Fuji Electric

Innovating Energy Technology

For Cranes use

VARIABLE SPEED AC DRIVES

FUJI INVERTER & CONVERTERS

A HIGHLY EFFICIENT AND EFFECTIVE GLOBAL INVERTER WITH THE FUNCTIONS AND CAPABILITIES FOR ALL YOUR NEEDS.

24A1-E-0053

For Crane use
Variable Speed AC Drives

Improved Control Performance

Control method

<Induction motor>
- Vector control with speed sensor
- Speed sensorless vector control
- V/f Control

<Synchronous motor>
- Vector control with speed sensor (including pole position detection)

Control Performance

- Achieved speed response: 600Hz (Unit type), 100Hz (Stack type)
- Speed control accuracy: ±0.005% of max. speed
- Torque control accuracy: ±3% of rated torque (When using vector control with speed sensor and controlling dedicated motor)

Functions for cranes

- Flux forcing function
- Load adaptive Control
- Braking control signal

Comprehensive Line-up

Inverter, converter line-up

- Line-up features unit type and stack type, facilitating easy construction of large-capacity systems.
- Stack type offers maximum capacity of up to 2200kW with direct parallel connection.

400V series

Inverter: Products Line-UP / Expand capacity range (Parallel connection)
Converter: Products Line-UP / Expand capacity range (Parallel connection)

Type	Series name	Product introduction	Form	Nominal applied motor [kW] (50 / 100 / 500 / 1000 / 5000)
Unit 	Inverter (FRENIC-VG)	This type consists of the converter and inverter circuits.The inverter can be operated using a commercial power supply.	Standard unit	3.7kW — 630kW — 1800kW; Direct parallel Multiwinding motor — 3700kW
	PWM Converter (RHC-C)	This converter is used where electric power regeneration or harmonic control is required. Peripheral devices are separately required.	Standard unit	7.5kW — 630kW — 1800kW; Isolation-less Isolation — 3700kW
Stack 	Inverter (FRENIC-VG)	The converter and inverter sections are separate units in this type. The diode converter (stack) or PWM converter is selected depending on the intended use.	Standard stack	30kW — 315kW — 800kW — 1200kW (Under development); Direct parallel Multiwinding motor — 3700kW
			Stack by phase	630kW — 2200kW — 3000kW (Under development); Direct parallel Multiwinding motor — 4800kW
	PWM Converter (RHC-D)	This converter is used where electric power regeneration or harmonic control is required. Peripheral devices are separately required.	Standard stack	132kW — 315kW — 800kW; Isolation-less Isolation — 1800kW
			Stack by phase	630kW — 800kW — 2400kW; Isolation-less Isolation — 4800kW
	Filter stack (RHF) (Under development)	This is a dedicated filter for the PWM converter (RHC-D).	Standard stack	160kW — 355kW
	Diode rectifier (RHD-D)	This converter is used where no electric power regeneration is required. Built-in DC Reactor as standard.	Standard stack	200kW — 315kW — 1370kW; Parallel connection

*Unit type:Having a standard built-in brake circuit (with 160kW or below). *Standard stack:Can be used by one set. Stack by phase:One set of the inverter consists of three stacks.
*Combination of inverters can be used with one converter (PWM converter, Diode rectifier). *Inverter:DC power can also be supplied without using the converter circuit.
*Refer to the 6,7 page for the capacity expansion method.

690V series

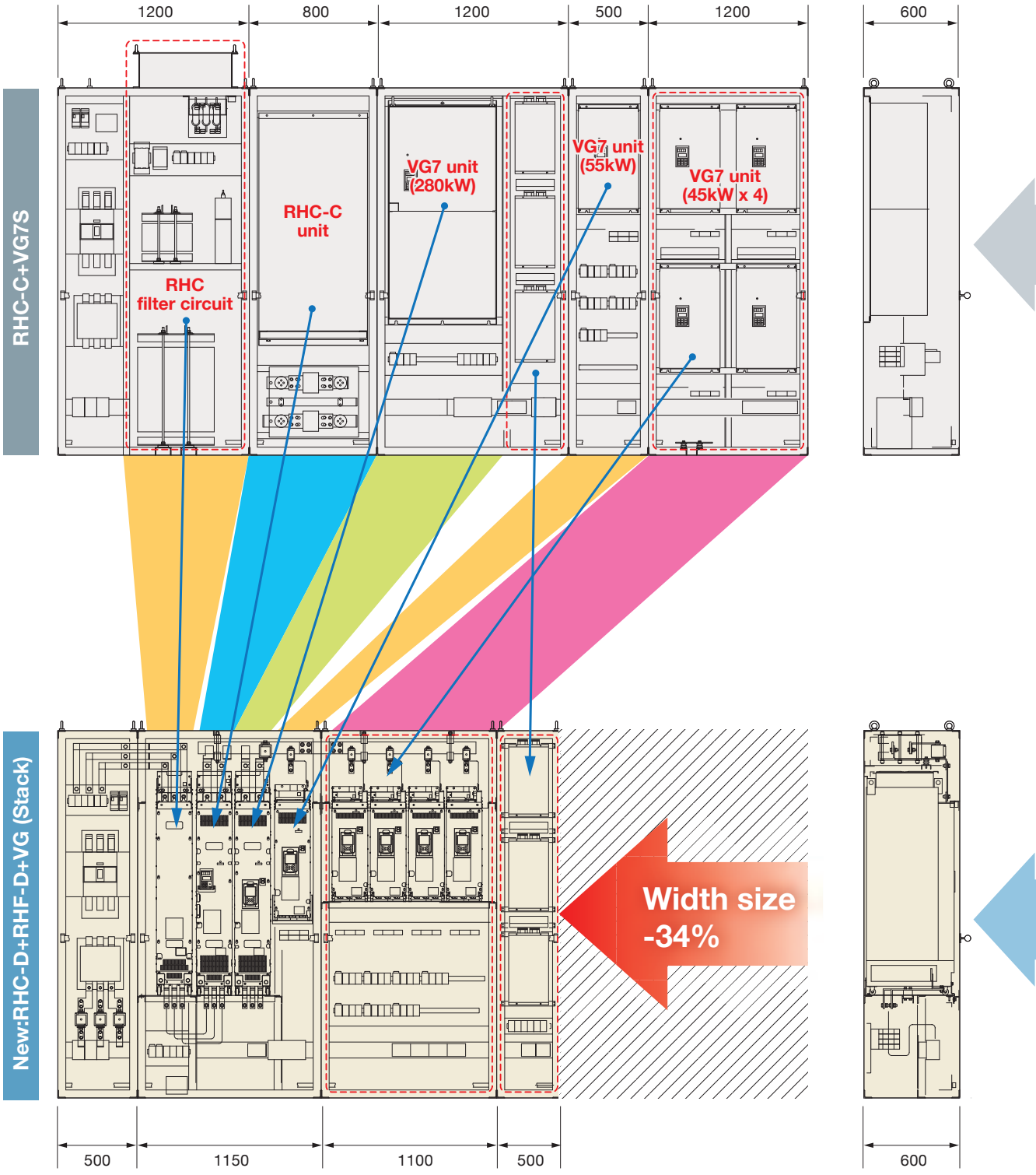
Type	Series name	Product introduction	Form	Nominal applied motor [kW] (50 / 100 / 500 / 1000 / 5000)
Unit/Stack 	Inverter (FRENIC-VG7) *1	This type consists of the converter and inverter circuits.The inverter can be operated using a commercial power supply.	Standard unit	160kW — 630kW
			Stack by phase	800kW — 1000kW
Stack 	Inverter (FRENIC-VG) (Under development)	The converter and inverter sections are separate units in this type. The diode converter (stack) or PWM converter is selected depending on the intended use.	Standard stack	90kW — 450kW — 1200kW; Direct parallel Multiwinding motor — 2700kW
	PWM Converter (RHC-D) (Under development)	This converter is used where electric power regeneration or harmonic control is required. Peripheral devices are separately required.	Standard stack	132kW — 450kW — 1200kW; Isolation-less Isolation — 2700kW
	Filter stack (RHF) (Under development)	This is a dedicated filter for the PWM converter (RHC-D).	Standard stack	160kW — 450kW
	Diode rectifier (RHD-D) (Under development)	This converter is used where no electric power regeneration is required. Built-in DC Reactor as standard.	Standard stack	220kW — 450kW — 1800kW; Parallel connection

*1) Contact Fuji Electric for detailed FRENIC-VG7 specifications.

Dedicated design for panel installation (Stack Type)

New dedicated design (Stack Type) realize panel width shortening (34% reduction compared conventional design).

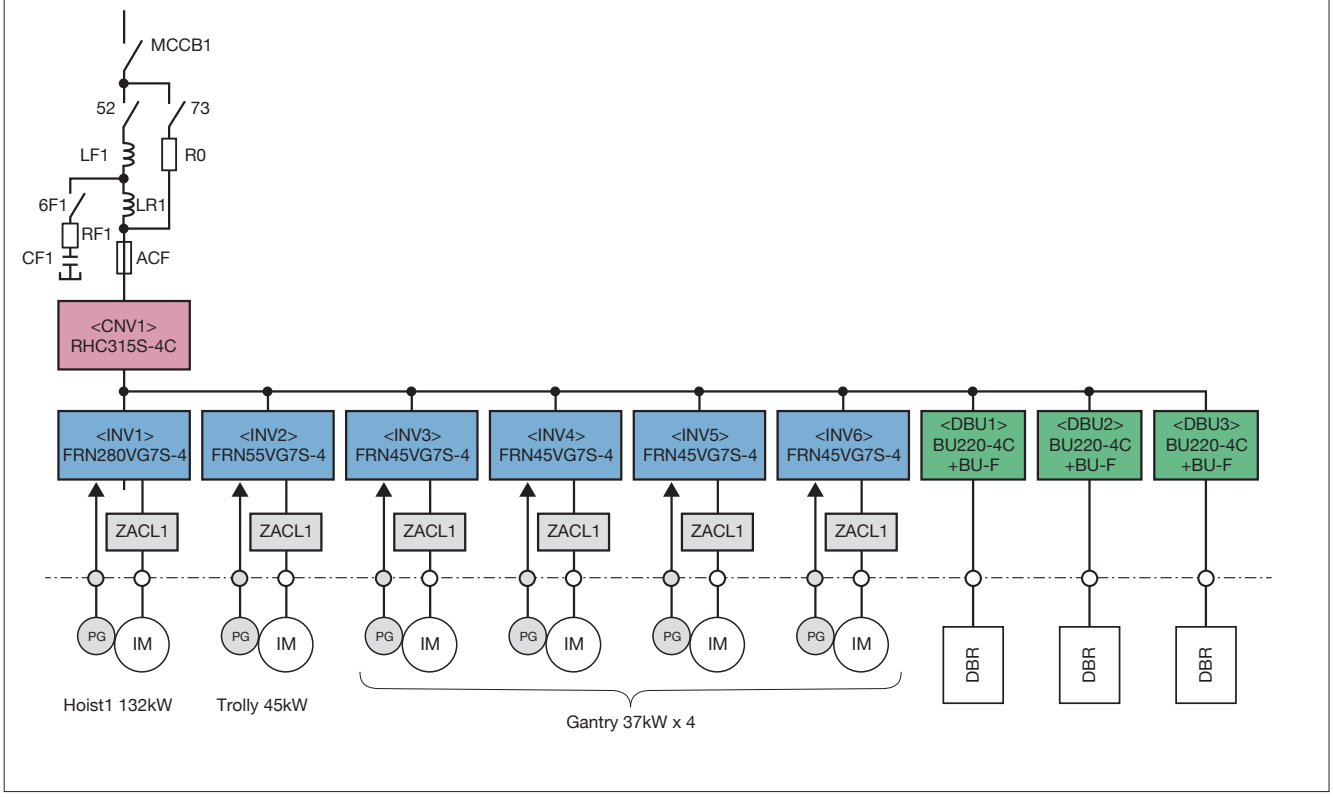
The width dimension in the crane system shown below has been reduced by 1650mm (4900mm ➡ 3250mm).



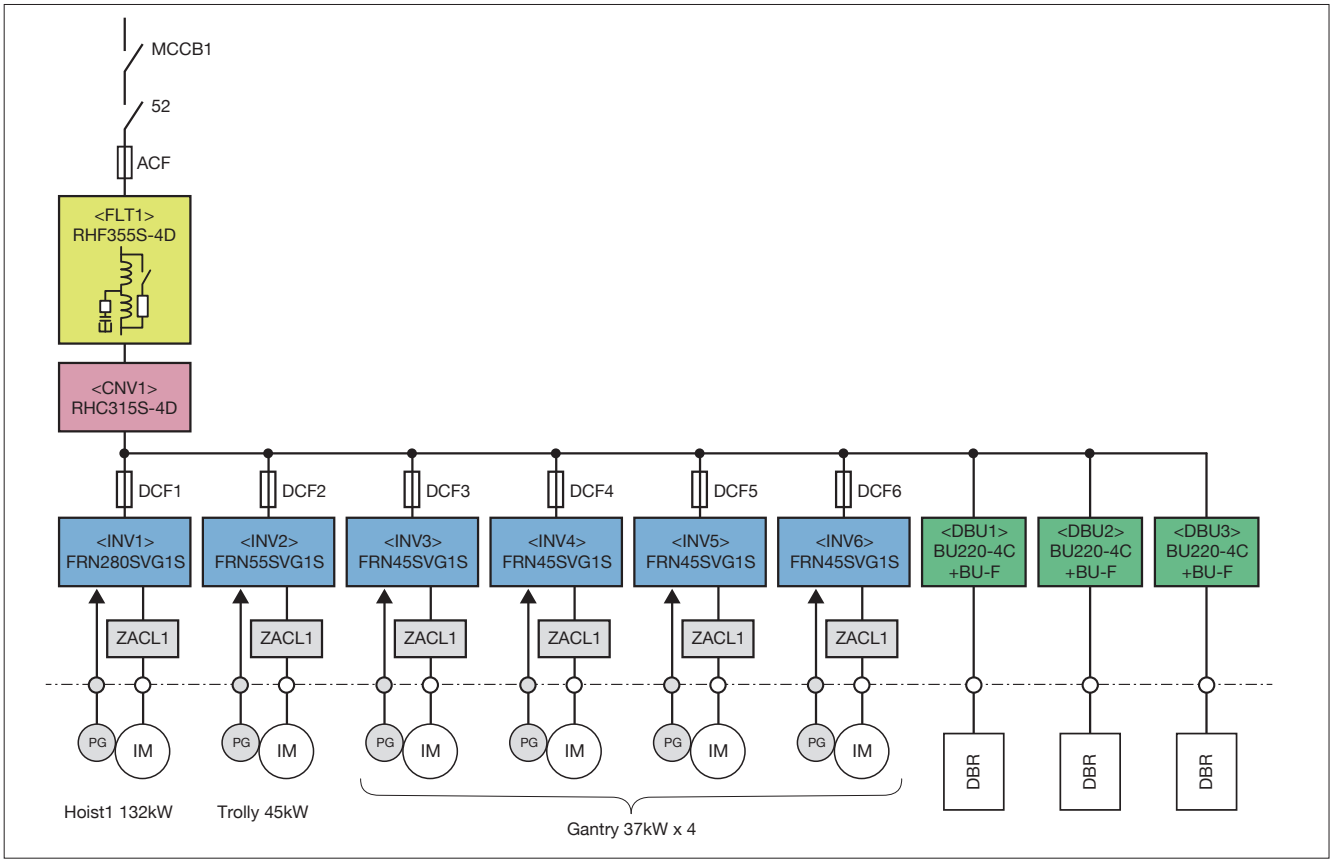
The height and depth dimensions are the same. Ingress protection degree is IP00.

Crane system Diagrams

FRENIC-VG7S system configuration

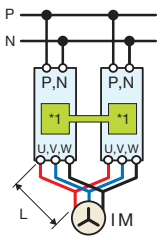
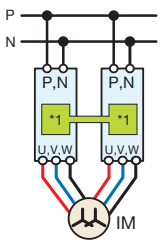


FRENIC-VG (Stack) system configuration



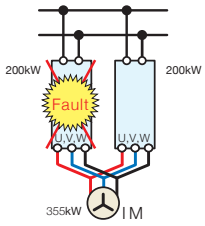
How to expand the capacity range of the inverters (Stack Type)

Direct parallel connection system and multiwinding motor drive system are provided for driving a large capacity motor.

System		Direct parallel connection system	Multiwinding motor drive system
Features	Drive motor	Single-winding motor	Multiwinding motor (Exclusive use for multiwinding motors)
	Restriction of wiring length	The minimum wiring length (L) varies with the capacity.	There is no particular limit.
	Reduced capacity operation	Available	Available (However, the wiring should be switched over.)
Number of inverters to be connected		2 to 3 inverters	2 to 6 inverters
Arrangement diagram		When 2 inverters are connected 	When 2 inverters are connected 

*1) OPC-VG1-TBSI is separately required.

*2) Reduced capacity operation. If a stack fails in case of direct parallel connection, the operation continues with lower output power using the stacks that have not failed

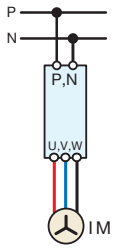
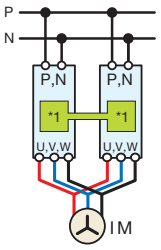
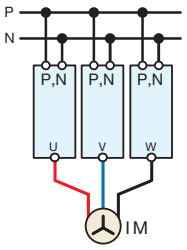
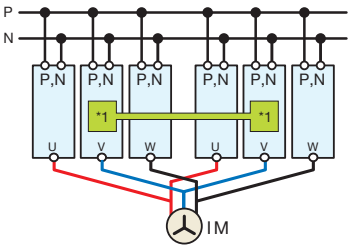


Example) If one inverter fails when 200kW x 2 inverters are driving a 355kW motor, the operation can continue with the 200kW inverter (capacity of one inverter).

(Note) To start the reduced capacity operation, consideration is needed to the switch over operation of PG signals or motor constants and sequence circuit. For details, refer to the operation manual.

■ Configuration table for direct parallel connection

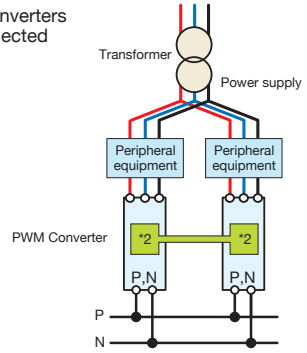
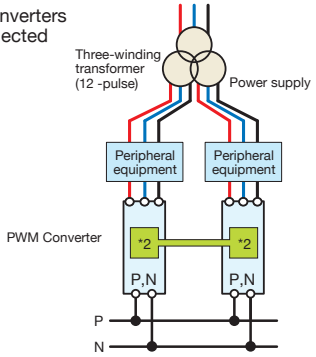
2 or even 3 inverters of the same capacity can be connected in parallel to increase capacity or facilitate system redundancy.

Connection system	Standard stack				Stack by phase				
Capacity [kW]	Applicable inverter	Applicable inverter	No. of units	Current [A]		Applicable inverter	Applicable inverter	No. of units	Current [A]
30	FRN30SVG1								
37	FRN37SVG1								
45	FRN45SVG1								
55	FRN55SVG1								
75	FRN75SVG1								
90	FRN90SVG1								
110	FRN110SVG1								
132	FRN132SVG1								
160	FRN160SVG1								
200	FRN200SVG1								
220	FRN220SVG1								
250	FRN250SVG1								
280	FRN280SVG1								
315	FRN315SVG1								
355		FRN200SVG1	2	716					
400		FRN220SVG1	2	789					
500		FRN280SVG1	2	988					
630		FRN220SVG1	3	1183		FRN630BVG1			
710		FRN280SVG1	3	1482		FRN710BVG1			
800		FRN280SVG1	3	1482		FRN800BVG1			
1000							FRN630BVG1	2	2223
1200							FRN630BVG1	2	2223
1500							FRN800BVG1	2	2812
1800							FRN630BVG1	3	3335
2000							FRN710BVG1	3	3905
2200							FRN800BVG1	3	4218

*1) OPC-VG1-TBSI is required for each stack.

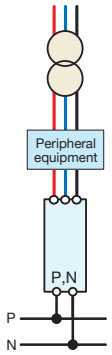
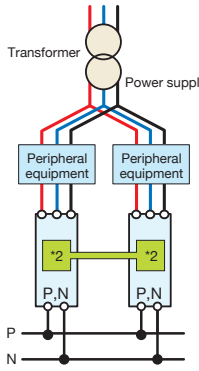
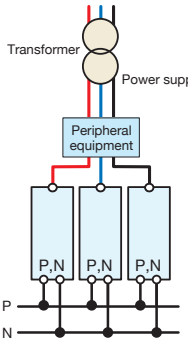
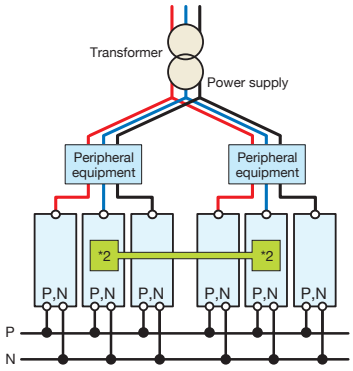
How to expand the capacity range of the PWM converters (Stack Type)

A “transformer-less parallel system” and “transformer insulation type parallel system” can be used to expand the total converter capacity.

System	Transformer isolation-less parallel system	Transformer insulation type parallel system
	This system involves connecting converter inputs to the power supply without isolating with a transformer, etc.	This system involves isolating respective converter inputs with a transformer.
Reduced capacity operation	Available	Available
Number of converter to be connected	2 to 3 converters	2 to 6 converters
Arrangement diagram	When 2 converters are connected 	When 2 converters are connected 

■ Configuration table for parallel connection (Transformer isolation-less parallel system)

2 or 3 converters of the same capacity can be connected in parallel to increase capacity or facilltate system redundancy.

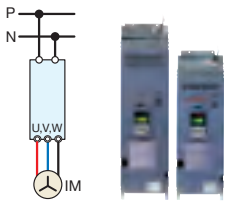
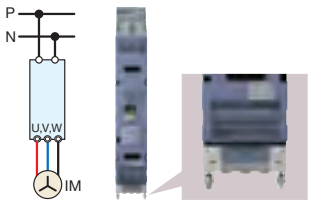
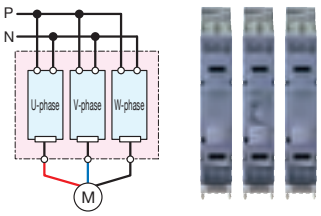
Connection system	Standard stack			Stack by phase		
						
Capacity [kW]	Applicable converter	Applicable converter	No. of units	Applicable converter	Applicable converter	No. of units
132	RHC132S-4D					
160	RHC160S-4D					
200	RHC200S-4D					
220	RHC220S-4D					
280	RHC280S-4D					
315	RHC315S-4D					
355		RHC200S-4D	2			
400		RHC200S-4D	2			
500		RHC280S-4D	2			
630		RHC315S-4D	2	RHC630B-4D		
710		RHC280S-4D	3	RHC710B-4D		
800		RHC280S-4D	3	RHC800B-4D		
1000					RHC630B-4D	2
1200					RHC630B-4D	2
1500					RHC800B-4D	2
1800					RHC630B-4D	3
2000					RHC710B-4D	3
2400					RHC800B-4D	3

*2) OPC-VG7-SIR is required for each stack.

