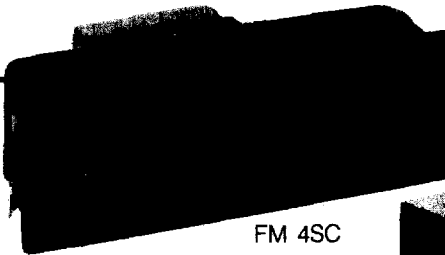


Power Entry Modules With Optional RFI Power Line Filters For General and Medical Applications

Patent No. 4,488,201



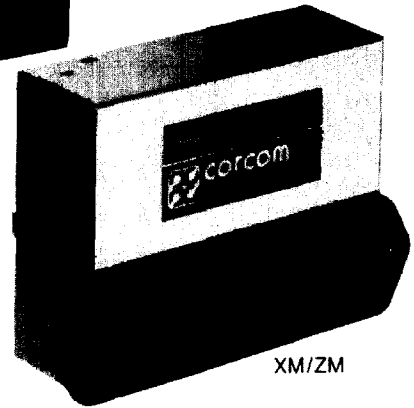
UL Recognized, CSA Certified, and VDE Approved.



FM 4SC



VM



XM/ZM

M Series

The M series power entry modules offers the most choices of power entry components and filtering options to fit a specific need. The fully configured M series expands the options of a manufacturer whose products are marketed worldwide. One component, fully assembled and tested, provides the capability of interfacing a multi-voltage power supply to any common voltage or fusing scheme in the world, without modification.

- The IEC connector provides an internationally accepted power entry termination, which can be used with a variety of line cords.
- The selectable fuse holder allows use of single or dual European fuses, or a single North American fuse.
- The optional DPST on/off switch breaks both sides of the line and is labeled with the international I/O markings.
- The optional voltage selector provides a convenient means to change transformer primary connections, and it is available in both 2-voltage and 4-voltage configurations.
- The series is available with four filter circuits to meet a variety of applications, and convenient connections are provided on unfiltered models to allow wiring of a separate RFI filter.

The M series is a family of components offering maximum flexibility and cost-effectiveness in the selection of primary power components. Wiring to the modules is accomplished via .110" faston terminals for labor savings and convenience.

The "C" suffix models of the M Series denote snap in design for front mounting in panel thickness of .06 - .09.

Four filter circuits provide a choice of attenuation tailored to specific categories of susceptibility and emissions needs.

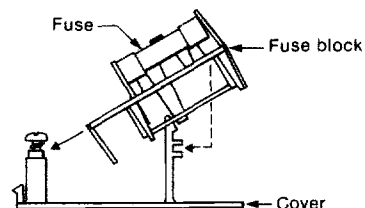
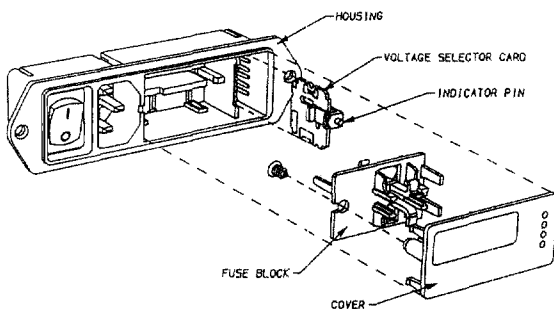
HM Models – This medical filter provides susceptibility protection without the leakage current associated with line-to-ground capacitors. Designed to allow equipment to meet UL544 for patient care and nonpatient care equipment, the HM filter has a maximum leakage current of 2 μ A at 120 VAC 60 Hz. See Appendix D for more information on medical applications and UL standards.

FM Models – General purpose RFI filter designed for susceptibility applications, effectively providing RFI control of line-to-ground noise. The design is compact and meets the very low leakage current requirements of SEV and VDE portable equipment as well as (120 Volt) UL544 nonpatient medical equipment.

XM Models – High performance RFI filter designed to bring most digital equipment (including switching power supplies) into compliance with FCC Part 15J, Class B conducted emissions limits.

ZM Models – Premium RFI filter designed to bring most digital equipment (including switching power supplies) into compliance with VDE 0871, Level B (as well as FCC Part 15J, Class B) conducted emissions limits.

Fuse Block/Cover Assembly



To change from North American to European fusing: open cover, using small blade screwdriver or similar tool; loosen Phillips screw 2 turns; remove fuse block by sliding up, then away from Phillips screw and lifting up from pedestal; change fuses (note that two European fuses are required, although a dummy fuse may be used in the neutral [lower] holder); invert fuse block and slide back onto Phillips screw and pedestal; tighten Phillips screw, and replace cover (note that fuse(s) that go into the housing first are the active set.)

