INTRODUCTION

This catalog is a collection of products that are designed for the special requirements of shielded rooms and secure areas that are found in many commercial and private test laboratories, and in military and diplomatic facilities. These products are available from Ultra EMS as an important part of its RFI Specialty Components program, which brings together critically important ranges of passive components that meet or exceed the technical and environmental requirements found in defense, aerospace, and medical applications.

Most products in this catalog are based on designs originally created by FILTRON. Ultra EMS offers more products for shielded rooms and secure areas, but which are not interchangeable with these FILTRON products. For information about these other products refer to the RFI Specialty Components catalog, in print or on the web site.

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POWERLINE SHIELDED ROOM FILTERS

From the early days of radio frequency interference suppression to its present-day developments and refinements, the electronic engineering profession has accepted FILTRON POWERLINE Series Filters as the ultimate in performance for shielded room and other Ultra EMS suppression applications. All of the components of the various filter assemblies are meticulously designed and manufactured to provide minimum voltage drop, high attenuation and dependable, trouble-free performance under continuous operation. Each filter is tested for voltage breakdown, insulation resistance, hermetic sealing, leakage, and conformance to design specifications.

Powerline filters are designed not only for dependable performance but also for ease of installation. The cases have large wiring compartments to accommodate heavy cables with large bending radii. The terminal assembly design incorporates a flexible lead attached to a U/L recognized stand-off insulator. Electrical connection is made at the stand-off insulator end of the flexible lead, not to the terminal itself. Installation and wiring hazards, excessive torque, mishandling, improper tools, etc. cannot damage the hermetic seal of the terminal.

Powerline filters are impregnated with a high quality dielectric material and hermetically sealed in corrosion-resistant steel cases. All of the seams are continuously heliarc welded, and the terminals are welded to the case. As a result, these filters are truly leak proof.

Field service and accelerated life tests have conclusively demonstrated the dependability and long range economy of the FILTER POWERLINE Series of Ultra EMS Suppression Filters. You can specify them with absolute confidence for your next shielded enclosure, interference-free laboratory or other applications where Ultra EMS suppression is mandatory.

ARCHITECTS' & ENGINEERS' SPECIFICATIONS

GENERAL

Powerline filters are designed for filtering of radio frequency interference and to meet the requirements of Military Specifications MIL-PRF-15733 when applicable.

ELECTRICAL

INSERTION LOSS: 100 db minimum over its indicated frequency range when measured in accordance with the applicable MIL-STD-220A, full load condition.

CURRENT RATING: The filters are capable of withstanding 140% of rated current overload for 15 minutes without deterioration.

VOLTAGE: The filters are capable of operating continuously at full-rated voltage and of withstanding an over-voltage test of twice the rated voltage for one minute.

MECHANICAL

CASE: Internal filter cases are made of cold rolled steel, minimum thickness #16 gauge, external cabinets #12 gauge, and painted with suitable lacquer over primer to resist corrosion. All unfinished grounding surfaces are protected by suitable plating or made of stainless steel. Each phase filter in the FSR-W and FSR-Y series filters are individually replaceable.

TERMINALS: The terminals are made of high temperature materials. The ceramic terminal has a flexible insulated lead, one end of which is connected to the terminal stud. The other end is terminated in a permanently affixed lug which is mounted on a U/L recognized flame-retardant plastic stand-off insulator. The lug is secured to the stand-off insulator with a suitable hexagon-head screw. All service connections are made only at the stand-off insulators.

CONSTRUCTION: Input and output terminals are completely enclosed in RF shielded compartments. Covers on the input and output RF shielded compartments for the FSR-W and FSR-Y series filters are held down with hex-head screws. Casketing of woven corrosion resistant metal mesh is used between the cover and the inside fitting flange to maintain RF integrity. Covers on the input and output RF shielded compartments for the FSR-1200, FSR-100 and FSR-400 series filters are friction fitted. Internal components shall be mounted and fixed to prevent damage when subjected to shock and vibration tests.

FSR-W
POWERLINE SERIES

RFI/EMC Filters for
5 to 200 Amp. Circuits (1.)

Attenuation: 100 db from 14 KHz to 10 GHz measured in accordance with MIL-STD-220A load condition

FEATURES:

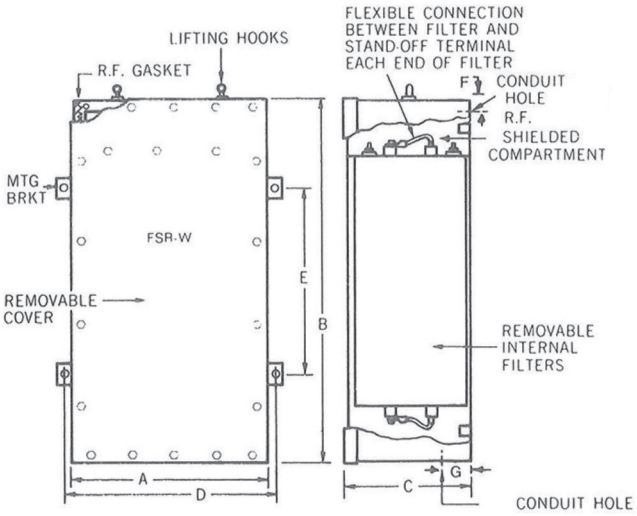
- All filters are rated for 0-60 Hz powerline frequencies (Filters for 400 Hz available upon request).
- Voltage rating 0-277 VAC line to neutral or 0-480 VAC line to line, 600 VDC max.
- Maximum voltage drop less than 2%.
- Maximum temperature rise 25°C.
- Overload safety 140% of rated current for 15 minutes. Short term current surge capability in excess of ten times rating.
- All filters comply with the applicable requirements of MIL-PRF-15733.
- Bleeder resistors installed for filter discharge.

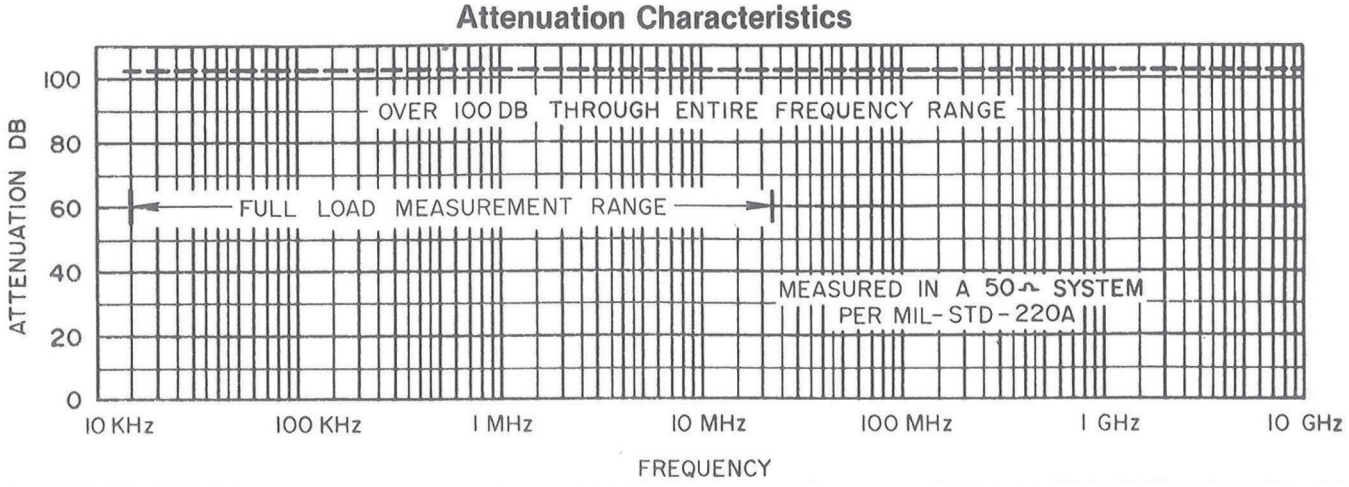
PART NO.	CURRENT AMPERES	DIMENSIONS, INCHES							CONDUIT HOLE DIA.	APPROX. WEIGHT (LBS.)
		A	B	C	D	E	F	G		
FSR-W-5BN	5	12-1/4	29	5	14-1/4	17	2	2	7/8	35
FSR-W-5B2*	2 x 5	12-1/4	29	5	14-1/4	17	2	2	7/8	45
FSR-W-5B3*	3 x 5	20	29	5	22	17	2	2	7/8	65
FSR-W-5B4	4 x 5	20	29	5	22	17	2	2	7/8	75
FSR-W-10BN	10	12-1/4	29	5	14-1/4	17	2	2	7/8	40
FSR-W-10B2*	2 x 10	12-1/4	29	5	14-1/4	17	2	2	7/8	50
FSR-W-10B3*	3 x 10	20	29	5	22	17	2	2	7/8	70
FSR-W-10B4	4 x 10	20	29	5	22	17	2	2	7/8	80
FSR-W-15BN	15	12-1/4	29	5	14-1/4	17	2	2	7/8	40
FSR-W-15B2*	2 x 15	12-1/4	29	5	14-1/4	17	2	2	7/8	55
FSR-W-15B3*	3 x 15	20	29	5	22	17	2	2	7/8	80
FSR-W-15B4	4 x 15	20	29	5	22	17	2	2	7/8	95
FSR-W-25BN	25	12-1/4	37	5	14-1/4	25	3	2	1-3/8	75
FSR-W-25B2*	2 x 25	12-1/4	37	5	14-1/4	25	3	2	1-3/8	105
FSR-W-25B3*	3 x 25	20	37	5	22	25	3	2	1-3/8	145
FSR-W-25B4	4 x 25	20	37	5	22	25	3	2	1-3/8	175
FSR-W-50BN	50	12-1/4	37	5	14-1/4	25	3	2	1-3/4	75
FSR-W-50B2*	2 x 50	12-1/4	37	5	14-1/4	25	3	2	1-3/4	105
FSR-W-50B3*	3 x 50	20	37	5	22	25	3	2	1-3/4	145
FSR-W-50B4	4 x 50	20	37	5	22	25	3	2	1-3/4	175
FSR-W-100BN	100	16-1/2	37	11	18-1/2	25	5	5	2	120
FSR-W-100B2*	2 x 100	16-1/2	37	11	18-1/2	25	5	5	2	170
FSR-W-100B3*	3 x 100	25	37	11	27	25	5	5	2	240
FSR-W-100B4	4 x 100	25	37	11	27	25	5	5	2	290
FSR-W-150BN	150	17-1/2	40	17	19-1/2	28	5	5	2-1/2	210
FSR-W-150B2*	2 x 150	17-1/2	40	17	19-1/2	28	5	5	2-1/2	310
FSR-W-150B3*	3 x 150	25	40	17	27	28	5	5	2-1/2	445
FSR-W-150B4	4 x 150	25	40	17	27	28	5	5	2-1/2	545
FSR-W-200BN	200	17-1/2	40	17	19-1/2	28	5	5	3	210
FSR-W-200B2*	2 x 200	17-1/2	40	17	19-1/2	28	5	5	3	310
FSR-W-200B3*	3 x 200	25	40	17	27	28	5	5	3	445
FSR-W-200B4	4 x 200	25	40	17	27	28	5	5	3	545

