

Compact high current DC EMC/EMI filter



- Reduces conducted emissions towards the solar panel
- Reduces the probability of EMI radiation off the solar panel
- Helps to prevent premature panel aging
- Helps to meet international EMC regulations
- Most compact standard solution in the industry
- FN 2210 without Cy capacitors to ground

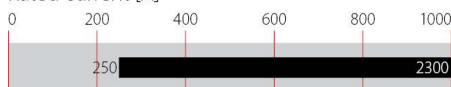


Performance indicators

Attenuation performance



Rated current [A]



Technical specifications

| | |
|--|---|
| Maximum continuous operating voltage | 1000 VDC |
| Operating frequency | DC |
| Rated currents | 250 to 2300 A @50°C |
| High potential test voltage | P -> E 4800VDC for 2 sec P -> P 3600VDC for 2 sec |
| Protection category | IP00 |
| Overload capability | 4x rated current at switch on, max. 8 sec 1.5x rated current for 1 minute, once per hour |
| Temperature range (operation and storage) | -40°C to +100°C |
| Climatic category | 40/100/21 acc. to IEC60068-1 |
| Terminals/Housing | Ni plated cu bars/Metal |
| Flammability corresponding to | UL 94V-0 |
| Design corresponding to | UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939, EN60721-3, EN62109 |

Approvals



The FN 2211 / FN 2210 series are the most compact dedicated high current DC filters for PV inverters in the industry and therefore are an optimum fit with most modern PV inverter generation. In addition the filters can be configured in a very flexible way to fulfil customized application requirements.

All FN 2211 / FN 2210 come in unsymmetrical housings, which help to prevent inverse installation and wrong electrical connection. Along with grid-side installed Schaffner AC EMC/EMI filters FN 2211 / FN 2210, the DC filters FN 2211 / FN 2210 are key to meet the stringent international standards for electromagnetic compatibility and help to ensure a reliable and fault-free operation of the entire PV system.

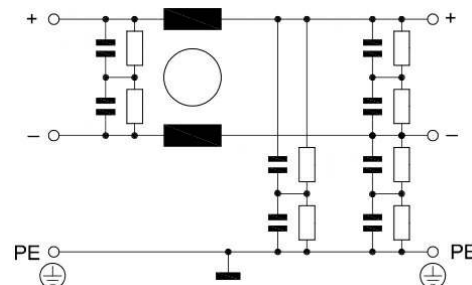
Features and benefits

Installed between the PV inverter and the solar panel, the FN 2211 and FN 2210 DC filters are used to influence positively the conducted emissions on the panel side of the system. Therefore the DC filters significantly reduce the potential for highfrequency (HF) interference radiation of the panel. The filter also helps to prevent premature panel aging because of HF stray and leakage currents.

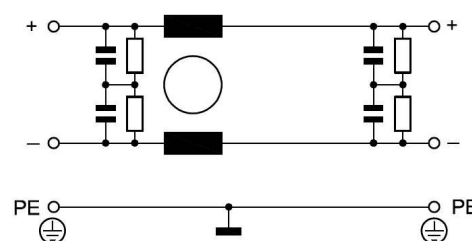
Typical applications

The FN 2211 / FN 2210 series are primarily designed for PV inverter applications between 250 and 2'300 A. However, they can potentially also be applied in other DC applications within published specifications, like UPS, DC motor drives, energy/battery storage systems, or DC charger installations.

Typical electrical schematic FN 2211



Typical electrical schematic FN 2210



Filter selection table

| Filters * | Rated current @ 50 °C [A] | Power loss @ 25 °C/DC [W] | Weight [kg] |
|--------------------------------|---------------------------------|---------------------------------|----------------|
| FN 2211 with Cy caps | | | |
| FN 2211-250-99-C30-R55 | 250 | 15 | 3.0 |
| FN 2211-400-99-C30-R55 | 400 | 24 | 4.0 |
| FN 2211-600-99-C30-R55 | 600 | 25 | 4.6 |
| FN 2211-1000-99-C30-R55 | 1000 | 55 | 6.8 |
| FN 2211-1500-99-C30-R55 | 1500 | 84 | 11.5 |
| FN 2211-2300-99-C30-R55 | 2300 | 116 | 17.5 |
| FN 2210 without Cy caps | | | |
| FN 2210-250-99-R5 | 250 | 15 | 2.4 |
| FN 2210-400-99-R5 | 400 | 24 | 3.1 |
| FN 2210-600-99-R5 | 600 | 25 | 3.8 |
| FN 2210-1000-99-R5 | 1000 | 55 | 6.2 |
| FN 2210-1500-99-R5 | 1500 | 84 | 11.3 |
| FN 2210-2300-99-R5 | 2300 | 116 | 17.5 |

