



Changes for the Better

POWER REGENERATION COMMON CONVERTER

MODEL

FR-CV

Powerful,
reasonable



Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001 (standards for quality assurance management systems)

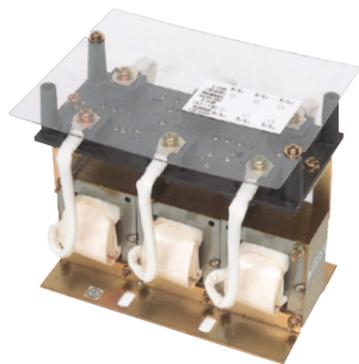


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Power regeneration common converter



Dedicated standalone reactor

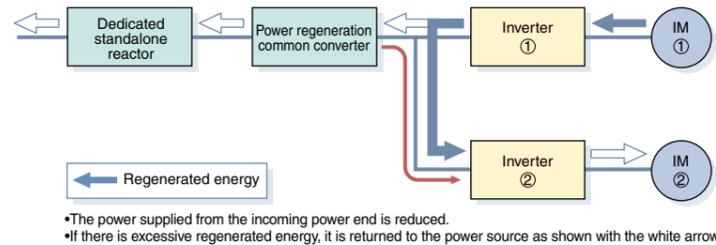
Features

1 Large braking ability

•A 100% torque continuous regeneration is possible, so continuous regeneration operation for elevating purposes or line control can be handled. (Max. 150% torque 60s regeneration is possible)

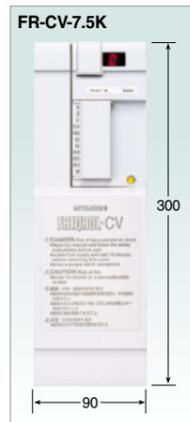
2 Reasonable with common converter method

•Total space and total costs can be reduced as a brake unit is not required for each inverter.
 •Energy saving as the regenerated energy can be used by other inverters, and excessive energy can be returned to the power source.



3 Easy panel design

•The slim body allows devices to be laid out easily in the panel.
 •By extruding the heat dissipating fin section of the power regeneration common converter outside the panel, the rise of the temperature in the panel can be suppressed, and the panel can be downsized.
 (When using external cooling fin type (FR-CV-□K). The inner-panel installed type (FR-CV-□K-AT) is also available.)



FREQROL-CV

Model Configuration

Type Power Regeneration Common Converter
FR-CV-H7.5K-AT

Symbol	Voltage	Symbol	Applicable capacity	Symbol	Structure
Note	200V class	7.5K-55K	Indicates capacity kW	Note	External cooling fin type
H	400V class			AT	Inner-panel installed type

Dedicated standalone reactor
FR-CVL-H7.5K

Symbol	Voltage	Symbol	Applicable capacity
Note	200V class	7.5K-55K	Indicates capacity kW
H	400V class		

Model Configuration

Voltage	Applicable inverter capacity	Main unit	Dedicated standalone reactor
200V	7.5K	FR-CV-7.5K(-AT)	FR-CVL-7.5K
	11K	FR-CV-11K(-AT)	FR-CVL-11K
	15K	FR-CV-15K(-AT)	FR-CVL-15K
	22K	FR-CV-22K(-AT)	FR-CVL-22K
	30K	FR-CV-30K(-AT)	FR-CVL-30K
	37K(Note)	FR-CV-37K	FR-CVL-37K
	55K(Note)	FR-CV-55K	FR-CVL-55K

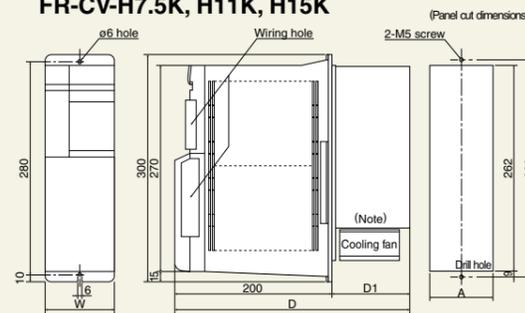
Voltage	Applicable inverter capacity	Main unit	Dedicated standalone reactor
400V	7.5K	FR-CV-H7.5K(-AT)	FR-CVL-H7.5K
	11K	FR-CV-H11K(-AT)	FR-CVL-H11K
	15K	FR-CV-H15K(-AT)	FR-CVL-H15K
	22K	FR-CV-H22K(-AT)	FR-CVL-H22K
	30K	FR-CV-H30K(-AT)	FR-CVL-H30K
	37K(Note)	FR-CV-H37K	FR-CVL-H37K
	55K(Note)	FR-CV-H55K	FR-CVL-H55K

