Fuji Electric

Innovating Energy Technology

Fuji Compact Power Regenerative Converter

FRENIC-eRHR Series

24Z1-E-0133a

The ability to use regenerative energy from the motor for other equipment contributes to energy saving!

Fuji Compact Power Regenerative Converter

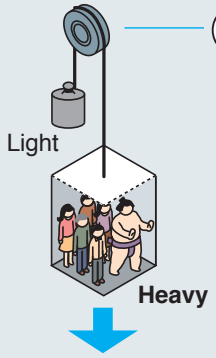
FRENIC-eRHR

Energy saving through power regeneration and higher breaking capacity

In a vertical transport system, conveyor, or equipment that is driven by an inverter, it is essential that regenerative energy produced by braking be processed. As a method to process this regenerative energy, it is common to use thermal conversion through the combination of a braking resistor and a braking unit, which has the following problems, however.

- Energy is wasted because it is consumed as heat.
- The size of the braking resistor becomes large depending on the load conditions, if continuous regenerative braking is required or if the instantaneous regenerative capacity is large.

To solve the above problems, we added this power regenerative converter series to the Fuji drive product lineup.

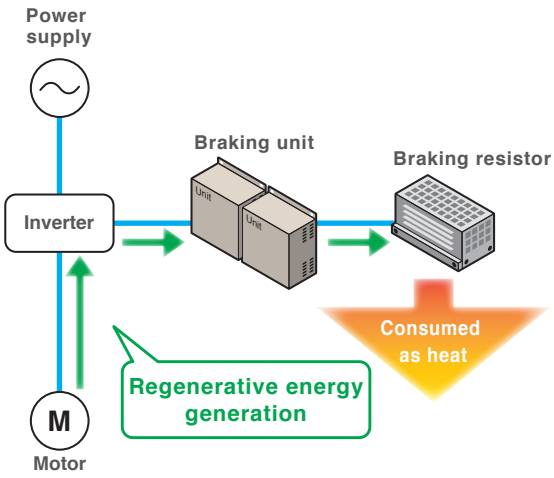


Example: Elevator

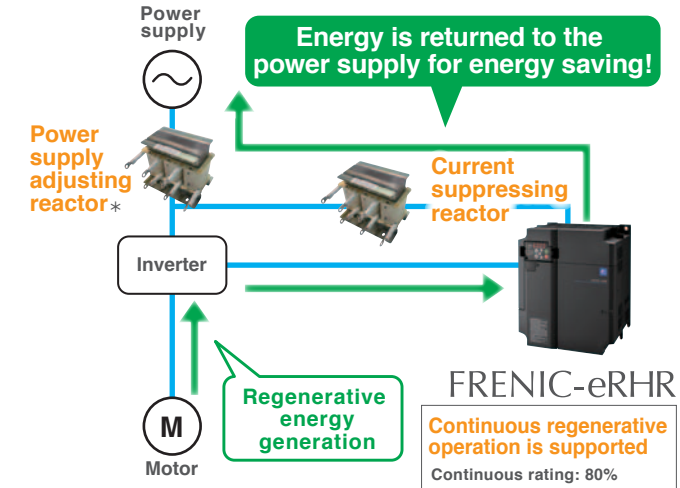
Mechanism of regenerative energy generation

1. During descent, the motor is rotated by the load to generate power. (Regenerative energy generation)
2. The regenerative energy from the load is return to power supply to enable energy saving.

When a braking resistor is used



When a power regenerative converter is used



* If the following conditions are satisfied, power supply adjusting reactor is unnecessary. (Power supply capacity required for the applicable inverter with the same capacity as the regenerative converter to be used (with DCR) × 10) > Power supply capacity)

Application examples

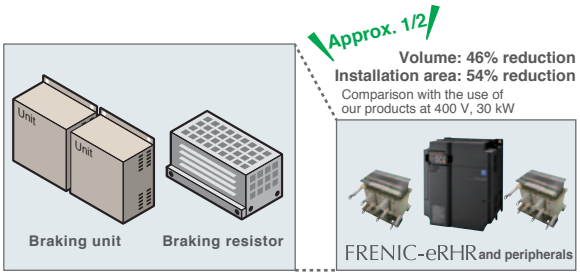
Elevator

Escalator

Overhead traveling crane

Low cost and space saving

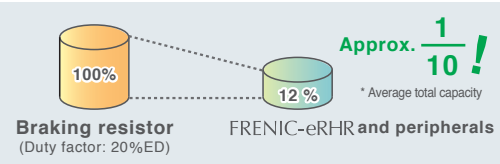
- For peripherals, the FRENIC-eRHR requires only a current suppressing reactor and a power supply adjusting reactor. The simple configuration not only reduces the introduction cost, but also enables energy saving through the power regeneration capability.
- The FRENIC-eRHR saves the control panel space.
  - It enables the downsizing of the control panel compared with the combination of a braking resistor and a braking unit.



  - The FRENIC-eRHR no longer requires a braking resistor, which enables a compact control panel design due to significantly reduced heat generation. This also improves the freedom of the installation space because there is no need to worry about the clearance with the resistor.

- The FRENIC-eRHR contributes to energy saving.
  - It returns the regenerative energy to the power supply, which contributes to energy saving compared with the combination of a braking resistor and a braking unit.

Comparison of incurred loss



Easy to use and ease of maintenance

- The FRENIC-eRHR 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.
- The FRENIC-eRHR supports RS-485 communications as standard. It also has a touch panel that you can operate in the same way as that of the FRENIC-Ace.

Long life

For various components with a limited life, we offer 10 years of design life, which is the same as that of the Fuji inverter.

