Fuji Electric

Innovating Energy Technology

Fuji Compact Power Regenerative PWM Converter

FRENIC-eRHC Series

Regenerative

Fuji Compact power regenerative PWM converter series

24Z1-E-0142

An instant solution to inverter problems related to harmonics. Higher energy savings and power factor improvement enable use of lower capacity power equipment!

Fuji Compact Power Regenerative PWM Converter

FRENIC-eRHC

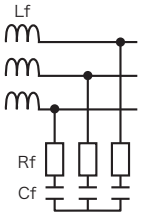
Significantly suppress the harmonic current

PWM converter eRHC acts as an Active Front End when used together with an inverter, in which the input current is changed to a sinusoidal wave to significantly suppress the harmonic current.

■ Relative harmonic content [%]

	Effects of harmonics suppression					
Circuit classification	**5th**	**7th**	**11th**	**13th**	**17th**	**19th**
PWM converter	1.6		1.9		0.5	
Without reactor	65	41	8.5	7.7	4.3	3.1
With reactor (DC side)	30	13	8.4	5.0	4.7	3.2

■ Role of Harmonics Suppressing Filter



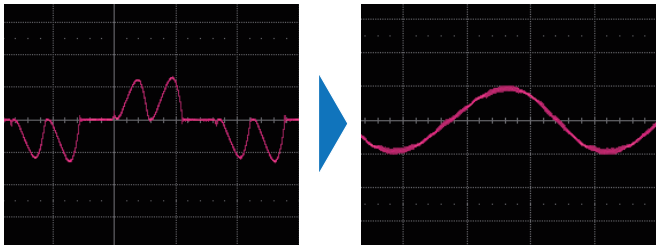
The harmonics suppressing filter consists of reactors (Lf), resistors (Rf) and capacitors (Cf). The waveform of the current flowing in a circuit having no harmonics suppressing filter is distorted with switching component. The role of the harmonics suppressing filter is to absorb the harmonics current while blocking it from flowing in the system.

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".

Reducing input current harmonics allows to use a more compact, lower capacity power transformer, circuit breaker, and other equipment compared with a standalone inverter, cutting down on costs.

■ Comparison of input current waveforms



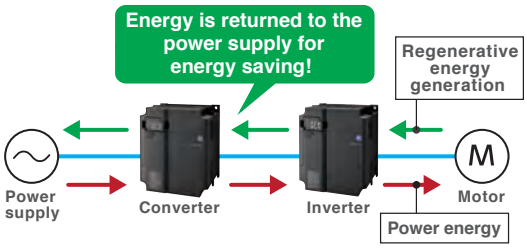
〈Without PWM converter〉 〈With PWM converter〉

Energy saving and Upgraded braking performance

Regenerated energy from highly frequent acceleration/deceleration and vertical applications is returned to power supply side.
Reusing regenerative energy for other equipment enables energy saving.

As the current waveform is also sinusoidal during regenerative operation, no troubles are caused to the power supply system.

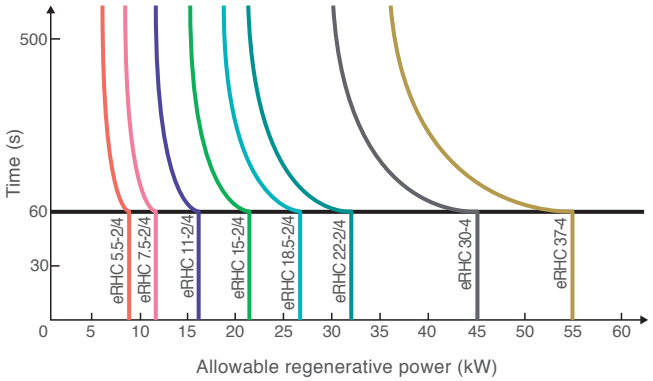
■ When the PWM converter is used



■ Continuous regenerative operation is supported

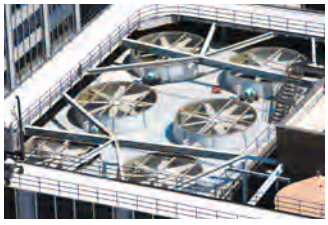
Continuous rating: **100%** Maximum rating: **150%-1 min.**

■ Regenerative braking torque characteristics



Application examples

Water treatment pump



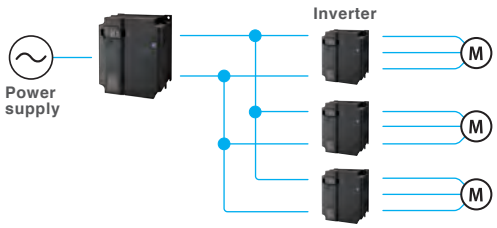
HVAC

Elevator

Escalator

Simultaneous connections to multiple inverters

The PWM converter supports multiple inverter connections. By selecting a proper PWM converter in consideration of the total inverter capacity, you can use more than one inverter to achieve power regeneration with reduced harmonics.



Easy to use and ease of maintenance

- The FRENIC-eRHC inherits the concept of our high-performance standard inverter FRENIC-Ace and, in addition to a similar appearance design, provides a variety of standard functions and a rich set of protective and maintenance functions.
- FRENIC-eRHC supports RS-485 communications as standard. It also has a touch panel that can be used to operate it in same way as FRENIC-Ace.

Visualization of energy saving data

Energy recovered can be monitored by yourself without installing additional components. (Available soon)

Long life

Components with limited life time has been designed to operate for 10 years, same as the inverters from Fuji Electric.

■ Design life Note 1

Capacitor in main circuit		10 years
Electrolytic capacitor on printed circuit board		10 years
Cooling fan		10 years
Conditions to extend service life	Ambient temperature	+40°C
	Load factor	80%

Note 1: This design life data represents calculated values, not guaranteed values.

Compliance with Global Standards

This product is expected to comply with the EC Directive (CE Marking).

CE

Model Lineup

Series	Form (Unit)	Voltage	Capacity [kW] 5.5 / 22 / 75
FRENIC-eRHC		200 V series	5.5 to 22 kW
		400 V series	5.5 to 75 kW

Ordering Number

RHC 22 C - 2 E J

- Series name: RHC PWM converter
- Standard applied inverter capacity: 5.5 to 75 (5.5 kW to 75 kW)
- Form: C Compact unit type
- Input power supply: 2 3-phase 200 V, 4 3-phase 400 V
- Development series: E Series
- Destination/manual: J Japanese, E English, C Chinese


Overhead traveling crane


Multi-story parking garage


Industrial-use mixer


Conveyor

Standard Specifications and Common Specifications

200V Series

Item		Standard specifications					
Model RHC□C-2EJ		5.5	7.5	11	15	18.5	22
Applied inverter capacity [kW]		5.5	7.5	11	15	18.5	22
Output	Continuous capacity [kW]	6.5	8.8	13	18	22	26
	Overload rating	150% of regenerative rated capacity for 1min					
	Direct current voltage	DC320 to 355V Variable according to power supply voltage					
	Rated DC side current (DC) [A]	21	28	41	55	68	81
Carrier frequency		10kHz					
Input	Phases, voltage and frequency	3-phase AC200 to 240V, 50/60Hz					
	Allowable voltage and frequency fluctuation	Voltage: +10 to -15% (Phase-to-phase imbalance ratio Within 2%) Frequency: +5 to -5%					
	Rated power supply side current (AC) [A]	20	27	40	55	67	80
	Power factor	≧99% (at 100% load) (*1)					
Mass [kg]		3.5	3.5	4.6	4.6	8.9	8.9