N in the part number denotes grounded neutral conductor terminals in the case.

*Also available with grounded neutral conductor terminals (add N to part number).

For Filter Discharge Unit, see page 13.
For Architects' & Engineers' Specifications, see page 4.
For Installation Recommendations, see page 16.
For Power Factor Correction Coils, see page 15.





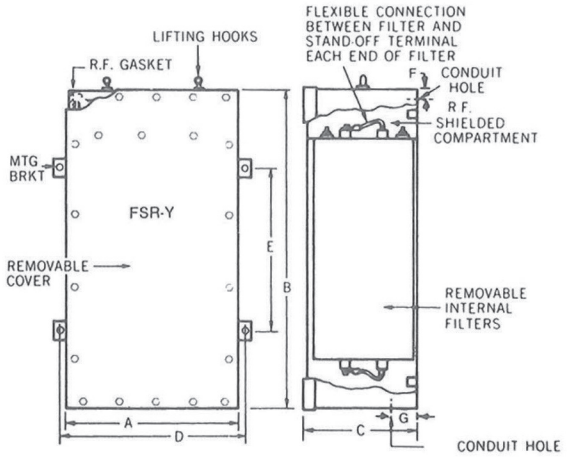
FSR-Y
POWERLINE SERIES

RFI/EMC Filters for
5 to 200 Amp. Circuits (1.)

Attenuation: 100 db from 14 KHz to 10 GHz measured in accordance with MIL-STD-220A load condition. Special: Also measured under full load condition from 14 KHz to 20 MHz with extended range buffer networks.

FEATURES:

- All filters are rated for 0-60 Hz powerline frequencies (Filters for 400 Hz available upon request).
- Voltage rating 0-277 VAC line to neutral or 0-480 VAC line to line, 600 VDC max.
- Maximum voltage drop less than 2%.
- Maximum temperature rise 25°C.
- Overload safety 140% of rated current for 15 minutes. Short term current surge capability in excess of ten times rating.
- All filters comply with the applicable requirements of MIL-PRF-15733.
- Bleeder resistors installed for filter discharge.



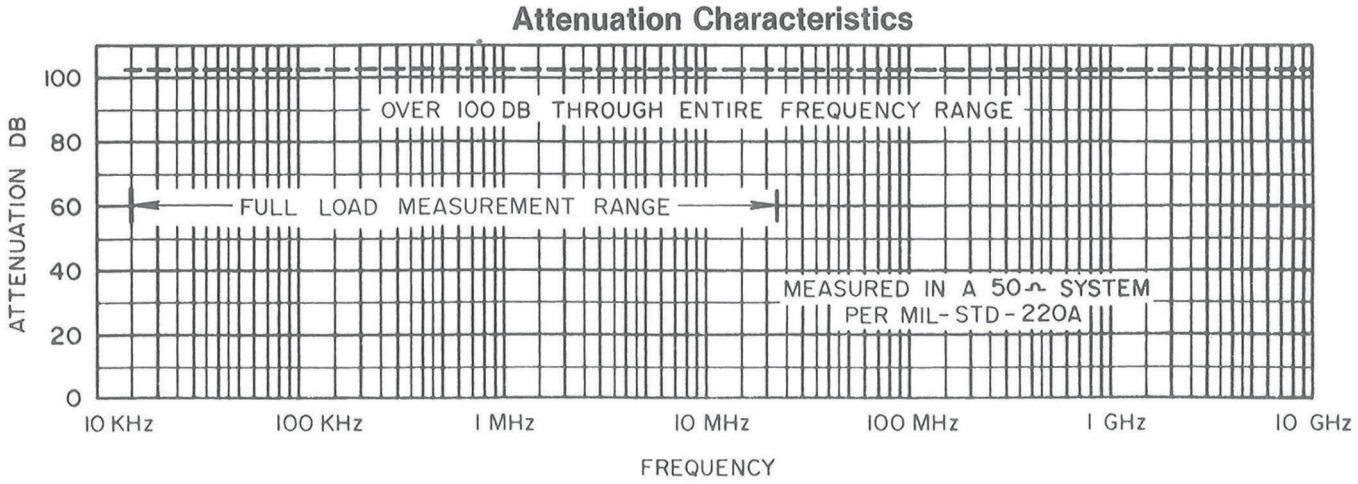
PART NO.	CURRENT AMPERES	DIMENSIONS, INCHES							CONDUIT HOLE DIA.	APPROX. WEIGHT (LBS.)
		A	B	C	D	E	F	G		
FSR-W-5BN	5	12-1/4	29	5	14-1/4	17	2	2	7/8	40
FSR-W-5B2*	2 x 5	12-1/4	29	5	14-1/4	17	2	2	7/8	50
FSR-W-5B3*	3 x 5	20	29	5	22	17	2	2	7/8	75
FSR-W-5B4	4 x 5	20	29	5	22	17	2	2	7/8	85
FSR-W-10BN	10	12-1/4	29	5	14-1/4	17	2	2	7/8	45
FSR-W-10B2*	2 x 10	12-1/4	29	5	14-1/4	17	2	2	7/8	60
FSR-W-10B3*	3 x 10	20	29	5	22	17	2	2	7/8	80
FSR-W-10B4	4 x 10	20	29	5	22	17	2	2	7/8	90
FSR-W-15BN	15	12-1/4	29	5	14-1/4	17	2	2	7/8	45
FSR-W-15B2*	2 x 15	12-1/4	29	5	14-1/4	17	2	2	7/8	65
FSR-W-15B3*	3 x 15	20	29	5	22	17	2	2	7/8	90
FSR-W-15B4	4 x 15	20	29	5	22	17	2	2	7/8	110
FSR-W-25BN	25	12-1/4	37	5	14-1/4	25	3	2	1-3/8	85
FSR-W-25B2*	2 x 25	12-1/4	37	5	14-1/4	25	3	2	1-3/8	120
FSR-W-25B3*	3 x 25	20	37	5	22	25	3	2	1-3/8	165
FSR-W-25B4	4 x 25	20	37	5	22	25	3	2	1-3/8	200
FSR-W-50BN	50	12-1/4	37	5	14-1/4	25	3	2	1-3/4	85
FSR-W-50B2*	2 x 50	12-1/4	37	5	14-1/4	25	3	2	1-3/4	120
FSR-W-50B3*	3 x 50	20	37	5	22	25	3	2	1-3/4	165
FSR-W-50B4	4 x 50	20	37	5	22	25	3	2	1-3/4	200
FSR-W-100BN	100	16-1/2	37	11	18-1/2	25	5	5	2	135
FSR-W-100B2*	2 x 100	16-1/2	37	11	18-1/2	25	5	5	2	190
FSR-W-100B3*	3 x 100	25	37	11	27	25	5	5	2	270
FSR-W-100B4	4 x 100	25	37	11	27	25	5	5	2	325
FSR-W-150BN	150	17-1/2	40	17	19-1/2	28	5	5	2-1/2	235
FSR-W-150B2*	2 x 150	17-1/2	40	17	19-1/2	28	5	5	2-1/2	350
FSR-W-150B3*	3 x 150	25	40	17	27	28	5	5	2-1/2	500
FSR-W-150B4	4 x 150	25	40	17	27	28	5	5	2-1/2	615
FSR-W-200BN	200	17-1/2	40	17	19-1/2	28	5	5	3	235
FSR-W-200B2*	2 x 200	17-1/2	40	17	19-1/2	28	5	5	3	350
FSR-W-200B3*	3 x 200	25	40	17	27	28	5	5	3	500
FSR-W-200B4	4 x 200	25	40	17	27	28	5	5	3	615

