HD, ND specification)	
	Cumulative operating status	• The inverter cumulative running time, cumulative input watt hours, and motor cumulative running time/start count (for each motor) is displayed. • A warning is output if the maintenance time or startup count set beforehand is exceeded.	
	Trip	Displays the cause of a trip.	
	Light alarm	The cause of light alarms is displayed.	
	During operation, when trip occurs	• Trip history: The cause (code) of the up to the last ten trips is retained and displayed. • All kinds of running status data for up to the past 4 trips is retained and displayed. •Date and time can be displayed in the history by using the clock function (TP-A2SW)	
Protective functions	Overcurrent protection	Stops the inverter to protect it from overcurrent caused by an overload.	
	Short circuit protection	Stops the inverter to protect it from overcurrent caused by shorting of the output circuit.	$OC1\ OC2\ OC3$
	Ground fault protection	Detects the overcurrent caused by the ground fault of the output circuit and stops the inverter Protection may be disabled if the power is turned ON with the ground fault still occurring.	
		Detects output current zero-phase current, and stops the inverter to protect it from overcurrent caused by an output circuit ground fault. (5.5 kW or higher, 7.5 kW or higher for G2P)	EF
	Overvoltage protection	Stops the inverter if a DC intermediate circuit overvoltage (400V series: 800 VDC, 200V series: 400 VDC) is detected. The inverter cannot be protected if an excessively large voltage is applied by accident.	$OU1\ OU2\ OU3$
	Undervoltage protection	Stops the inverter if a drop in DC intermediate circuit voltage (400V series: 400 VDC, 200V series: 200 VDC) is detected. However, this is disabled based on the restart after momentary power failure setting. Furthermore, operation is possible (regenerative operation only) at a voltage level lower than that above when performing battery operation.	LU
	Input phase loss protection	Stops the inverter if input voltage phase loss or interphase unbalance factor is detected. If the load is light, or when a DC reactor is connected, input phase loss may not function.	Lin
	Output phase loss protection	Stops the inverter if inverter output phase loss is detected during operation. This protective function also functions during auto tuning and during magnetic pole position tuning. (Operation selection possible)	OPL
	Overheat protection	Stops the inverter if a cooling fan fault, or cooling fin overheating when an overload occurs is detected.	$OH1$
		Stops the inverter if inverter unit internal charging resistor overheating is detected.	$OH3$
		Stops the inverter if inverter unit internal charging resistor overheating is detected.	$OH6$
		By setting the braking resistor electronic thermal overload relay function, the inverter is stopped to protect the braking resistor from overheating.	dbH
	Inverter overload protection	Stops the inverter if overheating is detected by calculating the IGBT internal temperature from the output current and detected internal temperature.	OLU
	External alarm input	Stops the inverter and displays an error if a digital input signal (THR) is input.	$OH2$
	Fuse blown	Stops the inverter and displays an error if a fuse is blown inside the inverter. (Not applicable for FRN75G2P-2J)	FUS
	Charging circuit fault	Stops the inverter and displays an error if an inverter charging circuit error is detected. (All models of 1.5 kW or higher)	PbF
	Braking transistor fault	Stops the inverter and displays an error if a braking transistor error is detected. (Braking transistor built-in type only)	dbA
	Motor protection — Electronic thermal overload relay	Stops the inverter if a motor overload is detected by setting the electronic thermal overload relay. Protects general-purpose motors and inverter motors in the entire frequency range. (The operation level and thermal time constant (0.5 to 75.0 minutes) can be set.)	$OL1$ to $OL4$
	Motor protection — PTC/NTC thermistor	The motor temperature is detected by the PTC/NTC thermistor, and the inverter is stopped if overheating is detected. To enable this function, connect the PTC/NTC thermistor between terminals [V2] and [11], and enable the switch on the control board.	$OH4$
	Motor protection — NTC thermistor wire break	The inverter is stopped and an error is displayed if a wire break is detected at the NTC thermistor connected between terminals [V2] and [11].	nrb
	Memory error	When the power is turned ON, a data check is performed when writing data, and an error is displayed if a memory error is detected	$Er1$
	Keypad communication error	Stops the inverter and displays an error if a communication fault is detected at the keypad during operation.	$Er2$
	CPU error	Stops the inverter and displays an error if a CPU error is detected due to noise, etc.	$Er3$
	Option communication error	Stops the inverter and displays an error if a communication error with the inverter unit is detected when using an option.	$Er4$
	Option error	Stops the inverter and displays an error if an error is detected at the option side when using an option.	$Er5$
	Operation error	[STOP] key priority Even when run commands are entered via the terminal block or communication, by pressing the keypad [STOP] button, the inverter forcibly decelerates and stops the motor, and an error is displayed after the motor has come to a stop.	$Er6$
		Start check When the power is turned ON, an alarm is cleared, or when switching the run command method from link operation, the sudden starting of operation is suppressed if a run command has been entered, and an error is displayed to notify the operator.	
		Brake status error Stops the inverter and displays an error if the brake signal (BRKS) output status and brake ON check signal (BRKE) input status do not match.	
	Tuning error	Stops the inverter and displays an error if tuning failure or interruption is detected during motor constant tuning, or if the tuning result is a defect.	$Er7$
	RS485 communication error (COM port 1)	Stops the inverter and displays an error if a communication error is detected when communicating via RS-485 COM port 1.	$Er8$

* For details, refer to the FRENIC-MEGA (G2) User's Manual.

