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INVERTER

New Product RELEASE No.18-4E

Addition of options for the FR-A842 Serving as a High Power Factor Converter (315K to 500K)

The plug-in option FR-A8AVP and the stand-alone options FR-A8VPB-H, FR-A8BL1, FR-A8BL2, FR-A8BC, and FR-A8MC are now available as new additions to the FR-A800 series inverter option lineup. The addition of options allows for capacities of 315K to 500K.

Features

FR-A842 inverter serving as a high power factor converter with the following options

Harmonic suppression (K5 = 0) achieved

The FR-A842 converter (converted from the FR-A842 inverter by using the plug-in option FR-A8AVP) is classified as a self-excitation three-phase bridge circuit under the "Harmonic Suppression Guidelines for Specific Consumers" and achieves K5 = 0 (conversion factor for equivalent capacity).

Only 5% or less of the total harmonic distortion of the input current (THDi)*

Such a low rate of THDi facilitates compliance with the overseas standards related to harmonic suppression.

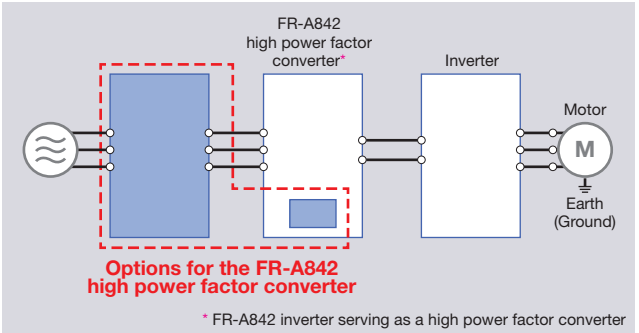
* When the input voltage is distorted, harmonic contents increase because power harmonics flow into the converter.

Merit

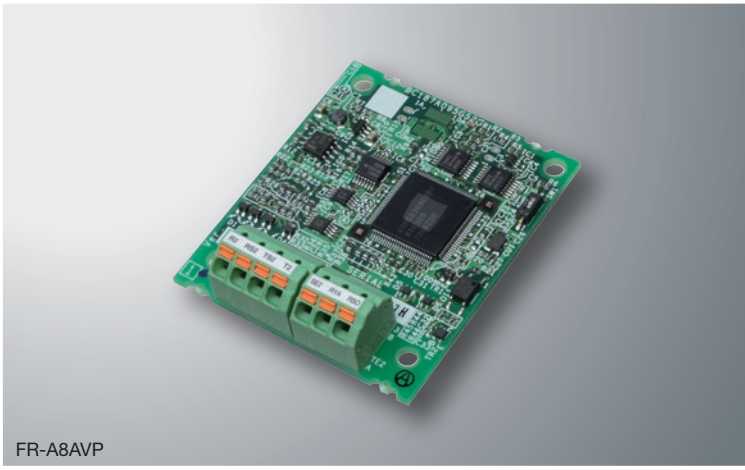
Turn spare inverters into converters

Inverters can be used as high power factor converters. They can be switched to a converter and back to an inverter again to match process requirements.

System configuration example



For wiring details, refer to page 3.


FR-A8AVP


FR-A8VPB-H


FR-A8BL2-H500K
FR-A8BL1-H500K


FR-A8BC-H500K


FR-A8MC-H500K

Release schedule June 2018

Inverters supporting conversion to a converter

The inverter/converter switching function is available for the inverter/converter which satisfies both of the following conditions.

- The inverter has two rating plates: one for the inverter, and the other for the high power factor converter.
- The inverter/converter has the following SERIAL (printed on the rating plate and the package).

Applicable model	Country of origin indication	SERIAL
FR-A842-12120(500K)	MADE in Japan	□7Z○○○○○○ or later
FR-A842-07700(315K) to 10940(450K)		□86○○○○○○ or later
FR-A842-07700(315K) to 12120(500K)	MADE in China	□87○○○○○○ or later

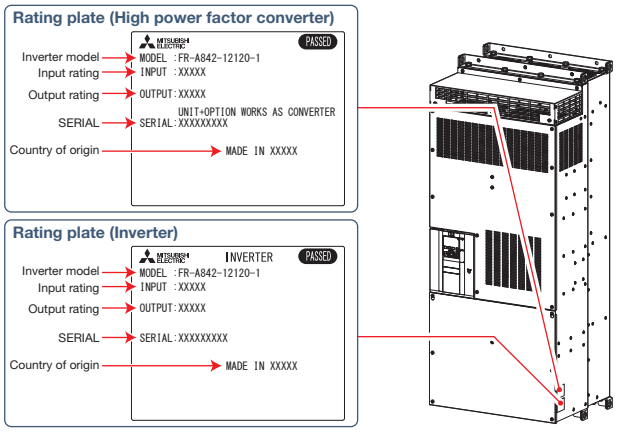
[Example]

