

# Product information

January 2008

Contact: Oliver Endres  
+49(0)2102/486-9710



## Sine wave output filter for 400V Inverter

Herewith we would like to inform you about the availability of the new FFR-SI sine wave filter series from Mitsubishi Electric Europe.

The new sine wave filter options will be usable for all 400V Inverter in the current range from 4A to 1700A, and are ready to order in our system.

Main features of the FFR-SI filters are:

- Smoothing of PWM drive output voltage  
Conversion of the PWM output signal of motor drives into a smooth sine wave with low residual ripple
- Efficient motor protection  
Elimination of premature motor damage caused by high dv/dt, over voltages, motor overheating and eddy current losses.
- Reduction of audible noise
- Reduction of parasitic losses  
Reduction of the pulse load of motor drive IGBTs and the parasitic losses on long shielded motor cables.
- Improvement of system reliability  
Vacuum impregnation ensures less humming noise and high durability

Typical applications for FFR-SI sine wave filters are:

- Motor drive applications with long motor cables
- Pumps
- Conveyors
- HVAC applications
- Elevators
- General automation tasks
- Applications with multiple motors in parallel

The Mitsubishi sine wave filter FFR-SI is applicable at a carrier frequency between 4kHz (2kHz above 116A) and 16kHz. When you are using the FFR-SI at a high carrier frequency this has no influence on the power losses in the filter.

For the FFR-SI-48A-SSI and less the maximum motor cables length is 200m unshielded and 100m shielded cable. For the FFR-SI-62A-SSI and above the maximum motor cable length is 800m unshielded and 600m shielded cable.

When you are using the FFR-SI the dv/dt is reduced to 5-10V/μs measured between the phases and 300-500V/μs measured between phase and earth.

For your information please find below the technical specifications, including the SAP article numbers:

Type	Article No.	Rated current [A]	Typical power loss [W]	Total weight [kg]	Dimensions [mm]		
					W	H	D
FFR-SI-4.5A-SS1	209735	4,5	66	3	125	180	75
FFR-SI-8,3A-SS1	209736	8,3	73	6,6	155	205	95
FFR-SI-18A-SS1	209737	18	144	11,5	190	230	120
FFR-SI-25A-SS1	209738	25	191	14	210	260	125
FFR-SI-32A-SS1	209739	32	273	16	210	260	135
FFR-SI-48A-SS1	209740	48	340	28	240	290	210
FFR-SI-62A-SS1	209741	62	290	35	240	290	220
FFR-SI-77A-SS1	209742	77	340	42	300	345	210
FFR-SI-93A-SS1	209743	93	360	46	300	345	215
FFR-SI-116A-SS1	209744	116	400	58	300	345	237
FFR-SI-180A-SS1	209745	180	700	88	450	400	max. 360
FFR-SI-260A-SS1	209746	260	900	125	450	510	max. 360
FFR-SI-432A-SS1	209747	432	1200	190	480	640	max. 680
FFR-SI-481A-SS1	209748	481	1400	235	600	625	max. 440
FFR-SI-683A-SS1	209749	683	2100	310	620	745	max. 550
FFR-SI-770A-SS1	209750	770	2900	470	660	690	max. 540
FFR-SI-880A-SS1	209751	880	3600	640	660	895	max. 560
FFR-SI-1212A-SS1	209752	1212	3800	680	740	940	max. 550
FFR-SI-1500A-SS1	209753	1500	*	*	*	*	*
FFR-SI-1700A-SS1	209754	1700	*	*	*	*	*

\*under reserve, in technical clarification

Maximum operating voltage:	3 x 400V/230VAC ±10%
Motor frequency:	0 to 70Hz
Switching frequency:	4 to 16kHz, above 116A 2 to 16kHz
Rated currents:	4,5 to 1700A @ 40°C
Motor cable length:	In ≤ 48A 200m unshielded, 100m shielded In > 48A 800m unshielded, 600m shielded
Impedance (uk):	10% @ 400V, 50Hz and rated current
Residual ripple voltage:	< 5%
High potential test voltage:	P -> E 3000VAC for 3 sec. P -> P 2000VAC for 3 sec.
Protection category:	IP00
Overload capability:	200% for at switch on for 30 sec. 150% for 60 sec. once per hour
Temperature range:	-25°C to +85°C
Insulation class:	T40/F (155°C) > 110A
Flammability corresponding to:	UL 94V-2 or better
Design corresponding to:	EN 61558-2-20 (VDE 0570-2-20)

