

RFI Filter Units for Frequency Inverters FR-S 500 EC/ECR

Short reference for RFI filter unit types FR-S5NFSA-0.75 k to FR-S5NFSA-1.5 k, FR-S5NFSB-0.75 k to FR-S5NFSB-1.5 k, FFR-S520S-14A-RF1 to FFR-S520S-20A-RF1, FFR-S540-8A-RF100, and FFR-S540-13A-RF100

Please read the following installation notes carefully to ensure a proper usage.



CAUTION:

The RFI filter units described in this reference sheet are designed exclusively for use with the Mitsubishi inverter type FR-S 500. These filters are necessary to comply with limits for conducted noise voltages defined by the EN 61800-3 standard.

It is possible that you may experience different results in practice, particularly if you do not completely and correctly follow the accepted EMC procedures for proper installation of filters and routing the power and control lines.

These filters are NOT designed for use in IT networks. When the noise filters are operated leakage currents are discharged to earth. This can trigger upstream protective devices, particularly when there are unbalanced mains voltages, mains phase failures or switching activities on the input side of the filter. 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. Safe functioning as well as the grade of the radio frequency protection do not take affect of this.

For further details please refer to the Mitsubishi manual for Frequency Inverters and EMC, which contains detailed information about EMC conforming installation.

Mounting

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

Frequency inverter	Filter	Motor cable lengths (shielded)		
		1. Environment		2. Environment
		Unrestricted distribution	Restricted distribution	100 A limit
FR-S 520S EC/ECR	0.2 k to 0.75 k	FR-S5NFSA-0.75 k	1 m	5 m
		FR-S5NFSB-0.75 k	30 m	100 m
		FFR-S520S-14A-RF1	30 m	75 m
	1.5 k	FR-S5NFSA-1.5 k	1 m	5 m
		FR-S5NFSB-1.5 k	30 m	100 m
		FFR-S520S-20A-RF1	30 m	100 m
FR-S 540 EC/ECR	0.4 k to 1.5 k	FFR-S540-8A-RF100	20 m	100 m
	2.2 k to 3.7 k	FFR-S540-13A-RF100	20 m	100 m

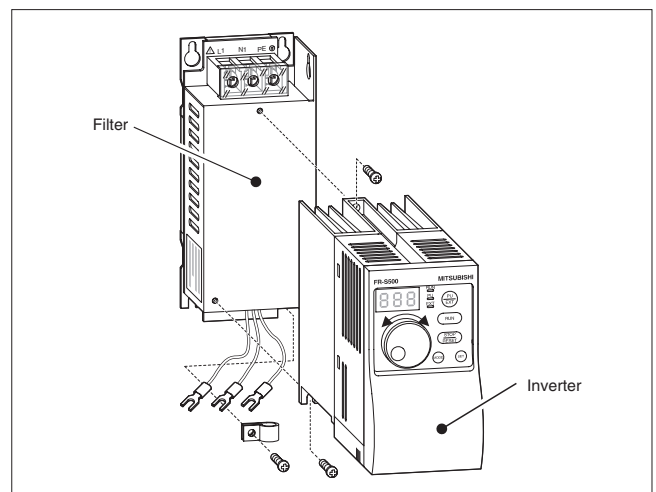
Function

The filters described in this document are designed to reduce conducted noise voltages to comply with the limits defined for Environments 1 and 2. Practical results may differ from this.

Mounting on rear panel of inverter

Place the inverter on the top side of the filter and secure it firmly with the provided screws.

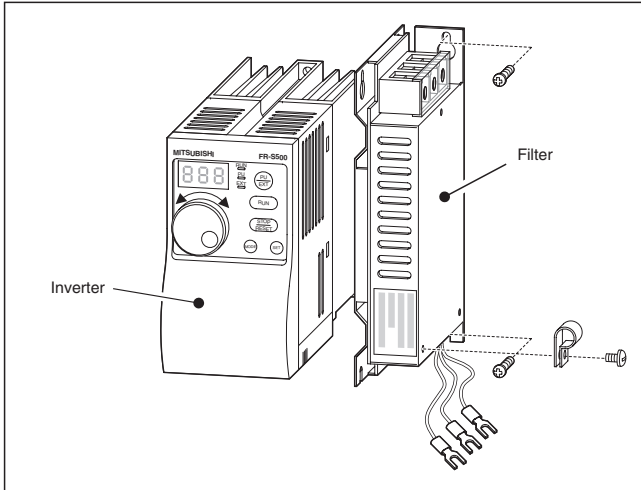
Fix the filter-inverter unit on the back of the cabinet. For correct filter performance the filter mounting bolts should electrically bond to the cabinet back panel which is connected to earth. Usually this is achieved by screwing the filter and the inverter to the back of the cabinet. If required, the paint should be removed from the cabinet in the appropriate places.