* Filters with reduced Cy capacitance to ground for high asymmetrical currents and higher voltages available upon request.

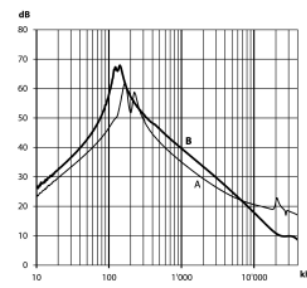
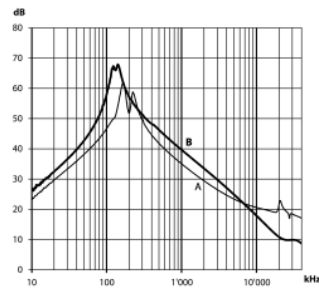
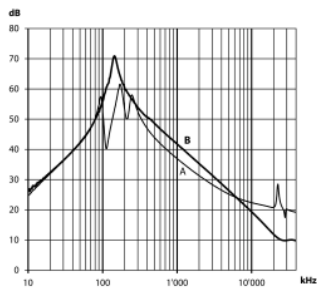
Typical filter attenuation FN 2211-xxx-99-C30-R55

Per CISPR 17; A = 50 Ω/50 Ω sym; B = 50 Ω/50 Ω asym

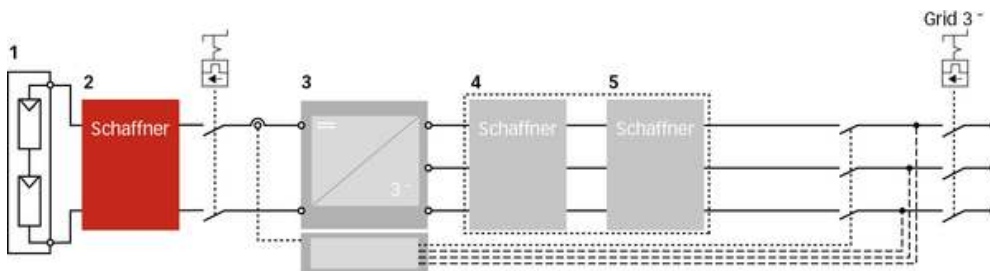
250 / 400 / 600 A types

1000 A types

1'500 / 2'300 A types



Typical block schematic



1 PV modules

2 Schaffner DC filter FN 22xx

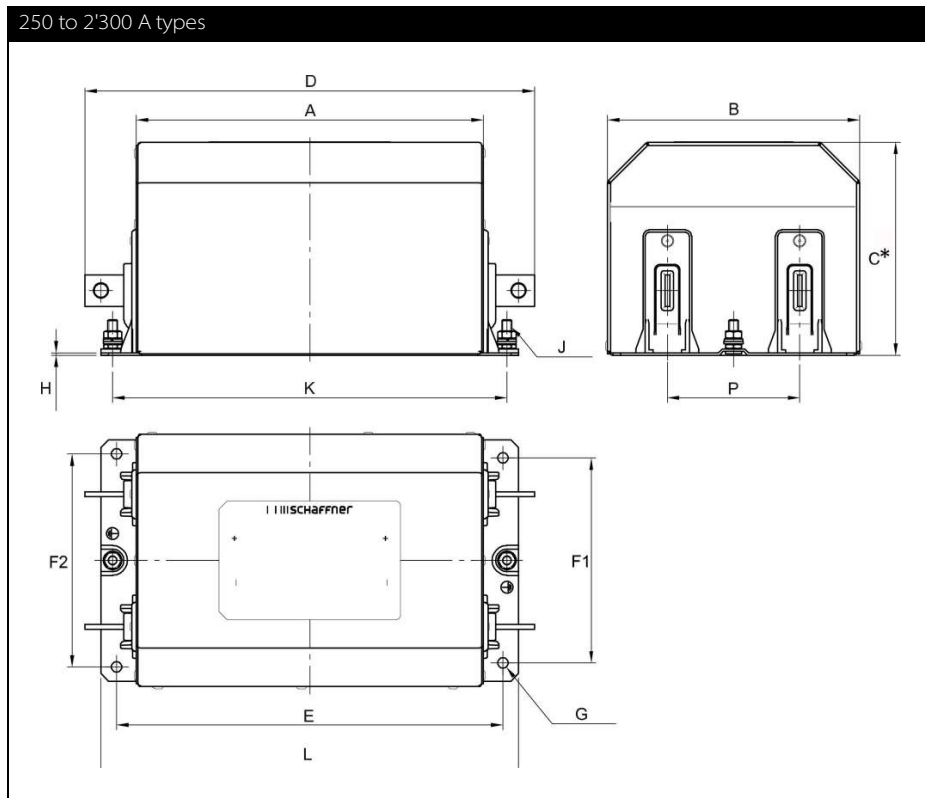