□ 7 Z ○○○○○○

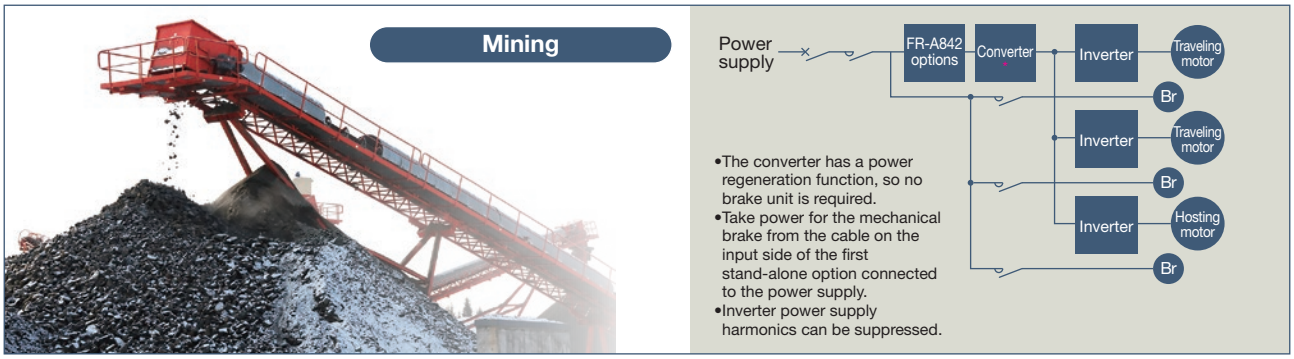
Symbol | Month | Year | Control number

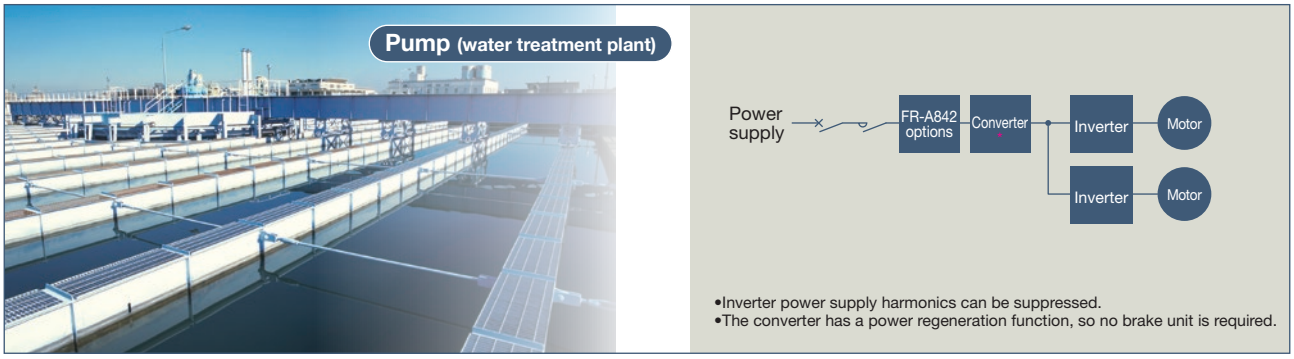
SERIAL

The SERIAL consists of one symbol, two characters indicating the production year and month, and six characters indicating the control number.
The last digit of the production year is indicated as the Year, and the Month is indicated by 1 to 9, X (October), Y (November), or Z (December).



Converter applications





* FR-A842 inverter serving as a high power factor converter

FR-A842 converter connects to multiple inverters

Up to 10 inverters are connectable to a single FR-A842 converter.
Ensure that the capacity of the converter is greater than the total capacity of connected inverters or motors. (If both inverters and motors are connected, choose the larger combined capacity of either the inverters or motors.) Additionally, the total capacity of the inverters or motors needs to be equal to or higher than half the capacity of the FR-A842 converter.
(FR-A842 converter capacity × 1/2 ≤ total capacity of connected inverters or motors ≤ FR-A842 converter capacity)
If the total inverter capacity is less than half the FR-A842 converter capacity the harmonic suppression effect is reduced.