N in the part number denotes grounded neutral conductor terminals in the case.

*Also available with grounded neutral conductor terminals (add N to part number).

For Filter Discharge Unit, see page 13.
For Architects' & Engineers' Specifications, see page 4.
For Installation Recommendations, see page 16.
For Power Factor Correction Coils, see page 15.

1. Larger than 225 Amp. Circuits available on request.



FIL-TEL

Secure Communications & Signal Line Filters

Filtron FIL-TEL® Filters are used in numerous communication and telephone lines in conjunction with shielded and controlled facilities to achieve secure communication standards such as those required for DCA RED/BLACK ENGINEERING — INSTALLATION CRITERIA (U) per Specification DCA CIR C175-6A; DCA ENSP-422-5C, DCA C 300-175-1; and BuShips Inst. 011120.12C.

The FIL-TEL communication and signal line filters meet or exceed the attenuation characteristics, and all other requirements, of the above specifications. All units are hermetically sealed and housed in plated metal cases provided with mounting flanges and/or threaded necks for convenient mounting. Terminals are of compression-type glass, solder sealed. Duty cycle is continuous for all units. When installed on a shield-room wall, the filters remove spurious high-frequency energy, while providing a continuous RF-tight shield for the filters signal. Filtron also supplies assemblies of any combination of filters, completely pre-wired to terminal strips and enclosed in an RF-tight cabinet.

ARCHITECTS AND ENGINEERS SPECIFICATIONS

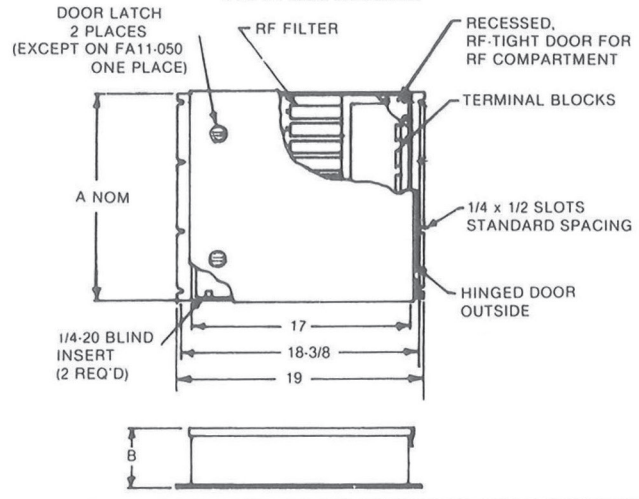
GENERAL: All filters shall be fabricated, tested and installed in accordance with military specification MIL-PRF-15733 and in accordance with the following detail requirements.

Telephone type filters can be installed and wired (optional) in a metallic shielded enclosure. The enclosures used to house the individual filters shall be constructed so that the input and output circuits of the filter will be shielded from each other to provide the required attenuation. The shielded compartment of the filter enclosure shall incorporate a removable cover to provide easy access for installation. This shielded compartment will have an RF gasket between the cover and the cover mounting surface to maintain the RF integrity of the filter. This filter enclosure shall be fabricated from sheet steel, no less than .075 inches thick (14 gauge). Each filter enclosure shall be provided with mounting brackets whose surfaces shall be clean, free of paint, and shall be plated in order to provide a low-impedance ground. The surfaces to which these filters mount will be clean, unpainted surfaces, suitably plated.

FILTER MODULE CASES

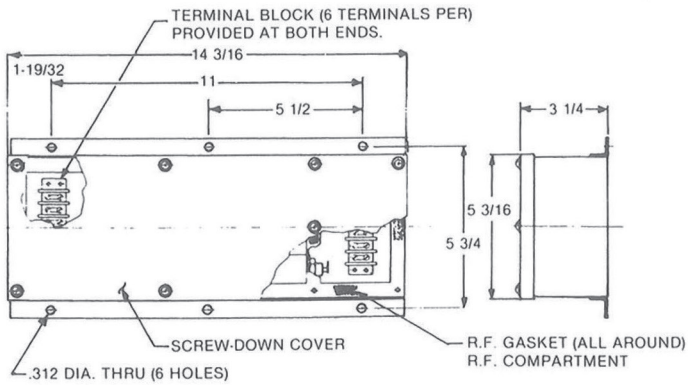
These cases will accommodate any of the following filter types in any desired combination; which are listed on the FIL-TEL chart.

FA-11-050 SERIES



No. of Filters		Dimensions		Case model number
Single	Dual	A	B	
6	3	*	*	FA-11-049
20	10	8¾	10¼	FA-11-050
50	25	19¼	10¼	FA-11-051
100	50	19¼	19¼	FA-11-052
200	100	36¾	19¼	FA-11-053

FA-11-049



FA11-049
NOTE: CASE WILL HOUSE A MAXIMUM OF 6 TUBULAR OR 3 DUAL FILTERS.

ORDERING INFORMATION

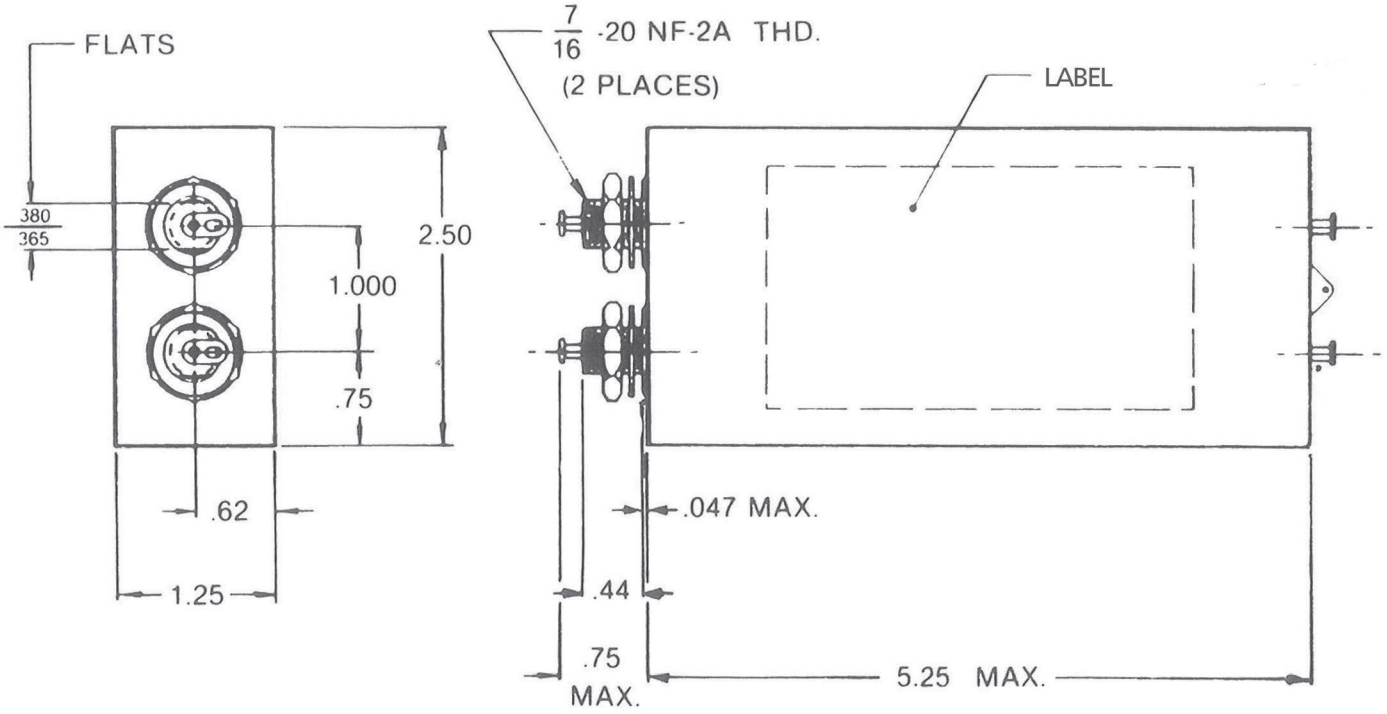
1. SELECT MODULE CASE LARGE ENOUGH FOR QUANTITY OF FILTERS REQUIRED AND FUTURE EXPANSION IF NECESSARY FROM MODULE CASE LIST.
2. SELECT QUANTITY AND TYPE OF FILTER OR FILTERS FROM FILTER LIST.

