

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.

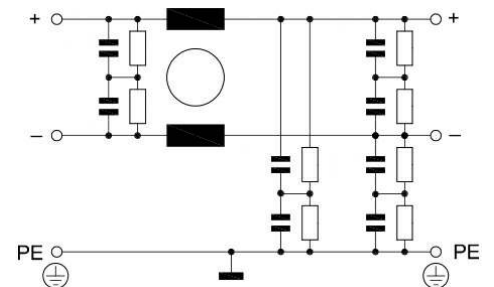
Features and benefits

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.

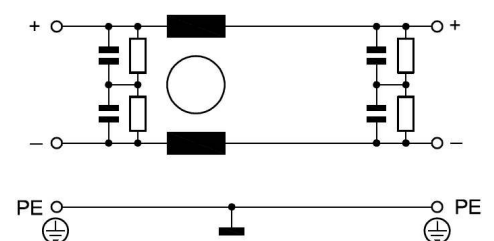
Typical applications

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.

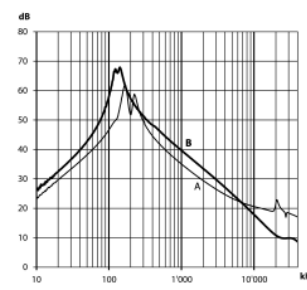
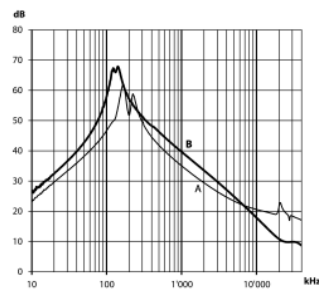
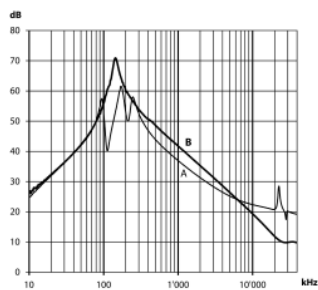
Typical filter attenuation FN 2211-xxx-99-C30-R55

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

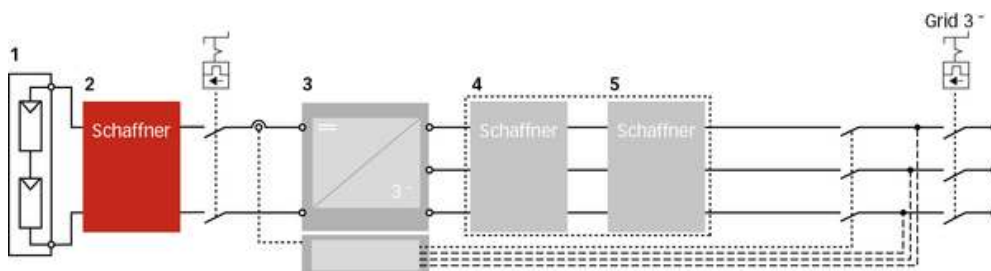
250 / 400 / 600 A types

1000 A types

1'500 / 2'300 A types



Typical block schematic



1 PV modules

2 Schaffner DC filter FN 22xx

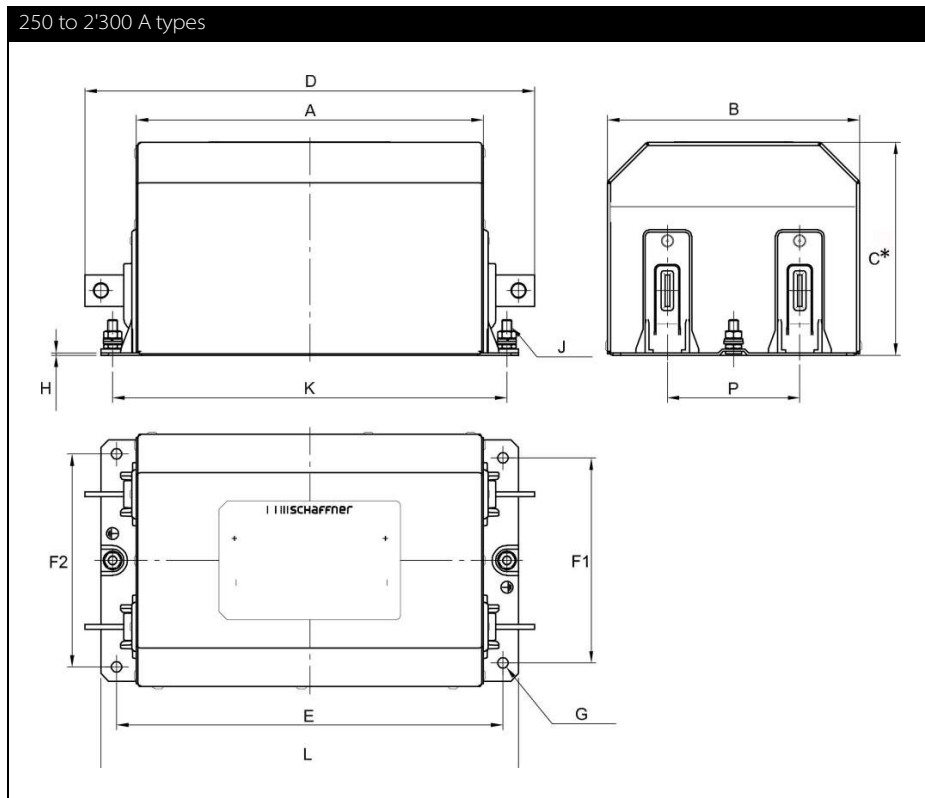
3 Central Inverter

4 Schaffner magnetic components

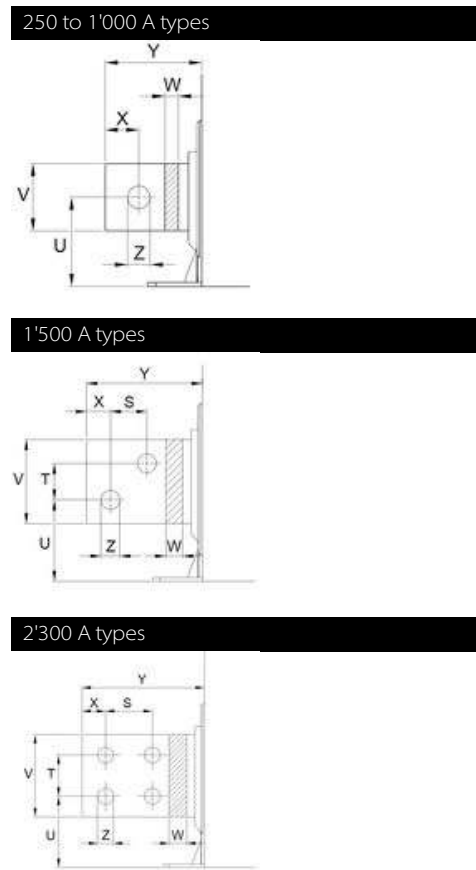
5 Schaffner AC EMC/EMI filter FN 3xxx

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>

To find your local partner within Schaffner's global network: www.schaffner.com

© 2015 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.