

Footprint RFI filters for

Mitsubishi Electric

FR-S520S, S540, E520S, E520, E540 and A540
motor inverters



MADE IN THE UK

Footprint and Block RFI filters for Mitsubishi Electric motor inverters

Requirements

Recent European legislation on EMC imposes limits on RF emissions from electrical equipment. These power line filters have been specifically developed for use with Mitsubishi motor drives, enabling systems incorporating them to meet the European RFI emissions standards for domestic or industrial use.

Ranges Covered

Inverters	200V Single Phase	200V Three Phase	400V Three Phase
FR-S500	0.1 to 1.5kW - FR-S520S		0.4 to 3.7kW - FR-S540E
FR-E500	0.4kW to 2.2kW - FR-E520S	0.4 to 7.5kW - FR-E520J	0.4 to 7.5kW - FR-E540E
FR-A500			0.4 to 55kW - FR-A540E

Design and Test Criteria

Generally with motor drive systems, the emission levels are greatly affected by the length of the cable between the drive itself and the motor - longer cables will cause considerably higher emissions.

The inverter / filter combinations here have been designed and tested to achieve compliance to:-
EN 55022:1994, Class B for use in domestic / light industrial environments (Equivalent to the RF emissions tests of Power Drive Standard EN 61800-3:1996 for drives with <25A input current) when fitted with up to 25m motor output cable and to
EN 55011:1991 Group 1, Class A for use in industrial environments (Equivalent to the RF emissions tests of Power Drive Standard EN 61800-3:1996 for drives with >25A input current) when fitted with up to 50m motor output cable.

Earth Leakage Measurements

In single phase applications the earth leakage current is present all of the time.

For three phase applications under normal conditions with the three phases balanced, earth leakage currents are extremely small - the max values stated are worst possible values such as would occur momentarily during switch on or failure of one or two phases.

Use of Filters with 200V Three Phase Inverters

These filter ranges may also be used with 200V three phase inverters, but care should be taken in the filter selection. The equivalent 200V model of an inverter will require approximately twice the current of the 400V model. For example, the FA5403.7 filter is suitable for the FR-A520-1.5K drive, but not the FR-A520-3.7K, even though the latter will fit. Running a filter on under-voltage is perfectly acceptable, but running at over-current for any extended period is not advisable.

Technical Information

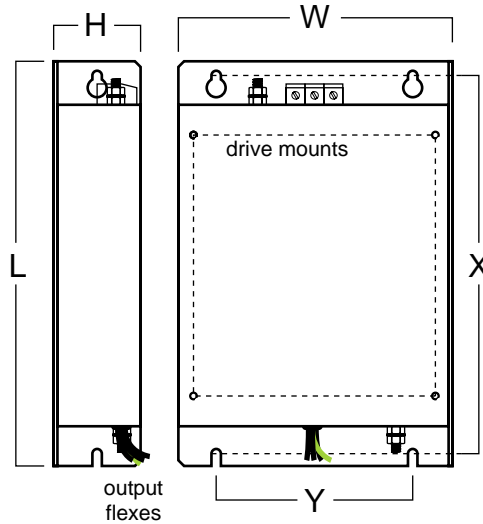
For more technical data, a separate data sheet is available for each filter model. This gives detailed dimensions, circuit diagram and electrical ratings.

FR-S500



- The **FS-500** range, especially for Mitsubishi FR-S500 Series inverters.
- Help to ensure EMC compliance of machinery and installations using FR-S500 drives.
- Footprint filters mount between the inverter and the panel, saving valuable space inside wiring cabinets.
- All filters are designed and manufactured to UL requirements and are CE marked.

Dimensions

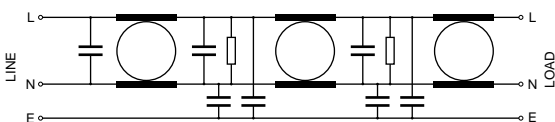


Applied FR-S500 Inverter	Filter Part No	Rated Current	Max Rated Voltage	Leakage current Nom / Max	External L x W x H (mm)	Mount Dims X x Y (mm)	Inverter Fixing	EMC Tested	UL
FR-S520S-0.1K FR-S520S-0.2K FR-S520S-0.4K	FS520S0.75	10A	1ph, 250V	3.5mA	162 x 72 x 34	150 x 51	3 x M4	✓	●
FR-S520S-0.75K FR-S520S-1.5K	FS520S1.5	23A	1ph, 250V	3.5mA	162 x 112 x 34	150 x 91	4 x M4	✓	●
FR-S540-0.4K FR-S540-0.75K	FS5401.5	8A	3ph, 480V	0.7 / 70mA	168 x 112 x 42	158 x 96	4 x M4	✓	●
FR-S540-1.5K FR-S540-2.2K FR-S540-3.7K	FS5403.7	13A	3ph, 480V	0.7 / 70mA	168 x 112 x 45	158 x 96	4 x M4	✓	●