FIL-TEL

Secure Communications & Signal Line Filters

PART NO.	TYPE	IMPEDANCE (OHMS)	CIRCUIT	DATA TRANSMISSION RATE	MAX. CURRENT (AMPS)	RATED VOLTAGE (VDC)	TYPICAL USE
FA10-884	Voice	300/600	Dual	2.4 Kb	0.20	600	Tel
FA60-1302	Data	300/600	Dual	9.6 Kb	0.20	300	Modem
FA60-1580	Data	50/50	Dual	19.2 Kb	0.20	100	Modem
FA60-1608	Data	50/50	Dual	56.0 Kb	0.20	100	Tel/Data
FA60-2007	Alarm	300/600	Dual	9.6 Kb	1.00	300	Fire Alarm
FA60-2030	Data	50/50	Dual	160.0 Kb	0.02	600	Tel/Data
FA60-2031	Data	50/50	Dual	190.0 Kb	0.02	600	Tel/Data
FA60-2082	Data	50/50	Dual	256.0 Kb	0.02	300	Tel/Data
FA60-2085	Voice	450/900	Dual	2.4 Kb	0.20	300	Tel
FA60-2088	Data	50/50	Dual	10.0 Kb	1.00	300	BNC—Ethernet
FA60-2089	Data	60/120	Dual	230.4 Kb	1.00	100	Apple Talk
FA60-2090	Data	300/600	Dual	19.2 Kb	0.20	100	Tel/Data
FA60-3022	Data	50/50	Dual	2.4 Kb	0.20	150	Tel/Data
FA60-3038	Alarm	75/150	Dual	9.6 Kb	1.00	150	Fire Alarm
FA60-3044	Data	50/50	Dual	64.0 Kb	0.20	150	Tel/Data
FA60-3049	Data	67.5/135	Dual	56.0 Kb	0.20	200	Tel/Data

FIL-TEL FILTERS APPROXIMATE DIMENSIONS



FSR-1200
FSR-100

POWERLINE SERIES
RFI/EMC Filters for
25 to 200 Amp. Circuits

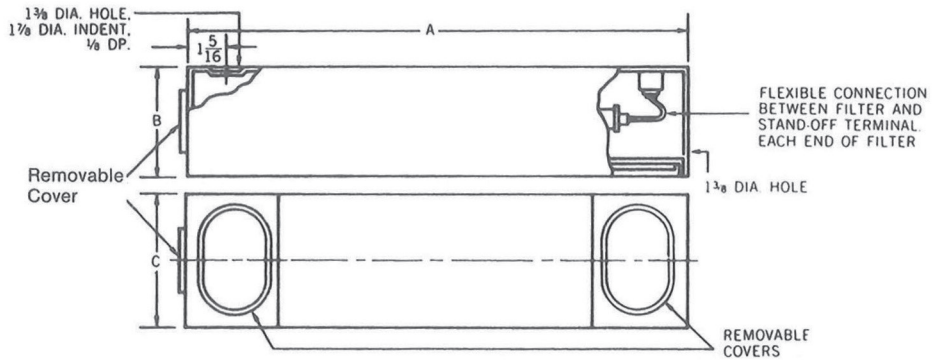
Attenuation: FSR-1200 Series; 100 Db from 14 KHz to 10 GHz MIL-STD-220A load condition. FSR-100 Series; 100 Db from 100 KHz to 1 GHz MIL-STD-220A load condition.

- Maximum voltage drop less than 2%.
- Maximum temperature rise 25°C.
- Overload safety 140% of rated current for 15 minutes. Short term current surge capability in excess of ten times rating.
- All filters comply with the applicable requirements of MIL-PRF-15733.

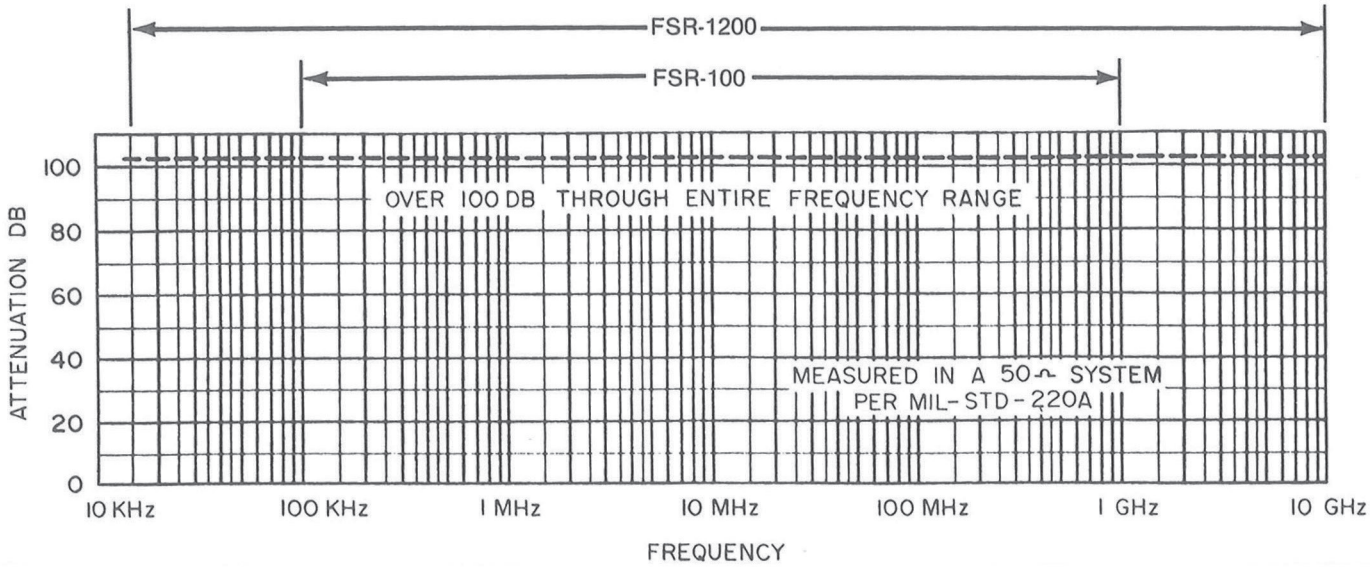
PART NO.	MAX. CURRENT (AMPS)	MAXIMUM VOLTAGE			POWER LINE FREQUENCY**	DIMENSIONS			APPROX. WT. (LBS.)
		AC		DC		A	B	C	
		LINE-TO-GROUND	LINE-TO-LINE						
FSR-1201E	25	277*	480	600	60 Hz	34	4-3/4	4-1/2	30
FSR-1202E	50	277*	480	600	60 Hz	34	4-3/4	4-1/2	30
FSR-1203E	100	277*	480	600	60 Hz	40	5	9	90
FSR-1204E	150	277*	480	600	60 Hz	40	5-1/4	15	135
FSR-1205E	200	277*	480	600	60 Hz	40	5-1/4	15	135
FSR-101E	25	277*	480	600	60 Hz	22	4-1/4	4	18
FSR-102E	50	277*	480	600	60 Hz	22	4-1/4	4	18
FSR-104E	100	277*	480	600	60 Hz	22	4-1/4	4	18
FSR-113E	150	277*	480	600	60 Hz	27-1/4	5	9-1/2	45
FSR-112E	200	277*	480	600	60 Hz	27-1/4	5	9-1/2	45
FSR-108E	25	500		1000	60 Hz	22	4-1/4	4	18
FSR-109E	50	500		1000	60 Hz	22	4-1/4	4	18
FSR-111E	100	500		1000	60 Hz	22	4-1/4	4	18
FSR-106E***	2 x 30	115		400	60 Hz	17-1/2	2-3/4	5	12

For Filter Discharge Unit, see page 13. For Architects' & Engineers' Specifications, see page 4. For Installation Recommendations, see page 16. For Power Factor Correction Coils, see page 15.

