

Multi-stage AC/DC EMI Filter with Excellent Attenuation Performance



- Rated currents from 1 to 30 A
- Two-stage filter
- Very high differential and common-mode attenuation
- Optional medical versions (B type)
- Optional safety versions (A type)
- Optional enhanced performance versions
- Optional overvoltage protection (Z type)



Performance indicators

Attenuation performance



Rated current [A]



Technical specifications

Rated voltage*	250 VAC, 50/60 Hz; 250 VDC
Operating frequency	DC to 400 Hz
Rated currents	1 to 30 A @ 40°C max.
High potential test voltage	P → PE 2000 VAC for 2 sec (equiv. cap <88 nF) P → PE 2550 VDC for 2 sec (equiv. cap >88 nF) P → PE 2500 VAC for 2 sec (B types) P → N 1100 VDC for 2 sec
Temperature range (operation and storage)	-25°C to +100°C (25/100/21)**
Certified to	UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939 (applies to AC and DC applications)
Flammability corresponding to	Terminal plastic for -06/-08 version: UL 94 V-0 Laces for -07 version: UL 94 VW-1 Grommet for -07 version: UL 94 V-0
Surge pulse protection (Z type)	Helps compliance to IEC61000-4-5 (Differential Mode only)
Overvoltage category	II acc. IEC 60664-1
Pollution degree	2 acc. IEC 60664-1
Altitude	2000m (above derating applies)**
MTBF @ 40°C/230 V (Mil-HB-217F)	1,300,000 hours (1 to 10 A types) 1,100,000 hours (12 A types) 517,000 hours (16 and 30 A types)

* maximum RMS operating voltage at rated frequency or the maximum DC operating voltage

** for dedicated requests exceeding this specification (e.g. -40 °C or higher altitude) please contact your local Schaffner Sales office

Approvals & Compliances



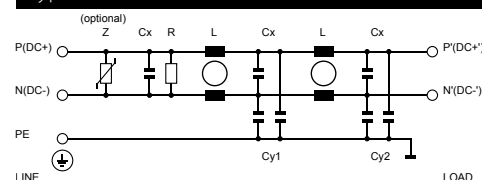
Features and benefits

- FN 2090 two-stage filters are designed for easy and fast chassis mounting.
- FN 2090 B versions without capacitors to earth comply to 1MOP for ME (medical equipment) acc. IEC 60601-1
- FN 2090 A versions with low capacitance to earth for safety critical applications with a requirement for low leakage currents.
- FN 2090 filters offers an optimized filter range for enhanced performance AC and DC applications, in same compact size (KK, LL, NN types)
- All filters provide an exceptional conducted attenuation performance, based on chokes with high permeable core material.
- FN 2090 two-stage filters are designed for noisy applications requiring excellent filter performance.
- The higher inductivity offers increased attenuation performance with the same form factor as FN 2060 and FN 2080 series.
- All FN 2090 filters can be delivered with optional surge pulse protection (Z type).
- FN 2090 filters are also available as singlestage 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 equipment
- Electronic data processing equipment
- Office automation and datacom equipment
- Various noisy applications requiring high filter performance