■ 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).

Model Line up

Series	Form (Unit)	Voltage	Capacity [kW] (5.5 / 22 / 75)
FRENIC-eRHR		200 V series	5.5 to 30 kW
		400 V series	5.5 to 75 kW

Ordering Number

RHR 22 C - 2 E J

- Series name: RHR Regenerative 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

Multi-story parking garage

Industrial-use mixer

Conveyor

Standard Specifications & Common Specifications

200V Series

Item		Standard specifications						
Model RHR□C-2EJ		5.5	7.5	11	15	18.5	22	30
Output	Applied inverter capacity (kW)	5.5	7.5	11	15	18.5	22	30
	Regenerative rated capacity (kW)	5	7	10	14	17	20	28
	Continuous rating	80% of regenerative rated capacity 100% of regenerative rated capacity for 1min 25%ED						
	Overload rating	150% of regenerative rated capacity for 1min						
	Rated DC side current (DC)(A)	20	27	41	55	68	81	112
Input	Phases, voltage and frequency	3-phase AC200~240V, 50/60Hz						
	Allowable voltage and frequency fluctuation	Voltage: +10~-15% (Phase-to-phase imbalance ratio Within 2%) Frequency: +5~-5%						
	Rated power supply side current (AC)(A)	16	22	32	45	55	64	90
	Power factor	≧90% (at rated load)						
Mass [kg]		3.4	3.4	3.4	3.4	4.3	4.3	8

400V Series

Item		Standard specifications										
Model RHR□C-4EJ		5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Applied inverter capacity (kW)	5.5	7.5	11	15	18.5	22	30	37	45	55	75
	Regenerative rated capacity (kW)	5	7	10	14	17	20	28	35	43	53	73
	Continuous rating	80% of regenerative rated capacity 100% of regenerative rated capacity for 1min 25%ED										
	Overload rating	150% of regenerative rated capacity for 1min										
	Rated DC side current (DC)(A)	11	15	22	30	36	43	58	73	89	109	149
Input	Phases, voltage and frequency	3-phase AC380~480V, 50/60Hz										
	Allowable voltage and frequency fluctuation	Voltage: +10~-15% (Phase-to-phase imbalance ratio Within 2%) Frequency: +5~-5%										
	Rated power supply side current (AC)(A)	8	11	16	23	27	32	45	56	69	85	117
	Power factor	≧90% (at rated load)										
Mass [kg]		3.2	3.2	3.2	3.3	4.3	4.3	8.4	8.4	26.3	26.3	26.3

Common Specifications

Item		Specifications
Control	Control method	Gate on every 120 degree
	Digital input	run, stop, autorun, alarm reset, various digital input 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
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 err, CPU error,
Surroundings	Ambient temperature	-10~50°C
	Ambient humidity	5~95% (without condensation)
	Altitude	below 1000M
	Air pressure	86~106 kPa
	Vibration	3mm (max amplitude) 2~9Hz 9.8m/s² 9~20Hz 2m/s² 20~55Hz 1m/s² 55~200Hz
Peripheral Devices		Power supply adjusting reactor, Current suppressing reactor

Protection and forecast function

[ ] indicates alarm codes.

Names of alarms	Display	Triggering conditions
AC overcurrent	AOC [4]	This alarm is triggered when AC current instantaneously exceeds the overcurrent level. For example when short or ground fault happens.
AC low voltage	ALU [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	AOU [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 "0."
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.

The alarm code can be checked by using alarm indication signals [AL1, 2, 4] of transistor output and the relationship between alarms and indication signals is shown as below.

Code	Abbreviation	Name	AL4	AL2	AL1
0	---	No alarm	OFF	OFF	OFF
2	AOU	AC overvoltage	OFF	ON	OFF
3	ALU	AC low voltage	OFF	ON	OFF
4	AOC	AC overcurrent	OFF	OFF	ON
6	LPU	Input phase loss	ON	OFF	OFF
7	FrE	Frequency error	ON	OFF	OFF
9	dOU	DC overvoltage	OFF	ON	OFF
10	dLU	DC low voltage	OFF	ON	OFF
12	OH1	Fin overheat	ON	ON	OFF
13	OH2	External alarm	ON	OFF	OFF
14	OH3	Converter internal overheat	ON	ON	OFF
15	OLU	Overload	ON	ON	OFF
16	Er1	Memory error	ON	OFF	ON
17	Er2	Keypad communication error	ON	OFF	ON
18	Er3	CPU error	ON	OFF	ON