M Series

Unfiltered Models

Part Number	Current Rating @ 120 V Amps	Current Rating @ 250 V (Amps)	Available Voltage Selection Position*	DPST On/Off Switch	Mounting Style	Fuse Holder Type	Unit Price
6VM1	6	6	1	—	Flange	Selectable	\$14.85
6VM1C	6	6	1	—	Snap-in	Selectable	\$15.77
6VM1S	6	4	1	•	Flange	Selectable	\$18.74
6VM1SC	6	4	1	•	Snap-in	Selectable	\$19.65
6VM2	6	6	2	—	Flange	Selectable	\$17.97
6VM2S	6	6	2	•	Flange	Selectable	\$21.86
6VM4	6	6	4	—	Flange	Selectable	\$17.97
6VM4C	6	6	4	—	Snap-in	Selectable	\$18.86
6VM4S	6	4	4	•	Flange	Selectable	\$21.86
6VM4SC	6	4	4	•	Snap-in	Selectable	\$22.78

* 1 - 120V/240V Fixed 2 - 120V/240V Selectable 4 - 100V, 120V, 230V, 240V Selectable

• Includes DPST switch

Filtered Models

Part Number	RFI Filter Type	Current Rating @ 120 V (Amps)	Current Rating @ 250 V (Amps)	Available Voltage Selection Position*	DPST On/Off Switch	Mounting Style	Fuse Holder Type	Unit Price
5EHM1	Medical ¹	5	4	1	—	Flange	Selectable	\$23.89
5EHM1S	Medical ¹	5	4	1	•	Flange	Selectable	\$27.81
5EHM4	Medical ¹	5	4	4	—	Flange	Selectable	\$27.00
5EHM4S	Medical ¹	5	4	4	•	Flange	Selectable	\$30.93
5EFM1	General Purpose ²	5	4	1	—	Flange	Selectable	\$23.42
5EFM1C	General Purpose ²	5	4	1	—	Snap-in	Selectable	\$24.35
5EFM1S	General Purpose ²	5	4	1	•	Flange	Selectable	\$27.32
5EFM1SC	General Purpose ²	5	4	1	•	Snap-in	Selectable	\$28.23
5EFM4	General Purpose ²	5	4	4	—	Flange	Selectable	\$26.55
5EFM4C	General Purpose ²	5	4	4	—	Snap-in	Selectable	\$27.47
5EFM4S	General Purpose ²	5	4	4	•	Flange	Selectable	\$30.47
5EFM4SC	General Purpose ²	5	4	4	•	Snap-in	Selectable	\$31.39
3EXM1S	SMPS FCC-B ³	3	2	1	•	Flange	Selectable	\$39.86
3EXM4	SMPS FCC-B ³	3	2	4	—	Flange	Selectable	\$39.09
3EXM4S	SMPS FCC-B ³	3	2	4	•	Flange	Selectable	\$43.02
3EZM1S	SMPS VDE-B ⁴	3	2	1	•	Flange	Selectable	\$45.46
3EZM4	SMPS VDE-B ⁴	3	2	4	—	Flange	Selectable	\$44.66
3EZM4S	SMPS VDE-B ⁴	3	2	4	•	Flange	Selectable	\$48.71

1 Medical filter for very low leakage UL 544 health care requirements.

2 General purpose filter for susceptibility applications.

3 Emissions filter for switching power supply applications where FCC-B level requirements must be met.

4 Emissions filter for switching power supply applications where VDE-B level requirements must be met.

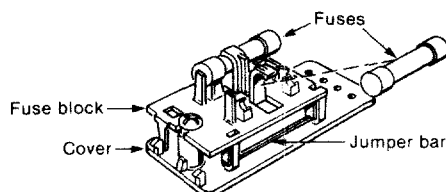
Refer to catalog page 75 for more information on available RFI filter types.

* 1 - 120V/240V Fixed 4 - 100V, 120V, 230V, 240V Selectable

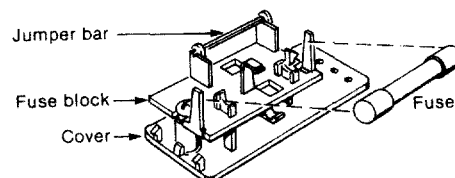
• Includes DPST switch

Fuse Changing

European Fusing Arrangement



North American Fusing Arrangement



Specifications – Unfiltered Models

Hipot rating (one minute):
 line-to-ground, 1500 VAC
 line-to-line 1450 VDC
 line-to-load (switch off) 2500 VAC

Operating voltages: 100, 120, 230, 240 VAC

Operating frequencies: 50/60/400 Hz

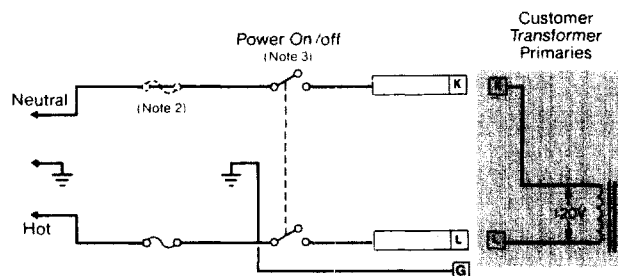
Switch: Double-insulated, rated for 100,000 operations at full load.
 10,000 operations at 70 amps inrush current.