Typical electrical schematic



Filter selection table

Filter*	Buy	Rated current	Leakage current**	Power Loss	Inductance***	Capacitance***			Resistance***	Input/Output connections			Weight
		@ 40°C (25°C)	@ 250V AC/50 Hz (@ 120V AC/60 Hz)	@ 25°C/DC	L	Cx	Cy1	Cy2	R				
		[A]	[mA]	[W]	[mH]	[µF]	[nF]	[nF]	[kΩ]				[g]
FN2090-1-..		1 (1.1)	0.45 (0.26)	1.8	20	0.22	2.2	1.0	680	-06	-07		73
FN2090-3-..		3 (3.4)	0.45 (0.26)	3.7	14	0.33	2.2	1.0	470	-06	-07		158
FN2090-4-..		4 (4.5)	0.45 (0.26)	6.4	14	0.33	2.2	1.0	470	-06	-07		176
FN2090-6-..		6 (6.7)	0.61 (0.35)	7.1	8	0.47	3.3	1.0	330	-06	-07	-08	191
FN2090-8-..		8 (8.9)	0.61 (0.35)	7.7	8	0.47	3.3	1.0	330	-06	-07		330
FN2090-10-..		10 (11.2)	0.61 (0.35)	8.4	8	0.47	3.3	1.0	330	-06	-07	-08	369
FN2090-12-..		12 (13.4)	0.93 (0.54)	12.1	4	1	10	1.0	220	-06	-07	-08	391
FN2090-16-..		16 (17.9)	0.93 (0.54)	10.7	4	1	10	1.0	220	-06	-07		425
FN2090-20-..		20 (22.4)	0.93 (0.54)	8.2	2.7	1	10	1.0	220	-06		-08	530
FN2090-30-08		30 (33.5)	0.93 (0.54)	10.1	1.5	1	10	1.0	220			-08	548
FN2090A-1-..		1 (1.1)	0.13 (0.07)	1.8	20	0.22	0.47	0.47	680	-06	-07		73
FN2090A-3-..		3 (3.4)	0.13 (0.07)	3.7	14	0.33	0.47	0.47	470	-06	-07		158
FN2090A-4-..		4 (4.5)	0.13 (0.07)	6.4	14	0.33	0.47	0.47	470	-06	-07		176
FN2090A-6-..		6 (6.7)	0.13 (0.07)	7.1	8	0.47	0.47	0.47	330	-06	-07	-08	191
FN2090A-8-..		8 (8.9)	0.13 (0.07)	7.7	8	0.47	0.47	0.47	330	-06	-07		330
FN2090A-10-..		10 (11.2)	0.13 (0.07)	8.4	8	0.47	0.47	0.47	330	-06	-07	-08	369
FN2090A-12-..		12 (13.4)	0.13 (0.07)	12.1	4	1	0.47	0.47	220	-06	-07	-08	391
FN2090A-16-..		16 (17.9)	0.13 (0.07)	10.7	4	1	0.47	0.47	220	-06	-07		425
FN2090A-20-..		20 (22.4)	0.13 (0.07)	8.2	2.7	1	0.47	0.47	220	-06		-08	530
FN2090A-30-08		30 (33.5)	0.13 (0.07)	10.1	1.5	1	10	10	220			-08	548
FN2090B-1-..		1 (1.1)	0.00	1.8	20	0.22			680	-06	-07		73
FN2090B-3-..		3 (3.4)	0.00	3.7	14	0.33			470	-06	-07		158
FN2090B-4-..		4 (4.5)	0.00	6.4	14	0.33			470	-06	-07		176
FN2090B-6-..		6 (6.7)	0.00	7.1	8	0.47			330	-06	-07	-08	191
FN2090B-8-..		8 (8.9)	0.00	7.7	8	0.47			330	-06	-07		330
FN2090B-10-..		10 (11.2)	0.00	8.4	8	0.47			330	-06	-07	-08	369
FN2090B-12-..		12 (13.4)	0.00	12.1	4	1			220	-06	-07	-08	391
FN2090B-16-..		16 (17.9)	0.00	10.7	4	1			220	-06	-07		425
FN2090B-20-..		20 (22.4)	0.00	8.2	2.7	1			220	-06		-08	530
FN2090B-30-08		30 (33.5)	0.00	10.1	1.5	1			220			-08	548
Enhanced performance													
FN2090KK-1-06		1 (1.15)	3.46 (1.99)	1.8	20	0.22	22	22	680	-06			95
FN2090NN-3-06		3 (3.4)	15.71 (9.05)	3.7	14	0.33	100	100	470	-06			200
FN2090NN-4-06		4 (4.5)	15.71 (9.05)	6.4	14	0.33	100	100	470	-06			210
FN2090NN-6-06		6 (6.7)	15.71 (9.05)	7.1	8	0.47	100	100	330	-06			220
FN2090NN-8-06		8 (8.9)	15.71 (9.05)	7.7	8	0.47	100	100	330	-06			340
FN2090LL-10-..		10 (11.2)	5.18 (2.98)	8.4	8	0.47	33	33	330	-06		-08	470
FN2090LL-12-..		12 (13.4)	5.18 (2.98)	12.1	4	1	33	33	220	-06		-08	500
FN2090LL-16-06		16 (17.9)	5.18 (2.98)	10.7	4	1	33	33	220	-06			530
FN2090LL-20-..		20 (23)	5.18 (2.98)	8.2	2.7	1	33	33	220	-06		-08	580
FN2090LL-30-08		30 (33.5)	5.18 (2.98)	10.1	1.5	1	33	33	220			-08	600