Description of Terminal Function

Description of Terminal Function

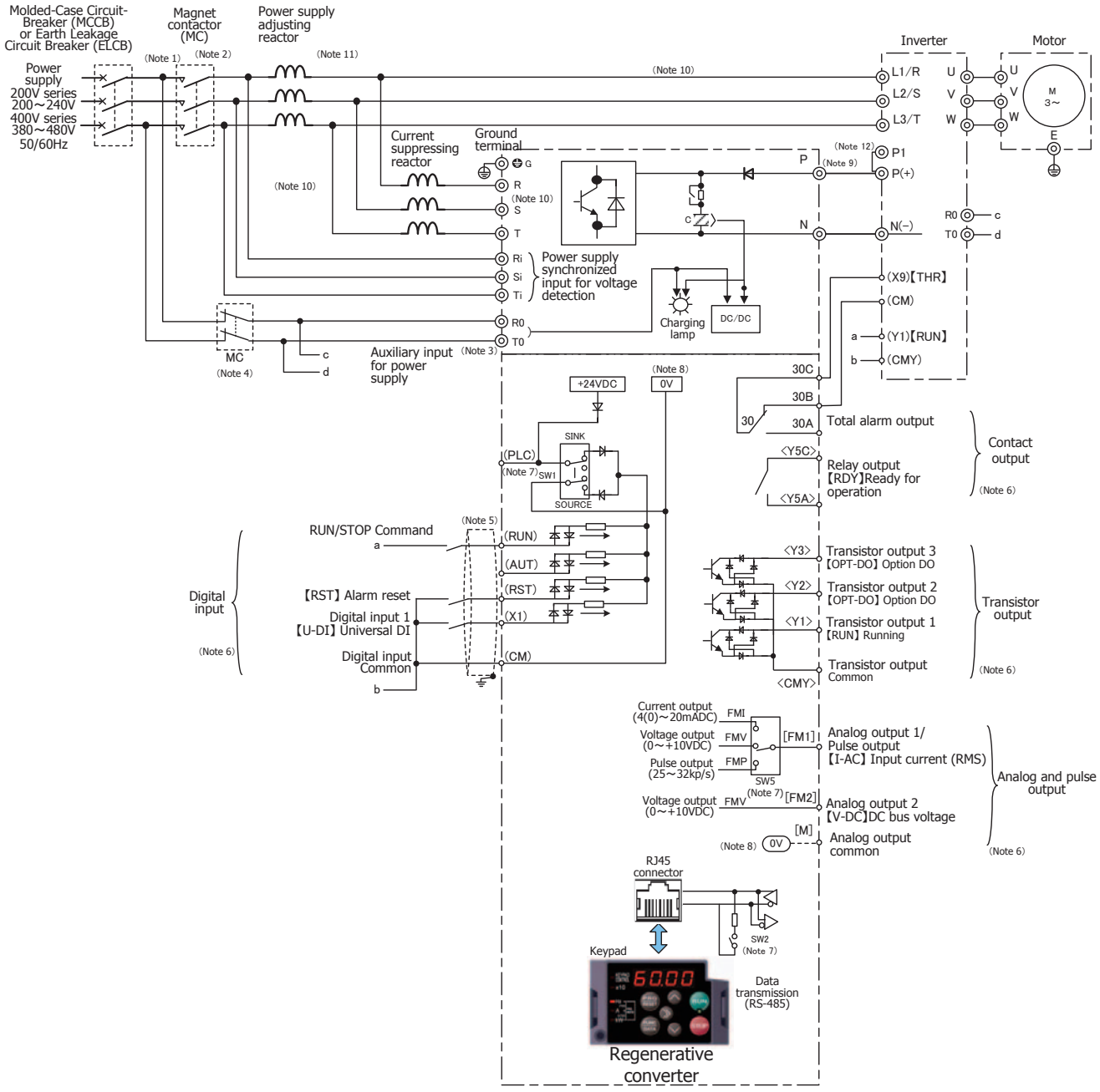
Terminal			Specification
Area	Symbol	Function	
Main circuit	R, S, T	Main power supply	Connect to 3-phase power supply via an exclusive reactor or the like.
	P, N	DC voltage output	Connect to the power input terminals P (+) and N (-) of the inverter.
	R0, T0	Auxiliary control power input	Backup for control 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 power supply adjusting reactor.
Control input ternminal	RUN	RUN / STOP command	Run command is input when RUN-CM is ON, and stops when RUN-CM is OFF.
	AUT	Autorun command	Runs automatically during regenerative status.
	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	Digital input (Sink / Source)	The following functions can be selected 0: External alarm [THR], 4: Universal DI[U-DI]
	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 ternminal	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], 3: Life forcast [LIFE], 4: Cooling fin overheat forecast [PRE-OH], 7: Regenerating [REG], 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], 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 5A cosφ=0.4)
	Y5C		
	FM1, FM2	Analog output	The following monitor signals can be output in analog DC voltage 0~10V or in DC current 4~20mA, or in pulse 25~32000p/s (FM2 can output DC voltage only). 0: Input current [PWR] 200%/10V 1: input current RMS [I-AC] 200%/10V 2: Input voltage RMS [V-AC] 250 (500)V/10V 3: DC us voltage [V-DC] 500 (1000)V/10V 4: Power supply frequency [FREQ] 100Hz/10V 5: +10V output for test [P10] -
	M	Analog output common	Common terminal for analog output.
Commuication	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
F01	Operation setting	0: Operation through keypad 1: Operation through external signals	1	-	1
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	-	1
F04	LED monitor (display selection)	0~5 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
F10	Operation mode selection	0: Manual mode (Keep running when run command is input) 1: Autorun mode (After run command is input, run only when DC bus voltage increase is detected.)	1	-	0
F11	Duration time for autorun mode	Opration duration time during autorun mode can be set here. 0.0~60.00	1	s	4
F12	Stop power level for autorun mode	It is used to set power level to end autorun. During auto-running, auto-run will be ended once regenerative power falls below this level. 0.0~100.0	0.1	%	50.0
F13	Start voltage level for autorun mode	It is used to set the start voltage level for autorun. 0~100	1	V	5
F17	Stop voltage level for autorun mode	It is used to set the stop voltage level for autorun. 0~100	1	V	2
E01	X1 terminal (Function selection)	0~4 0: External alarm [THR] 4: Universal DI [U-DI]	1	-	4
E02	Y1 terminal transistor output (function selection)	0~34 0: Running [RUN] 1: Ready for operation [RDY] 3: Life forecast [LIFE] 4: Cooling fin overheat forecast [PRE-OH] 7: Regenerating [REG] 9: Restart after momentary power failure [U-RES] 10: Source frequency synchronization [SY-HZ] 11: Alarm information 1 [AL1] 12: Alarm information 2 [AL2] 13: Alarm information 4 [AL4] 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)				25
E04	Y3 terminal transistor output (function selection)				25
E05	Y5 terminal relay output (function selection)				1
E14	I/O function normally open/close	0000~007F 0: Normal open 1: Normal close	1	-	0
E16	ON-OFF control for cooling fan	0: Deactivated (Fan is always ON) 1: Activated (ON/OFF control)	1	-	0
E18	FM1 function slsection	0~10 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	-	0
E19	FM2 function selection		1	-	3
E20	FM1 function selection	0: Voltage output (DC0~+10V) 1: Current output (DC4~20mA) 2: Current output (DC0~20mA) 3: Pulse output	1	-	0
E21	FM1 gain	0~100.00 (times)	0.01	time	1
E22	FM2 gain				1
E23	FM1 (pulse rate)	25~32000p/s (pulse when monitor data is 100%)		p/s	1440
E24	FM1 bias	-100.0~100.0%	0.1	%	0
E25	FM2 bias				0
E27	FM1-2 filter	0.000~0.500s	0.001	s	0.01
H00	Data initialization	It is used to make all function codes return to initial status.	1	-	0
H14	Clear alarm data	0: Disable 1: Alarm data clear (Automatically return to 0 after clearing data)	1	-	0
U06-U10	Reserved	-32768 ~ 32767	1	-	0

