

# Multi-stage EMI Filter with Excellent Attenuation Performance



- Rated currents from 1 to 30 A
- Two-stage filter
- Very high differential and common-mode attenuation
- Optional medical versions (B type)
- Optional safety versions (A type)
- Optional overvoltage protection (Z type)



### Performance indicators



### Technical specifications

<b>Operating voltage</b>	110/250 VAC, 50/60 Hz
<b>Operating frequency</b>	dc to 400 Hz
<b>Rated currents</b>	1 to 30 A @ 40 °C max.
<b>High potential test voltage</b>	P → PE 2000 VAC for 2 sec (standard types) P → N 1100 VDC for 2 sec P → PE 2500 VAC for 2 sec (B types)
<b>Design corresponding to</b>	UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939
<b>Flammability corresponding to</b>	UL 94 V-2 or better
<b>Surge pulse protection (optional)</b>	2 kV, IEC 61000-4-5
<b>MTBF @ 40°C/230V (Mil-HB-217F)</b>	1,300,000 hours (1 to 10 A types) 1,100,000 hours (12 A types) 517,000 hours (16 and 30 A types)
<b>Temperature range (operation and storage)</b>	-25 °C to +100 °C (25/100/21)

### Approvals



### Features and benefits

FN 2090 two-stage filters are designed for easy and fast chassis mounting.

The FN 2090 filters are also available as B versions with no Y-capacitors for medical applications as well as A versions with low capacitance for safety critical applications with a requirement for low leakage currents.

All filters provide an exceptional conducted attenuation performance, based on chokes with high permeable core material and excellent thermal behavior.

FN 2090 two-stage filters are designed for noisy applications requiring excellent filter performance.

The higher inductivity versus amperage offers increased attenuation performance with the same form factor compared to FN 2060 and FN 2080 filter series.

All FN 2090 filters can be delivered with optional surge pulse protection.

FN 2090 filters are also available as singlestage filters (FN 2030 series).

Various terminal options allow you to select the desired connection style.

### Typical applications

- Electrical and electronic equipment
- Consumer goods
- Household equipment
- Building automation
- Industrial applications
- Machinery
- Medical equipment
- Electronic data processing equipment
- Office automation and datacom equipment
- Various noisy applications requiring high filter performance

### Typical electrical schematic

□

### Filter selection table

Filter*	Rated current @ 40 °C (25 °C) [A]	Leakage current** @ 230V AC/50 Hz [mA]	Inductance L [mH]	Capacitance			Resistance R [kΩ]	Input/Output connections		Weight [g]
				Cx [μF]	Cy [nF]	Cy1 [nF]				
FN 2090-1-..	1 (1.1)	0.5	20	0.22	2.2	1.0	680	-06	-07	73
FN 2090-3-..	3 (3.4)	0.5	14	0.33	2.2	1.0	470	-06	-07	158
FN 2090-4-..	4 (4.5)	0.5	14	0.33	2.2	1.0	470	-06	-07	176
FN 2090-6-..	6 (6.7)	0.67	8	0.47	3.3	1.0	330	-06	-07	191
FN 2090-8-..	8 (8.9)	0.67	8	0.47	3.3	1.0	330	-06	-07	330
FN 2090-10-..	10 (11.2)	0.67	8	0.47	3.3	1.0	330	-06	-07	369
FN 2090-12-..	12 (13.4)	1.02	4	1	10	1.0	220	-06	-07	391
FN 2090-16-..	16 (17.9)	1.02	4	1	10	1.0	220	-06	-07	425
FN 2090-20-..	20 (22.4)	1.02	2.7	1	10	1.0	220	-06	-08	530
FN 2090-30-08	30 (33.5)	1.02	1.5	1	10	1.0	220		-08	548
FN 2090A-1-..	1 (1.1)	0.08	20	0.22	0.47	0.47	680	-06	-07	73
FN 2090A-3-..	3 (3.4)	0.08	14	0.33	0.47	0.47	470	-06	-07	158
FN 2090A-4-..	4 (4.5)	0.08	14	0.33	0.47	0.47	470	-06	-07	176
FN 2090A-6-..	6 (6.7)	0.08	8	0.47	0.47	0.47	330	-06	-07	191
FN 2090A-8-..	8 (8.9)	0.08	8	0.47	0.47	0.47	330	-06	-07	330
FN 2090A-10-..	10 (11.2)	0.08	8	0.47	0.47	0.47	330	-06	-07	369
FN 2090A-12-..	12 (13.4)	0.08	4	1	0.47	0.47	220	-06	-07	391
FN 2090A-16-..	16 (17.9)	0.08	4	1	0.47	0.47	220	-06	-07	425
FN 2090A-20-..	20 (22.4)	0.08	2.7	1	0.47	0.47	220	-06	-08	530
FN 2090B-1-..	1 (1.1)	0.002	20	0.22			680	-06	-07	73
FN 2090B-3-..	3 (3.4)	0.002	14	0.33			470	-06	-07	158
FN 2090B-4-..	4 (4.5)	0.002	14	0.33			470	-06	-07	176
FN 2090B-6-..	6 (6.7)	0.002	8	0.47			330	-06	-07	191
FN 2090B-8-..	8 (8.9)	0.002	8	0.47			330	-06	-07	330
FN 2090B-10-..	10 (11.2)	0.002	8	0.47			330	-06	-07	369
FN 2090B-12-..	12 (13.4)	0.002	4	1			220	-06	-07	391
FN 2090B-16-..	16 (17.9)	0.002	4	1			220	-06	-07	425
FN 2090B-20-..	20 (22.4)	0.002	2.7	1			220	-06	-08	530
FN 2090B-30-08	30 (33.5)	0.002	1.5	1			220		-08	548

