

RFI Filter Units for FREQROL Frequency Inverter FR-D800 / FR-E800 / FR-CS80

ENG, EFR-EFF ver. B

Safety Information

For qualified staff only

All work on the line filter and the associated hardware – including planning and system design, installation, electrical connection, commissioning, maintenance, servicing, as well as inspection and testing activities – may only be carried out by electrical specialists who are properly trained, professionally qualified, and authorized.

This manual is intended exclusively for personnel with recognized qualifications who are fully familiar with the relevant standards, safety requirements, and legal regulations in automation and electrical engineering. Disconnect the power supply before installation, wiring or maintenance work. After disconnecting the power supply, hazardous voltages may be present due to charged internal capacitors. Allow sufficient time for discharge before starting any work regulations.

Proper use of equipment

The frequency inverters of the FREQROL series are only intended for the specific applications explicitly described in this manual and the manuals listed below. Please take care to observe all the installation and operating parameters specified in the manuals. Only accessories and peripherals specifically approved by Mitsubishi Electric may be used. Any other use or application of the products is deemed to be improper.

Relevant safety regulations

All safety and accident prevention regulations relevant to your specific application must be observed in the system design, installation, setup, maintenance, servicing and testing of these products. In this manual special warnings that are important for the proper and safe use of the products are clearly identified as follows:



DANGER

Personnel health and injury warnings.

Failure to observe the precautions described here can result in serious health and injury hazards.



CAUTION

Equipment and property damage warnings.

Failure to observe the precautions described here can result in serious damage to the equipment or other property.

Do not open, modify or disassemble the RFI filter. Unauthorized modification may result in electric shock, fire or equipment damage.

Further Information

The following manuals contain further information about the devices:

- Manual for frequency inverters and EMC [Inverter EMC Installation Guidelines]
- Installation manual of the frequency inverter FREQROL series: FR-D800 / FR-E800 / FR-CS80
- Instruction manuals of the frequency inverter FREQROL series: FR-D800 / FR-E800 / FR-CS80
- Quick start guide for FR-D800 / FR-E800 / FR-CS80

These manuals are available free of charge through the internet (<https://eu3a.MitsubishiElectric.com/fa/en/>).

If you have any questions concerning the programming and operation of the equipment described in this manual, please contact your relevant sales office or department.

Installation Notes

Observe the following installation instructions to ensure correct and safe operation of the filter unit.

Inspect the RFI filter for mechanical damage before installation. Do not install a damaged device.



CAUTION

- The RFI filters described in this document are intended exclusively for use with Mitsubishi Electric FREQROL inverters FR-D800, FR-E800 and FR-CS80.**
- These filters are necessary to comply with conducted noise voltage limits of class C1/C2/C3 defined by European standard EN 61800-3.**
- EMC performance depends on correct installation and wiring practices. Deviations from recommended EMC installation principles may result in increased electromagnetic interference.**
- Use of the RFI filter in IT networks is NOT permitted and is outside the intended use.**
- The RFI filter must be protected by appropriate upstream overcurrent and short-circuit protective devices.**
- During operation, leakage currents flow to protective earth and may cause unintended tripping of upstream residual current devices (RCDs). The RFI filter must be permanently connected to protective earth (PE).**
- Connect the protective earth (PE) conductor first and disconnect it last.**
 - The values of the power loss and leakage current in the following tables are typical values in a steady and error-free state. Depending on the power supply voltage, the power supply frequency and the filter used they may vary slightly.**
 - Please note, that the appearance and wiring mechanics of the noise filters may differ from the figures shown in this short reference. These differences do not affect the functional safety or EMC performance of the filter.**
 - For further details please refer to the Mitsubishi Electric manual for Frequency Inverters and EMC, which contains detailed information about EMC conforming installation.**
- During operation, the filter housing and terminals may become hot.**
- Install the RFI filter in a clean, dry enclosure, protected from dust, oil, moisture and corrosive atmospheres.**

Installation/Mounting

Check the inverter type. The filter should be used only in combination with inverters described in the table below.

Filter	Frequency inverter
200 V class, single-phase	FR-CS82S-02S, FR-CS82S-042
	FR-D820S-0.1K-008, FR-D820S-0.2K-014, FR-D820S-0.4K-025, FR-D820S-0.75K-042
	FR-E820S-0008, FR-E820S-0015, FR-E820S-0030
	FR-CS82S-070, FR-CS82S-100
	FR-D820S-1.5K-070, FR-D820S-2.2K-100
	FR-E820S-0050, FR-E820S-0080
400 V class, three-phase	FR-E820S-0110
	FR-CS84-012, FR-CS84-022
	FR-D840-0.4K-012, FR-D840-0.75K-022, FR-D840-1.5K-037
	FR-CS84-036, FR-CS84-050, FR-CS84-080
	FR-D840-2.2K-050, FR-D840-3.7K-081
	FR-E840-0016, FR-E840-0026 FR-E840-0040
	FR-CS84-230, FR-CS84-295
	FR-D840-11K-230, FR-D840-15K-295
	FR-E840-0060, FR-E840-0095
	FR-D840-5.5K-120, FR-D840-7.5K-163
	FR-E840-0120, FR-E840-0170
	FR-CS84-120, FR-CS84-160
	FR-E840-0230, FR-E840-0300
	FR-E840-0380, FR-E840-0440

Table 1

Maintenance and disposal

The RFI filter is maintenance-free. In case of malfunction, disconnect it from the power supply and replace it. Dispose of the filter in accordance with local regulations.