* These filters are suitable for use in 3-phase systems up to 480 volts, phase-to-phase.
** Further information will be supplied by Ultra EMS on frequencies above 60 Hz.
*** Dual unit.



Attenuation Characteristics



FSR-300

SERIES
RFI/EMC Filters for
5, 10 & 15 Amp. Circuits

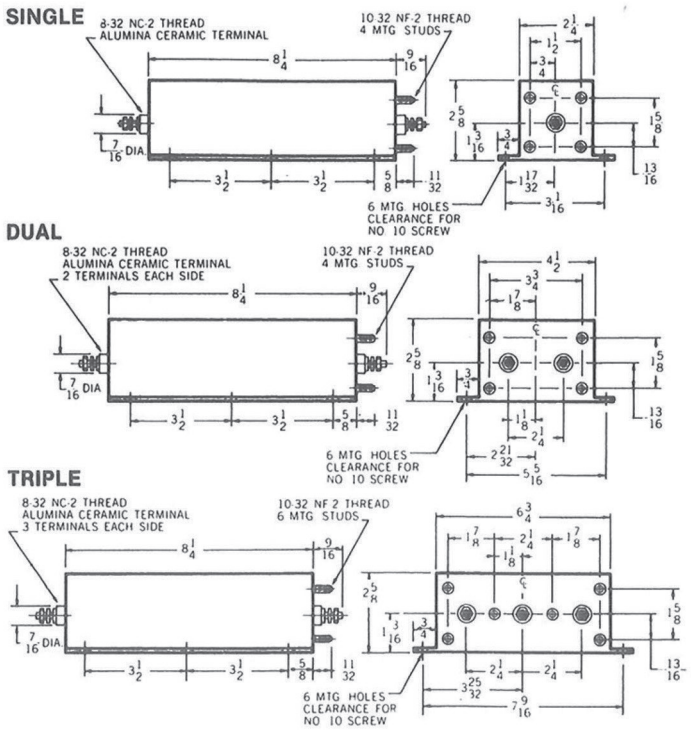
Attenuation: 100 Db from 90 KHz to 1 GHz measured in accordance with MIL-STD-220A

- High reliability. Special design and construction developed for strategic missile sites...in continuous service for years without failure.
- Leak proof.
- Hermetically sealed compartment.
- 85°C operation without need for external cooling.
- Overload safety. Complies with MIL-PRF-15733: 140% of rated current for 15 minutes. Short term current surge capability in excess of 10 times rating without damage.

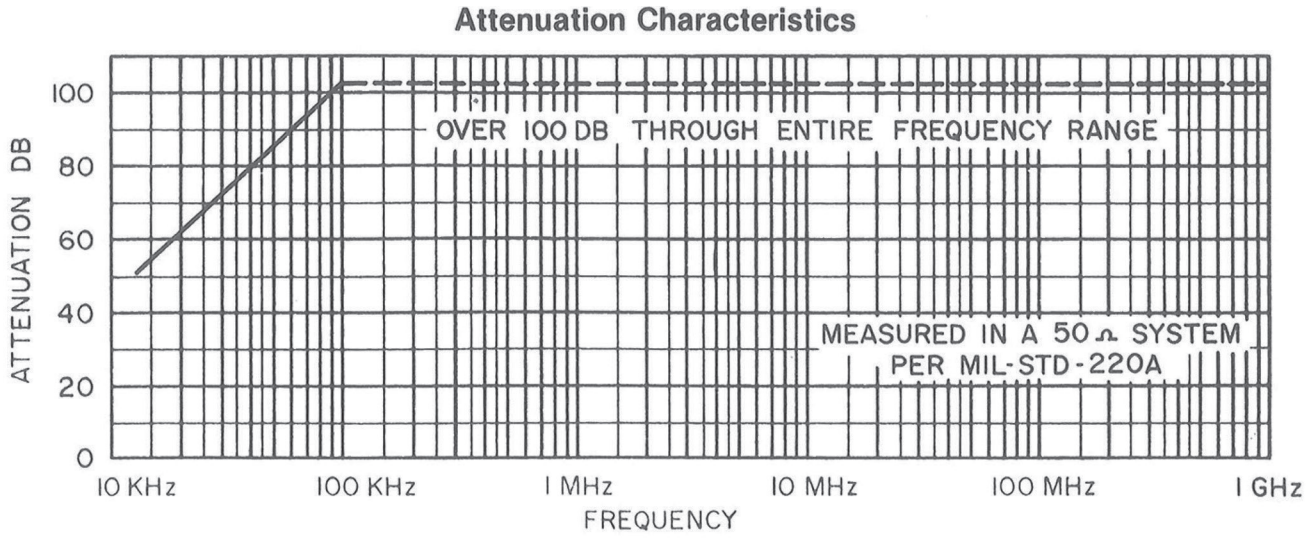
PART NO.	CURRENT AMPERES	LINE-TO-GROUND VOLTAGE		POWER LINE FREQUENCY**	APPROX. WT. (LBS.)
		AC	DC		
FSR-301D	5	130	400	0-400 Hz	3
FSR-302D	10	130	400	0-400 Hz	3
FSR-303D	15	130	400	0-400 Hz	3
FSR-304D	2 x 5	130	400	0-400 Hz	6
FSR-305D	2 x 10	130	400	0-400 Hz	6
FSR-306D	2 x 15	130	400	0-400 Hz	6
FSR-307D	3 x 5	130	400	0-400 Hz	9
FSR-308D	3 x 10	130	400	0-400 Hz	9
FSR-309D	3 x 15	130	400	0-400 Hz	9

For universal application these filters are available mounted in cabinets with standard knockouts for installation in all types of wiring circuits. (See Page 13)

Steel case, all surfaces corrosion-resistant finish. Designed and manufactured for continuous 24-hour-a-day operation at full rating.



SEE PAGE 13 FOR RECOMMENDED ENCLOSURES



FSR-400

POWERLINE SERIES
RFI/EMC Filters for
25 to 200 Amp. Circuits

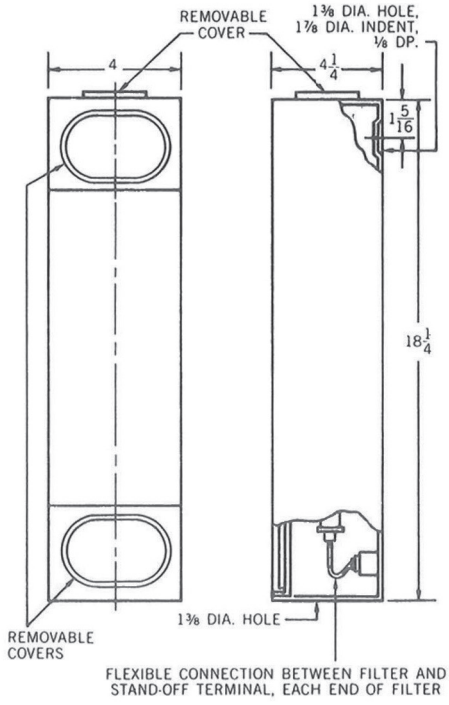
Attenuation: See Chart

- Maximum voltage drop less than 2%.
- Maximum temperature rise 25°C.
- Overload safety 140% of rated current for 15 minutes. Short term current surge capability in excess of ten times rating.
- All filters comply with the applicable requirements of MIL-PRF-15733.