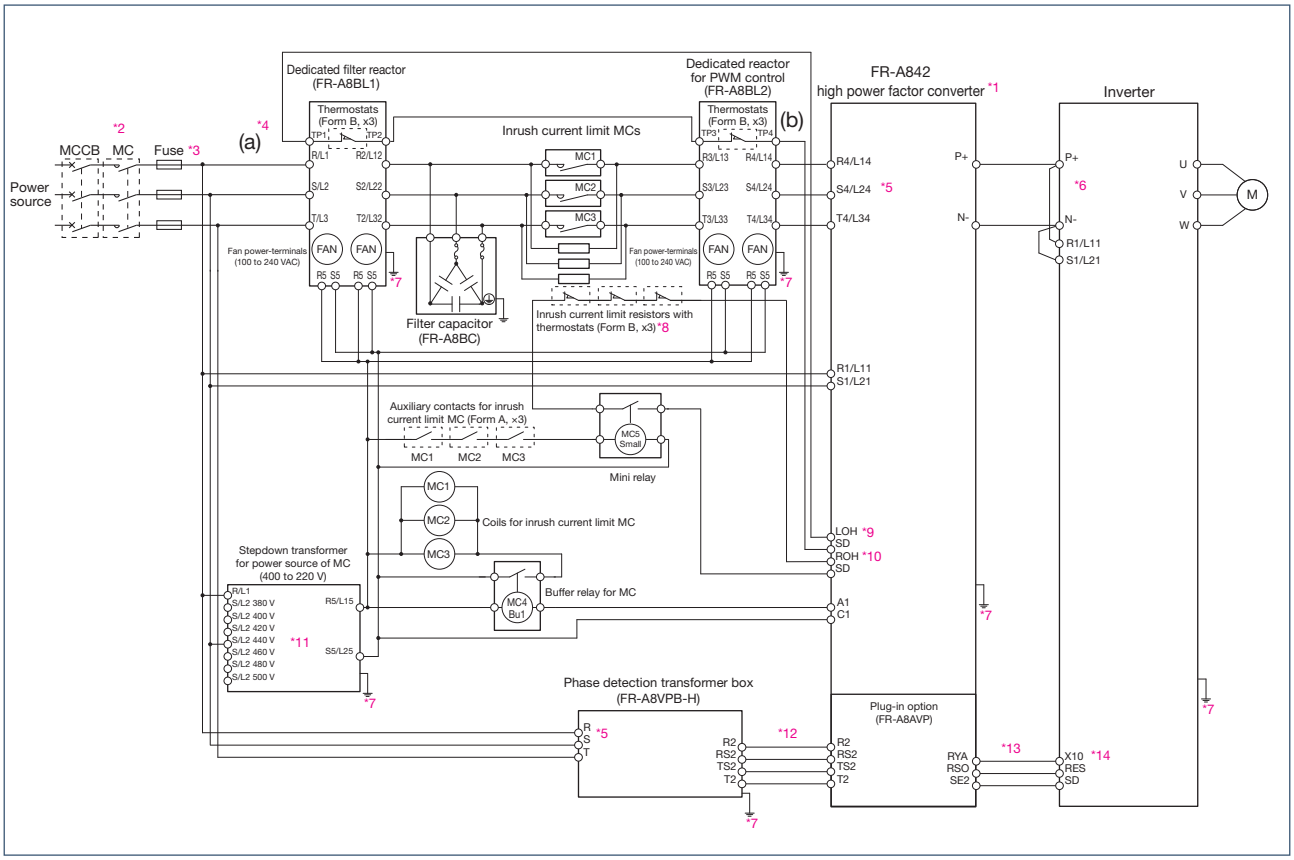
- Junction terminals and cross wiring may be required for the wiring of the multiple inverters. For the gauge of cable used between the two junction terminals, refer to the descriptions in the following figure. Total capacity of higher-number axis inverters must be considered for the cable selection.
- For the multiple inverter connection, place the higher capacity inverter in the lower number axis.
- It is recommended that a fuse is wired to each inverter power cable used between the inverter and the junction terminal. Select a fuse according to the motor capacity. When using a motor, of which the capacity is smaller than the inverter capacity by two ranks or more, select the fuse with the capacity that is one rank lower than the inverter capacity.
- Keep the length of cables between the converter and the final axis inverter on each terminal within 50 m.

Converter ratings and specifications

Model FR-A842-[]	315K	355K	400K	450K	500K
	07700	08660	09620	10940	12120
Applicable inverter capacity (kW)	315	355	400	450	500
Rated output capacity (kW)*1	375	423	476	536	595
Rated voltage (V) *2*3	Three-phase 380 to 500 V, 50/60 Hz*6*7				
Rated current (A)	564	636	716	806	895
Overload current rating*4	150% 60 s				
Permissible power supply voltage fluctuation	323 to 506 V, 50/60 Hz				
Permissible power supply frequency fluctuation	±5%				
Input power factor	0.99 or more (when load ratio is 100%)				
Power supply capacity (kVA)	456	515	580	652	724
Protective structure of the converter*5	Open type (IP00)				
Cooling system	Forced air				
Approx. mass (kg)	163	163	243	243	243

*1 DC output capacity when the input voltage is 400 VAC. Multiple ratings are not supported.
*2 Change the stepdown transformer tap according to the input voltage.
*3 The output voltage is approx. 594 VDC at an input voltage of 400 VAC, approx. 653 VDC at 440 VAC, and approx. 742 VDC at 500 VAC.
*4 The percentage of the overload current rating is the ratio of the overload current to the converter's rated input current. For repeated duty, allow time for the temperatures of the converter and the inverter to return to or below the temperatures under 100% load.
*5 FR-DU08: IP40 (except for the PU connector)
*6 The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)
*7 The rated voltage when connecting a motor to the FR-A840-02160(75K) and FR-F840-02160(90K) and above. If connecting to inverters other than those mentioned above, the rated voltage is 380 to 480 V.

