Multi-stage EMI filter with excellent attenuation performance

ⅢⅢⅢⅢscHaffner

safety for electronic systems

- **Current ratings from 1 to 20A**
- **Two stage filter**
- **Very high differential and common mode attenuation**
- **Optional medical versions (B type)**
- **Optional safety versions (A type)**
- **Optional overvoltage protection**
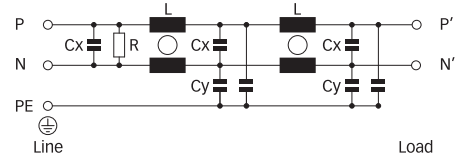
Approvals

ⓊⓁ® CSA® ⚡14

RoHS
2002/95/EC

Technical specifications

Maximum continuous operating voltage:	250VAC, 50/60Hz
Operating frequency:	dc to 400Hz
Rated currents:	1 to 20A @ 40°C, max.
High potential test voltage:	P –> E 2000VAC for 2 sec
	P –> E 2500VAC for 2 sec; medical versions
	P –> N 1100VDC for 2 sec
Protection category:	IP40 according to IEC60529
Temperature range (operation and storage):	-25°C to +100°C (25/100/21)
Design corresponding to:	UL1283, CSA22.2 No. 8 1986, EN133'200, IEC60939
Flammability corresponding to:	UL94V-2 or better
Surge pulse protection (optional):	2kV, IEC61000-4-5
MTBF @ 40°C/230V (Mil-HB-217F):	1,300,000 hours, 1 to 10A types
	1,100,000 hours, 12A type
	517,000 hours, 16 to 20A types

Typical electrical schematic

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 single stage 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 systems
- Electronic data processing equipment
- Office automation and datacom equipment
- Various noisy applications requiring high filter performance

Filter selection table

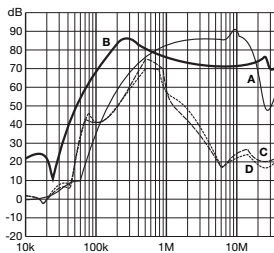| Filter*	Rated current @ 40°C (25°C) [A]	Leakage current** @ 230VAC/50Hz [mA]	Inductance L [mH]	Cx [μF]	Capacitance Cy [nF]	Cy [nF]	Resistance R [kΩ]		Input/Output connections		Weight [g]
FN 2090-1-..	1 (1.1)	0.5	20	0.22	2.2	1.0	680	-06	-07		73
FN 2090-3-..	3 (3.4)	0.5	14	0.33	2.2	1.0	470	-06	-07		158
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	575
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	575
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	575

*   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.
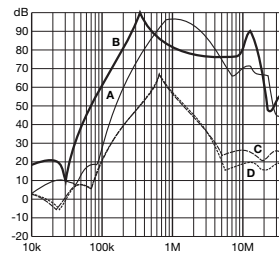
Typical filter attenuation

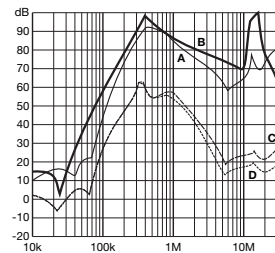Per CISPR 17; A = 50Ω/50Ω sym; B = 50Ω/50 asym; C = 0.1Ω/100Ω sym; D = 100Ω/0.1Ω sym
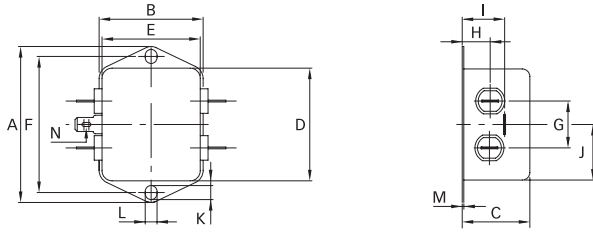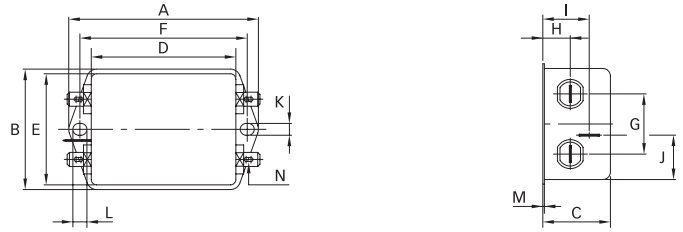
1 to 4A types

6 to 10A types
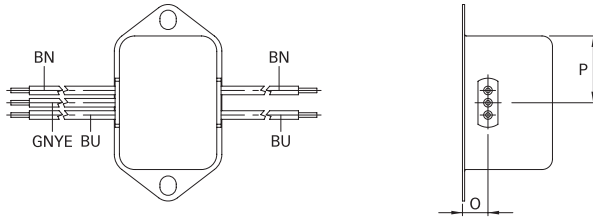
12 to 20A types

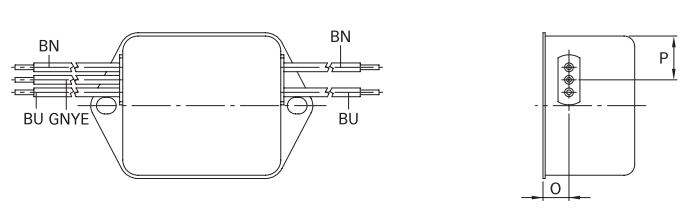## Mechanical data

Connection style -06, 1A types

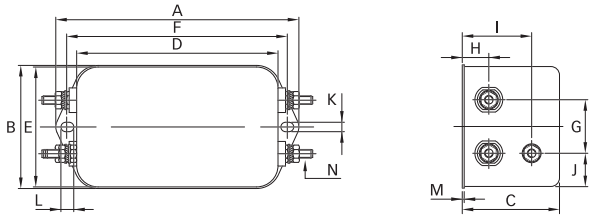Connection style -06, 3 to 20A types

Connection style -07, 1A types (same dimensions as above)

Connection style -07, 3 to 20A types (same dimensions as above)

Connection style -08, 20A types

Dimensions

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

All dimensions in mm; 1 inch = 25.4mm

Tolerances according: ISO2768 / EN22768

*   Other cable length or additional wire connector on request.