400V Series

Item		Standard specifications										
Model RHC□C-4EJ		5.5	7.5	11	15	18.5	22	30	37	45	55	75
Applied inverter capacity [kW]		5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Continuous capacity [kW]	6.5	8.8	13	18	22	26	36	44	53	65	88
	Overload rating	150% of regenerative rated capacity for 1min										
	Direct current voltage	DC640 to 710V Variable according to power supply voltage										
	Rated DC side current (DC) [A]	11	14	21	28	34	41	55	68	83	101	138
Carrier frequency		10kHz										
Input	Phases, voltage and frequency	3-phase AC200 to 240V, 50/60Hz										
	Allowable voltage and frequency fluctuation	Voltage: +10 to -15% (Phase-to-phase imbalance ratio Within 2%) Frequency: +5 to -5%										
	Rated power supply side current (AC) [A]	10	14	20	27	34	40	55	67	82	100	134
	Power factor	≧99% (at 100% load) (*1)										
Mass [kg]		3.5	3.5	4.6	4.6	8.9	8.9	23.8	23.8	28.3	28.3	35.6

*1: During operation with 50% or a larger load at a source voltage above 420V (210V), the power factor of the power supply drops to about 0.95.
(Only during regenerative operation)

Common Specifications

Item		Specifications
Control	Control method	AVR, and ACR control
	Digital input	Run, stop, alarm reset, various digital input (X1, X2) and power supply for PLC signal.
	Digital output	Transistor output (Y1, Y2, Y3), relay output (Y5A/Y5C) and total alarm output (30A/30B/30C)
	Analog output	FM1, FM2
	Input power factor	Conversion co-efficient Ki = 0 is achieved in the harmonics suppression measure guide-lines of METI
Protection		AC overcurrent, AC/DC low voltage, AC/DC overvoltage, input phase lose, frequency error, cooling fin overheat, external alarm, internal overheat, overload, memory error, keypad communication error, CPU error, network error, charging circuit error, AC fuse blown, AC input current error, DC fan locked
Surroundings	Ambient temperature	-10 to 50°C
	Ambient humidity	5 to 95% (without condensation)
	Altitude	below 1000M
	Air pressure	86 to 106 kPa
	Vibration	3mm (max amplitude) 2 to 9Hz 9.8m/s^2 9 to 20Hz 2m/s^2 20 to 55Hz 1m/s^2 55 to 200Hz
Peripheral Devices		Boosting reactor, Reactor for harmonic filter, Capacitor for harmonic filter, Resistor for harmonic filter, Contactor, AC fuse, Charging resistor

Protection and Forecast Function

[ ] indicates alarm codes.

Names of alarms	Display	Triggering conditions
AC overcurrent	OCr [4]	This alarm is triggered when AC current instantaneously exceeds the overcurrent level. For example when short or ground fault happens.
AC low voltage	LU [3]	This alarm is triggered when AC power supply voltage falls below the low voltage level. This function works only when converter is running and can be set as invalid by setting [F02: Restart after momentary power failure] as 1.
AC overvoltage	OU [2]	This alarm is triggered when AC power supply voltage exceeds the AC overvoltage level.
DC overvoltage	dOU [9]	This alarm is triggered when regenerative current of the inverter increases (to cause the regenerative energy to exceed the braking capacity) to cause the link voltage of the main circuit to exceed the DC overvoltage detection level.
DC lowvoltage	dLU [10]	This alarm is triggered when the DC link voltage of the main circuit is reduced below the low voltage detection level due to a voltage drop of the power supply during converter operation. However, the alarm is invalid if the setting of F02 "Restart After Momentary Power Failure (operation selection)" is "1."
Input phase loss	LPU [6]	This alarm is triggered when there is a phase lack in the three-phase power supply connected to main power supply inputs L1/R, L2/S and L3/T, or there is imbalance in the source voltage of three phases, to cause the converter to be stopped upon an alarm. To reset the converter, turn off then on the power.
Frequency error	FrE [7]	This alarm is triggered when power supply frequency exceeds the range allowed. However, this alarm is not issued if the setting of F02 "Restart Mode After Momentary Power Failure (Select)" is "1."
Cooling fin overheat	OH1 [12]	This alarm is triggered when the temperature around the cooling fin of semiconductor elements of the main circuit rises due to a stopped cooling fan or the like.
External alarm	OH2 [13]	This alarm is triggered when external alarm (THR) signal is input.
Converter internal overheat	OH3 [14]	This alarm is triggered when the temperature around the control board rises due to poor ventilation inside the converter or the like.
Converter overload	OLU [15]	This alarm is triggered when the AC source current exceeds the overload level of the converter (150% / 60s).
Memory error	Er1 [16]	This alarm is triggered when data writing error or other errors in the memory.
Keypad communication error	Er2 [17]	This alarm is triggered when keypad communication error occurs.
CPU error	Er3 [18]	This alarm is triggered when CPU error occurs.
Network error	Er4 [19]	This alarm is triggered when communication error occurs during converter's running with RS-485 communication. It is most likely caused by PLC device malfunction or noise.
Charging circuit error	PbF [11]	This function is activated only when "73 answerback [73ANS] is selected using X1/X2 function selection. There is no X1/X2 input (that is, the electromagnetic contactor for bypassing the charging circuit is not closed) within 0.5sec after the charging circuit control output [73A] signal is issued. To reset, change the X1/X2 function selection or turn off then on the power.
AC fuse blown	ACF [1]	The AC fuse outside the converter is blown out due to a short-circuiting or broken internal circuit.
AC input current error	ACE [5]	The difference between the current reference value of the converter and the detected input AC power supply exceeds the input current error detection level. However, the alarm is not issued if the setting of F02 "Restart Mode After Momentary Power Failure (Select)" is "1."
DC fan locked	dFA [34]	This alarm is triggered when DC fan stops running (75kW model only). This alarm can be deactivated by setting [H28: Light alarm definition] as 1.