** To compile a complete part number, please replace the -.. with the required I/O connection style.

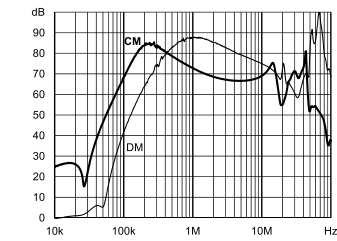
For surge pulse protection, please add Z (e.g. FN2090Z-10-06, FN2090BZ-20-08). The different letters code the used Cy values in the filter type (A = 0.47nF; K = 22nF; L = 33nF; N = 100nF; as the FN2090 is a dual stage filter each letter stands for one stage of Cy)

** Maximum leakage under usual AC operating conditions (acc. IEC 60939-3). Note: if the neutral line is interrupted, worst case leakage could reach twice this level. Leakage current for DC application is 0 mA

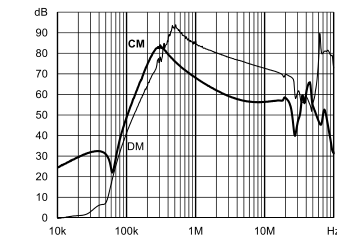
*** Tolerances apply: Inductance: -30/+50%, Capacitance: ±20%, Resistance: ±10%

Typical filter attenuation

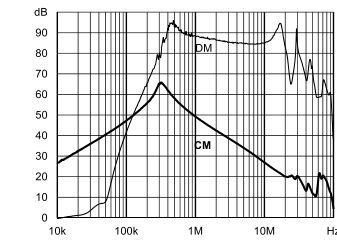
Per CISPR 17; A=50 Ω /50 Ω sym; B=50 Ω /50 Ω asym



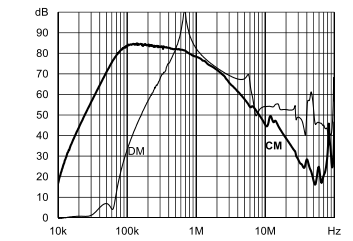
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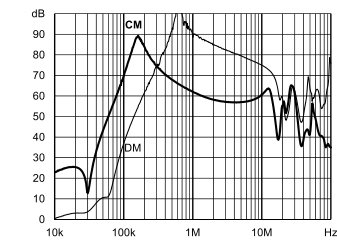
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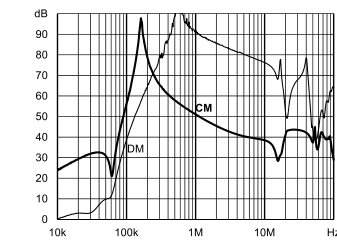
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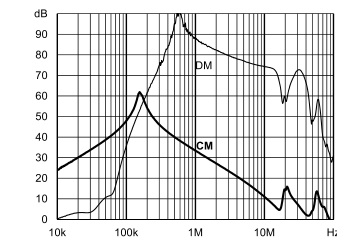
Enhanced performance



