Fuji Electric

Innovating Energy Technology

High Performance Multifunctional Inverters

FRENIC-MEGA Series

New Standard

FRENIC-MEGA G2

With the flexibility and functionality to support a wide range of applications on all types of mechanical equipment, the FRENIC-MEGA takes core capability, responsiveness, environmental awareness, and easy maintenance to the next level.

CEN-G2EN23.05

The Industry's Best Just Got Better

Inherits the excellent performance specifications and functionality of the G1 Series while providing a more stylish design.
Unrelenting pursuit of performance and functionality to further enhance adaptability.
It is time to experience the fullness of the MEGA Series world.

High basic performance

Supports vector control, sensorless vector control, dynamic torque vector control, and V/f control.

Various applications

Comes with feature-rich functionality and enhances compatibility with system networks.

FRENIC-MEGA G2 SERIES

Easy maintenance

Enhances work efficiency through simplified wiring and configuration and ensures safety and security through standard features such as preventive and predictive maintenance functions.

Environmentally resistant

Globally compliant lineup compatible with adverse atmospheres and various safety standards.

CONTENTS

IMPORTANT NOTICE

Product model type codes and details are subject to change soon. Until further release, this is a temporary document.

Features

High basic performance

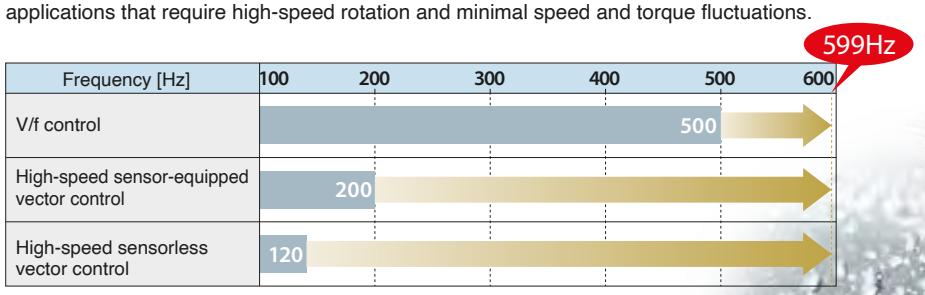
Supports vector control, sensorless vector control, dynamic torque vector control, and V/f control.

01 Faster operating speeds

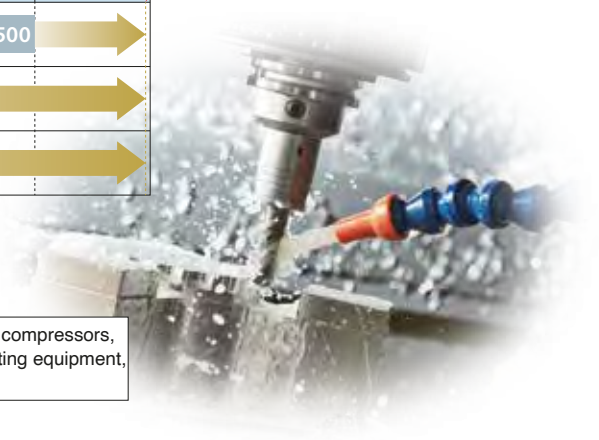
HIGH BASIC PERFORMANCE

Expanded range

Increases the maximum output frequency of all control systems to 599 Hz and supports applications that require high-speed rotation and minimal speed and torque fluctuations.



* Due to revised export control regulations (for frequency converters), the inverter will trip when the output frequency exceeds the upper limit of 599 Hz.



Example	Machine tools, compressors, automotive testing equipment, etc.

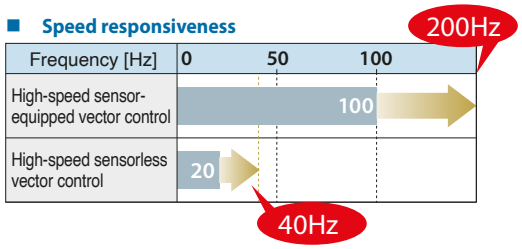
02 Enhanced response

HIGH BASIC PERFORMANCE

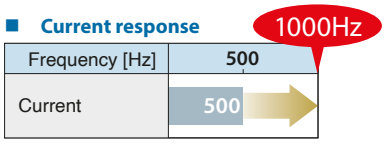
Improved speed and current

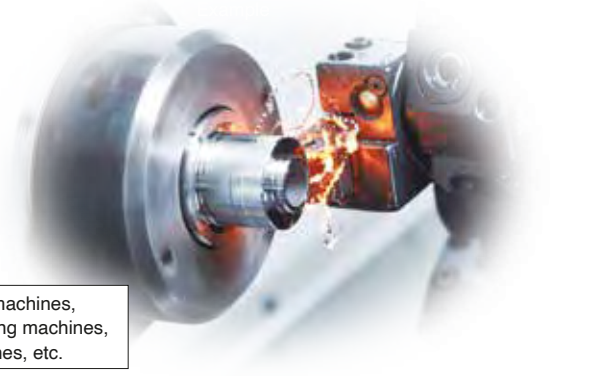
Improves speed and current responsiveness and stabilizes product quality by substantially reducing torque ripple and rotation irregularities.

■ **Speed responsiveness**



■ **Current response**





Example	Wire drawing machines, metal processing machines, printing machines, etc.

03 Can be used with any motor NEW

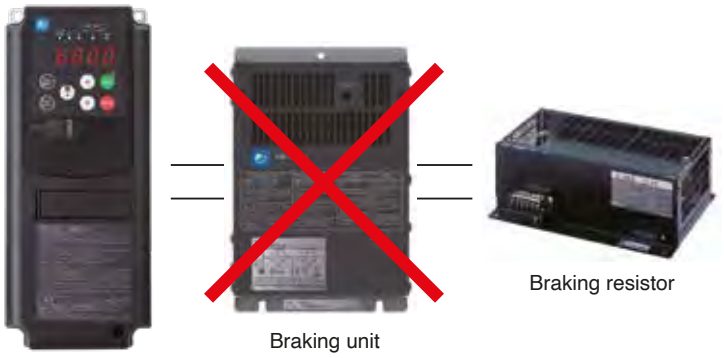
HIGH BASIC PERFORMANCE

Comes with new auto-tuning features that enable multi-drive operation using our induction and synchronous motors as well as those of other companies.

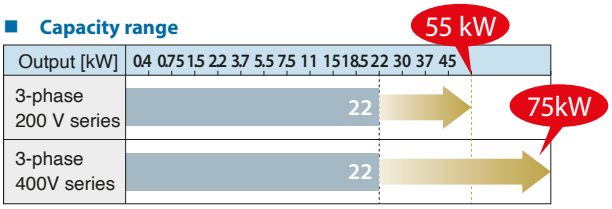
04 Expands the capacity of the built-in braking resistor type Enhancement

HIGH BASIC PERFORMANCE

Comes standard with a larger capacity range and contributes to control panel space and cost savings.



■ **Capacity range**



Features

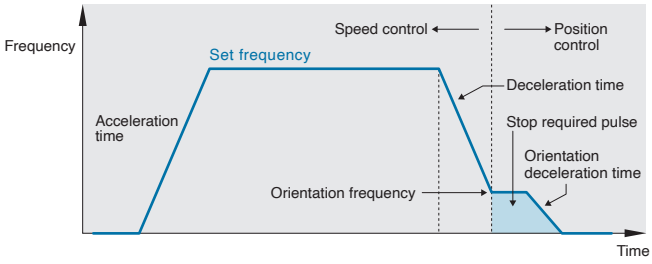
Various applications

Comes with feature-rich functionality and enhances compatibility with system networks.

01 Orientation function NEW

VARIOUS APPLICATIONS

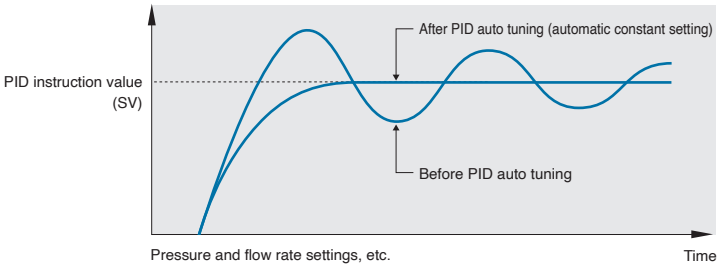
Capable of rotator positioning, enabling machinery to be held in place via servo locking after stoppage.



02 PID auto tuning function NEW

VARIOUS APPLICATIONS

Simplifies optimization via automatic adjustment of proportional and integral gains, resulting in shorter system start-up times, etc.



03 Load limiter NEW

VARIOUS APPLICATIONS

Improves system reliability by stopping when excessive torque is detected and by allowing operation only in the direction opposite to that in which the excessive load was detected.

04 Load adaptive control NEW

VARIOUS APPLICATIONS

When the actual load level is lower than the configured load level, the system can be operated at a ratio-multiplied frequency, resulting in significantly better efficiency.

05 Customizable logic functions

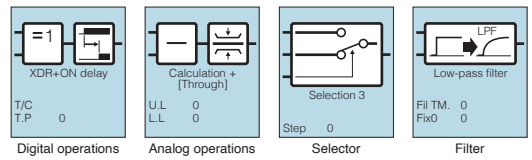
Enhancement

VARIOUS APPLICATIONS

Customizable inverter functions to meet your own specific needs.
Requires no PLC or external control equipment (relays, timers, etc.) circuits, and can be configured simply by setting and combining various parameters inside the inverter.

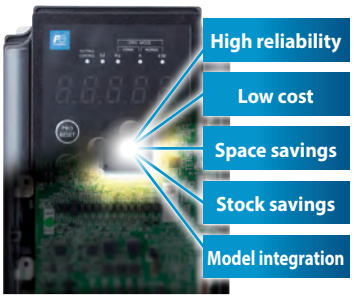
■ Comes with a wide variety of logic symbols and programming steps

Item	FRENIC-MEGA
Logic symbol type (Logical operations, counters, timers, arithmetic operations, comparators, limiters, selectors, holders, etc.)	Total of 55 digital & analog types
Number of programming steps	260 steps



* The programming tool software can be downloaded for free from our website.

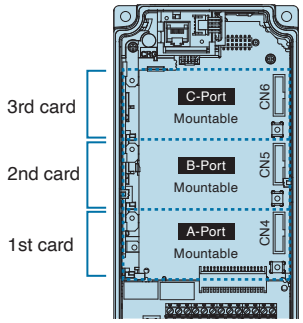
■ Advantages



06 Supports a variety of networks

Option cards

VARIOUS APPLICATIONS



Insert the option card into the connector inside the main unit.
Up to three cards can be inserted.

Optional communication card types

1. DeviceNet
2. CC-Link
3. T-Link
4. PROFIBUS-DP
5. CANopen
6. SX bus
7. Ethernet (Ethernet/IP, PROFINET RT, Modbus-TCP, BACnet/IP, and EtherCAT)

Note) There are some limitations to how option cards can be combined. Please contact us for details.

* For details on other options, refer to page 80.

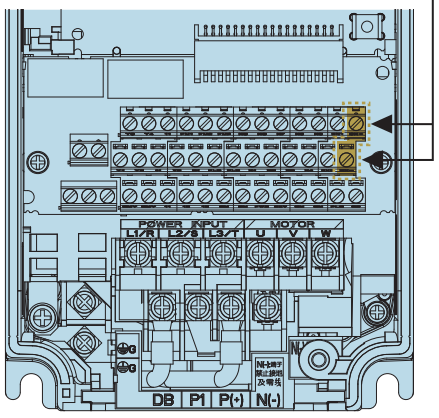
07 Enhanced network functions

VARIOUS APPLICATIONS

Compatible with RS-485 communication (terminal block)

Comes standard with an RS-485 terminal in addition to a port (RJ-45 connector) that is shared with the keypad.
Simplifies multi-drop connections via terminal connection.

Supports RS-485 terminal multi-drop connection



Features

Easy handling

Enhances work efficiency through simplified wiring and configuration and ensures safety and security through standard features such as preventive and predictive maintenance functions.

01 Same mounting dimensions

MAINTAINABILITY

The appearance and mounting dimensions of the inverter are fully compatible.
The position and size of the main circuit screw terminals are also the same.

Can be installed as a replacement for conventional FRENIC-MEGA_G1 series products.

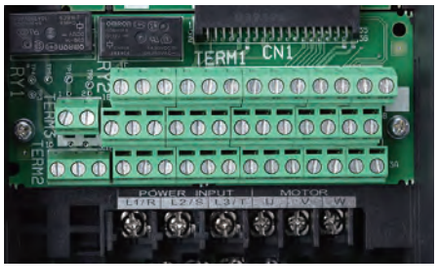
02 Simple wiring

MAINTAINABILITY

The control terminal block uses an industry-standard rod-shaped block (44-pole, ⊖ screw) and improves workability of wiring.

Supports replacement or mounting of conventional FRENIC-MEGA_G1 Series' round terminal blocks (35-pole ⊕ screw).

Rod-shaped terminal block 44 poles



03 Easy parameter migration

MAINTAINABILITY

Compatibility mode allows parameters read from the previous model to be written directly to the G2 Series.

The previous models include FRENIC-MEGA_G1 and FRENIC-MEGA_GX1 series products.
The standard conventional touch panel (TP-E1U) is compatible with the PC loader, and the new keypad (TP-E2 and TP-A2SW) can be used to copy data.
Please note that the newly added function codes will not be changed.

04 Designed with new operation keypad NEW

MAINTAINABILITY

Comes standard with a 7-segment 5-digit LED display whose large screen is very intuitive and enhances maintainability via improved key button operability and cursor digit control.

Standard Option

G2

TP-E2

Additional features

Character display

・7-segment, 5-digit LED display.

"M/Shift" key

・The cursor can be moved to any position.
・Can assign the same signals as the digital input terminal (X terminal).
・Can fix the assigned signal to ON by pressing and holding the key.

"M" LED display

・Can use LEDs to monitor the digital output signals of inverters.
・Y-terminal signals can be assigned to enable checking without using a conventional loader or keypad.

Multi-function Option

G2

TP-A2SW

Additional features

Character display

・Equipped with a highly visible LCD.
・Supports a total of 19 languages.

0:Japanese	1:English	2:German	3:French	4:Spanish
5:Italian	6:Chinese	8:Russian	9:Greek	10:Turkish
11:Polish	12:Czech	13:Swedish	14:Portuguese	15:Dutch
16:Malay	17:Vietnamese	18:Thai	19:Indonesian	

USB port

・Mounts to both standard keypad and multifunctional keypad.
・Can be directly connected to a PC with a commercially available USB cable (mini B).

Clock function

・Time data can be added to the alarm history.
Battery (CR2032 type) not included.

SD card slot

・Can store traceback data on micro SD card.

Water resistant

・The front surface and sides are IP55 protected. The back side is IP20 protected.

Built-in Bluetooth

・Parameter changes and maintenance can be performed remotely using a mobile device.
Radio law certified countries: Japan, Europe, North America, China, Thailand

05 Enhances alarm history and traceback functions NEW

MAINTAINABILITY

- Capable of displaying and storing data for the past four occurrences, such as data for output voltage and output frequency at the times of alarms.
  * Occurrence time data can also be acquired when using the multi-function keypad.
- Capable of acquiring and saving waveform data immediately before an alarm occurs.