Basic Connection Diagram



(Note 1) Please install MCCB or ELCB into the input side of inverter/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 inverter or converter from power supply without opening MCCB or ELCB, therefore it is recommended to install magnet contactor (MC) for inverter/converter. 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](digital input), [Y1]~[Y3](transistor output), and [FM1]~[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 regenerative converter (terminal P, P(+) and N, N(-)) should be no more than 5m.

(Note 10) The length of cable between power supply adjusting reactor and inverter/converter should be no more than 10m.

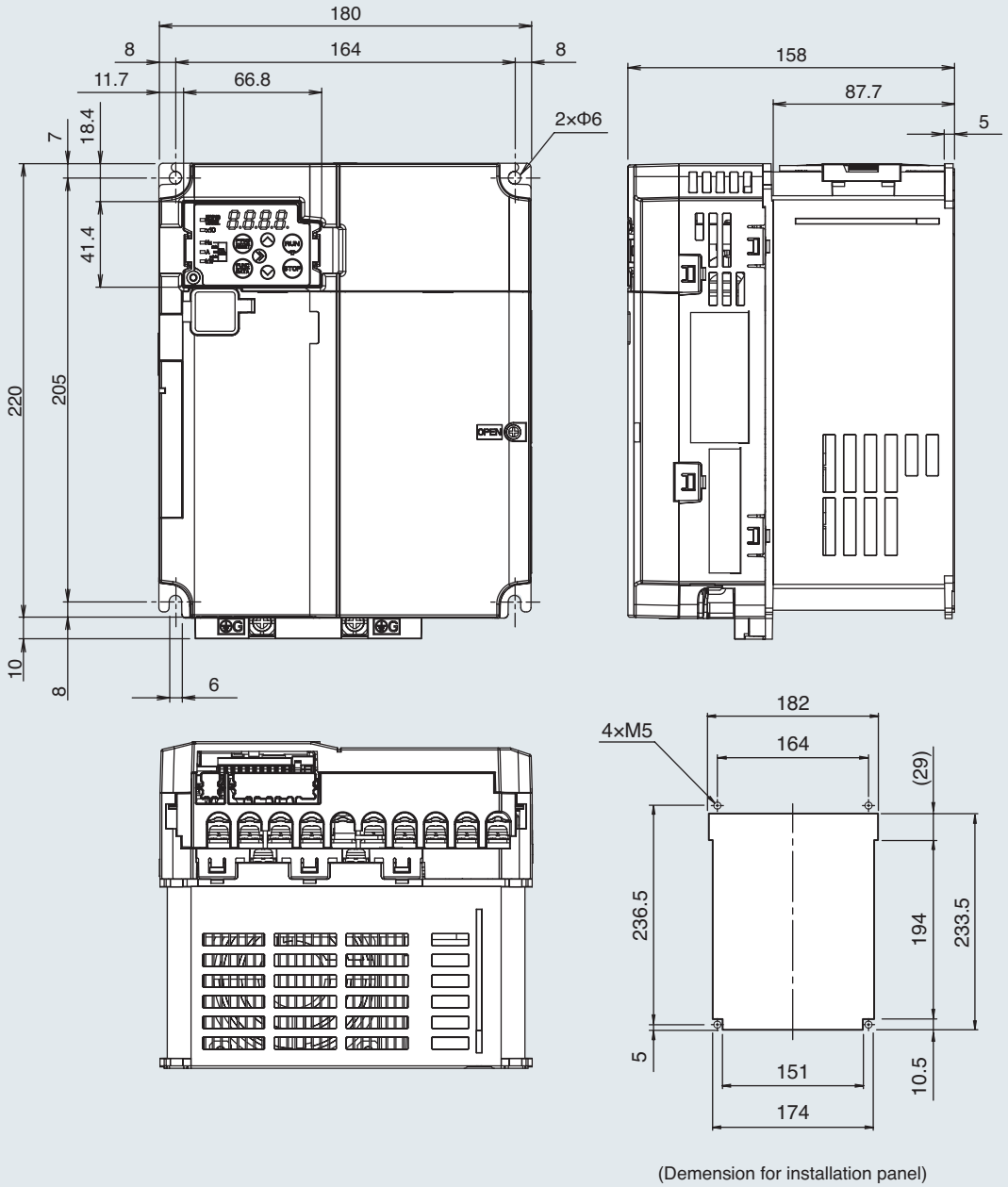
(Note 11) If the following conditions are satisfied, power supply adjusting reactor is unnecessary.
(Power supply capacity required for the applicable inverter with the same capacity as the regenerative converter to be used (with DCR) × 10) > Power supply capacity)

(Note 12) Do not remove the shorting bar from terminals P1-P(+) if the direct current reactor is not used.