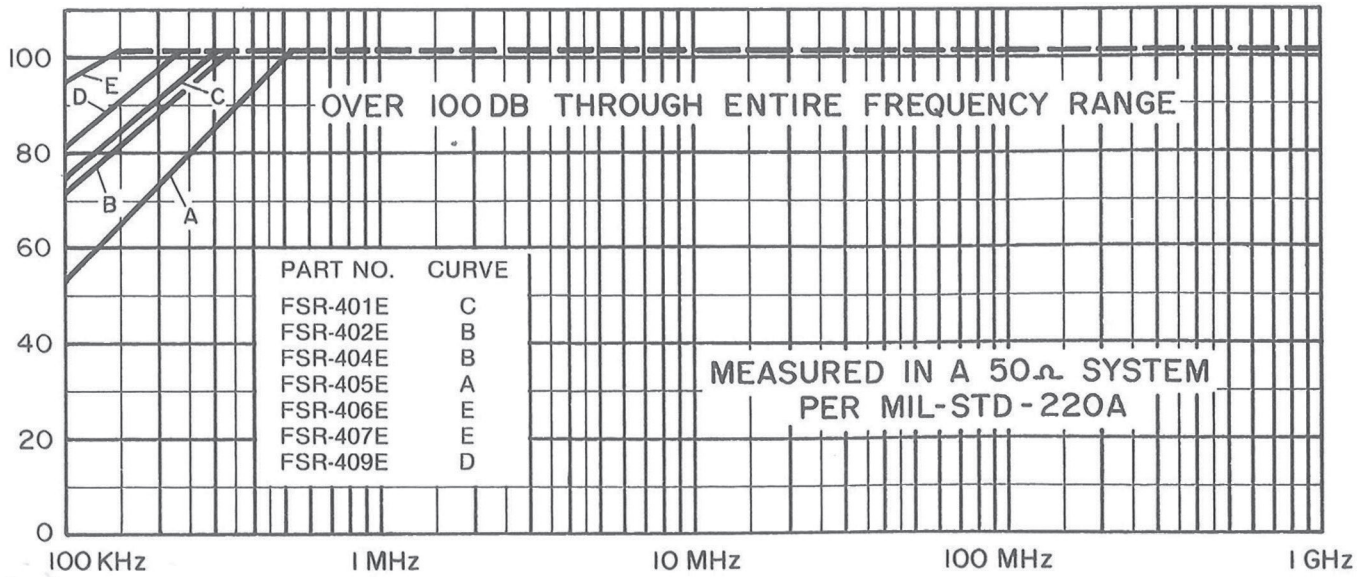
PART NO.	CURRENT AMPERES	LINE-TO-GROUND VOLTAGE		POWER LINE FREQUENCY**	APPROX. WT. (LBS.)
		AC	DC		
FSR-401E	25	277	600	0-60 HZ	13
FSR-402E	50	277	600	0-60 HZ	13
FSR-404E	100	277	600	0-60 HZ	13
FSR-405E	200	277	600	0-60 HZ	13
FSR-406E	25	277	600	0-400 HZ	13
FSR-407E	50	277	600	0-400 HZ	13
FSR-409E	100	277	600	0-400 HZ	13

For Filter Discharge Unit, see page 13.
For Architects' & Engineers' Specifications, see page 4.
For Installation Recommendations, see page 16.
For Power Factor Correction Coils, see page 15.

* These filters are suitable for use in 3-phase systems up to 480 volts, phase to phase



Attenuation Characteristics



FSR-600

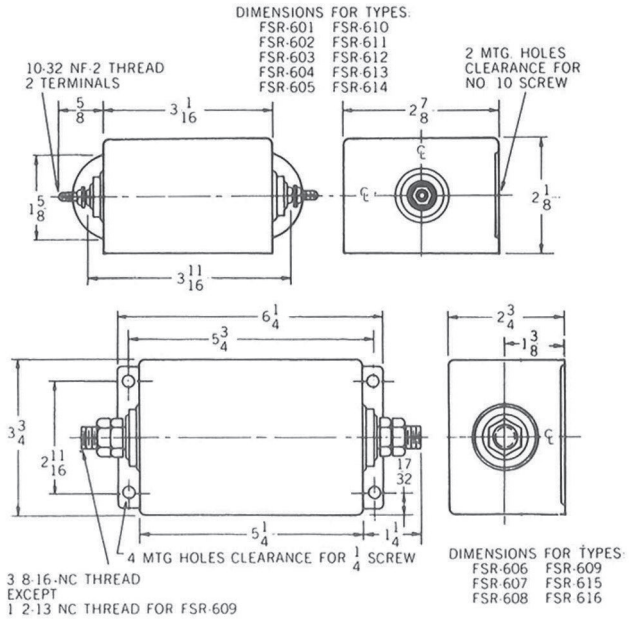
SERIES
RFI/EMC Filters for
5 to 300 Amp. Circuits

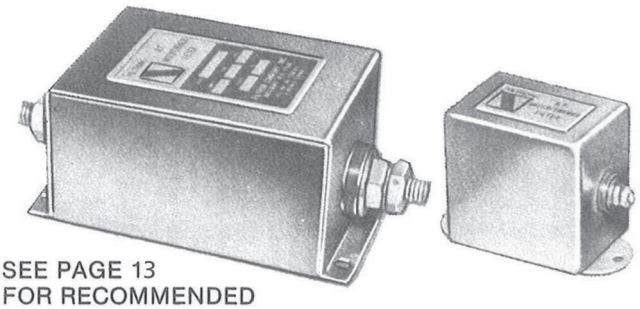
Attenuation: See Chart - measured in accordance with MIL-STD-220A

- Reliable and low cost
- Hermetically sealed
- Plated, corrosion-resistant metal case
- Filtron FSR-600 Series Filters are designed for use where attenuation requirements and interference levels are moderate. Thousands of this popular line of filters are in continuous service. Designed primarily for low cost installation, they are manufactured to exacting standards with no comprimise in workmanship or component quality
- FSR-600 Series Filters can be found in screen rooms, diathermy apparatus, induction heaters and similar industrial installations

PART NO.	CURRENT AMPERES	LINE-TO-GROUND VOLTAGE		POWER LINE FREQUENCY	APPROX. WT. (LBS.)
		AC	DC		
FSR-601	5	250	600	0-60 HZ	1-1/2
FSR-602	10	250	600	0-60 HZ	1-1/2
FSR-603	15	250	600	0-60 HZ	1-3/4
FSR-604	25	250	600	0-60 HZ	1-3/4
FSR-605	50	250	600	0-60 HZ	1-3/4
FSR-606	75	250	600	0-60 HZ	5-1/4
FSR-607	100	250	600	0-60 HZ	5-1/4
FSR-608	200	250	600	0-60 HZ	6-1/4
FSR-609	300	250	600	0-60 HZ	6-1/2
FSR-610	5	250	600	0-400 Hz	1-1/2
FSR-611	10	250	600	0-400 Hz	1-1/2
FSR-612	15	250	600	0-400 Hz	1-3/4
FSR-613	25	250	600	0-400 Hz	1-3/4
FSR-614	50	250	600	0-400 Hz	1-3/4
FSR-615	75	250	600	0-400 Hz	5-1/4
FSR-616	100	250	600	0-400 Hz	5-1/4

FSR-600 Series Filters are available either individually or mounted in cabinets with standard knockouts intended for versatile installation in all types of wiring circuits. (See Page 13)





SEE PAGE 13
FOR RECOMMENDED
ENCLOSURES

Attenuation Characteristics

Part No.	ATTENUATION (db)									
	0.15 MHz	0.3 MHz	0.5 MHz	1.0 MHz	5.0 MHz	10 MHz	30 MHz	50 MHz	100 MHz	150 MHz
FSR-601B	62	85	84	77	69	64	55	51	47	42
FSR-602B	62	85	84	77	69	64	55	51	47	42
FSR-603B	47	67	83	85	73	68	63	59	50	42
FSR-604B	47	67	83	85	73	68	63	59	50	42
FSR-605B	40	64	81	79	70	65	57	53	45	40
FSR-606B	67	86	91	89	73	68	60	54	40	33
FSR-607B	67	86	91	89	73	68	60	54	40	33
FSR-608B	43	65	89	90	79	74	62	61	44	26
FSR-609B	44	67	71	67	55	46	40	35	32	25
FSR-610B	62	85	84	77	69	64	55	51	47	42
FSR-611B	62	85	84	77	69	64	55	51	47	42
FSR-612B	47	67	83	85	73	68	63	59	50	42
FSR-613B	47	67	83	85	73	68	63	59	50	42
FSR-614B	40	64	81	79	70	65	57	53	45	40
FSR-615B	67	86	91	89	73	68	60	54	40	33
FSR-616B	67	86	91	89	73	68	60	54	40	33

FDU-100

Filter Discharge Unit for RFI/EMC Filters

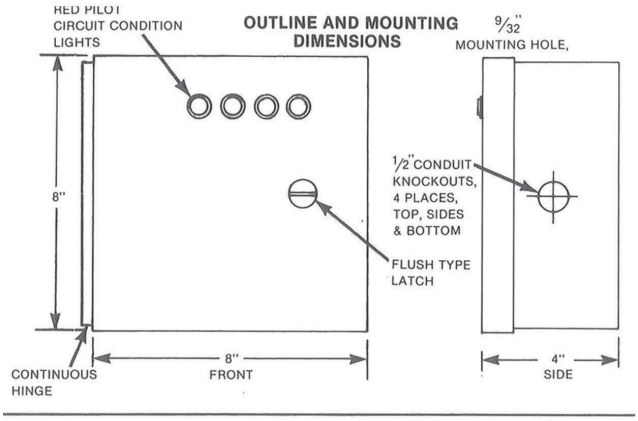
FILTER DISCHARGE UNIT FDU-100 SERIES

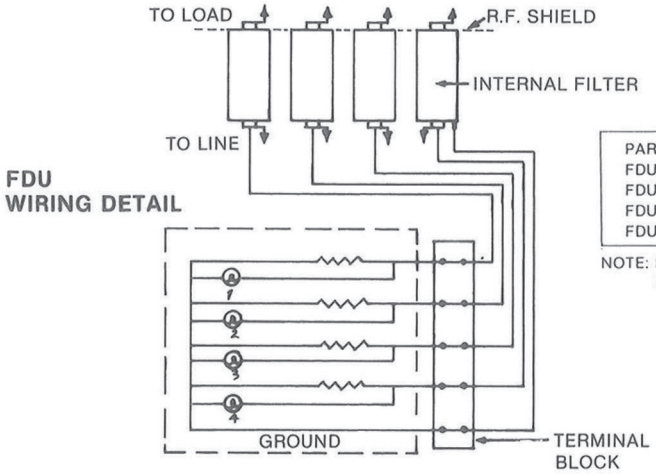
RFI/EMC filters contain large, high quality capacitor sections which can store lethal charges of electrical energy for long time periods after the main source of electrical power has been turned off.