■Number of saves

	No.
Standard keypad (TP-E2)	1
Multifunctional keypad (TP-A2SW)	100 * SD card

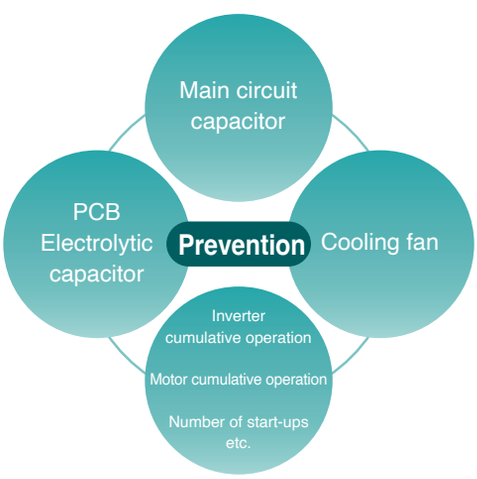
* The numbers above indicate the number of tracebacks.

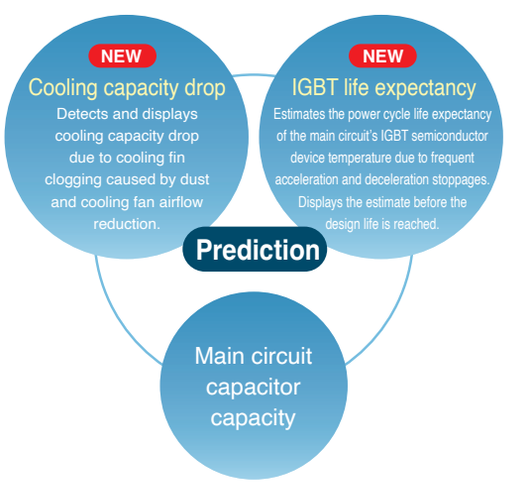
Enhancement

06 Life expectancy diagnosis and maintenance functions

MAINTAINABILITY

The keypad and PC loader make it easy to check the status of equipment and detect problems before they occur, helping to reduce production equipment maintenance time and downtime.



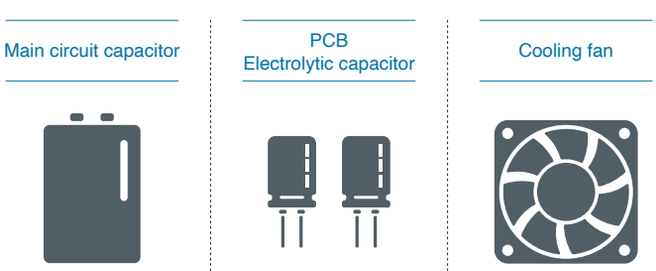


07 Long life expectancy (main components)

MAINTAINABILITY

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

* 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)

Features

Environmentally resistant

Globally compliant lineup compatible with adverse atmospheres and various safety standards.

01 Improves environmental resistance Enhancement

ENVIRONMENTAL RESISTANCE

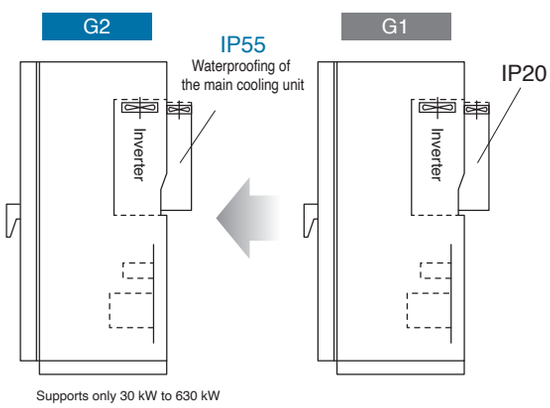
(1) Uses copper bars with Ni and Sn plating

(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



02 Compliant with the revised European RoHS Directive

ENVIRONMENTAL RESISTANCE

■Ten environmental impact substances

RoHS 2019

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)

03 Globally compliant

ENVIRONMENTAL RESISTANCE

Compliant with overseas safety standards.

European regions	United States/ Canada	United Kingdom	Russia, Eurasia
EC directive (CE marking)	UL standard/cUL standard	UK CA standard	Eurasian Conformity Mark

Main application examples

Expansion of Mega Series app

Fans and pumps

Others Blowers, turbo chillers, etc.

»PID control Auto tuning function

Ensures smooth equipment startup and optimal operation adjustment through automatic PID parameter adjustment.

»Automatic energy-saving operation mode

Minimizes inverter and motor loss through automatic operation, helping to achieve equipment energy savings.

»Multi drive New auto tuning function

Enables multi-drive operation with a single inverter through induction and synchronous motor tuning.

Compressors

Others Machine tools, gear pumps, etc.

»Sensorless vector control Synchronous motors

Capable of driving synchronous motors up to 599 Hz, helping to achieve equipment downsizing and energy savings.

Machine tools

Others Compressors, automobile testing instruments, etc.

»Position control Orientation functions

Enables operation and rotator stopping angle specification using tool changer positioning, allowing stopped machinery to be held in place via servo locking.

»Speed responsiveness Vector control

Reduces the effects of rotation irregularities and interference on machines through improved responsiveness (with sensor: 200 Hz; without sensor: 40 Hz).

»High-speed operation

Expands the output frequency range to 599 Hz for all control methods and shortens machining times through high-speed rotation.

lications

Supports a wide variety of applications and is useful in various situations.

Press machines

Others Forging press machines, hoisting and transporting, etc.

»High-speed responsiveness

Speed and current response | Vector control

Stabilizes quality by ensuring a constant rotational speed during load fluctuations through improved speed and current responsiveness.

»Regeneration avoidance function

Stabilizes operations by suppressing load fluctuation overvoltage alarms even in regenerative mode.

»Built-in braking transistor

Saves space and reduces cost of electric panels by expanding the capacity range (200 V series: 0.4 to 55 kW, 400 V series: 0.4 to 75 kW).

Winding machines

Others Printing machines, wrapping machines, etc.

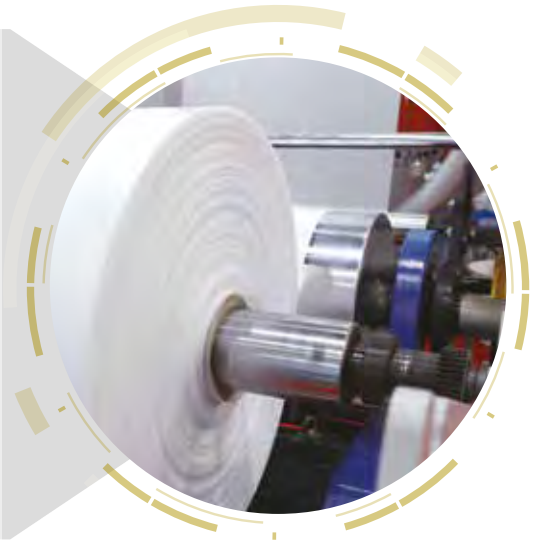
»High-speed responsiveness

Speed and current response | Vector control

Stabilizes quality by ensuring a constant rotational speed during load fluctuations through improved speed and current responsiveness.

»Stability at low speeds

Can control product quality variations even when the motor is running at low speed.



Hoists

Others Cranes and multistory warehouses, etc.

»Load adaptive control

Load adaptive control

When the actual load level is lower than the configured load level, the system can be operated at a ratio-multiplied speed (in terms of the configured frequency), resulting in significantly better efficiency.

»Load limiter

Load limiter

Maintains safety and recovery of suspended loads by stopping when excessive torque is detected and by allowing operation only in the direction opposite to that in which the excessive load was detected.

»Vector control

Torque biasing function

Automatically incorporates the load portion into torque instructions to enable smooth start-up compensation during lifting and lowering.

Main application examples

Stacker cranes

Others Elevators, escalators, etc.

»Position control function

Enables high-precision positioning control and takt time reduction through the use of pulse train instructions and operations, origin return, and position preset overtravel detection.

»Brake release signals

Outputs braking signals based on inverter operating conditions to prevent cargo bed rollback and overrunning.

»Motor constant switching

Enables multi-motor switchover operation for driving, lifting, and forking applications, and reduces costs by decreasing the number of inverters in use.

Multistory parking lots

Others Cranes, hoists, etc.

»Built-in braking transistor

Saves space and reduces cost of electric panels by expanding the capacity range (200 V series: 0.4 to 55 kW, 400 V series: 0.4 to 75 kW).

»Dynamic torque vector control

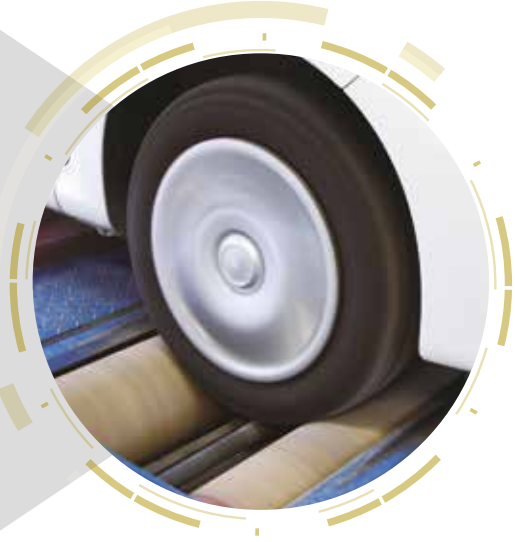
Enables smooth startup by outputting powerful torque even at low speeds.

»Brake release signals

Outputs braking signals based on inverter operating conditions to prevent vehicle rollback and overrunning.

Automotive testing equipment

Others Machine tools, press machines, etc.



»Torque control Sensor-equipped vector control

Supports configuration of test equipment for simulating loads using torque control.

»High-speed responsiveness Speed and current response Vector control

Enables quantification of testing by ensuring a constant rotational speed during load fluctuations through improved speed and current responsiveness.

»Speed control range Sensor-equipped vector control

Enables high-speed motor driving rotation testing through expansion of the constant output range (1:16).

Crushing machines

»Dynamic torque vector control

Enables powerful operation even during sudden load changes and low-speed rotation.

»Life expectancy forecasting

Monitors inverter current and temperature rise to predict and detect inverter tripping and failure. Prevents equipment stoppages and reduces downtime.

»Customizable logic functions

Enables creation of customized programs (such as a program for recovering from stoppages due to jamming) by combining a wide variety of digital and analog operation blocks.

Plant related

1 Rolling mills

»High-speed responsiveness Speed and current response Vector control

Enables high-precision roller operation by ensuring a constant rotational speed during load fluctuations through improved speed and current responsiveness.

»Load inertia estimation

Estimates the theoretical acceleration and deceleration time based on the load inertia, enabling users to make optimal settings.

2 Kilns

»Multi-pole motor operation

Can operate motors with up to 128 poles and supports rated frequencies as low as 5 Hz.

»Life expectancy forecasting

Monitors inverter current and temperature rise to predict and detect inverter tripping and failure. Prevents device and equipment stoppages and reduces downtime.

Model Variations

Model list

HHD spec (High carrier frequency Heavy Duty) : 200%-3s, 150%-1min
HND spec (High carrier frequency Normal Duty) : 120%-1min

Standard applied motor [kW]	Basic type				EMC filter built-in type	
	3-phase 400 V series		3-phase 200 V series		3-phase 400 V series	
	HHD spec	HND spec	HHD spec	HND spec	HHD spec	HND spec
0.4	FRN0002G2S-4G		FRN0003G2S-2G		FRN0002G2E-4G	
0.75	FRN0003G2S-4G		FRN0005G2S-2G		FRN0003G2E-4G	
1.5	FRN0004G2S-4G		FRN0008G2S-2G		FRN0004G2E-4G	
2.2	FRN0006G2S-4G		FRN0011G2S-2G		FRN0006G2E-4G	
3.7	FRN0009G2S-4G		FRN0018G2S-2G		FRN0009G2E-4G	
5.5	FRN0018G2S-4G		FRN0032G2S-2G		FRN0018G2E-4G	
7.5	FRN0023G2S-4G	FRN0018G2S-4G	FRN0046G2S-2G	FRN0032G2S-2G	FRN0023G2E-4G	FRN0018G2E-4G
11	FRN0031G2S-4G	FRN0023G2S-4G	FRN0059G2S-2G	FRN0046G2S-2G	FRN0031G2E-4G	FRN0023G2E-4G
15	FRN0038G2S-4G	FRN0031G2S-4G	FRN0075G2S-2G	FRN0059G2S-2G	FRN0038G2E-4G	FRN0031G2E-4G
18.5	FRN0045G2S-4G	FRN0038G2S-4G	FRN0088G2S-2G	FRN0075G2S-2G	FRN0045G2E-4G	FRN0038G2E-4G
22	FRN0060G2S-4G	FRN0045G2S-4G	FRN0115G2S-2G	FRN0088G2S-2G	FRN0060G2E-4G	FRN0045G2E-4G
30	FRN0075G2S-4G	FRN0060G2S-4G	FRN0146G2S-2G	FRN0115G2S-2G	FRN0075G2E-4G	FRN0060G2E-4G
37	FRN0091G2S-4G	FRN0075G2S-4G	FRN0180G2S-2G	FRN0146G2S-2G	FRN0091G2E-4G	FRN0075G2E-4G
45	FRN0112G2S-4G	FRN0091G2S-4G	FRN0215G2S-2G	FRN0180G1S-2G	FRN0112G2E-4G	FRN0091G2E-4G
55	FRN0150G2S-4G	FRN0112G2S-4G	FRN0288G2S-2G	FRN0215G2S-2G	FRN0150G2E-4G	FRN0112G2E-4G
75	FRN0180G2S-4G	FRN0150G2S-4G	FRN0346G2S-2G	FRN0288G2S-2G	FRN0180G2E-4G	FRN0150G2E-4G
90	FRN0216G2S-4G	FRN0180G2S-4G	FRN0432G2S-2G	FRN0346G2S-2G	FRN0216G2E-4G	FRN0180G2E-4G
110	FRN0260G2S-4G	FRN0216G2S-4G		FRN0432G2S-2G	FRN0260G2E-4G	FRN0216G2E-4G
132	FRN0325G2S-4G	FRN0260G2S-4G			FRN0325G2E-4G	FRN0260G2E-4G
160	FRN0377G2S-4G	FRN0325G2S-4G			FRN0377G2E-4G	FRN0325G2E-4G
200	FRN0432G2S-4G	FRN0377G2S-4G			FRN0432G2E-4G	FRN0377G2E-4G
220	FRN0520G2S-4G	FRN0432G2S-4G			FRN0520G2E-4G	FRN0432G2E-4G
280	FRN0650G2S-4G	FRN0520G2S-4G			FRN0650G2E-4G	FRN0520G2E-4G
315	FRN0740G2S-4G				FRN0740G2E-4G	
355	FRN0960G2S-4G	FRN0650G2S-4G			FRN0960G2E-4G	FRN0650G2E-4G
400	FRN1040G2S-4G	FRN0740G2S-4G			FRN1040G2E-4G	FRN0740G2E-4G
500	FRN1170G2S-4G	FRN0960G2S-4G			FRN1170G2E-4G	FRN0960G2E-4G
560		FRN1040G2S-4G				FRN1040G2E-4G
630	FRN1386G2S-4G	FRN1170G2S-4G			FRN1386G2E-4G	FRN1170G2E-4G
710		FRN1386G2S-4G				FRN1386G2E-4G

IMPORTANT NOTICE

The type codes marked in red are subject to change soon. This is a temporary document.