Easier Maintenance and Improved Reliability

Easy stack replacement

The inverters (stack type) have an arrangement with consideration for the installation of the product into the panel and easier change.
The inverters (stack type) (132 to 315 kW) can easily be installed or changed because they have caster.
With the inverters (stack type) (630 to 800 kW), stacks are divided for each output phase (U, V and W), which has realized the lighter weight.

Nominal applied motor capacity [kW]	30 to 110	132 to 315	630 to 800
Type	FRN30SVG1S-4□ to FRN110SVG1S-4□	FRN132SVG1S-4□ to FRN315SVG1S-4□	FRN630BVG1S-4□ to FRN800BVG1S-4□
Categoly	Standard stack	Standard stack	Stack by phase
Caster	Not provided	Provided	Provided
Arrangement			
Maintenance	The weight of one stack is reduced (50 kg or less) to give consideration to replacement work.	The models where each stack is heavy have wheels in order to change the stacks easily. A lifter for replacement*1 is available.  Lifter (Conceptual view)	Trim weight by dividing the stack into 3 parts by each output phase (U, V and W). In the event of a breakdown, only the target phase needs to be replaced with a new one. The stack to be replaced should be an exclusive part. 
Approx weight[kg]	28 to 43	85 to 126	126 × 3

*1) The lifter will be available soon.

Model compatibility

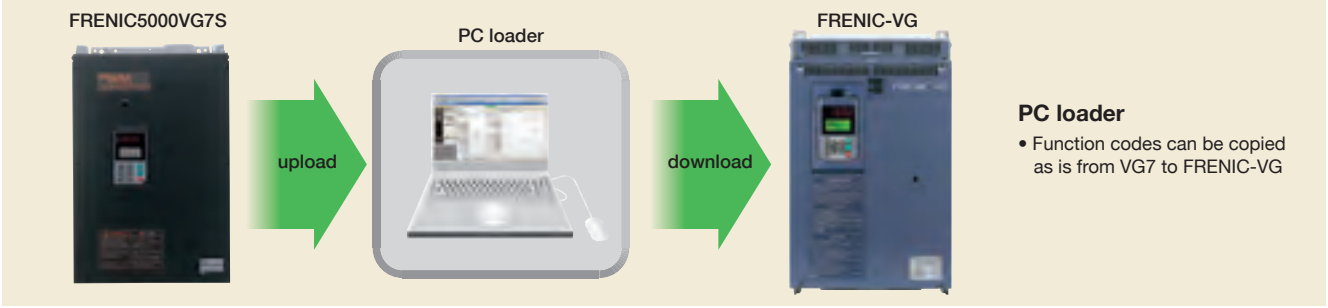
The VG7 is compatible with Fuji Electric's older vector controlled inverter models.
Updating to the FRENIC-VG can be performed easily.

■ Compatibility with FRENIC5000VG7S

The FRENIC-VG function codes are compatible with VG7 function codes, allowing function codes from the VG7 to be set in the FRENIC-VG directly. Furthermore, function codes can be copied directly from the VG7 to the FRENIC-VG with the PC loader.
Furthermore, with the unit type, an adapter (conversion adapter) has been prepared for same capacities, in order to fit the same dimensions as for VG7S.

■ Compatibility with FRENIC5000VG5S

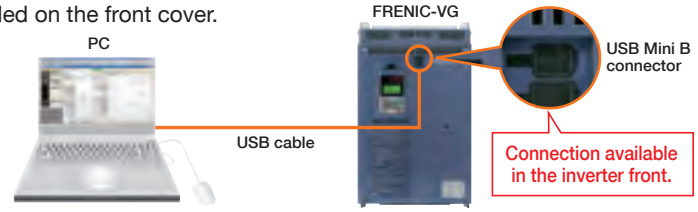
The function code numbers and data definitions differ between FRENIC-VG and VG5, so they can not be set from VG5 to FRENIC-VG directly.
Codes can be updated easily from VG5 to FRENIC-VG settings by using a function code conversion sheet.
Furthermore, with the unit type, an adapter (conversion adapter) has been prepared for some capacities, in order to fit the same dimensions as for VG5.



PC loader functions

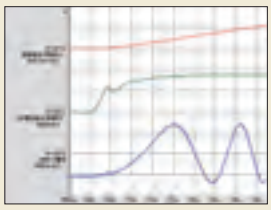
PC Loader can be used via the USB connector (mini B) provided on the front cover.

- The front cover does not have to be removed.
- No RS-485 converter is needed.
- Commercial cables can be used.



[Fault diagnosis using the trace back function]

Edited on the trace screen on the loader



- Internal data, time and date around the fault are recorded.
  The real-time clock (clock function) is built-in as standard.
- Data are backed up by battery.
  *Battery: 30kW or above (built-in as standard), 22kW or below (available as option: OPK-BP)
- Trace waveform can be checked on the PC loader

* If data exists, it can be analyzed anywhere.

[Easy edit and detail monitor]

Data editing and detailed data monitor analysis operations are much easier than with a conventional PC loader.

Function code setting User-defined displays (customized displays), data explanation display for each code.

Trace function Real-time trace: for long-term monitoring
Historical trace: for detailed data diagnosis for short periods
Trace back: for fault analysis (last 3 occurrences)

*The paid-for loader software (WPS-VG1-PCL) supports real-time tracing and historical tracing. Trace data can be stored in the memory even while the power is off. With 22kW or below capacity inverters, optional memory back-up battery must be installed.

Keypad

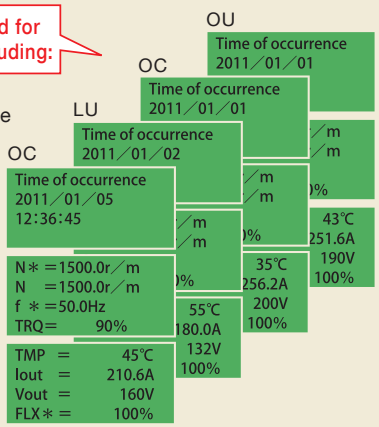
- Wide 7-segment LED ensures comfortable view.
- The back-light is incorporated in the LCD panel, which allows the use of the keypad even in the dark.
- Enhanced copy function
  The function codes can be copied to other inverters easily. (Three patterns of function codes can be stored.) Copying data in advance reduces restoration time when problems occur, by exchanging the keypad when replacing the unit.
- Remote control operation is available.
  The Keypad can be remotely installed and operated by connecting the keypad with a standard LAN cable.
- JOG (jogging) operation can be executed using the Keypad.
- The HELP key displays operation guidance.

Simple fault diagnosis

Save alarm data

Detailed data are stored for the last four alarms, including:

- Time of alarm occurrence
- Speed setting value
- Detected speed value
- Torque command value
- Temperature
  (heat sink, internal temperature)
- Accumulated operation time
- Detected output current value
- Magnetic-flux reference value
- I/O status



- The number of alarm data to be stored has been increased from the previous model.
  Thanks to the real-time clock function built-in as standard, the complete data of the latest and last 3 alarm occurrences is stored: time, speed command, torque, current and others. This enables machine units to be checked for abnormalities.

Alarm severity selection

Alarm severity (light-alarm and heavy-alarm) can be selected, eliminating the risk of critical facility stoppage due to a minor fault.

	30-relay output	Y-terminal output	Inverter operation	Selection
Motor overload, communications error, DC fan lock, etc.	No output (minor fault)	Provided	Operation continued	Can be selected for each function.
	Output	Not provided	Shut off	
Blown fuse, overcurrent ground fault, etc.	Output	Not provided	Shut off	Fixed

PG fault diagnosis

- The PG interface circuit incorporated as standard detects disconnection of the power supply line as well as the PG signal line.
- Operation can be continued in sensorless mode during PG disconnection or fault (Coming soon).
  Old model: The inverter was stopped by a trip and the motor coast to a stop.
  New model: The mode is automatically switched to sensorless vector control mode when a PG fault is detected, minimizing effect to the production process.
  (Sensorless control shows lower control performance than vector control with a speed sensor. Combine equipment and machines to be used and check their operation in advance for insufficient torque at low speed, etc.)
- A mode was added that judges if it is a PG fault or a fault on the inverter side
  Simulated output mode is provided at the PG pulse output terminal (FA and FB). Operation can be checked by connecting this to the PG input terminal.

Easy change of the cooling fan

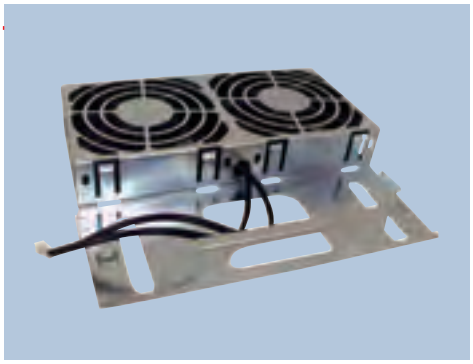
Unit Type

The cooling fan can easily be changed without removing the front cover and printed circut board.

Applicable models : FRENIC-VG
(excluding converter RHC-C)

Inverter body

Fan body



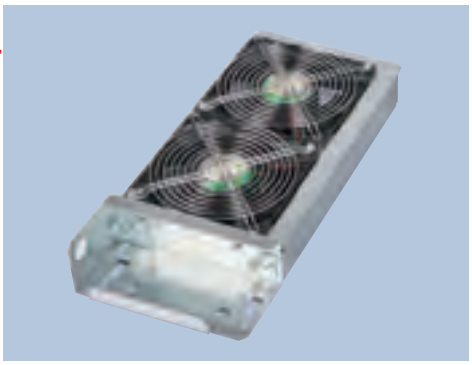
Stack Type

The cooling fan installed at the top can easily be changed without drawing the stacks. However, for the 220 to 315kW inverter, the 2 connection bars of the DC side have to be removed to change the cooling fan.

Applicable models : FRENIC-VG
Converter (RHC-D, RHF-D, RHD-D)

Inverter body

Fan body



Components with a long life

For the various consumable parts inside the inverter, their designed lives have been extended to 10 years.
This also extended the equipment maintenance cycles.

Life conditions

Ambient temperature: 40°C*2, load factor: 100% (HD spec), 80% (MDspecs)

*1) The planned life is determined by calculation, and is not the guaranteed value.
*2) For the stack type, the ambient temperature is 30°C.

Life-limited component	Design lifetime*1
Cooling fan	10 years
Smoothing capacitor on main circuit	
Electrolytic capacitors on PCB	

Applicable models : FRENIC-VG
Converter (RHC-D, RHF-D, RHD-D)
(excluding FRENIC-VG7, RHC-C)

Enhanced lifetime alarm

- Lifetime alarms can be checked rapidly on the Keypad and PC loader (optional).
- Facility maintenance can be performed much easier thanks to lifetime alarms.

Items			
Inverter accumulated time (h)	No. of inverter starts (times)	Facility maintenance warning Accumulated time (h) No. of starts (times)	Inverter lifetime alarm information is displayed.

Applicable models : FRENIC-VG

Useful functions for test run and adjustment

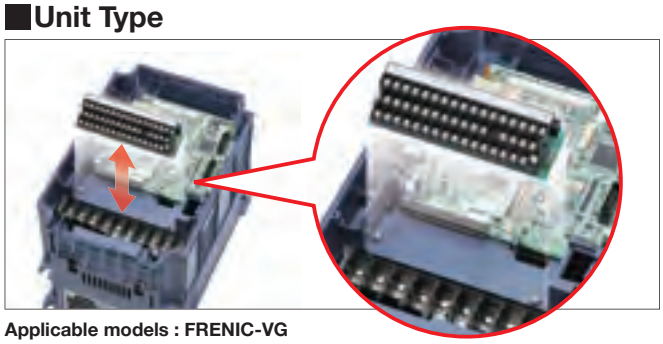
- Customization of functions for test run and adjustment (Individual items on the loader can be set to be displayed or not.)
- Each communications I/O map input/output status is displayed (for PLC software debug) on the loader or the keypad (Soon to be supported).
- Simulated fault alarm issued by a special function on the Keypad
- Monitor data hold function
- Simulated operation mode
  Simulated connection allows the inverter to be operated with internal parts in the same way as if they were connected to the motor, without actually being connected.
- The externally input I/O monitor and PG pulse states can be checked on the Keypad.
- ASR auto tuning (Soon to be supported).

Applicable models : FRENIC-VG

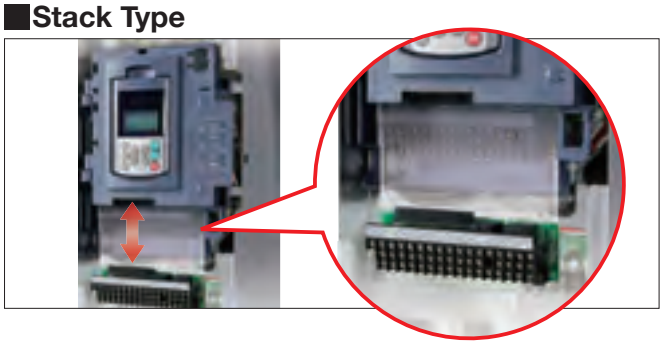
Easy wiring (removable control terminal block)

- The terminal block can be connected to the inverter after control wiring work is completed. Wiring work is simplified.
- Restoration time for updating equipment, problem occurrence, and inverter replacement has been drastically reduced. Just mount the wired terminal block board to the replaced inverter.

Unit Type



Stack Type



Applicable models : FRENIC-VG

Adaptation to Environment and Safety

Compliance with overseas standards

Applicable models : FRENIC-VG (Unit Type)

- The FRENIC-VG complies with the following overseas standards in its standard configuration, allowing standardization of device and machinery specifications in Japan and overseas:
  EC directives: Low Voltage Directive, RoHS Directive, Machinery Directive, UL Standards, cUL Standards, KC Certification
- The FRENIC-VG also complies with the EMC Directive when the standard model is combined with an option (EMC filter).

EU	US/Canada	Korea
EC Directive (CE marking)	UL Standards/ cUL Standards	KC certification

Safety standards

- The functional safety (FS) function STO that conforms to the FS standard EN61800-5-2 is incorporated as standard.
- The FS functions STO, SS1, SLS and SBC that conform to FS standard EN61800-5-2 can be also available by installing the option card OPC-VG1-SAFE. These functions are available only when controlling the motor using feedback encoder (closed loop).

Safety function STO: Safe Torque Off
This function shuts off the output of the inverter (motor output torque) immediately.

Safety function SS1: Safe Stop 1
This function decreases the motor speed to shut down the motor output torque (by STO FS function) after the motor reaches the specified speed or after the specified time has elapsed.

Safety function SLS: Safely Limited Speed
This function prevents the motor from rotating over the specified speed.

Safety function SBC: Safe Brake Control
This function outputs a safe signal of the motor brake control.

Enviroment

Environmental resistance has been enhanced compared to conventional inverters.
(1) Environmental resistance of cooling fan has been enhanced.
(2) Nickel and Tin plating are applied to copper bars.

Environmental resistance has been enhanced on the FRENIC-VG compared to conventional models; however, the following environments should be examined based on how the equipment is being used.

a. Sulfidizing gas
b. Conductive dust and foreign particles
c. Others: unique environments not included under standard environments

Contact Fuji Electric before using the product in environments such as those indicated above.
Salt resistant is option.

RoHS Directive compliance

FRENIC-VG complies with European regulations that limit the use of specific hazardous substances (RoHS) as a standard.

Applicable models : FRENIC-VG

Six hazardous substances

Lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyl (PBB), polybrominated diphenyl ether (PBDE)
*Contact Fuji Electric for detailed information.

About RoHS

Directive 2002/95/EC, promulgated by the European Parliament and European Council, limits the use of specific hazardous substances included in electrical and electronic devices.

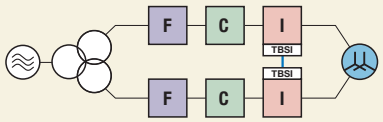
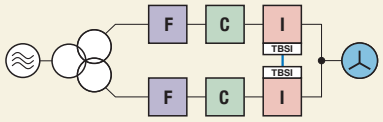
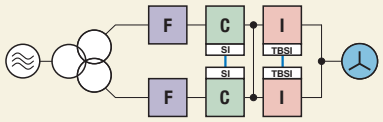
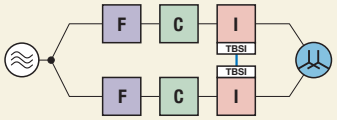
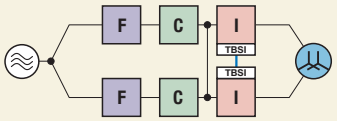
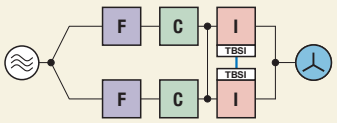
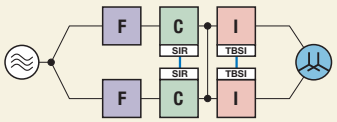
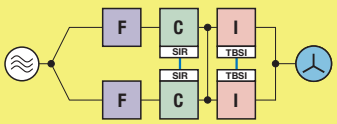
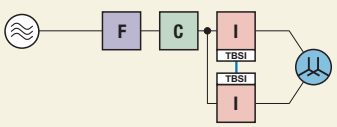
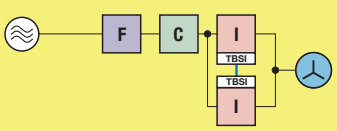
System Configuration Overview

■ PWM converter + inverter

Note

Transformer(multi phase) | Power Supply | Single winding motor | Multi winding motor

F Filter circuit (individual) or filter stack | C Converter unit(RHC-C) or stack(RHC-D) | I Inverter unit or stack | SI / SIR / TBSI Optical communication card (option)

No.	System structure	System construction	Filter stack (RHF)	Filter for RHC-C series (individual type)	Motor capacity (Ex. FRN315SVG1-4 parallel use)
1		◎ Available CNV: 6 pieces/max INV: 6 parallel connection/max	◎ Available	◎ Available	~1800kW (6 winding motor)
2		✕ Not available (Direct parallel connection. Use the No.3 connection.)	—	—	—
3		◎ Available CNV: 6 parallel connection/max INV: 3 parallel connection/max	◎ Available	◎ Available	~800kW (INV: 3 parallel connection)
4		◎ Available CNV: 6 pieces/max INV: 6 parallel connection/max	◎ Available	◎ Available	~1800kW (6 winding motor)
5		✕ Not available (If sharing converter output, use the No.7 connection.)	—	—	—
6		✕ Not available (If sharing converter output, use the No.8 connection.)	—	—	—
7		◎ Available CNV: 3 parallel connection/max INV: 6 parallel connection/max	◎ Available	○ Available Cf(filter capacitor) and Rf(filter resistor) should be parallel installation (2 pieces), capacity of 6F (MC for filter) should be increased.	~1800kW (6 winding motor)
8		◎ Available CNV: 3 parallel connection/max INV: 3 parallel connection/max	◎ Available	○ Available Cf(filter capacitor) and Rf(filter resistor) should be parallel installation (2 pieces), capacity of 6F (MC for filter) should be increased.	~800kW (INV: 3 parallel connection)
9		◎ Available INV: 6 parallel connection/max	◎ Available	◎ Available	~CNV capacity
10		◎ Available INV: 3 parallel connection/max	◎ Available	◎ Available	~CNV capacity

(Note 1) Capacity of inverter should be same
(Note 2) When several inverters are powered by one converter, converter capacity >= total inverter capacity
Check in the manual the capability of converter charging circuit.
(Note 3) When operating a motor using direct parallel system, a minimum wiring length between motor and inverter should be kept. Check the manual.
(Note 4) Power should be applied to all converters at the same time.
(Note 5) The filter stack (RHF) is for exclusive use with the converter stack (RHC-D). It cannot be used with the converter unit (RHC-C).

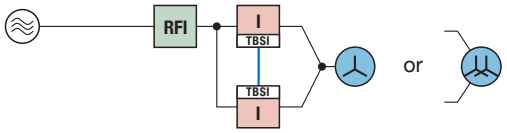
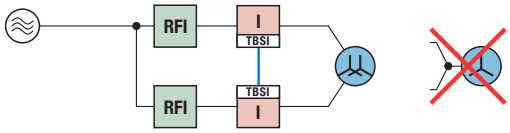
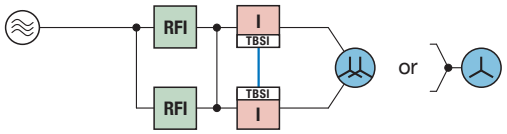
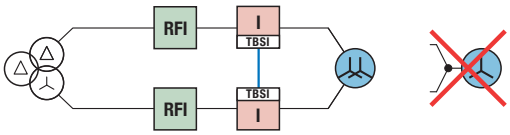
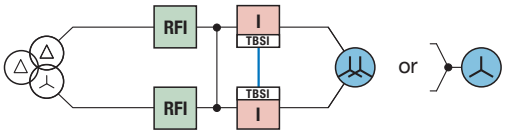
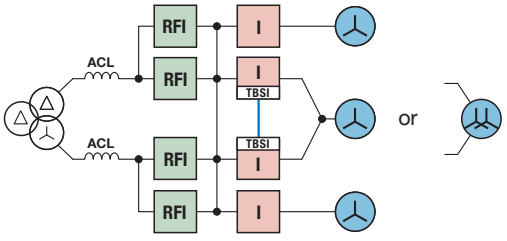
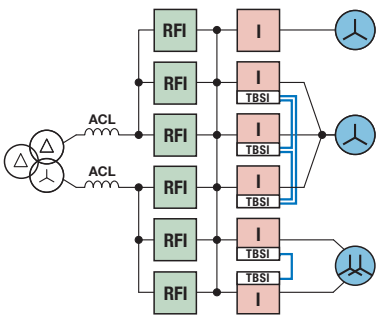
Ideal for crane systems.