Note) With the 37K and 55K, either the external cooling fin or inner-panel installation type can be used by changing the position of the installation leg members. Thus, the-AT type does not apply.

External Dimension Drawings

External cooling fin type

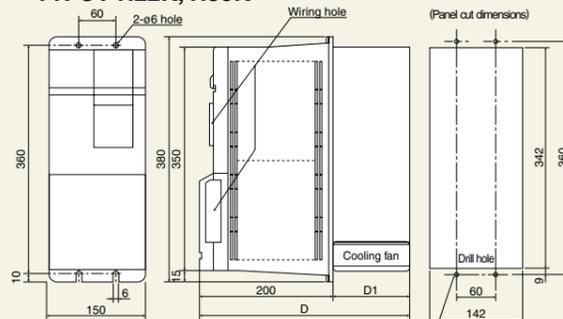
•FR-CV-7.5K, 11K, 15K
 FR-CV-H7.5K, H11K, H15K



(Note) The FR-CV-H7.5K does not have a cooling fan.

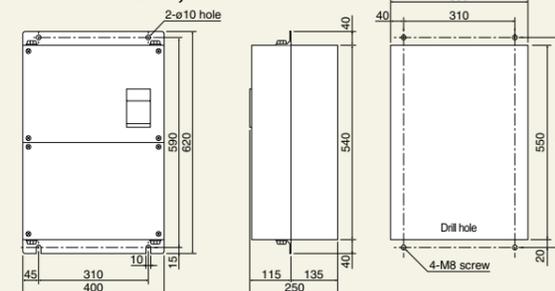
Capacity	W	D	D1	Capacity	A
7.5K/11K	90	303	103	7.5K/11K	B2
15K	120	305	105	15K	H7.5K/H11K/H15K
H7.5K/H11K/H15K	120	305	105	H7.5K/H11K/H15K	112

•FR-CV-22K, 30K
 FR-CV-H22K, H30K



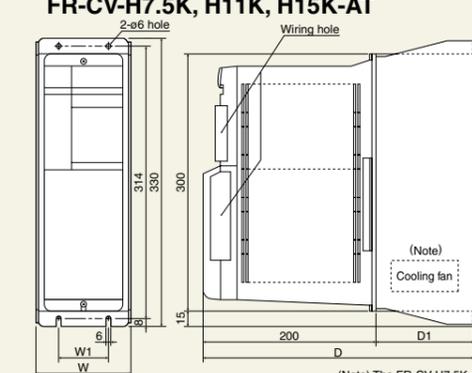
Capacity	D	D1
22K/30K	322	122
H22K/H30K	305	105

•FR-CV-37K, 55K
 FR-CV-H37K, H55K



Inner-panel installation type

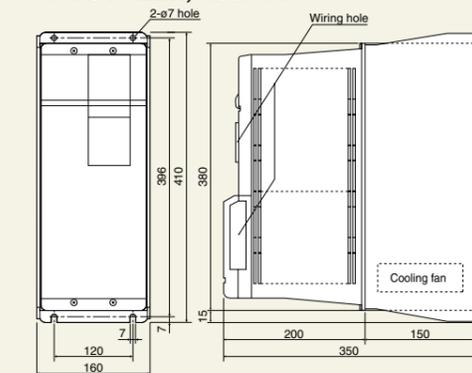
•FR-CV-7.5K, 11K, 15K-AT
 FR-CV-H7.5K, H11K, H15K-AT



(Note) The FR-CV-H7.5K-AT does not have a cooling fan.