How to read the inverter model

FRN 0003 G 2 S - 4 G

Code	Series name
FRN	FRENIC series

Code	Applicable motor rating
0002	0.4kW
⇕	⇕
1386	630kW, 710kW

Code	Applicable range
G	High performance, multifunctional type

Code	Destination
G	Global

Code	Input power source
4	3-phase 400V
2	3-phase 200V

Code	Enclosure
S	Standard (basic type)
E	EMC filter built-in type

Code	Order of development
2	Series

Standard Specifications

Basic type | **Three-phase** | **400V series**

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

0.4 to 45kW

Item			Specifications													
Type (FRN□□□□G2S-4G)			0002	0003	0004	0006	0009	0018	0023	0031	0038	0045	0060	0075	0091	0112
Nominal applied motor [kW] (*1)			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
Output ratings	Rated capacity [kVA] (*2)		1.1	1.9	3.2	4.5	6.8	10	14	18	24	29	34	45	57	69
	Rated voltage [V] (*3)		Three-phase 380 to 480 (with AVR function)													
	Rated current [A]		1.5	2.5	4.2	6.0	9.0	13.5	18.5	24.5	32	39	45	60	75	91
	Overload capacity		150%-1min, 200%-3.0s													
	Rated frequency [Hz]		50, 60													
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 380 to 480V, 50/60Hz													
	Auxiliary control power input: Phases, voltage, frequency		-		Single-phase 380 to 480V, 50/60Hz											
	Voltage, frequency variations		Voltage:(10 to -15% (Voltage unbalance:2% or less (*4)) Frequency:+5 to -5%													
	Rated current [A] (*5)	with DCR	0.85	1.6	3.0	4.5	7.5	10.6	14.4	21.1	28.8	35.5	42.2	57.0	68.5	83.2
		without DCR	1.7	3.1	5.9	8.2	13.0	17.3	23.2	33.0	43.8	52.3	60.6	77.9	94.3	114
	Required power supply capacity [kVA] (*6)	with DCR	0.6	1.2	2.1	3.2	5.2	7.4	10	15	20	25	30	40	48	58
Braking	Torque [%] (*7)		150		100					20				10 to15		
	Braking transistor		Built-in as standard													
	Min. ohmic value [Ω]		200		160		96	64	48	32	24	16		10	9.0	8.0
	Built-in braking resistance [Ω]		720	470	160			80		Option						
		Braking time[s]	5							—						
		%ED	5	3	5	3	2	3	2	—						
	DC injection braking		Starting frequency:0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level:0 to 100%													
DC reactor (DCR)			Option													
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1													
Enclosure (IEC60529)			IP20 (IEC60529) closed type, UL open type (UL 50)										IP00 open type, UL open type IP55 at external side when external cooling installed			
Cooling method			Natural cooling			Fan cooling										
Weight/Mass [kg]			1.7	2.0	2.6	2.9	3.0	5.9	6.0	5.7	10	11	11	25	25	28

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

55 to 630kW

Item			Specifications													
Type (FRN□□□□G2S-4G)			0150	0180	0216	0260	0325	0377	0432	0520	0650	0740	0960	1040	1170	1386
Nominal applied motor [kW] (*1)			55	75	90	110	132	160	200	220	280	315	355	400	500	630
Output ratings	Rated capacity [kVA] (*2)		85	114	137	164	198	247	287	329	396	445	495	563	731	891
	Rated voltage [V] (*3)		Three-phase 380 to 480 (with AVR function)													
	Rated current [A]		112	150	180	216	260	325	377	432	520	585	650	740	960	1170
	Overload capacity		150%-1min, 200%-3.0s													
	Rated frequency [Hz]		50, 60													
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 380 to 480V, 50/60Hz													
	Auxiliary control power input: Phases, voltage, frequency		Single-phase 380 to 480V, 50/60Hz													
	Voltage, frequency variations		Voltage:(10 to -15% (Voltage unbalance:2% or less (*4)) Frequency:+5 to -5%													
	Rated current [A] (*5)	with DCR	102	138	164	201	238	286	357	390	500	559	628	705	881	1115
		without DCR	140	—	—	—	—	—	—	—	—	—	—	—	—	—
	Required power supply capacity [kVA] (*6)	with DCR	71	96	114	140	165	199	248	271	347	388	436	489	611	773
Braking	Torque [%] (*7)		10 to 15													
	Braking transistor		Built-in as standard		Option											
	Min. ohmic value [Ω]		6.5	4.7	—											
	Built-in braking resistance [Ω]		Option													
		Braking time[s]	—													
		%ED	—													
	DC injection braking		Starting frequency:0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level:0 to 100%													
DC reactor (DCR)			Option	Option (*8)												
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1													
Enclosure (IEC60529)			IP00 open type, UL open type IP55 at external side when external cooling installed													
Cooling method			Fan cooling													
Weight/Mass [kg]			31	38	60	60	89	89	116	124	221	221	291	295	450	450

(*1) Fuji's 4-pole standard motor When selecting an inverter, in addition to considering the kWs of the inverter, make sure that the output current rating is larger than the motor current rating.
(*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) Output voltage cannot exceed the power supply voltage.
(*4) 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).
(*5) These values are calculated on assumption that the inverter is connected to a power supply with a capacity of 500 kVA (or 10 times the inverter capacity when the inverter capacity exceeds 50 kVA) and %X is 5%.
(*6) Required when a DC reactor (DCR) is used.
(*7) This is the average braking torque when performing individual operation. (This will vary based on the motor efficiency.)
(*8) When using a motor with a rating of 75 kW or more, be sure to use a DC reactor (option).

Standard Specifications

Basic type | **Three-phase** | **400V series**

HND (High carrier frequency Normal Duty) 7.5 to 110 kW

Item			Specifications										
Type (FRN□□□G2S-4G)			0018	0023	0031	0038	0045	0060	0075	0091	0112	0150	0180	0216
Nominal applied motor [kW] (*1)			7.5	11	15	18.5	22	30	37	45	55	75	90	110
Output ratings	Rated capacity [kVA] (*2)		13	17	23	28	34	45	57	69	85	114	137	164
	Rated voltage [V] (*3)		Three-phase 380 to 480 (with AVR)											
	Rated current [A]		17.5	23	31	38	45	60	75	91	112	150	180	216
	Overload capacity		120% -1min											
	Rated frequency [Hz]		50, 60											
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 380 to 480V, 50/60Hz											
	Auxiliary control power input: Phases, voltage, frequency		Single-phase 380 to 480V, 50/60Hz											
	Voltage, frequency variations		Voltage: (10 to -15% (Voltage unbalance: 2% or less (*4)) Frequency: +5 to -5%											
	Rated current [A] (*5)	with DCR	14.4	21.1	28.8	35.5	42.2	57.0	68.5	83.2	102	138	164	201
		without DCR	23.2	33.0	43.8	52.3	60.6	77.9	94.3	114	140	-	-	-
	Required power supply capacity [kVA] (*6)	with DCR	10	15	20	25	30	40	48	58	71	96	114	140
Braking	Torque [%]		70		15				7 to 12					
	Braking transistor		Built-in											-
	Min. ohmic value [Ω]		64	48	32	24	16		10	9	8	6.5	4.7	-
	Built-in braking resistance [Ω]		80		—									
		Braking time[s]	3.7	3.4	—									
		%ED	2.2	1.4	—									
	DC injection braking		Starting frequency:0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level: 0 to 80%											
DC reactor (DCR)			Option									Option (*7)		
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1											
Enclosure (IEC60529)			IP20 (IEC60529) closed type, UL open type (UL 50)						IP00 open type, UL open type IP55 for the cooling part outside the panel					
Cooling method			Fan cooling											
Weight/Mass [kg]			5.9	6.0	5.7	10	11	11	23	23	28	31	38	60

HND (High carrier frequency Normal Duty) 132 to 710 kW

Item			Specifications									
Type (FRN□□□G2S-4G)			0260	0325	0377	0432	0520	0650	0740	0960	1040	1170	1386
Nominal applied motor [kW] (*1)			132	160	200	220	280	355	400	500	560	630	710
Output ratings	Rated capacity [kVA] (*2)		198	247	287	329	396	495	563	731	792	891	1056
	Rated voltage [V] (*3)		Three-phase 380 to 480 (with AVR)										
	Rated current [A]		260	325	377	432	520	650	740	960	1040	1170	1386
	Overload capacity		120%-1min										
	Rated frequency [Hz]		50, 60										
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 380 to 480V, 50/60Hz										
	Auxiliary control power input: Phases, voltage, frequency		Single-phase 380 to 480V, 50/60Hz										
	Voltage, frequency variations		Voltage: (10 to -15% (Voltage unbalance: 2% or less (*4)) Frequency: +5 to -5%										
	Rated current [A] (*5)	with DCR	238	286	357	390	500	628	705	881	990	1115	1256
		without DCR	-	-	-	-	-	-	-	-	-	-	-
	Required power supply capacity [kVA] (*6)	with DCR	165	199	248	271	347	436	489	611	686	773	871
Braking	Torque [%]		7 to 12										
	Braking transistor		—										
	Min. ohmic value [Ω]		—										
	Built-in braking resistance [Ω]		—										
		Braking time[s]	—										
		%ED	—										
	DC injection braking		Starting frequency: 0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level: 0 to 80%										
DC reactor (DCR)			Option(*7)										
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1										
Enclosure (IEC60529)			IP00 open type, UL open type IP55 for the cooling part outside the panel										
Cooling method			Fan cooling										
Weight/Mass [kg]			60	89	89	116	124	221	221	291	295	450	450

(*1) Fuji's 4-pole standard motor When selecting an inverter, in addition to considering the kWs of the inverter, make sure that the output current rating is larger than the motor current rating.
(*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) Output voltage cannot exceed the power supply voltage.
(*4) 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).
(*5) These values are calculated on assumption that the inverter is connected to a power supply with a capacity of 500 kVA (or 10 times the inverter capacity when the inverter capacity exceeds 50 kVA) and %X is 5%.
(*6) Required when a DC reactor (DCR) is used.
(*7) When using a motor with a rating of 75 kW or more, be sure to use a DC reactor (option).

Basic type | Three-phase | 200V series

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

Item			Specifications															
Type (FRN□□□G2S-2G)			0003	0005	0008	0011	0018	0032	0046	0059	0075	0088	0115	0146	0180	0215	0288	0346	0432
Nominal applied motor [kW] (*1)			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Output ratings	Rated capacity [kVA] (*2)		1.1	1.9	3.0	4.1	6.8	10	14	18	24	28	34	45	55	68	81	109	131
	Rated voltage [V] (*3)		Three-phase 200 to 240 (with AVR)											Three-phase 200 to 230 (with AVR)					
	Rated current [A]		3	5	8	11	18	27	37	49	63	76	90	119	146	180	215	288	346
	Overload capacity		150%-1min, 200%-3.0s																
	Rated frequency [Hz]		50, 60																
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 200 to 240V, 50/60Hz											Three-phase 200 to 230V, 50/60Hz					
	Auxiliary control power input: Phases, voltage, frequency		-		Single-phase 200 to 240V, 50/60Hz									Single-phase 200 to 230V, 50/60Hz					
	Voltage, frequency variations		Voltage:(10 to -15% (Voltage unbalance:2% or less (*4)) Frequency:+5 to -5%																
	Rated current [A] (*5)	with DCR	1.6	3.2	6.1	8.9	15	21.1	28.8	42.2	57.6	71.0	84.4	114	138	167	203	282	334
		without DCR	3.1	5.3	9.5	13.2	22.2	31.5	42.7	60.7	80.1	97.0	112	151	185	225	270	-	-
	Required power supply capacity [kVA] (*6)	with DCR	0.6	1.2	2.2	3.1	5.2	7.4	10	15	20	25	30	40	48	58	71	98	116
Braking	Torque [%]		150			100				20				10 to 15					
	Braking transistor		Built-in															—	
	Min. ohmic value [Ω]		100		40		24	16	12	8	6	4		2.5	2.25	2	1.6	—	
	Built-in braking resistance [Ω]		100		40			20		—									
		Braking time[s]	5							—									
		%ED	5	3	5	3	2	3	2	—									
	DC injection braking		Starting frequency:0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level:0 to 100%																
EMC filter			Complying EMC standard on emissions and immunity: Category C3 (2nd Env.) (IEC61800-3: 2017)																
DC reactor (DCR)			Option															Option (*7)	
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1																
Enclosure (IEC60529)			IP20 closed type, UL open type											IP00 open type, UL open type IP55 for the cooling part outside the panel					
Cooling method			Natural cooling			Fan cooling													
Weight/Mass [kg]			1.7	1.9	2.6	2.9	2.9	5.8	6.2	5.7	11	11	12	23	31	40	42	60	97

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

Item			Specifications										
Type (FRN□□□G2S-2G)			0032	0046	0059	0075	0088	0115	0146	0180	0215	0288	0346	0432
Nominal applied motor [kW] (*1)			7.5	11	15	18.5	22	30	37	45	55	75	90	110
Output ratings	Rated capacity [kVA] (*2)		12	17	22	28	33	43	55	68	81	109	131	164
	Rated voltage [V] (*3)		Three-phase 200 to 240 (with AVR)						Three-phase 200 to 230 (with AVR)					
	Rated current [A]		31.8	46.2	59.4	74.8	88	115	146	180	215	288	346	432
	Overload capacity		120%-1min											
	Rated frequency [Hz]		50, 60											
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 200 to 240V, 50/60Hz						Three-phase 200 to 230V, 50/60Hz					
	Auxiliary control power input: Phases, voltage, frequency		Single-phase 200 to 240V, 50/60Hz						Single-phase 200 to 230V, 50/60Hz					
	Voltage, frequency variations		Voltage:(10 to -15% (Voltage unbalance:2% or less) Frequency:+5 to -5%											
	Rated current [A] (*5)	with DCR	28.8	42.2	57.6	71.0	84.4	114	138	167	203	282	334	410
		without DCR	42.7	60.7	80.1	97.0	112	151	185	225	270	-	-	-
	Required power supply capacity [kVA] (*6)	with DCR	10	15	20	25	30	40	48	58	71	98	116	143
Braking	Torque [%]		70		15				7 to 12					
	Braking transistor		Built-in										—	
	Min. ohmic value [Ω]		16	12	8	6	4		2.5	2.25	2	1.6	—	
	Built-in braking resistance [Ω]		20		—									
		Braking time[s]	3.7	3.4	—									
		%ED	2.2	1.4	—									
	DC injection braking		Starting frequency: 0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level: 0 to 100%											
EMC filter			Complying EMC standard on emissions and immunity: Category C3 (2nd Env.) (IEC61800-3: 2017)											
DC reactor (DCR)			Option									Option (*7)		
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1											
Enclosure (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											
Weight/Mass [kg]			5.8	6.2	5.7	11	11	12	23	31	40	42	60	97

(*1) Fuji's 4-pole standard motor When selecting an inverter, in addition to considering the kWs of the inverter, make sure that the output current rating is larger than the motor current rating.
(*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) Output voltage cannot exceed the power supply voltage.
(*4) 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).
(*5) These values are calculated on assumption that the inverter is connected to a power supply with a capacity of 500 kVA (or 10 times the inverter capacity when the inverter capacity exceeds 50 kVA) and %X is 5%.
(*6) Required when a DC reactor (DCR) is used.
(*7) When using a motor with a rating of 75 kW or more, be sure to use a DC reactor (option).