Diode Rectifier (RHD-D) + inverter

Note

Transformer (12 phase) | Power Supply | Single winding motor | Multi winding motor

ACL AC reactor | RFI Diode rectifier (RHD-D) | I Inverter unit or stack | TBSI Optical communication card (option)

No.	System structure		Applicable system Continous rating (total)	Remarks
1	RFI:INV= 1:N		**Direct parallel system** **Multiwinding system** **INV: Motor = 1:1 system** **Continous rating (total)** 110 to 353kW	
2	RFI:INV= 2:2 RFI:INV= 3:3		**Multiwinding system** **INV: Motor = 1:1 system** **Continous rating (total)** 220 to 706kW	1) If common bus not applied for RFI output (DC output) 2) Not applicable with direct parallel systems
3	RFI:INV= 2:N RFI:INV= 3:N		**Direct parallel system** **Multiwinding system** **INV: Motor = 1:1 system** **Continous rating (total)** 220 to 706kW	1) A common bus should be applied for RFI output (DC output). 2) Restrictions apply to wiring conditions from TR to INV. 3) Voltage distortion in input voltage (3%, from IEC standards) 4) Wiring restrictions apply from input power supply to DC common bus.
4	RFI:INV= 2:2 RFI:INV= 3:3		**Multiwinding system** **INV: Motor = 1:1 system** **Continous rating (total)** 220 to 706kW	1) If common bus not applied for RFI output (DC output) 2) Not applicable with direct parallel systems
5	RFI:INV= 2:N		**Direct parallel system** **Multiwinding system** **INV: Motor = 1:1 system** **Continous rating (total)** 220 to 585kW	
6	RFI:INV= 4:N RFI:INV= 6:N		**Direct parallel system** **Multiwinding system** **INV: Motor = 1:1 system** **Continous rating (total)** 440 to 1031kW	**If using RFI (x4, or 6) structure configuration** 1) A common bus should be applied for RFI output (DC output). 2) Restrictions apply to wiring conditions from Transformer to Inverter. 3) Voltage distortion in input voltage (3%, from IEC standards) 4) Use an AC reactor.
7	RFI:INV= 6:N		**Direct parallel system** **Multiwinding system** **INV: Motor = 1:1 system** **Continous rating (total)** 660 to 1546kW	**If using RFI (x6) structure** 1) A common bus should be applied for RFI output (DC output). 2) Restrictions apply to wiring conditions from Transformer to Inverter. 3) Voltage distortion in input voltage (3%, from IEC standards) 4) Use an AC reactor.

(Note 1) Use inverters of the same capacity for direct parallel systems and multiwinding motor drive systems.
(Note 2) Motor capacity is calculated based on a power supply voltage of 400 V.
(Note 3) Turn ON the main power supply for all converters at the same time.

Model variation (Inverter)

Nominal applied motor (kW)	400V Series			690V Series	
	Unit Type		Stack Type	Unit Type	Stack Type
	HD (150%, 1 min./200%, 3sec.)	MD (150% 1min.)	MD (150% 1min.)	MD(CT) (150% 1min.)	MD(CT) (150% 1min.)
Applied load	High Duty Spec	Medium Duty Spec	Medium Duty Spec	Medium Duty Spec	Medium Duty Spec
3.7	FRN3.7VG1S-4☐				
5.5	FRN5.5VG1S-4☐				
7.5	FRN7.5VG1S-4☐				
11	FRN11VG1S-4☐				
15	FRN15VG1S-4☐				
18.5	FRN18.5VG1S-4☐				
22	FRN22VG1S-4☐				
30	FRN30VG1S-4☐		FRN30SVG1S-4☐		
37	FRN37VG1S-4☐		FRN37SVG1S-4☐		
45	FRN45VG1S-4☐		FRN45SVG1S-4☐		
55	FRN55VG1S-4☐		FRN55SVG1S-4☐		
75	FRN75VG1S-4☐		FRN75SVG1S-4☐		
90	FRN90VG1S-4☐		FRN90SVG1S-4☐		FRN90SVG1S-69☐
110	FRN110VG1S-4☐	FRN90VG1S-4☐	FRN110SVG1S-4☐		FRN110SVG1S-69☐
132	FRN132VG1S-4☐	FRN110VG1S-4☐	FRN132SVG1S-4☐		FRN132SVG1S-69☐
160	FRN160VG1S-4☐	FRN132VG1S-4☐	FRN160SVG1S-4☐	FRN160VG7S-69 *	FRN160SVG1S-69☐
200	FRN200VG1S-4☐	FRN160VG1S-4☐	FRN200SVG1S-4☐	FRN200VG7S-69 *	FRN200SVG1S-69☐
220	FRN220VG1S-4☐	FRN200VG1S-4☐	FRN220SVG1S-4☐		FRN220SVG1S-69☐
250		FRN220VG1S-4☐	FRN250SVG1S-4☐		FRN250SVG1S-69☐
280	FRN280VG1S-4☐		FRN280SVG1S-4☐	FRN280VG7S-69 *	FRN280SVG1S-69☐
315	FRN315VG1S-4☐	FRN280VG1S-4☐	FRN315SVG1S-4☐	FRN315VG7S-69 *	FRN315SVG1S-69☐
355	FRN355VG1S-4☐	FRN315VG1S-4☐		FRN355VG7S-69 *	FRN355SVG1S-69☐
400	FRN400VG1S-4☐	FRN355VG1S-4☐			FRN400SVG1S-69☐
450		FRN400VG1S-4☐			FRN450SVG1S-69☐
500	FRN500VG1S-4☐			FRN500VG7S-69 *	
630	FRN630VG1S-4☐		FRN630BVG1S-4☐	FRN630VG7S-69 *	
710			FRN710BVG1S-4☐		
800			FRN800BVG1S-4☐		FRN800BVG7S-69 *
1000					FRN1000BVG7S-69 *

Under development

How to read the model number

FRN 30 S VG 1 S – 4 J

Code	Series name
FRN	FRENIC Series

Code	Nominal applied motor capacity
3.7	3.7kW
5.5	5.5kW
7.5	7.5kW
≀	≀
800	800kW

Code	Form
None	Unit type
S	Standard stack
B	Stack by phase

Code	Application range
VG	High performance vector control

Code	Destination / Instruction Manual
J	Japanese
E	English
C	Chinese
Other	Special specification

Code	Input power source
4	Three-phase 400V
69	Three-phase 690V

Code	Structure
S	Standard

Code	Developed inverter series
1	1 Series

Caution! The product detail described in this document is intended for selecting a model. When using a product, read the Instruction Manual carefully and use the product properly.

* Model: Refer to the variable speed AC Drives (For crane use) catalog (MEH637) or contact Fuji Electric for details on the FRENIC-VG7S-69.
* A DC input type is also available for the 690V Series Unit Type (VG7S). Please contact Fuji Electric.

Model variation (Converter)

Nominal applied motor (kW)	400V Series				690V Series		
	Unit Type (PWM)	Stack Type (PWM)	Stack Type (Filter)	Diode rectifier	Stack Type (PWM)	Stack Type (Filter)	Diode rectifier
	MD(CT) (150% 1min.)	MD (150% 1min.)	—	MD (150% 1min.)	MD (150% 1min.)	—	MD (150% 1min.)
Applied load	High Duty Spec	Medium Duty Spec	—	Medium Duty Spec	Medium Duty Spec	—	Medium Duty Spec
3.7							
5.5							
7.5	RHC7.5-4C						
11	RHC11-4C						
15	RHC15-4C						
18.5	RHC18.5-4C						
22	RHC22-4C						
30	RHC30-4C						
37	RHC37-4C						
45	RHC45-4C						
55	RHC55-4C						
75	RHC75-4C						
90	RHC90-4C						
110	RHC110-4C						
132	RHC132-4C	RHC132S-4D☐			RHC132S-69D☐		
160	RHC160-4C	RHC160S-4D☐	RHF160S-4D☐		RHC160S-69D☐	RHF160S-69D☐	
200	RHC200-4C	RHC200S-4D☐		RHD200S-4D☐	RHC200S-69D☐		
220	RHC220-4C	RHC220S-4D☐	RHF220S-4D☐		RHC220S-69D☐	RHF220S-69D☐	RHD220S-69D☐
280	RHC280-4C	RHC280S-4D☐	RHF280S-4D☐		RHC280S-69D☐	RHF280S-69D☐	
315	RHC315-4C	RHC315S-4D☐	RHF355S-4D☐	RHD315S-4D☐	RHC315S-69D☐		
355	RHC355-4C				RHC355S-69D☐	RHF355S-69D☐	
400	RHC400-4C				RHC400S-69D☐		
450					RHC450S-69D☐	RHF450S-69D☐	RHD450S-69D☐
500	RHC500-4C						
630	RHC630-4C	RHC630B-4D☐					
710		RHC710B-4D☐					
800		RHC800B-4D☐					

Under development

Description of converter type

RHC 315 S – 4 D J

Code	Series name
RHC	PMW converter
RHF	Filter for PMW converter
RHD	Diode rectifier

Code	Nominal applied motor capacity
7.5	7.5kW
≀	≀
800	800kW

Code	Form
None	Unit type
S	Standard stack
B	Stack by phase

Code*	Destination / Instruction Manual
J	Japanese
E	English
C	Chinese

* This item is available only with the D series.

Code	Developed inverter series
C	C Series
D	D Series

Code	Input power source
4	Three-phase 400V
69	Three-phase 690V

Caution! The product detail described in this document is intended for selecting a model. When using a product, read the Instruction Manual carefully and use the product properly.

Standard specifications

HD specification (Unit Type)

400V series

Type FRN□VG1S-4□		3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315	355	400	500	630
Nominal applied motor [kW]		3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315	355	400	500	630
Rated capacity [kVA] (*1)		6.8	10	14	18	24	29	34	45	57	69	85	114	134	160	192	231	287	316	396	445	495	563	731	891
Rated current [A]		9.0	13.5	18.5	24.5	32.0	39.0	45.0	60.0	75.0	91.0	112	150	176	210	253	304	377	415	520	585	650	740	960	1170
Overload current rating		150% of rated current -1min. (*2) 200% -3s. (*3)																							
Power supply voltage	Main power Phase, Voltage, Frequency	3-phase 380 to 480V, 50Hz/60Hz											3-phase 380 to 440V/50Hz, 380 to 480V/60Hz (*4)												
	Auxiliary control power supply Phase, Voltage, Frequency	Single phase 380 to 480V, 50Hz/60Hz																							
	Auxiliary input for fan power Phase, Voltage, Frequency (*5)	–											Single phase 380 to 440V, 50Hz 380 to 480V/60Hz (*4)												
	Voltage/frequency variation	Voltage: +10 to -15%, Frequency: +5 to -5%, Voltage unbalance: 2% or less (*6)																							
	Rated current [A] (*7) (with DCR)	7.5	10.6	14.4	21.1	28.8	35.5	42.2	57.0	68.5	83.2	102	138	164	210	238	286	357	390	500	559	628	705	881	1115
	Rated current [A] (*7) (without DCR)	13.0	17.3	23.2	33	43.8	52.3	60.6	77.9	94.3	114	140	–	–	–	–	–	–	–	–	–	–	–	–	–
	Required power supply capacity [kVA] (*8)	5.2	7.4	10	15	20	25	30	40	48	58	71	96	114	140	165	199	248	271	347	388	436	489	610	773
Braking method /braking torque		Braking resistor discharge control: 150% braking torque, Separately installed braking resistor (option), Separately installed braking unit (option for FRN200VG1S-4J or higher)																							
Carrier frequency [kHz] (*9)		2 to 15											2 to 10											2 to 5	
Approx.weight [kg]		6.2	6.2	6.2	11	11	11	11	25	26	31	33	42	62	64	94	98	129	140	245	245	330	330	555	555
Enclosure		IP20 closed type UL open type							IP00 open type UL open type (IP20 closed type is available as option)																
Applicable safety standards		UL 508C, C22.2 No.14 (*10), IEC/EN 61800-5-1 (Overvoltage category: 3)																							

Note 1) The specification above are established when the function code F80 = 0 (HD specification) is applied.
Note 2) When using DC reactor, note the followings.
- •Type FRN□VG1S-4J: 55kW or below: provided as option, 75kW or above: Provided as standard.
- •Type FRN□VG1S-4E, -4C: Provided as option.

*1) The rated output voltage is 440V for 400V series.
*2) When the inverter output frequency converter value is 10Hz or less, the inverter may trip early due to overload depending on the conditions such as ambient temperature.
*3) When the inverter output frequency converter value is 5Hz or less, the inverter may trip early due to overload depending on the conditions such as ambient temperature.
*4) The inverters with the power supply of 380 to 398V/50Hz and 380 to 430V/60Hz must be switched using a connector inside the inverter.
The output power of the inverter with 380V may drop depending on situations. For details, refer to the FRENIC-VG User Manual chapter 10.5.
*5) This input is used to supply the AC fan when supplying the inverter from DC inputs, like when combining the inverter with RHC or RHD converter (therefore it is not always used).

*6) Voltage unbalance [%] $= \dfrac{\text{Max. voltage [V] - Min. voltage [V]}}{\text{Three-phase average voltage [V]}} \times 67$

Use an AC reactor if the voltage unbalance exceeds 2%.
*7) The value is calculated on assumption that the inverter is connected with a power supply capacity of 500kVA (or 10 times the inverter capacity if the inverter capacity exceeds 50kVA) and %X is 5%.
*8) The values shown apply when DC reactor is used.
*9) The inverter may automatically reduce carrier frequency in accordance with ambient temperature or output current in order to protect itself.
*10) The FRN75/160/200/220/355/400VG1S-4□ do not conform to C22.2 No.14. If necessary, please contact Fuji Electric.

MD specification (Unit Type)

400V series

Type FRN□VG1S-4□		90	110	132	160	200	220	280	315	355	400
Nominal applied motor [kW] (*8)		110	132	160	200	220	250	315	355	400	450
Rated capacity [kVA] (*1)		160	192	231	287	316	356	445	495	563	640
Rated current [A]		210	253	304	377	415	468	585	650	740	840
Overload current rating		150% of rated current -1min. (*2)									
Power supply voltage	Main power Phase, Voltage, Frequency	3-phase 380 to 440V/50Hz, 380 to 480V/60Hz (*3)									
	Auxiliary control power supply Phase, Voltage, Frequency	Single phase 380 to 480V, 50Hz/60Hz									
	Auxiliary input for fan power Phase, Voltage, Frequency (*4)	Single phase 380 to 440V, 50Hz 380 to 480V/60Hz (*3)									
	Voltage/frequency variation	Voltage: +10 to -15%, Frequency: +5 to -5%, Voltage unbalance: 2% or less (*5)									
	Rated current [A] (*6) (with DCR)	210	238	286	357	390	443	559	628	705	789
	Rated current [A] (*6) (without DCR)	–									
	Required power supply capacity [kVA] (*7)	140	165	199	248	271	312	388	436	489	547
Braking method /braking torque		Braking resistor discharge control: 150% braking torque, Separately installed braking resistor (option)				Braking resistor discharge control: 150% braking torque, Separately installed braking resistor (option) Separately installed braking unit (option)					
Carrier frequency [kHz]		2									
Approx.weight [kg]		62	64	94	98	129	140	245	245	330	330
Enclosure		IP00 open type UL open type (IP20 closed type is available as option)									
Applicable safety standards		UL 508C, C22.2 No.14 (*9), IEC/EN 61800-5-1 (Overvoltage category: 3)									

Note 1) The specifications above are established when the function code F80 = 3 (MD specification) is applied.
Note 2) When using DC reactor, note the followings.
- •Type FRN□VG1S-4J: Provided as standard.
- •Type FRN□VG1S-4E, -4C: Provided as option.

*1) When the rated output voltage is 440V
*2) When the converted inverter output frequency is less than 1Hz, the inverter may trip earlier in some ambient temperature conditions if the motor is overloaded
*3) When the power supply is 380 to 398V at 50 Hz or 380 to 430V at 60Hz, a connector inside the inverter must be reconnected accordingly.
The output of the inverter with 380V may drop depending on situations. For the detail, refer to the FRENIC-VG User Manual 10.5.
*4) This input is used to supply the AC fan when supplying the inverter from DC inputs, like when combining the inverter with RHC or RHD converter (therefore it is not always used).

*5) Voltage unbalance [%] = $\frac{\text{Max. voltage [V] - Min. voltage [V]}}{\text{Three-phase average voltage [V]}} \times 67$

Use an AC reactor if the voltage unbalance exceeds 2%.
*6) The value is calculated on assumption that the inverter is connected with a power supply capacity of 10 times the inverter capacity and %X is 5%.
*7) The values shown apply when DC reactor is used.
*8) Since heat generation of the motor due to low carrier may be increased depending on the load condition, designate the MD specification when ordering the motor.
*9) The FRN160/200/220/355/400VG1S-4□ do not conform to C22.2 No.14. If necessary, please contact Fuji Electric.

690V series

* Refer to the variable speed AC Drives (For crane use) catalog (MEH637) or contact Fuji Electric.

Standard specifications

MD specifications (Stack Type)

400V series

Type FRN□○V1S-4□		30S	37S	45S	55S	75S	90S	110S	132S	160S	200S	220S	250S	280S	315S	630B(*5)	710B(*5)	800B(*5)
Nominal applied motor [kW]		30	37	45	55	75	90	110	132	160	200	220	250	280	315	630	710	800
Rated capacity [kVA] (*1)		45	57	69	85	114	134	160	192	231	287	316	356	396	445	891	1044	1127
Rated current [A]		60	75	91	112	150	176	210	253	304	377	415	468	520	585	1170	1370	1480
Overload current rating		150% of rated current -1min. (*2)																
Power supply voltage	Main power	Refer to the specifications of PWM converter of DC input type.																
	Auxiliary control power supply Phase, Voltage, Frequency	Single phase 380 to 480V, 50/60Hz																
	Auxiliary input for fan power Phase, Voltage, Frequency	Auxiliary input for fan power					Single phase 380 to 440V, 50Hz 380 to 480V, 60Hz (*3)											
	Voltage/frequency variation	Voltage: +10 to -15%, Frequency: +5 to -5%																
Carrier frequency [kHz] (*4)		2																
Approx. weight [kg]		30	30	30	37	37	45	45	95	95	95	125	135	135	135	135×3(*6)	135×3(*6)	135×3(*6)
Enclosure		IP00 open type																

Note 1) The above specifications are for Function Code F80=0, 2 and 3 (MD specification). Default setting=0. 0 and 2 are displayed as HD on keypad.
*1) When the rated output voltage is 440V
*2) When the converted inverter output frequency is less than 1Hz, the inverter may trip earlier in some ambient temperature conditions if the motor is overloaded.
*3) When the power supply is 380 to 398V at 50Hz or 380 to 430V at 60Hz, a connector inside the inverter must be reconnected accordingly.
*4) When the synchronous motor is run at a low carrier frequency, the permanent magnet may be over-heated and demagnetized by harmonic components of the output current. Be sure to check the permissible carrier frequency of the motor.
*5) One set of the inverter consists of three stacks.
*6) This weight may be changed. For details, contact the Sales Department at Fuji.

690V series (Under development)

Type FRN□SVG1S-69□		90	110	132	160	200	220	250	280	315	355	400	450
Nominal applied motor [kW]		90	110	132	160	200	220	250	280	315	355	400	450
Rated capacity [kVA] (*1)		120	155	167	192	258	281	317	353	394	436	490	550
Rated current [A]		100	130	140	161	216	235	265	295	330	365	410	460
Overload current rating		150% of rated current -1min. (*2)											
Power supply voltage	Main power	Refer to the specifications of PWM converter of DC input type. (690V series)											
	Auxiliary control power supply Phase, Voltage, Frequency	Single phase 575 to 690V, 50/60Hz											
	Auxiliary input for fan power Phase, Voltage, Frequency	Single phase 575 to 690V, 50/60Hz (*3)											
	Voltage/frequency variation	Voltage:+10 to -15%, Frequency:+5 to -5%											
Carrier frequency [kHz] (*4)		2											
Approx. weight [kg]		–	–	–	–	–	–	–	–	–	–	–	–
Enclosure		IP00 open type											

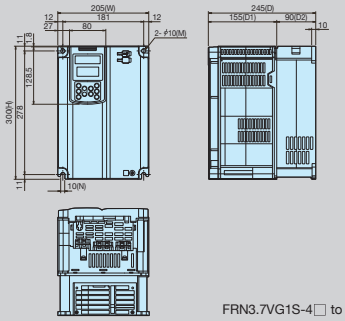
Note 1) The above specifications are for Function Code F80=0, 2 and 3 (MD specification). Default setting=0. 0 and 2 are displayed as HD on keypad.
*1) When the rated output voltage is 690V
*2) When the converted inverter output frequency is less than 1Hz, the inverter may trip earlier in some ambient temperature conditions if the motor is overloaded.
*3) When the power supply is 575 to 629V at 50Hz, 60Hz, a connector inside the inverter must be reconnected accordingly.
*4) When the synchronous motor is run at a low carrier frequency, the permanent magnet may be over-heated and demagnetized by harmonic components of the output current. Be sure to check the permissible carrier frequency of the motor.
Note 2) Please contact Fuji Electric for details on the FRN 800BV7S-69 and FRN1000BVG7S-69.

Dimensions

Dimensions (Unit Type)

Inverter

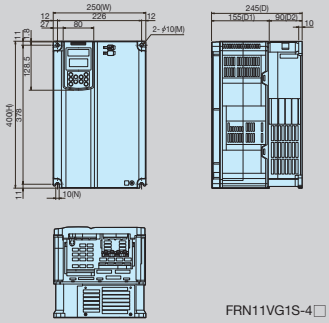
Fig. A



[Unit: mm]

FRN3.7VG1S-4□ to FRN7.5VG1S-4□

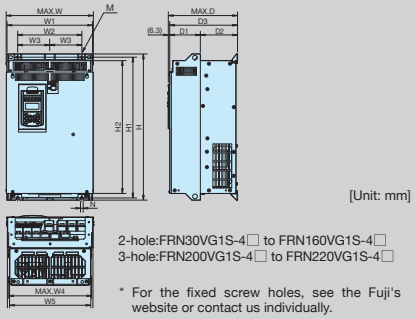
Fig. B



[Unit: mm]

FRN11VG1S-4□ to FRN22VG1S-4□

Fig. C

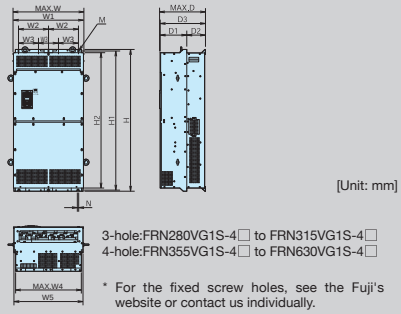


[Unit: mm]

2-hole:FRN30VG1S-4□ to FRN160VG1S-4□
3-hole:FRN200VG1S-4□ to FRN220VG1S-4□

* For the fixed screw holes, see the Fuji's website or contact us individually.

Fig. D

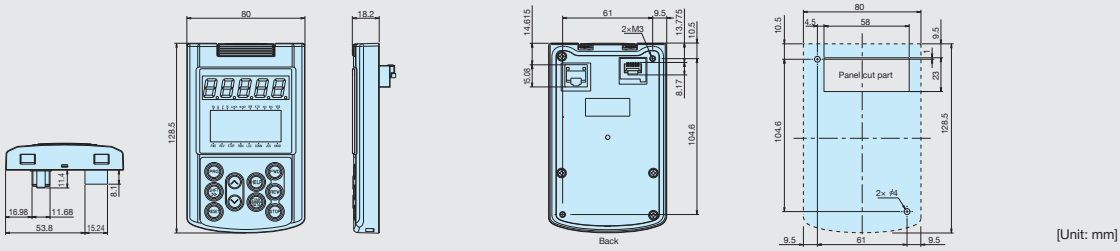


[Unit: mm]

3-hole:FRN280VG1S-4□ to FRN315VG1S-4□
4-hole:FRN355VG1S-4□ to FRN630VG1S-4□

* For the fixed screw holes, see the Fuji's website or contact us individually.