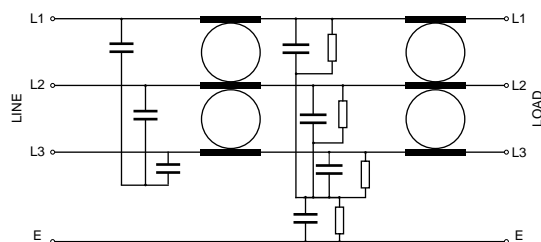
UL Approval Status - ✓ Complete, ● Pending

Typical Circuit Schematics

Single Phase



Three Phase

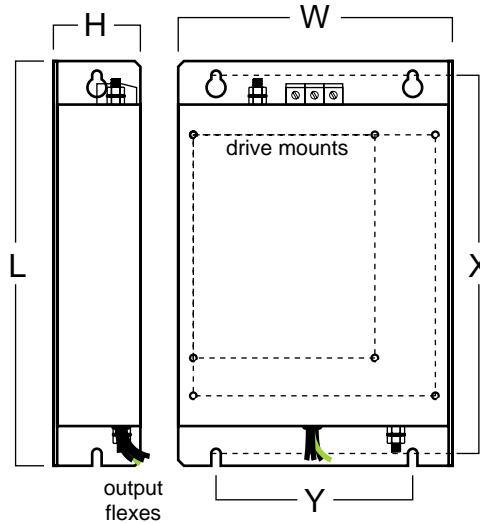


FR-E500



- The **FE-500** range, especially for Mitsubishi FR-E500 Series inverters.
- Help to ensure EMC compliance of machinery and installations using FR-E500 drives.
- Footprint filters mount between the inverter and the panel, saving valuable space inside wiring cabinets.
- All filters are designed and manufactured to UL requirements and are CE marked.

Dimensions

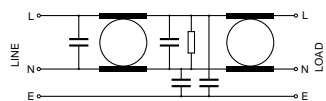


Applied FR-E500 Inverter	Filter Part No	Rated Current	Max Rated Voltage	Leakage current Nom / Max	External L x W x H (mm)	Mount Dims X x Y (mm)	Inverter Fixing	EMC Tested	UL
FR-E520S-0.4K FR-E520S-0.75K	FE520S0.75	10A	1ph, 250V	3.5mA	214 x 145 x 38	200 x 104	4 x M4	✓	●
FR-E520S-1.5K FR-E520S-2.2K	FE520S2.2	18A	1ph, 250V	3.5mA	214 x 145 x 46	200 x 104	4 x M5	✓	●
FR-E520J-0.4K FR-E520J-0.75K	FE5401.5	7A	3ph, 250V	1.0 / 85mA	214 x 145 x 38	200 x 104	3 x M4		●
FR-E520J-1.5K FR-E520J-2.2K	FE5403.7	16A	3ph, 250V	1.0 / 85mA	214 x 145 x 46	200 x 104	4 x M4		●
FR-E520J-3.7K	FE5407.5	30A	3ph, 250V	0.2 / 22mA	214 x 225 x 50	200 x 184	4 x M4		●
FR-E520J-5.5K FR-E520J-7.5K	FE5207.5J	52A	3ph, 250V	0.7 / 70mA	304 x 184 x 56	288 x 150	4 x M5		●
FR-E540E-0.4K FR-E540E-0.75K FR-E540E-1.5K	FE5401.5	7A	3ph, 480V	1.5 / 160mA	214 x 145 x 38	200 x 104	4 x M4	✓	●
FR-E540E-2.2K FR-E540E-3.7K	FE5403.7	16A	3ph, 480V	1.5 / 160mA	214 x 145 x 46	200 x 104	4 x M4	✓	●
FR-E540E-5.5K FR-E540E-7.5K	FE5407.5	30A	3ph, 480V	0.3 / 40mA	214 x 225 x 50	200 x 184	4 x M4	✓	●

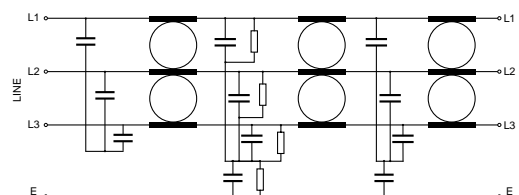
UL Approval Status - ✓ Complete, ● Pending

Typical Circuit Schematics

Single Phase



Three Phase

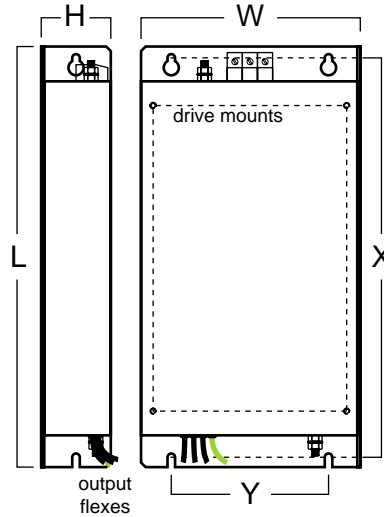


FR-A500



- The **FA-500** range, especially for Mitsubishi FR-A500 Series inverters.
- Help to ensure EMC compliance of machinery and installations using FR-A500 drives.
- Footprint filters mount between the inverter and the panel, saving valuable space inside wiring cabinets.
- All filters are designed and manufactured to UL requirements and are CE marked.