EMC filter built-in type Three-phase 400V series

HHD (High carrier frequency Heavy Duty) spec for heavy load 0.4 to 45kW

Item			Specifications													
Type (FRN□□□G2E-4G)			0002	0003	0004	0006	0009	0018	0023	0031	0038	0045	0060	0075	0091	0112
Nominal applied motor [kW] (*1)			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
Output ratings	Rated capacity [kVA] (*2)		1.1	1.9	3.2	4.5	6.8	10	14	18	24	29	34	45	57	69
	Rated voltage [V] (*3)		Three-phase 380 to 480 (with AVR)													
	Rated current [A]		1.5	2.5	4.2	6	9	13.5	18.5	24.5	32	39	45	60	75	91
	Overload capacity		150%-1min, 200%-3.0s													
	Rated frequency [Hz]		50, 60													
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 380 to 480V, 50/60Hz													
	Auxiliary control power input: Phases, voltage, frequency		-		Single-phase 380 to 480V, 50/60Hz											
	Voltage, frequency variations		Voltage:(10 to -15% (Voltage unbalance:2% or less (*4)) Frequency:+5 to -5%													
	Rated current [A] (*5)	with DCR	0.85	1.6	3.0	4.5	7.5	10.6	14.4	21.1	28.8	35.5	42.2	57.0	68.5	83.2
		without DCR	1.7	3.1	5.9	8.2	13.0	17.3	23.2	33	43.8	52.3	60.6	77.9	94.3	114
	Required power supply capacity [kVA] (*6)	with DCR	0.6	1.2	2.1	3.2	5.2	7.4	10	15	20	25	30	40	48	58
Braking	Torque [%]		150		100					20			10 to15			
	Braking transistor		Built-in													
	Min. ohmic value [Ω]		200		160		96	64	48	32	24	16		10	9	8
	Built-in braking resistance [Ω]		720	470	160			80		—						
		Braking time[s]	5							—						
		%ED	5	3	5	3	2	3	2	—						
	DC injection braking		Starting frequency:0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level:0 to 100%													
EMC filter			Complying EMC standard on emissions and immunity: Category C3 (2nd Env.) (IEC61800-3: 2017)													
DC reactor (DCR)			Option													
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1													
Enclosure (IEC60529)			IP20 (IEC60529) closed type, UL open type (UL 50)									IP00 open type, UL open type IP55 for the cooling part outside the panel				
Cooling method			Natural cooling			Fan cooling										
Weight/Mass [kg]			1.8	2.1	2.8	3.1	3.2	6.6	6.6	6.4	11	11	12	23	23	30

HHD (High carrier frequency Heavy Duty) spec for heavy load 55 to 630kW

Item			Specifications													
Type (FRN□□□G2E-4G)			0150	0180	0216	0260	0325	0377	0432	0520	0650	0740	0960	1040	1170	1386
Nominal applied motor [kW] (*1)			55	75	90	110	132	160	200	220	280	315	355	400	500	630
Output ratings	Rated capacity [kVA] (*2)		85	114	137	164	198	247	287	329	396	445	495	563	731	891
	Rated voltage [V] (*3)		Three-phase 380 to 480 (with AVR)													
	Rated current [A]		112	150	180	216	260	325	377	432	520	585	650	740	960	1170
	Overload capacity		150%-1min, 200%-3.0s													
	Rated frequency [Hz]		50, 60													
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 380 to 480V, 50/60Hz													
	Auxiliary control power input: Phases, voltage, frequency		Single-phase 380 to 480V, 50/60Hz													
	Voltage, frequency variations		Voltage:(10 to -15% (Voltage unbalance:2% or less (*4)) Frequency:+5 to -5%													
	Rated current [A] (*5)	with DCR	102	138	164	201	238	286	357	390	500	559	628	705	881	1115
		without DCR	140	-	-	-	-	-	-	-	-	-	-	-	-	-
	Required power supply capacity [kVA] (*6)	with DCR	71	96	114	140	165	199	248	271	347	388	436	489	611	773
Braking	Torque [%]		10 to 15													
	Braking transistor		Built-in		—											
	Min. ohmic value [Ω]		6.5	4.7	—											
	Built-in braking resistance [Ω]		—													
		Braking time[s]	—													
		%ED	—													
	DC injection braking		Starting frequency:0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level:0 to 100%													
EMC filter			Complying EMC standard on emissions and immunity: Category C3 (2nd Env.) (IEC61800-3: 2017)													
DC reactor (DCR)			Option	Option (*7)												
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1													
Enclosure (IEC60529)			IP00 open type, UL open type IP55 for the cooling part outside the panel													
Cooling method			Fan cooling													
Weight/Mass [kg]			31	38	60	60	89	89	116	124	221	221	291	295	450	450

(*1) Fuji's 4-pole standard motor When selecting an inverter, in addition to considering the kWs of the inverter, make sure that the output current rating is larger than the motor current rating.
(*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) Output voltage cannot exceed the power supply voltage.
(*4) 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).
(*5) These values are calculated on assumption that the inverter is connected to a power supply with a capacity of 500 kVA (or 10 times the inverter capacity when the inverter capacity exceeds 50 kVA) and %X is 5%.
(*6) Required when a DC reactor (DCR) is used.
(*7) When using a motor with a rating of 75 kW or more, be sure to use a DC reactor (option).

EMC filter built-in type Three-phase 400V series

HND (High carrier frequency Normal Duty) 7.5 to 110kW

Item			Specifications											
Type (FRN□□□G2E-4G)			0018	0023	0031	0038	0045	0060	0075	0091	0112	0150	0180	0216
Nominal applied motor [kW] (*1)			7.5	11	15	18.5	22	30	37	45	55	75	90	110
Output ratings	Rated capacity [kVA] (*2)		13	17	23	28	34	45	57	69	85	114	137	164
	Rated voltage [V] (*3)		Three-phase 380 to 480 (with AVR)											
	Rated current [A]		17.5	23	31	38	45	60	75	91	112	150	180	216
	Overload capacity		120%-1min											
	Rated frequency [Hz]		50, 60											
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 380 to 480V, 50/60Hz											
	Auxiliary control power input: Phases, voltage, frequency		Single-phase 380 to 480V, 50/60Hz											
	Voltage, frequency variations		Voltage:(10 to -15% (Voltage unbalance:2% or less (*4)) Frequency:+5 to -5%											
	Rated current [A] (*5)	with DCR	14.4	21.1	28.8	35.5	42.2	57.0	68.5	83.2	102	138	164	201
		without DCR	23.2	33.0	43.8	52.3	60.6	77.9	94.3	114	140	-	-	-
	Required power supply capacity [kVA] (*6)	with DCR	10	15	20	25	30	40	48	58	71	96	114	140
Braking	Torque [%]		70		15				7 to 12					
	Braking transistor		Built-in											-
	Min. ohmic value [Ω]		64	48	32	24	16	16	10	9	8	6.5	4.7	-
	Built-in braking resistance [Ω]		80		—									
		Braking time[s]	3.7	3.4	—									
		%ED	2.2	1.4	—									
	DC injection braking		Starting frequency:0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level:0 to 80%											
EMC filter			Complying EMC standard on emissions and immunity: Category C3 (2nd Env.) (IEC61800-3: 2017)											
DC reactor (DCR)			Option										Option (*7)	
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1											
Enclosure (IEC60529)			IIP20 (IEC60529) closed type, UL open type (UL 50)						IP00 open type, UL open type IP55 for the cooling part outside the panel					
Cooling method			Fan cooling											
Weight/Mass [kg]			6.6	6.6	6.4	11	11	12	23	23	30	31	38	60

HND (High carrier frequency Normal Duty) 132 to 710kW

Item			Specifications										
Type (FRN□□□G2E-4G)			0260	0325	0377	0432	0520	0650	0740	0960	1040	1170	1386
Nominal applied motor [kW] (*1)			132	160	200	220	280	355	400	500	560	630	710
Output ratings	Rated capacity [kVA] (*2)		198	247	287	329	396	495	563	731	792	891	1056
	Rated voltage [V] (*3)		Three-phase 380 to 480 (with AVR)										
	Rated current [A]		260	325	377	432	520	650	740	960	1040	1170	1386
	Overload capacity		120%-1min										
	Rated frequency [Hz]		50, 60										
Input ratings	Main circuit power: Phases, voltage, frequency		Three-phase 380 to 480V, 50/60Hz										
	Auxiliary control power input: Phases, voltage, frequency		Single-phase 380 to 480V, 50/60Hz										
	Voltage, frequency variations		Voltage: (10 to -15% (Voltage unbalance: 2% or less (*4)) Frequency: +5 to -5%										
	Rated current [A] (*5)	with DCR	238	286	357	390	500	628	705	881	990	1115	1256
		without DCR	-	-	-	-	-	-	-	-	-	-	-
	Required power supply capacity [kVA] (*6)	with DCR	165	199	248	271	347	436	489	611	686	773	871
Braking	Torque [%]		7 to 12										
	Braking transistor		—										
	Min. ohmic value [Ω]		—										
	Built-in braking resistance [Ω]		—										
		Braking time[s]	—										
		%ED	—										
	DC injection braking		Starting frequency:0.0 to 60.0Hz, Braking time: 0.0 to 30.0s, Braking level:0 to 80%										
EMC filter			Complying EMC standard on emissions and immunity: Category C3 (2nd Env.) (IEC61800-3: 2017)										
DC reactor (DCR)			Option (*7)										
Applicable safety standards (Planned)			UL61800-5-1, C22.2No.274-17, IEC/EN 61800-5-1										
Enclosure (IEC60529)			IP00 open type, UL open type IP55 for the cooling part outside the panel										
Cooling method			Fan cooling										
Weight/Mass [kg]			60	89	89	116	124	221	221	291	295	450	450

(*1) Fuji's 4-pole standard motor When selecting an inverter, in addition to considering the kWs of the inverter, make sure that the output current rating is larger than the motor current rating.
(*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) Output voltage cannot exceed the power supply voltage.
(*4) 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).
(*5) These values are calculated on assumption that the inverter is connected to a power supply with a capacity of 500 kVA (or 10 times the inverter capacity when the inverter capacity exceeds 50 kVA) and %X is 5%.
(*6) Required when a DC reactor (DCR) is used.
(*7) When using a motor with a rating of 75 kW or more, be sure to use a DC reactor (option).

Common Specifications

Item				Explanation		Remarks
Output	Adjustment		Maximum output frequency	5 to 599 Hz variable setting		
			Base frequency	5 to 599 Hz variable setting (in conjunction with maximum output frequency)		
			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	• 0.75 to 16 kHz variable setting (HHD specification : FRN0003G2S-2G to FRN0288G2S-2G/ FRN0002G2■-4G to FRN0150G2■-4G (HND specification : FRN0032G2S-2G to FRN0088G2S-2G/ FRN0018G2■-4G to FRN0045G2■-4G) • 0.75 to 10 kHz variable setting (HHD specification : FRN0346G2S-2G to FRN0432G2S-2G/ FRN0180G2■-4G to FRN1386G2■-4G), (HND specification : FRN0115G2S-2G to FRN0288G2S-2G/ FRN0060G2■-4G to FRN0150G2■-4G) • 0.75 to 6 kHz variable setting (HND specification : FRN0346G2S-2G to FRN0432G2S-2G/ FRN0180G2■-4G to FRN1386G2■-4G) 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) • Keypad setting : ±0.01% of maximum output frequency (at 10 to +50 °C)		
	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 motors	When performing V/f control with sensor When performing dynamic torque vector control with sensor		Speed control Range	• 1:20 (Minimum speed: Nominal speed),1:200 (Minimum speed: Nominal speed) • 1:2 (fixed torque area : fixed output area)	
				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, 4P, 7,5 to 1.500 r/min) • 1:2 (fixed torque area : fixed output area)	
				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 to +50 °C)	
		When performing vector control with sensor		Speed control Range	• 1:1500 (Minimum speed: Nominal speed, 4P, 1 to 1.500 r/min) • 1:16 (fixed torque area : fixed output area)	
				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, 6P, 180 to 1.800 r/min) • 1:2 (fixed torque area: fixed output area)	
				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, 4P, 1 to 1.500 r/min) • 1:2 (fixed torque area: fixed output area)	
				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.	
				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, • FRN0145G2S-2G/FRN0075G2■-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 (standard keypad) Start and stop with FWD, REV, and STOP keys (optional multi-function keypad)	
				External signals: Forward (reverse) rotation, start/stop commands (capable of 3-wire operation), (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		
	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) Current 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%	

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

	Item	Explanation	Remarks
Control	Frequency setting	UP/DOWN operation: Frequency can be increased or decreased while the digital input signal is ON.	
		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 (built in as standard), field bus communication (option)	
		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: (standard) Pulse input = terminal [X6], [X7], forward/reverse pulse, pulse + rotation direction Complementary output: Max. 100 kHz Open collector output: Max. 30 kHz	
		Pulse train input: (option) PG interface option, forward/reverse pulse, pulse + rotation direction 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).	
	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.)	
	Bias frequency	Bias of reference frequency and PID command can be independently set (setting range: 0 to ±100%).	
	Analog input	• Gain: Setting range from 0 to 200% • 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 (standard 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.	
	Hardware current limiter	Limits the current by hardware to prevent an overcurrent trip from being caused by fast load variation or momentary power failure, which cannot be covered by the software current limiter. This limiter can be canceled.	
	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	
	Software current limiter	Automatically reduces the frequency so that the output current becomes lower than the preset operation level.	
	PID control	• PID processor for process control/dancer control • Switch normal/inverse operation • Low liquid level stop function (pressurized operation possible before low liquid level stop) • PID command: keypad, analog input (terminals [12], [C1] (C1 function, V3 function), [V2],), RS 485 communication • PID feedback value: analog input (terminals [12], [C1] (C1 function, V3 function), [V2]) • Alarm output (absolute value alarm, deviation alarm) • PID output limiter • Integration reset/hold • Anti reset wind up function	
	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.	
	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.	

* For online tuning, refer to the FRENIC-MEGA (G2) User’s Manual.