External Demensions

Figure A

(Unit: mm)

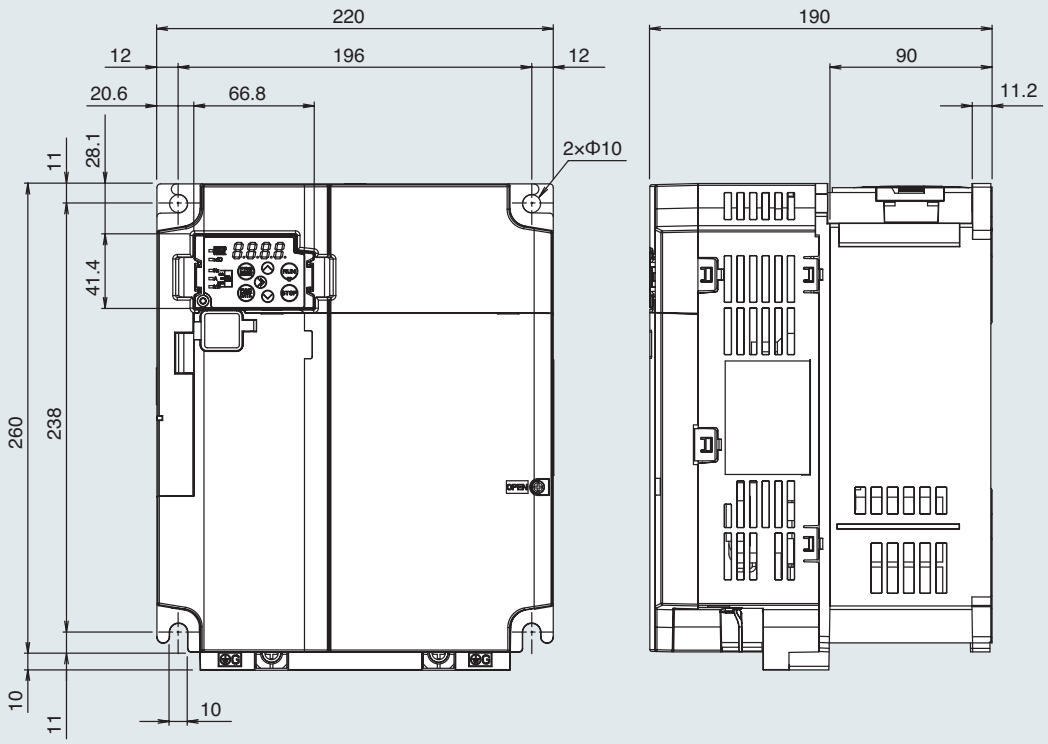


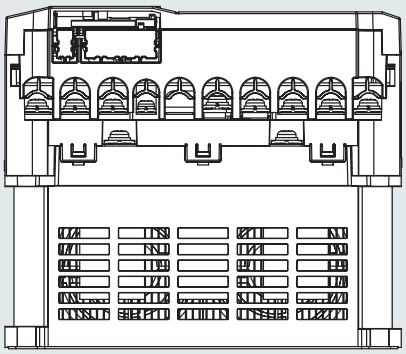
(Demension for installation panel)

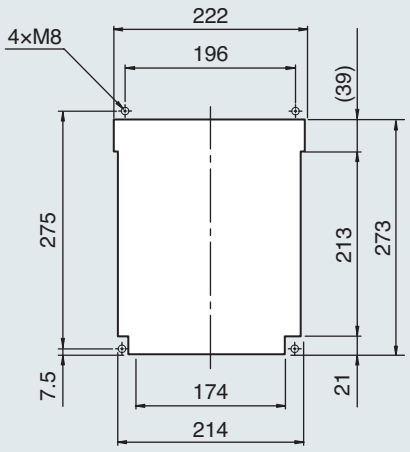
Power supply voltage	Converter type
Three-phase 200V	RHR5.5C-2EJ
	RHR7.5C-2EJ
	RHR11C-2EJ
	RHR15C-2EJ
Three-phase 400V	RHR5.5C-4EJ
	RHR7.5C-4EJ
	RHR11C-4EJ
	RHR15C-4EJ

Figure B

(Unit: mm)