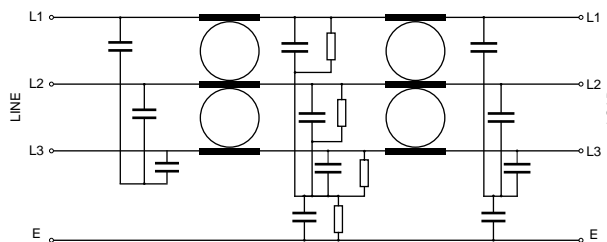
Dimensions



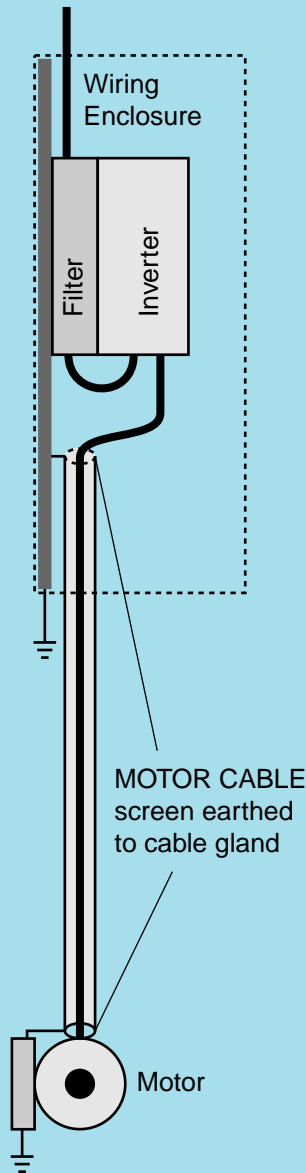
Applied FR-A500 Inverter	Filter Part No	Rated Current	Max Rated Voltage	Leakage current Nom / Max	External L x W x H (mm)	Mount Dims X x Y (mm)	Inverter Fixing	EMC Tested	UL
FR-A540-0.4K FR-A540-0.75K FR-A540-1.5K FR-A540-2.2K FR-A540-3.7K	FA5403.7	20A	3ph, 480V	0.3 / 40mA	313 x 151 x 46	298 x 110	4 x M5	✓	●
FR-A540-5.5K FR-A540-7.5K	FA5407.5	30A	3ph, 480V	0.3 / 40mA	313 x 221 x 50	298 x 150	4 x M5	✓	●
FR-A540-11K FR-A540-15K	FA54015	60A	3ph, 480V	0.3 / 40mA	460 x 256 x 67	437 x 180	4 x M8	✓	●
FR-A540-18.5K FR-A540-22K	FA54022	75A	3ph, 480V	0.3 / 40mA	460 x 256 x 67	437 x 180	4 x M8	✓	●
FR-A540-30K	FA54030	100A	3ph, 480V	3mA / 300mA	636 x 340 x 90	606 x 280	4 x M8	●	●
FR-A540-37K	FA54037	130A	3ph, 480V	3mA / 300mA	636 x 450 x 120	616 x 380	4 x M10	●	●
FR-A540-45K FR-A540-55K	FA54055	180A	3ph, 480V	3mA / 300mA	652 x 450 x 120	632 x 380	4 x M10	●	●

UL Approval Status - ✓ Complete, ● Pending

Typical Circuit Schematic



UL approval documentation and EMC Test Certificates from Independent Test House



Filter Installation Notes

To conform to EMC directives, it is essential that good wiring practice is observed and that all installation recommendations are followed.

- ◆ The usual safety procedures when working with electrical equipment must be followed and all electrical connections to the filter, inverter & motor must be made by a qualified electrical technician.
- ◆ Filters should be fitted as closely as possible to the incoming mains supply of the wiring enclosure, usually directly after the enclosures circuit breaker or supply switch.
- ◆ Care should be taken to remove any paint etc. from filter and inverter mounting holes and face area of the panel to ensure the best possible earthing of the units.
- ◆ All lead lengths should be kept as short as possible and incoming mains, outgoing motor cables and control cables should be kept well separated. Cable earth screens should only be stripped back as far as necessary to make connections - screens should be securely earth bonded to the wiring panel.

DUE TO CONTINUAL PRODUCT DEVELOPMENT, SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



RASMI ELECTRONICS LTD.

Morrison Road, Annfield Plain, Stanley, Co. Durham DH9 7RX, England.
email: sales@rasmi.com Tel: +44 (0)1207 291300 Fax: +44 (0)1207 291304