Description of Terminal Function

Terminal			Specification
Area	Symbol	Function	
Main circuit	R, S, T	Main power supply	Connect to 3-phase power supply via an exclusive reactor or the like.
	P, N	DC voltage output	Connect to the power input terminals P (+) and N (-) of the inverter.
	R0, T0	Auxiliary control power input	Backup for control power supply. (30kW or above)
	G	Grounding terminal	Terminal for grounding.
	Ri, Si, Ti	Synchronous power supply input for voltage detection	Voltage detection terminal used for the control inside converter; connect to exclusive reactor.
	73A, C	Charging circuit control output	Control output of external charging circuit. (Contact capacity: AC250V 5A)
Control input terminal	RUN	RUN / STOP command	Run command is input when RUN-CM is ON, and stops when RUN-CM is OFF.
	RST	Alarm reset command	After removing the cause of the alarm upon alarm stop, connect across RST and CM to cancel protection and restart operation.
	X1, X2	Digital input (Sink / Source)	The following functions can be selected. 0: External alarm [THR], 1: Current limit cancel [LMT-CCL], 2: 73 answerback [73ANS], 3: Current limit switch [I-LIM], 14: Universal DI[U-DI], 15: AC fuse blown [ACF]
	PLC	PLC signal power supply	Connect the power supply of the PLC output signals. Rated voltage 24 (22 to 27) VDC, maximum output current: 100mA.
	CM	Digital input common	Common terminal for digital input signals.
Control output terminal	30A	Total alarm output (signal output from contact terminal (1C) without voltage)	Signal is output upon alarm stop after the protective function of the converter is activated. (Contact capacity: AC250V 0.3A cosΦ=0.3)
	30B		
	30C		
	Y1, Y2, Y3	Transistor output	The following functions can be selected. 0: Running [RUN], 1: Ready for operation [RDY], 2: Source current limit [IL], 3: Life forcast [LIFE], 4: Cooling fin overheat forecast [PRE-OH], 5: Overload forecast [PRE-OL], 6: Power running [DRV], 7: Regenerating [REG], 8: Current limit forecast [CUR], 9: Restart after momentary power failure [U-RES], 10: Source frequency synchronization [SY-HZ], 11: Alarm information [AL1], 12: Alarm information [AL2], 13: Alarm information [AL4], 14: DC fan lock [DCFL], 25: Universal DO [U-DO], 27: Cooling fan in operation [FAN], 32: Alarm output (for any alarm) [ALM], 33: Turn ON Y-terminal test output [Y-ON], 34: Turn OFF Y-terminal test output [Y-OFF]
	CMY	Transistor output common	Common terminal for transistor output signals.
	Y5A	Relay output	Signal can be selected similarly to Y1 to Y3 terminals. (Contact capacity: AC250V 0.3A cosΦ=0.3)
	Y5C		
	FM1, FM2	Analog output	The following monitor signals can be output in analog DC voltage 0 to 10V or in DC current 4 to 20mA, or in pulse 25 to 32000p/s (FM2 can output DC voltage only). 0: Input power [PWR] +200%/+10V, 1: Input current RMS [I-AC] +200%/+10V, 2: Input voltage RMS [V-AC] 250(500)V/10V, 3: DC bus voltage [V-DC] 500(1000)V/10V, 4: Frequency [FREQ] 100Hz/10V, 5: +10V output for testing [P10]
	M	Analog output common	Common terminal for analog output.
Communication	RJ-45 connector	RJ-45 port used for connecting a keypad	Used to connect the keypad. The power to the keypad will be supplied from the compact power regenerative converter through this connector.
		RS-485 communications port	Can be used to connect a computer, programmable controller, etc by RS-485 communication.

Functional Specifications

Description of Function Codes

Code	Name	Data range	Min. increment	Unit	Default value
F00	Data protection	0: No data protection, 1: Data protection activated	1	-	0
F02	Restart mode after Momentary power failure (Selection)	0: Invalid (Stop operating after low voltage being detected) 1: Valid (Restart after momentary power failure)	1	-	0
F04	LED monitor (display selection)	0 to 5 0: Input power 1 [%], 1: Input power 2 [kW], 2: Input current RMS [A], 3: Input voltage RMS [V], 4: DC bus voltage [V], 5: Power supply frequency [Hz]	1	-	0
F09	Display coefficient for "Input watt-hour data"	0.000 to 9999 Setting 0.000 clears the integrated power data to "0".	0.001	-	0.010
E01	X1 terminal (Function selection)	0 to 15 0: External alarm [THR], 1: Current limit cancel [LMT-CCL], 2: 73 answerback [73ANS], 3: Current limit switch [I-LIM], 14: Universal DI[U-DI], 15: AC fuse blown [ACF]	1	-	14
E28	X2 terminal (Function selection)				15
E02	Y1 terminal transistor output (function selection)	0 to 34 0: Running [RUN], 1: Ready for operation [RDY], 2: Source current limit [IL], 3: Life forcast [LIFE], 4: Cooling fin overheat forecast [PRE-OH], 5: Overload forecast [PRE-OL], 6: Power running [DRV], 7: Regenerating [REG], 8: Current limit forecast [CUR], 9: Restart after momentary power failure [U-RES], 10: Source frequency synchronization [SY-HZ], 11: Alarm information [AL1], 12: Alarm information [AL2], 13: Alarm information [AL4], 14: DC fan lock [DCFL], 25: Universal DO [U-DO], 27: Cooling fan in operation [FAN], 32: Alarm output (for any alarm) [ALM], 33: Turn ON Y-terminal test output [Y-ON], 34: Turn OFF Y-terminal test output [Y-OFF]	1	-	0
E03	Y2 terminal transistor output (function selection)				2
E04	Y3 terminal transistor output (function selection)				3
E05	Y5 terminal relay output (function selection)				1
E14	I/O function normally open/close	0000 to 007F 0: Normal open, 1: Normal close	1	-	0
E15	Converter overload early warning	50 to 105%	1	%	80
E16	ON - OFF control for cooling fan	0: Deactivated (Fan is always ON) 1: Activated (ON/OFF control)	1	-	0
E17	Current limiting signal (hys level)	0 to 30%	1	%	10
E18	FM1 function selection	0 to 10 0: Input power [PWR] +200%/+10V, 1: Input current RMS [I-AC] +200%/+10V, 2: Input voltage RMS [V-AC] 250(500)V/10V, 3: DC bus voltage [V-DC] 500(1000)V/10V, 4: Frequency [FREQ] 100Hz/10V, 5: +10V output for testing [P10]	1	-	1
E19	FM2 function selection				0
E20	FM1 function selection	0: Voltage output (DC0 to +10V), 1: Current output (DC4 to 20mA), 2: Current output (DC0 to 20mA), 3: Pulse output	1	-	0
E21	FM1 gain	0 to 100.00 (times)	0.01	time	1
E22	FM2 gain				1
E23	FM1 (pulse rate)	25 to 32000p/s (pulse when monitor data is 100%)		p/s	1440
E24	FM1 bias	-100.0 to 100.0%	0.1	%	0
E25	FM2 bias				0
E27	FM1-2 filter	0.000 to 0.500s	0.001	s	0.01
H14	Clear alarm data	0: Disable 1: Alarm data clear (Automatically return to 0 after clearing data)	1	-	0
H15	Current limiter valve (dRV level 1)	0 to 150%	1	%	150
H16	Current limiter valve (dRV level 2)		1	%	150
H17	Current limiter valve (Reg level 1)	-150 to 0%	1	%	-150
H18	Current limiter valve (Reg level 2)		1	%	-150
H19	Current limiter early warning (Level)	-150 to 150%	1	%	100
H20	Current limiter early warning (Timer)	0 to 60s	1	s	0
H22	ON-OFF control for cooling fan (Holding time)	0 to 600s	1	s	600
H23	Initial value of cooling fan cumulative operation time	0 to 65535 (10 hours unit) Reset to 0 when H23=1 (Returns to 0 automatically after setting the data.)	1	-	0
H28	Light alarm definition	0: DC fan alarm detection activated 1: DC fan alarm detection disactivated	1	-	0
H37	All save function	0: deactivated 1: all save (Returns to 0 automatically after all save is excuted.)	1	-	0
H38	Data initialization	Setting 1 restores the factory default values. (Returns to 0 automatically after data initialization.)	1	-	0
U04	AVR control response	-32768 to 32767 0: Standard high response mode 1: Control mode1 2: Control mode2	1	-	0
U05	DC voltage reference selection	0 to 9999 Variable mode: Vary according to power source voltage. Constant mode: Fixed as a specified value.	1	-	0
U06-U10	Reserved	-32768 to 32767	1	-	0