WEEE registration number: 928 414 00

Function

The filters described in this document are designed to reduce conducted noise voltages to comply with the limits of EN 61800-3.

Category C1: Intended for use in residential, commercial, and light industrial locations. Devices may be connected directly to public low-voltage networks.

Category C2: Intended for use in an industrial location and, to a limited extent, in a commercial or light industrial location. Devices are not intended for use in a residential location and must not be pluggable or portable.

Category C3: Intended for use in an industrial location and not for use in a residential, commercial, or light industrial location (not connected to the public low-voltage power grid).

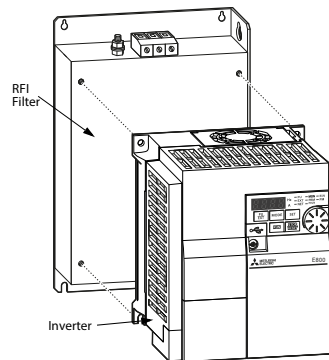
Please always use shielded motor cable.

Please take care of the maximum possible motor cable lengths.

Max. motor cable length categories: C1: 20 m, C2: 50 m, C3: 100 m

Footprint-mounting

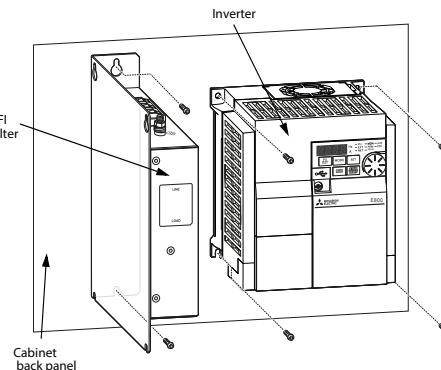
Put the inverter on the top side of the filter and fix it with the recommended mounting screws (see tables 3 + 4).



To fix the filter-inverter unit on the cabinet back panel use proper screws (not provided with the filter). For correct filter performance the filter should electrically bond to the cabinet back panel which needs to have proper connection to earth. If needed please remove the paint under the filter footprint.

Side-by-side-mounting

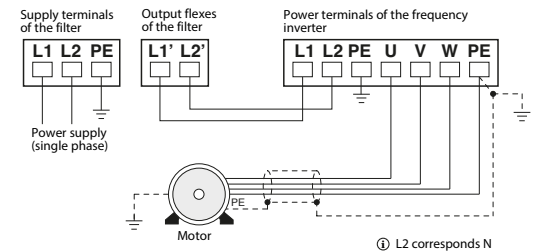
If you mount the filter and inverter side by side, always mount the filter on the left side of the inverter to avoid couplings from the motor cables. For correct filter performance, the filter housing must be connected to the cabinet rear wall with low resistance, which must be properly grounded. If this is not possible, the paint should be removed from the cabinet directly under the filter footprint.



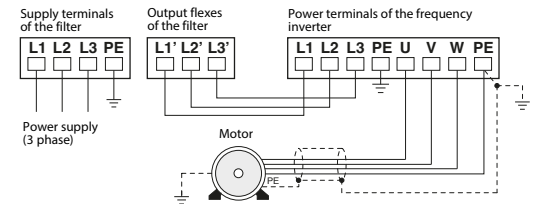
Wiring

For electrical installation follow the wiring procedure shown in the picture below. The maximum wiring length of the motor cable should be within the specified values.

200 V class



400 V class



The shielded motor cable must be earthed at both ends in order to reduce radiated noise.

For environmental conditions and mounting position please note the instructions in the operation manual for the frequency inverter.

EMC compliance of the Power Drive System

Electromagnetic compatibility (EMC) of a Power Drive System depends on the complete system configuration and installation, not solely on the use of an RFI/EMC filter.

Compliance with applicable EMC emission limits cannot be guaranteed by the filter alone and may be affected by installation practices, wiring, grounding, cable routing and enclosure design.

The user is responsible for ensuring that the overall Power Drive System installation complies with applicable EMC requirements.

For further information on EMC-compliant installation and system design, refer to [Inverter EMC Installation Guidelines] and [Inverter EMC technical notes].