Connection example



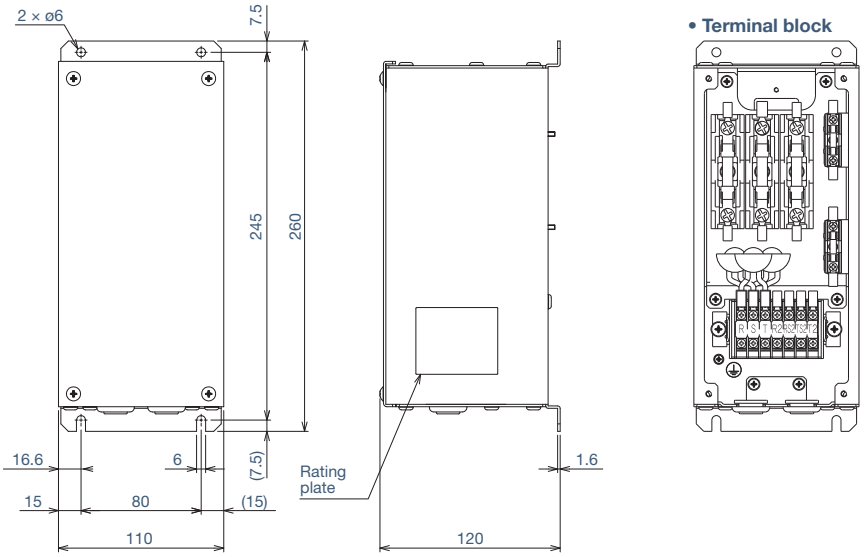
*1: Use the FR-A842 inverter converted into a high power factor converter.
*2: Install a magnetic contactor for each phase.
*3: Install the UL listed fuse (specified in the Instruction Manual of the FR-A8AVP) on the input side of the FR-A842 converter to meet the UL/cUL standards.
*4: Do not install an MCCB or MC between the dedicated filter reactor input terminals (R/L1, S/L2, and T/L3) (a) and the converter input terminals (R4/L14, S4/L24, and T4/L34) (b).
Doing so disrupts proper operation (except for the inrush current limit MC).
*5: Confirm the correct voltage phase sequence between terminals R4/L14, S4/L24, and T4/L34 of the converter and terminals R, S, and T of the phase detection transformer box.
*6: Do not install any MCCB between the inverter and the converter (P to P and N to N). Connecting opposite polarity of terminals P and N will damage the converter and the inverter.
*7: Securely perform grounding (earthing) by using the grounding (earthing) terminal.
*8: Connect the following devices to the inrush current limit MC used for each phase of the converter: one BKO-CA2573H01 (resistor without thermostat) and one BKO-CA2573H11 (resistor with thermostat) for FR-A842-08660(355K) converters or lower, and two BKO-CA2573H01 (resistor without thermostat) and one BKO-CA2573H11 (resistor with thermostat) for FR-A842-09620(400K) converters or higher.
*9: The LOH signal is assigned to terminal RT in the initial status. Set "33" in any of Pr.178 to Pr.189 (Input terminal function selection) to assign the LOH signal to another terminal.
*10: The ROH signal is assigned to terminal AU in the initial status. Set "34" in any of Pr.178 to Pr.189 (input terminal functionselection) to assign the ROH signal to another terminal.
*11: Select a terminal S/L2 according to the input voltage.
*12: Always connect between terminals R2, RS2, T2, and TS2 of the FR-A8AVP installed on the converter and those terminals of the phase detection transformer box, respectively. Failure to do so can damage the converter when the inverter is operated.
*13: Always connect between terminal RYA of the FR-A8AVP installed on the converter and an inverter terminal to which the X10 signal is assigned, and between terminal SE2 of the FR-A8AVP and terminal SD (terminal PC in the source logic) of the inverter. Failure to do so may damage the converter.
*14: Use the Input terminal function selection to assign the X10 signal to an inverter terminal. The X10 signal is assigned to terminal MRS in the initial status. (Refer to the Instruction Manual of the inverter.)

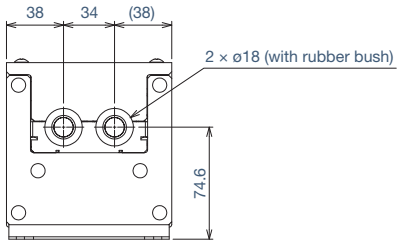
The name of the option FR-A8MC is not shown in the connection diagram above because the FR-A8MC is only a package name. Instead, the diagram shows the components of the package such as the inrush current limit magnetic contactor, stepdown transformer for power source of magnetic contactor, buffer relay, mini relay, and inrush current limit resistor.
For wiring details, refer to the Instruction Manual of the FR-A8AVP.