Fuse (not included): Reversible fuse holder accepts one 1/4 x 1 1/4" fuse or two 5 x 20mm fuses

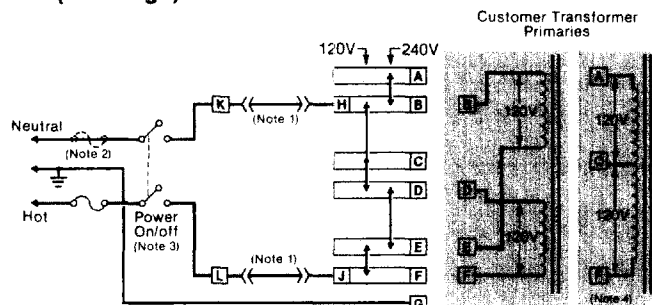
Terminals: .110" (2.79mm) fastons

Electrical Schematics – Unfiltered Models

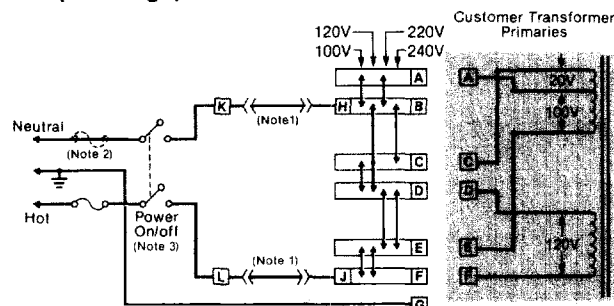
VM (1-Voltage)



VM (2-Voltage)



VM (4-Voltage)



Note 1: Jumpers required if no input filter is used.
 Note 2: Provision for dual European style fusing.
 Note 3: On/Off switch present only with "S" suffix.
 Note 4: When using a center-tapped transformer, the C-F winding should be the low voltage (high current) winding and must be capable of handling the full primary current in the 120V position.

Specifications – Filtered Models

Maximum leakage current, each line-to-ground
 @ 120 VAC 60 Hz: HM Models 2 μ A
 FM Models 0.25 mA
 XM/ZM Models 0.30 mA

@ 250 VAC 50 Hz: HM Models 5 μ A
 FM/XM/ZM Models 0.50 mA

Hipot rating (one minute):
 line-to-ground HM Models 1500 VAC
 FM/XM/ZM 1500 VAC
 line-to-line All Models 1450 VDC

Operating voltages: 100, 120, 230, 240 VAC

Operating frequency: 50/60 Hz

Rated voltage: 120/250 VAC

Switch: Double-insulated, rated for 100,000 operations at full load.
 10,000 operations at 70 amps inrush current.

Fuse (not included): Reversible fuse holder accepts one 1/4 x 1 1/4" fuse or two 5 x 20mm fuses

Terminals: .110" (2.79mm) fastons

Minimum Insertion Loss in dB:

Line-to-ground in 50 ohm circuit

Frequency MHz	HM 5A	FM 5A	XM 3A	ZM 3A
.01	—	—	2	15
.05	—	—	13	29
.15	14	14	23	39
.50	18	21	40	46
1.0	19	26	46	43
5.0	22	40	44	40
10.0	22	45	44	40
30.0	17	40	44	40

Line-to-line in 50 ohm circuit

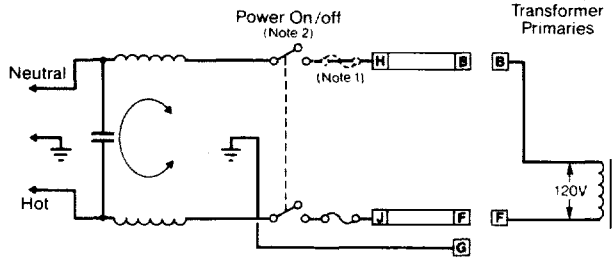
Frequency MHz	XM 3A	ZM 3A
.02	—	5
.03	—	13
.05	—	28
.07	5	37
.15	34	55
.50	62	75
1.0	68	75
5.0	60	62
10.0	50	54
30.0	40	44

230V Nomenclature relates to pending European CENELEC agreement

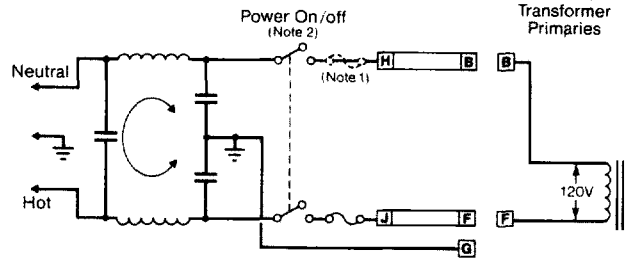
M Series

Electrical Schematics – Filtered Models

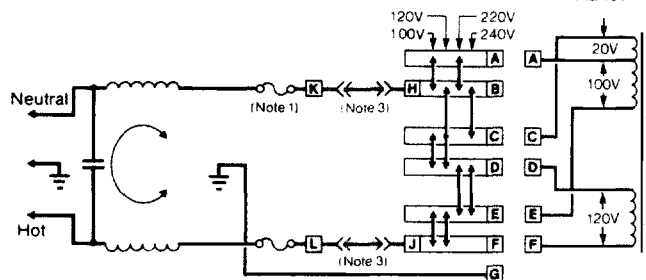
HM (1-Voltage)