Capacity	W	W1	D	D1
7.5K/11K-AT	110	60	315	115
15K-AT	130	90	320	120
H7.5K/H11K/H15K-AT	130	90	320	120

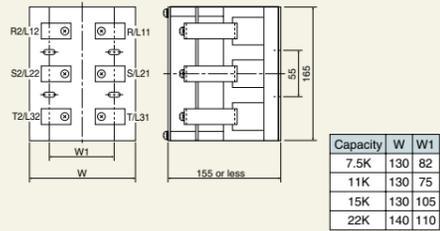
•FR-CV-22K, 30K-AT
 FR-CV-H22K, H30K-AT



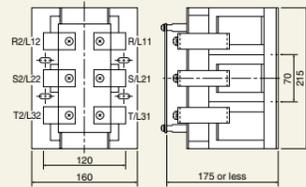
External Dimension Drawings

Dedicated standalone reactor

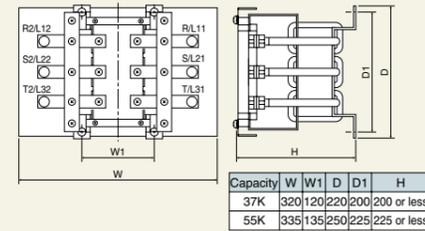
FR-CVL-7.5K, 11K, 15K, 22K



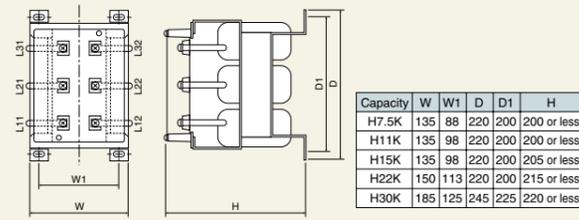
FR-CVL-30K



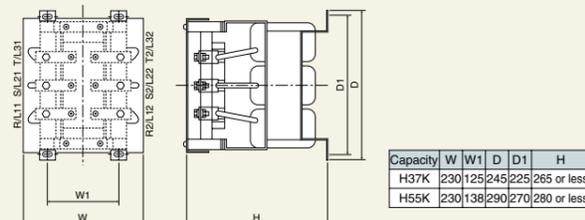
FR-CVL-37K, 55K



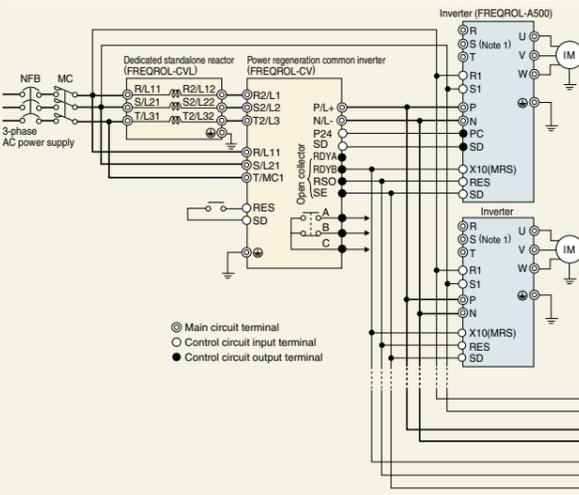
FR-CVL-H7.5K, H11K, H15K, H22K, H30K



FR-CVL-H37K, H55K



Terminal connection diagram



(Note 1) Never connect the power supply to the inverter terminals R, S and T. Incorrect connection could lead to inverter and power regeneration common converter damage.

(Note 2) Always observe the wire connection order shown in the example when wiring the wires between the dedicated standalone reactor and power regeneration common converter, and between the power supply and terminals R/L11, S/L21 and T/MC1. (Match the power supply phase order.) Incorrect connections could damage the power regeneration common converter.

(Note 3) Up to six inverters can be connected to one power regeneration common converter.