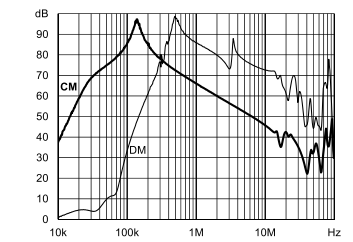
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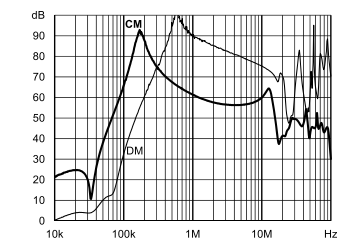
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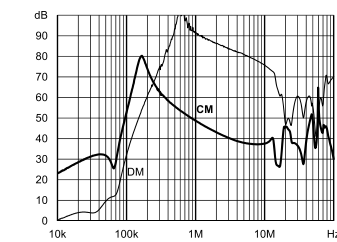
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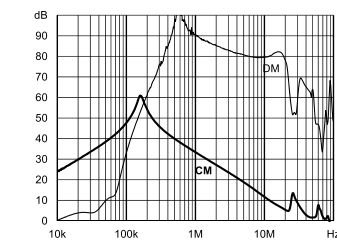
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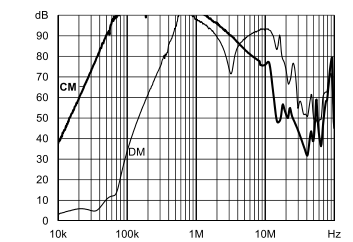
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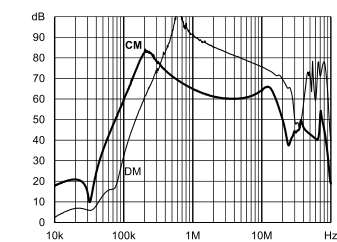
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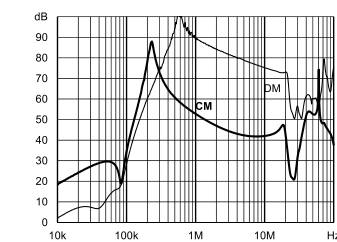
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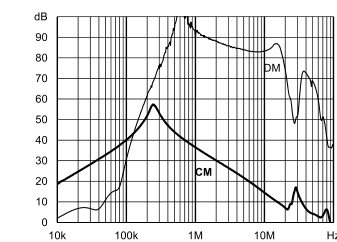
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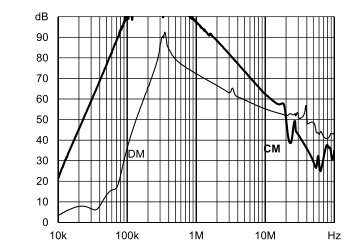
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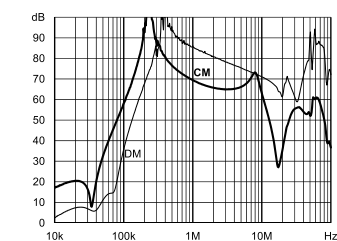
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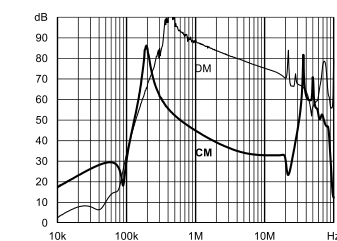
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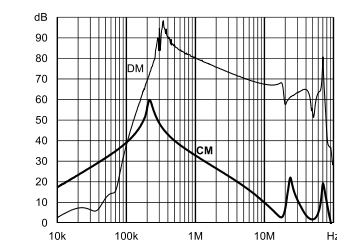
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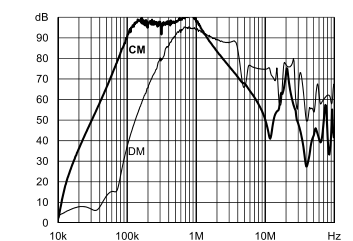
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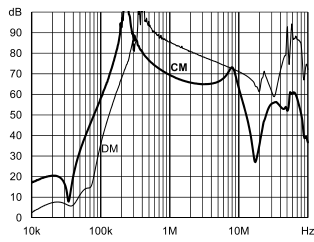
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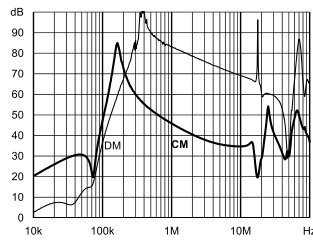
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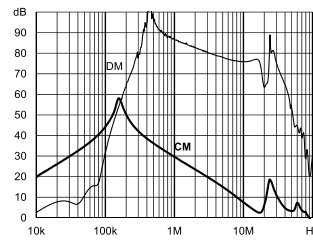