3 Central Inverter

4 Schaffner magnetic components

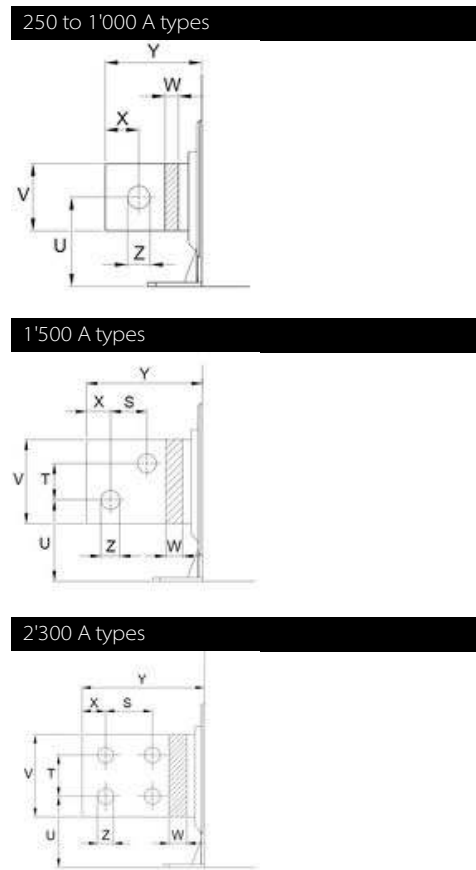
5 Schaffner AC EMC/EMI filter FN 3xxx

Important note: depending on the grounding scheme of the solar power system, including the solar panel and the grid side transformer, the appropriate DC- and AC EMC/EMI filter version need to be selected. For support, please contact your local Schaffner sales office or partner.

Mechanical data



Busbar connections



Note: all FN 2211 and FN 2210 provide unsymmetrical mounting hole patterns to prevent inverse filter installation in the field.