KEYPAD



[Unit: mm]

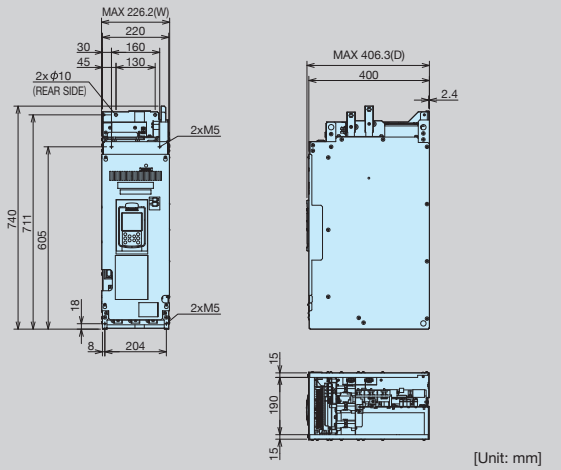
[Unit: mm]

Series	Inverter type	Fig	Dimensions														
			W	W1	W2	W3	W4	W5	H	H1	H2	D	D1	D2	D3	M	N
400V series	FRN3.7VG1S-4□	A	205	-	-	-	-	-	300	-	-	245	155	90	-	2X ϕ10	10
	FRN5.5VG1S-4□	A															
	FRN7.5VG1S-4□	A															
	FRN11VG1S-4□	B	250						400								
	FRN15VG1S-4□	B															
	FRN18.5VG1S-4□	B															
	FRN22VG1S-4□	B															
	FRN30VG1S-4□	C	326.2	320	240	-	310.2	304	550	530	500	261.3	115	140	255		
	FRN37VG1S-4□	C															
	FRN45VG1S-4□	C	361.2	355	275	-	345.2	339	615	595	565	276.3		155	270		
	FRN55VG1S-4□	C							675	655	625						
	FRN75VG1S-4□	C							740	720	690						
	FRN90VG1S-4□	C	536.4	530	430	-	506.4	500.6		710	678.7	321.3	135	180	315	2X ϕ15	15
	FRN110VG1S-4□	C															
	FRN132VG1S-4□	C							1000	970	939.5	366.3	180		360	3X ϕ15	
	FRN160VG1S-4□	C															
	FRN200VG1S-4□	C	686.4	680	-	290	656.4	650.6									
	FRN220VG1S-4□	C															
	FRN280VG1S-4□	D			290	-	659	653	1400	1370	1330	445.5	260		440		
	FRN315VG1S-4□	D															
	FRN355VG1S-4□	D	886.4	880	-	260	859.1	853				446.3				4X ϕ15	
	FRN400VG1S-4□	D															
	FRN500VG1S-4□	D	1006	1000		300	972	966	1550	1520	1480	505.9	313.2	186.8	500		
	FRN630VG1S-4□	D															

Dimensions

Dimensions (Stack Type)

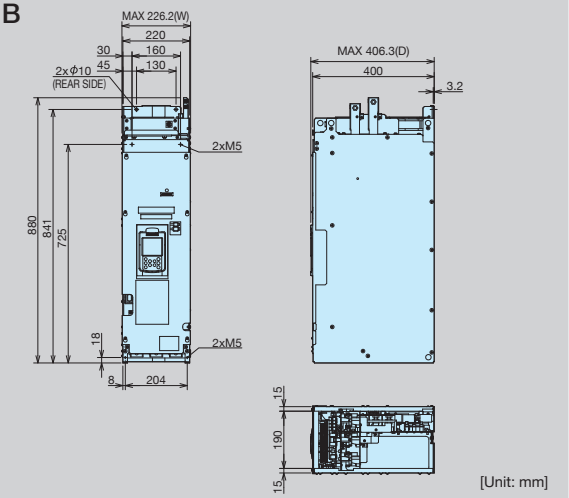
Fig. A



[Unit: mm]

FRN30SVG1S-4□ to FRN45SVG1S-4□

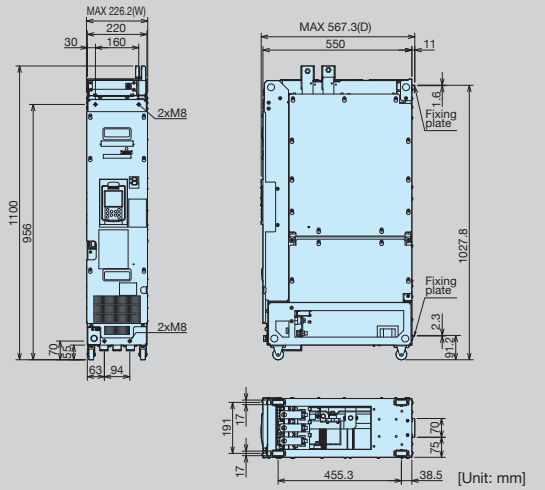
Fig. B



[Unit: mm]

FRN55SVG1S-4□ to FRN110SVG1S-4□

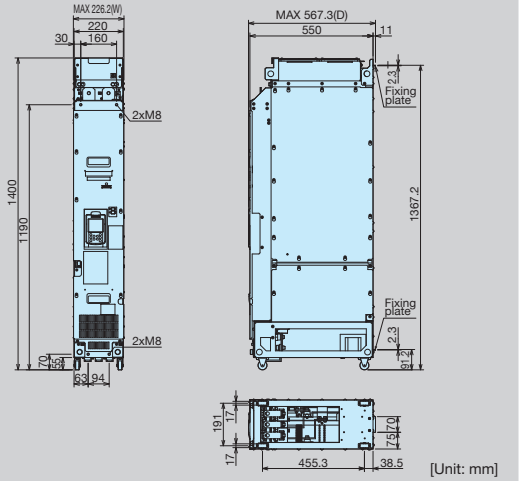
Fig. C



[Unit: mm]

FRN132SVG1S-4□ to FRN200SVG1S-4□

Fig. D

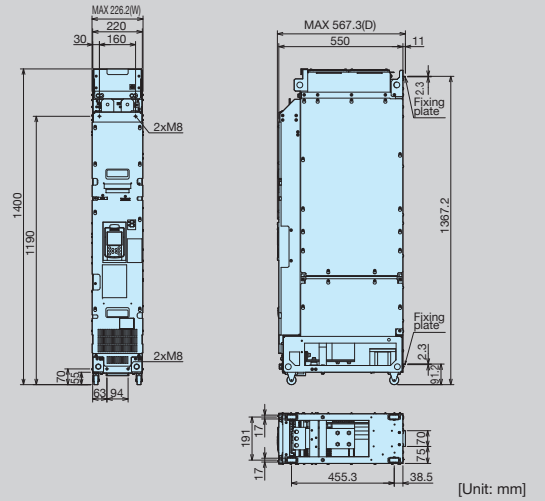


[Unit: mm]

FRN220SVG1S-4□ to FRN315SVG1S-4□

Fig. E

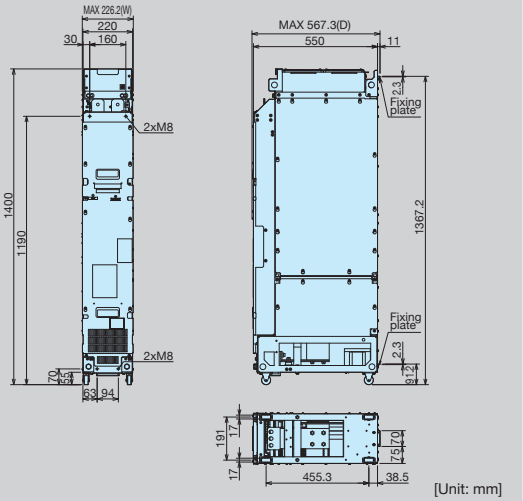
V-phase stack



[Unit: mm]

FRN630BVG1S-4□ to FRN800BVG1S-4□

U,W-phase stack



[Unit: mm]

FRN630BVG1S-4□ to FRN800BVG1S-4□

[Unit: mm]

Series	Inverter type	Fig	Dimensions		
			W	H	D
400V series	FRN30SVG1S-4□	A	226.2	740	406.3
	FRN37SVG1S-4□	A			
	FRN45SVG1S-4□	A			
	FRN55SVG1S-4□	B	226.2	880	406.3
	FRN75SVG1S-4□	B			
	FRN90SVG1S-4□	B			
	FRN110SVG1S-4□	B			
	FRN132SVG1S-4□	C	226.2	1100	567.3
	FRN160SVG1S-4□	C			
	FRN200SVG1S-4□	C			
	FRN220SVG1S-4□	D	226.2	1400	567.3
	FRN250SVG1S-4□	D			
	FRN280SVG1S-4□	D			
	FRN315SVG1S-4□	D			
	FRN630BVG1S-4□(*1)	E	226.2	1400	567.3
	FRN710BVG1S-4□(*1)	E			
	FRN800BVG1S-4□(*1)	E			

*1) One set of the inverter consists of three stacks. The touch panel is connected to the V phase only.

Power regenerative PWM converter (RHC series)

Features

■ Possible to reduce power supply facility capacity

Its power-factor control realizes the same phase current as the power-supply phase-voltage. The equipment, thus, can be operated with the power-factor of almost "1."
This makes it possible to reduce the power transformer capacity and downsize the other devices, compared with those required without the converter.

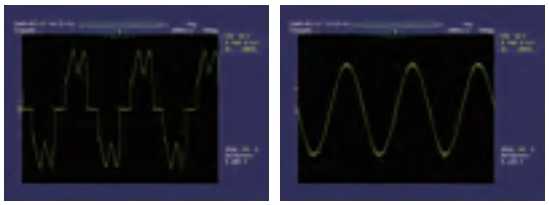
■ Braking performance

Regenerated energy occurring at highly frequent accelerating and decelerating operation and elevating machine operation is entirely returned to power supply side. Thus, energy saving during regenerative operation is possible. As the current waveform is sinusoidal during regenerative operation, no troubles are caused to the power supply system.

Rated continuous regeneration : 100%
Rated regeneration for 1 min : 150% MD/CT spec.

Comparison of input current waveform

<Without PWM converter> <With PWM converter>



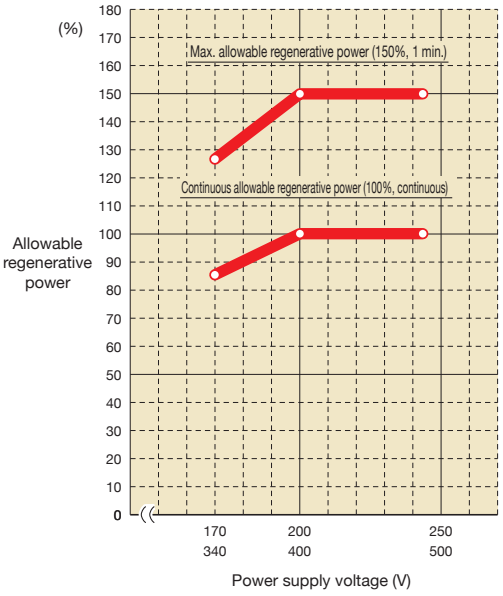
■ Maintenance/protective functions

Failure can be easily analyzed with the trace back (option).
①The past 10 alarms can be displayed with the keypad LED display. This helps you analyze the alarm causes and take countermeasures.
②When momentary power failure occurs, the converter turns off the gates to enable continuous operation after recovery.
③The converter can issue warning signals like overload, heat sink overheating, or the end of service life prior to converter tripping.

■ Network

•The converter can be connected to MICREX-SX, F series and CC-Link master devices (using option card). The RS-485 interface is provided as standard (Unit Type).

Allowable characteristics of the RHC unit



Standard Specifications

MD/CT specifications (Unit and Stack Type)

400V series

Type RHC□□□△-4◇○(*4)		7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315	355	400	500	630	710	800
Applicable inverter capacity [kW]		7.5	11	15	18.5	22	30	37	45	55	75	90	110	13	160	200	220	280	315	355	400	500	630	710	800
Output	Continuous capacity [kW]	8.8	13	18	22	26	36	44	53	65	88	103	126	150	182	227	247	314	353	400	448	560	705	795	896
	Overload rating	150% of rated current for 1 min.																							
	Voltage	DC640 to 710V (Variable with input power supply voltage) (*2)																							
Required power supply capacity [kVA]		9.5	14	19	24	29	38	47	57	70	93	111	136	161	196	244	267	341	383	433	488	610	762	858	967
Carrier frequency (*5)		Standard 15kHz									Standard 10kHz			Standard 5kHz											
Power supply voltage	Number of phase/Voltage/Frequency	3-phase, 380 to 440V 50Hz, 380 to 460V 60Hz (*1)																							
	Voltage/Frequency variation	Voltage: +10 to -15%, Frequency: ±5%, Voltage unbalance: 2% or less (*3)																							
Enclosure		IP00 open type																							

(*1) A connector inside converter must be reconnected accordingly when the power supply voltage is 380 to 398V/50Hz or 380 to 430V/60Hz. The capacity must be reduced when the power supply voltage is less than 400V.
(*2) The output voltage is 640V DC, 686V DC, 710V DC when the power supply voltage is 400V, 440V and 460V, respectively.
(*3) Voltage unbalance [%] = (Max. voltage [V] - Min. voltage [V])/Three-phase average voltage [V] × 67
(*4) Unit type: 7.5 to 630kW, Stack type: 132 to 315 and 630 to 800kW
(*5) Transformer isolation-less parallel system is used: Unit type= 5kHz, Stack type= 2.5kHz.
(*6) When inverter and converter are the same capacity, and an overload current uses it exceed 150%, select a converter with one rank higher capacity.

690V series (Under development)

Type RHC□S-69DJ		132	160	200	220	250	280	315	355	400	450
Nominal applied motor [kW]		132	160	200	220	250	280	315	355	400	450
Output	Continuous capacity [kW]	151	183	229	246	280	314	353	398	448	504
	Overload rating	150% of continuous rating for 1 min.									
	Voltage	DC920 to 1065V (variable with input power supply voltage) (*2)									
Required power capacity [kVA]		161	195	245	266	302	302	339	429	484	544
Carrier frequency		Standard 5kHz									
Input power supply	Number of phase/Voltage/Frequency	3-phase, 575 to 690V, 50Hz/60Hz (*1)									
	Voltage/Frequency variation	Voltage: -15 to +10%, Frequency: -5 to +5%, Voltage unbalance: 2% or less (*3)									
Enclosure		IP00 open type									

(*1) When the power supply voltage is 575 to 629V/50Hz, 60Hz, a connector inside converter must be reconnected accordingly.
When the power supply voltage is less than 575V, the capacity needs to be reduced.
(*2) When the power supply voltage is 575V and 690V, the output voltage is 920 VDC and 1065 VDC, respectively.
(*3) Inter-phase voltage unbalance ratio [%] = (Max. voltage [V] - Min. voltage [V]) /3-phase average voltage x 67

Specifications (Control and Displays of keypad)

Item		Specifications
control	Control method	AVR constant control with internal ACR.
	Running and operation	Rectification starts with power ON after connected. Boosting starts with the running signal (RUN-CM short-circuit or running command from communications). Then, preparation for operation is completed.
	Running status signal	Running, driving, regenerating, operation ready, alarm relay output (for any fault), etc.
	Input power factor	Above 0.99 (for 100% load)
	Input harmonics current	According to the guideline for suppressing harmonics issued by the Ministry of Economy, Trade and Industry, the converter factor (Ki) can be set to 0.
	Restart mode after momentary power failure	Stops the gates when the voltage level reaches undervoltage level if momentary power failure occurs, and the converter can automatically restart after the power recovers.
	Power limit control	Controls the power not to exceed the preset limit value.
Displays of Keypad	Alarm display (protective functions)	AC fuse blown, AC overvoltage, AC undervoltage, AC overcurrent, AC input current error, Input phase loss, Synchronous power supply frequency error, DC fuse blown, DC overvoltage, DC undervoltage, Charge circuit error, Heat sink overheat, External alarm, Converter overheat, Overload, Memory error, Keypad communication error, CPU error, Network device error, Operation procedure error, A/D converter error, Optical network error, IPM error (*1)
	Alarm history	Records and displays the last 10 alarms. The detailed information of the trip cause for the latest alarm is stored and displayed.
	Monitor	Displays input power, input effective current, input effective voltage, DC intermediate current and power supply frequency.
	Load factor	The load rate can be measured by using the keypad.
	Display language	Text can displayed in 3 languages: Japanese, English and Chinese.
	Charge LED	Lights when the main circuit capacitor is charged.

(*1) Not available in the stack type

Power regenerative PWM converter (RHC series)

Equipment Configuration List

Power Supply Voltage	Nominal applied motor [kW]	PWM converter Type	Power supply contactor		Contactor for power source		Charging circuit box (*1)						Boosting reactor		Filtering resistor		Filtering reactor		Filtering capacitor		Filtering circuit contactor	
									Charger resistor		AC Fuse											
			(73)	Q'ty	(52)	Q'ty	(CU)	Q'ty	(R0)	Q'ty	(Fac)	Q'ty	(Lr)	Q'ty	(Rf)	Q'ty	(Lf)	Q'ty	(Cf)	Q'ty	(6F)	Q'ty
400V series	7.5	RHC7.5-4C	SC-05	1			CU7.5-4C	1	(TK50B 30ΩJ)	(3)	(CR6L-30/UL)	(2)	LR4-7.5C	1	GRZG80 1.74Ω	3	LFC4-7.5C	1	CF4-7.5C	1		
	11	RHC11-4C	SC-4-0	1			CU15-4C	1	(HF5B0416)		(CR6L-50/UL)	(2)	LR4-15C	1	GRZG150 0.79Ω	3	LFC4-15C	1	CF4-15C	1		
	15	RHC15-4C	SC-5-1	1																		
	18.5	RHC18.5-4C	SC-N1	1			CU18.5-4C	1	(80W 7.5Ω)	(3)			LR4-22C	1	GRZG200 0.53Ω	3	LFC4-22C	1	CF4-22C	1		
	22	RHC22-4C					CU22-4C	1	(HF5C5504)		(CR6L-75/UL)	(2)										
	30	RHC30-4C	SC-N2	1			CU30-4C	1			(CR6L-100/UL)	(2)	LR4-37C	1	GRZG400 0.38Ω	3	LFC4-37C	1	CF4-37C	1		
	37	RHC37-4C	SC-N2S	1			CU45-4C	1			(CR6L-150/UL)	(2)										
	45	RHC45-4C	SC-N3	1									LR4-55C	1	GRZG400 0.26Ω	3	LFC4-55C	1	CF4-55C	1		
	55	RHC55-4C	SC-N4	1			CU55-4C	1			(CR6L-200/UL)	(2)										
	75	RHC75-4C	SC-N5	1			CU75-4C	1					LR4-75C	1	GRZG400 0.38Ω	3	LFC4-75C	1	CF4-75C	1		
	90	RHC90-4C	SC-N7	1			CU90-4C	1			(CR6L-300/UL)	(2)	LR4-110C	1	GRZG400 0.53Ω [2 parallel]	6	LFC4-110C	1	CF4-110C	1		
	110	RHC110-4C	SC-N8	1			CU110-4C	1	(GRZG120 2Ω)	(3)												
	132	RHC132○-4△□					CU132-4C	1			(A50P400-4)	(2)	LR4-160C	1	RF4-160C	1	LFC4-160C	1	CF4-160C	1		
	160	RHC160○-4△□	SC-N11	1			CU160-4C	1			(A50P600-4)	(2)										
	200	RHC200○-4△□	SC-N12	1			CU200-4C	1	(GRZG400 1Ω)	(3)			LR4-220C	1	RF4-220C	1	LFC4-220C	1	CF4-220C	1		
	220	RHC220○-4△□					CU220-4C	1			(A70QS800-4)	(2)										
	280	RHC280○-4△□	SC-N3	1	SC-N14	1			GRZG400 1Ω [2 parallel]	6	A70QS800-4	2	LR4-280C	1	RF4-280C	1	LFC4-280C	1	CF4-280C	1	SC-N4	1
	315	RHC315○-4△□									A70P1600-4TA	2	LR4-315C	1	RF4-315C	1	LFC4-315C	1	CF4-315C	1		
	355	RHC355-4C											LR4-355C	1	RF4-355C	1	LFC4-355C	1	CF4-355C	1		
	400	RHC400-4C			SC-N16	1							LR4-400C	1	RF4-400C	1	LFC4-400C	1	CF4-400C	1		
	500	RHC500-4C			SC-N11	3							LR4-500C	1	RF4-500C	1	LFC4-500C	1	CF4-500C	1(*2)	SC-N4(*3)	1
	630	RHC630○-4△□			SC-N12	3					A70P2000-4	2	LR4-630C	1	RF4-630C	1	LFC4-630C	1	CF4-630C	1(*2)	SC-N7(*3)	1
	710	RHC710B-4△□	SC-N4	1							HF5G2655	2	LR4-710C	1	RF4-710C	1	LFC4-710C	1	CF4-710C	1(*2)	SC-N8	1
	800	RHC800B-4△□			SC-N14	3							LR4-800C	1	RF4-800C	1	LFC4-800C	1	CF4-800C	1(*2)		

Note) If using the converter stack (RHC-D), the filter stack (RHF) can also be used.
(*1) The charging box (CU) contains a combination of a charging resistor (R0) and a fuse (Fac). If no CU used, it is necessary to prepare the charging resistor (R0) and fuse (F) at your end.
(*2) The filtering capacitor consists of two pieces of capacitors. For an order of quantity "1," two pieces of capacitors are to be delivered.
(*3) When changing the carrier frequency from the factory default, it is necessary to change the filtering circuit contactor (6F). For details, refer to the PWM converter Instruction Manual.

Optional card

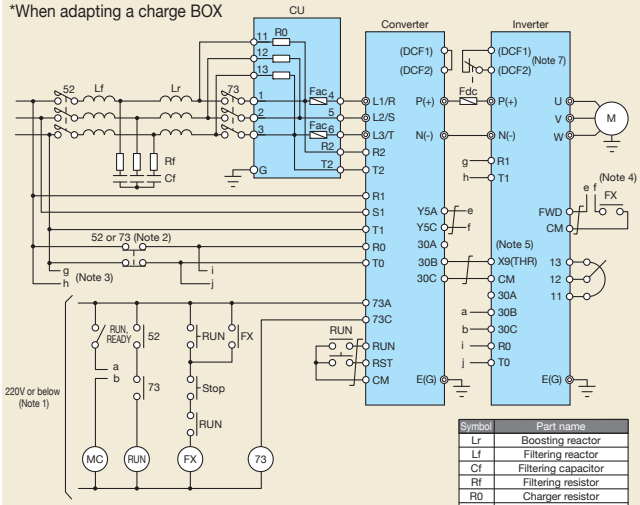
Name	Type	Specifications
Optical communication	OPC-VG7-SIR	Using this option card makes possible to perform the load sharing control in a parallel connection system.