\*\* To compile a complete part number, please replace the -.. with the required I/O connection style.

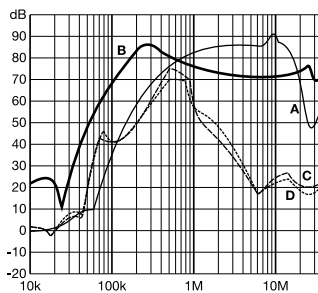
For surge pulse protection, please add Z (e.g. FN 2090Z-10-06, FN 2090BZ-20-08).

\*\* Maximum leakage under normal operating conditions. Note: if the neutral line is interrupted, worst case leakage could reach twice this level.

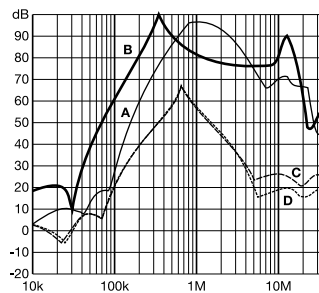
### Typical filter attenuation

Per CISPR 17; A = 50 Ω/50 Ω sym; B = 50 Ω/50 Ω asym; C = 0.1 Ω/100 Ω sym; D = 100 Ω/0.1 Ω sym

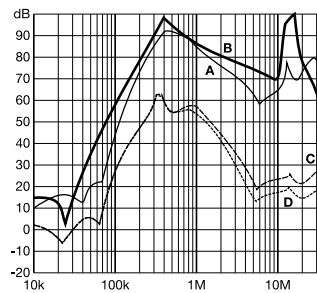
1 to 4 A types



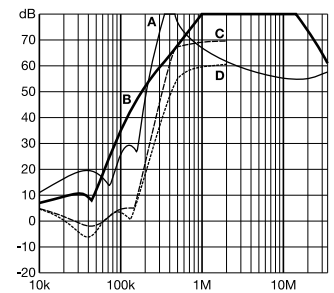
6 to 10 A types



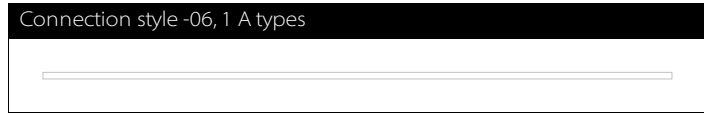
12 to 20 A types



30 A types



## Mechanical data



## Dimensions

	1 A	3 A	4 A	6 A	8 A	10 A	12 A	16 A	20 A	30 A	Tolerances
<b>A</b>	71	85	85	85	113.5 ±1	113.5 ±1	113.5 ±1	113.5 ±1	113.5 ±1	113.5 ±1	±0.5
<b>B</b>	46.6	54	54	54	57.5 ±1	57.5 ±1	57.5 ±1	57.5 ±1	57.5 ±1	57.5 ±1	±0.5
<b>C</b>	22.3	30.3	30.3	30.3	45.4 ±1	45.4 ±1	45.4 ±1	45.4 ±1	45.4 ±1	45.4 ±1	±0.5
<b>D</b>	50.5	64.8	64.8	64.8	94 ±1	94 ±1	94 ±1	94 ±1	94 ±1	94 ±1	±0.5
<b>E</b>	44.5	49.8	49.8	49.8	56	56	56	56	56	56	±0.5
<b>F</b>	61	75	75	75	103	103	103	103	103	103	±0.3
<b>G</b>	21	27	27	27	25	25	25	25	25	25	±0.2
<b>H</b>	10.8	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	±0.5
<b>I</b>	16.8	20.8	20.8	20.8	32.4	32.4	32.4	32.4	32.4	32.4	±0.5
<b>J</b>	25.25	19.9	19.9	19.9	15.5	15.5	15.5	15.5	15.5	15.5	±0.5
<b>K</b>	5.3	5.3	5.3	5.3	4.4	4.4	4.4	4.4	4.4	4.4	
<b>L</b>	6.3	6.3	6.3	6.3	6	6	6	6	6	6	
<b>M</b>	0.7	0.7	0.7	0.7	0.9	0.9	0.9	0.9	0.9	0.9	
<b>Connection style -06</b>											
<b>N</b>	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	
<b>Connection style -07</b>											