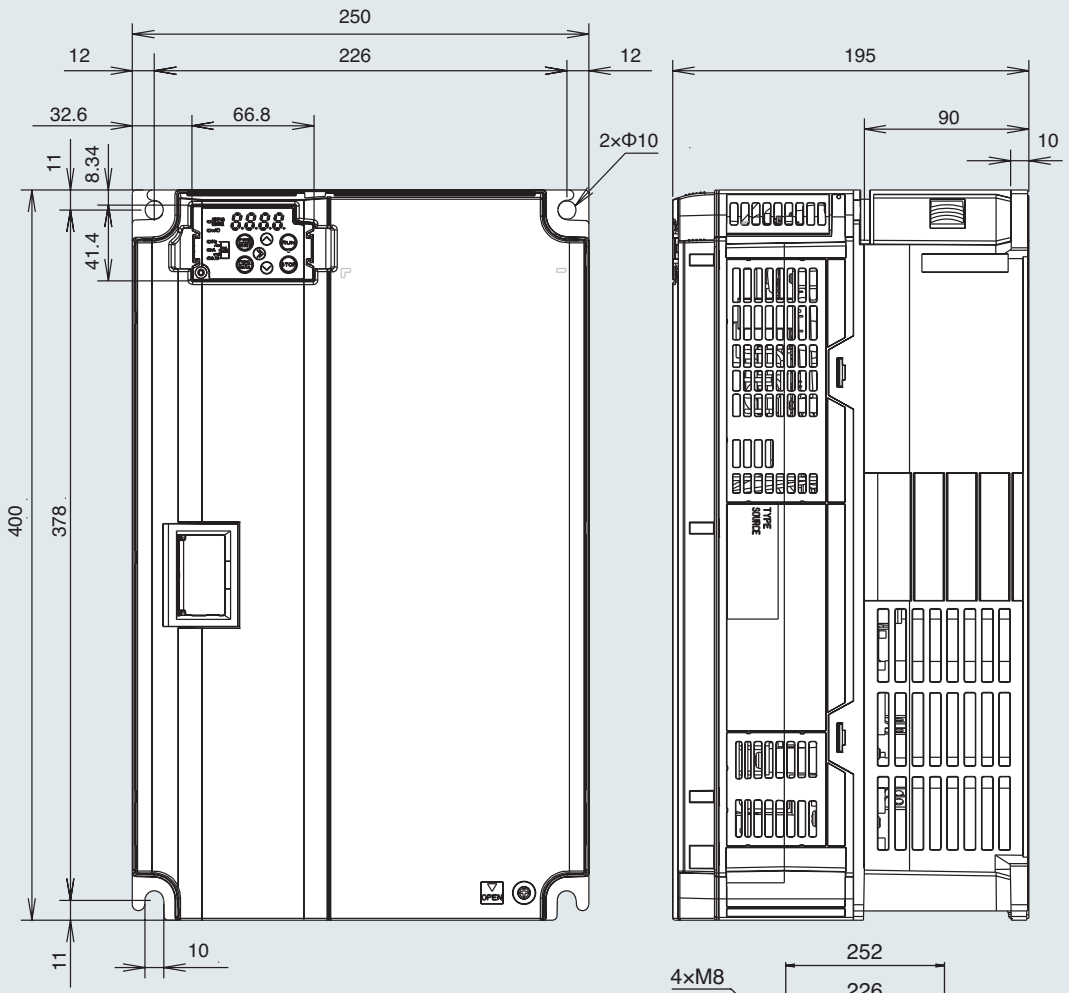
(Demension for installation panel)

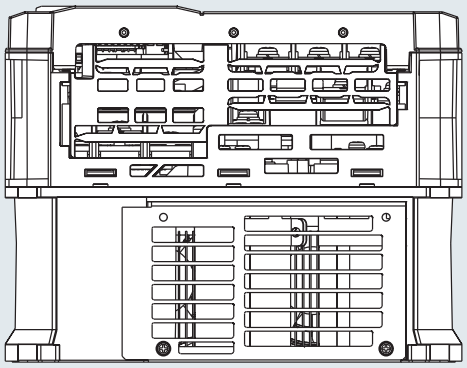
Power supply voltage	Converter type
Three-phase 200V	RHR18.5C-2EJ
	RHR22C-2EJ
Three-phase 400V	RHR18.5C-4EJ
	RHR22C-4EJ

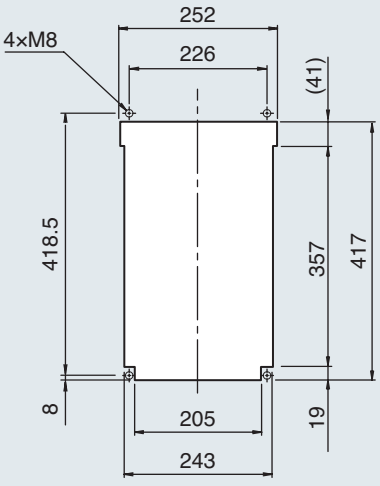
External Demensions

Figure C

(Unit: mm)