Wiring Diagram

Basic Wiring Diagram

<Unit Type>
■RHC7.5-4C to RHC220-4C
*When adapting a charge BOX

<Stack Type>
■RHC132S-4D□ to RHC220S-4D□

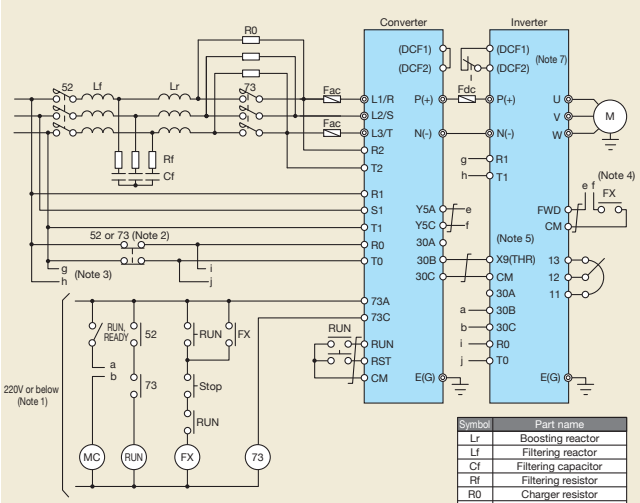


Symbol	Part name
Lr	Boosting reactor
Lf	Filtering reactor
Cf	Filtering capacitor
Rf	Filtering resistor
R0	Charger resistor
Fac	AC fuse
Fdc	DC fuse
73	Magnetic contactor for charging circuit
52	Magnetic contactor for power supply

(Note 1) For the 400 V class power supply, connect a stepdown transformer to limit the voltage of the sequence circuit to 220 V or below.
(Note 2) Be sure to connect the auxiliary power input terminals R0 and T0 of the PWM converter to the main power input lines via B contacts of magnetic contactors of the charging circuit (73 or MC). Note that when applied to an ungrounded power supply, an insulated transformer is required. For the details, refer to the "PWM Converter Instruction Manual".
(Note 3) Be sure to connect the auxiliary power input terminals R0 and T0 of the inverter to the main power input lines via B contacts of magnetic contactors of the charging circuit (73 or MC). For the capacities FRN75VG1S-4□ or higher and stack type inverter (all capacity range), connect the fan power input terminals R1 and T1 of the inverter to the main power input lines without going through the MC's B contacts or 73.
(Note 4) Construct a sequence in which a run command is given to the inverter after the PWM converter becomes ready to run.
(Note 5) Assign the external alarm THR to any of terminals [X1] to [X9] on the inverter.
(Note 6) Wiring for terminals L1/R, L2/S, L3/T, R2, T2, R1, S1, and T1 should match with the phase sequence.
(Note 7) Not available in the unit type inverter.

<Unit Type>
■RHC7.5-4C to RHC220-4C

<Stack Type>
■RHC132S-4D□ to RHC220S-4D□

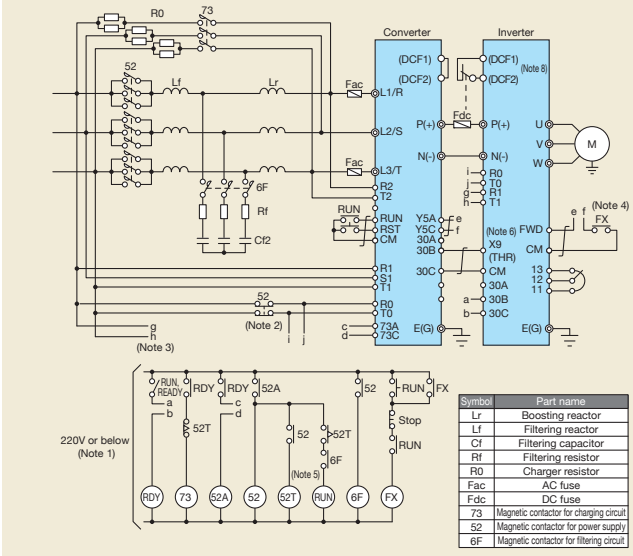


Symbol	Part name
Lr	Boosting reactor
Lf	Filtering reactor
Cf	Filtering capacitor
Rf	Filtering resistor
R0	Charger resistor
Fac	AC fuse
Fdc	DC fuse
73	Magnetic contactor for charging circuit
52	Magnetic contactor for power supply

(Note 1) For the 400 V class power supply, connect a stepdown transformer to limit the voltage of the sequence circuit to 220 V or below.
(Note 2) Be sure to connect the auxiliary power input terminals R0 and T0 of the PWM converter to the main power input lines via B contacts of magnetic contactors of the charging circuit (73 or MC). Note that when applied to an ungrounded power supply, an insulated transformer is required. For the details, refer to the "PWM Converter Instruction Manual".
(Note 3) Be sure to connect the auxiliary power input terminals R0 and T0 of the inverter to the main power input lines via B contacts of magnetic contactors of the charging circuit (73 or MC). For the capacities FRN75VG1S-4□ or higher and stack type inverter (all capacity range), connect the fan power input terminals R1 and T1 of the inverter to the main power input lines without going through the MC's B contacts or 73.
(Note 4) Construct a sequence in which a run command is given to the inverter after the PWM converter becomes ready to run.
(Note 5) Assign the external alarm THR to any of terminals [X1] to [X9] on the inverter.
(Note 6) Wiring for terminals L1/R, L2/S, L3/T, R2, T2, R1, S1, and T1 should match with the phase sequence.
(Note 7) Not available in the unit type inverter.

<Unit Type>
■RHC280-4C to RHC400-4C

<Stack Type>
■RHC280S-4D□ to RHC315S-4D□

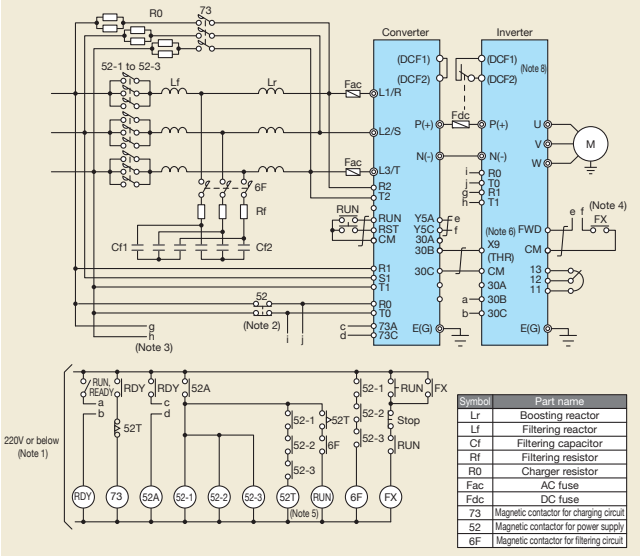


Symbol	Part name
Lr	Boosting reactor
Lf	Filtering reactor
Cf	Filtering capacitor
Rf	Filtering resistor
R0	Charger resistor
Fac	AC fuse
Fdc	DC fuse
73	Magnetic contactor for charging circuit
52	Magnetic contactor for power supply
6F	Magnetic contactor for filtering circuit

(Note 1) For the 400 V class power supply, connect a stepdown transformer to limit the voltage of the sequence circuit to 220 V or below.
(Note 2) Be sure to connect the auxiliary power input terminals R0 and T0 of the PWM converter to the main power input lines via B contacts of magnetic contactors of the charging circuit (73 or MC). Note that when applied to an ungrounded power supply, an insulated transformer is required. For the details, refer to the "PWM Converter Instruction Manual".
(Note 3) Be sure to connect the fan power input terminals R1 and T1 of the inverter to the main power input lines without going through the MC's B contacts or 73.
(Note 4) Construct a sequence in which a run command is given to the inverter after the PWM converter becomes ready to run.
(Note 5) Set the timer 52T at 1 sec.
(Note 6) Assign the external alarm THR to any of terminals [X1] to [X9] on the inverter.
(Note 7) Wiring for terminals L1/R, L2/S, L3/T, R2, T2, R1, S1, and T1 should match with the phase sequence.
(Note 8) Not available in the unit type inverter.

<Unit Type>
■RHC500-4C to RHC630-4C

<Stack Type>
■RHC630S-4D□ to RHC800B-4D□



Symbol	Part name
Lr	Boosting reactor
Lf	Filtering reactor
Cf	Filtering capacitor
Rf	Filtering resistor
R0	Charger resistor
Fac	AC fuse
Fdc	DC fuse
73	Magnetic contactor for charging circuit
52	Magnetic contactor for power supply
6F	Magnetic contactor for filtering circuit

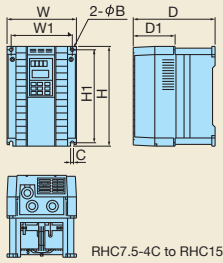
(Note 1) For the 400 V class power supply, connect a stepdown transformer to limit the voltage of the sequence circuit to 220 V or below.
(Note 2) Be sure to connect the auxiliary power input terminals R0 and T0 of the PWM converter to the main power input lines via B contacts of magnetic contactors of the charging circuit (73 or MC). Note that when applied to an ungrounded power supply, an insulated transformer is required. For the details, refer to the "PWM Converter Instruction Manual".
(Note 3) Be sure to connect the fan power input terminals R1 and T1 of the inverter to the main power input lines without going through the MC's B contacts or 73.
(Note 4) Construct a sequence in which a run command is given to the inverter after the PWM converter becomes ready to run.
(Note 5) Set the timer 52T at 1 sec.
(Note 6) Assign the external alarm THR to any of terminals [X1] to [X9] on the inverter.
(Note 7) Wiring for terminals L1/R, L2/S, L3/T, R2, T2, R1, S1, and T1 should match with the phase sequence.
(Note 8) Not available in the unit type inverter.

Power regenerative PWM converter (RHC series)

Dimensions

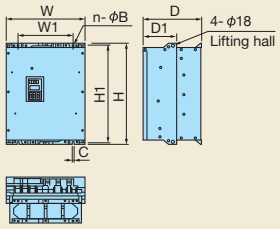
PWM converter (Unit Type)

Fig. A



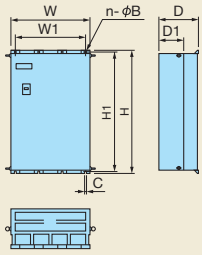
RHC7.5-4C to RHC15-4C

Fig. B



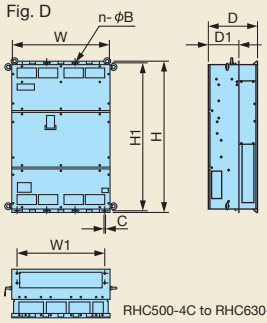
RHC18.5-4C to RHC75-4C

Fig. C



RHC90-4C to RHC400-4C

Fig. D

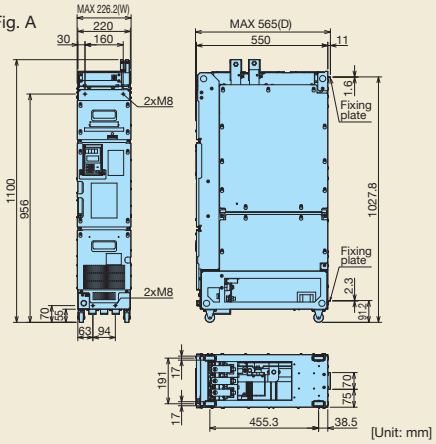


RHC500-4C to RHC630-4C

PWM converter type		Fig	Dimensions [mm]									Approx. weight [kg]
			W	W1	H	H1	D	D1	n	B	C	
400V series	RHC7.5-4C	A	250	226	380	358	245	125	2	10	10	12.5
	RHC11-4C											
	RHC15-4C											
	RHC18.5-4C	B	340	240	480	460	255	145	2	10	10	24
	RHC22-4C											
	RHC30-4C	B	340	240	550	530	255	145	2	10	10	29
	RHC37-4C	B	375	275	550	530	270	145	2	10	10	34
	RHC45-4C	B	375	275	675	655	270	145	2	10	10	38
	RHC55-4C	B	375	275	675	655	270	145	2	10	10	39
	RHC75-4C	B	375	275	740	720	270	145	2	10	10	48
	RHC90-4C	C	530	430	740	710	315	175	2	15	15	70
	RHC110-4C											
	RHC132-4C	C	530	430	1000	970	360	220	2	15	15	100
	RHC160-4C											
	RHC200-4C	C	680	580	1000	970	360	220	3	15	15	140
	RHC220-4C											
	RHC280-4C	C	680	580	1400	1370	450	285	3	15	15	320
	RHC315-4C											
	RHC355-4C	C	880	780	1400	1370	450	285	4	15	15	410
	RHC400-4C											
	RHC500-4C	D	999	900	1550	1520	500	313.2	4	15	15	525
	RHC630-4C											

PWM converter (Stack Type)

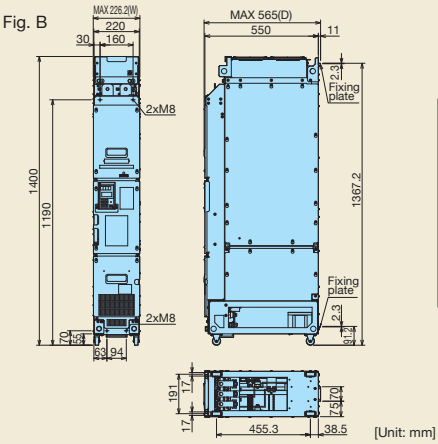
Fig. A



[Unit: mm]

RHC132S-4D□ to RHC200S-4D□

Fig. B



[Unit: mm]

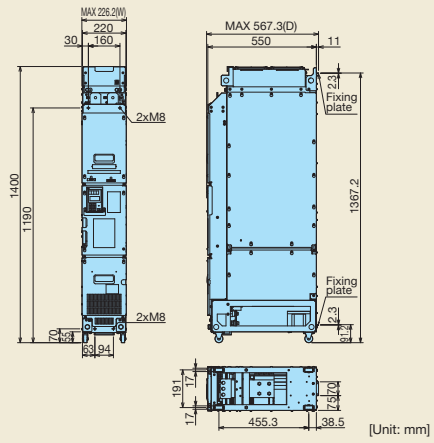
RHC220S-4D□ to RHC315S-4D□

Series	PWM converter type	Fig	Dimensions [mm]			Approx. weight [kg]
			W	H	D	
400V series	RHC132S-4D□	A	226.2	1100	565	95
	RHC160S-4D□	A				
	RHC200S-4D□	A				
	RHC220S-4D□	B	226.2	1400	565	125
	RHC280S-4D□	B				135
	RHC315S-4D□	B				
	RHC630B-4D□ (*1)	C	226.2	1400	567.3	135×3
	RHC710B-4D□ (*1)	C				
	RHC800B-4D□ (*1)	C				

*1) Each stack corresponds to one phase, and one set of the inverter consists of three stacks.
The keypad is attached only to the S phase.

Fig. C

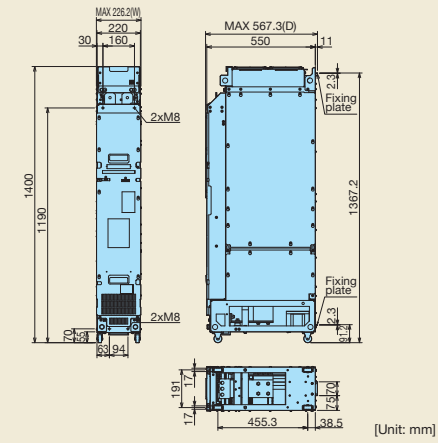
S-phase stack



[Unit: mm]

RHC630B-4D□ to RHC800B-4D□

R,T-phase stack



[Unit: mm]

RHC630B-4D□ to RHC800B-4D□

Peripheral equipment

<Boosting reactor>

Fig. A

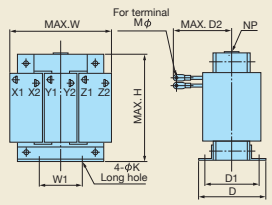


Fig. B

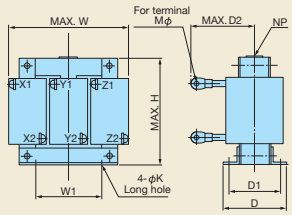


Fig. C

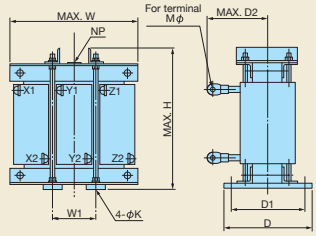


Fig. D

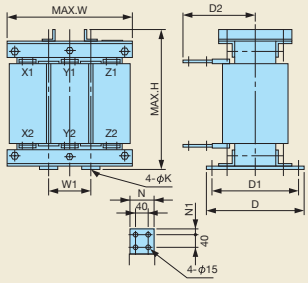
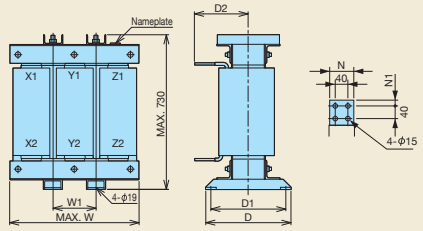


Fig. E



Boosting reactor type		Fig	Dimensions [mm]										Approx. weight [kg]
			W	W1	H	D	D1	D2	K	M	N	N1	
400V series	LR4-7.5C	B	180	75	205	105	85	90	7	M4	-	-	12
	LR4-15C	A	195	75	215	131	110	120	7	M5	-	-	18
	LR4-22C	C	240	80	340	215	180	120	10	M6	-	-	33
	LR4-37C	C	285	95	405	240	205	130	12	M8	-	-	50
	LR4-55C	C	285	95	415	250	215	145	12	M10	-	-	58
	LR4-75C	C	330	110	440	255	220	150	12	M10	-	-	70
	LR4-110C	C	345	115	490	280	245	170	12	M12	-	-	100
	LR4-160C	C	380	125	550	300	260	185	15	M12	-	-	140
	LR4-220C	C	450	150	620	330	290	230	15	M12	-	-	200
	LR4-280C	C	480	160	740	330	290	240	15	M16	-	-	250
	LR4-315C	C	480	160	760	340	300	250	15	M16	-	-	270
	LR4-355C	C	480	160	830	355	315	255	15	M16	-	-	310
	LR4-400C	C	480	160	890	380	330	260	19	M16	-	-	340
	LR4-500C	C	525	175	960	410	360	290	19	M16	-	-	420
	LR4-630C	D	600	200	640	440	390	290	19	-	75	17.5	450
	LR4-710C	E	645	215	730	440	390	295	19	-	100	30	510
	LR4-800C	E	690	230	850	450	400	290	19	-	100	30	600

<Filtering reactor>

Fig. A

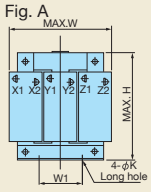


Fig. B

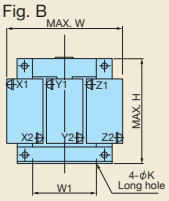
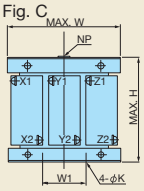
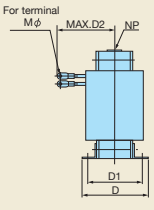
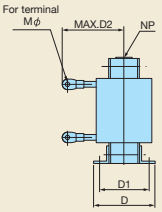


Fig. C







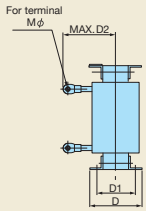


Fig. D

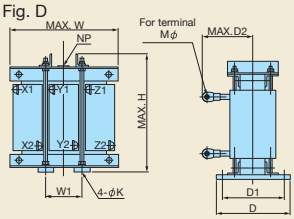
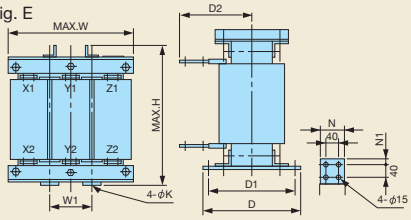


Fig. E



Filter reactor type		Fig	Dimensions [mm]										Approx. weight [kg]
			W	W1	H	D	D1	D2	K	M	N	N1	
400V series	LFC4-7.5C	A	125	40	100	85	67	75	6	M4	-	-	2.2
	LFC4-15C	A	125	40	100	93	75	90	6	M5	-	-	2.5
	LFC4-22C	A	125	40	100	93	75	95	6	M6	-	-	3.0
	LFC4-37C	B	150	60	115	108	90	110	6	M8	-	-	5.0
	LFC4-55C	B	175	60	145	110	90	120	6	M10	-	-	8.0
	LFC4-75C	B	195	80	200	113	93	130	7	M10	-	-	12
	LFC4-110C	C	255	85	220	113	90	145	7	M12	-	-	19
	LFC4-160C	C	255	85	245	137	110	150	7	M12	-	-	22
	LFC4-220C	D	300	100	320	210	180	170	10	M12	-	-	35
	LFC4-280C	D	330	110	320	230	195	195	12	M16	-	-	43
	LFC4-315C	D	315	105	365	230	195	200	12	M16	-	-	48
	LFC4-355C	D	315	105	395	235	200	210	12	M16	-	-	53
	LFC4-400C	D	345	115	420	235	200	235	12	M16	-	-	60
	LFC4-500C	D	345	115	480	240	205	240	12	M16	-	-	72
	LFC4-630C	E	435	145	550	295	255	200	15	-	75	17.5	175
	LFC4-710C	E	480	160	570	295	255	215	15	-	100	30	190
	LFC4-800C	E	480	160	600	320	270	220	15	-	100	30	220

Power regenerative PWM converter (RHC series)

Dimensions

Peripheral equipment

<Filtering capacitor>

Fig. A

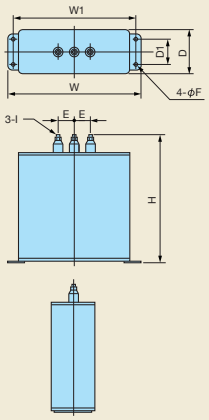
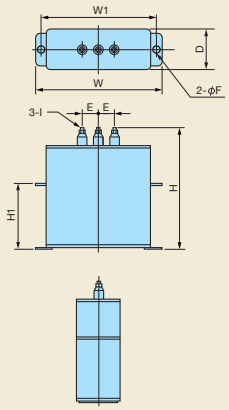