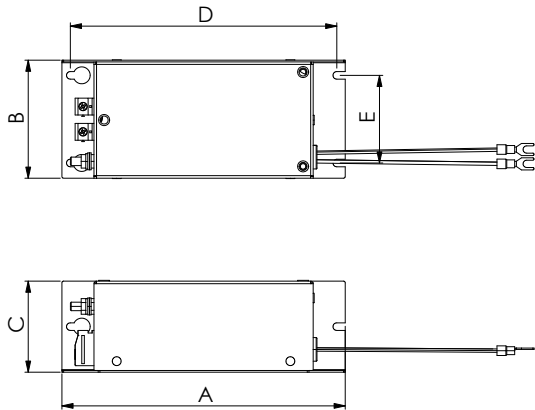
Common specifications

Specifications	Filter type	
	200 V class	400 V class
Rated voltage	Max. 1~250 V AC	Max. 3~480 V AC
Frequency	48 - 63 Hz	
Rated and leakage current	See the following tables 3 + 4	
Power loss	See the following tables 3 + 4	
Ambient temperature range	-25 up to +85 °C	
Ambient humidity	Max. 95% (non-condensing)	
Vibration	Max. 5.9 m/s ²	

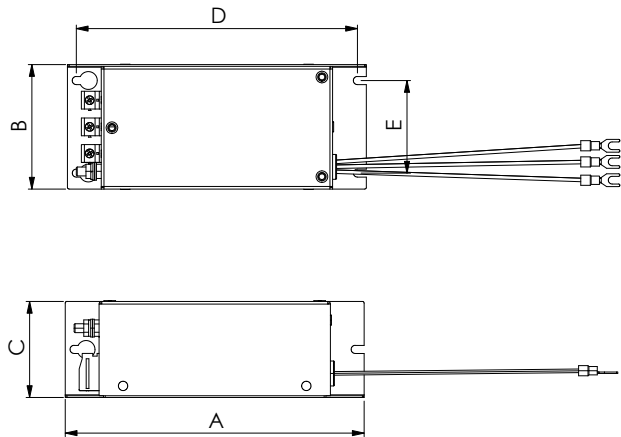
Table 2

Dimensions

200 V class
EFR-EFF-1x-xxA



400 V class
EFR-EFF-3x-xxA



Filter	Inverter	Inverter mounting		Dimension [mm]					Mounting hole diameter [mm]	Weight [kg]	Power loss [W]	Nominal leakage current [mA]*	Rated current [A]
		Mounting screw	Tightening torque [Nm]	A	B	C	D	E					
EFR-EFF-1A-11A	see table 1	3x M4x12	1.5-1.7	168	70	54	158	52	4.5	0.4	6.5	<7.0	11
EFR-EFF-1B-24A	see table 1	4x M4x12	1.5-1.7	168	111	42	158	92	4.5	0.5	9.8	<7.0	24
EFR-EFF-1C-25A	see table 1	4x M4x12	1.5-1.7	170	143	46	160	124	4.5	0.8	10.6	<7.0	25

Table 3

Filter	Inverter	Inverter mounting		Dimension [mm]					Mounting hole diameter [mm]	Weight [kg]	Power loss [W]	Nominal leakage current [mA]*	Rated current [A]
		Mounting screw	Tightening torque [Nm]	A	B	C	D	E					
EFR-EFF-3A-7A	see table 1	3x M4x12	1.5-1.7	168	70	54	158	52	4.5	0.5	6.2	<3.5	7
EFR-EFF-3B-15A	see table 1	4x M4x12	1.5-1.7	168	111	42	158	92	4.5	0.6	8.1	<3.5	15
EFR-EFF-3D-41A	see table 1	4x M5x20	2.0-2.2	318	180	56	302	160	5.5	1.9	25.2	<3.5	41
EFR-EFF-3E-16A	see table 1	4x M4x12	1.5-1.7	208	143	46	198	124	4.5	0.9	13.4	<3.5	16
EFR-EFF-3F-32A	see table 1	4x M4x16	1.5-1.7	210	223	55	198	204	5.5	1.7	38.5	<3.5	32
EFR-EFF-3G-22A	see table 1	4x M4x16	1.5-1.7	210	201	55	198	182	5.5	1.1	13.4	<3.5	22
EFR-EFF-3H-54A	see table 1	4x M5x20	2.0-2.2	328	220	56	312	191	5.5	2.5	47.2	<3.5	54
EFR-EFF-3I-76A	see table 1	4x M8x16	8.0-9.0	418	220	59	400	191	8.5	3.1	62.4	<7.0	76

Table 4

Max. tightening torque for screw terminals L1, L2, and L3: 4mm²: 0,5Nm; 6mm²: 1.2Nm; 25mm²: 2.0Nm; 50mm²: 2.5Nm
Tightening torque for earth screw: M5: 2.0–2.3Nm; M6: 4.0–4.5Nm

* The values shown are for the leakage currents in a balanced 250/480 V, 50 Hz mains network under normal conditions. Higher leakage currents can occur briefly in the event of phase failures and when systems are powered on. Values calculated according to IEC 60939-3.