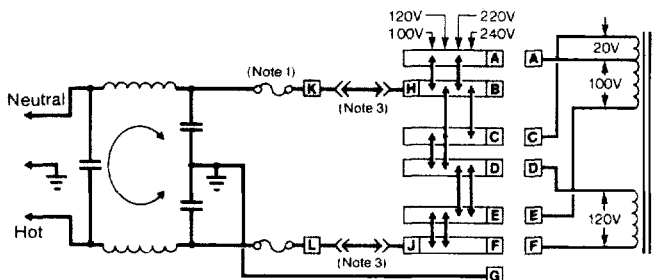
FM (1-Voltage)



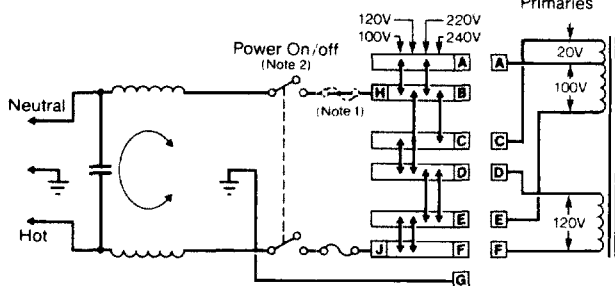
HM (4-Voltage Without Switch)



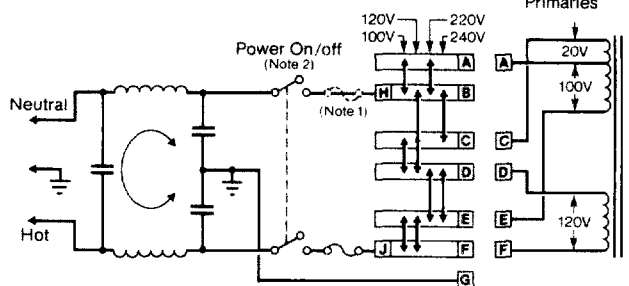
FM (4-Voltage Without Switch)



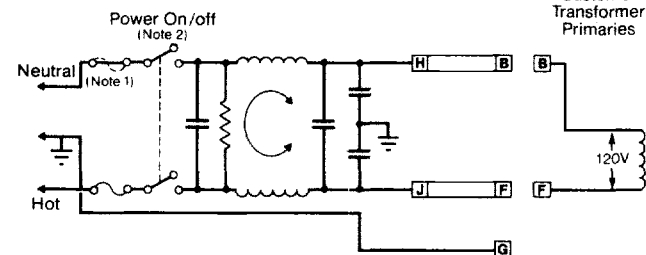
HM (4-Voltage With Switch)



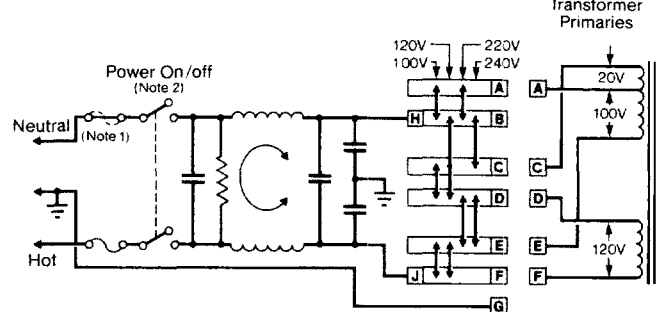
FM (4-Voltage With Switch)



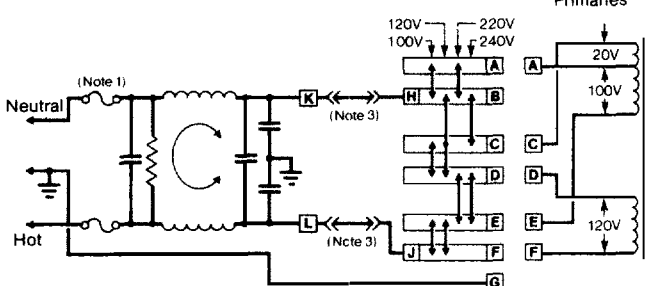
XM & ZM (1-Voltage)



XM & ZM (4-Voltage With Switch)



XM & ZM (4-Voltage Without Switch)



Note 1: Provision for dual European style fusing.

Note 2: On/Off switch present only with "S" suffix.

Note 3: Models HM4, FM4, XM4, and ZM4 have added terminals K and L. External switch or jumper must be placed from K to H and L to J.

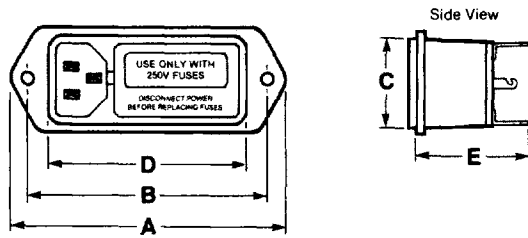
230V Nomenclature relates to pending European CENELEC agreement

Case Styles – Unfiltered Models

Metric shown in italics.