Outline dimensions

(Unit: mm)

Phase detection transformer box (FR-A8VPB-H)





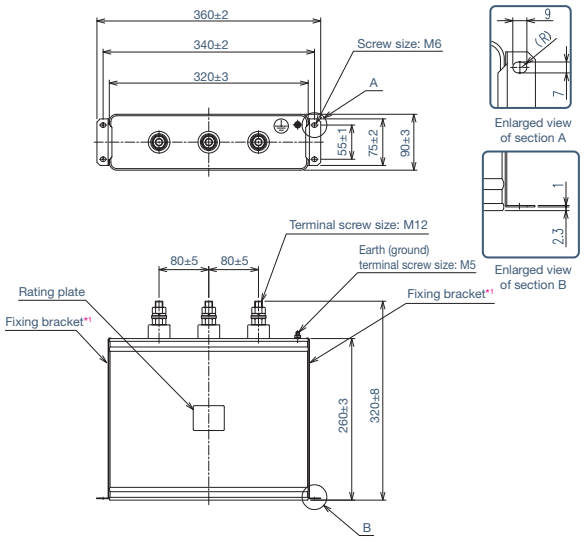
Terminal screw size

Model	Terminals R, S, T, R2, RS2, TS2, and T2	Earth (ground) terminal
FR-A8VPB-H	M3.5	M3.5

Mass: 3.2 kg

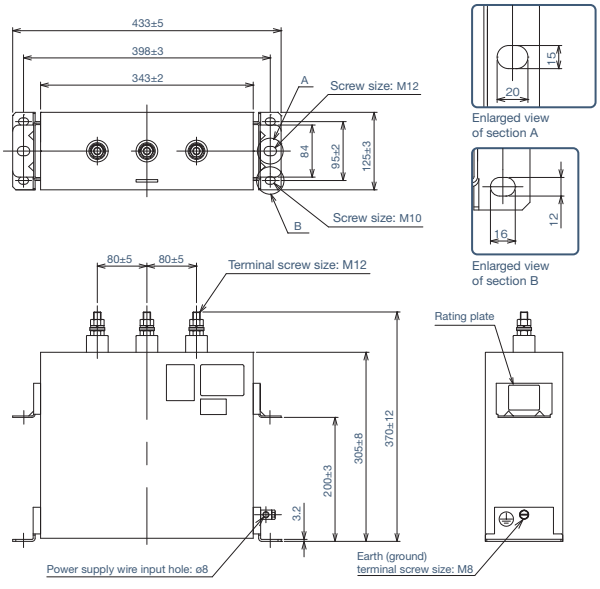
Dedicated filter capacitor (FR-A8BC)

