

## Sales and Service

### General-purpose AC Servo Compatible with Compact Reactors (FR-HAL/FR-HEL)

Thank you for your continued patronage of the Mitsubishi general-purpose AC servo and FA products. The following target models are compatible with the compact reactors (FR-HAL and FR-HEL). We ask for your understanding in this matter.

#### 1. Target Models

MR-J3, MR-J3W, MR-J2S, MR-J2M, and MR-C series

#### 2. Purpose

To be compatible with the compact reactors (FR-HAL and FR-HEL).

Since the reactors are reduced in size, the mounting area of the FR-HAL and the FR-HEL are less than that of the conventional models (FR-BAL and FR-BEL).

Example: For the FR-HEL-5.5K, the mounting area is approximately 60% of the conventional model (FR-BEL-5.5K).

#### 3. Specifications of the FR-HAL and the FR-HEL

The following shows the specifications of the FR-HAL and the FR-HEL.

For details of the specifications, refer to the instruction manuals of the FR-HAL and the FR-HEL.

	FR-HAL	FR-HEL
Power specifications	200V class: Three-phase 200 to 240VAC 50Hz/60Hz 400V class (55kW or less): Three-phase 380 to 480VAC 50Hz/60Hz	Three-phase 200 to 240VAC 50Hz/60Hz 380 to 480VAC 50Hz/60Hz
Ambient temperature	-10°C to 50°C (non-freezing)	
Ambient humidity	90%RH or less (non-condensing)	
Storage temperature	-20°C to 65°C (non-freezing)	
Atmosphere	Indoors (free from corrosive gas, flammable gas, oil mist, dust, and dirt)	
Altitude/vibration	Maximum 1000m above sea level/5.9m/s <sup>2</sup> or less	

#### 4. Combination of the AC servo and the FR-HAL or the FR-HEL

For details of the combination of the AC servo and the FR-HAL or the FR-HEL, refer to the following table. The DC reactor is not compatible with the AC servo that does not have the P-P<sub>1</sub> terminals.

Series	FR-HAL (AC reactor)	FR-HEL (DC reactor)
MR-J3	Compatible	Compatible
MR-J3W	Compatible	Not compatible
MR-J2S	Compatible	Compatible with only some models
MR-J2M	Compatible	Not compatible
MR-C	Compatible	Not compatible

The following shows the power factors when the reactors are used with the servo amplifiers.

Model	AC reactor		DC reactor	
	FR-BAL	FR-HAL	FR-BEL	FR-HEL
Power factor	Approximately 90%	Approximately 80%	Approximately 95%	Approximately 85%

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## 5. Schedule

Immediately

## 6. Precautions when Replacing the FR-BAL or the FR-BEL with the FR-HAL or the FR-HEL


When replacing the FR-BAL or the FR-BEL with the FR-HAL or the FR-HEL, refer to the following precautions.

- (1) Reducing the power factor increases input current. Since the input current increases, some combinations of the servo amplifier and the FR-HAL or the FR-HEL are changed.
- (2) Since the characteristics differ between the FR-BAL or the FR-BEL and the FR-HAL or the FR-HEL, the suppressing effect of inrush current is reduced. Therefore, when using the FR-HAL or the FR-HEL to reduce inrush current that flows in the buses P and N or others with more than two servo amplifiers, check if no error occurs.