Common Specifications

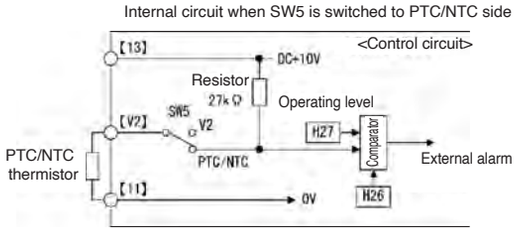
	Item		Explanation	Remarks
Control	Cooling fan ON OFF control		• Detects inverter internal temperature and stops cooling fan when the temperature is low. • Possible to output a fan control signal to an external device.	
	Motor 1 to 4 settings		• Switching is possible between 4 motors. • It is possible 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		Notch filter for vibration control	
	Line speed control		In a machine such as winder/unwinder, regulates the motor speed to keep the peripheral speed of the spool constant.	
	Master follower operation		Performs position synchronization for two motors.	
	Pre excitation		Excitation is carried out to create the motor flux before starting the motor.	
	Zero speed control		The motor speed is held to zero by forcibly zeroing the speed command.	
	Servo lock		Stops the motor and holds the motor in the stopped position.	
	Torque control		• Analog torque command input • Speed limit function is provided to prevent the motor from becoming out of control.	
	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 interface		2 inputs, 1 output, logic calculation, timer function, 260 steps	
	Battery operation		Inverters at which an undervoltage has occurred are run with the battery power.	
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 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 four trips is retained and displayed. • All kinds of running status data for up to the past four trips is retained and displayed.	
Protective functions	Overcurrent protection		Stops the inverter to protect it from overcurrent caused by an overload.	0C1.0C2.0C3
	Circuit protection shorting		Stops the inverter to protect it from overcurrent caused by shorting of the output circuit.	
	Ground fault protection		Stops the inverter to protect it from overcurrent caused by an output circuit ground fault. 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)	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.	0V1.0V2.0V3
	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.	LV
	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
			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
	Blown fuse		Stops the inverter and displays an error if a main circuit blown fuse is detected inside the inverter. (75 kW or higher (200V class), 90 kW or higher (400V class))	FUS
	Charger circuit error		Stops the inverter and displays an error if an inverter charging circuit error is detected. (37 kW or higher (200V class), 75 kW or higher (400V class))	PBF
	Braking transistor error		Stops the inverter and displays an error if a braking transistor error is detected.	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
		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
		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].	NTB
	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

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

	Item	Explanation	Remarks
Protective functions	Option error	Stops the inverter and displays an error if an error is detected at the option side when using an option.	ERS
	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.	ERS
		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.	ERB
	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.	ERD
	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.	OPD
	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.	LOK
	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
	Warning	Motor overload early warning	OL
		Cooling fin overheat early warning	OH
		Lifetime alarm	LIF
		Reference command loss detected	REF
		PID alarm output	PID
		Low torque detection	UTL
		PTC thermistor activated	PTC
		Machine life (Cumulative motor running hours)	RTE
		Inverter life (Number of startups)	CNT
		Customizable logic alarm	CA1 to CA5
		IGBT lifetime alarm	IGB
		Cooling capability drop warning	FAN
	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.)	
	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.	
Environmental	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	
	Ambient temperature	10 to +55°C (derating is required if temperature exceeds 50°C.) *For dense mounting horizontally: -10 to +40°C (22 kW or less)	
	Ambient humidity	5 to 95% RH (avoid condensation)	
	Altitude	1000 m or less	
	Vibration	FRN0115G2□-2G or lower, FRN0060G2□-4G or lower: 3 mm (max. aplitude); 9 to less than 20 Hz: 9.8 m/s²; 20 to less than 55Hz: 5.9 m/s²; 55 to less than 200 Hz: 1 m/s²	
		FRN0288G2□-2G or lower, FRN0180G2□-4G or lower: 3 mm (max. aplitude); 9 to less than 20 Hz: 9.8 m/s²; 20 to less than 55Hz: 2 m/s²; 55 to less than 200 Hz: 1 m/s²	
		FRN0346G2□-4G or higher, FRN0216G2□-4G or higher: 3 mm (max. aplitude); 9 to less than 20 Hz: 2 m/s²; 20 to less than 55Hz: 2 m/s²; 55 to less than 200 Hz: 1 m/s²	
	Storage temperature	• -25 to +70°C (during transport), -25 to +65°C (during temporary storage) • -10 to +35°C (during long-term storage exceeding 3 months)	
	Storage humidity	5 to 95% RH (avoid condensation)	

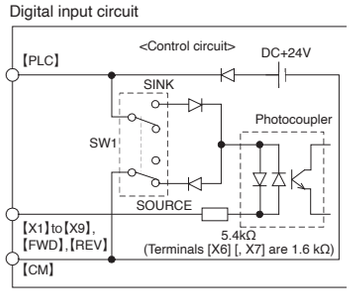
* For details, refer to the FRENIC-MEGA (G2) User's Manual.

Terminal Specifications

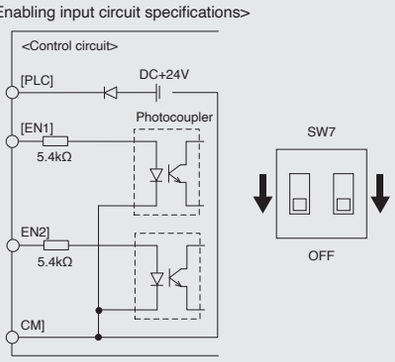
Class	Symbol	Terminal name	Explanation
Main circuit	L1/R,L2/S,L3/T	Main power supply input terminals	Connect a three-phase power supply.
	U,V,W	Inverter output	3-phase motor connection
	P(+),P1	For DC reactor connection	Connect DC reactor (DCR) (optional) HHD specification: Optionally connect for FRN0002 to FRN0150, but always make sure to connect for FRN0180 or more. HND specification: Optionally connect for FRN0018 to FRN0112, but always make sure to connect for FRN0150 or more. * Select a standard motor that is applicable to the HND specifications.
	P(+),N(-)	For DC busbar connection	Use to connect to the DC intermediate circuit of other inverters, PWM converters, etc
	P(+),DB	For braking resistor connection	Connect terminal (+) of the braking resistor (DB) (optional) and the DB (wiring distance: 5 m or less)
	⏚G	For grounding the chassis (case) of the inverter	• This is the earth terminal of the inverter chassis (case) and motor. • Connect one terminal to the ground and the other terminal to the earth terminal of the motor (comes with two terminals).
	R0,T0	Auxiliary control power input	Connect to the power supply when you want to preserve the batch alarm signal during protective function activation (even when the main power of the inverter has been cut off), or when you want to continuously display the keypad (FRN0004 or more).
Analog input	【13】	Power supply for variable resistor	• Use as a power supply (+10 V DC) for an external frequency setter (variable resistor: 1 to 5 kΩ). • Use a variable resistor of 1/2 W or more when connecting.
	【12】	Analog setting voltage input	(1) Set the frequency according to the external analog voltage input instruction value. • 0 to ±10 V DC/0 to ±100 (%) (normal action) • +10 to 0 V DC/0 to 100 (%) (reverse action) (2) It supports using analog inputs to assign frequency settings, PID instructions, PID control feedback signals, auxiliary frequency settings, ratio settings, torque limiting settings, torque instruction values/torque current instruction values, speed limiting values, and analog input monitors. (3) Hardware specification * Input impedance: 22 (kΩ) * Can input up to ±15 V DC. However, it will be deemed to be ±10 V DC for any value that exceeds ±10 V DC. * Set function code C35 to "0" when inputting the analog setting voltage of both poles (0 to ±10 V DC) at terminal [12].
	【C1】	Analog setting current input (C1 function)	(1) Set the frequency according to the external analog current input instruction value. • 4 to 20 mA DC/0 to 100 (%), 0 to 20 mA DC/0 to 100 (%) (normal action) • 20 to 4 mA DC/0 to 100 (%), 20 to 0 mA DC/0 to 100 (%) (reverse action) (2) It supports using analog inputs to assign frequency settings, PID instructions, PID control feedback signals, auxiliary frequency settings, ratio settings, torque limiting settings, torque instruction values/torque current instruction values, speed imiting values, and analog input monitors. (3) Hardware specifications * Input impedance: 250 (Ω) * Can input up to 30 mA DC. However, it will be deemed to be 20 mA DC for any value that exceeds 20 mA DC.
		Analog setting voltage input (V3 function)	(1) Set the frequency according to the external analog voltage input instruction value. • 0 to ±10 V DC/0 to ±100 (%) (normal action) • +10 to 0 V DC/0 to 100 (%) (reverse action) (2) It supports using analog inputs to assign frequency settings, PID instructions, PID control feedback signals, auxiliary frequency settings, ratio settings, torque limiting settings, torque instruction values/torque current instruction values, speed limiting values, and analog input monitors. (3) Hardware specifications * Input impedance: 22 (kΩ) * Can input up to ±15 V DC. However, it will be deemed to be ±10 V DC for any value that exceeds ±10 V DC. * Set function code C78 to "0" when inputting the analog setting voltage of both poles (0 to ±10 V DC) at terminal [V3].
	【V2】	Analog setting voltage input (V2 function)	(1) Set the frequency according to the external analog voltage input instruction value. • 0 to ±10 V DC/0 to ±100 (%) (normal action) • +10 to 0 V DC/0 to 100 (%) (reverse action) (2) It supports using analog inputs to assign frequency settings, PID instructions, PID control feedback signals, uxiliary frequency settings, ratio settings, torque limiting settings, torque instruction values/torque current instruction values, speed limiting values, and analog input monitors. (3) Hardware specifications * Input impedance: 22 (kΩ) * Can input up to ±15 V DC. However, it will be deemed to be ±10 V DC for any value that exceeds ±10 V DC. * Set function code C45 to "0" when inputting the analog setting voltage of both poles (0 to ±10 V DC) at terminal [V2].
		PTC/NTC thermistor input (PTC/NTC function)	(1) A PTC/NTC thermistor can be connected to protect the motor. (2) The PCB's SW5 switch needs to be switched to PTC/NTC side. • The figure below shows the internal circuit when SW5 (the switch for terminal [V2]) is switched to the PTC/NTC side. • When SW5 is switched to PTC/NTC side, function code H26 also needs to be changed. Internal circuit when SW5 is switched to PTC/NTC side 
	【11】	Analog common	• Common terminals for analog I/O signals (terminals [13], [12], [C1], [V2], [FM1], and [FM2]). • Insulated against terminals [CM] and [CMY].

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

<table>
<tr><th>Class</th><th>Symbol</th><th>Terminal name</th><th>Explanation</th></tr>
<tr><td rowspan="13">Analog input</td><td>【X1】</td><td>Digital input 1</td><td rowspan="12">(1) Various signals (coast to stop command, external alarms, multistep frequency selection, etc.) can be set for terminals [X1] to [X9], [FWD], and [REV].
(2) The input mode and SINK/SOURCE can be switched using SW1.
(3) The operating mode between each digital input terminal and terminal [CM] can be switched to "ON when shorted (active ON)" or "OFF when shorted (active OFF)".
(4) Digital input terminals [X6] and [X7] can be set up as pulse train input terminals by changing the function code.
• When connected to complementary output pulse generator: max. 100 Hz
• When connected to open collector output pulse generator: max. 30 Hz
(A pull-up resistor and pull-down resistor are required.)

<Digital input circuit specifications>
Digital input circuit
 

<table>
<tr><th colspan="2">Item</th><th>Min.</th><th>Max.</th></tr>
<tr><td rowspan="2">Operating voltage (SINK)</td><td>ON level</td><td>0V</td><td>2V</td></tr>
<tr><td>OFF level</td><td>20V</td><td>27V</td></tr>
<tr><td rowspan="2"></td><td>ON level</td><td>20V</td><td>27V</td></tr>
<tr><td>OFF level</td><td>0V</td><td>2V</td></tr>
<tr><td colspan="2">Operating current when ON (when input voltage 27 V) (X6/X7 input terminals)</td><td>2.5mA (3mA)</td><td>5mA (16mA)</td></tr>
<tr><td colspan="2">Permissible leakage current when OFF</td><td>—</td><td>0.5mA</td></tr>
</table></td></tr>
<tr><td>【X2】</td><td>Digital input 2</td></tr>
<tr><td>【X3】</td><td>Digital input 3</td></tr>
<tr><td>【X4】</td><td>Digital input 4</td></tr>
<tr><td>【X5】</td><td>Digital input 5</td></tr>
<tr><td>【X6】</td><td>Digital input 6</td></tr>
<tr><td>【X7】</td><td>Digital input 7</td></tr>
<tr><td>【X8】</td><td>Digital input 8</td></tr>
<tr><td>【X9】</td><td>Digital input 9</td></tr>
<tr><td>【FWD】</td><td>Forward・rotation/stop command Input</td></tr>
<tr><td>【REV】</td><td>Reverse・rotation/stop command Input</td></tr>
<tr><td>【EN1】
【EN2】</td><td>Enable input</td><td>(1) When the terminal between [EN1] and [-PLC] or between [EN2] and [-PLC] is OFF, the operation of the inverter's output transistor will be stopped (Safe torque off: STO).
Always make sure to operate terminals [EN1] and [EN2] simultaneously.
If the terminals are not operated simultaneously, the eCf alarm will trigger and this will prevent the inverter from operating.
(2) The input mode of terminals [EN1] and [EN2] is fixed to the source and cannot be switched to the sink.
(3) SW7 can be used to enable or disable this function.
To use this function, set each SW7 switch to OFF.

<Enabling input circuit specifications>
 

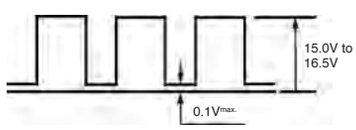
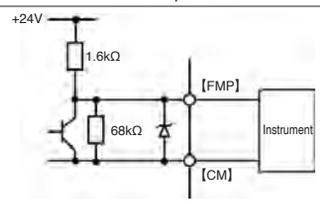
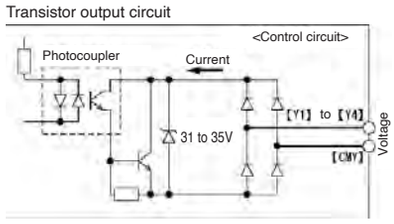
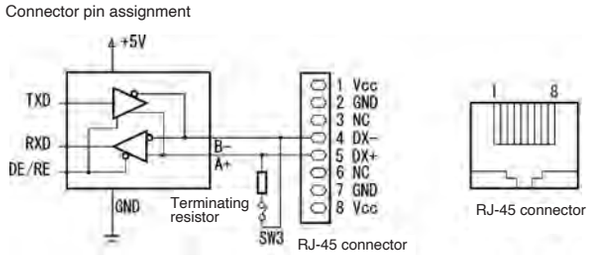
<table>
<tr><th colspan="2">Item</th><th>Min.</th><th>Max.</th></tr>
<tr><td rowspan="2">Operating voltage (SOURCE)</td><td>ON level</td><td>20V</td><td>27V</td></tr>
<tr><td>OFF level</td><td>0V</td><td>2V</td></tr>
<tr><td colspan="2">Operating current when ON (when input voltage 27 V)</td><td>2.5mA</td><td>10mA</td></tr>
<tr><td colspan="2">Permissible leakage current when OFF</td><td>—</td><td>0.5mA</td></tr>
</table></td></tr>
<tr><td>【PLC】</td><td>Programmable controller signal power supply</td><td>(1) Connect the output signal power supply for the programmable controller.
(Rated voltage +24 VDC (power supply voltage fluctuation range: +20 to +27 VDC), maximum 100 mA DC)
(2) The terminal can also be used as the power supply for loads connected to transistor outputs</td></tr>
<tr><td>【CM】</td><td>Digital common</td><td>This is a common terminal for digital input signals.
The terminal is insulated from terminals [11] and [CMY].</td></tr>
<tr><td rowspan="2">Analog output</td><td>【FM1】
【FM2】</td><td>Analog monitor
(FMA function)</td><td>This function outputs a monitor signal of analog DC voltage 0 to ±10 V DC, analog DC current 4 to 20 mA DC, or 0 to 20 mA DC.
The [FM1] output format (VO1/IO1) is switched by the PCB's SW4 switch and function code F29.
The content of the signal is selected from the following items based on the data setting of function code F31.
The [FM2] output format (VO2/IO2) is switched by the PCB's SW6 switch and function code F32.
The content of the signal is selected from the following items based on the data setting of function code F61.