Fig. B



Filtering capacitor type		Fig	Dimensions [mm]									Approx. weight [kg]
			W	W1	H	H1	D	D1	E	F	I	
400V series	CF4-7.5C	A	165	150	135	-	70	40	30	7	M5	1.3
	CF4-15C	A	165	150	215	-	70	40	30	7	M5	2.3
	CF4-22C	A	205	190	185	-	70	40	30	7	M5	2.5
	CF4-37C	A	205	190	205	-	70	40	30	7	M5	2.9
	CF4-55C	A	205	190	245	-	70	40	30	7	M5	3.5
	CF4-75C	A	205	190	205	-	70	40	30	7	M5	2.9
	CF4-110C	A	205	190	245	-	70	40	30	7	M5	3.5
	CF4-160C	A	280	265	260	-	90	55	80	7	M6	6.0
	CF4-220C	B	435	400	310	125	100	-	80	15x20 Long hole	M12	13.0
	CF4-280C	B	435	400	350	165	100	-	80	15x20 Long hole	M12	15.0
	CF4-315C	B	435	400	460	275	100	-	80	15x20 Long hole	M12	20.0
	CF4-355C	B	435	400	520	335	100	-	80	15x20 Long hole	M12	23.0
	CF4-400C	B	435	400	610	425	100	-	80	15x20 Long hole	M12	27.0
	CF4-500C	B	435	400	310	125	100	-	80	15x20 Long hole	M12	13.0
	CF4-630C	B	435	400	460	275	100	-	80	15x20 Long hole	M12	20.0
	CF4-710C	B	435	400	520	335	100	-	80	15x20 Long hole	M12	23.0
	CF4-800C	B	435	400	610	425	100	-	80	15x20 Long hole	M12	27.0

<Filtering resistor>

Fig. A

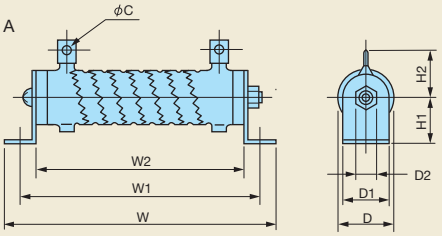


Fig. B

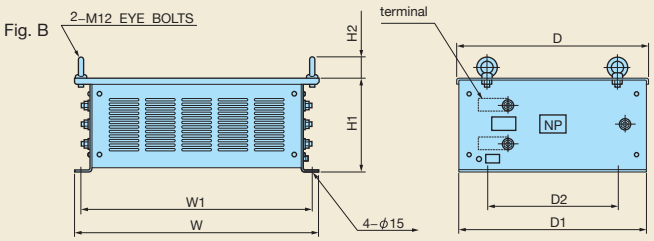
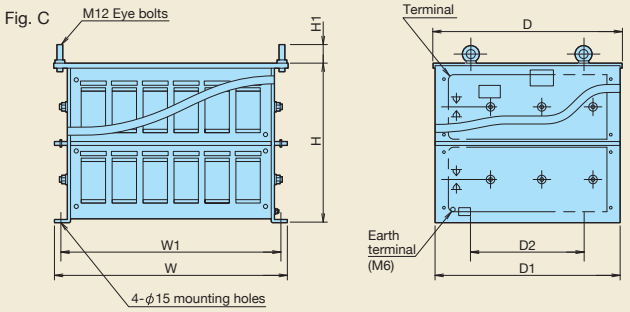
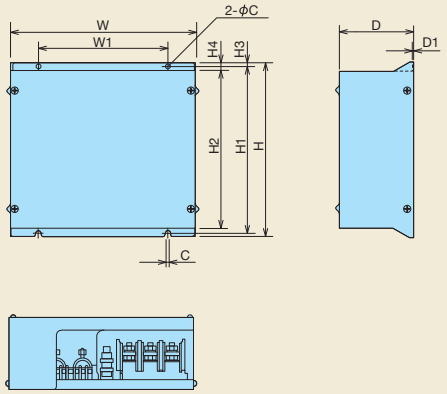


Fig. C



Filtering resistor type		Fig	Dimensions [mm]									Approx. weight [kg]	Number
			W	W1	W2	H1	H2	D	D1	D2	C		
400V series	GRZG80 1.74Ω	A	167	148	115	22	32	33	26	6	5.5	0.19	3
	GRZG150 0.79Ω	A	247	228	195	22	32	33	26	6	5.5	0.30	3
	GRZG200 0.53Ω	A	306	287	254	22	32	33	26	6	5.5	0.35	3
	GRZG400 0.38Ω	A	411	385	330	40	46	47	40	9.5	8.2	0.85	3
	GRZG400 0.26Ω	A	411	385	330	40	46	47	40	9.5	8.2	0.85	3
	GRZG400 0.53Ω	A	411	385	330	40	46	47	40	9.5	8.2	0.85	6
	RF4-160C	B	400	370	-	240	55	470	460	320	-	22	1
	RF4-220C											25	1
	RF4-280C	C	655	625	-	240	55	470	460	320	-	31	1
	RF4-315C											35	1
	RF4-355C											36	1
	RF4-400C											38	1
	RF4-500C											41	1
	RF4-630C		655	625	-	440	55	530	520	320	-	70	1
	RF4-710C											70	1
	RF4-800C											80	1

<Charging circuit box>



Charging circuit box type		Dimensions [mm]										Mounting bolt	Approx. weight [kg]
		W	W1	H	H1	H2	H3	H4	D	D1	C		
400V series	CU7.5-4C	270	170	300	285	270	7.5	15	100	2.4	6	M5	5.5
	CU15-4C												
	CU18.5-4C												6
	CU22-4C												
	CU30-4C	300	200	310	295	280	7.5	15	110	2.4	6	M5	7
	CU45-4C												
	CU55-4C												
	CU75-4C	330	230	310	295	280	7.5	15	130	2.4	6	M5	8
	CU90-4C												
	CU110-4C												
	CU132-4C	430	330	560	536	510	12	25	150	3.2	10	M8	18
	CU160-4C												
	CU200-4C												20
	CU220-4C												

<Charger resistor>

Fig. A

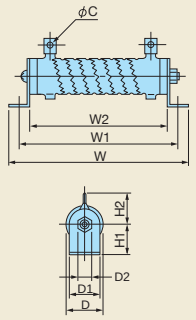
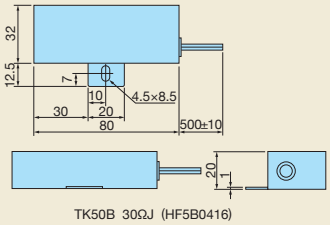


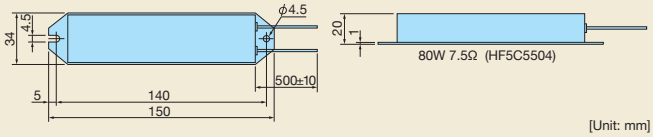
Fig. B



TK50B 30ΩJ (HF5B0416)

[Unit: mm]

Fig. C



80W 7.5Ω (HF5C5504)

[Unit: mm]

Charger resistor type	Fig	Dimensions [mm]									Approx. weight [g]
		W	W1	W2	H1	H2	D	D1	D2	C	
GRZG120 2Ω	A	217	198	165	22	32	33	22	6	5.5	250
GRZG400 1Ω	A	411	385	330	40	39	47	40	9.5	5.5	850
TK50B 30ΩJ (HF5B0416)	B	-	-	-	-	-	-	-	-	-	150
80W 7.5Ω (HF5C5504)	C	-	-	-	-	-	-	-	-	-	180

<Fuse>

Fig. A

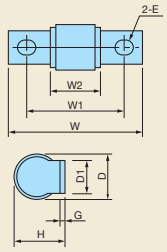


Fig. B

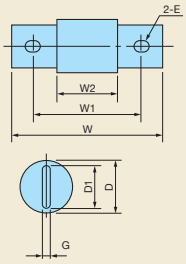
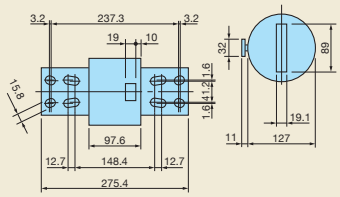
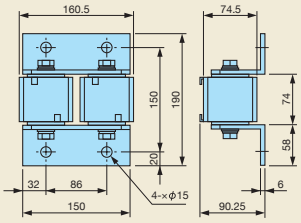


Fig. C



[Unit: mm]

Fig. D

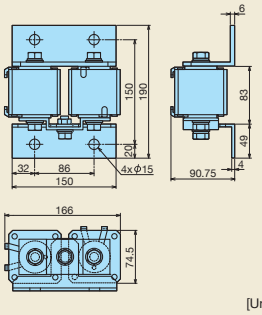


[Unit: mm]

Fuse type		Fig	Dimensions [mm]								Approx. weight [g]
			W	W1	W2	H	D	D1	G	E	
400V series	CR6L-30/UL	A	76	62	47	18.5	17.5	12	2	6.5x8.5	42
	CR6L-50/UL										
	CR6L-75/UL	A	95	70	40	34	30	25	3.2	11x13	150
	CR6L-100/UL										
	CR6L-150/UL										
	CR6L-200/UL	A	107	82	43	42	37	30	4	11x13	246
	CR6L-300/UL										
	A50P400-4	B	110	78.6	53.1	-	38.1	25.4	6.4	10.3x18.4	300
	A50P600-4	B	113.5	81.75	56.4	-	50.8	38.1	6.4	10.3x18.2	600
	A70QS800-4	B	180.2	129.4	72.2	-	63.5	50.8	9.5	13.5x18.3	1100
	A70P1600-4TA	C	-	-	-	-	-	-	-	-	7400
	A70P2000-4	C	-	-	-	-	-	-	-	-	8000
	HF5G2655	D	-	-	-	-	-	-	-	-	4700
	SA598473	E	-	-	-	-	-	-	-	-	4500

Note) The "SA598473" will be used for the stack type inverter.
For the detail, refer to the FRENIC-VG User Manual (For the Stack Type).

Fig. E



[Unit: mm]

Filter stack (RHF series) for Power regenerative PWM converter (RHC-D)

Features

This is a filter assembled in a stack type construction, to be used together with stack type PWM converter (RHC-D).

Specifications (RHF series)

400V series

Type RHF□S-4D□	160	220	280	355
Rated current [A]	282	384	489	619
Main power Phase, Voltage, Frequency	3-Phase 380 to 440V/50Hz, 380 to 460V/60Hz Voltage: +10 to -15%, Frequency: +5 to -5%			
Approx. weight [kg]	155	195	230	250
Enclosure	IP00 open type			

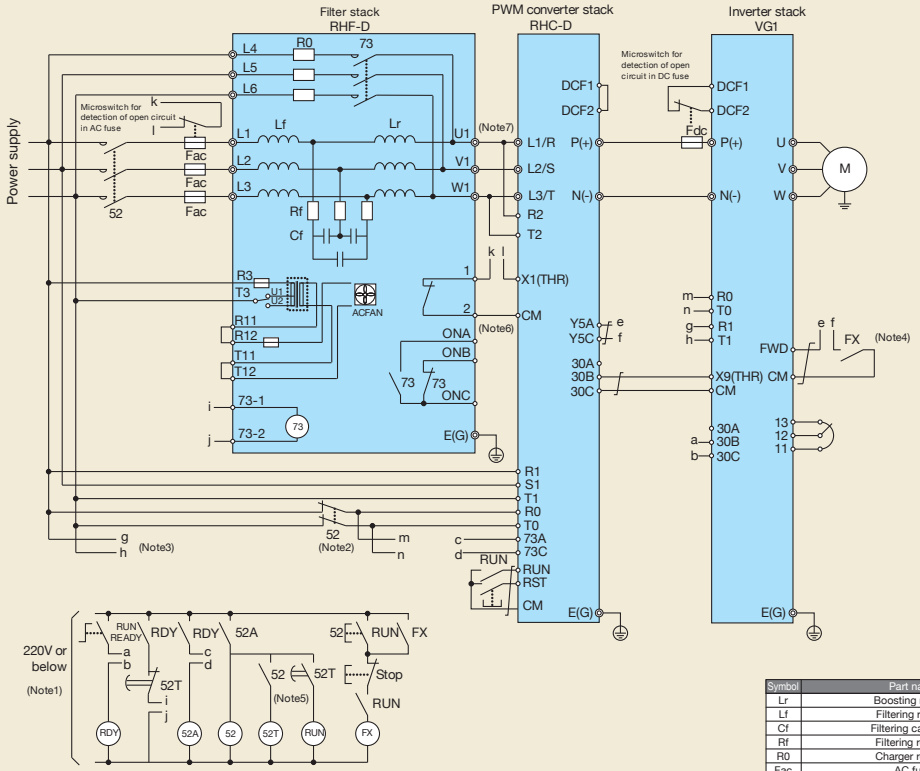
690V series (Under development)

Type RHF□S-69D□	160	220	280	355	450
Rated current [A]	163	223	283	359	455
Main power Phase, Voltage, Frequency	3-Phase 575 to 690V, 50Hz/60Hz Voltage: +10 to -15%, Frequency: +5 to -5%				
Approx. weight [kg]	-	-	-	-	-
Enclosure	IP00 open type				

Terminal Functions

Category	Symbol	Name	Functions
Main circuit	L1, L2, L3	Main Power input	Connects a 3-phase power supply.
	U1, V1, W1	Filter output	Connect to PWM converter power input terminals L1/R,L2/S, and L3/T.
	L4, L5, L6	Charging circuit input	Connects a 3-phase power supply.
	E(G)	Grounding	Ground terminal for filter stack chassis (housing).
	R3, T3	Fan power supply input (at input of 400 V)	To be used as supply input of AC cooling fan inside of filter stack.
	R11, R12 T11, T12	For manufacturer use	
Input signal	73-1 73-2	Control input of contactor for charging circuit	Input control signal for contactor for charging circuit. <Rated capacity of coil> • At power on ... 200 V/50 Hz: 120 VA, 220 V/60 Hz: 135 VA • At power hold ... 200 V/50 Hz: 12.7 VA, 220 V/60 Hz: 12.4 VA
Output signal	ONA ONB ONC	Operation signal of charging circuit	Auxiliary contact of contactor for charging circuit To be used as signal for operational check of charging circuit. Contact rating: 24 VDC 3 A * Min. working voltage/current: 5 VDC 3 mA
	1 2	Alarm output	Signal is output when internal parts of filter stack are overheated. Contact rating: 24 VDC, 3 mA /max

Wiring Diagram



Symbol	Part name
Lr	Boosting reactor
Lf	Filtering reactor
Cf	Filtering capacitor
Rf	Filtering resistor
R0	Charger resistor
Fac	AC fuse
Fdc	DC fuse
73	Magnetic contactor for charging circuit
52	Magnetic contactor for power supply

(Note 1) For the 400 V class power supply, connect a stepdown transformer to limit the voltage of the sequence circuit to 220 V or below.
(Note 2) Be sure to connect the auxiliary power input terminals R0 and T0 of the PWM converter to the main power input lines via B contacts of magnetic contactors of the charging circuit (73 or MC). Note that when applied to an ungrounded power supply, an insulated transformer is required. For the details, refer to the "PWM Converter Instruction Manual".
(Note 3) Be sure to connect the fan power input terminals R1 and T1 of the inverter to the main power input lines without going through the MC's B contacts or 73.
(Note 4) Construct a sequence in which a run command is given to the inverter after the PWM converter becomes ready to run.
(Note 5) Set the timer 52T at 1 sec.
(Note 6) Assign the external alarm THR to any of terminals [X1] to [X9] on the inverter.
(Note 7) Wiring for terminals L1/R, L2/S, L3/T, R2, T2, R1, S1, and T1 should match with the phase sequence.

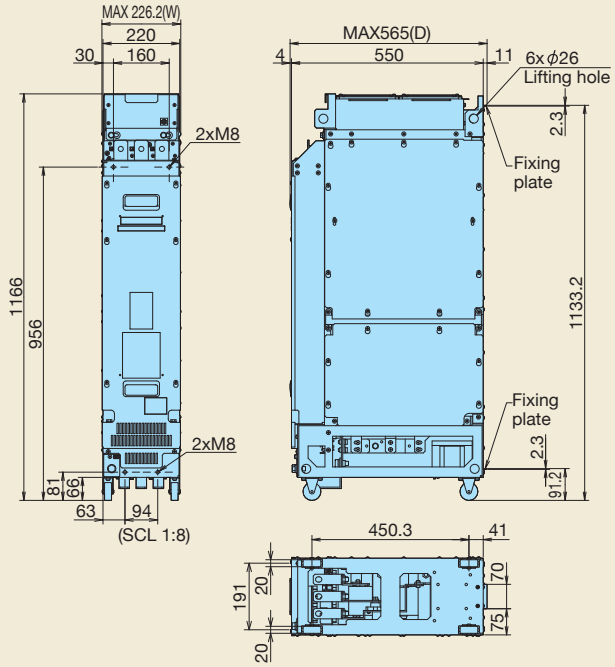
RHC-D application table

RHC-D Type	RHF-D		MCCB, ELCB	Magnetic contactor		Fuse		Microswitch	
	Type	Q'ty	Rated current [A]	Type	Q'ty	Type	Q'ty	Type	Q'ty
RHC132S-4D□	RHF160S-4D□	1	300	SC-N8	1	170M5446	3	170H3027	3
RHC160S-4D□	RHF160S-4D□	1	350	SC-N11	1	170M6546	3		
RHC200S-4D□	RHF220S-4D□	1	500	SC-N12	1	170M6547	3		
RHC220S-4D□	RHF220S-4D□	1	500	SC-N12	1	170M6547	3		
RHC280S-4D□	RHF280S-4D□	1	600	SC-N14	1	170M6499	3		
RHC315S-4D□	RHF355S-4D□	1	700	SC-N14	1	170M6500	3		

Filter stack (RHF series) for Power regenerative PWM converter (RHC-D)

Dimensions

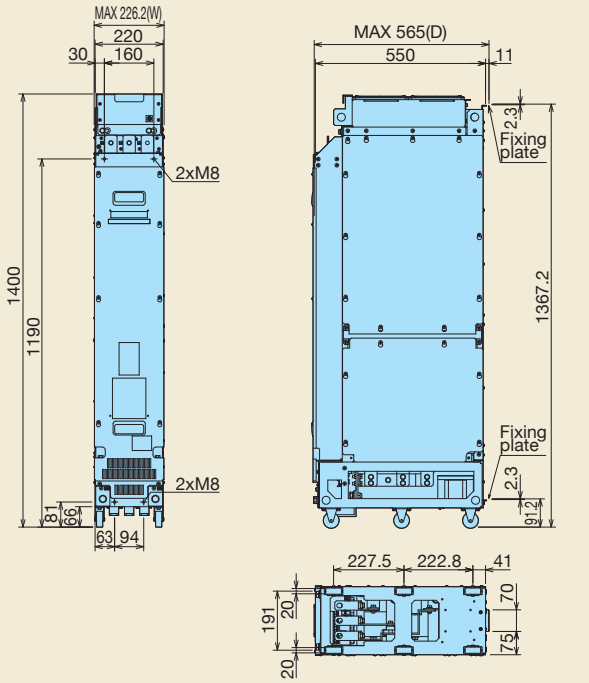
Fig. A



[Unit: mm]

RHF160S-4D□
RHF220S-4D□

Fig. B



[Unit: mm]

RHF280S-4D□
RHF355S-4D□

[Unit: mm]

	Fig	W	H	D
RHF160S-4D□	A	220 (MAX:226.2)	1166	550 (MAX:565)
RHF220S-4D□				
RHF280S-4D□	B	220 (MAX:226.2)	1400	550 (MAX:565)
RHF355S-4D□				

Diode rectifier (RHD-D)

Features

Converter type
Diode rectifier converts AC power to DC power, then supplies DC power to inverter.

Substantial applicable capacity
A large capacity system may be constructed by connecting converters in parallel.
(3-parallel, 12-pulse rectifying system: using 6 units of diode rectifiers) Max:1370kW

Suppression of harmonic currents
This unit is equipped with DC reactor for suppression of the harmonic currents. Further suppression of harmonic currents is made possible by creating a 12-pulse rectifier system in combination with power transformer, when connecting more than one unit in parallel.

Control device
A control device for regenerative energy processing (attached externally) is available for equipment which generate regenerative energy from motor, offering a selection of capacities required for the amount of regenerative energy for construction of a compact system.