All filtered circuits, lighting, power outlets and equipment power supply lines can remain alive and charged and present a serious hazard to personnel and equipment unless filter capacitors are properly and safely discharged.

The capacitor discharge device is a mandatory safety requirement under National Electrical Code, Article 460 and National Electrical Manufacturers Association, NEMA Standard 11-17-1960. Extinguished lights on FDU indicate safe condition.

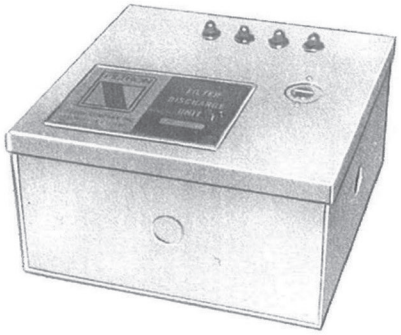
Filtron Filter Discharge Units are presently being specified and installed at all government and commercial facilities in domestic and global service.





PART NO.	APPLICATION
FDU-101	1 FILTERED CIRCUIT
FDU-102	2 FILTERED CIRCUITS
FDU-103	3 FILTERED CIRCUITS
FDU-104	4 FILTERED CIRCUITS

NOTE: PILOT INDICATOR FURNISHED FOR EACH FILTERED CIRCUIT



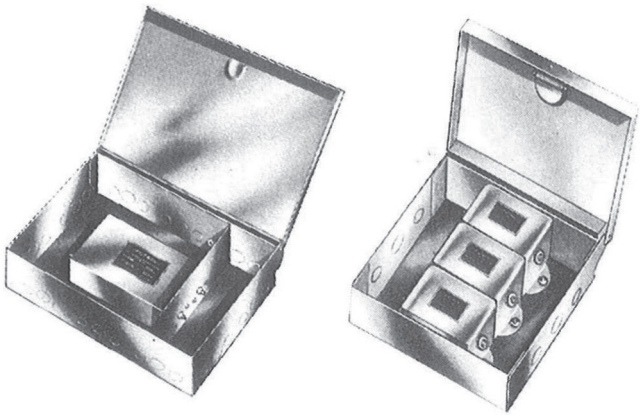
CABINETS FOR FSR 300 & 600

STEEL SURFACE CABINETS FOR FILTRON FSR-300 & FSR-600 FILTERS

FSR-300 and FSR-600 Filters are available installed in cabinets with standard knockouts. Select suitable size from chart; allow space for wiring.

Refer to FSR-300 and FSR-600, pages 10 and 12 for filter dimensions.

Part No.	Size (Inches)
KO-1	9 x 9 x 3
KO-2	14 x 12 x 3½
KO-3	15 x 10 x 4
KO-4	18 x 12 x 6
KO-5	24 x 12 x 6
KO-6	24 x 18 x 6



FSR-700

SERIES
Line Impedance Networks for
50, 100, 200 & 500 Amp. Circuits

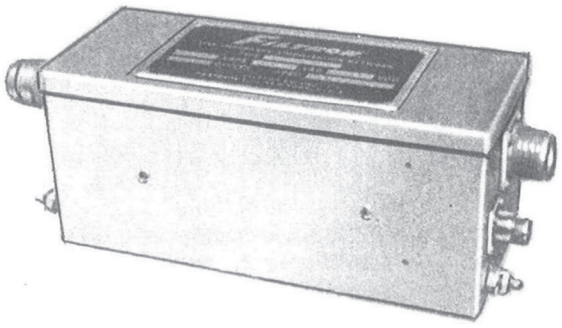
For RFI Measurements as specified in MIL-I-6181, MIL-I-26600, MIL-I-11748, MIL-I-16910A, MIL-STD-461, 462, 463, and FED-STD-222 and others

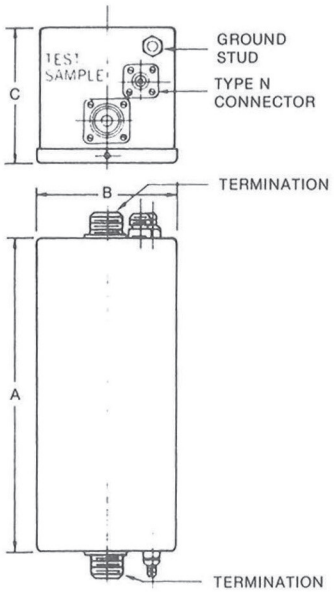
- High reliability
- Available in choice of four (4) ratings for U.S. Navy; U.S. Air Force or U.S. Signal Corps Spec. Measurements
- Filtron FSR-700 Series Line Impedance Stabilization Networks are designed for use by laboratories in taking radio frequency interference measurements in accordance with U.S. Air Force Specifications MIL-I-26600, MIL-I-6181B and MIL-I-6181D, U.S. Navy Specifications MIL-I-16910A and U.S. Signal Corps Specification MIL-I-11748. Line impedance stabilization networks are specified in the above military specifications and are required for performing radio frequency interference measurements as described in these same specifications; one such network being inserted in each power supply lead and electrical load lead (if used), when making all radiated and conducted tests.
- Designed to meet the electrical characteristics of these military specifications, the components of the Filtron FSR-700 stabilization networks are carefully engineered to provide dependable, trouble-free performance in service.
- Ultra EMS maintains a complete laboratory to insure the highest standard of quality in these networks. Every unit is 100% tested for conformance to electrical and mechanical design specifications.

LINE IMPEDANCE STABILIZATION NETWORKS			
SPECIFICATION	NETWORK	CURRENT	USE
MIL-I-6181B	FSR-701A FSR-702A FSR-703A FSR-704A	50 amps 100 amps 200 amps 800 amps	Use on power input lines and electrical load lines
MIL-I-6181D	FSR-701D FSR-702D FSR-703D FSR-704D	50 amps 100 amps 200 amps 500 amps	input power leads
MIL-I-16910A MIL-I-16910C MIL-I-16165D MIL-I-17623A	FSR-701N FSR-702N FSR-703N FSR-704N	50 amps 100 amps 200 amps 500 amps	Input power leads
MIL-I-16910C MIL-I-17623A	FSR-711	50 amps	Input power leads
MIL-I-26600 MIL-I-43121A	FSR-701AC FSR-702AC FSR-703AC FSR-704AC	50 amps 100 amps 200 amps 500 amps	Input power leads measurements using stab networks required only on lines 50 amps or less
MIL-I-11748A MIL-I-11748B MIL-E-55301(EL)	FSR-702SC	100 amps	Electrical input and load lines
MIL-STD-461 MIL-STD-462 MIL-STD-463	FSR-710 FSR-710A FSR-710B FSR-710C	50 amps 200 amps 250 amps 300 amps	Input power leads input power leads input power leads input power leads
MSFC-Spec-279	FSR-701E	50 amps	All power lines
FED-STD-222	FSR-712 FSR-6244 FSR-701N	50 amps	Input power leads

Performance characteristics will permit measurements of test items of the following maximum voltage ratings.