Mounting side-by-side with inverter

For the side-by-side mounting the filter and the respective inverter are mounted on the back of the cabinet one beside the other. Use the provided mounting screws for fixing the filter.

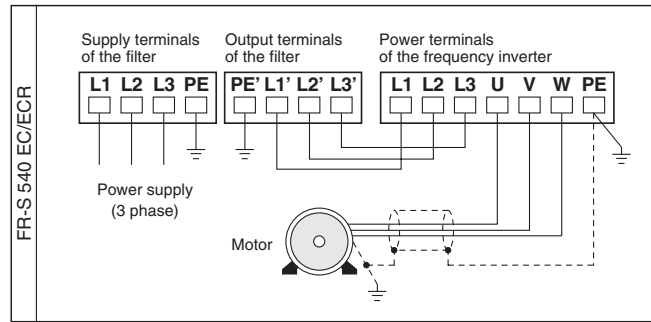
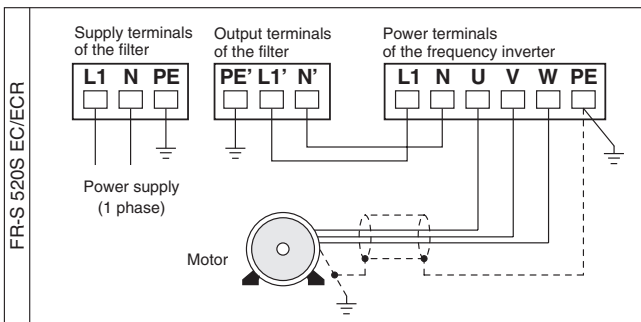
For correct filter performance the housings of the filter and the inverter must electrically bond to the cabinet back panel which is connected to earth. Usually this is achieved by screwing the filter and the inverter to the back of the cabinet. If required, the paint should be removed from the cabinet in the appropriate places.



Wiring

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

The connection of the inverters FR-S 520S EC/ECR is single-phase, the connection of the inverters FR-S 540 EC/ECR is three-phase.



All cables especially the line between inverter and motor must be shielded to reduce cable radiation. The shield of the motor line must be connected on both the motor and inverter side. Earth motor and filter.

The outputs of the filters are equipped with coloured wires. The combination of the wires and the inverter terminals is listed in the following table.

Filter	Filter side	Inverter side
FR-S5NFSA-□ k	Black	L1
	Blue	N
	Yellow/green	PE
FR-S5NFSA-□ k	Black	L1
	Blue	N
	Yellow/green	PE
FFR-S520S-□A-RF1	Brown	L1
	Blue	N
	Yellow/green	PE
FFR-S540-□A-RF100	Black	L1, L2, L3
	Yellow/green	PE

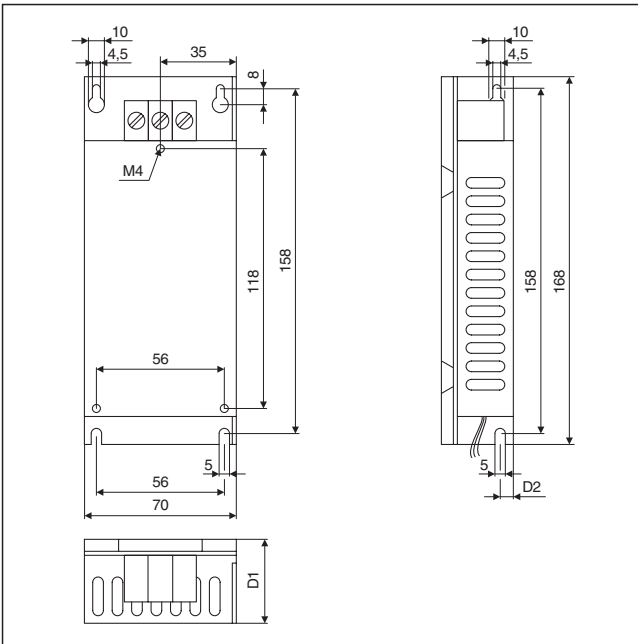
For environmental conditions and mounting position please note the instructions in the operation manual for the frequency inverter FR-S 500 EC/ECR.