FR-A8BC-H400K



Mass: 9 kg

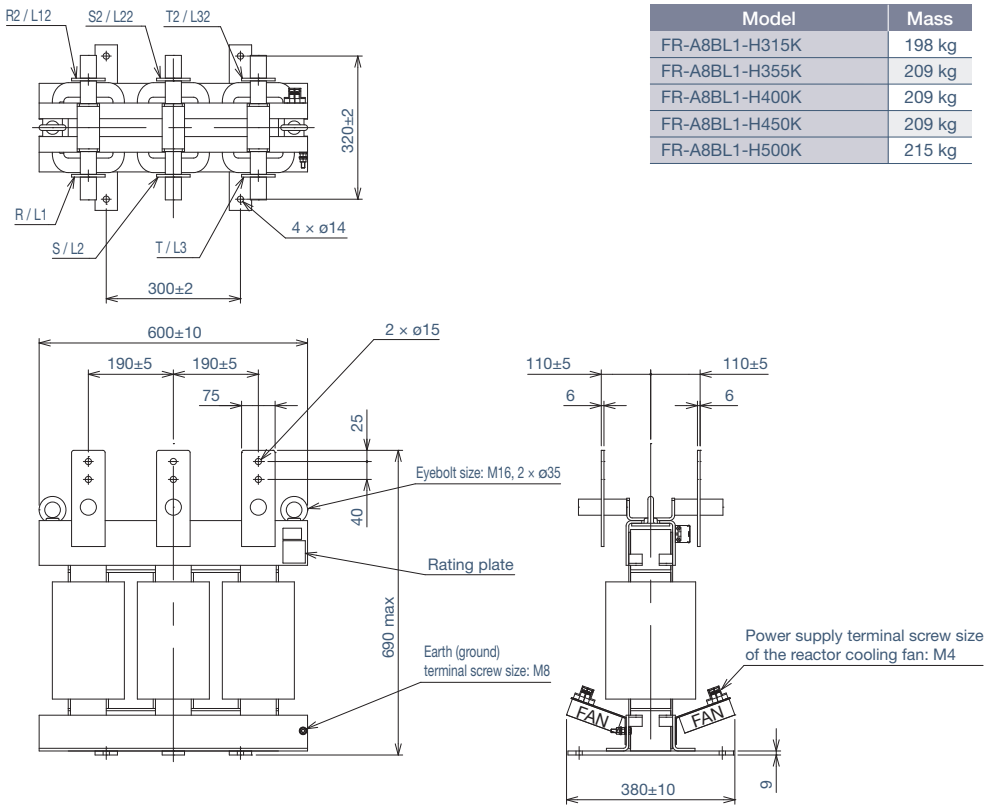
FR-A8BC-H500K



Mass: 20 kg

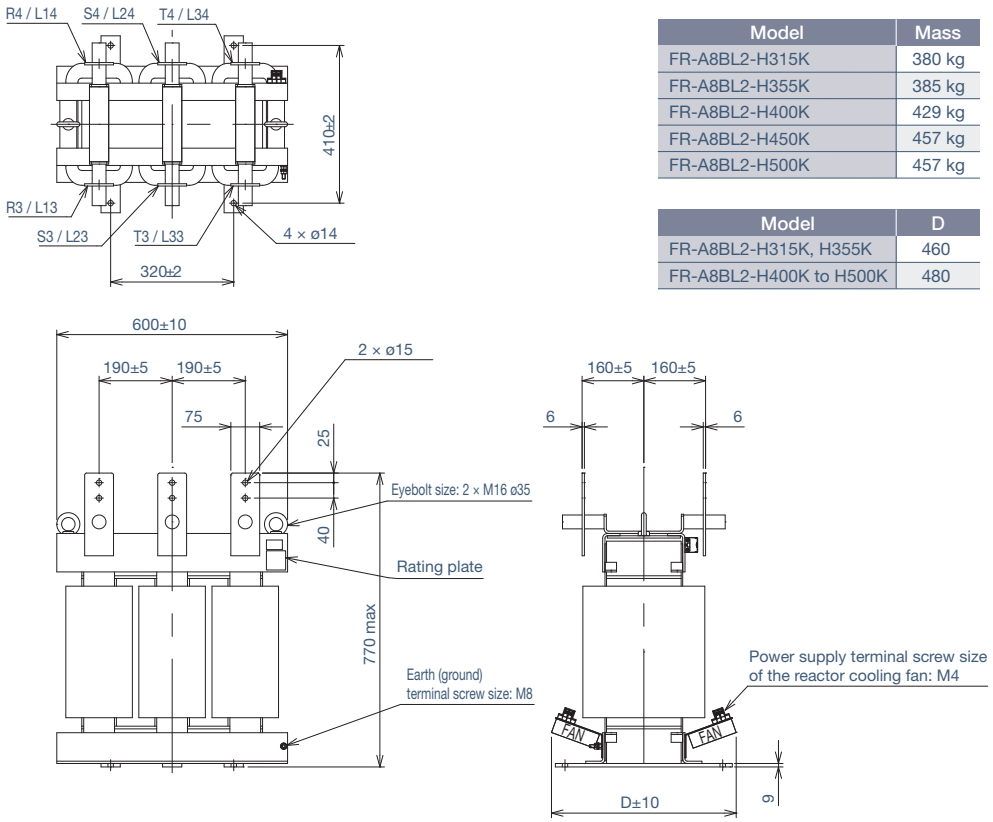
*1: The fixing brackets included are to be installed by the user.

Dedicated filter reactor (FR-A8BL1)



Model	Mass
FR-A8BL1-H315K	198 kg
FR-A8BL1-H355K	209 kg
FR-A8BL1-H400K	209 kg
FR-A8BL1-H450K	209 kg
FR-A8BL1-H500K	215 kg

Dedicated reactor for PWM control (FR-A8BL2)



Model	Mass
FR-A8BL2-H315K	380 kg
FR-A8BL2-H355K	385 kg
FR-A8BL2-H400K	429 kg
FR-A8BL2-H450K	457 kg
FR-A8BL2-H500K	457 kg

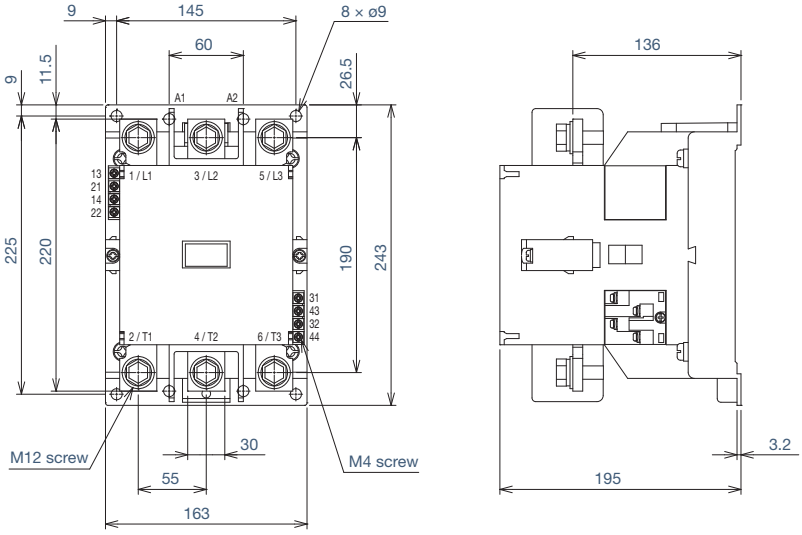
Model	D
FR-A8BL2-H315K, H355K	460
FR-A8BL2-H400K to H500K	480