(a) Combination of the MR-J3 series and the FR-HAL or the FR-HEL □: A/B/T


1) Combination of the MR-J3 series and the FR-HAL

Servo amplifier	Power factor improving AC reactor	No-fuse breaker when using the power factor improving reactor
MR-J3-10□1	FR-HAL-0.75K	30A frame 5A
MR-J3-20□1	FR-HAL-1.5K	30A frame 10A
MR-J3-40□1	FR-HAL-2.2K	30A frame 15A
MR-J3-10□	FR-HAL-0.4K	30A frame 5A
MR-J3-20□	FR-HAL-0.4K	30A frame 5A
MR-J3-40□	FR-HAL-0.75K	30A frame 10A
MR-J3-60□	FR-HAL-1.5K	30A frame 10A
MR-J3-70□	FR-HAL-1.5K	30A frame 10A
MR-J3-100□	FR-HAL-2.2K	30A frame 10A
MR-J3-200□	FR-HAL-3.7K	30A frame 15A
MR-J3-350□	FR-HAL-7.5K	30A frame 30A
MR-J3-500□	FR-HAL-11K	50A frame 50A
MR-J3-700□	FR-HAL-15K	50A frame 50A
MR-J3-11K□	FR-HAL-15K	100A frame 100A
MR-J3-15K□	FR-HAL-22K	100A frame 125A
MR-J3-22K□	FR-HAL-30K	225A frame 175A
MR-J3-60□4	FR-HAL-H1.5K	30A frame 5A
MR-J3-100□4	FR-HAL-H2.2K	30A frame 10A
MR-J3-200□4	FR-HAL-H3.7K	30A frame 15A
MR-J3-350□4	FR-HAL-H7.5K	30A frame 20A
MR-J3-500□4	FR-HAL-H11K	30A frame 30A
MR-J3-700□4	FR-HAL-H15K	50A frame 30A
MR-J3-11K□4	FR-HAL-H15K	50A frame 50A
MR-J3-15K□4	FR-HAL-H22K	60A frame 60A
MR-J3-22K□4	FR-HAL-H30K	100A frame 100A

Note. The shaded area  shows that the FR-HAL or FR-HEL capacity differs from the FR-BAL or the FR-BEL capacity.

## 2) Combination of the MR-J3 series and the FR-HEL


Servo amplifier	Power factor improving DC reactor	No-fuse breaker when using the power factor improving reactor
MR-J3-10□	FR-HEL-0.4K	30A frame 5A
MR-J3-20□	FR-HEL-0.4K	30A frame 5A
MR-J3-40□	FR-HEL-0.75K	30A frame 10A
MR-J3-60□	FR-HEL-1.5K	30A frame 10A
MR-J3-70□	FR-HEL-1.5K	30A frame 10A
MR-J3-100□	FR-HEL-2.2K	30A frame 10A
MR-J3-200□	FR-HEL-3.7K	30A frame 15A
MR-J3-350□	FR-HEL-7.5K	30A frame 30A
MR-J3-500□	FR-HEL-11K	50A frame 50A
MR-J3-700□	FR-HEL-15K	50A frame 50A
MR-J3-11K□	FR-HEL-15K	100A frame 100A
MR-J3-15K□	FR-HEL-22K	100A frame 125A
MR-J3-22K□	FR-HEL-30K	225A frame 175A
MR-J3-60□4	FR-HEL-H1.5K	30A frame 5A
MR-J3-100□4	FR-HEL-H2.2K	30A frame 10A
MR-J3-200□4	FR-HEL-H3.7K	30A frame 15A
MR-J3-350□4	FR-HEL-H7.5K	30A frame 20A
MR-J3-500□4	FR-HEL-H11K	30A frame 30A
MR-J3-700□4	FR-HEL-H15K	50A frame 30A
MR-J3-11K□4	FR-HEL-H15K	50A frame 50A
MR-J3-15K□4	FR-HEL-H22K	60A frame 60A
MR-J3-22K□4	FR-HEL-H30K	100A frame 100A

Note. The shaded area  shows that the FR-HAL or FR-HEL capacity differs from the FR-BAL or the FR-BEL capacity.