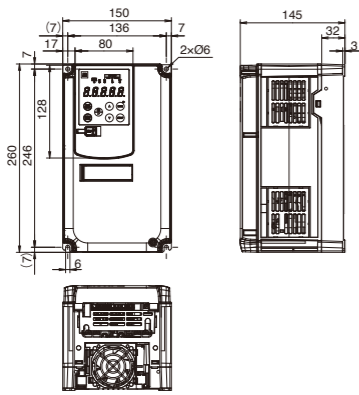| Item	Explanation	Remarks
RS485 communication error (COM port 2)	Stops the inverter and displays an error if a communication error is detected when communicating via RS-485 COM port 2.	ErP
Data saving error during undervoltage	Stops the inverter and displays an error if unable to successfully save data when undervoltage protection is triggered.	ErF
Position control error	Stops the inverter and displays an error if the positioning deviation is excessive when the servo lock is applied, or when performing master-follower operation.	Ero
Hardware error	Stops the inverter and displays an error if an inverter internal hardware fault is detected.	ErH
STOP input (EN1, EN2) terminal circuit error	Stops the inverter and displays an error if the inverter detects an EN1 or EN2 terminal circuit mismatch.	ECF
PG wire break	Stops the inverter and displays an error if a pulse encoder wire break is detected. (This function is valid on some PG interface option cards.)	PG
Excessive positioning deviation	Stops the inverter and displays an error if the position deviation is found to be excessive while performing position control.	d0
Overspeed protection	Stops the inverter and displays an error if the following conditions are met. • If d35 = 999, the speed detection value is the maximum output frequency x (d32 or d33) x 120% or higher • If d35 ≠ 999, the speed detection value is the maximum output frequency x (d35) or higher • The detection value exceeds 599 Hz	OS
Magnetic pole position detection error	Stops the inverter and displays an error if the signal from the magnetic pole position sensor mounted on the PM motor is abnormal.	ErC
Step-out detection/ detection failure of magnetic pole position at startup	This occurs when a PM motor step-out is detected, or if magnetic pole position detection fails when starting.	Erd
Speed inconsistency/ excessive speed deviation	Stops the inverter and displays an error if the state in which the speed deviation between the command speed and detected speed (ASR feedback) is too great continues for the specified time or longer.	ErE
Password protection	Stops the inverter and displays an error if an attempt is made by a malicious third party to disable the password set by the user.	LoP
Customizable logic error	Stops the inverter and displays an error if an attempt is made to make changes to customizable logic related settings while the inverter is running.	ECL
Simulation failure	A simulation failure can be produced if the keypad STOP button and FUNC DATA button are held down for 5 seconds or longer. A simulation failure can be produced even if function code H45 is set to "1".	Err
Current input terminal signal line break detection	Stops the inverter and displays an error if a line break is detected when current is less than 2 mA when using the current input terminal (terminal [C1] or [C2]) as current input 4 to 20 mA.	CoF
Customizable logic alarm	An error is displayed if the alarm conditions defined by the user with customizable logic are met. (This is not an error at the inverter itself.)	CA1 to CA5
EN (STO) terminal OFF	This is displayed if the run command turns ON when both terminal [EN1] and [EN2] are OFF, and the inverter is not ready to perform operation (STO status).	En.OFF
	Cooling fin overheating (OH1), external alarm (OH2), inverter internal overheating (OH3), charging resistor overheating (OH6), braking resistor overheating (dbH), thermistor (NTC) wire break (nrb), motor overload (OL1 to OL4), option communication error (Er4), option error (Er5), RS-485 communication error (COM port 1) (Er8), RS-485 communication error (COM port 2) (ErP), master-follower synchronization error (Ero), position control error (d0), speed does not reach (ErE)/excessive speed deviation (ErE), current input (terminal [C1]/[C2]) wire break detection (CoF), DC fan lock detection (FAL), Excessive position deviation (d0), Low battery warning/Date and time information loss (Lob), PID1 feedback error 1,2(PV1,PV2), Feedback error (External PID)(PVA,PVb,PVC), Dry-run protection(Pdr),Control of maximum starts per hour(roC), End of curve protection (PoL), Filter clogging error(FoL), Impeller anti-jam (rLo), Userdefined alarm (CA1 to CA5)	
	Motor overload early warning	OL
	Cooling fin overheat early warning	OH
	Lifetime warning	LiF
	Reference command loss detected	rEF
	PID warning output	Pid
Minor failure(Warnings)	Low torque detection	uTL
	Overheat warning by PTC thermistor in motor	PTC
	Machine life (Cumulative motor running hours)	rTE
	Inverter life (Number of startups)	Cnr
	PID control 1,2 warning output	PA1,PA2
	External PID control1,2,3 warning output	PAA,PAb,PAC
	Follower inverter alarm in mutual operation	SLA
	IGBT lifetime warning	iGb
	Reduced air flow warning	rAF
	Relay signals are output while the inverter is stopped due to an alarm. The alarm is cleared with digital input signal "RST". (Reset the alarm using the [PRG/RESET] key on the optional Multi-function keypad.)	
Retry	The inverter can be automatically reset allowing it to be restarted when it stops due to a trip.(The number of retries and the latency between stop and reset can be specified.)	
Overload prevention control	• Overload prevention control (Input phase loss): In case of input missing phase, the output frequency is reduced to reduce the load and operation is continued as long as possible. • Overload prevention control (Low voltage): When the output current increases due to a drop in power supply and an overload condition occurs, the output frequency is reduced to reduce the load and operation is continued as long as possible.	
Surge protection	This function protects the inverter from a surge voltage between main circuit power lines and the ground.	
Main circuit power cutoff detection	• Inverter operation is not possible when the inverter AC input power supply (main power supply) is not ON. • In such cases as when supplying power via a PWM converter or when using a DC bus bar connection, set main circuit power cutoff detection to "None".	
Forced operation (Fire mode)	Alarms other than critical alarms are ignored, and a retry is performed forcibly.	
Usage location	Indoors (environmental standard IEC60721-3-3:3C2); No corrosive gas, flammable gas, dust, oil mist (pollution level 2 (IEC60664-1)); No direct sunlight	