Terminal specification

Terminal symbol	Terminal name	Explanation of application
Main circuit	R2/L1, S2/L2, T2/L3	AC power input terminal Connect with the dedicated standalone reactor's R2/L12, S2/L22 and T2/L32 terminals. (200V Class) 3-phase 200 to 220V 50Hz, 200 to 230V 60Hz, (400V Class) 3-phase 380 to 480V 50Hz/60Hz
	P/L+, N/L-	DC power output terminal Connect with the inverter's P terminal and N terminal. (200V Class) Direct current approx. 280 to 325VDC (400V Class) Direct current approx. 537 to 679VDC
	R/L11, S/L21, T/MC1	Power phase detection terminal This is the power phase and power voltage detection terminal. Connect with the dedicated standalone reactor's R/L11, S/L21 and T/L31 terminals.
	⊕	Grounding terminal Always ground the unit.
Control circuit	RDYA	Ready output signal This is output (turns ON) when the power regeneration common converter is ready for operation. This output has the opposite logic of the RDYB terminal. The permissible load is 24VDC 0.1A.
	RDYB	Inverter operation enable signal This is output (turns ON) when a power regeneration common converter alarm occurs, and when reset is input. Connect with the inverter's X10 (MRS) terminal. This output has the opposite logic of the RDYA terminal. The permissible load is 24VDC 0.1A.
	RSO	Converter reset The reset signal is output to the inverter when the reset signal is input to the power regeneration common converter. Connect to the inverter's RES terminal. The permissible load is 24VDC 0.1A.
	SE	Open collector output common This is the common terminal for the RDYA, RDYB and RSO terminals. Connect with the inverter's SD terminal.
	A, B, C	Error output This is output when a power regeneration common converter error occurs. 230VAC 0.3A, 30VDC 0.3A When error occurs: No-continuity between B-C (continuity between A-C), when normal: Continuity between B-C (no-continuity between A-C)
	P24	24VDC input terminal The power for driving the error output relay and for driving the RES signal is input. Permissible input voltage fluctuation: 22VDC to 26VDC 30mA
	RES	Reset terminal When the reset signal is input to the power regeneration common converter, the reset signal is also input to the inverter.
SD	Contact input common 24VDC input common The RES terminal and this terminal are short-circuited when reset is input. Connect the 24VDC common.	

Specifications

		3-phase 200V power supply						3-phase 400V power supply							
Type	FR-CV-□ (external cooling fin type)	7.5K	11K	15K	22K	30K	37K (Note 5)	55K (Note 5)	H7.5K	H11K	H15K	H22K	H30K	H37K (Note 5)	H55K (Note 5)
	FR-CV-□AT (inner-panel installation type)														
	Dedicated standalone reactor (Note 4)	FR-CVL-7.5K	FR-CVL-11K	FR-CVL-15K	FR-CVL-22K	FR-CVL-30K	FR-CVL-37K	FR-CVL-55K	FR-CVL-H7.5K	FR-CVL-H11K	FR-CVL-H15K	FR-CVL-H22K	FR-CVL-H30K	FR-CVL-H37K	FR-CVL-H55K
Applicable inverter capacity (Note 1)		7.5K	11K	15K	22K	30K	37K	55K	H7.5K	H11K	H15K	H22K	H30K	H37K	H55K
Output	Applicable inverter rated current (A)	33	46	61	90	115	145	215	17	23	31	43	57	71	110
	Overload current rating (Note 2)	150% 60s													
	Regenerative braking torque	Short-time rating: 150% 60s Continuous rating: 100%													
Power supply	Rated input AC voltage, frequency	3-phase 200-220V 50Hz, 200-230V 60Hz						3-phase 380-480V 50/60Hz							
	Permissible AC voltage fluctuation	3-phase 170-242V 50Hz, 170-253V 60Hz						3-phase 323-528V 50/60Hz							
	Permissible frequency fluctuation	± 5%													
	Power facility capacity (kVA) (Note 3)	17	20	28	41	52	66	100	17	20	28	41	52	66	100
Protective structure (JEM1030)		Open type (IP00)													
Cooling method		Forced air-cooling						Self-cooling	Forced air-cooling						
Approx. weight (kg)	External cooling fin type	5.0	5.0	6.0	9.5	10.5	34.0	38.0	6.0	6.0	6.0	10.0	10.0	32.5	32.5
	Inner-panel installation type	6.5	6.5	7.5	12.5	13.5			7.5	7.5	7.5	13.0	13.0		
	Dedicated standalone reactor	4.5	4.0	5.5	6.5	11.0	16.0	20.0	7.0	7.5	8.0	10.5	12.0	16.0	22.5
Input signal		Reset													
Output signals		Ready output signal, inverter operation enable signal, error signal, converter reset													
Protection functions		Overcurrent, overvoltage, electronic thermal, undervoltage, phase failure, CPU error, instantaneous stop error, power error													
Environment	Ambient temperature, humidity	-10c° to 50c° (with no freezing), 90%RH or less (with no dew condensation)													
	Atmosphere	Indoors (with no corrosive gas, flammable gas, oil mist or dust)													
Altitude, vibration		1000m or less above sea level, 5.9m/s² or less													