DC	600 volts
60 hertz	440 volts
400 hertz	230 volts
800 hertz	115 volts

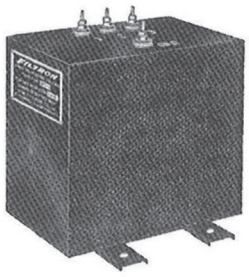




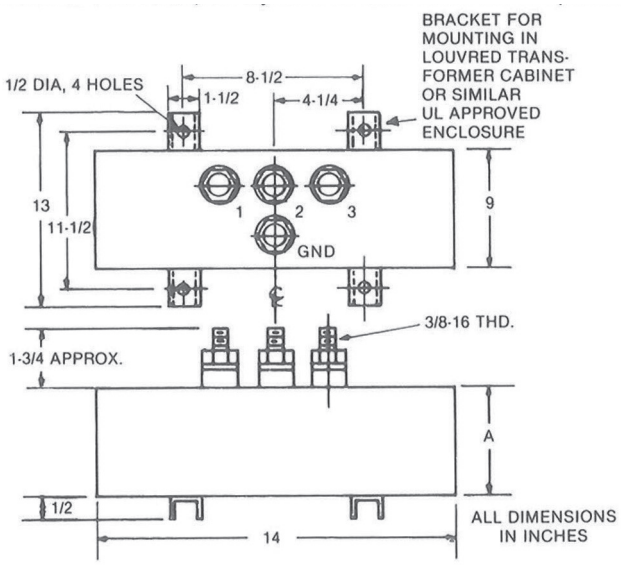
FSR-800
Power Factor Correction Coils

- High reliability
- For use with FSR-100, 400, 1200 and FSR-W, U & Y Series Filters
- Convenient to install

These FILTRON Power Factor Correction Coils are designed primarily for service in power lines where limited generator output requires a reduction in reactive current. Since screen room filters consist basically of inductors and capacitors, their effect on a power line is to apply a fixed reactive load. Filters which provide high attenuation at low radio frequencies (i.e. 14 kc to 100 kc) present the greatest possibility of no-load current problems due to their large capacitive component. If the power source has sufficient reserve to furnish this additional reactive current, there is no difficulty. But, if the power source is limited, Power Factor Correction Coils must be used to cancel the undesirable capacitive-reactive load component. This problem normally arises only during 400 cycle operation (or high line frequencies); reactive current for all standard FILTRON filters at 115 volts, 60 cycles is less than 2.5 amperes.



Correction Network Series No.	Used With Filtron No.
FSR-801 (a) (b) FSR-802 (a) (b) FSR-804 (a) (b) FSR-804 (a) (b) FSR-806 (a) (b) *	FSR-101, 102 FSR-103, 104 FSR-112 FSR-1201, 1202 FSR-1203 FSRW, X & Y Series
(a) See Application Listing (b) Case thickness: 16 ga. (.059); Terminals: 3/8-16 Threaded Stud * Requires design for specific unit.	



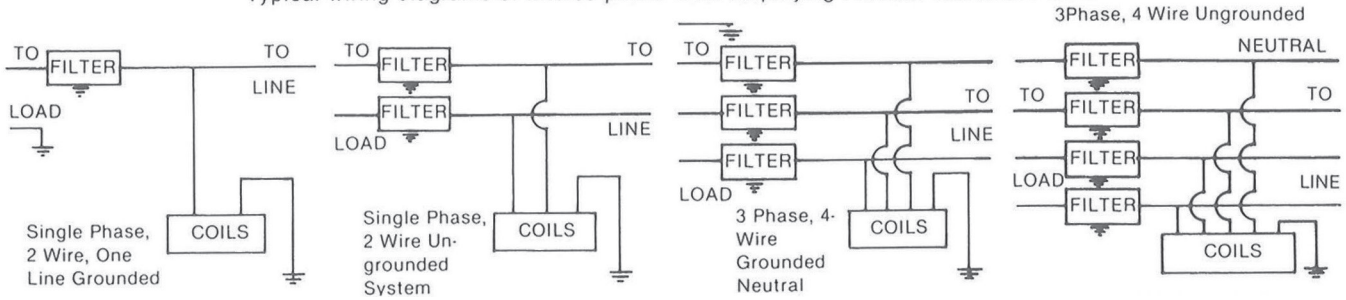
Application	No. of Terminals †	"A" Dimension
(1) Single-phase, 2-wire one line grounded	2	9
(2) Single-phase, 2-wire ungrounded system	3	9
(3) Three-phase, 4-wire neutral grounded	4	12
(4) Three-phase, 4-wire ungrounded neutral	5	16
† Including Ground Terminal		

Performance Characteristics of FSR-800 Series When Used with Typical FILTRON Filters

Uncorrected Reactive Current *	Reactive Current Corrected with FSR-800 Series
8 Amperes	1.5 Amperes
11 Amperes	1.5 Amperes
5 Amperes	**
19 Amperes	2.5 Amperes

* At 115 volts, 400 cycle power line frequency. For a single-phase 2-wire 115 VAC ungrounded line or three-phase 4-wire ungrounded system, the reactive current will be approximately half the above values.
** FSR-800 networks may also be supplied for these filters although their low reactive current does not normally require power factor correction.

Typical wiring diagrams of filtered power lines employing FSR-800 Correction Coils



INSTALLATION RECOMMENDATIONS FOR SHIELDED ROOM FILTERS

INSTALLATION & DESIGN CONSIDERATIONS FOR THE SUPPRESSION OF RFI-PRODUCING EQUIPMENT

Filtron's complete line of radio frequency interference suppression filters are designed for the sole purpose of minimizing conducted and radiated interference from power lines in which they are installed. To assure maximum effectiveness of any of these filters and to prevent equipment radiation - which power line filtering cannot eliminate - several important precautions must be observed.

- Contact surfaces between the filter and the interfering equipment induction heater, diathermy, etc., should be free of paint, corrosion, oil, anodize, or any other insulating finish or material so as to provide GOOD metal-to-metal contact with a resultant low RF ground impedance.
- Filter terminals which are connected to the equipment should be shielded to prevent coupling between the filter input and the output wires. Typical installations for various Filtron filter types are shown.
- Noise generating equipment should be bonded to a good earth ground; i.e. water pipe, power conduit, etc. This bonding should be done with copper straps using a minimum width-to-length ratio of 1:5.
- Mating surfaces between various parts of the equipment should be free of insulating finish - and preferably gasketed, using metal contact fingers or conducting gasket to prevent RF leakage from the seams. This continuous ground path is also necessary to assure a low RF impedance between the filter and earth ground.
- For very extreme and severe situations, where equipments generate extremely high radiated fields (diathermy apparatus, etc.) it may be necessary to shield the device completely by enclosing it with in a grounded shielded enclosure. The filters then would be mounted on the outside of the shielded enclosure with the power leads from the filter connected directly through the screen as illustrated.

HOW TO DETERMINE FILTER REQUIREMENTS FOR ANY CIRCUIT

When it becomes necessary to filter the single-phase AC circuits or 2-wire DC circuits, two filters will be required if both lines are ungrounded. Only one filter is required if one side of the line is grounded.

When filtering single-phase, 3-wire AC circuits, 3 filters will be required where the common neutral conductor is ungrounded. Only 2 filters are necessary when the common neutral is grounded. Three-phase, 4-wire systems with an ungrounded common neutral require 4 filters. Three-phase, 4-wire systems with a grounded common neutral need only 3 filters.

When filtering 3-phase systems, all ungrounded conductors must be filtered. For 3-phase, 3-wire systems without common neutral, 3 filters are necessary. Three-phase, 4-wire systems with a grounded common neutral need only 3 filters.

NOTE: When installing filters in ungrounded conductors, the voltage between the conductor and ground MUST NOT EXCEED THE VOLTAGE RATING OF THE FILTER.

TYPICAL SHIELDED ROOM INSTALLATION FOR POWERLINE SERIES FILTERS

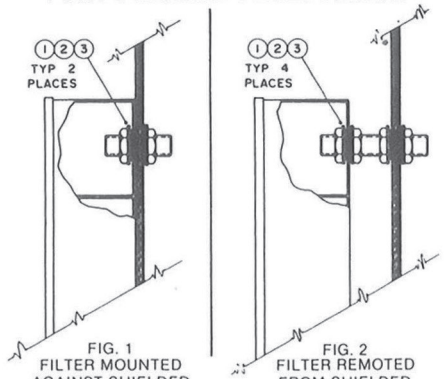


FIG. 1
FILTER MOUNTED AGAINST SHIELDED ENCLOSURE
1 — R.F. GASKET
2 — FLAT WASHER
3 — JAM NUT

FIG. 2
FILTER REMOTED FROM SHIELDED ENCLOSURE
1 — R.F. GASKET
2 — FLAT WASHER
3 — JAM NUT

TYPICAL SURFACE CABINET INSTALLATION ON SHIELDED ROOM POWER PANEL OF FILTRON FSR-300 SERIES FILTERS

TYPICAL SURFACE CABINET INSTALLATION ON SHIELDED ROOM POWER PANEL OF FILTRON FSR-600 SERIES FILTERS