(Left margin vertical labels: Protective functions)

Item		Explanation	Remarks
	Ambient temperature	HHD, HND: -10 to +55°C [14 to 131°F] (current derating necessary in +50 to +55°C [122 to 131°F] range) HD, ND : -10 to +55°C [14 to 131°F] (current derating necessary in +40 to +55°C [104 to 131°F] range)	
	Ambient humidity	5 to 95% RH (avoid condensation)	
	Altitude	1000 m or less	
Environmental	Vibration	**S (Basic)/E (EMC filter built-in)** — Voltage series 200 V to 400 V: 22 kW or less / **S (Basic)/E (EMC filter built-in)** — Voltage series 200 V: 30 kW to 55 kW, Voltage series 400 V: 30 kW to 75 kW / **S (Basic)/E (EMC filter built-in)** — Voltage series 200 V: 75 kW or higher, Voltage series 400 V: 90 kw or higher **P (Zero-phase reactor built-in)** — Voltage series 200 V to 400 V: 30 kW or less / **P (Zero-phase reactor built-in)** — Voltage series 200 V to 400 V: 37 kW to 75 kW 3 mm: 2 to less than 9 Hz, 9.8 m/s²: 9 to less than 20 Hz, 5.9 m/s²: 20 to less than 55 Hz, 1 m/s²: 55 to 200 Hz / 3 mm: 2 to less than 9 Hz, 9.8 m/s²: 9 to less than 20 Hz, 2 m/s²: 20 to less than 55 Hz, 1 m/s²: 55 to 200 Hz / 3 mm: 2 to less than 9 Hz, 2 m/s²: 9 to less than 55 Hz, 1 m/s²: 55 to 200 Hz	
	Storage temperature	• -25 to +70°C (during transport) • -25 to +65°C (during temporary storage)	
	Relative humidity	5 to 95% RH (avoid condensation)	

* For details, refer to the FRENIC-MEGA (G2) User's Manual.
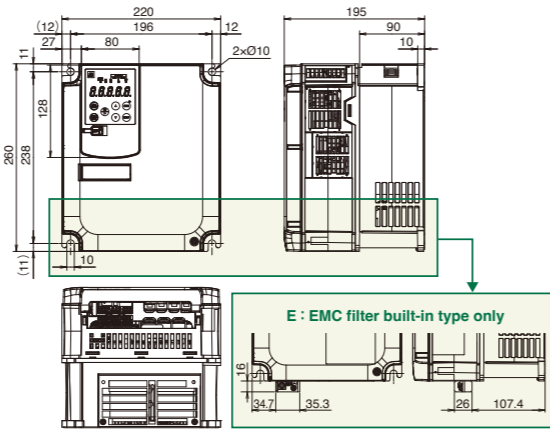
► External dimensions

Type FRN5.5G2P-2J/4J

[Unit: mm]

Type FRN5.5G2□-2J～11G2□-2J, FRN5.5G2□-4J～11G2□-4J
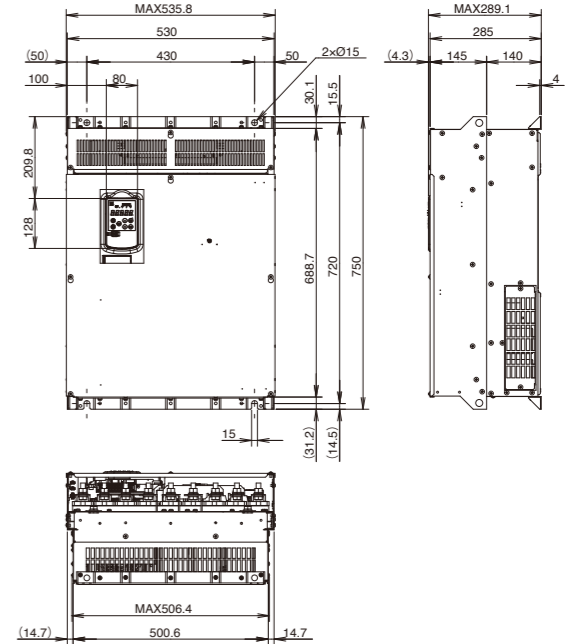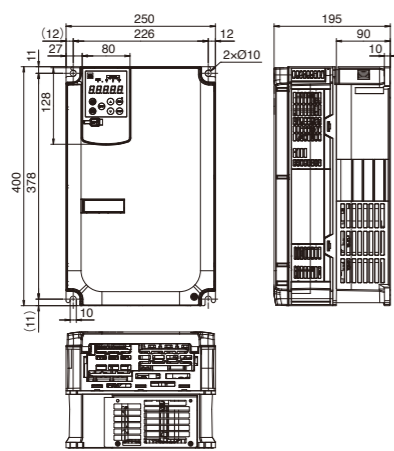FRN7.5G2P-2J～15G2P-2J, FRN7.5G2P-4J～15G2P-4J