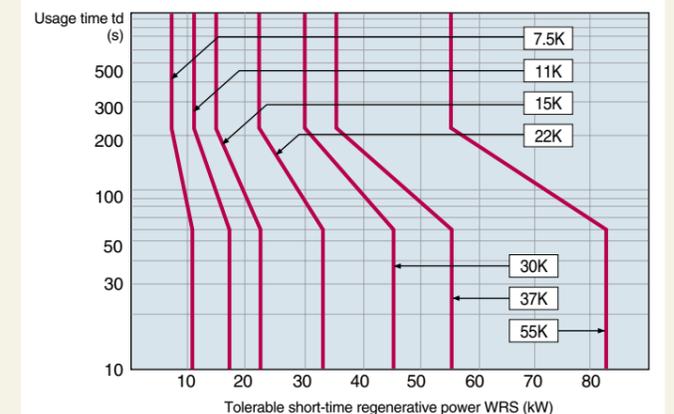
(Notes)

- The capacity of the applicable inverter for the power regeneration common converter is the total (maximum six unit) capacity. (Example) Applicable inverter capacity when using FR-CV-15K → FR-A520-15K, FR-A520-11K + FR-A520-3.7K
- The percentage given for the overload current rating indicates the percentage with respect to the applicable inverter rated current for the power regeneration common converter.
- The power capacity will differ according to the power side impedance (including the dedicated standalone reactor and wire).
- Always use this as a set with the main unit.
- With the 37K and 55K, either the external cooling fin or inner-panel installation type can be used by changing the position of the installation leg members. Thus, the -AT type does not apply.

Characteristics

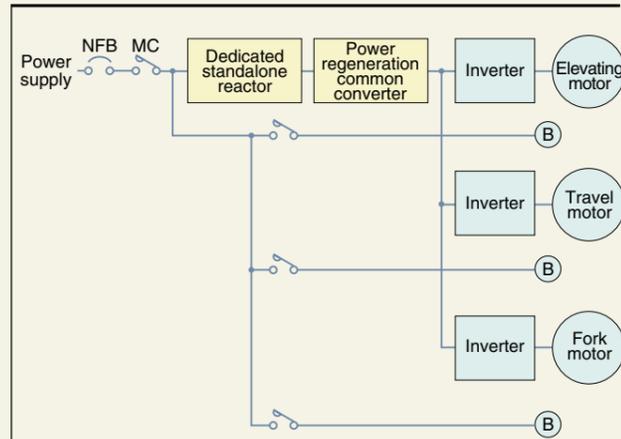
Regenerative braking torque

FR-CV-7.5K, 11K, 15K, 22K, 30K, 37K, 55K
FR-CV-H7.5K, H11K, H15K, H22K, H30K, H37K, H55K



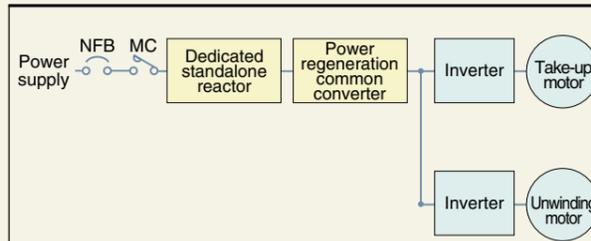
Application examples

For elevation



- A brake unit is not required as the power regeneration function is provided.
- The power for the mechanical brakes is connected from the power supply side for the dedicated standalone reactor.