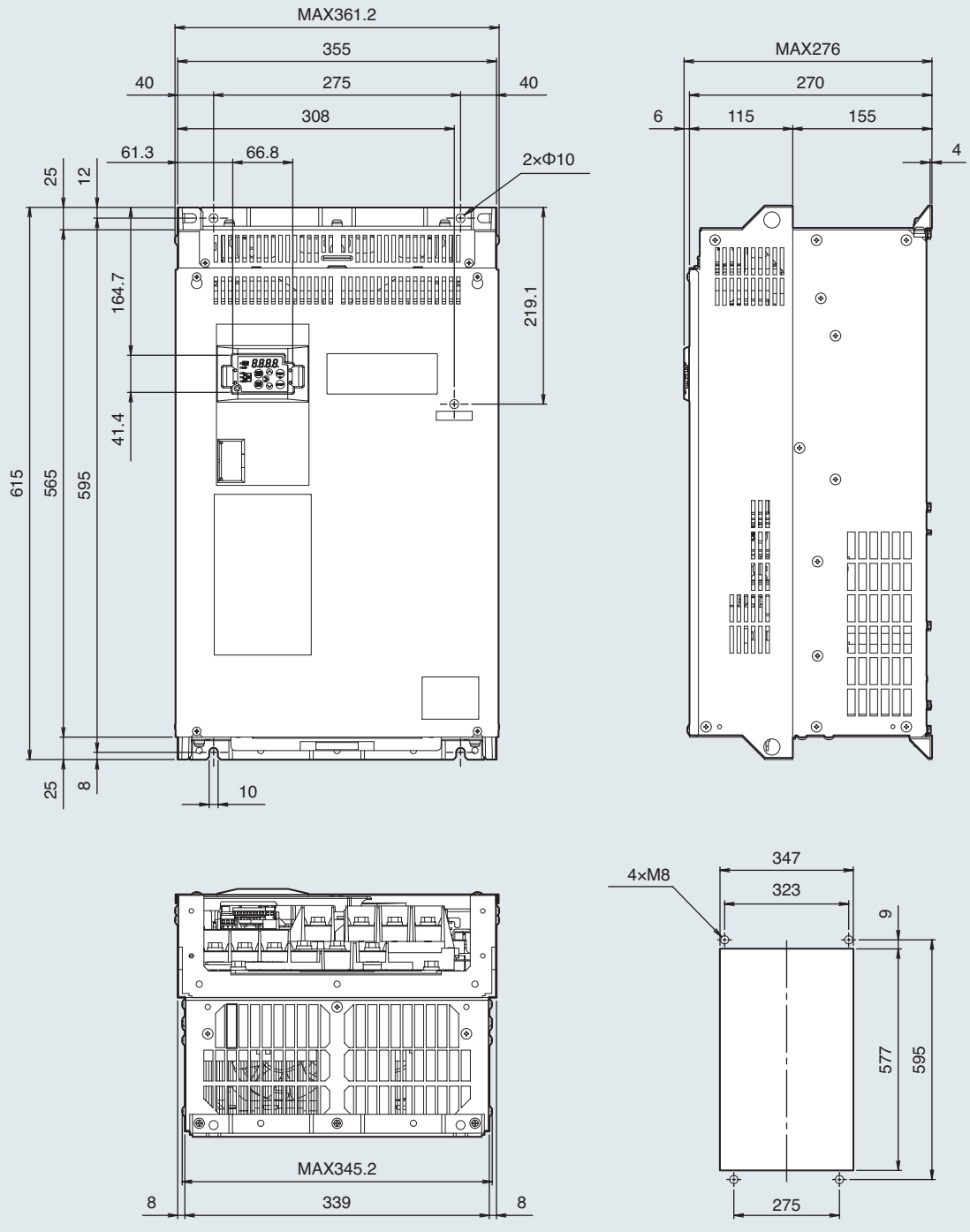


(Demension for installation panel)

Power supply voltage	Converter type
Three-phase 200V	RHR30C-2EJ
Three-phase 400V	RHR30C-4EJ
	RHR37C-4EJ

Figure D

(Unit: mm)



(Demension for installation panel)

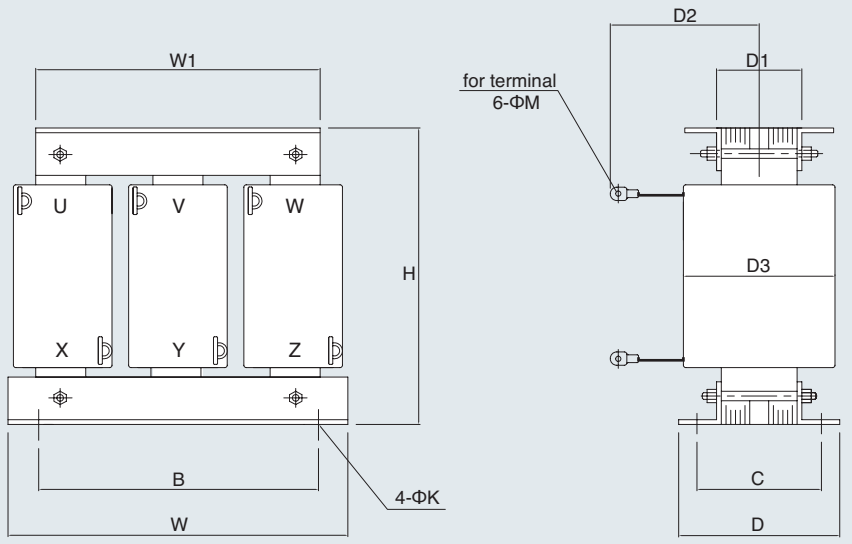
Power supply voltage	Converter type
Three-phase 400V	RHR45C-4EJ
	RHR55C-4EJ
	RHR75C-4EJ