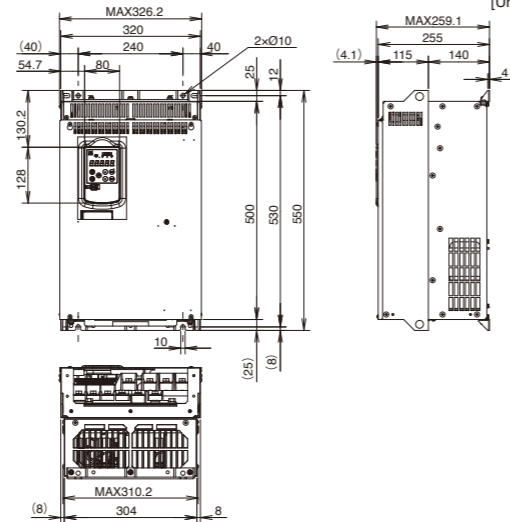[Unit: mm]

E：EMC filter built-in type only

Type FRN15G2□-2J～22G2□-2J, FRN15G2□-4J～22G2□-4J
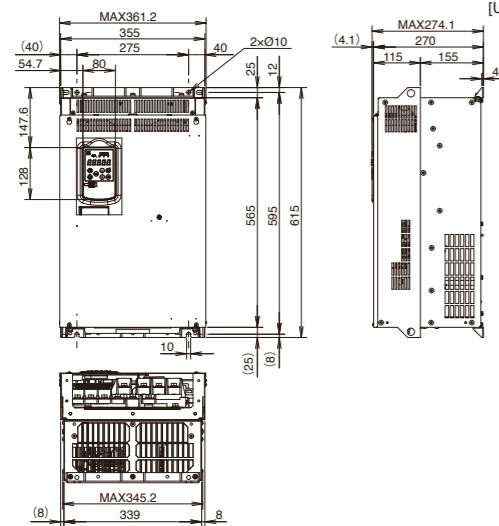FRN18.5G2P-2J～30G2P-2J, FRN18.5G2P-4J～30G2P-4J

[Unit: mm]

Type FRN30G2□-2J, FRN30G2□-4J, FRN37G2□-4J
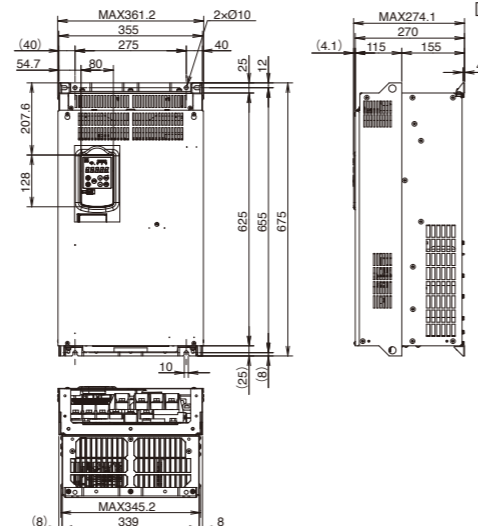FRN37G2P-2J, FRN37G2P-4J～55G2P-4J

[Unit: mm]

Type FRN37G2□-2J, FRN45G2□-4J
FRN45G2P-2J～55G2P-2J, FRN75G2P-4J

[Unit: mm]

Type FRN55G2□-4J

[Unit: mm]

Type FRN45G2□-2J, FRN55G2□-2J, FRN75G2□-4J
FRN75G2P-2J

[Unit: mm]

Type FRN75G2□-2J

[Unit: mm]

Type FRN90G2□-2J

[Unit: mm]
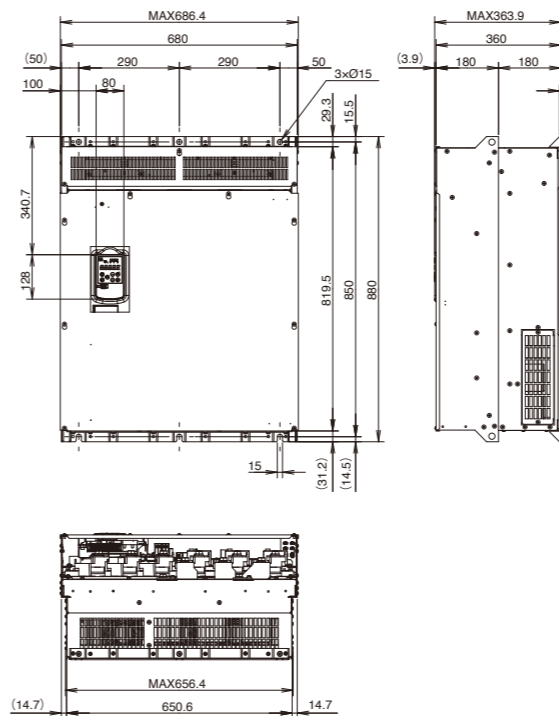
Type FRN90G2□-4J, FRN110G2□-4J