Standard Specifications

400V series

Model		RHD200S-4D□	RHD315S-4D□
Max. connection capacity [kW] (*1)		600	945
Min. connection capacity [kW] (*2)		110	180
Output	Continuous rating [kW]	227	353
	Overload rating	150% of continuous rating for 1 minute	
	Voltage	DC 436 to 747V (variable with input power supply voltage and load)	
Required power supply capacity [kVA]		248	388
Input power supply	Main power Phase, Voltage, Frequency	3-phase, 380 to 440V/50Hz, 380 to 480V 60Hz (*3)	
	Auxiliary input for fan power Phase, Voltage, Frequency	Single-phase, 380 to 440V/50Hz, 380 to 480V 60Hz (*4)	
	Voltage/frequency variation	Voltage: +10 to -15%, Frequency: +5 to -5%, Voltage unbalance: 2% or less (*5)	
Approximate weight [kg]		125	160
Enclosure		IP00	

690V series (Under development)

Model		RHD220S-69D□	RHD450S-69D□
Max. connection capacity [kW] (*1)		-	-
Min. connection capacity [kW] (*2)		-	-
Output	Continuous rating [kW]	252	504
	Overload rating	150% of continuous rating for 1 minute	
	Voltage	DC 776 to 1091V (variable with input power supply voltage and load)	
Required power supply capacity [kVA]		270	549
Input power supply	Main power Phase, Voltage, Frequency	3-phase, 575 to 690V/50Hz, 60Hz (*3)	
	Auxiliary input for fan power Phase, Voltage, Frequency	Single-phase, 575 to 690V/50Hz, 60Hz (*4)	
	Voltage/frequency variation	Voltage: +10 to -15%, Frequency: +5 to -5%, Voltage unbalance: 2% or less (*5)	
Approximate weight [kg]		-	-
Enclosure		IP00	

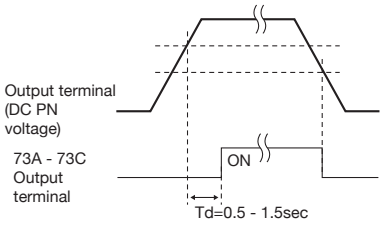
(*1) Represents the total capacity of connectable inverters; however, capacity which may be operated simultaneously in driving mode is continuous rating.
(*2) Represents the minimum capacity of connectable inverters. For less capacity the power factor decreases remarkably.
(*3) 400V series : Suppression of capacity is required for supply voltage under 400V.
690V series : Suppression of capacity is required for supply voltage under 690V.
(*4) 400V series : Connector inside the diode rectifier needs to be switched in case of 380 to 398V/50Hz and 380 to 430V/60Hz power supplies.
690V series : Connector inside the diode rectifier needs to be switched in case of 575 to 629V/50Hz, 60Hz power supplies.
(*5) $\text{Interphase unbalance rate (\%)} = \frac{\text{max. voltage [V] - min. voltage [V]}}{\text{3-phase average voltage}} \times 67$

Diode rectifier (RHD-D)

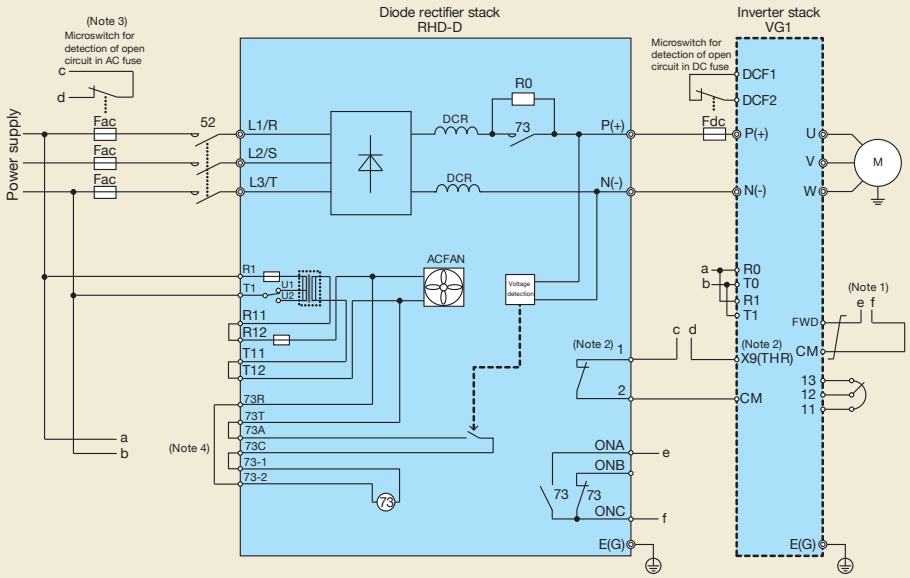
Terminal Functions

Category	Symbol	Name	Functions
Main circuit	L1/R, L2/S, L3/T	Main supply input	Connect to 3-phase power supply.
	P(+), N(-)	Converter output	Connect to inverter power input terminals P (+) and N (-).
	E(G)	Ground terminal	Ground terminal of diode rectifier chassis (case)
	R1, T1	Fan power supply input (at input of 400 V)	To be used as supply input of AC cooling fan inside of diode rectifier. Internal switching connector needs to be changed to meet supply voltage.
	R11, R12 T11, T12	For manufacturer use	
	73R 73T	Power supply for charging circuit	Coil supply of charging circuit contactor for charging circuit. Not to be used as power supply for external circuit.
Input signal	73-1 73-2	Control input of contactor for charging circuit	Input control signal for charging circuit contactor. Control signal may also be input externally. <Rated capacity of coil> • At power on ... 200 V/50 Hz: 195 VA, 220 V/60 Hz: 230 VA • At power hold ... 200 V/50 Hz: 14.3 VA, 220 V/60 Hz: 14.4 VA
Output signal	73A 73C	Output of control signal for charging circuit	Control signal of charging circuit Contact rating : 250 VAC 0.5 A cosϕ=0.3, 30 VDC 0.5 A
	ONA ONB ONC	Operation signal of charging circuit	Auxiliary contact of charging circuit contactor. To be used as signal for operational check of charging circuit. Contact rating: 24 VDC 3 A * Min. working voltage/current: 5 VDC 3 mA
	1 2	Output of bulk alarm	Signal is output when internal parts of diode rectifier are overheated. Contact rating: 24 VDC, 3 mA /max

(*1) See below for timing chart of output signal, and DC PN voltage at signal output.



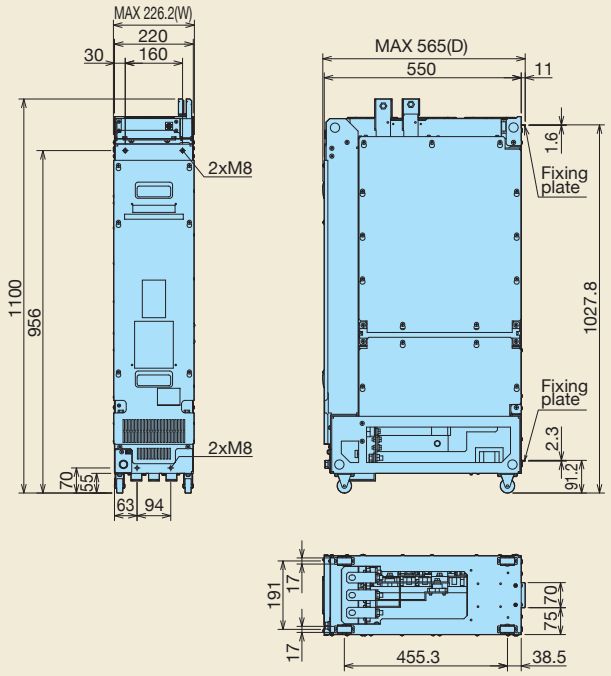
Wiring Diagram



Note 1) Construct a sequence so that the run command is input to the inverter after the initial charging of the diode rectifier has been completed.
Note 2) The overheat signal of the diode rectifier is output. Connect after setting any one of X1 - X9 terminals of inverter to external alarm (THR) or coast-to-a-stop command (BX). THR setting is shown in this diagram.
Note 3) Connect after setting any one of X1 - X9 terminals of inverter to external alarm (THR) or coast-to-a-stop command (BX) when detecting open circuit in AC fuse. THR setting is shown in this diagram.
Note 4) The control signals and drive power supply for charging circuit contactors (73) can be input externally. Refer to the User's Manual for details.

Dimensions

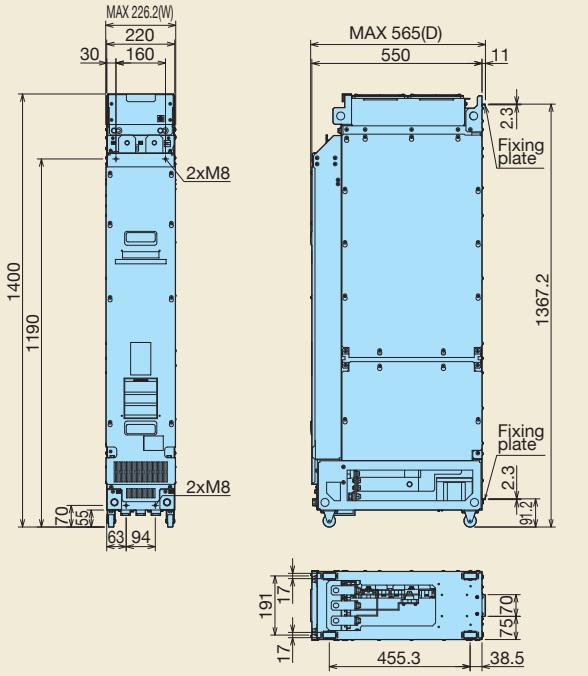
Fig. A



[Unit: mm]

RHD200S-4D□

Fig. B



[Unit: mm]

RHD315S-4D□

[Unit: mm]

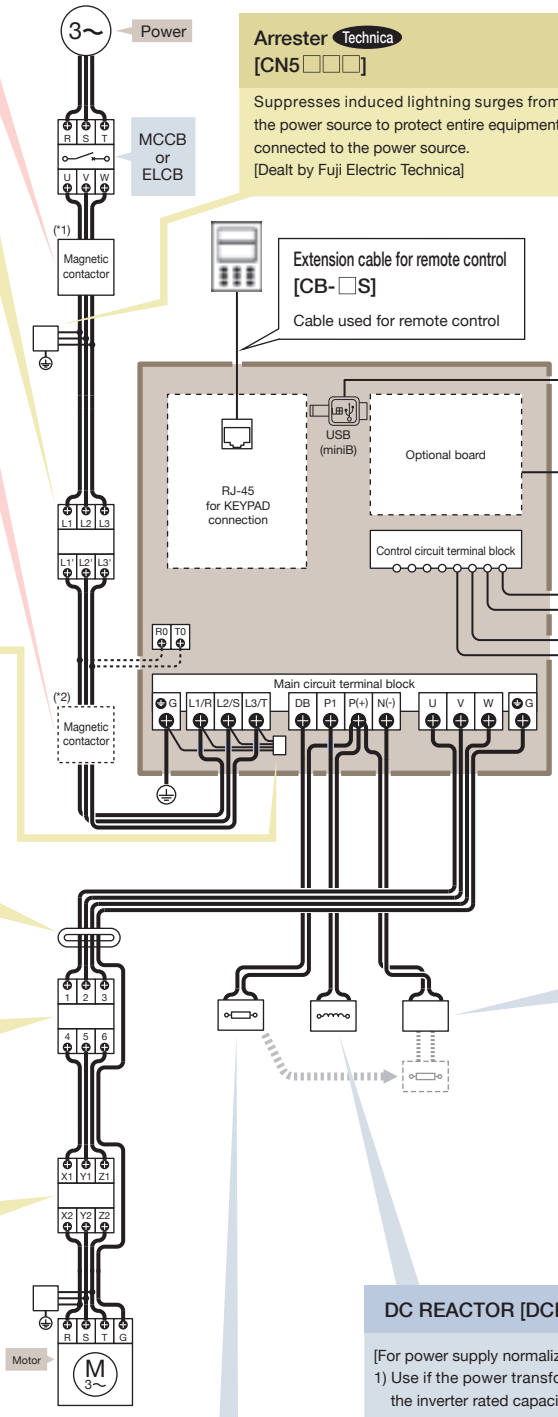
	Fig	W	H	D
RHD200S-4D□	A	220 (MAX:226.2)	1100	550 (MAX:565)
RHD315S-4D□	B	220 (MAX:226.2)	1400	550 (MAX:565)

RHD-D application table
<MD mode>

RHD-D Type	MCCB	Electromagnetic contactor	Fuse	Microswitch
	Rated current [A]	Type	Type	Type
RHD200S-4D□	500	SC-N12	170M6547	170H3027
RHD315S-4D□	700	SC-N12	170M6500	170H3027

System configuration guides

System configuration guides (Example of Unit Type)



(*1)
When R0 and T0 terminals are not used, install a magnetic contactor in this position.

EMC compliance filter (coming soon) [EFL-□□□, FS□□, FN□□]

Dedicated filter to comply with the European EMC Directive (Emission). Install the filter while referring to the details in the installation manual.

Power filter for input circuit Technica [RNF□C□□-□□]

This filter can be used for the same purpose as the EMC compliance filter, but is not an EMC compliance.

(*2)
When R0 and T0 terminals are used, install a magnetic contactor in this position.

Filter capacitor for reducing radio noise Technica [NFM□□M315KPD□]

Used to reduce radio noise. This is effective for the AM radio frequency band.
*Do not use it on the inverter output side.
[Made by Nippon Chemi-con, dealt by Fuji Electric Technica]

Zero phase reactor for reducing radio noise [ACL-40B, ACL-74B, F200160]

Used to reduce radio noise. Suppressive effect to the frequency band is available by approximately 1MHz or more. This is appropriate as a simple measure against noise since it affects broad range in the frequency band.It is recommended to insert it on the power supply side if the cable length between a motor and an inverter is short (roughly 20m or less) or on the output side if the cable length exceeds 20m.

Power filter for output circuit Technica [RNF□S□□-□□]

This will become more effective in noise reduction if used together with the power filter for input circuit.

Output circuit filter [OFL-□□□-4A]

Connected to the output of an inverter to:
- Suppress fluctuations of motor terminal voltage.
- Prevent damages to the motor insulation due to surge voltage in 400V series inverter.

*This filter is not limited by carrier frequency. Also, motor can be tuned while this option is installed.

Surge killer

Absorbs surge voltage coming from L-load of magnetic contactor and solenoid valve to protect electronic devices from malfunctioning.

Surge absorber Technica

(Connect in parallel to the coil that is a generation source of surge.)

[S2-A-O (for magnetic contactor and solenoid valve)]
[S1-B-O (for mini control relay and timer)]

Surge killer for L-load

(Connect to the power circuit that is a generation source of surge.)

[FSL-323 (for 3-phase)]
[FSL-123 (for single -phase)]

Arrester Technica [CN5□□□]

Suppresses induced lightning surges from the power source to protect entire equipment connected to the power source.
[Dealt by Fuji Electric Technica]

Extension cable for remote control [CB-□S]

Cable used for remote control

PC loader for Windows Inverter support software (FRENIC-VG loader)

This software is used to set the function codes of the inverter from a PC, to manage the data. ("WPS-VG1-STR" is available as free download from our website.)

Battery for memory backup, storing trace back memory and calendar function [OPK-BP]

22kW or below: optional,
30kW or above: standard equipment

Speed setting potentiometer

Tachometer

Braking unit [BU□□-□C]

To be used together with a braking resistor to increase the inverter braking performance.

Power regenerative PWM converter, RHC series [RHC□□-□C]

Used for suppressing power source harmonics of inverters. It is also equipped with a power supply regenerative function to drastically increase braking capability and reduce energy consumption.

* Use in combination with dedicated reactors for the RHC series.
* Use in combination with dedicated filter reactors, filter capacitors and filter resistors.

Dedicated filter for the RHC series

Dedicated filter for the RHC series is used if other electronic equipment is connected to the same power source.

Braking resistor [DB□□V-□□]

Increases braking capability for highly frequent stopping and large moment of inertia. When used together with a braking unit, connect this to the connection terminal of the braking unit.

DC REACTOR [DCR□-□□□]

[For power supply normalization]
1) Use if the power transformer capacity is 500kVA or more and exceeds the inverter rated capacity by 10 times.
2) Use if the inverter and a thyristor converter are connected to the same transformer.

*Check if the thyristor converter uses a commutation reactor. If not,an AC reactor must be connected to the power supply side.

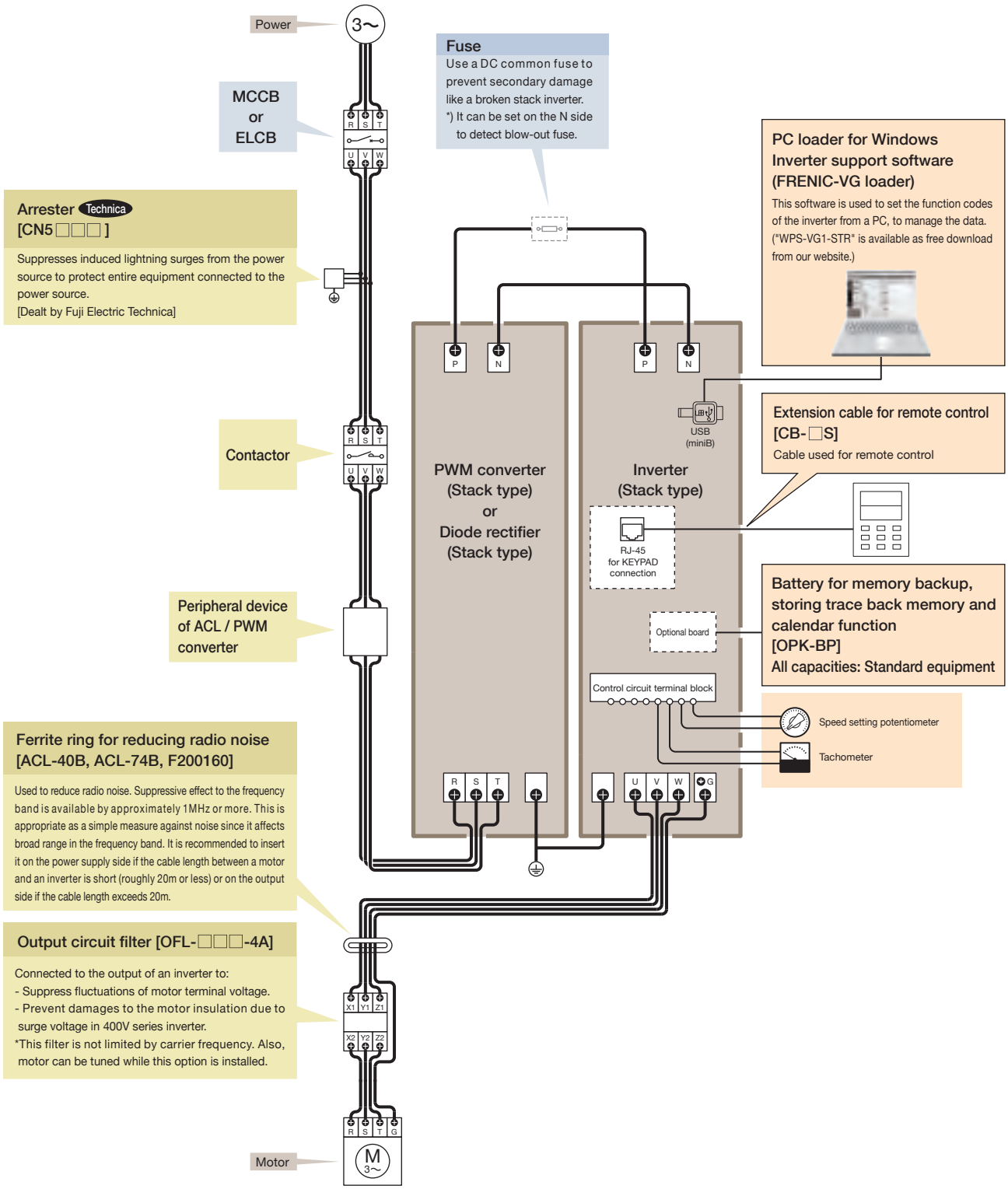
3) Connect to prevent trips when trip occurs due to opening/closing of the phase-advancing capacitor for the power supply lines.
4) Use if the voltage unbalance exceeds 2%.

[For improving the input power-factor and reducing harmonics]
● Used to reduce the input harmonic current (correcting power-factor)

* For the drop effect, refer to the guideline appendix.

* The items indicated with Technica are dealt by Fuji Electric Technica.

System configuration guides (Example of Stack Type)



* The items indicated with Technica are dealt by Fuji Electric Technica.

Options

The options for inverter.

Optional card

Category	Name	Type	Switch with SW on the Pt board	Specifications	Remarks
Analog card	Aio extension card	OPC-VG1-AIO		Extension card of Ai 2 points + Ao 2 points	
Digital card (for 8 bit bus)	Di interface card	OPC-VG1-DI	OPC-VG1-DI (A)	16 bit Di of binary or 4-digit BCD + sign	
			OPC-VG1-DI (B)	For setting the speed, torque and the torque current reference.	
	Dio extension card	OPC-VG1-DIO	OPC-VG1-DIO (A)	Extension of Di (4bits) and Do (8bits) for function selection. Dio option card for direct landing control. Di × 16 bit + Do ×10 bit	
			OPC-VG1-DIO (B)	UPAC exclusive use	
	PG interface expansion card	OPC-VG1-PG	OPC-VG1-PG (SD)	+ 5V line driver type, voltage output PGs	
			OPC-VG1-PG (LD)	(A,B and Z-phase signals).	
			OPC-VG1-PG (PR)	Used for detecting motor speed, line speed, position	
			OPC-VG1-PG (PD)	reference and position detection.	
		OPC-VG1-PGo	OPC-VG1-PGo (SD)	Open collector type voltage output PGs	
			OPC-VG1-PGo (LD)	(A,B and Z-phase signals).	
			OPC-VG1-PGo (PR)	Used for detecting motor speed, line speed, position	
			OPC-VG1-PGo (PD)	reference and position detection.	
		OPC-VG1-SPGT		ABS encoder with 17 bit resolution	
	PG card for synchronous motor drive	OPC-VG1-PMPG		+5V line driver type / A, B + magnetic pole position (Max. 4bit)	
		OPC-VG1-PMPGo		Open collector type / A, B + magnetic pole position (Max. 4bit)	
	T-Link interface card	OPC-VG1-TL		T-Link interface card	
	CC-Link interface card	OPC-VG1-CCL		CC-Link compliant card (Ver2.00)	
	High-speed serial connections for UPAC	OPC-VG1-SIU		Use for UPAC communication system	
Digital card (for 16 bit bus)	SX bus communication card	OPC-VG1-SX		SX bus communication card	
	E-SX bus communication card	OPC-VG1-ESX		E-SX bus communication card	
	PROFINET-IRT	OPC-VG1-PNET		PROFINET-IRT communication card	coming soon
	User Programmable Application Card	OPC-VG1-UPAC		Technology card	
Fieldbus interface card	PROFIBUS-DP	OPC-VG1-PDP		PROFIBUS-DP interface card	
	DeviceNet	OPC-VG1-DEV		DeviceNet interface card	
Safety card	Functional safety card	OPC-VG1-SAFE		Safety standard compliant card	
Control circuit terminal	Terminal block for high-speed serial communications	OPC-VG1-TBSI		Used for multiple-winding motor drive system, direct parallel connection system	
Loader	Inverter support loader	WPS-VG1-STR		For Windows (Free version).	
		WPS-VG1-PCL		For Windows (Paid version).	