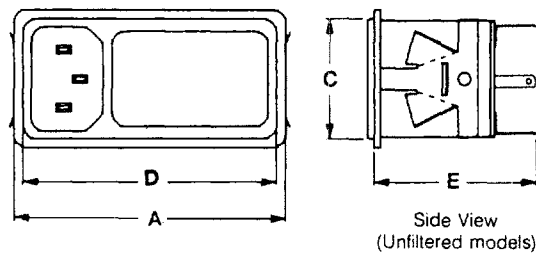
6VM1

IEC Connector, Selectable Fuse Holder



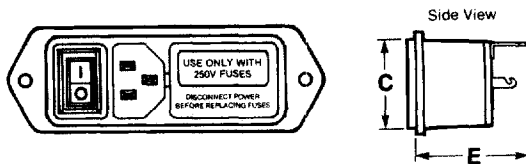
6VM1C / 5EF1C

IEC Connector, Selectable Fuse Holder, Snap-In



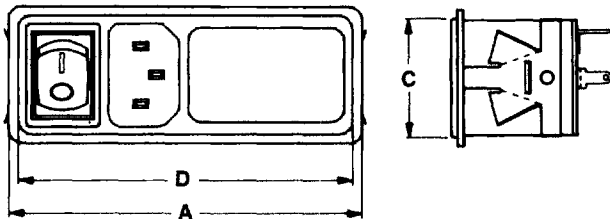
6VM1S

IEC Connector, DPST On/Off Switch, Selectable Fuse Holder

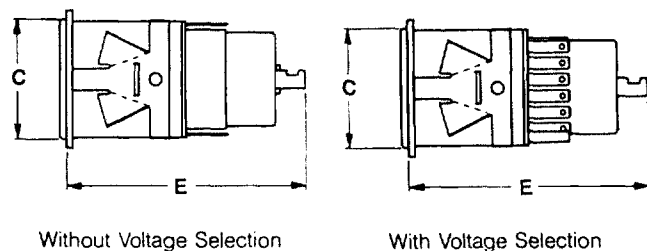


6VM1SC / 5EFM1SC

IEC Connector, DPST On/Off Switch, Selectable Fuse Holder, Snap-In

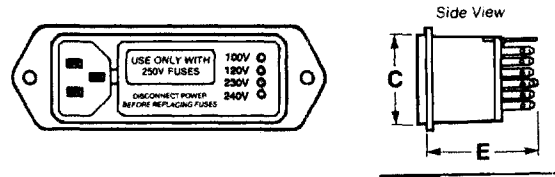


Side View (filtered models)



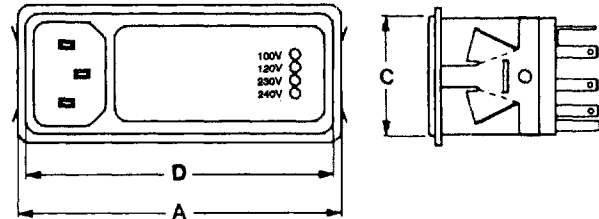
6VM2 & 6VM4

IEC Connector, Voltage Selection, Selectable Fuse Holder



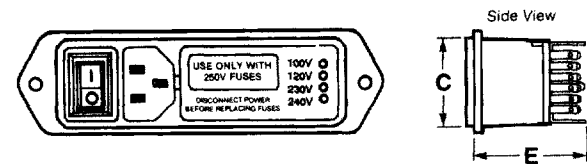
6VM4C / 5EFM4C

IEC Connector, Voltage Selection, Selectable Fuse Holder, Snap-In



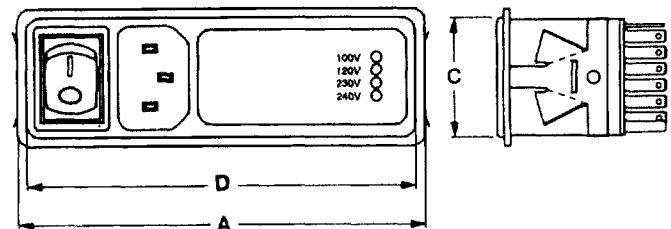
6VM2S & 6VM4S

IEC Connector, DPST On/Off Switch, Voltage Selection, Selectable Fuse Holder

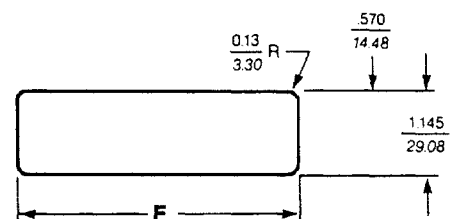


6VM4SC / 5EFM4SC

IEC Connector, DPST On/Off Switch, Voltage Selection, Selectable Fuse Holder, Snap-In



Recommended Panel Cutout Snap-In Only



All mounting holes countersunk.

M Series

Case Dimensions — Unfiltered Models

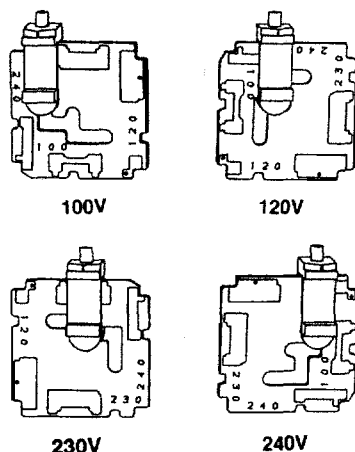
Metric Shown in *italics*.