Product type Mitsubishi	SAP code	In @ 40°C [A]	In @ 50°C [A]	Voltage	Fc [kHz]	A740 *1	F740	E740	E540	D740	S540
FFR-SI-4.5A-SS1	209735	4,5	4,05	3x400V	4	FR-A740-00023-EC FR-A740-00038-EC FR-A740-00052-EC	FR-F740-00023-EC FR-F740-00038-EC	FR-E740-016-EC FR-E740-026-EC FR-E740-040-EC	FR-E540-0,4K FR-E540-0,75K FR-E540-1,5K (ND)	FR-D740-012-EC FR-D740-022-EC	FR-S540-0,4K FR-S540-0,75K FR-S540-1,5K
FFR-SI-8,3A-SS1	209736	8,3	7,47	3x400V	4	FR-A740-00083-EC	FR-F740-00052-EC FR-F740-00083-EC	FR-E740-060-EC	FR-E540-1,5K (LD) FR-E540-2,2K (ND) FR-E540-2,2K (LD)	FR-D740-036-EC FR-D740-050-EC	FR-S540-2,2K
FFR-SI-18A-SS1	209737	18	16,2	3x400V	4	FR-A740-00126-EC FR-A740-00170-EC	FR-F740-00126-EC FR-F740-00170-EC	FR-E740-120-EC	FR-E540-3,7K FR-E540-5,5K (ND) FR-E540-5,5K (LD) FR-E540-7,5K (ND)	FR-D740-080-EC FR-D740-120-EC	FR-S540-3,7K
FFR-SI-25A-SS1	209738	25	22,5	3x400V	4	FR-A740-00250-EC	FR-F740-00250-EC	FR-E740-170-EC	FR-E540-7,5K (LD)	FR-D740-160-EC	
FFR-SI-32A-SS1	209739	32	28,8	3x400V	4	FR-A740-00310-EC	FR-F740-00310-EC	FR-E740-230-EC			
FFR-SI-48A-SS1	209740	48	43,2	3x400V	4	FR-A740-00380-EC FR-A740-00470-EC	FR-F740-00380-EC FR-F740-00470-EC	FR-E740-300-EC			
FFR-SI-62A-SS1	209741	62	55,8	3x400V	4	FR-A740-00620-EC	FR-F740-00620-EC				
FFR-SI-77A-SS1	209742	77	69,3	3x400V	4	FR-A740-00770-EC	FR-F740-00770-EC				
FFR-SI-93A-SS1	209743	93	83,7	3x400V	4	FR-A740-00930-EC	FR-F740-00930-EC				
FFR-SI-116A-SS1	209744	116	104,4	3x400V	4	FR-A740-01160-EC	FR-F740-01160-EC				
FFR-SI-180A-SS1	209745	180	162	3x400V	2	FR-A740-01800-EC FR-A740-02160-EC	FR-F740-01800-EC				
FFR-SI-260A-SS1	209746	260	234	3x500V	2	FR-A740-02600-EC FR-A740-03250-EC	FR-F740-02160-EC FR-F740-02600-EC				
FFR-SI-432A-SS1	209747	430	387	3x500V	2	FR-A740-03610-EC FR-A740-04320-EC FR-A740-04810-EC	FR-F740-03250-EC FR-F740-03610-EC				
FFR-SI-481A-SS1	209748	481	432,9	3x500V	2	FR-A740-05470-EC	FR-F740-04320-EC FR-F740-04810-EC				
FFR-SI-683A-SS1	209749	683	614,7	3x500V	2	FR-A740-06100-EC FR-A740-06830-EC	FR-F740-05470-EC FR-F740-06100-EC FR-F740-06830-EC				
FFR-SI-770A-SS1	209750	770	693	3x500V	2	FR-A740-07700-EC	FR-F740-07700-EC				
FFR-SI-880A-SS1	209751	880	792	3x500V	2	FR-A740-08660-EC FR-A740-09620-EC	FR-F740-08660-EC				
FFR-SI-1212A-SS1	209752	1212	1090,8	3x500V	2	FR-A740-10940-EC FR-A740-12120-EC	FR-F740-09620-EC FR-F740-10940-EC FR-F740-12120-EC				
FFR-SI-1500A-SS1	209753	1500	1350	3x500V	2						
FFR-SI-1700A-SS1	209754	1700	1530	3x500V	2						

\*1 = Suitable filters for 200% overload (ND). If you need lower overload, which means higher current, choose one size bigger filter.