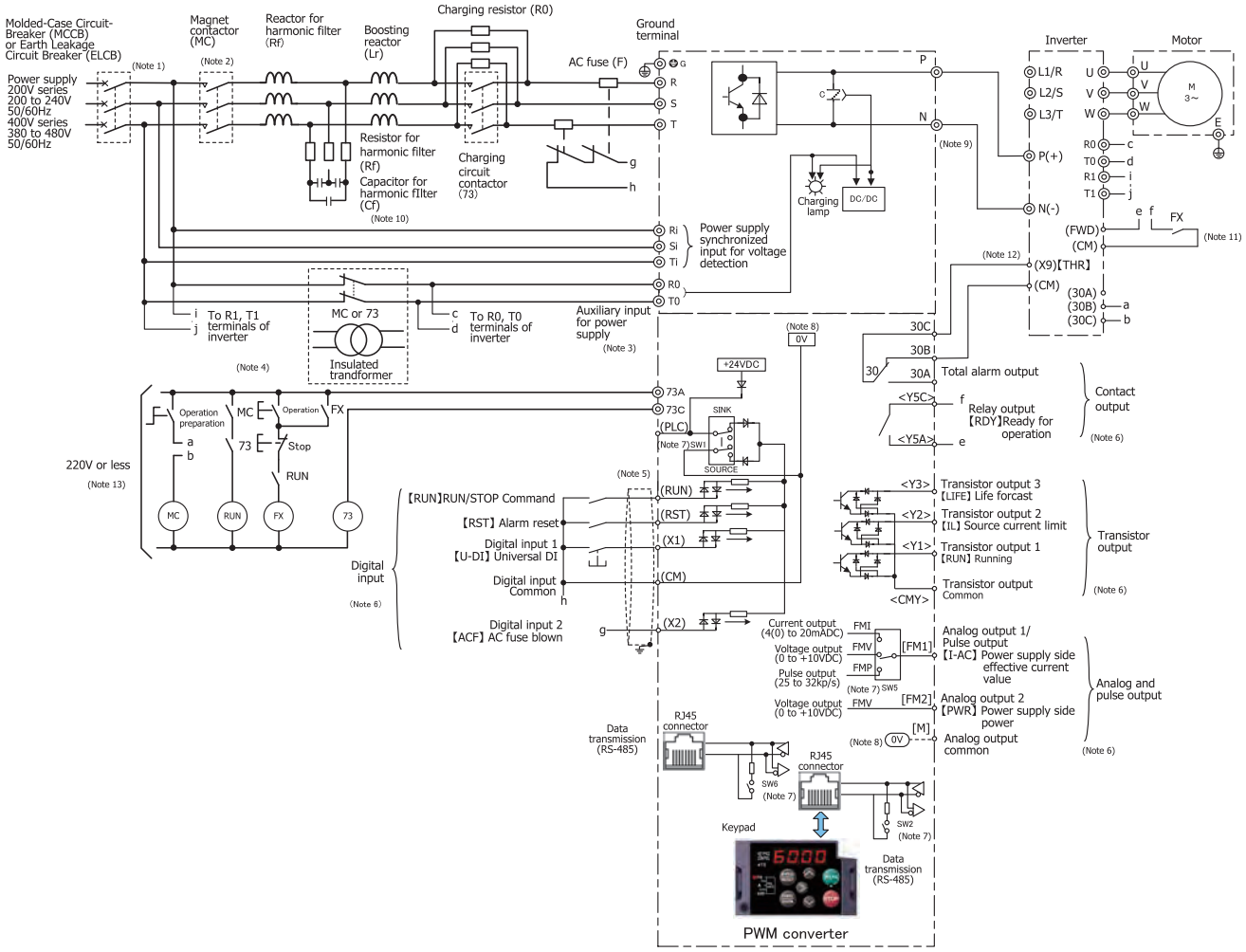
Application Table for Peripheral Devices

Voltage	Applied motor [kW]	PWM converter model	Boosting reactor		Resistor for harmonic filter		Reactor for harmonic filter		Capacitor for harmonic filter	
			(Lr)	Qty	(Rf)	Qty	(Lf)	Qty	(Cf)	Qty
200V system	5.5	RHC5.5C-2EJ	LR2C-7.5E	1	RF80-0.42OHM	3	LFC2C-7.5E	1	CF2C-7.5E	1
	7.5	RHC7.5C-2EJ								
	11	RHC11C-2EJ	LR2C-15E	1	RF150-0.2OHM	3	LFC2C-15E	1	CF2C-15E	1
	15	RHC15C-2EJ								
	18.5	RHC18.5C-2EJ	LR2C-22E	1	RF200-0.13OHM	3	LFC2C-22E	1	CF2C-22E	1
	22	RHC22C-2EJ								
400V system	5.5	RHC5.5C-4EJ	LR4C-7.5E	1	RF80-1.74OHM	3	LFC4C-7.5E	1	CF4C-7.5E	1
	7.5	RHC7.5C-4EJ								
	11	RHC11C-4EJ	LR4C-15E	1	RF150-0.79OHM	3	LFC4C-15E	1	CF4C-15E	1
	15	RHC15C-4EJ								
	18.5	RHC18.5C-4EJ	LR4C-22E	1	RF200-0.53OHM	3	LFC4C-22E	1	CF4C-22E	1
	22	RHC22C-4EJ								
	30	RHC30C-4EJ	LR4C-37E	1	RF400-0.38OHM	3	LFC4C-37E	1	CF4C-37E	1
	37	RHC37C-4EJ								
	45	RHC45C-4EJ	LR4C-55E	1	RF400-0.26OHM	3	LFC4C-55E	1	CF4C-55E	1
	55	RHC55C-4EJ								
	75	RHC75C-4EJ	LR4C-75E	1	RF400-0.38OHM	3	LFC4C-75E	1	CF4C-75E	1

Voltage	Applied motor [kW]	PWM converter model	Charging circuit contactor		Charging circuit			
			(73)	Qty	Charging resistor (R0)	Qty	Fuse (F)	Qty
200V system	5.5	RHC5.5C-2EJ	SC-5-1	1	CR80-7.5OHM	3	CR2LS-50S/UL	2
	7.5	RHC7.5C-2EJ						
	11	RHC11C-2EJ	SC-N1	1			CR2LS-75S/UL	2
	15	RHC15C-2EJ	SC-N2	1			CR2LS-100S/UL	2
	18.5	RHC18.5C-2EJ	SC-N3	1	CR120-2OHM	3		
	22	RHC22C-2EJ					CR2L-150S/UL	2
400V system	5.5	RHC5.5C-4EJ	SC-05	1	CR60-30OHM	3	CR6L-30S/UL	2
	7.5	RHC7.5C-4EJ						
	11	RHC11C-4EJ	SC-4-0	1			CR6L-50S/UL	2
	15	RHC15C-4EJ	SC-5-1	1				
	18.5	RHC18.5C-4EJ	SC-N1	1	CR80-7.5OHM	3		
	22	RHC22C-4EJ					CR6L-75S/UL	2
	30	RHC30C-4EJ	SC-N2	1			CR6L-100S/UL	2
	37	RHC37C-4EJ	SC-N2S	1			CR6L-150S/UL	2
	45	RHC45C-4EJ	SC-N3	1				
	55	RHC55C-4EJ	SC-N4	1			CR6L-200S/UL	2
	75	RHC75C-4EJ	SC-N5	1				

* A package of the resistor for harmonic filter (Rf)/charging resistor (R0) contains a set of three resistors. In other words, when the order quantity is '1,' three resistors will be shipped.