[Unit: mm]
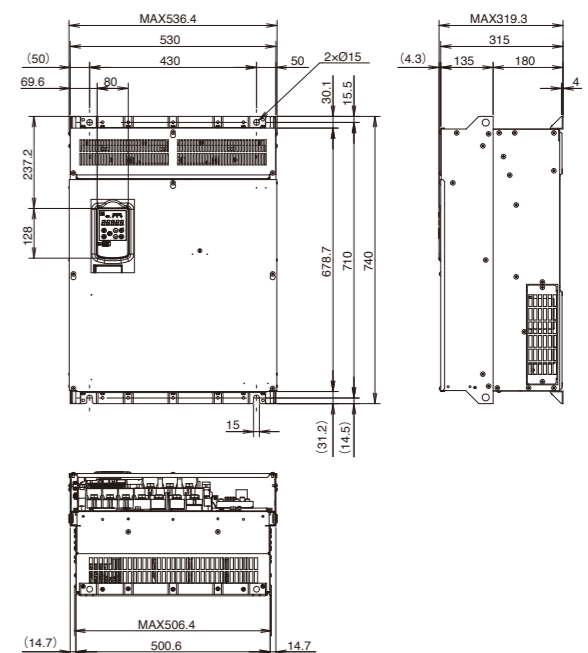
Note) □ in the type code above: S denotes basic type, and E denotes EMC filter built-in type.

Note) □ in the type code above: S denotes basic type, and E denotes EMC filter built-in type.

FRENIC MEGA

▶ External dimensions

Type FRN132G2□-4J, FRN160G2□-4J

[Unit: mm]


```
MAX536.4
530
(50)  430  50   2×Ø15
100   80
MAX364.1
360
(3.9)  180  180
4
29.3
15.5
365.9
128
909.5
970
1000
15
(31.2)
(14.5)
MAX506.4
(14.7)  500.6  14.7
```

Type FRN200G2□-4J, FRN220G2□-4J

[Unit: mm]


```
MAX686.4
680
(50)  290  290  50   3×Ø15
100   80
MAX363.9
360
(3.9)  180  180
4
29.3
15.5
365.9
128
939.5
970
1000
15
(31.2)
(14.5)
MAX656.4
(14.7)  650.6  14.7
```

Type FRN280G2□-4J, FRN315G2□-4J

[Unit: mm]


```
MAX686.4
680
(60)
(50)  290  290  60
87    80      50   3×Ø15
MAX444.1
440
(4.1)
260  180
6.4
35
15.5
424
128
1330
1370
1400
MAX1425
15
(35)
(14.5)
MAX659
(13.5)  653  13.5
```
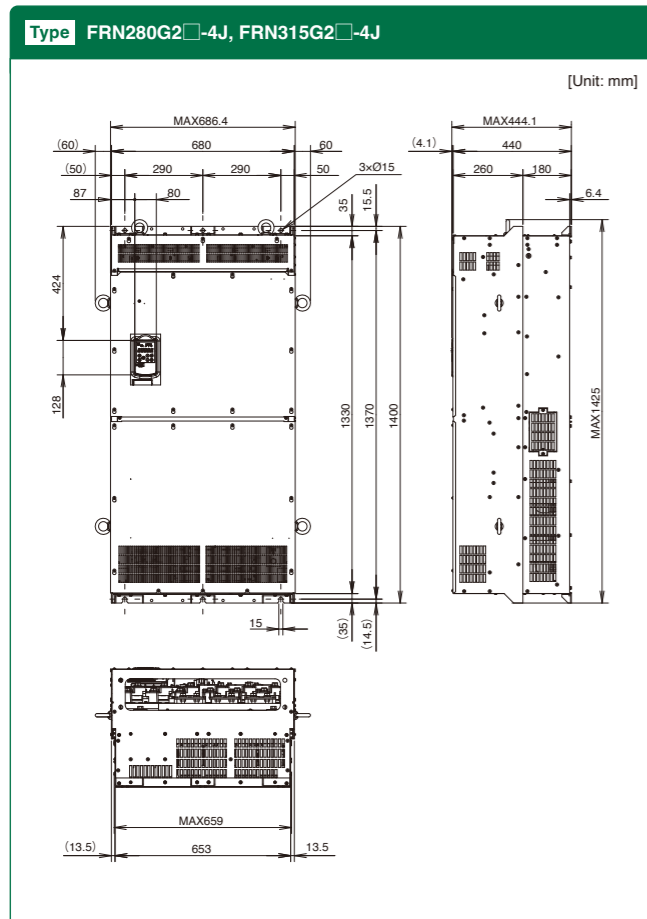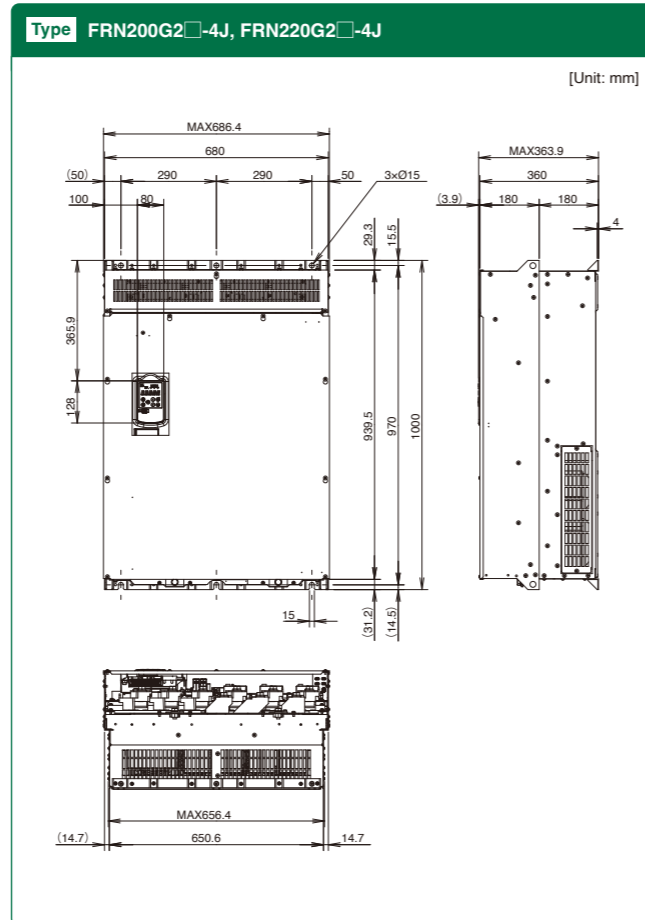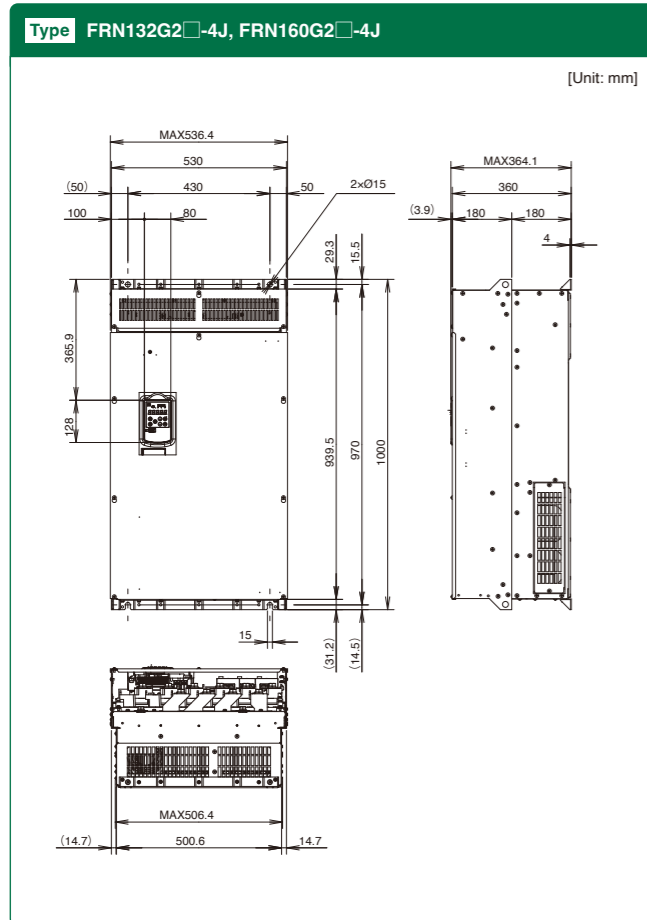
Note) □ in the type code above: S denotes basic type, and E denotes EMC filter built-in type.