Dimensions

| | FN 2211 250 A | FN 2210* 250 A | FN 2211 400 A | FN 2210* 400 A | FN 2211 600 A | FN 2210* 600 A | FN 2211 1'000 A | FN 2210* 1'000 A | FN 2211 1'500 A | FN 2210* 1'500 A | FN 2211 2'300 A | FN 2210* 2'300 A |
|-----------|------------------|-------------------|------------------|-------------------|------------------|-------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|
| A | 220 | 205 | 235 | 215 | 240 | 225 | 265 | 265 | 275 | 275 | 305 | 305 |
| B | 160 | 145 | 175 | 160 | 175 | 170 | 180 | 180 | 215 | 215 | 230 | 230 |
| C* | 135 | 95 | 150 | 100 | 150 | 100 | 160 | 110 | 200 | 150 | 210 | 210 |
| D | 285 | 270 | 310 | 290 | 315 | 300 | 380 | 380 | 440 | 440 | 495 | 495 |
| E | 245 | 277 | 260 | 240 | 265 | 250 | 300 | 300 | 315 | 315 | 345 | 345 |
| F1 | 130 | 120 | 140 | 125 | 140 | 135 | 140 | 140 | 175 | 175 | 190 | 190 |
| F2 | 135 | 125 | 145 | 130 | 145 | 140 | 145 | 145 | 180 | 180 | 195 | 195 |
| G | Ø 7 | Ø 7 | Ø 9 | Ø 9 | Ø 9 | Ø 9 | Ø 11 | Ø 11 | Ø 11 | Ø 11 | Ø 11 | Ø 11 |
| H | 1.5 | 1.5 | 2 | 2 | 2 | 2 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| J | M6 | M6 | M8 | M8 | M8 | M8 | M8 | M8 | M10 | M10 | M10 | M10 |
| K | 250 (+/- 1) | 230 (+/- 1) | 265 (+/- 1) | 245 (+/- 1) | 270 (+/- 1) | 255 (+/- 1) | 310 (+/- 1) | 310 (+/- 1) | 321 (+/- 1) | 321 (+/- 1) | 351 (+/- 1) | 351 (+/- 1) |
| L | 265 | 245 | 285 | 265 | 290 | 275 | 330 | 330 | 345 | 345 | 375 | 375 |
| M | 41 | 41 | 46 | 46 | 49.5 | 49.5 | 53 | 53 | 58 | 58 | 60.5 | 60.5 |
| N | | | | | | | | | 26 | 26 | 35 | 35 |
| P | 84 (+/- 0.5) | 74 (+/- 0.5) | 86 (+/- 0.5) | 71 (+/- 0.5) | 84 (+/- 0.5) | 79 (+/- 0.5) | 86 (+/- 0.5) | 86 (+/- 0.5) | 86 (+/- 0.5) | 86 (+/- 0.5) | 93 (+/- 0.5) | 93 (+/- 0.5) |
| S | | | | | | | | | 26 | 26 | 40 | 40 |
| V | 20 | 20 | 25 | 25 | 25 | 25 | 40 | 40 | 60 | 60 | 70 | 70 |
| W | 3 | 3 | 4 | 4 | 8 | 8 | 8 | 8 | 10 | 10 | 15 | 15 |
| X | 10 | 10 | 12.5 | 12.5 | 12.5 | 12.5 | 20 | 20 | 17 | 17 | 20 | 20 |
| Y | 32.5 | 32.5 | 37.5 | 37.5 | 37.5 | 37.5 | 57.5 | 57.5 | 82.5 | 82.5 | 82.5 | 95 |
| Z | Ø 9 | Ø 9 | Ø 11 | Ø 11 | Ø 11 | Ø 11 | Ø 13.5 | Ø 13.5 | Ø 13.5 | Ø 13.5 | Ø 13.5 | Ø 13.5 |

* FN 2210 with flat top (Dimension C)

All dimensions in mm; 1 inch=25.4mm

Tolerances according: ISO 2768-m / EN 22768-m, if not stated otherwise

Please see the brochure "Basics in EMC and Power Quality" on our website www.schaffner.com/downloads 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
<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
<http://www.schaffner.com.cn/>

Finland

Schaffner Oy

Sauvonrinne 19 H
08500 Lohja
T +358 19 35 72 71
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

Germany

Schaffner Deutschland GmbH

Schoemperlenstrasse 12B
76185 Karlsruhe
T +49 721 56910
F +49 721 569110
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

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
<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

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

Sweden

Schaffner EMC AB

Turebergstorg 1, 6
19147 Sollentuna
T +46 8 5792 1121 / 22
F +46 8 92 96 90
swedensales@schaffner.com

Switzerland

Schaffner EMV AG

Nordstrasse 11
4542 Luterbach
T +41 32 681 66 26
F +41 32 681 66 41
switzerlandsales@schaffner.com

Taiwan R.O.C.

Schaffner EMV Ltd.

6 Floor, No. 413
114 Neihu District Taipei City
T +886 2 87525050
F +886 2 87518086
taiwansales@schaffner.com

Thailand

Schaffner EMC Co. Ltd.

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

UK

Schaffner Ltd.

Wokingham
RG41 2PL Berkshire
T +44 118 9770070
F +44 118 9792969
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
<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://schaffner-trencos.com>

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