Basic Connection Diagram



(Note 1) Please install MCCB or ELCB into the input side of PWM converter system for protection. In addition make sure that the rated current of breaker installed is no larger than rated current recommended.

(Note 2) Sometimes it is necessary to power off PWM converter from power supply without opening MCCB or ELCB, therefore it is recommended to install magnet contactor (MC). In addition, please install the surge absorber parallelly when coils like MC and solenoid is installed near inverter/converter.

(Note 3) Please connect these terminals to power supply if there is a need to keep outputting the total alarm signal or to keep keypad displaying even after the main power supply has been cut off from converter. In addition, converter can operate normally without these terminals connected (for capacity larger than 30kW only).

(Note 4) Make sure the connection pass through an insulating transformer or b contact of MC therefore it can be cut off from main circuit. In addition, insulating tansformer is necessary when using a non-grounding system as power supply.

(Note 5) Please use the twisted pair cable or shielded cable for control signal cable. Basically shielded cable should be connected to earth, but in case that system is interfered by severe induction noise it can be connected to [CM] to suppress the noise somehow. In addition, cable for control signals should be as far as possible from the main circuit cables and should not be inserted into the same duct (the distance should be no less than 10cm as recommended). In case that control signal cable has to meet with main circuit cable, please try to make them at right angle.

(Note 6) The descriptions about functions for terminal [X1] to [X2](digital input), [Y1] to [Y3](transistor output), and [FM1] to [FM2](monitor output) are for initial status.

(Note 7) These are various kinds of switches on control PCB and can be used to change the performance of functions.

(Note 8) (0V) and [0V] are separated and insulated from each other.

(Note 9) The length of DC bus cables between inverter and PWM converter (terminal P, P(+) and N, N(-)) should be no more than 5m.

(Note 10) Please ensure that cable length between capacity for harmonic filter and power source is within 5m.

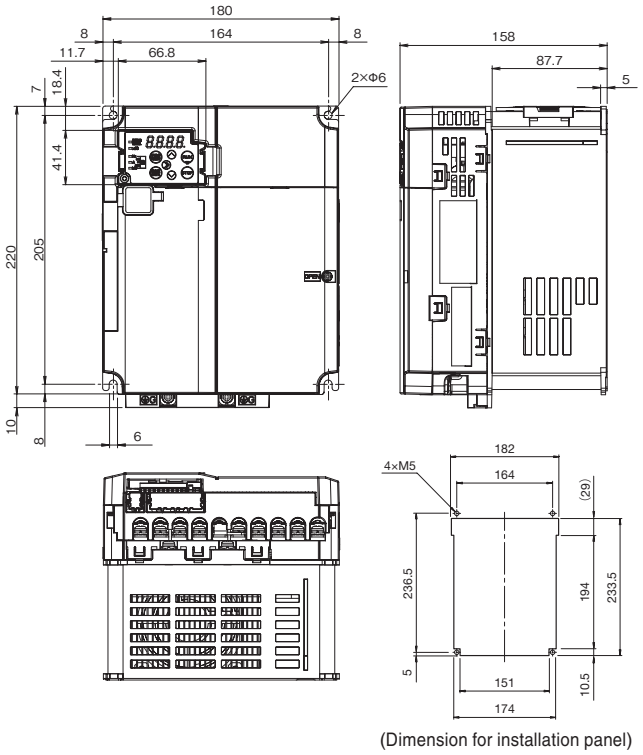
(Note 11) Please design the sequence that run signal for inverter should not be input until converter becomes ready.

(Note 12) Please set any one of the X terminals as external alarm [THR].

(Note 13) When using a 400V power source, please use a step-down tansformer to ensure that sequence circuit voltage is under 220V.

External Dimensions

Figure A

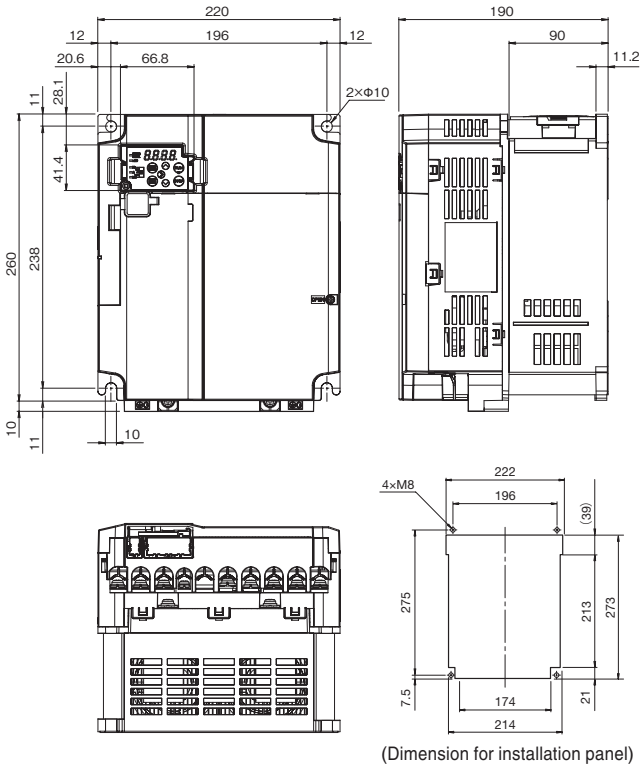


(Dimension for installation panel)

(Unit: mm)

Power supply voltage	Converter type
Three-phase 200V	RHC5.5C-2EJ
	RHC7.5C-2EJ
Three-phase 400V	RHC5.5C-4EJ
	RHC7.5C-4EJ

Figure B



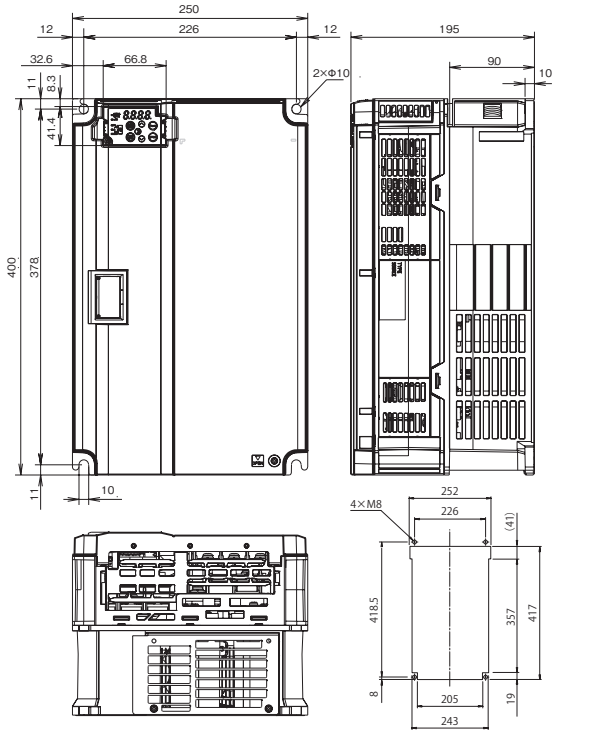
(Dimension for installation panel)