Peripheral devices

Current suppressing reactor

Power supply voltage	Converter model	Current suppressing Reactor model	Demension [mm]											Mass [kg]
			H	W	B	C	D	W1	D1	D2	D3	K	Solderless Terminal size	
			MAX	±1	±1	±2	±2	±1	+2,-1	±5	MAX			
200V	RHR5.5C-2EJ	ACR2-5.5CS	110	155	104	66	92	113.8	23	70	45	7×10	M5	3
	RHR7.5C-2EJ	ACR2-7.5CS	110	155	104	66	92	113.8	24	72	49	7×10	M5	3
	RHR11C-2EJ	ACR2-11CS	120	155	104	80	106	130	36	80	55	7×10	M5	5
	RHR15C-2EJ	ACR2-15CS	125	155	104	79	105	130	35	82	57	7×10	M6	5
	RHR18.5C-2EJ	ACR2-18.5CS	125	155	104	86	112	130	43	88	65	7×10	M6	6
	RHR22C-2EJ	ACR2-22CS	130	155	104	79	105	130	35	85	56	7×10	M6	5
	RHR30C-2EJ	ACR2-30CS	130	155	104	87	113	130	43	90	67	7×10	M8	6
400V	RHR5.5C-4EJ	ACR4-5.5CS	110	155	104	66	92	113.8	24	65	46	7×10	M4	3
	RHR7.5C-4EJ	ACR4-7.5CS	110	155	104	78	104	113.8	36	72	58	7×10	M4	4
	RHR11C-4EJ	ACR4-11CS	125	155	104	80	106	130	35	76	57	7×10	M5	5
	RHR15C-4EJ	ACR4-15CS	125	155	104	80	106	130	35	81	62	7×10	M5	5
	RHR18.5C-4EJ	ACR4-18.5CS	125	155	104	80	106	130	35	82	63	7×10	M5	6
	RHR22C-4EJ	ACR4-22CS	125	155	104	87	113	130	43	82	72	7×10	M6	6
	RHR30C-4EJ	ACR4-30CS	152	180	128	76	102	160	40	93	74	7×10	M6	9
	RHR37C-4EJ	ACR4-37CS	150	180	128	92	118	160	56	96	83	7×10	M6	11
	RHR45C-4EJ	ACR4-45CS	152	180	128	92	118	160	56	100	90	7×10	M8	12
	RHR55C-4EJ	ACR4-55CS	186	215	155	86	112	194	50	107	94	7×10	M8	16
	RHR75C-4EJ	ACR4-75CS	186	215	155	99	125	194	63	112	95	7×10	M8	19

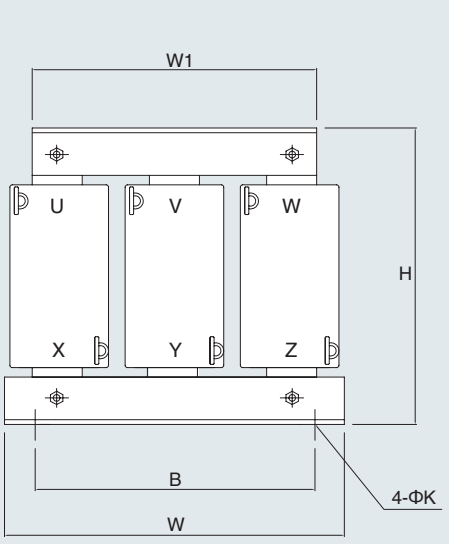
(Unit: mm)

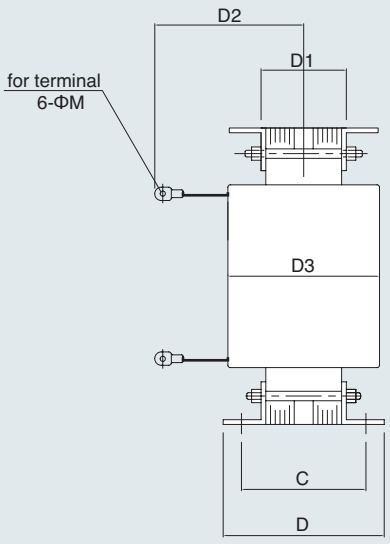


Power supply adjusting reactor

Power supply voltage	Converter model	Power supply adjusting reactor model	Demension [mm]											Mass [kg]
			H	W	B	C	D	W1	D1	D2	D3	K	Solderless Terminal size	
			MAX	± 1	± 1	± 2	± 2	± 1	+2,-1	± 5	MAX			
200V	RHR5.5C-2EJ	ACR2-5.5PC	105	155	104	66	92	113.8	23	74	42	7×10	M6	3
	RHR7.5C-2EJ	ACR2-7.5PC	105	155	104	66	92	113.8	23	78	46	7×10	M6	3
	RHR11C-2EJ	ACR2-11PC	105	155	104	84	110	113.8	41	89	55	7×10	M8	5
	RHR15C-2EJ	ACR2-15PC	125	155	104	79	105	130	35	88	60	7×10	M8	5
	RHR18.5C-2EJ	ACR2-18.5PC	121	155	104	80	106	130	35	92	63	7×10	M8	5
	RHR22C-2EJ	ACR2-22PC	125	155	104	79	105	130	35	96	65	7×10	M8	6
	RHR30C-2EJ	ACR2-30PC	125	155	104	88	114	130	44	103	77	7×10	M8	7
400V	RHR5.5C-4EJ	ACR4-5.5PC	105	155	104	74	100	113.8	32	75	52	7×10	M5	4
	RHR7.5C-4EJ	ACR4-7.5PC	105	155	104	86	111	113.8	44	80	64	7×10	M5	5
	RHR11C-4EJ	ACR4-11PC	105	155	104	85	112	113.8	43	79	65	7×10	M6	5
	RHR15C-4EJ	ACR4-15PC	125	155	104	80	106	130	35	86	59	7×10	M6	5
	RHR18.5C-4EJ	ACR4-18.5PC	121	155	104	79	105	130	35	86	60	7×10	M6	5
	RHR22C-4EJ	ACR4-22PC	125	155	104	79	105	130	35	87	64	7×10	M6	6
	RHR30C-4EJ	ACR4-30PC	125	155	104	88	114	130	44	95	78	7×10	M8	7
	RHR37C-4EJ	ACR4-37PC	125	155	104	89	115	130	45	102	78	7×10	M8	7
	RHR45C-4EJ	ACR4-45PC	125	155	104	89	115	130	45	103	81	7×10	M8	7
	RHR55C-4EJ	ACR4-55PC	125	155	104	94	120	130	50	106	83	7×10	M8	8
	RHR75C-4EJ	ACR4-75PC	183	215	155	76	102	194	41	103	74	7×10	M10	13

(Unit: mm)





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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Printed in Japan 2017-08 (H17a/D17) T05 FOLS