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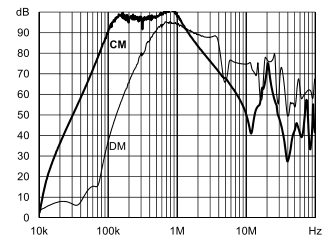
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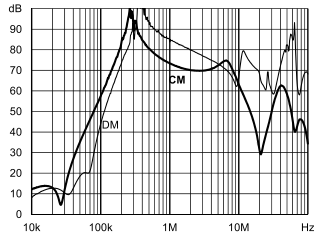
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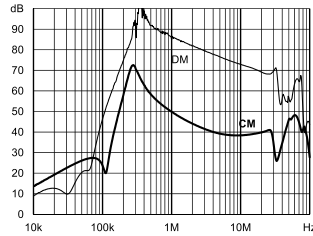
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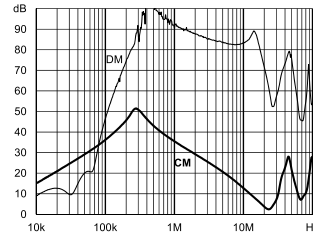
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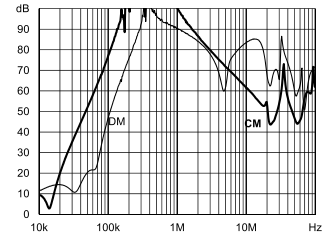
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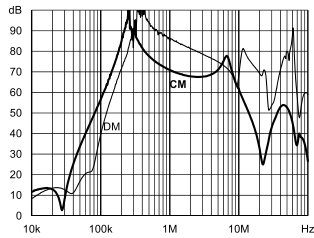
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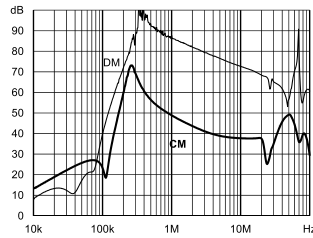
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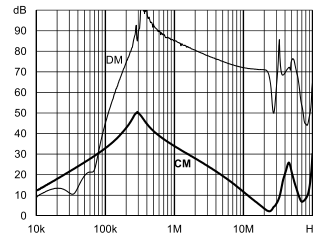
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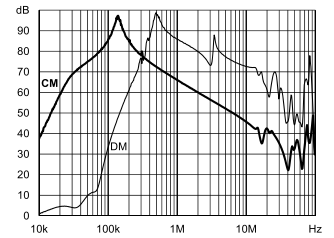
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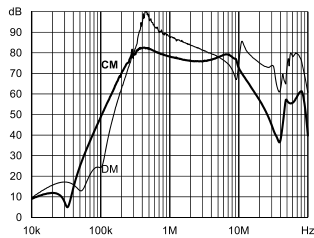
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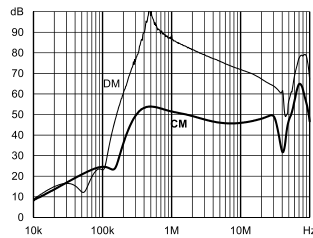
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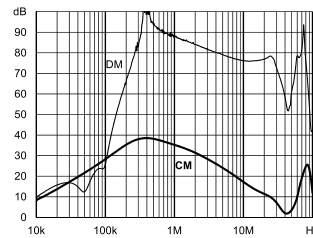
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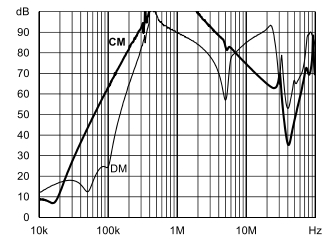
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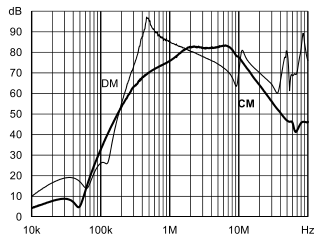
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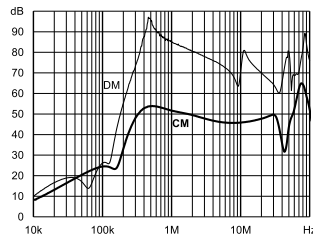
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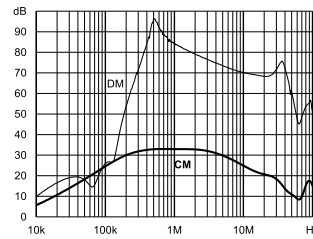
Enhanced performance