Outline dimensions

(Unit: mm)

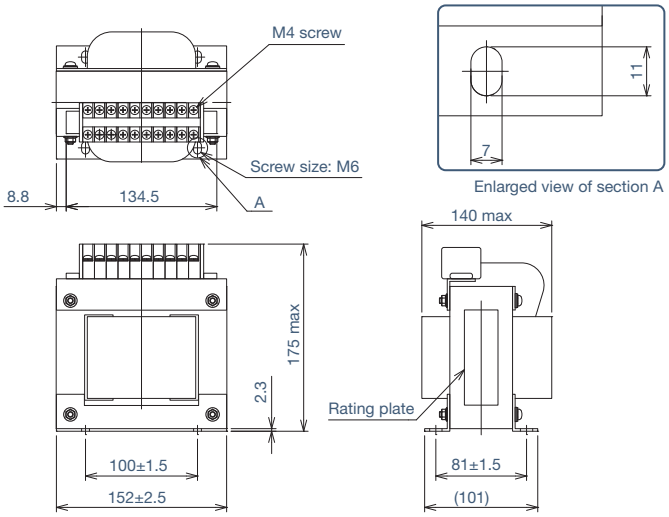
Components of the dedicated circuit parts for inrush current protection (FR-A8MC)

Inrush current limit magnetic contactor (S-N400 AC200V 2A2B)



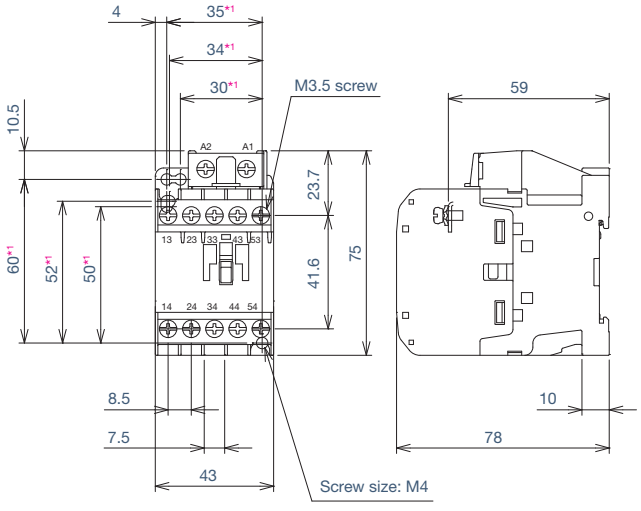
Mass: 9.5 kg

Stepdown transformer for power source of magnetic contactor (BKO-CA2571H01)



Mass: 9 kg

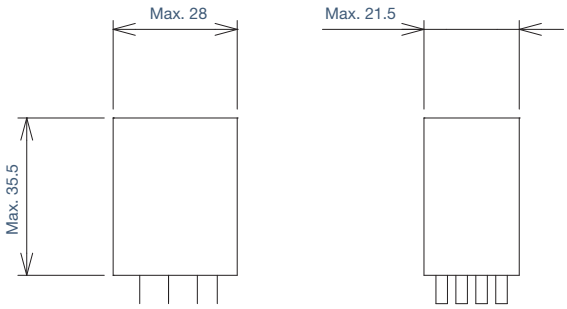
Buffer relay (SR-T5 AC200V 5A)



*1: The upper-left mounting hole is selectable from four locations: 1) 30 mm left and 60 mm up from the lower-right hole, 2) 34 mm left and 52 mm up from the lower-right hole, 3) 35 mm left and 50-52 mm up from the lower-right hole, 4) 35 mm left and 60 mm up from the lower-right hole.

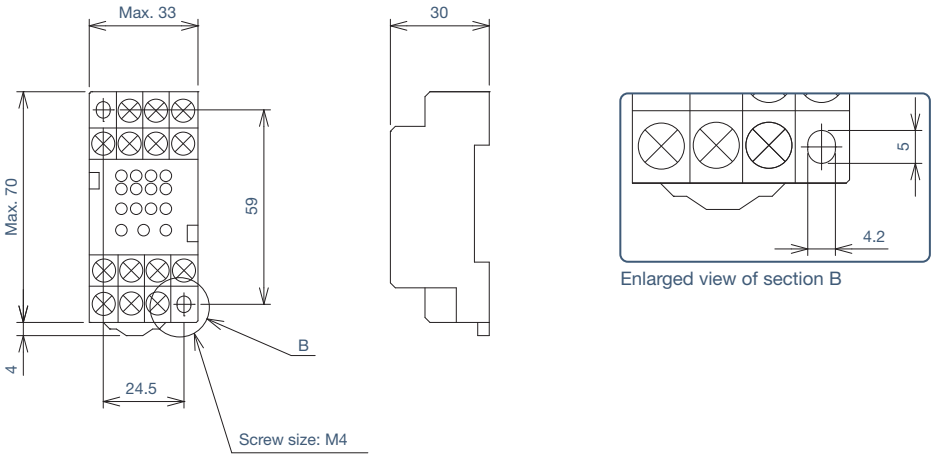
Mass: 0.27 kg

Mini relay (MYQ4Z AC200/220)