▶ Environmental considerations

■ Improves environmental resistance

(1) Uses copper bars with Ni and Sn plating

(2) Ambient operating temperature up to +55°C
* Derating is required when used at 50°C or higher.

(3) Further strengthens PCB coating
(JIS C 60721-3-3/IEC 60721-3-3 Class 3C2)
* Salt-resistant products, etc., can be manufactured to order.

(4) IP55 protection for the inverter's main cooling unit contributes to enhanced cooling outside the panel, lower costs, and downsizing.

Note) If you are using or considering using the product under the following conditions, please contact our sales department.
a. Environments containing sulfurized gas (e.g., some applications in the tire manufacturing, paper manufacturing, sewage treatment, textile industries, etc.)
b. Environments containing conductive dust and foreign objects (e.g., metal processing machines, extruders, printing machines, waste disposal machinery, etc.)
c. When using the product in non-standard environments

IP55
Waterproofing of the main cooling unit

Inverter

* Supports only 30 kW to 630 kW
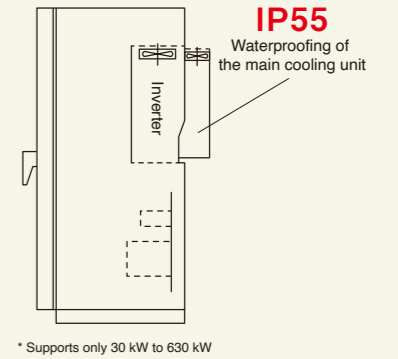
■ Long life expectancy (main components)

Many of the serviceable parts inside the inverter have been designed to meet customer equipment maintenance cycles.

Design life
10 years

Main circuit capacitor

PCB Electrolytic capacitor
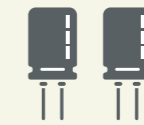
Cooling fan
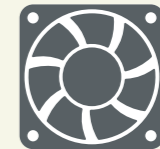
* The above values refer to the design life (calculated values) and are not guaranteed values.

Life expectancy conditions | Ambient temperature 40°C, load factor 100% (HHD specification), 80% (HND specification)

■ Compliant with the revised European RoHS Directive

RoHS 2019

■ Ten environmental impact substances

Lead, mercury, cadmium, and hexavalent chromium
Polybrominated biphenyl (PBB)
Polybrominated diphenyl ether (PBDE)
Di-2-ethylhexyl phthalate (DEHP)
Butyl benzyl phthalate (BBP)
Di-n-butyl phthalate (DBP)
Diisobutyl phthalate (DIBP)

■ Globally compliant

Compliant with overseas safety standards.

