schaffner
shaping electrical power

Compact high current DC EMC/EMI filter



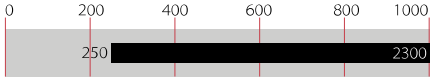
- Reduces conducted emissions towards the solar panel
- Reduces the probability of EMI radiation off the solar panel
- Helps to prevent premature panel aging
- Helps to meet international EMC regulations
- Most compact standard solution in the industry
- FN 2210 HV without Cy capacitors to ground

Performance indicators

Attenuation performance



Rated current [A]



Technical specifications

Maximum continuous operating voltage	1'500 VDC
Operating frequency	DC
Rated currents	250 to 2300 A @ 50°C
High potential test voltage	P -> E 6'800 VDC for 2 sec P -> P 3'850 VDC for 2 sec
Protection category	IP 00
Overload capability	4x rated current at switch on, max. 8 sec 1.5x rated current for 1 minute, once per hour -40°C
Temperature range (operation and storage)	to +100°C
Climatic category	40/100/21 acc. to IEC 60068-1
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, EN 60721-3, EN 62109
Rated currents	250 to 2300 A @50°C (480 V filters)
MTBF @ Rated amb. Temp./Voltage (Mil-HB-217F)	> 200,000 hours

Approvals & Compliances

RoHS c UL us CE

The FN 2211 HV/FN 2210 HV 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 HV/FN 2210 HV 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 3311 HV/FN 3310 HV, the DC filters FN 2211 HV/FN 2210 HV 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.

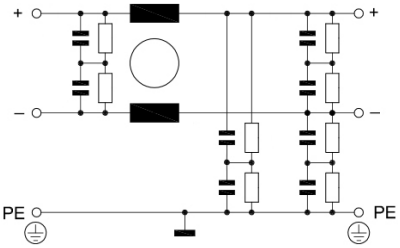
Features and benefits

Installed between the PV inverter and the solar panel, the FN 2211 HV and FN 2210 HV 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.

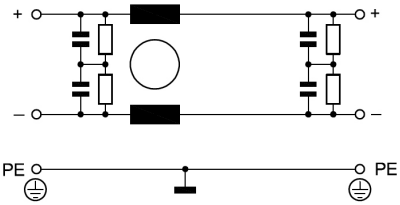
Typical applications

The FN 2211 HV/FN 2210 HV 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 HV



Typical electrical schematic FN 2210 HV



Filter selection table

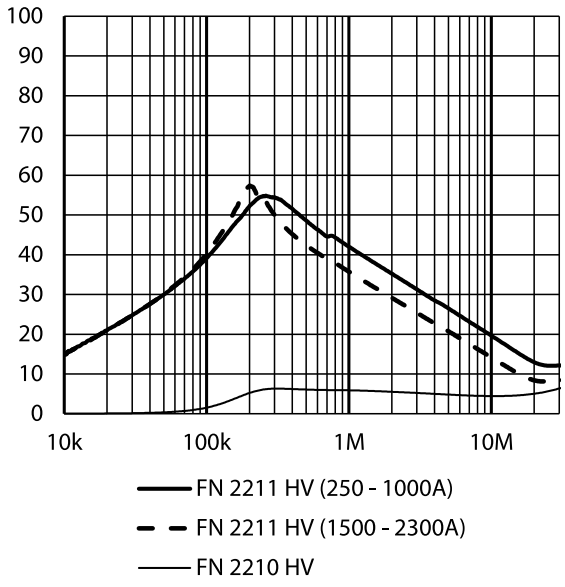
Filters *	Rated current @ 50°C [A]	Power losss @ 25°C/DC [W]	Weight [kg]
FN 2211 HV with Cy caps			
FN 2211HV-250-99-C27-R99	250	9	3.3
FN 2211 HV-400-99-C27-R99	400	14	4.2
FN 2211 HV-600-99-C27-R99	600	15	4.8
FN 2211 HV-1000-99-C27-R99	1000	31	7.1
FN 2211 HV-1500-99-C27-R99	1500	41	12.4
FN 2211 HV-2300-99-C27-R99	2300	64	18.3
FN 2210 HVwithout Cy caps			
FN 2210 HV-250-99-R9	250	9	2.
FN 2210 HV-400-99-R9	400	14	3.3
FN 2210 HV-600-99-R9	600	15	4.0
FN 2210 HV-1000-99-R9	1000	31	6.4
FN 2210 HV-1500-99-R9	1500	41	11.2
FN 2210 HV-2300-99-R9	2300	64	17.6