<b>O</b>	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.4			±0.5
<b>P</b>	14	14.9	14.9	14.9	18	18	18	18			±0.5
<b>AWG type wire</b>	AWG 20	AWG 20	AWG 20	AWG 18	AWG 18	AWG 18	AWG 16	AWG 16			
<b>Wire length</b>	140	140	140	140	140	140	140	140			
<b>Connection style -08</b>											
<b>N</b>									M4	M4	

All dimensions in mm; 1 inch = 25.4 mm  
Tolerances according: ISO 2768-m / EN 22768-m

Please visit [www.schaffner.com](http://www.schaffner.com) to find more details on filter connectors.

## Headquarters, global innovation and development center

### Switzerland

#### Schaffner Group

Nordstrasse 11  
4542 Luterbach  
T +41 32 6816 626  
F +41 32 6816 630  
[info@schaffner.com](mailto:info@schaffner.com)  
<http://www.schaffner.com>

## Sales and application centers

### China

#### Schaffner EMC Ltd. Shanghai

T20-3, No 565 Chuangye Road  
Pudong New Area  
201201 Shanghai  
T +86 21 3813 9500  
F +86 21 3813 9501 / 02  
[cschina@schaffner.com](mailto:cschina@schaffner.com)  
<http://www.schaffner.com.cn/>

### Finland

#### Schaffner Oy

Sauvonrinne 19 H  
08500 Lohja  
T +358 19 35 72 71  
[finlandsales@schaffner.com](mailto:finlandsales@schaffner.com)

### France

#### Schaffner EMC S.A.S.

112 Quai de Bezons  
Boîte postale 133  
95100 Argenteuil  
T +33 1 34 34 30 60  
F +33 1 39 47 02 28  
[francesales@schaffner.com](mailto:francesales@schaffner.com)

### Germany

#### Schaffner Deutschland GmbH

Schoemperlenstrasse 12B  
76185 Karlsruhe  
T +49 721 56910  
F +49 721 569110  
[germanysales@schaffner.com](mailto:germanysales@schaffner.com)

### Italy

#### Schaffner EMC S.r.l.

Via Galileo Galilei 47  
20092 Cinisello Balsamo (MI)  
T +39 02 66 04 30 45/47  
F +39 02 61 23 943  
[italysales@schaffner.com](mailto:italysales@schaffner.com)