European regions	United States / Canada
EC directive (CE marking)	UL standard/cUL standard
C E	c (UL) US LISTED

*The zero-phase reactor built-in type does not comply with the EC Directive (CE marking).

1. Combined operation

· Multiple synchronous motors cannot be operated with a single inverter.
· Contact us when operating a synchronous motor from another manufacturer.
· When operating an induction motor, the function of this inverter can be selected.

Note: When using sensorless vector control, there is a possibility that the motor will reverse slightly at startup depending on the current draw method selected for the magnetic pole position detection method. Contact us if reverse rotation is not acceptable.

2. Installation

· Inverters and motors may become hot. Be careful not to allow flammable materials such as wood and paper to be near them.
· Leave a space around inverters and motors to prevent heat from accumulating. In particular, do not place anything around the exhaust and ventilation holes.
· Be careful not to allow the air vents to become clogged and prevent cooling.
· Motors may become hot when energized or immediately after the power is turned off. Be careful not to touch them directly.

3. Wiring

· These motors cannot be operated with commercial power. Check the wiring for any errors before turning on the power.
· Applying commercial power to the motor input terminals (U, V, W) will burn out the motor. Be sure to connect the power source to the inverter output terminals (U, V, W).
· Be sure to connect the motor input terminals (U, V, W) and inverter output terminals (U, V, W) in phase.
· Be careful of electric shocks even when the power is turned off because high voltage is generated at the motor input terminals (U, V, W) while the motor is rotating.
· The maximum wiring length between the inverter and motor should be no longer than 100 m.

Motor operation	Vibration	A motor operated by an inverter may resonate due to the natural frequency including the mechanical system when installed in a machine. - Consider using tier couplings or dampening rubber. - Use the jump frequency function of the inverter to avoid resonance points.
	Noise	Set the inverter carrier frequency higher to reduce noise. In addition, wind noise increases when operating at a high speed of 90 Hz and above. (However, separately powered fans are excluded.)
Application of special motors	Confirm operation	Perform a combination test with the motor in advance to ensure that safe operation is possible.
	Brake motors	For motors equipped with parallel-connected brakes, their braking power must be connected to the inverter input circuit (primary circuit). If the braking power is connected to the inverter power output circuit (secondary circuit) by mistake, power may not be supplied to the brake and the brake may not operate. Do not use inverters for driving motors equipped with series-connected brakes.
Ambient environment	Installation location	Install and use this equipment within the allowable ambient temperature range (–10 to +40°C). The inverter cooling fans may become hot depending on the inverter operating conditions. Install inverters on a nonflammable materials (such as metal). Ensure that the installation location meets the environmental conditions specified in Environment in inverter specifications.
Connection of peripheral devices	Installing a molded case circuit breaker (MCCB)	Install a recommended molded case circuit breaker (MCCB) or an earth leakage circuit breaker (ELCB) with overcurrent protection in the primary circuit of each inverter to protect the wiring. Ensure that the circuit breaker capacity is equivalent to or lower than the recommended capacity.
	Output side (secondary side) magnetic contactor	If a magnetic contactor is mounted in the inverter secondary circuit for switching the motor to commercial power or for any other purpose, ensure that both the inverter and the motor are fully stopped before you turn the magnetic contactor on or off. Remove the surge suppressor integrated with the magnetic contactor.
	Input side (primary side) magnetic contactor	Do not turn the magnetic contactor in the primary circuit on or off more than once an hour as an inverter fault may result. If frequent starts or stops are required during motor operation, use FWD/REV signals of the control circuit terminals.
	Motor protection	The electronic thermal facility of the inverter can protect the motor. The operation level and the motor type should be set. For high-speed motors or water-cooled motors, set a small value for the thermal time constant to protect the motor. If you connect the motor thermal relay to the motor with a long cable, a high-frequency current may flow into the wiring stray capacitance. This may cause the relay to trip at a current lower than the set value for the thermal relay. If this happens, lower the carrier frequency or use the output circuit filter (OFL).
	Eliminate power-factor correcting capacitors	Do not install power factor correcting capacitors on the input side (primary side) of the inverter because it has no effect. The power factor of the inverter is improved with a DC reactor. Do not use power factor correcting capacitors in the inverter output circuit (secondary). An overcurrent trip will occur, disabling motor operation.
	Eliminate surge suppressors	Do not install a surge suppressor on the output side (secondary side) of the inverter.
	Noise countermeasures	Use of a filter and shielded wires are typical measures against noise to ensure that EMC Directives are met. For details, refer to Inverter Panel Design Technical Data (MHT221).
	Surge countermeasure	If an overvoltage trip occurs while the inverter is stopped or operated under a light load, it is assumed that the surge current is generated by opening and closing of the phase-advancing capacitor in the power system. We recommend connecting a DC reactor to the inverter.
	Megger test	When checking the insulation resistance of the inverter, use a 500 V megger and follow the instructions contained in the Instruction Manual.
Wiring, installation	Wiring distance of control circuit	When performing remote operation, limit the wiring distance between the inverter and the control box to 20 m or less, and use twisted shielded wires for the wiring.
	Wiring distance between inverter and motor	If long wiring is used between the inverter and the motor, the inverter will overheat or trip as a result of overcurrent (high-frequency current flowing into the stray capacitance) in the wires connected to the phases. Ensure that the wiring is shorter than 50 m. If this length must be exceeded, lower the carrier frequency or mount an output circuit filter (OFL). If the wiring distance is 50 m or more and sensorless vector control or vector control with PG is selected, perform auto-tuning (offline) to ensure performance.
	Wiring size	Select cables with a sufficient capacity by referring to the current value or recommended wire size.
	Wiring type	Do not use multi-core cables to connect multiple inverters and multiple motors together.
	Ground wiring	Be sure to ground the inverter using the grounding terminal.
Selecting inverter capacity	Driving standard motors	In general, select the standard motor capacity shown in the list of inverters. When high starting torque is required or quick acceleration or deceleration is required, select an inverter with a capacity one size greater than the standard.
	Driving special motors	After checking the rated current value of the motor, select an inverter so that the rated current of the inverter is larger than the rated current of the motor.
Transportation and storage		When transporting or storing inverters, follow the procedures and select locations that meet the environmental conditions that agree with the inverter specifications.