Specifications

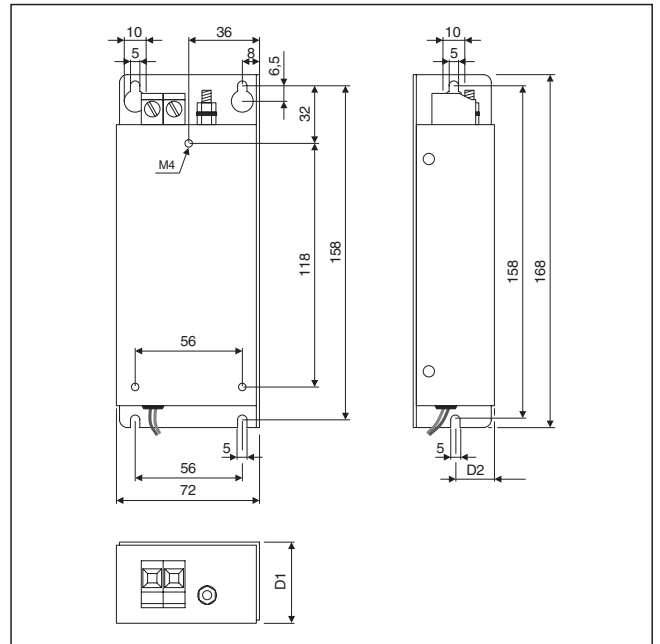
Specifications	Filter			
	FR-S5NFSA-□ k	FR-S5NFSA-□ k	FFR-S520S-□A-RF1	FFR-S540-□A-RF100
Rated voltage	1~ 200-240 V (+10 % / -15 %)		1~ 250 V AC	3~ 480 V AC
Frequency	50 / 60 Hz			
Rated and leakage current	See the following tables			
Power loss	See the following tables			
Ambient temperature range	-10-50 °C		-25-85 °C	-25-65 °C
Ambient humidity	90 % (no condensation)			
Vibration resistance	5-200 Hz; 1.2 G			