Part No.	A (max)	B ± 0.01 ± 0.25	C (max)	D (max)	E (max)	F (max)
6VM1	<u>3.39</u> 86.1	<u>2.84</u> 72.1	<u>1.14</u> 29.0	<u>2.44</u> 62.0	<u>1.45</u> 36.8	<u>2.50</u> 63.5
6VM1C	<u>2.56</u> 65.0	—	<u>1.14</u> 29.0	<u>2.44</u> 62.0	<u>1.45</u> 36.8	<u>2.50</u> 63.2
6VM1S	<u>4.17</u> 105.9	<u>3.62</u> 91.9	<u>1.14</u> 29.0	<u>3.22</u> 81.8	<u>1.45</u> 36.8	<u>3.28</u> 83.3
6VM1SC	<u>3.34</u> 84.8	—	<u>1.14</u> 29.0	<u>3.27</u> 83.1	<u>1.45</u> 36.8	<u>3.27</u> 83.1
6VM2	<u>3.88</u> 98.6	<u>3.32</u> 84.3	<u>1.14</u> 29.0	<u>2.92</u> 74.2	<u>1.45</u> 36.8	<u>2.98</u> 75.7
6VM4	<u>3.88</u> 98.6	<u>3.32</u> 84.3	<u>1.14</u> 29.0	<u>2.92</u> 74.2	<u>1.45</u> 36.8	<u>2.98</u> 75.7
6VM4C	<u>3.04</u> 77.2	—	<u>1.14</u> 29.0	<u>2.92</u> 74.2	<u>1.45</u> 36.8	<u>2.97</u> 75.4
6VM2S	<u>4.65</u> 118.1	<u>4.10</u> 104.1	<u>1.14</u> 29.0	<u>3.72</u> 94.5	<u>1.45</u> 36.8	<u>3.76</u> 95.5
6VM4S	<u>4.65</u> 118.1	<u>4.10</u> 104.1	<u>1.14</u> 29.0	<u>3.72</u> 94.5	<u>1.45</u> 36.8	<u>3.76</u> 95.5
6VM4SC	<u>3.82</u> 97.0	—	<u>1.14</u> 29.0	<u>3.7</u> 94.0	<u>1.45</u> 36.8	<u>3.75</u> 95.3

Voltage Selection

To change selected voltage: open cover, using small blade screwdriver or similar tool; set aside cover/fuse block assembly; pull voltage selector card straight out of housing, using indicator pin; orient selector card so that desired voltage is readable at the bottom; orient indicator pin to point up when desired voltage is readable at bottom (note that when indicator pin is fixed, successive voltages are selected by rotating the card 90° clockwise); insert voltage selector card into housing, *printed side of card facing toward IEC connector*, and edge containing the desired voltage first; replace cover, and verify that indicator pin shows the desired voltage.

Voltage Selector Card Orientation

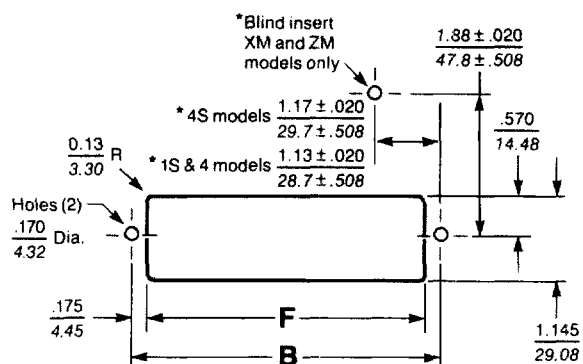


Case Dimensions — Filtered Models

Metric Shown in *italics*.