Important ordering information

The warranty of this product is as follows unless the special instructions state otherwise in the quote, contract, catalog, or specifications at the time of quote or order.

In addition, some of the products described in this document may have limits on the intended use and area, or may require periodic inspections. Please contact the distributor from which you purchased the product from, or Fuji Electric for further information.

In addition, please conduct a prompt incoming inspection of the product upon purchase or delivery. Also, please give enough consideration to management and maintenance of the product prior to accepting it.

1. Period and coverage of the warranty

1-1 Period

(1) The warranty period of the product is the period up to one (1) year from the date of purchase or eighteen (18) months from the week of manufacture printed on the nameplate, whichever comes first.
(2) However, this warranty period may not apply if the product life is affected by the usage environment, usage conditions, or usage frequency.
(3) The warranty period for parts repaired by Fuji Electric service department is effective for six (6) months from the date of repair.

1-2 Coverage

(1) If a malfunction occurs during the period of warranty due to Fuji Electric, the malfunctioning parts will be exchanged or repaired free of charge at the location of purchase or delivery. However, the warranty does not apply in the following cases.

1) The malfunction is caused by inappropriate conditions, environment, handling, usage, etc. other than those described in catalogs, instruction manuals, specifications, etc.
2) The malfunction is caused by factors that do not originate in the purchased or delivered product.
3) The malfunction is caused by other devices or software design of the customer that does not originate in Fuji Electric products.
4) For programmable products, a program was executed that was not performed by Fuji Electric or a malfunction was caused by it.
5) The malfunction is caused by an alteration or repair that is not performed by Fuji Electric.
6) The malfunction is caused by the consumable parts described in the instruction manual, catalog, etc. not being properly maintained or replaced.
7) The malfunction is caused by factors that were not foreseeable by the practical application of science and technology at the time of purchase or delivery.
8) The malfunction is caused by the product being used for an unintended purpose.
9) The malfunction is caused by a disaster or natural disaster that Fuji Electric is not responsible for.

(2) The warranty is only applicable to the single purchased and delivered product.
(3) The warranty covers only the area stated in above (1). Any damage induced by the malfunction of the purchased or delivered product, including the damage or loss to a device or machine and passive damages, is not covered by the warranty.

1-3 Malfunction diagnosis

As a general rule, the customer is requested to carry out the temporary failure diagnosis. However, if requested by the customer, our company or our service network can perform this service for a fee. The fee is to be paid by the customer at the rate stipulated in the rate schedule of Fuji Electric.

2. Exclusion of warranty liability such as opportunity loss

Regardless of whether the occurrence was within the warranty period, Fuji Electric is not liable for damage caused by factors Fuji Electric is not responsible for, opportunity loss of the customer caused by malfunction of a Fuji Electric product, lost profits, damage caused by special situations regardless of whether it was foreseeable or not by us, secondary damage, accident compensation, damage to products that were not manufactured by Fuji Electric, and compensation for other business operations.

3. Period for repair and provision of spare parts after the production is discontinued (maintenance period)

Discontinued models (products) can be repaired for seven (7) years from the date of discontinuation. Also, most spare parts used for repair are provided for seven (7) years from the date of discontinuation. However, some electric parts may not be obtainable due to their short life cycle. In this case, repair or provision of parts may be difficult during that period. Please contact Fuji Electric or its service providers for further information.

4. Delivery conditions

Standard products that do not entail application setting or adjustment are regarded as received by the customer upon delivery. Fuji Electric is not responsible for local adjustments and test runs.
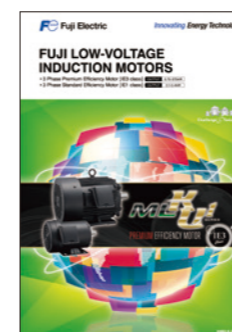
5. Service

The price of purchased and delivered products does not include service fees such as for dispatching technicians. Please contact Fuji Electric or its service providers for further information.
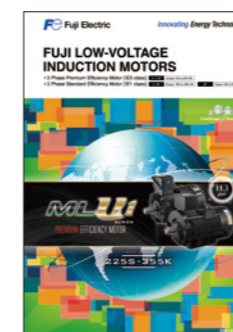
6. Service scope

The above contents shall be assumed to apply to transactions and use in Japan. For transactions and use outside of Japan, please contact your dealer or Fuji Electric separately.

▶ **Related product catalogs**

[24B2-E-0087]   [03A1-E-0017]   [24A1-E-0166]

FⓔFuji Electric Co.,Ltd.

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