Output frequency / Power consumption / Motor output
Output current / PID feedback amount / Analog output test
Output voltage / Speed detection（PG feedback value） / PID command
Output torque / Intermediate DC voltage / PID output
Load factor / Universal AO / Master-follower angle deviation

* Connectable impedance: Minimum of 5 kΩ (when outputting 0 to ±10 V DC) (up to two analog voltmeters (0 to 10 V DC, input impedance of 10 kΩ) can be connected.)
* Connectable impedance: Maximum of 500 Ω (at 4 m to 20 mA DC output)
* Gain adjustment range: 0 to 300%</td></tr>
<tr><td>【11】</td><td>Analog common</td><td>This is a common terminal for analog input/output signals.
This terminal is isolated from terminals [CM] and [CMY].</td></tr>
</table>

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

Terminal Specifications

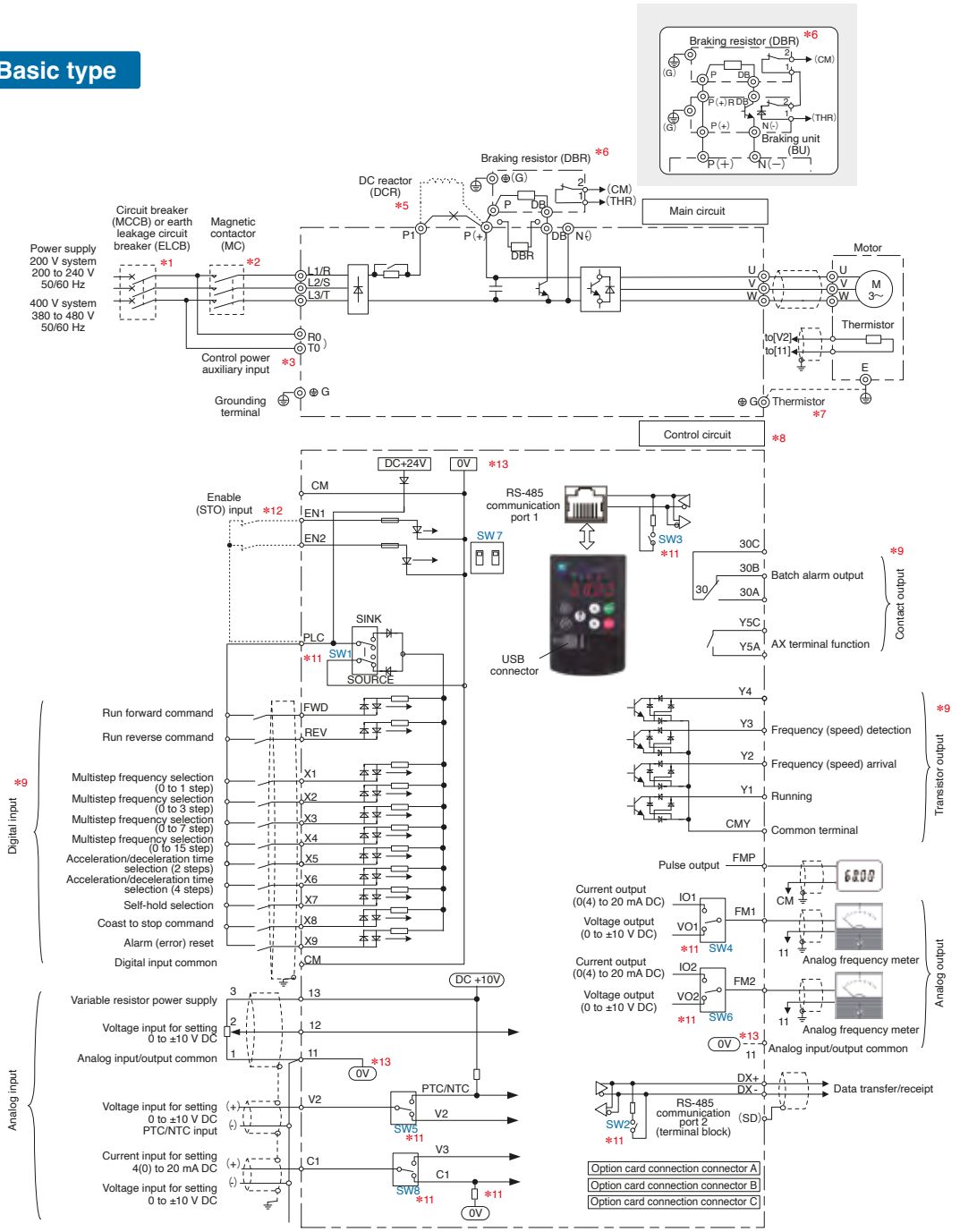
<table>
<tr><th>Class</th><th>Symbol</th><th>Terminal name</th><th>Explanation</th></tr>
<tr><td rowspan="2">Analog output</td><td rowspan="2">【FMP】</td><td rowspan="2">Pulse monitor
(FMP function)</td><td>This function outputs pulse signals. The content of the signal can be selected in the same way as the FM1/2 function by setting the function code F35.
* Connectable impedance: Minimum of 5 kΩ (up to two analog voltmeters (0 to 10 V DC, input impedance of 10 kΩ) can be connected.
* Pulse duty: About 50%; Pulse rate: 25 to 6000 p/s (at full scale)
Pulse output waveform
 
FMP output circuit
  </td></tr>
<tr><td>Digital common</td><td>This is a common terminal for digital input signals and terminal [FMP] output.
The terminal is insulated from terminals [11] and [CMY]. This is the same terminal as terminal [CM] for digital input.</td></tr>
<tr><td rowspan="5">Transistor output</td><td>【Y1】</td><td>Transistor output 1</td><td rowspan="4">(1) Various signals (running signals, frequency arrival signals, overload early warning signals, etc.) set with function codes E20 to E24 can be output.
(2) The operating mode between transistor output terminals [Y1] and [Y4] and terminal [CMY] can be switched to "ON when signal output (active ON)" or "OFF when signal output (active OFF)".
<Transistor output circuit specifications>
Transistor output circuit
 
<table><tr><th colspan="2">Item</th><th>Max.</th></tr><tr><td rowspan="2">Operating voltage</td><td>ON level</td><td>2V</td></tr><tr><td>OFF level</td><td>48V</td></tr><tr><td colspan="2">Operating current when ON</td><td>50mA</td></tr><tr><td colspan="2">Leakage current when OFF</td><td>0.1mA</td></tr></table></td></tr>
<tr><td>【Y2】</td><td>Transistor output 2</td></tr>
<tr><td>【Y3】</td><td>Transistor output 3</td></tr>
<tr><td>【Y4】</td><td>Transistor output 4</td></tr>
<tr><td>【CMY】</td><td>Transistor output common</td><td>This is a common terminal for transistor output signals.
This terminal is isolated from terminals [CM] and [11].</td></tr>
<tr><td rowspan="2">Analog output</td><td>【Y5A】
【Y5C】</td><td>General-purpose relay output</td><td>(1) The same signals as those of terminals [Y1] to [Y4] can be selected and output as multi-purpose relay outputs.
Contact capacity: 250 VAC 0.3 A cosϕ = 0.3, 48 VDC 0.5 A
(2) It is possible to switch between a "short circuit between terminals [Y5A] and [Y5C] when an ON signal is output (excitation: active ON)" or an "open circuit between terminals [Y5A] and [Y5C] when an ON signal is output (non-excitation: active OFF)".</td></tr>
<tr><td>【30A】
【30B】
【30C】</td><td>Integrated alarm output</td><td>(1) When the inverter stops with an alarm, an integrated alarm is output at the relay contact (1C).
Contact capacity: 250 VAC 0.3 A cosϕ = 0.3, 48 VDC 0.5 A
(2) The same signals as those of terminals [Y1] to [Y4] can be selected and output.
(3) It is possible to switch between a "short circuit between terminals [30A] and [30C] when an ON signal is output (excitation: active ON)" or an "open circuit between terminals [30A] and [30C] when an ON signal is output (non-excitation: active OFF)".</td></tr>
<tr><td rowspan="3">Communication</td><td>【DX+】
【DX-】
【SD】</td><td>RS-485 COM port 2
(terminal block)</td><td>• This is an input/output terminal used to connect a personal computer or programmable controller, etc. by RS-485 communication.
• Use the recommended stick terminal when making a daisy chain connection.</td></tr>
<tr><td>RJ-45 connector
Keypad</td><td>RS-485 COM port 1
(for keypad connection)</td><td>(1) This is used as a connector for connecting the keypad. The keypad power is supplied from the inverter via an extension cable for remote operation.
(2) This is used to connect a personal computer or programmable controller, etc. by RS-485 communication after disconnecting the keypad.
Connector pin assignment
 
• Pins 1, 2, 7, and 8 are assigned as the keypad's power source.
• Do not use these pins when connecting the RJ-45 connector to other devices.</td></tr>
<tr><td>USB connector</td><td>USB port (on keypad)</td><td>• This is a USB connector (mini B) for connecting to a computer.
• Use the inverter support loader (FRENIC loader) to edit, transfer, and verify function codes, perform test operations for the inverter, and monitor various statuses.</td></tr>
</table>

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

Basic Wiring Diagram

Wiring of main circuit terminal and grounding terminal

Basic type



*1 To protect the wiring, install the recommended molded case circuit breaker (MCCB), or residual-current-operated protective device (RCD)/earth leakage breaker (ELCB) (with overcurrent protection function) in the inverter primary circuit.

*2 If necessary, install a magnetic contactor (MC) in each inverter, and separate the inverter and power supply in addition to the MCCB or RCD/ELCB. If installing a coil such as an MC or solenoid near the inverter, connect a surge absorber in parallel.

*3 Prepare [R0] and [T0] terminals for 0004 type (400V class) and 0008 type (200V class) inverters with capacity of 1.5 kW or higher. Connect the terminals to the power supply line to retain alarm output signal ALM that occurs at the inverter programmable output terminal using a protective function, and to maintain keypad operation even if the main power supply is cut off.

*5 If connecting an optional DC reactor (DCR), remove the jumper bar from between terminals [P0] and [P1]. It is necessary to connect a DCR to LD specification inverters with capacity of 55kW, or 75 kW or higher. Be sure to connect to these inverters.

*6 A built-in braking resistor (DBR) is connected between terminals P(+) and DB on 7.5 kW or lower inverters. If connecting an external braking resistor (DBR), be sure to remove the built-in one.

*7 This terminal is used for grounding the motor. Use this terminal to ensure safety.

*8 Use twisted wire or shielded twisted wire for control signal lines. If using shielded twisted wire, connect the shields to a common terminal on the control circuit. To prevention malfunction due to noise, keep the control circuit wiring as far away from the main circuit wiring as possible (recommended distance: 10 cm or more). Never install the wiring in the same wiring duct. If crossing the control circuit wiring and main circuit wiring, set the angle.

*9 The connection diagram shows the factory default functions assigned to digital input terminals [X1] to [X9], [FWD], and [REV], transistor output terminals [Y1] to [Y4], relay contact output terminals [Y5A/C], and [30A/B/C].

*10 Changes the main circuit connector.

*11 These are control board slide switches. Inverter operation is customized using these switches.

*12 Set SW7 to the "OFF" side if using the enable input (EN1, EN2) functions. Use approved, safe relay devices which conform to EN ISO 13849-1 PL-e and IEC/EN 61800-5-2 SIL3 for switching of the hardware circuit between terminals [EN1], [EN2] and [PLC].

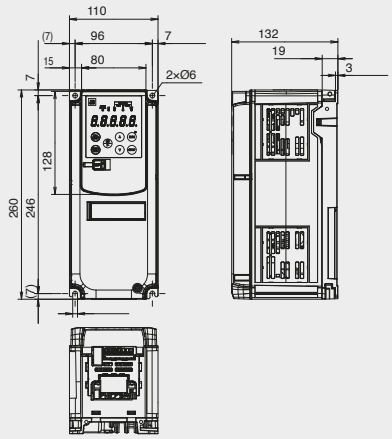
*13 [0V] and (0V) are separated and insulated.

External Dimensions

Basic type **EMC Filter Built-in Type**

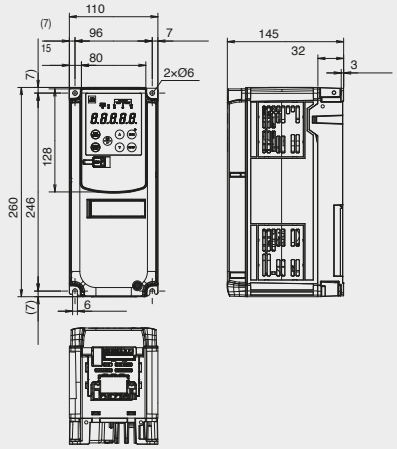
Type FRN0003G2□-2G, FRN0002G2□-4G

[Unit: mm]



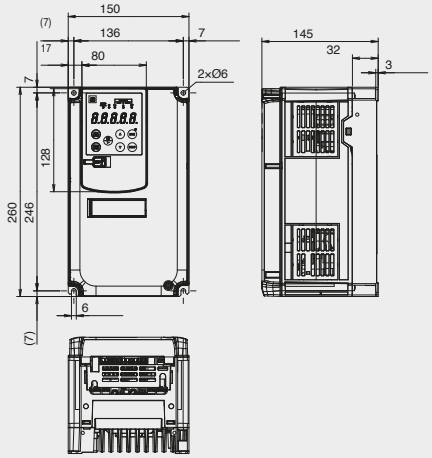
Type FRN0005G2□-2G, FRN0003G2□-4G

[Unit: mm]



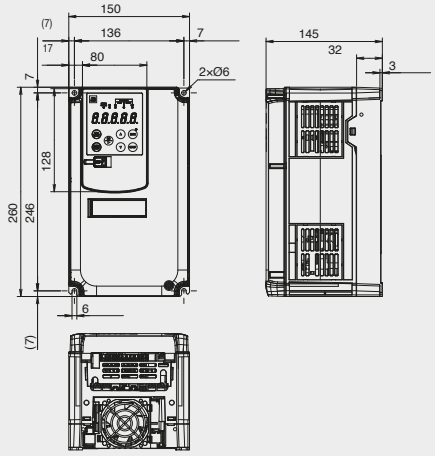
Type FRN0008G2□-2G, FRN0004G2□-4G

[Unit: mm]



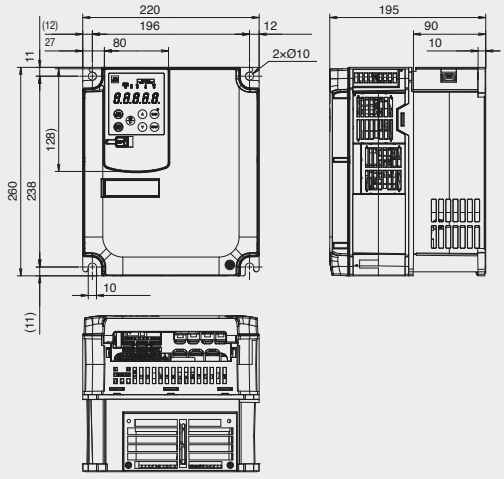
Type FRN0011G2□-2G to 0018G2□-2G, FRN0006G2□-4G to 0009G2□-4G

[Unit: mm]



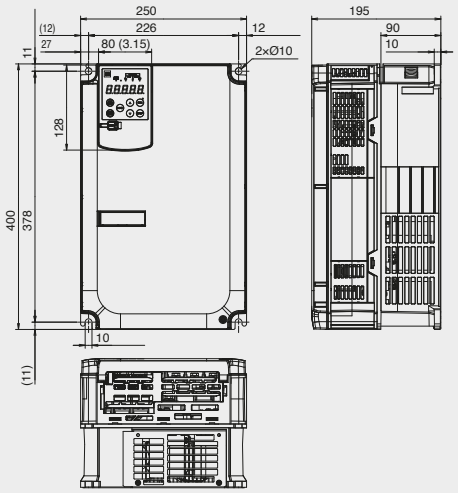
Type FRN0032G2□-2G to 0059G2□-2G, FRN0018G2□-4G to 0031G2□-4G