(Unit: mm)

Power supply voltage	Converter type
Three-phase 200V	RHC11C-2EJ
	RHC15C-2EJ
Three-phase 400V	RHC11C-4EJ
	RHC15C-4EJ

External Dimensions

Figure C

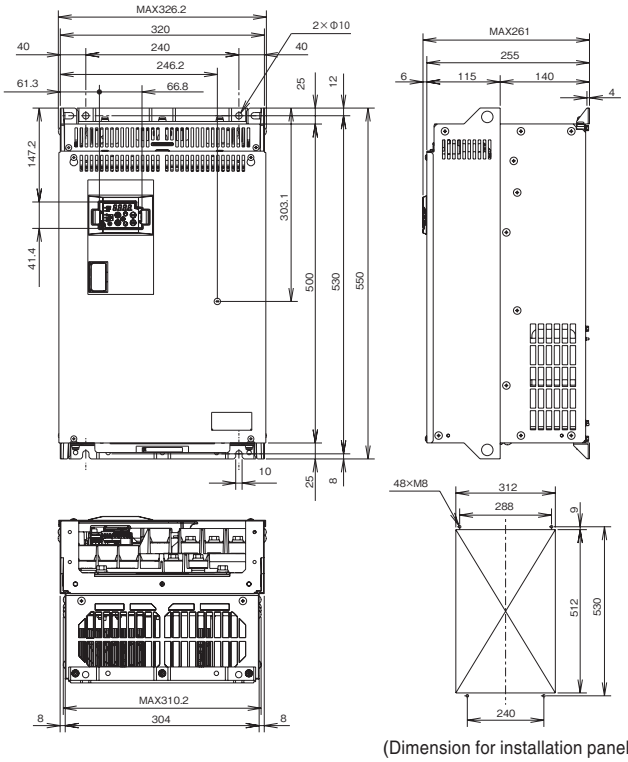


(Dimension for installation panel)

(Unit: mm)

Power supply voltage	Converter type
Three-phase 200V	RHC18.5C-2EJ
	RHC22C-2EJ
Three-phase 400V	RHC18.5C-4EJ
	RHC22C-4EJ

Figure D

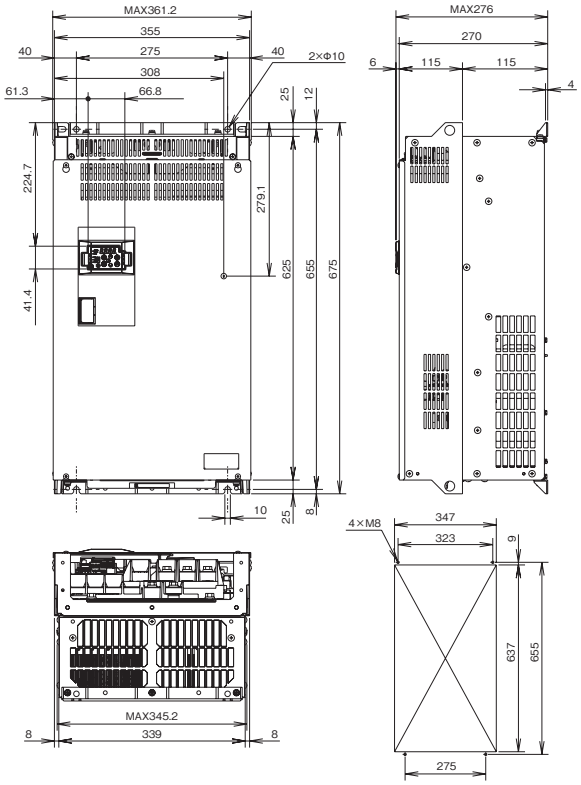


(Dimension for installation panel)

(Unit: mm)

Power supply voltage	Converter type
Three-phase 400V	RHC30C-4EJ
	RHC37C-4EJ

Figure E

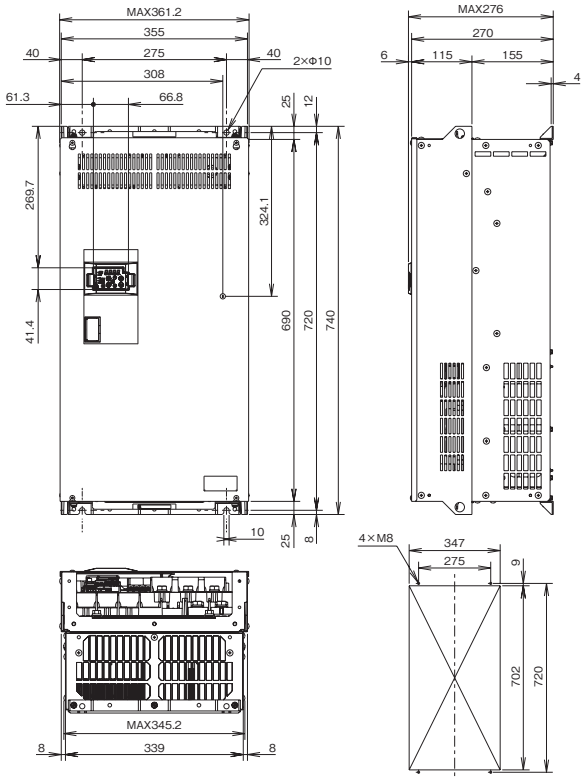


(Unit: mm)

(Dimension for installation panel)

Power supply voltage	Converter type
Three-phase 400V	RHC45C-4EJ
	RHC55C-4EJ

Figure F



(Unit: mm)

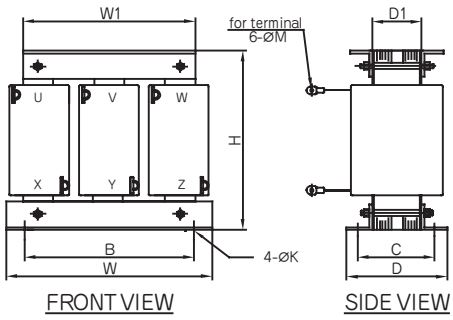
(Dimension for installation panel)