### Japan

#### Schaffner EMC K.K.

1-32-12, Kamiyama, Setagaya-ku  
7F Mitsui-seimei Sangenjaya Bldg.  
154-0011 Tokyo  
T +81 3 5712 3650  
F +81 3 5712 3651  
[japansales@schaffner.com](mailto:japansales@schaffner.com)  
<http://www.schaffner.jp>

### Singapore

#### Schaffner EMC Pte Ltd.

Blk 3015A Ubi Road 1  
05-09 Kampong Ubi Industrial Estate  
408705 Singapore  
T +65 6377 3283  
F +65 6377 3281  
[singaporesales@schaffner.com](mailto:singaporesales@schaffner.com)

### Spain

#### Schaffner EMC España

Calle Caléndula 93, Miniparc III, Edificio E,  
Alcobendas  
Miniparc III, Edificio E  
El Soto de la Moraleja  
Alcobendas  
28109 Madrid  
M +34 618 176 133  
T +34 917 912 900  
F +34 917 912 901  
[spainsales@schaffner.com](mailto:spainsales@schaffner.com)

### Sweden

#### Schaffner EMC AB

Turebergstorg 1, 6  
19147 Sollentuna  
T +46 8 5792 1121 / 22  
F +46 8 92 96 90  
[swedensales@schaffner.com](mailto:swedensales@schaffner.com)

### Switzerland

#### Schaffner EMV AG

Nordstrasse 11  
4542 Luterbach  
T +41 32 6816 626  
F +41 32 6816 641  
[sales@schaffner.ch](mailto:sales@schaffner.ch)

### Taiwan R.O.C.

#### Schaffner EMV Ltd.

6 Floor, No. 413  
Rui Guang Road  
114 Neihu District Taipei City  
T +886 2 87525050  
F +886 2 87518086  
[taiwansales@schaffner.com](mailto:taiwansales@schaffner.com)

### Thailand

#### Schaffner EMC Co. Ltd.

Northern Region Industrial Estate  
67 Moo 4 Tambon Ban Klang  
Amphur Muang P.O. Box 14  
51000 Lamphun  
T +66 53 58 11 04  
F +66 53 58 10 19  
[thailandsales@schaffner.com](mailto:thailandsales@schaffner.com)

### UK

#### Schaffner Ltd.

5 Ashville Way  
Molly Millars Lane  
Wokingham  
RG41 2PL Berkshire  
T +44 118 9770070  
F +44 118 9792969  
[uksales@schaffner.com](mailto:uksales@schaffner.com)  
<http://www.schaffner.uk.com>

### USA

#### Schaffner EMC Inc.

52 Mayfield Avenue  
08837 Edison, New Jersey  
T +1 800 367 5566  
T +1 732 225 9533  
F +1 732 225 4789  
[usasales@schaffner.com](mailto:usasales@schaffner.com)  
<http://www.schaffner.com/us>

#### Schaffner MTC LLC

6722 Thirlane Road  
24019 Roanoke, Virginia  
T +1 276 228 7943  
F +1 276 228 7953  
<http://www.schaffner-mtc.com>

#### Schaffner Trencos LLC

2550 Brookpark Road  
44134 Cleveland, Ohio  
T +1 216 741 5282  
F +1 216 741 4860  
<http://www.schaffner-trencos.com>

To find your local partner within Schaffner's global network: [www.schaffner.com](http://www.schaffner.com)

© 2014 Schaffner Group

The content of this document has been carefully checked and understood. However, neither Schaffner nor its subsidiaries assume any liability whatsoever for any errors or inaccuracies of this document and the consequences thereof. Published specifications are subject to change without notice. Product suitability for any area of application must ultimately be determined by the customer. In all cases, products must never be operated outside their published specifications. Schaffner does not guarantee the availability of all published products. This disclaimer shall be governed by substantive Swiss law and resulting disputes shall be settled by the courts at the place of business of Schaffner Holding AG. Latest publications and a complete disclaimer can be downloaded from the Schaffner website. All trademarks recognized.