Line control



- A brake unit is not required as the power regeneration function is provided.
- The regeneration energy for the unwinding motor is consumed by the take-up motor, thereby conserving energy.

Peripheral devices and options

Peripheral devices

Voltage	Power regeneration common converter	Dedicated standalone reactor	No-fuse breaker Earth leakage breaker	Magnetic contactor	Wire(mm ²)	
					R2,S2,T2	P, N
200V	FR-CV-7.5K(-AT)	FR-CVL-7.5K	100AF/60A	S-N35	14	14
	FR-CV-11K(-AT)	FR-CVL-11K	100AF/75A	S-N50	14	14
	FR-CV-15K(-AT)	FR-CVL-15K	225AF/125A	S-N65	22	22
	FR-CV-22K(-AT)	FR-CVL-22K	225AF/175A	S-N95	38	38
	FR-CV-30K(-AT)	FR-CVL-30K	225AF/225A	S-N125	60	60
	FR-CV-37K	FR-CVL-37K	400AF/250A	S-N150	100	100
	FR-CV-55K	FR-CVL-55K	400AF/400A	S-N220	150	150
400V	FR-CV-H7.5K(-AT)	FR-CVL-H7.5K	30AF/30A	S-N20	3.5	3.5
	FR-CV-H11K(-AT)	FR-CVL-H11K	50AF/50A	S-N20	5.5	5.5
	FR-CV-H15K(-AT)	FR-CVL-H15K	100AF/60A	S-N25	14	14
	FR-CV-H22K(-AT)	FR-CVL-H22K	100AF/100A	S-N50	22	22
	FR-CV-H30K(-AT)	FR-CVL-H30K	225AF/125A	S-N65	22	22
	FR-CV-H37K	FR-CVL-H37K	225AF/150A	S-N80	38	38
	FR-CV-H55K	FR-CVL-H55K	225AF/200A	S-N125	60	60

Inverter options

Name	Type	Application, specifications, etc.
Radio noise filter	FR-BIF(-H)	For reduction of radio noise
Line noise filter	FR-BLF	For reduction of line noise

Safety Precautions

For Maximum Safety

- Always read the instruction manual before use to use the equipment properly and safely.
- This product is not designed or manufactured to be used in equipment or systems in situations that can affect or endanger human life.
- When considering this product for operation in special applications such as machinery or systems used in passenger transportation, medical, aerospace, nuclear energy, electric power, or submarine relay applications, please contact your nearest Mitsubishi sales representative.
- Although this product was manufactured under strict quality control conditions, it is strongly advised to install safety devices to forestall serious accidents when used in facilities where a breakdown of the product is likely to cause a serious accident or loss.
- Do not use for loads other than dedicated inverter.

Precautions for installation

- Wiring distance
The total wiring distance between the power regeneration common inverter (FREQROL-CV) and inverter must be within 5m, and the wiring distance between the power regeneration common converter (FREQROL-CV) and dedicated standalone reactor (FREQROL-CVL) must be within 10m.
The wiring between the power regeneration common converter (FREQROL-CV) and power phase detection terminal (R/L11, S/L21, T/MC1) must be within 10m.
- Installation of reactor on power supply side
The power regeneration common converter (FREQROL-CV) power phase detection terminals (R/L11, S/L21, T/MC1) are used to detect the power phase, so wire from the primary side of the dedicated standalone reactor (FREQROL-CVL). Power will not be regenerated if wired from the secondary side of the dedicated standalone reactor (FREQROL-CVL).

Precautions for selection

- Dedicated inverter
A DC input type inverter must be used for the combination. Designate the FREQROL-A500/F500/E500*/S500* Series.
*Only 3-phase 200V power input specification products.
- Dedicated standalone reactor
Always use the power regeneration common converter (FREQROL-CV) as a set with the dedicated standalone reactor (FREQROL-CVL). Refer to page 1 for details on the combinations.



Safety Warning

To ensure proper use of the products listed in this catalog,
please be sure to read the instruction manual prior to use.

 **mitsubishi electric corporation**
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