[Unit: mm]



Type FRN0075G2□-2G to 0115G2□-2G, FRN0038G2□-4G to 0060G2□-4G

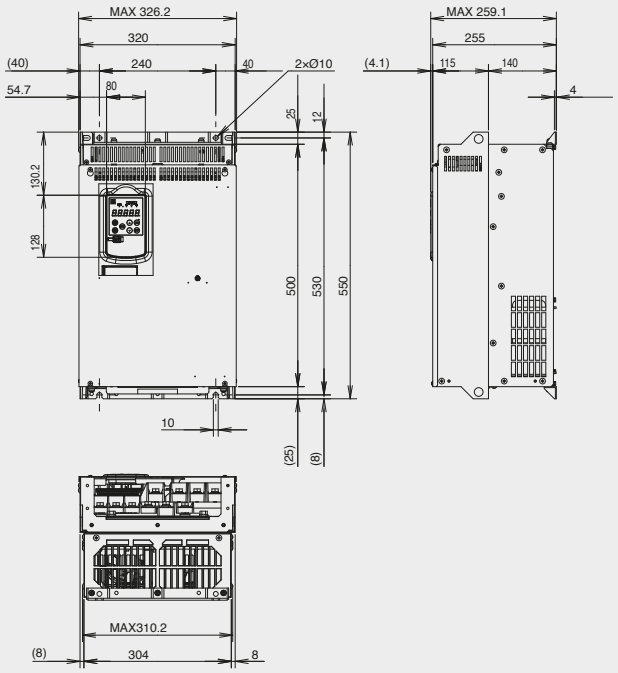
[Unit: mm]



Basic type | EMC Filter Built-in Type

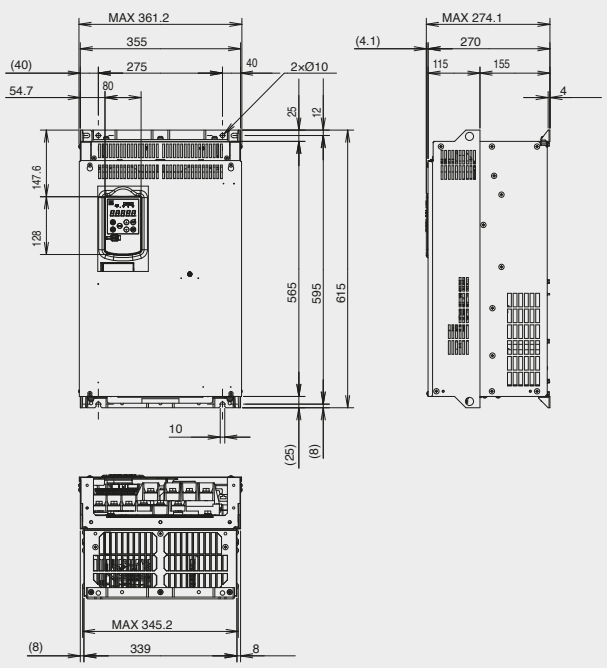
Type FRN0146G2□-2G, FRN0075G2□-4G, FRN0091G2□v-4G

[Unit: mm]



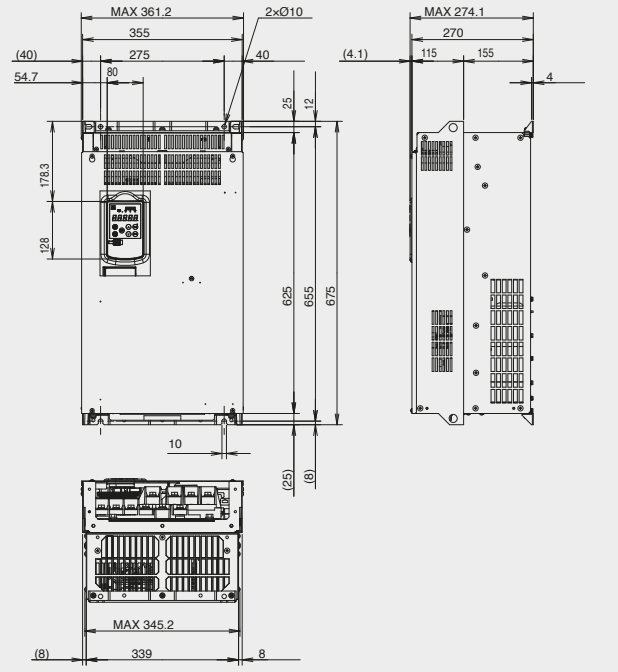
Type FRN0180G2□-2G, FRN0112G2□-4G

[Unit: mm]



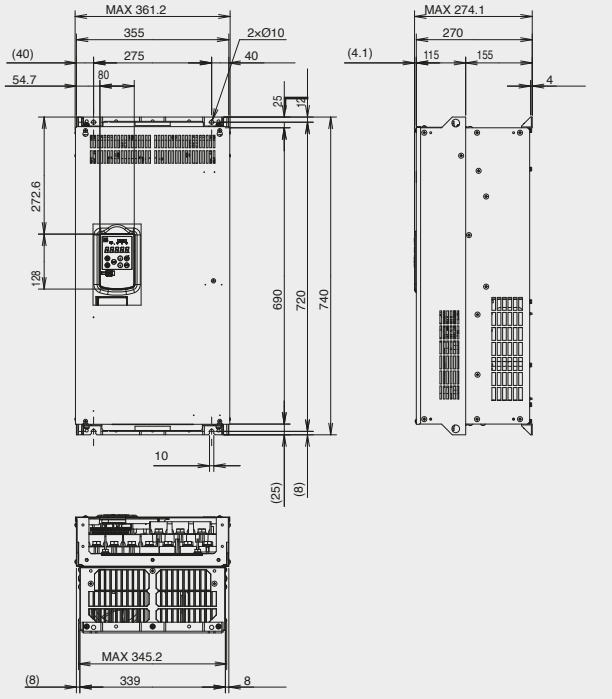
Type FRN0150G2□□-4G

[Unit: mm]



Type FRN0215G2□-2G, FRN0288G2□-2G, FRN0180G2□-4G

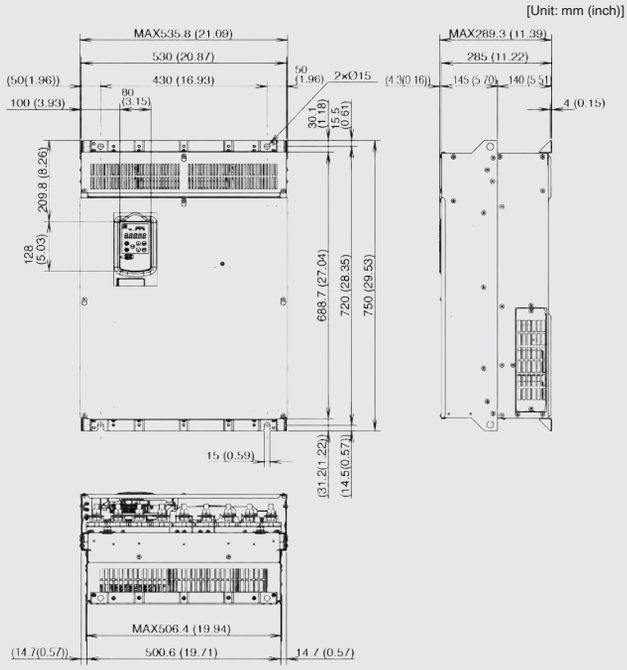
[Unit: mm]



External Dimensions

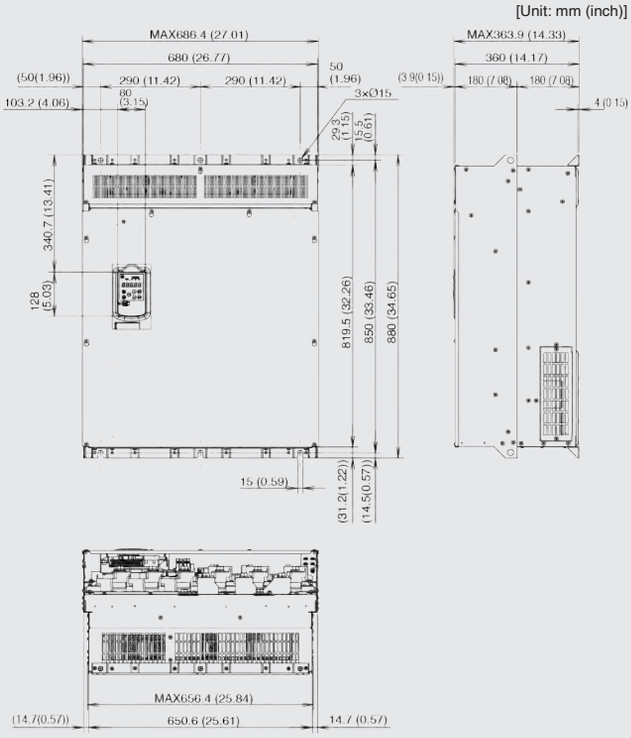
Type FRN0345G2□-2G

[Unit: mm (inch)]



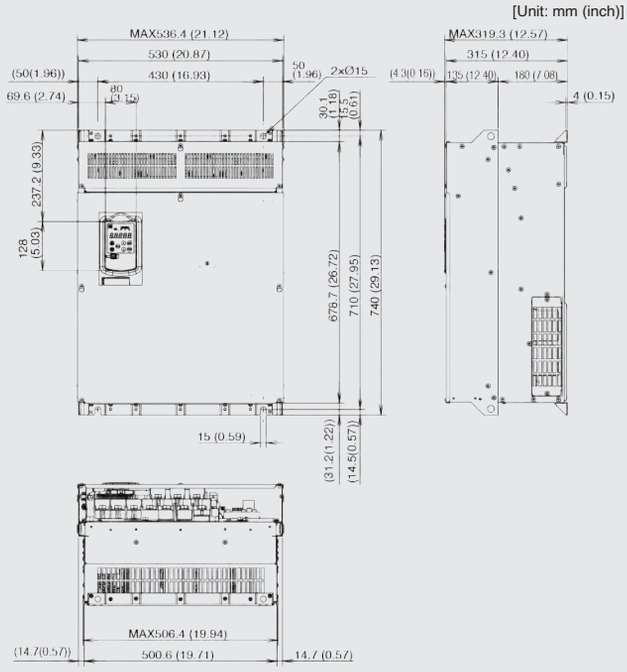
Type FRN0432G2□-2G

[Unit: mm (inch)]



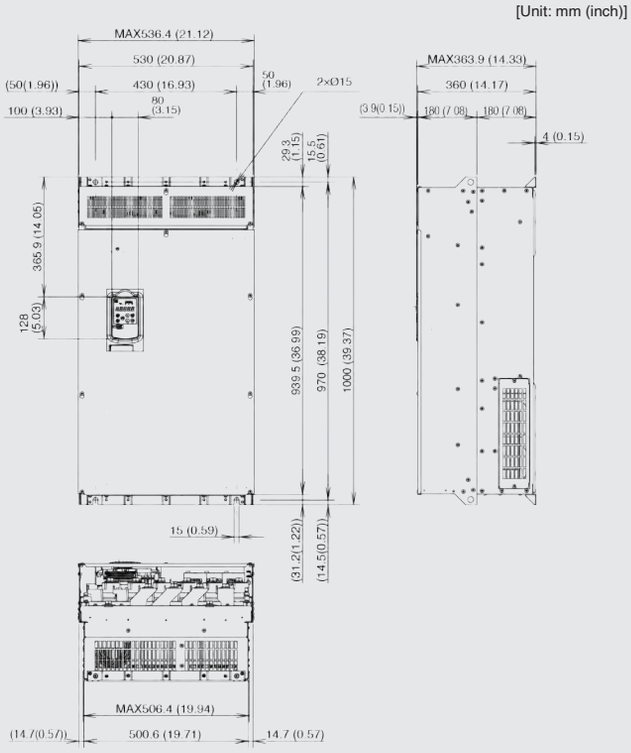
T ype FRN0216G2□-4G, FRN0260G2□-4G

[Unit: mm (inch)]



Type FRN0325G2□-4G, FRN0377G2□-4G

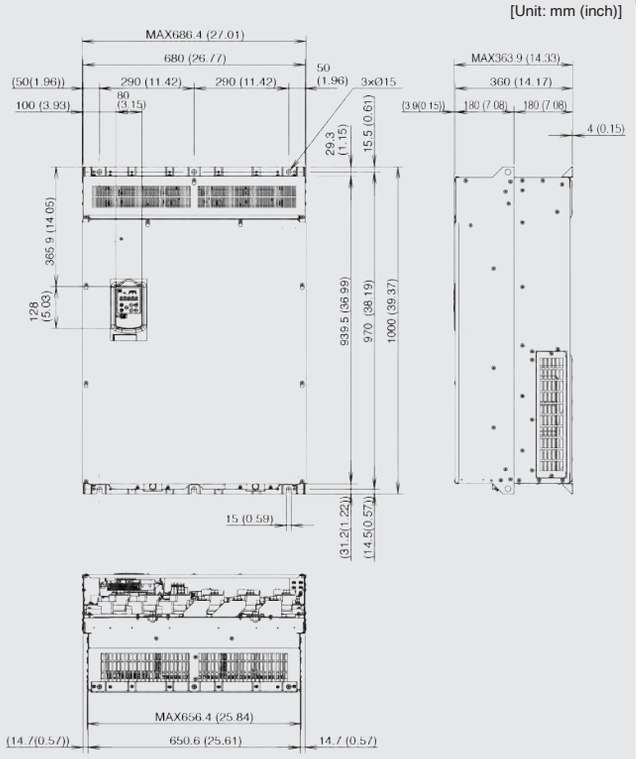
[Unit: mm (inch)]



Basic type | EMC Filter Built-in Type

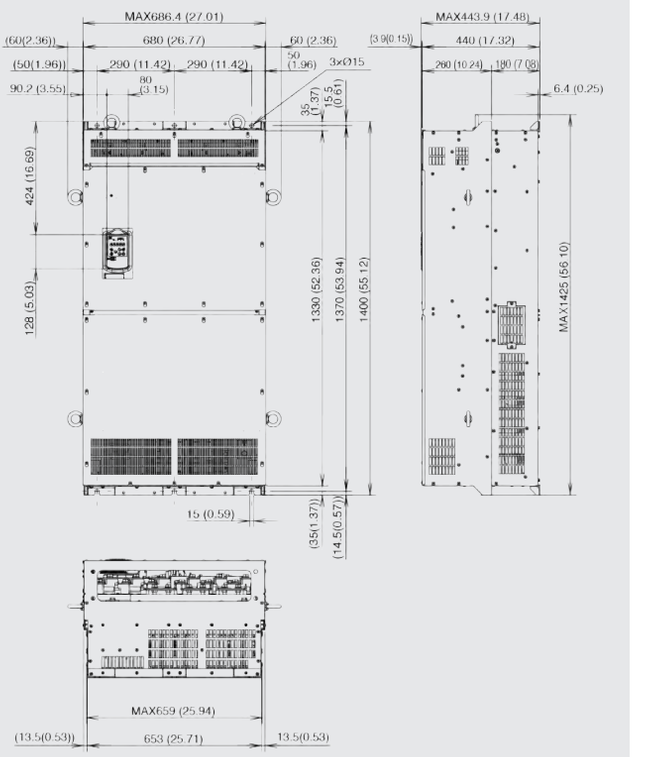
Type FRN0432G2□-4G, FRN0520G2□-4G

[Unit: mm (inch)]