Dimensions

Filter FR-S5NFSA-0.75 k and FR-S5NFSA-0.75 k

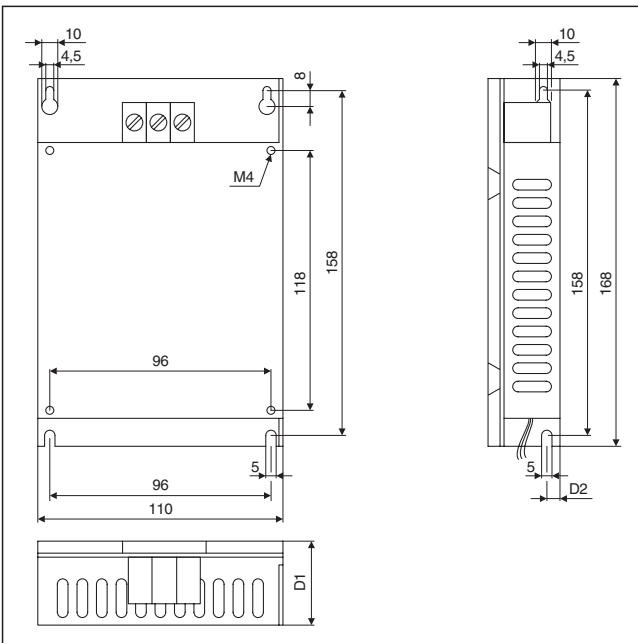


Filter FFR-S520S-14A-RF1

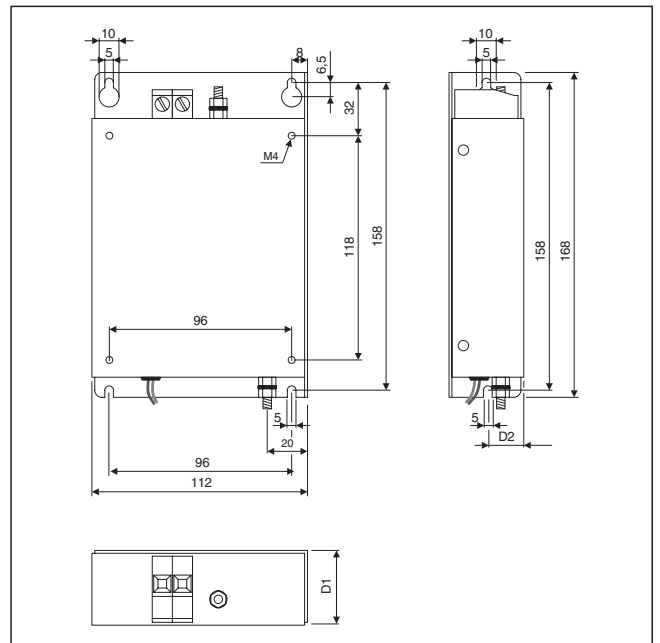


Filter	Frequency inverter	D1	D2	Mounting screws	Weight [kg]	Power loss [W]	Leakage current [mA]	Rated current [A]
FR-S5NFSA-0.75 k	FR-S 520 S-0.2 k-0.75 k EC/ECR	35	9.5	4 × M4	0.7	1.74	< 4.5	14
FR-S5NFSA-0.75 k		47	11	4 × M4	0.9	6.75	< 9.5	14
FFR-S520S-14A-RF1		38	19	3 × M4	0.8	6.5	< 7	14

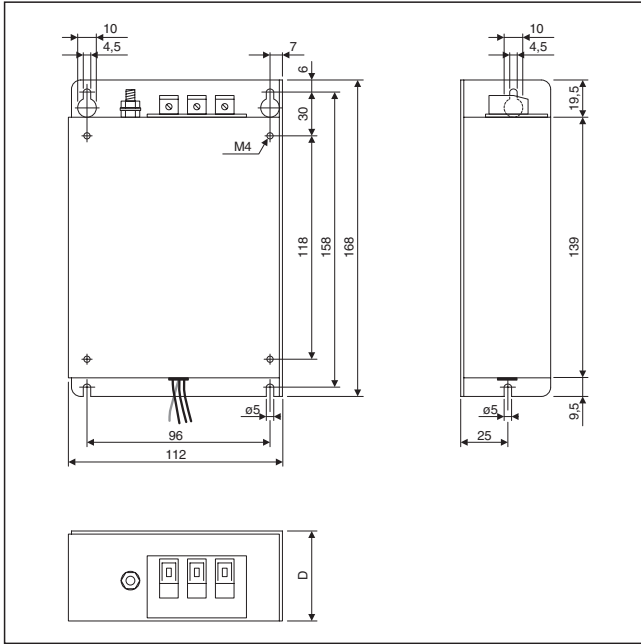
Filter FR-S5NFSA-1.5 k and FR-S5NFSA-1.5 k



Filter FFR-S520S-20A-RF1



Filter	Frequency inverter	D1	D2	Mounting screws	Weight [kg]	Power loss [W]	Leakage current [mA]	Rated current [A]
FR-S5NFSA-1.5 k	FR-S 520 S-1.5 k EC/ECR	35	9.5	5 × M4	0.8	8.55	< 9.5	25
FR-S5NFSA-1.5 k		47	11	5 × M4	1.3	9.25	< 14	20
FFR-S520S-20A-RF1		38	19	4 × M4	1.0	12	< 10	20

Filter FFR-S540-8A-RF100 and FFR-S540-13A-RF100


Filter type	Frequency inverter	D	Mounting screws	Weight [kg]	Power loss [W]	Leakage current [mA]	Rated current [A]
FFR-S540-8A-RF100	FR-S 540-0.4–1.5 k EC/ECR	40	4 × M4	0.8	5.1	< 10	8
FFR-S540-13A-RF100	FR-S 540-2.2–3.7 k EC/ECR	45	4 × M4	0.9	7.1	< 10	13