Part No.	A (max)	B (max)	C (max)	D (max)	E (max)	F (max)	G ± 0.020 ± 0.508
5EFM1	<u>3.39</u> 86.1	<u>2.84</u> 72.1	<u>1.14</u> 29.0	<u>2.44</u> 62.0	<u>2.19</u> 55.6	<u>2.50</u> 63.5	—
5EHM1	<u>3.39</u> 86.1	<u>2.84</u> 72.1	<u>1.14</u> 29.0	<u>2.44</u> 62.0	<u>2.19</u> 55.6	<u>2.50</u> 63.5	—
5EFM1C	<u>2.56</u> 65.0	—	<u>1.14</u> 29.0	<u>2.44</u> 62.0	<u>2.19</u> 55.6	<u>2.49</u> 63.2	—
5EHM1C	<u>2.56</u> 65.0	—	<u>1.14</u> 29.0	<u>2.44</u> 62.0	<u>2.19</u> 55.6	<u>2.49</u> 63.2	—
5EFM1S	<u>4.17</u> 105.9	<u>3.62</u> 91.9	<u>1.14</u> 29.0	<u>3.22</u> 81.8	<u>2.19</u> 55.6	<u>3.28</u> 83.3	—
5EHM1S	<u>4.17</u> 105.9	<u>3.62</u> 91.9	<u>1.14</u> 29.0	<u>3.22</u> 81.8	<u>2.19</u> 55.6	<u>3.28</u> 83.3	—
5EFMISC	<u>3.34</u> 84.8	—	<u>1.14</u> 29.0	<u>3.27</u> 83.1	<u>2.19</u> 55.6	<u>3.27</u> 83.1	—
5EHMISC	<u>3.34</u> 84.8	—	<u>1.14</u> 29.0	<u>3.27</u> 83.1	<u>2.19</u> 55.6	<u>3.27</u> 83.1	—
5EFM4	<u>3.88</u> 98.6	<u>3.32</u> 84.3	<u>1.14</u> 29.0	<u>2.92</u> 74.2	<u>2.19</u> 55.6	<u>2.98</u> 75.7	—
5EHM4	<u>3.88</u> 98.6	<u>3.32</u> 84.3	<u>1.14</u> 29.0	<u>2.92</u> 74.2	<u>2.19</u> 55.6	<u>2.98</u> 75.7	—
5EFM4C	<u>3.04</u> 77.2	—	<u>1.14</u> 29.0	<u>2.92</u> 74.2	<u>2.19</u> 55.6	<u>2.97</u> 75.4	—
5EHM4C	<u>3.04</u> 77.2	—	<u>1.14</u> 29.0	<u>2.92</u> 74.2	<u>2.19</u> 55.6	<u>2.97</u> 75.4	—
5EFM4S	<u>4.65</u> 118.1	<u>4.10</u> 104.1	<u>1.14</u> 29.0	<u>3.70</u> 94.0	<u>2.19</u> 55.6	<u>3.76</u> 95.5	—
5EHM4S	<u>4.65</u> 118.1	<u>4.10</u> 104.1	<u>1.14</u> 29.0	<u>3.70</u> 94.0	<u>2.19</u> 55.6	<u>3.76</u> 95.5	—
5EFM4SC	<u>3.82</u> 97.0	—	<u>1.14</u> 29.0	<u>3.70</u> 94.0	<u>2.19</u> 55.6	<u>3.75</u> 95.3	—
5EHM4SC	<u>3.82</u> 97.0	—	<u>1.14</u> 29.0	<u>3.70</u> 94.0	<u>2.19</u> 55.6	<u>3.75</u> 95.3	—
3EXM1S	<u>4.17</u> 105.9	<u>3.62</u> 91.9	<u>1.14</u> 29.0	<u>3.22</u> 81.8	<u>1.72</u> 43.7	<u>3.28</u> 83.3	<u>3.30</u> 83.8
3EZM1S	<u>4.17</u> 105.9	<u>3.62</u> 91.9	<u>1.14</u> 29.0	<u>3.22</u> 81.8	<u>1.72</u> 43.7	<u>3.28</u> 83.3	<u>3.30</u> 83.8
3EXM4	<u>3.88</u> 98.6	<u>3.32</u> 84.3	<u>1.14</u> 29.0	<u>2.92</u> 74.2	<u>1.72</u> 43.7	<u>2.98</u> 75.7	<u>2.99</u> 75.9
3EZM4	<u>3.88</u> 98.6	<u>3.32</u> 84.3	<u>1.14</u> 29.0	<u>2.92</u> 74.2	<u>1.72</u> 43.7	<u>2.98</u> 75.7	<u>2.99</u> 75.9
3EXM4S	<u>4.65</u> 118.1	<u>4.10</u> 104.1	<u>1.14</u> 29.0	<u>3.72</u> 94.5	<u>1.72</u> 43.7	<u>3.76</u> 95.5	<u>3.80</u> 96.5
3EZM4S	<u>4.65</u> 118.1	<u>4.10</u> 104.1	<u>1.14</u> 29.0	<u>3.72</u> 94.5	<u>1.72</u> 43.7	<u>3.76</u> 95.5	<u>3.80</u> 96.5

Recommended Panel Cutout



NOTE: Snap-in models allow front mount only.
XM and ZM models allow for back mount only.
FM and HM allow front or back mounting.

Accessories for M series include interconnection assembly, medical standoff bracket, voltage selector cards, and insulating shroud. See page 107.

All mounting holes countersunk.

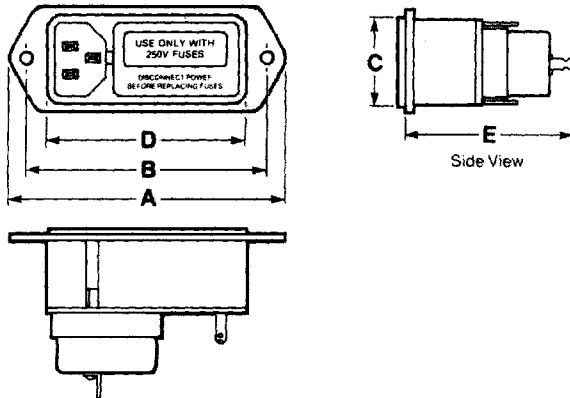
Libertyville, IL (847) 680-7400

Case Styles – Filtered Models

Metric shown in *italics*.

