

# 1-phase filters FN 2090

## Multi-stage EMI filter with excellent attenuation performance

**SCHAFFNER**

energy efficiency and reliability



- Rated currents from 1 to 30A
- 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)

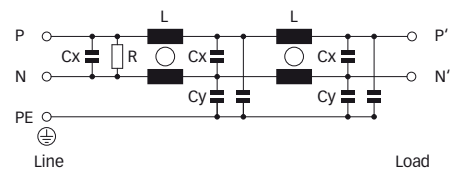
### Approvals



### Technical specifications

Maximum continuous operating voltage:	250VAC, 50/60Hz
Operating frequency:	dc to 400Hz
Rated currents:	1 to 30A @ 40°C max.
High potential test voltage:	P → E 2000VAC for 2 sec (standard types) P → E 2500VAC for 2 sec (B types) P → N 1100VDC for 2 sec
Temperature range (operation and storage):	-25°C to +100°C (25/100/21)
Design corresponding to:	UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939
Flammability corresponding to:	UL 94V-2 or better
Surge pulse protection (optional):	2kV, IEC 61000-4-5
MTBF @ 40°C/230V (Mil-HB-217F):	1,300,000 hours (1 to 10A types) 1,100,000 hours (12A types) 517,000 hours (16 and 30A 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 2050 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

Filter selection table

Filter*	Rated current @ 40°C (25°C)	Leakage current** @ 230VAC/50Hz	Inductance L	Cx	Capacitance Cy	Resistance R	Input/Output connections			Weight
	[A]	[mA]	[mH]	[µF]	[nF]	[kΩ]				[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	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 2090A-30-08	30 (33.5)	0.08	1.5	1	0.47	0.47	220		-08	548
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

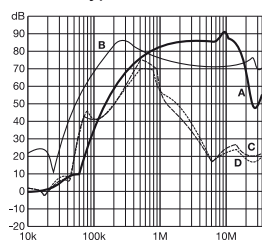
\* To compile a complete part number, please replace the .. with the required I/O connection style. For surge pulse protection, please add Z (e.g. FN 2090Z-10-06, FN 2090BZ-20-08).

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

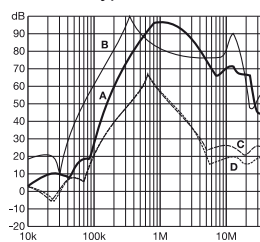
Typical filter attenuation

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

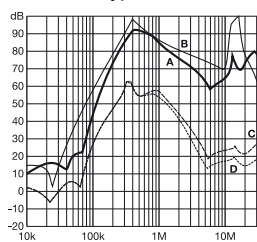
1 to 4A types



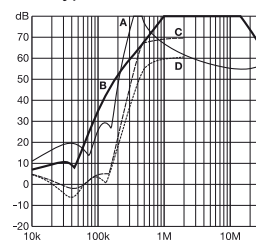
6 to 10A types



12 to 20A types

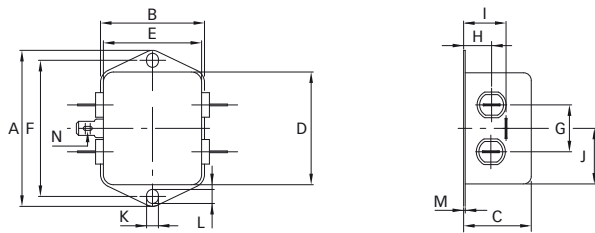


30A types

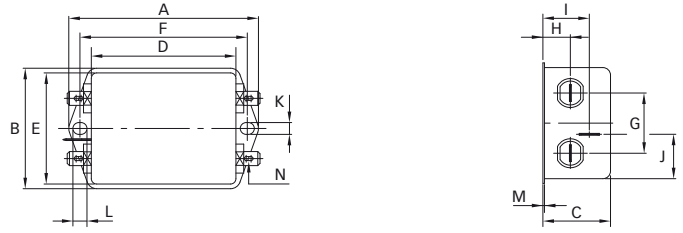


**Mechanical data**

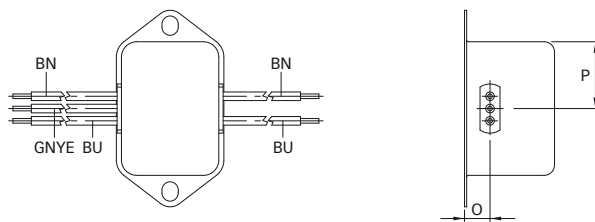
Connection style -06, 1A types



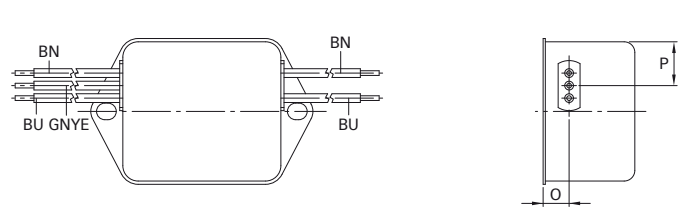
Connection style -06, 3 to 20A types



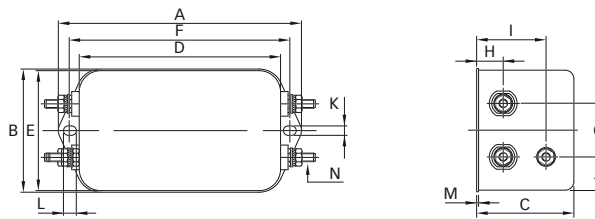
Connection style -07, 1A types (same dimensions as style -06)



Connection style -07, 3 to 20A types (same dimensions as style -06)



Connection style -08, 20 and 30A types



**Dimensions**

	1A	3A	4A	6A	8A	10A	12A	16A	20A	30A	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 = 25.4mm

Tolerances according: ISO 2768-m / EN 22768-m

\* Other cable length or additional wire connector on request.