Power supply voltage	Converter type
Three-phase 400V	RHC75C-4EJ

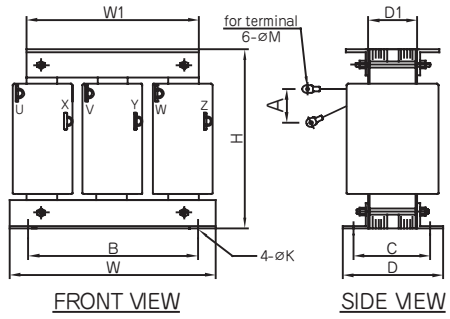
Peripheral Devices

Boosting Reactor

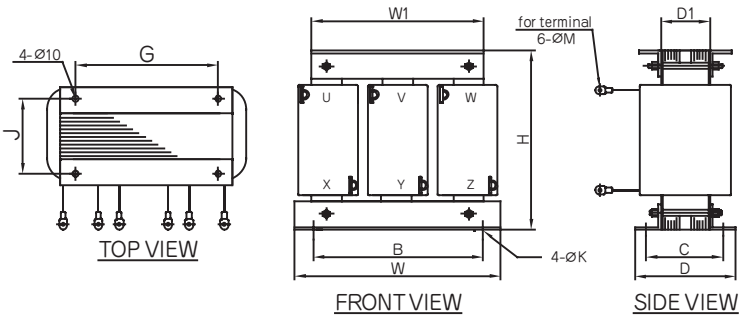
PWM converter model	Model	Dimensions [mm]										K	M	Fig.	Mass [kg]
		H (max)	W (±1)	B (±1)	C (±5)	D (±5)	W1 (±1)	D1 (+5)	A (±5)	G	J				
RHC5.5C-2EJ	LR2C-7.5E	150	180	128	127	149	160	57	10	-	-	7×10	5	F2	11
RHC7.5C-2EJ															
RHC11C-2EJ	LR2C-15E	180	210	140	133	155	175	63	-	-	-	7×10	8	F1	16
RHC15C-2EJ															
RHC18.5C-2EJ	LR2C-22E	195	240	160	153	175	200	63	-	170	99	7×10	8	F3	21
RHC22C-2EJ															
RHC5.5C-4EJ	LR4C-7.5E	152	180	128	117	139	160	47	-	-	-	7×10	5	F1	10
RHC7.5C-4EJ															
RHC11C-4EJ	LR4C-15E	178	215	145	123	145	180	53	-	-	-	7×10	5	F1	14
RHC15C-4EJ															
RHC18.5C-4EJ	LR4C-22E	175	210	150	143	165	185	73	-	-	-	7×10	6	F1	19
RHC22C-4EJ															
RHC30C-4EJ	LR4C-37E	257	250	175	163	185	215	73	-	185	109	7×10	8	F3	35
RHC37C-4EJ															
RHC45C-4EJ	LR4C-55E	269	305	205	180	202	255	86	-	225	122	12×14	10	F3	50
RHC55C-4EJ															
RHC75C-4EJ	LR4C-75E	277	310	210	190	212	260	96	-	230	132	12×14	10	F3	58



F1



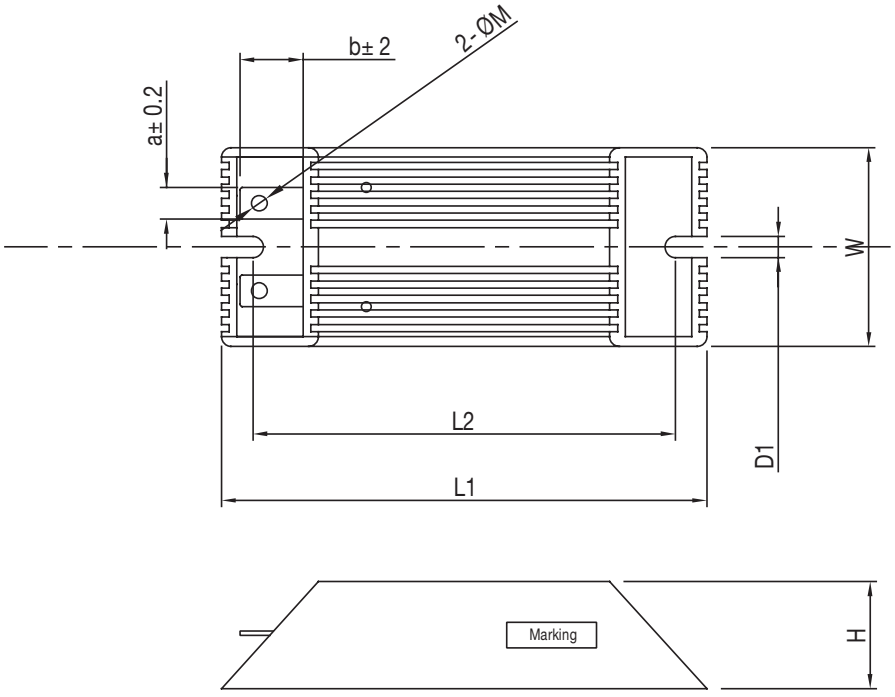
F2



F3

Resistance for Harmonic Filter

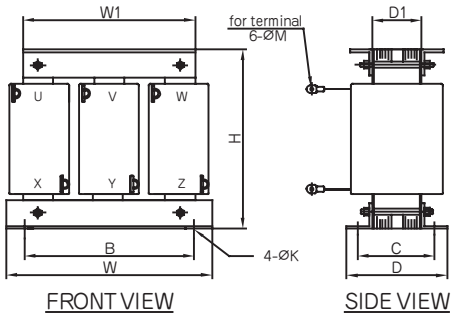
PWM converter model	Model	Dimensions [mm]							M	Mass [kg]
		L1 (±2)	L2 (±2)	W (±0.5)	H (±0.5)	D1 (±0.3)	a (±0.2)	b (±2)		
RHC5.5C-2EJ	RF80-0.42OHM	150	137	41	22	4.3	6.5	10	3.2	0.20
RHC7.5C-2EJ										
RHC11C-2EJ	RF150-0.2OHM	210	197	41	22	4.3	6.5	10	3.2	0.28
RHC15C-2EJ										
RHC18.5C-2EJ	RF200-0.13OHM	165	146	60	30	5.3	10	20.8	4.3	0.49
RHC22C-2EJ										
RHC5.5C-4EJ	RF80-1.74OHM	150	137	41	22	4.3	6.5	10	3.2	0.20
RHC7.5C-4EJ										
RHC11C-4EJ	RF150-0.79OHM	210	197	41	22	4.3	6.5	10	3.2	0.28
RHC15C-4EJ										
RHC18.5C-4EJ	RF200-0.53OHM	165	146	60	30	5.3	10	20.8	4.3	0.49
RHC22C-4EJ										
RHC30C-4EJ	RF400-0.38OHM	265	246	60	30	5.3	10	20.8	4.3	0.77
RHC37C-4EJ										
RHC45C-4EJ	RF400-0.26OHM	265	246	60	30	5.3	10	20.8	4.3	0.77
RHC55C-4EJ										
RHC75C-4EJ	RF400-0.38OHM	265	246	60	30	5.3	10	20.8	4.3	0.77