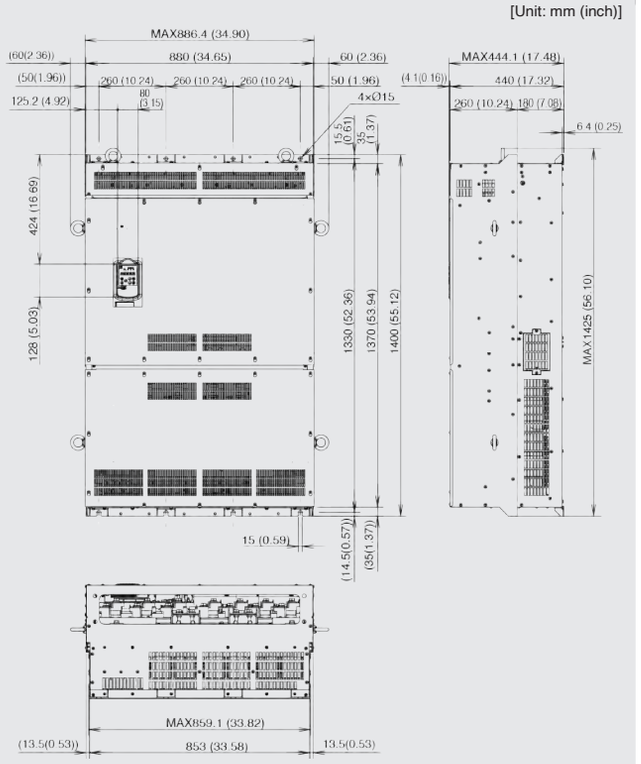
Type FRN0650G2□-4G, FRN0740G2□-4G

[Unit: mm (inch)]



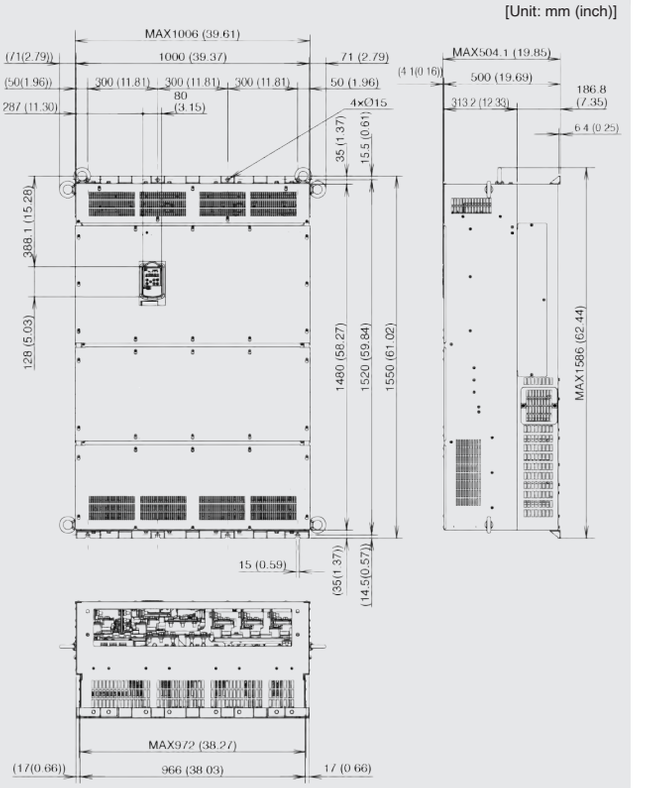
Type FRN0960G2□-4G, FRN1040G2□-4G

[Unit: mm (inch)]



Type FRN1170G2□-4G, FRN1386G2□-4G

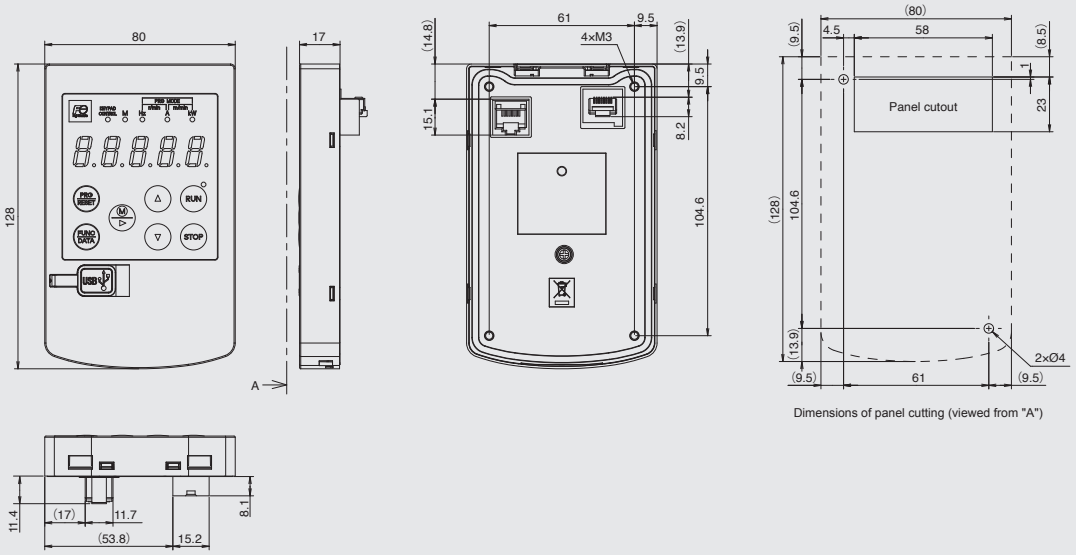
[Unit: mm (inch)]



Keypad (touch panel)

Standard (USB connector model) Type : TP-E2 Option

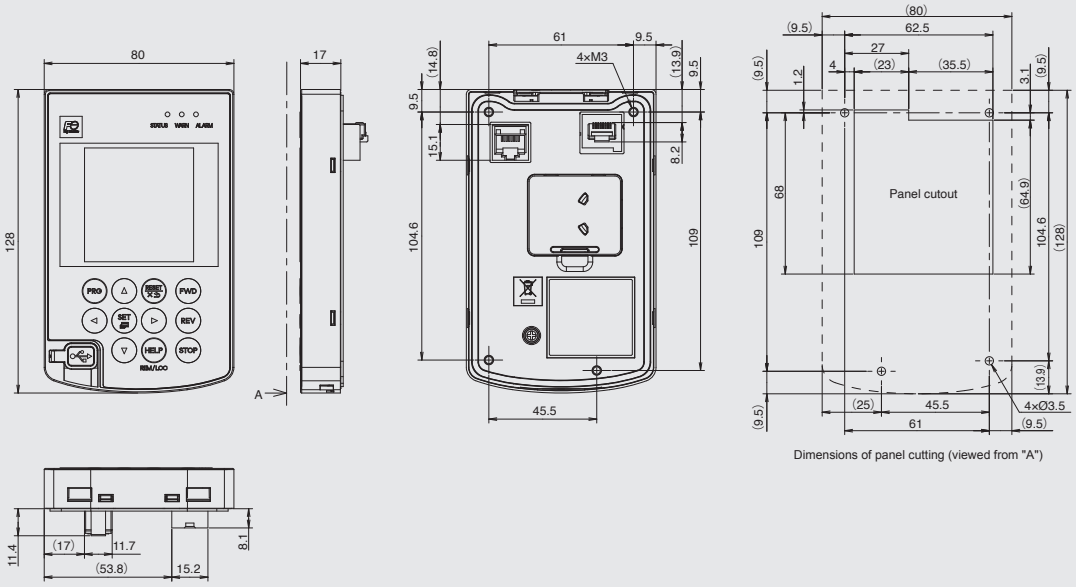
[Unit: mm]



Dimensions of panel cutting (viewed from "A")

Multi-functional (USB connector model) Type : TP-A2SW Option

[Unit: mm]



Dimensions of panel cutting (viewed from "A")

Keypad Functions

Use the keypad to start and stop the inverter, display various data, set function code data, check I/O, and display maintenance and alarm information.

Overview of operation and functionality

Item	Display and keys	Overview of functionality
Data display		This is a 5-digit, 7-segment LED monitor. It displays the following information for each operation mode. ■ Operation mode : Operation information (output frequency, output current, output voltage, etc.) Switches to status display when the operating state is other than normal. Switches to minor failure display when a minor failure occurs. ■ Program mode : Menu, function code, function code data, etc. ■ Alarm mode : Alarm code indicating the cause of the protection function's activation.
Key operation		Switches the operation mode. ■ Operation mode : Pressing this key will switch it to program mode. ■ Program mode : Pressing this key will switch it to operation mode. ■ Alarm mode : After clearing the alarm cause, pressing this key will switch it to the operation mode deactivated by the alarm.
		Performs the following operations: ■ Operation mode : Switches the operation state monitoring items (output frequency, output current, output voltage, etc.). ■ Program mode : Displays function code or establishes the data. ■ Alarm mode : Switches the display of the alarm detailed information.
		Starts the motor operation. (When the keypad is being operated)
		Stops the motor operation. (When the keypad is being operated)
		Used to select the setting items displayed on the LED monitor or change the function code data.
		■ Operation mode : The functionality assigned by function code E70 is available. Press and hold for one second to turn the functionality ON or OFF. It is OFF by default when the power is turned on. ■ Program mode During menu display : Proceeds to the next menu number. During function code display : Advances the display number in steps of 10. During numerical setting : Moves the cursor digit to the right. ■ Alarm mode : Advances the alarm detailed information number in steps of 10.
LED display	RUN (Green)	Lights up when the " RUN " key is pressed or when operated by issuing the "FWD" or "REV" signal or communication commands.
	KEYPAD CONTROL (Green)	Lights up when the RUN key on the keypad is enabled as an operation command. However, in program mode or alarm mode, no operation is possible even if this LED is lit. It blinks every second in local mode.
	M (Blue)	Displays the selected signal with function code E71.
	Unit LEDs (three red LEDs)	Hz, A, kW, r/min, m/min: Displays the unit when monitoring the operating status in operation mode via a combination of three LEDs.
		PRG.MODE: Two LEDs on the left and right will light up when you transition to program mode. (●Hz ○A ●kW)
USB port		The inverter can be connected to a computer via a USB cable. The inverter has a mini-B type connector.

NOTES

When running general-purpose motors

- **Driving a 400V general-purpose motor**
  When driving a 400V general-purpose motor with an inverter using extremely long cables, damage to the insulation of the motor may occur. Use an output circuit filter (OFL) if necessary after checking with the motor manufacturer. Fuji's motors do not require the use of output circuit filters because of their reinforced insulation.
- **Torque characteristics and temperature rise**
  When the inverter is used to run a general-purpose motor, the temperature of the motor becomes higher than when it is operated using a commercial power supply. In the low-speed range, the cooling effect will be weakened, so decrease the output torque of the motor. If constant torque is required in the low-speed range, use a Fuji inverter motor or a motor equipped with an externally powered ventilating fan.
- **Vibration**
  When the motor is mounted to a machine, resonance may be caused by the natural frequencies, including that of the machine. Operation of a 2-pole motor at 60Hz or more may cause abnormal vibration.
  * Study use of tier coupling or dampening rubber.
  * It is also recommended to use the inverter jump frequency control to avoid resonance points.
- **Noise**
  When an inverter is used with a general-purpose motor, the motor noise level is higher than that with a commercial power supply. To reduce noise, raise carrier frequency of the inverter. High-speed operation at 60Hz or more can also result in more noise.

When running special motors

- **High-speed motors**
  When driving a high-speed motor while setting the frequency higher than 120Hz, test the combination with another motor to confirm the safety of high-speed motors.
- **Explosion-proof motors**
  When driving an explosion-proof motor with an inverter, use a combination of a motor and an inverter that has been approved in advance.
- **Submersible motors and pumps**
  These motors have a larger rated current than general-purpose motors. Select an inverter whose rated output current is greater than that of the motor.
  These motors differ from general-purpose motors in thermal characteristics. Set a low value in the thermal time constant of the motor when setting the electronic thermal function.
- **Brake motors**
  For motors equipped with parallel-connected brakes, their braking power must be supplied from the primary circuit (commercial power supply). If the brake power is connected to the inverter power output circuit (secondary circuit) by mistake, problems may occur.
  Do not use inverters for driving motors equipped with series-connected brakes.
- **Geared motors**
  If the power transmission mechanism uses an oil-lubricated gearbox or speed changer/reducer, then continuous motor operation at low speed may cause poor lubrication. Avoid such operation.
- **Synchronous motors**
  It is necessary to use software suitable for this motor type. Contact Fuji for details.
- **Single-phase motors**
  Single-phase motors are not suitable for inverter-driven variable speed operation. Use three-phase motors.
  * Even if a single-phase power supply is available, use a three-phase motor as the inverter provides three-phase output.

Environmental conditions

- **Installation location**
  Use the inverter in a location with an ambient temperature range of -10 to 50˚C.
  The inverter and braking resistor surfaces become hot under certain operating conditions. Install the inverter on nonflammable material such as metal.
  Ensure that the installation location meets the environmental conditions specified in "Environment" in inverter specifications.

Combination with peripheral devices

- **Installing a molded case circuit breaker (MCCB)**
  Install a recommended molded case circuit breaker (MCCB) or an earth leakage circuit breaker (ELCB) 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.
- **Installing a magnetic contactor (MC) in the output (secondary) circuit**
  If a magnetic contactor (MC) is mounted in the inverter's 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 MC on or off. Remove the surge killer integrated with the MC.
- **Installing a magnetic contactor (MC) in the input (primary) circuit**
  Do not turn the magnetic contactor (MC) 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.
- **Protecting the motor**
  The electronic thermal function of the inverter can protect the motor. The operation level and the motor type (general-purpose motor, inverter motor) 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).
- **Regarding power-factor correcting capacitor**
  Do not mount power factor correcting capacitors in the inverter (primary) circuit. Use the DC REACTOR to improve the inverter power factor. Do not use power factor correcting capacitors in the inverter output circuit (secondary). An overcurrent trip will occur, disabling motor operation.
- **Discontinuance of surge killer**
  Do not mount surge killers in the inverter output (secondary) circuit.
- **Reducing noise**
  Use of a filter and shielded wires are typical measures against noise to ensure that EMC Directives are met.
- **Measures against surge currents**
  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 open/close 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 500V megger and follow the instructions contained in the Instruction Manual.

Wiring

- **Wiring distance of control circuit**
  When performing remote operation, use twisted shield wire and limit the distance between the inverter and the control box to 20m.
- **Wiring length 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 50m. If this length must be exceeded, lower the carrier frequency or mount an output circuit filter (OFL).
- **Wiring size**
  Select cables with a sufficient capacity by referring to the current value or recommended wire size.
- **Wiring type**
  Do not use multicore cables that are normally used for connecting several inverters and motors.
- **Grounding**
  Securely ground the inverter using the grounding terminal.

Selecting inverter capacity

- **Driving general-purpose motor**
  Select an inverter according to the applicable motor ratings listed in the standard specifications table for the inverter. 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**
  Select an inverter that meets the following condition: Inverter rated current > Motor rated current.

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.

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Information in this catalog is subject to change without notice.

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