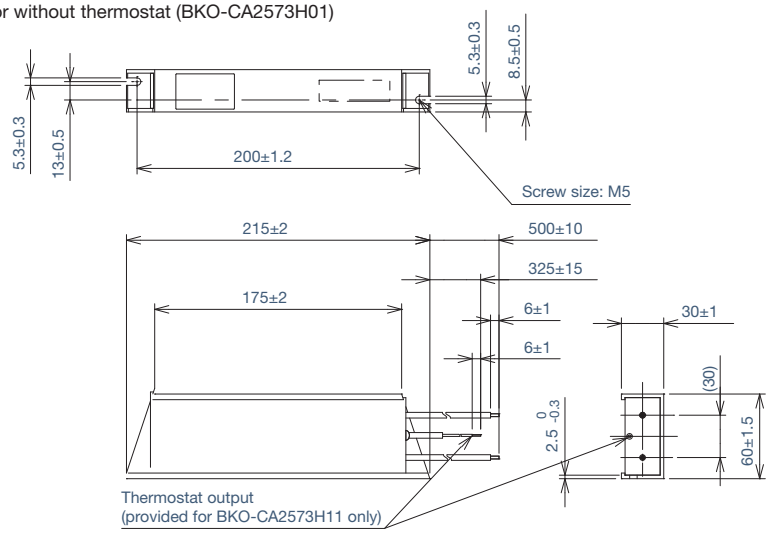
Mass: 35 g

Mini relay terminal block (PYF14T)



Mass: 53 g

Inrush current limit resistor with thermostat (BKO-CA2573H11)
Inrush current limit resistor without thermostat (BKO-CA2573H01)



Mass: 0.8 kg

Option lineup

For information on the installation location of each option, refer to page 3.

Phase detection option

The FR-A8AVP converts the FR-A842 inverter into a high power factor converter. In combination with the FR-A8VPB-H, the FR-A8AVP can send phase and voltage information about the commercial power supply to an inverter connected to the FR-A842 converter. It is not possible to use any other plug-in option when the FR-A8AVP is installed on the FR-A842 converter. All terminal options become unusable too.

FR-A8AVP

Phase detection transformer box

This is a stepdown transformer acquiring phase and voltage information about the power system to send to the FR-A842 converter.

FR-A8VPB-H

Symbol	Voltage
H	400 V class

Dedicated filter reactor

This is a filter reactor specifically made for the FR-A842 converter to improve its input power factor and reduce harmonics in the power supply.

FR-A8BL1-H□K

Symbol	Voltage
H	400 V class

Capacity of Dedicated filter reactor: Capacity (kW)

Model	315	355	400	450	500
FR-A8BL1-H[]K	●	●	●	●	●

Dedicated reactor for PWM control

This is a PWM control reactor specifically made for the FR-A842 converter.

FR-A8BL2-H□K

Symbol	Voltage
H	400 V class

Capacity of Dedicated reactor for PWM control: Capacity (kW)

Model	315	355	400	450	500
FR-A8BL2-H[]K	●	●	●	●	●

Dedicated filter capacitor

This is a filter capacitor specifically made for the FR-A842 converter to improve its input power factor and reduce harmonics in the power supply.

FR-A8BC-H□K

Symbol	Voltage
H	400 V class

Capacity of Dedicated filter capacitor: Capacity (kW)

Model	400	500
FR-A8BC-H[]K	●	●

Dedicated circuit parts for inrush current protection

This is an inrush current limit circuit kit specifically made for the FR-A842 converter.

FR-A8MC-H□K

Symbol	Voltage
H	400 V class

Capacity of Dedicated circuit parts for inrush current protection: Capacity (kW)

Model	355	500
FR-A8MC-H[]K	●	●

Combination table

Capacity required	Converter	Phase detection option	Phase detection transformer box	Dedicated filter reactor	Dedicated reactor for PWM control	Dedicated filter capacitor	Dedicated circuit parts for inrush current protection
315kW	FR-A842-315K	FR-A8AVP	FR-A8VPB-H	FR-A8BL1-H315K	FR-A8BL2-H315K	FR-A8BC-H400K	FR-A8MC-H355K
355kW	FR-A842-355K			FR-A8BL1-H355K	FR-A8BL2-H355K		
400kW	FR-A842-400K			FR-A8BL1-H400K	FR-A8BL2-H400K		FR-A8MC-H500K
450kW	FR-A842-450K			FR-A8BL1-H450K	FR-A8BL2-H450K	FR-A8BC-H500K	
500kW	FR-A842-500K			FR-A8BL1-H500K	FR-A8BL2-H500K		

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