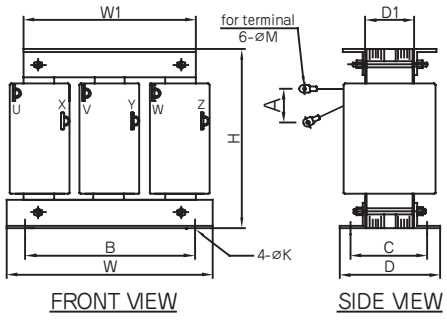
Peripheral Devices

Reactor for Harmonic Filter

PWM converter model	Model	Dimensions [mm]								K	M	Fig.	Mass [kg]
		H (max)	W (±1)	B (±1)	C (±5)	D (±5)	W1 (±1)	D1 (+5)	A (±5)				
RHC5.5C-2EJ	LFC2C-7.5E	105	155	91	95	117	114	25	40	7×10	5	F2	3
RHC7.5C-2EJ													
RHC11C-2EJ	LFC2C-15E	105	155	91	98	120	114	28	-	7×10	8	F1	4
RHC15C-2EJ													
RHC18.5C-2EJ	LFC2C-22E	105	155	91	102	124	114	32	-	7×10	8	F1	4
RHC22C-2EJ													
RHC5.5C-4EJ	LFC4C-7.5E	107	155	91	95	117	114	25	18	7×10	5	F2	3
RHC7.5C-4EJ													
RHC11C-4EJ	LFC4C-15E	107	155	91	100	122	114	30	-	7×10	5	F1	4
RHC15C-4EJ													
RHC18.5C-4EJ	LFC4C-22E	109	155	91	110	132	114	40	-	7×10	6	F1	4
RHC22C-4EJ													
RHC30C-4EJ	LFC4C-37E	123	155	104	107	129	130	37	-	7×10	8	F1	6
RHC37C-4EJ													
RHC45C-4EJ	LFC4C-55E	120	155	104	120	142	130	50	-	7×10	10	F1	7
RHC55C-4EJ													
RHC75C-4EJ	LFC4C-75E	154	180	128	127	149	160	57	-	7×10	10	F1	13



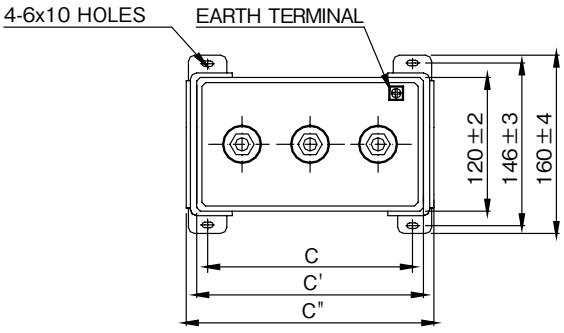
F1

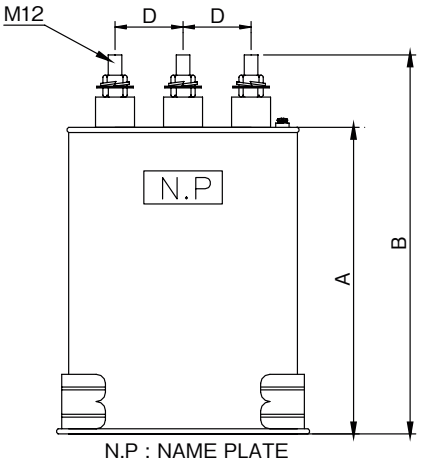


F2

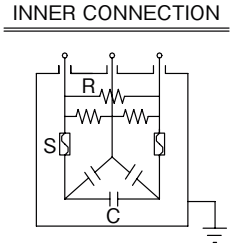
Capacitor for Harmonic Filter

PWM converter model	Model	Dimensions [mm]						Mass [kg]
		A	B	C	C'	C"	D	
RHC5.5C-2EJ	CF2C-7.5E	120	185	170	200	210	60	4.3
RHC7.5C-2EJ								
RHC11C-2EJ	CF2C-15E	120	185	170	200	210	60	4.3
RHC15C-2EJ								
RHC18.5C-2EJ	CF2C-22E	120	185	170	200	210	60	4.3
RHC22C-2EJ								
RHC5.5C-4EJ	CF4C-7.5E	120	185	170	200	210	60	4.2
RHC7.5C-4EJ								
RHC11C-4EJ	CF4C-15E	130	195	170	200	210	60	4.5
RHC15C-4EJ								
RHC18.5C-4EJ	CF4C-22E	150	215	170	200	210	60	4.9
RHC22C-4EJ								
RHC30C-4EJ	CF4C-37E	150	215	170	200	210	60	4.9
RHC37C-4EJ								
RHC45C-4EJ	CF4C-55E	170	235	170	200	210	60	5.4
RHC55C-4EJ								
RHC75C-4EJ	CF4C-75E	150	215	170	200	210	60	4.9





N.P : NAME PLATE

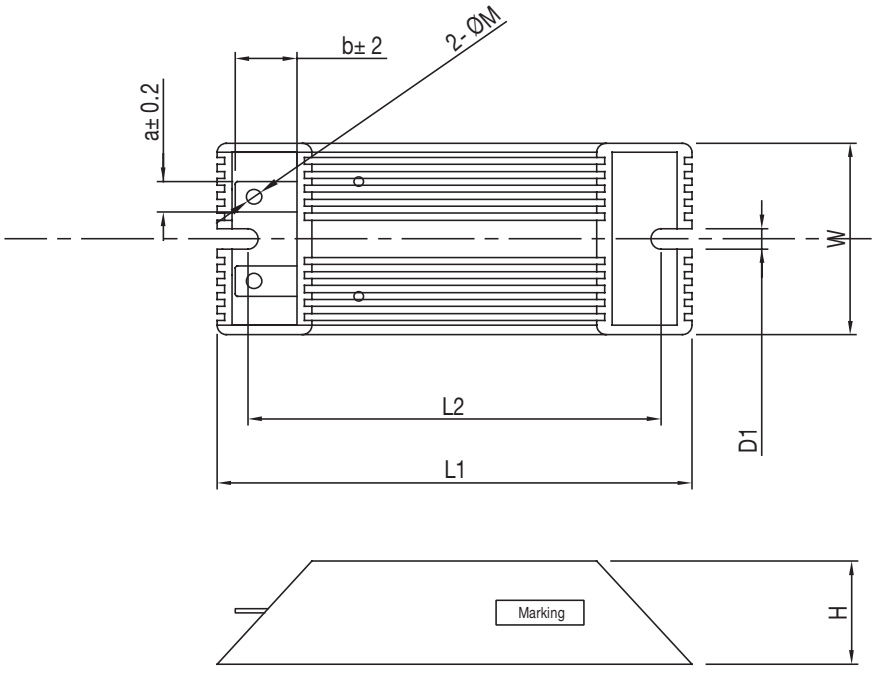


R : RESISTOR
C : CAPACITOR
S : SAFETY DEVICE

Charging Circuit

Charging Resistor

PWM converter model	Model	Dimensions [mm]							M	Mass [kg]
		L1 (±2)	L2 (±2)	W (±0.5)	H (±0.5)	D1 (±0.3)	a (±0.2)	b (±2)		
RHC5.5C-2EJ	CR80-7.5OHM	150	137	41	22	4.3	6.5	10	3.2	0.20
RHC7.5C-2EJ										
RHC11C-2EJ										
RHC15C-2EJ										
RHC18.5C-2EJ	CR120-2OHM	182	169	41	22	4.3	6.5	10	3.2	0.24
RHC22C-2EJ										
RHC5.5C-4EJ	CR60-30OHM	100	87	41	22	4.3	6.5	13	3.2	0.11
RHC7.5C-4EJ										
RHC11C-4EJ										
RHC15C-4EJ										
RHC18.5C-4EJ	CR80-7.5OHM	150	137	41	22	4.3	6.5	10	3.2	0.20
RHC22C-4EJ										
RHC30C-4EJ										
RHC37C-4EJ										
RHC45C-4EJ										
RHC55C-4EJ										
RHC75C-4EJ										



Memo

Memo

Memo

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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