Cable

Category	Name	Type	Length (m)	Specifications
Cable	Extension cable for remote control	CB-5S	5m	Connection cable between an inverter and the KEYPAD panel
		CB-3S	3m	
		CB-1S	1m	
	Encoder cable for GNF2	CB-VG1-PMPG-05S	5m	Straight plug
		CB-VG1-PMPG-15S	15m	
		CB-VG1-PMPG-30S	30m	
		CB-VG1-PMPG-50S	50m	
		CB-VG1-PMPG-05A	5m	Angle plug
		CB-VG1-PMPG-15A	15m	
		CB-VG1-PMPG-30A	30m	
		CB-VG1-PMPG-50A	50m	

Dedicated lifter for Inverter (Stack Type)

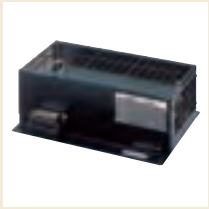
Coming soon

Applicable models: FRENIC-VG (Stack type), Converter (RHC-D, RHF-D, RHD-D)

Appearance of lifter

Example of use of lifter

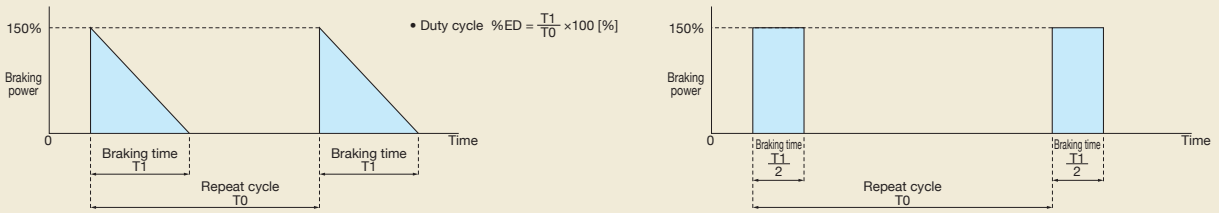
Braking resistor, braking unit (max. 150% torque, 10% ED)



Power supply voltage	Nominal applied motor [kW]	Inverter type	Braking unit		Braking resistor			Continuous braking (150% torque conversion value)			Repetitive braking (100s or less cycle)	
			For unit type									
		Unit type * (HD spec)	Type	Q'ty	Type	Ohmic value	Q'ty	Max. braking torque [%]	Braking time [s]	Discharging capability [kWs]	Duty cycle [%ED]	Average loss [kW]
400V series	3.7	FRN3.7VG1S-4□	Built-in unit		DB3.7V-41B	96Ω	1	150%	10s	27.75	10%ED	**0.2775**
	5.5	FRN5.5VG1S-4□			DB5.5V-41B	64Ω	1			41.25		**0.4125**
	7.5	FRN7.5VG1S-4□			DB7.5V-41B	48Ω	1			56.25		**0.5625**
	11	FRN11VG1S-4□			DB11V-41B	32Ω	1			82.5		**0.825**
	15	FRN15VG1S-4□			DB15V-41B	24Ω	1			112.5		**1.125**
	18.5	FRN18.5VG1S-4□			DB18.5V-41B	18Ω	1			138.75		**1.3875**
	22	FRN22VG1S-4□			DB22V-41B	16Ω	1			165		**1.65**
	30	FRN30VG1S-4□			DB30V-41B	10Ω	1			225		**2.25**
	37	FRN37VG1S-4□			DB37V-41B	9Ω	1			277.5		**2.775**
	45	FRN45VG1S-4□			DB45V-41B	8Ω	1			337.5		**3.375**
	55	FRN55VG1S-4□			DB55V-41C	6.5Ω	1			412.5		**4.125**
	75	FRN75VG1S-4□			DB75V-41C	4.7Ω	1			562.5		**5.625**
	90	FRN90VG1S-4□			DB90V-41C	3.9Ω	1			675		**6.75**
	110	FRN110VG1S-4□			DB110V-41C	3.2Ω	1			825		**8.25**
	132	FRN132VG1S-4□			DB132V-41C	2.6Ω	1			990		**9.9**
	160	FRN160VG1S-4□			DB160V-41C	2.2Ω	1			1200		**12.0**
	200	FRN200VG1S-4□	BU220-4C	2	DB200V-41C	3.5Ω/2	1			1500		**15.0**
	220	FRN220VG1S-4□			DB220V-41C	3.2Ω/2	1			1650		**16.5**
	250	–	–	–								
	280	FRN280VG1S-4□	BU220-4C	2	DB160V-41C	2.2Ω/2	2			2100		**21.0**
	315	FRN315VG1S-4□			DB160V-41C	2.2Ω/2	2			2363		**23.6**
	355	FRN355VG1S-4□	BU220-4C	3	DB132V-41C	2.6Ω/3	3			2663		**26.6**
	400	FRN400VG1S-4□			DB132V-41C	2.6Ω/3	3			3000		**30.0**
	500	FRN500VG1S-4□		4	DB132V-41C	2.6Ω/4	4			3750		**37.5**
	630	FRN630VG1S-4□			DB160V-41C	2.2Ω/4	4			4725		**47.3**

* For the unit type (MD) specification, refer to the User Manual.
* Please refer to the FRENIC-VG catalog for external dimensions.

(Note 1) The duty cycle [%ED] are calculated as the 150% torque braking used for deceleration as described below.
(Note 2) Two braking resistors are required for each of DB160V-41C, DB200V-41C, or DB220V-41C.
(Note 3) When connecting three braking units or more in parallel, refer to the supplement document of the DB Unit instruction manual (notes in connecting multiple units) INR-HF51614*.



[Selection procedure] All three conditions listed below must be satisfied simultaneously.

1 "The maximum braking torque" does not exceed the value shown on the table.
2 The energy discharged in the resistor for each braking (the area of the triangle shown in the above figure) does not exceed "the discharging capability [kWs]" on the table.
3 The average loss (energy discharged in the resistor divided by the braking interval) does not exceed "the average loss [kW]" shown on the table.

Options

Braking resistor (max. 150% torque, 30%ED)

Power supply voltage	Nominal applied motor [kW]	Inverter type		Braking resistor			Continuous braking (150% torque conversion value)		Repetitive braking (100s or less cycle)	
		Unit type HD spec (Stack type MD spec)	Unit type MD spec	Type	Ohmic value	Q'ty	Max. braking torque [%]	Discharging capability [kWs]	Duty cycle [%ED]	Average loss [kW]
400V series	3.7	FRN3.7VG1S-4□		DB003V-430SA	96Ω	1	150%	167	30%ED *Note	1.67
	5.5	FRN5.5VG1S-4□		DB005V-430SA	64Ω	1		248		2.48
	7.5	FRN7.5VG1S-4□		DB007V-430SA	48Ω	1		338		3.38
	11	FRN11VG1S-4□		DB011V-430SA	32Ω	1		495		4.95
	15	FRN15VG1S-4□		DB015V-430SA	24Ω	1		675		6.75
	18.5	FRN18.5VG1S-4□		DB018V-430SA	18Ω	1		833		8.33
	22	FRN22VG1S-4□		DB022V-430SA	16Ω	1		990		9.90
	30	FRN30VG1S-4□		DB030V-430SA	12Ω	1		1350		13.50
	37	FRN37VG1S-4□		DB037V-430SA	9Ω	1		1665		16.65
	45	FRN45VG1S-4□		DB045V-430SA	8Ω	1		2025		20.25
	55	FRN55VG1S-4□		DB055V-430SA	6.5Ω	1		2475		24.75
	75	FRN75VG1S-4□		DB075V-430SA	4.7Ω	1		3375		33.75
	90	FRN90VG1S-4□		DB045V-430SA (2P)	4Ω	2		4050		40.50
	110	FRN110VG1S-4□	FRN90VG1S-4□	DB055V-430SA (2P)	3.25Ω	2		4950		49.50
	132	FRN132VG1S-4□	FRN110VG1S-4□	DB045V-430SA (3P)	2.7Ω	3		6075		60.75
	160	FRN160VG1S-4□	FRN132VG1S-4□	DB055V-430SA (3P)	2.2Ω	3		7425		74.25
	200	FRN200VG1S-4□	FRN160VG1S-4□	Consult with Fuji						
	220	FRN220VG1S-4□	FRN200VG1S-4□							
	250		FRN220VG1S-4□							
	280	FRN280VG1S-4□								
	315	FRN315VG1S-4□	FRN280VG1S-4□							
	355	FRN355VG1S-4□	FRN315VG1S-4□							
	400	FRN400VG1S-4□	FRN355VG1S-4□							
	450		FRN400VG1S-4□							
	500	FRN500VG1S-4□								
	630	FRN630VG1S-4□								

* Inverters with a capacity of 160kW or below have a built-in braking circuit.

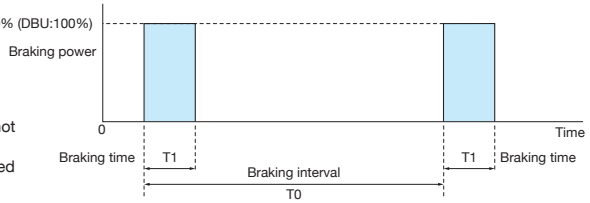
Braking resistor (max. 150% torque, 40%ED)

Power supply voltage	Nominal applied motor [kW]	Inverter type		Braking resistor			Continuous braking (150% torque conversion value)		Repetitive braking (100s or less cycle)	
		Unit type HD spec (Stack type MD spec)	Unit type MD spec	Type	Ohmic value	Q'ty	Max. braking torque [%]	Discharging capability [kWs]	Duty cycle [%ED]	Average loss [kW]
400V series	3.7	FRN3.7VG1S-4□		DB003V-440SA	96Ω	1	150%	222	40%ED *Note	2.22
	5.5	FRN5.5VG1S-4□		DB005V-440SA	64Ω	1		330		3.30
	7.5	FRN7.5VG1S-4□		DB007V-440SA	48Ω	1		450		4.50
	11	FRN11VG1S-4□		DB011V-440SA	32Ω	1		660		6.60
	15	FRN15VG1S-4□		DB015V-440SA	24Ω	1		900		9.00
	18.5	FRN18.5VG1S-4□		DB018V-440SA	18Ω	1		1110		11.10
	22	FRN22VG1S-4□		DB022V-440SA	16Ω	1		1320		13.20
	30	FRN30VG1S-4□		DB030V-440SA	12Ω	1		1800		18.00
	37	FRN37VG1S-4□		DB037V-440SA	9Ω	1		2220		22.20
	45	FRN45VG1S-4□		DB045V-440SA	8Ω	1		2700		27.00
	55	FRN55VG1S-4□		DB055V-440SA	6.5Ω	1		3300		33.00
	75	FRN75VG1S-4□		DB075V-440SA	4.7Ω	1		4500		45.00
	90	FRN90VG1S-4□		DB045V-440SA (2P)	4Ω	2		5400		54.00
	110	FRN110VG1S-4□	FRN90VG1S-4□	DB055V-440SA (2P)	3.25Ω	2		6600		66.00
	132	FRN132VG1S-4□	FRN110VG1S-4□	DB045V-440SA (3P)	2.7Ω	3		8100		81.00
	160	FRN160VG1S-4□	FRN132VG1S-4□	DB055V-440SA (3P)	2.2Ω	3		9900		99.00
	200	FRN200VG1S-4□	FRN160VG1S-4□	Consult with Fuji						
	220	FRN220VG1S-4□	FRN200VG1S-4□							
	250		FRN220VG1S-4□							
	280	FRN280VG1S-4□								
	315	FRN315VG1S-4□	FRN280VG1S-4□							
	355	FRN355VG1S-4□	FRN315VG1S-4□							
	400	FRN400VG1S-4□	FRN355VG1S-4□							
	450		FRN400VG1S-4□							
	500	FRN500VG1S-4□								
	630	FRN630VG1S-4□								

* Inverter with a capacity of 160kW or below have a built-in braking circuit.

(Note) *The braking time and duty cycle [%ED] are calculated as the constant-power braking as described below.

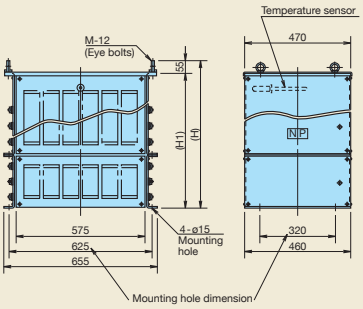
• Duty cycle %ED = $\frac{T1}{T0} \times 100$ [%]



[Selection procedure]

1 The maximum braking torque does not exceed the value shown on the table.
2 The energy discharged in the resistor for each braking (the area shown in the above figure) does not exceed the discharging capability [kWs] on the table.
3 The average loss (energy discharged in the resistor divided by the braking interval) does not exceed the average loss [kW] shown on the table.

Dimensions (Braking resistor max.150% torque, 30%, 40%ED Spec.)



30%ED/constant-power (100s cycle)

Voltage	Type	Dimensions [mm] H	Dimensions [mm] H1	Mass [kg]
400V series	DB003V-430SA	725	670	60
	DB005V-430SA	525	470	40
	DB007V-430SA			38
	DB011V-430SA			
	DB015V-430SA			41
	DB018V-430SA			50
	DB022V-430SA			60
	DB030V-430SA			63
	DB037V-430SA			80
	DB045V-430SA	725	670	125
	DB055V-430SA	925	870	138
	DB075V-430SA	1125	1070	230

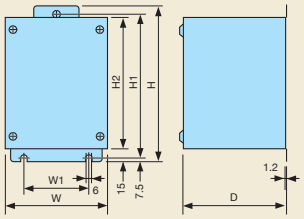
40%ED/constant-power (100s cycle)

Voltage	Type	Dimensions [mm] H	Dimensions [mm] H1	Mass [kg]
400V series	DB003V-440SA	725	670	60
	DB005V-440SA	525	470	40
	DB007V-440SA			38
	DB011V-440SA			
	DB015V-440SA			41
	DB018V-440SA			50
	DB022V-440SA			60
	DB030V-440SA			76
	DB037V-440SA	725	670	110
	DB045V-440SA	925	870	140
	DB055V-440SA	1125	1070	200
	DB075V-440SA *Note	925	870	365

Note: DB075V-440SA is composed of 2 resistors of the described size. Mass shows the total weight.

Braking unit (BU□□-□)

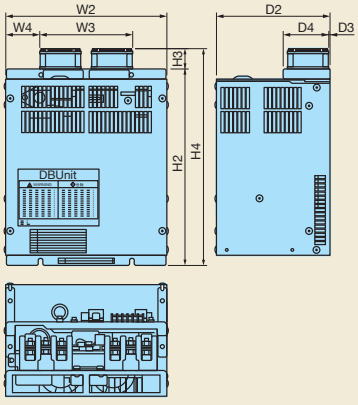
Fig. A



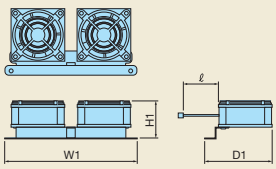
Voltage	Type	Fig	Dimensions [mm] W	W1	H	H1	H2	D	Approx. weight [kg]
400V series	BU37-4C	A	150	100	280	265	250	160	4
	BU55-4C		230	130	280	265	250		5.5
	BU90-4C		230	130	280	265	250		5.5
	BU132-4C		250	150	370	355	340		9
	BU220-4C		250	150	450	435	420		13

Fan unit for braking unit (BU-F)

■Braking unit + Fan unit



■Fan unit



The duty cycle [%ED] of the model with an external braking unit is increased from 10% ED to 30% ED by using this option.

[Fan unit]

Type	Dimensions [mm] W1	H1	D1	ℓ (Fan power supply cable)
BU-F	149	44	76	320

[Braking unit + Fan unit]

Voltage	Type	Dimensions [mm] W2	W3	W4	H2	H3	H4	D2	D3	D4
400V series	BU37-4C+BU-F	150	135	7.5	280	30	310	160	1.2	64
	BU55-4C+BU-F	230		47.5	280		310			
	BU90-4C+BU-F	230		47.5	280		310			
	BU132-4C+BU-F	250		57.5	370		400			
	BU220-4C+BU-F	250		57.5	450		480			

Options

The DC reactor is mainly used for the unit type. With the stack type, the DC reactor is built into the diode converter.
* For details, refer to the Stack Type User Manual.

DC Reactor (DCR□-□□□)

*For models with a standard motor of 75kW or more, it is included as a standard.

Voltage	Nominal applied motor [kW]	Inverter type		Reactor type
		HD Specification	MD Specification	
400V series	3.7	FRN3.7VG1S-4□	–	DCR4-3.7
	5.5	FRN5.5VG1S-4□	–	DCR4-5.5
	7.5	FRN7.5VG1S-4□	–	DCR4-7.5
	11	FRN11VG1S-4□	–	DCR4-11
	15	FRN15VG1S-4□	–	DCR4-15
	18.5	FRN18.5VG1S-4□	–	DCR4-18.5
	22	FRN22VG1S-4□	–	DCR4-22A
	30	FRN30VG1S-4□	–	DCR4-30B
	37	FRN37VG1S-4□	–	DCR4-37B
			–	DCR4-37C
	45	FRN45VG1S-4□	–	DCR4-45B
			–	DCR4-45C
	55	FRN55VG1S-4□	–	DCR4-55B
			–	DCR4-55C
	75	FRN75VG1S-4□	–	DCR4-75C
	90	FRN90VG1S-4□	–	DCR4-90C
	110	FRN110VG1S-4□	FRN90VG1S-4□	DCR4-110C
	132	FRN132VG1S-4□	FRN110VG1S-4□	DCR4-132C
	160	FRN160VG1S-4□	FRN132VG1S-4□	DCR4-160C
	200	FRN200VG1S-4□	FRN160VG1S-4□	DCR4-200C
	220	FRN220VG1S-4□	FRN200VG1S-4□	DCR4-220C
	250	–	FRN220VG1S-4□	DCR4-250C
	280	FRN280VG1S-4□	–	DCR4-280C
	315	FRN315VG1S-4□	FRN280VG1S-4□	DCR4-315C
	355	FRN355VG1S-4□	FRN315VG1S-4□	DCR4-355C
	400	FRN400VG1S-4□	FRN355VG1S-4□	DCR4-400C
	450	–	FRN400VG1S-4□	DCR4-450C
	500	FRN500VG1S-4□	–	DCR4-500C
	630	FRN630VG1S-4□	–	DCR4-630C

DC Reactor type	Remarks
Input power factor of DCR4-□□/□□A/□□B: approx. 90 to 95%	The letter at the end of the type code varies depending on the capacity.
Input power factor of the DCR4-□□C: about 86 to 90%	This can be selected with the inverter of 37kW or above.

•The DC Reactor (DCR) in thick-frame are provided as standard (supplied adding to the unit). Inverter types with -4E and -4C on the end are not available as standard. Please purchase as options.
*The DCR4-□□ B type is also prepared for motors of 75kW or above capacities, which are applicable as standard. Contact Fuji Electric for ordering product separately.
* Please refer to the FRENIC-VG catalog for external dimensions.

Voltage	Nominal applied motor [kW]	Inverter type	Reactor type
690V series	500	FRN500VG7S-69	DCR690-630B
	630	FRN630VG7S-69	

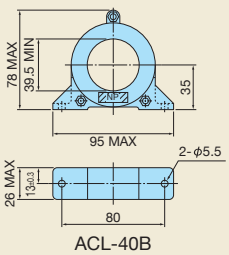
*Please refer to the variable speed AC Drives (For crane use) catarog (MEH637) for extnal dimensions.

AC Reactor (ACR□-□□□)

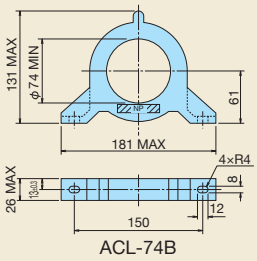
Voltage	Reactor type
400V series	ACR4-110
	ACR4-132
	ACR4-220
	ACR4-280
	ACR4-355
	ACR4-450
	ACR4-530
	ACR4-630

Note) It is not necessary to use the reactor unless a particularly stable power supply is required, i.e., DC bus connection operation (PN connection operation).
Use the DC reactor (DCR) as a measure against harmonics.
* Please refer to the FRENIC-VG catalog for external dimensions.

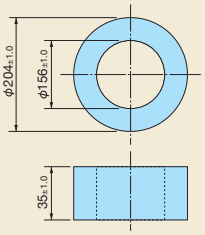
Zero-phase reactor for reducing radio noise (ACL-40B, ACL-74B, F200160)



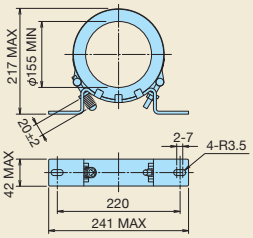
ACL-40B



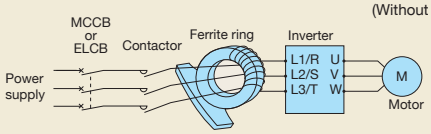
ACL-74B



F200160
(Without Mounting legs)



F200160PB
(With Mounting legs)



■Applied wire size list

Zero-phase reactor for reducing radio noise	Q'ty	No. of turns	Recommended wire size [mm²] Note)
ACL-40B	1	4	2.0, 3.5, 5.5
	2	2	8, 14
ACL-74B	1	4	8, 14
	2	2	22, 38, 60, 5.5×2, 8×2, 14×2, 22×2
	4	1	100, 150, 200, 250, 325, 38×2, 60×2, 100×2, 150×2
F200160	4	1	200×2, 250×2, 325×2, 325×3
F200160PB	4	1	200×2, 250×2, 325×2, 325×3

NOTE) Use a 600V HIV insulation cable (Allowable temp. 75°C).

Output circuit filter (OFL-□□□4A)

Voltage	Nominal applied motor [kW]	Inverter type			Filter Type
		Unit type		Stack type	
		HD Specification	MD Specification	MD Specification	
400V series	3.7	FRN3.7VG1S-4□	–	–	OFL-3.7-4A
	5.5	FRN5.5VG1S-4□	–	–	OFL-7.5-4A
	7.5	FRN7.5VG1S-4□	–	–	
	11	FRN11VG1S-4□	–	–	OFL-15-4A
	15	FRN15VG1S-4□	–	–	
	18.5	FRN18.5VG1S-4□	–	–	OFL-22-4A
	22	FRN22VG1S-4□		–	
	30	FRN30VG1S-4□	–	FRN30SVG1S-4□	OFL-30-4A
	37	FRN37VG1S-4□	–	FRN37SVG1S-4□	OFL-37-4A
	45	FRN45VG1S-4□	–	FRN45SVG1S-4□	OFL-45-4A
	55	FRN55VG1S-4□	–	FRN55SVG1S-4□	OFL-55-4A
	75	FRN75VG1S-4□	–	FRN75SVG1S-4□	OFL-75-4A
	90	FRN90VG1S-4□	–	FRN90SVG1S-4□	OFL-90-4A
	110	FRN110VG1S-4□	FRN90VG1S-4□	FRN110SVG1S-4□	OFL-110-4A
	132	FRN132VG1S-4□	FRN110VG1S-4□	FRN132SVG1S-4□	OFL-132-4A
	160	FRN160VG1S-4□	FRN132VG1S-4□	FRN160SVG1S-4□	OFL-160-4A
	200	FRN200VG1S-4□	FRN160VG1S-4□	FRN200SVG1S-4□	OFL-200-4A
	220	FRN220VG1S-4□	FRN200VG1S-4□	FRN220SVG1S-4□	OFL-220-4A
	250	–	FRN220VG1S-4□	FRN250SVG1S-4□	OFL-280-4A
	280	FRN280VG1S-4□	–	FRN280SVG1S-4□	
	315	FRN315VG1S-4□	FRN280VG1S-4□	FRN315SVG1S-4□	OFL-315-4A
	355	FRN355VG1S-4□	FRN315VG1S-4□	–	OFL-355-4A
	400	FRN400VG1S-4□	FRN355VG1S-4□	–	OFL-400-4A
	450	–	FRN400VG1S-4□	–	OFL-450-4A
	500	FRN500VG1S-4□	–	–	OFL-500-4A
	630	FRN630VG1S-4□	–	FRN630BVG1S-4□	OFL-630-4A
	710	–	–	FRN710BVG1S-4□	–
	800	–	–	FRN800BVG1S-4□	–

* Carrier frequency is not limited with OFL-*** -4A.
* Please refer to the FRENIC-VG catalog for external dimensions.

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 frequencies 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

• 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.

• 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.

• Single-phase motors
Single-phase motors are not suitable for inverter-driven variable speed operation. Use three-phase motors.

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 facility of the inverter can protect the general-purpose 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).

• Discontinuance of power-factor correcting capacitor
Do not mount power factor correcting capacitors in the inverter (primary) circuit. Use a 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 shielded 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).
When wiring is longer than 50m, and sensorless vector control or vector control with speed sensor is selected, execute off-line tuning.

• 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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