## (b) Combination of the MR-J2S series and the FR-HAL or the FR-HEL □: A/B/CP/CL

### 1) Combination of the MR-J2S series and the FR-HAL

Servo amplifier	Power factor improving AC reactor	No-fuse breaker when using the power factor improving reactor
MR-J2S-10□1	FR-HAL-0.75K	30A frame 5A
MR-J2S-20□1	FR-HAL-1.5K	30A frame 10A
MR-J2S-40□1	FR-HAL-2.2K	30A frame 15A
MR-J2S-10□	FR-HAL-0.4K	30A frame 5A
MR-J2S-20□	FR-HAL-0.4K	30A frame 5A
MR-J2S-40□	FR-HAL-0.75K	30A frame 10A
MR-J2S-60□	FR-HAL-1.5K	30A frame 10A
MR-J2S-70□	FR-HAL-1.5K	30A frame 10A
MR-J2S-100□	FR-HAL-2.2K	30A frame 10A
MR-J2S-200□	FR-HAL-3.7K	30A frame 15A
MR-J2S-350□	FR-HAL-7.5K	30A frame 30A
MR-J2S-500□	FR-HAL-11K	50A frame 50A
MR-J2S-700□	FR-HAL-15K	50A frame 50A
MR-J2S-11K□	FR-HAL-15K	100A frame 100A
MR-J2S-15K□	FR-HAL-22K	100A frame 125A
MR-J2S-22K□	FR-HAL-30K	225A frame 175A
MR-J2S-60□4	FR-HAL-H1.5K	30A frame 5A
MR-J2S-100□4	FR-HAL-H2.2K	30A frame 10A
MR-J2S-200□4	FR-HAL-H3.7K	30A frame 15A
MR-J2S-350□4	FR-HAL-H7.5K	30A frame 20A
MR-J2S-500□4	FR-HAL-H11K	30A frame 30A
MR-J2S-700□4	FR-HAL-H15K	50A frame 30A
MR-J2S-11K□4	FR-HAL-H15K	50A frame 50A
MR-J2S-15K□4	FR-HAL-H22K	60A frame 60A
MR-J2S-22K□4	FR-HAL-H30K	100A frame 100A

Note. The shaded area  shows that the FR-HAL or FR-HEL capacity differs from the FR-BAL or the FR-BEL capacity.


For the models without the description of the power factor improving reactor, the underlined items show the capacities reduced by the power factor improvement.

2) Combination of the MR-J2S series and the FR-HEL

Servo amplifier	Power factor improving DC reactor	No-fuse breaker when using the power factor improving reactor
MR-J2S-11K□	FR-HEL-15K	100A frame 100A
MR-J2S-15K□	FR-HEL-22K	100A frame 125A
MR-J2S-22K□	FR-HEL-30K	225A frame 175A
MR-J2S-11K□4	FR-HEL-H15K	50A frame 50A
MR-J2S-15K□4	FR-HEL-H22K	60A frame 60A
MR-J2S-22K□4	FR-HEL-H30K	100A frame 100A


(c) Combination of the MR-J3W series and the FR-HAL

Servo amplifier	Power factor improving AC reactor	No-fuse breaker when using the power factor improving reactor
300W or less	FR-HAL-0.75K	30A frame 5A
More than 300W to 450W or less	FR-HAL-0.75K	30A frame 10A
More than 450W to 600W or less	FR-HAL-1.5K	30A frame 10A
More than 600W to 1kW or less	FR-HAL-2.2K	30A frame 10A
More than 1kW to 2.0kW or less	FR-HAL-3.7K	30A frame 15A

Note. The shaded area  shows that the FR-HAL or FR-HEL capacity differs from the FR-BAL or the FR-BEL capacity.


(d) Combination of the MR-J2M series and the FR-HAL

Servo amplifier	Power factor improving AC reactor	No-fuse breaker when using the power factor improving reactor
400W or less	FR-HAL-0.75K	30A frame 5A
More than 400W to 550W or less	FR-HAL-1.5K	30A frame 5A
More than 550W to 750W or less	FR-HAL-1.5K	30A frame 10A
More than 750W to 1100W or less	FR-HAL-2.2K	30A frame 10A
More than 1100W to 1900W or less	FR-HAL-3.7K	30A frame 15A
More than 1900W to 2200W or less	FR-HAL-5.5K	30A frame 20A
More than 2200W to 2500W or less	FR-HAL-5.5K	30A frame 30A
More than 2500W to 3300W or less	FR-HAL-7.5K	30A frame 30A

Note. The shaded area  shows that the FR-HAL or FR-HEL capacity differs from the FR-BAL or the FR-BEL capacity.

(e) Combination of the MR-C series and the FR-HAL

Servo amplifier	Power factor improving AC reactor	No-fuse breaker when using the power factor improving reactor
MR-C10A1	FR-HAL-0.75K	30A frame 5A
MR-C20A1	FR-HAL-1.5K	30A frame 10A
MR-C10A	FR-HAL-0.75K	30A frame 5A
MR-C20A	FR-HAL-0.75K	30A frame 5A
MR-C40A	FR-HAL-1.5K	30A frame 10A

Note. The shaded area  shows that the FR-HAL or FR-HEL capacity differs from the FR-BAL or the FR-BEL capacity.