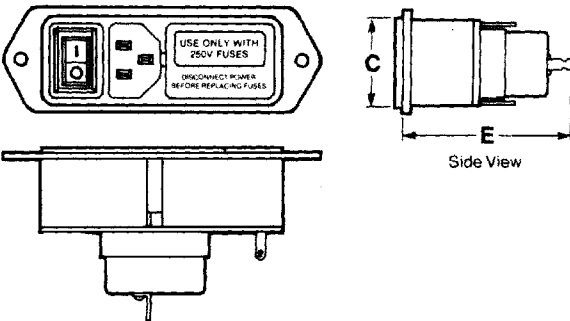
5EHM1 & 5EFM1

IEC Connector, Selectable Fuse Holder



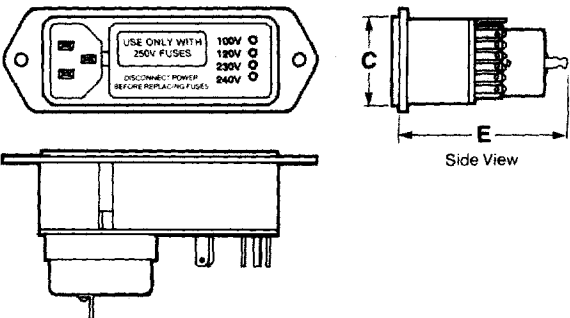
5EHM1S & 5EFM1S

IEC Connector, DPST On/Off Switch, Selectable Fuse Holder



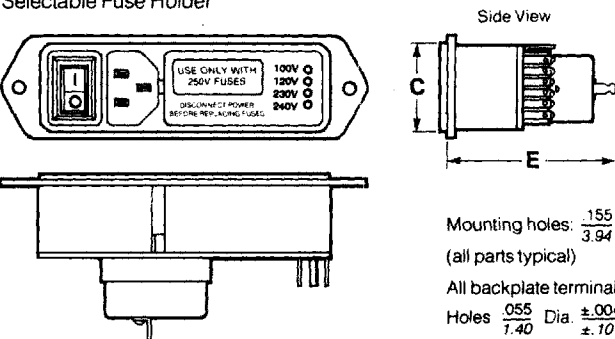
5EHM4 & 5EFM4

IEC Connector, Voltage Selection, Selectable Fuse Holder



5EHM4S & 5EFM4S

IEC Connector, DPST On/Off Switch, Voltage Selection, Selectable Fuse Holder



Mounting holes: $\frac{.155}{3.94}$ Dia.
(all parts typical)

All backplate terminals: $\frac{.110}{2.79}$ fastons.

Holes $\frac{.055}{1.40}$ Dia. $\pm .004$ except solder lug ground tab with wire wrap.

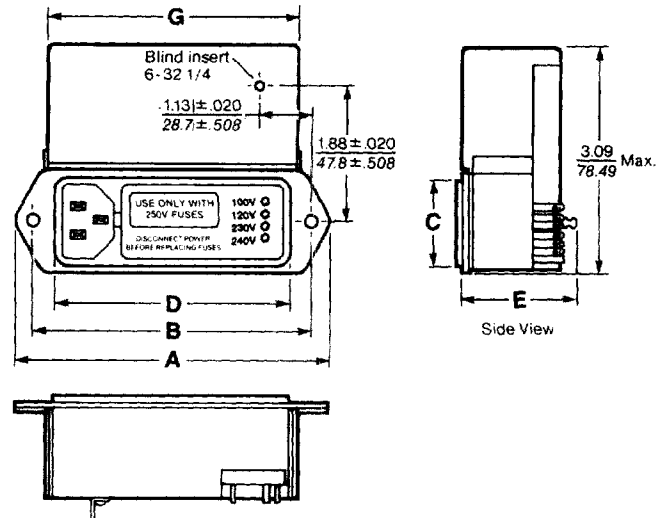
Note: Mounting holes on tabs are countersunk and take a #6 flat-head screw.

Case Styles – Filtered Models

Metric shown in *italics*.

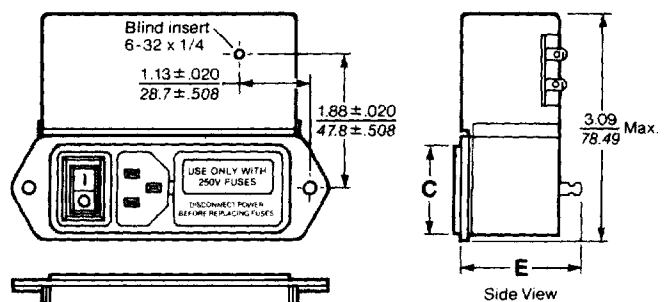
3EXM4 & 3EZM4

IEC Connector, Voltage Selection, Selectable Fuse Holder



3EXM1S & 3EZM1S

IEC Connector, DPST On/Off Switch, Selectable Fuse Holder



3EXM4S & 3EZM4S

IEC Connector, DPST On/Off Switch, Voltage Selection, Selectable Fuse Holder