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

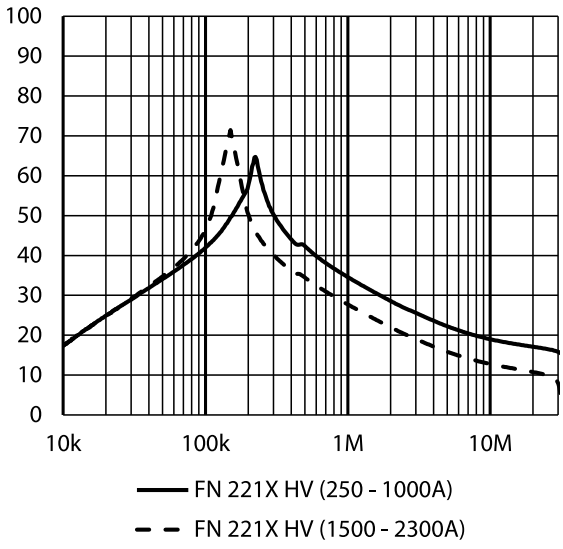
Typical filter attenuation FN 221x HV-xxx-99-C27-R99

Per CISPR 17

50 / 50 Ω asym

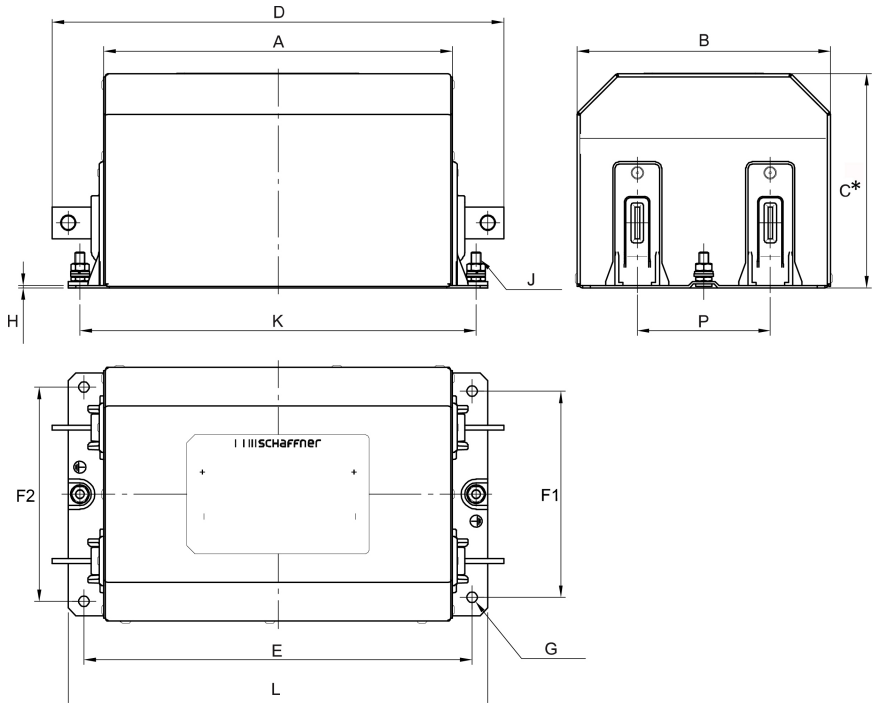


50 / 50 Ω sym



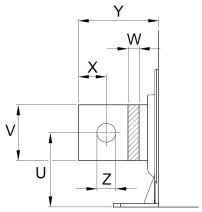
Mechanical data

250 to 2'300 A types

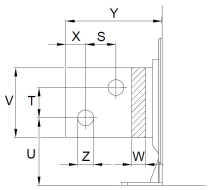


Busbar connections

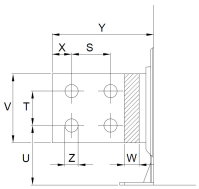
250 to 1'000 A types



1'500 A types



2'300 A types



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

Dimensions

	FN 2211 HV 250 A	FN 2210 HV* 250 A	FN 2211 HV 400 A	FN 2210 HV* 400 A	FN 2211 HV 600 A	FN 2210 HV* 600 A	FN 2211 HV 1'000 A	FN 2210 HV* 1'000 A	FN 2211 HV 1'500 A	FN 2210 HV* 1'500 A	FN 2211 HV 2'300 A	FN 2210 HV* 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*	140	105	150	110	150	110	165	110	200	150	210	165
D	285	270	310	290	315	300	380	380	440	440	495	495
E	245	227	260	240	265	250	300	300	315	315	345	345
F1	130	120	140	125	140	135	140	140	175	175	180	180
F2	135	125	145	130	145	140	145	145	180	180	185	185
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
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
T									26	26	35	35
U	41	41	46	46	49.5	49.5	53	53	58	58	60.5	60.5
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

* Filters 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.

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