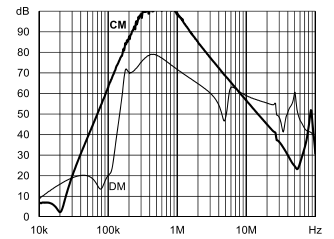
30 A: Standard type



A type



B type



Enhanced performance

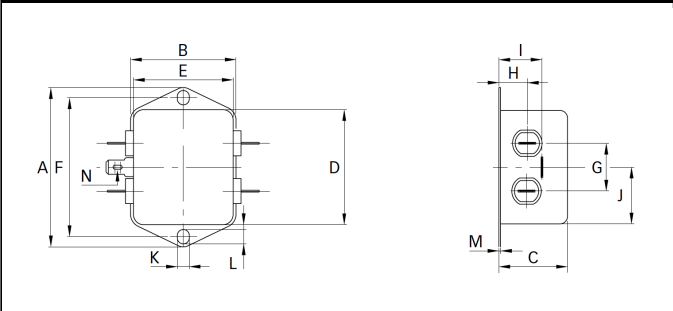
Product selector

FN 2090 xy-xx-yy

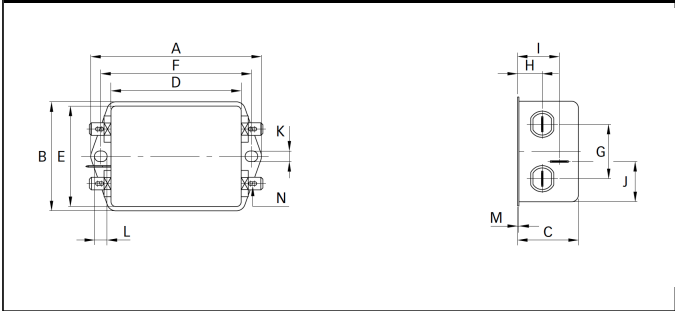
06	Faston 6.3 × 0.8 mm (spade/soldering)
07	Wire leads
08	Studs (M4 screws)
1 to 30	Rated current
Blank	Standard version
Z	With surge protection
Blank	Standard version
A	Safety version
B	Medical version
KK/LL/NN	High performance version

Mechanical data

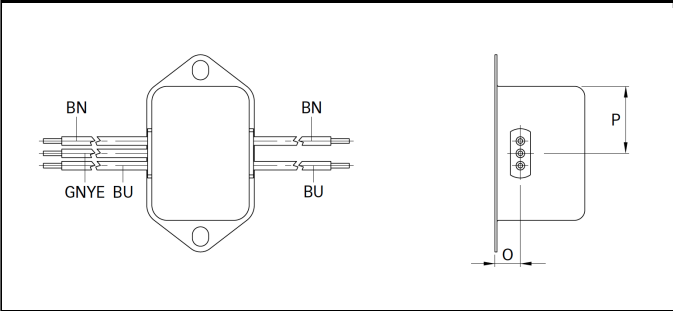
Connection style -06, 1 A types



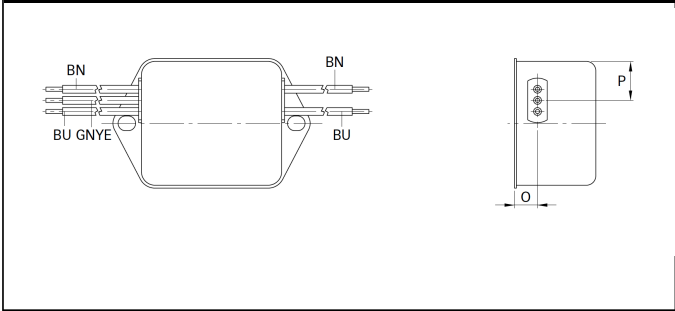
Connection style -06, 3 to 20 A types



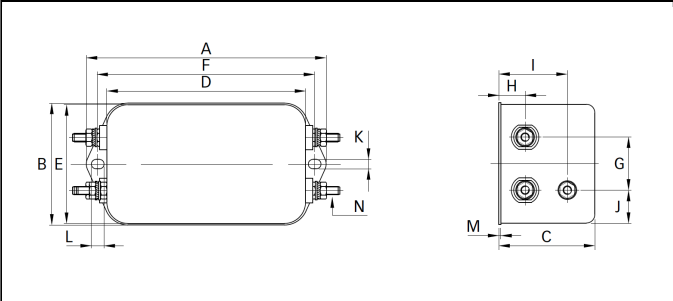
Connection style -07, 1 A types (same dimensions as style -06)



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



Connection style -08, 10 to 30 A types



Dimensions

	1 A	3 A	4 A	6 A	8 A	10 A	12 A	16 A	20 A	30 A	Tolerances
A	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	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
C	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
D	50.5	64.8	64.8	64.8	94 ±1	94 ±1	94 ±1	94 ±1	94 ±1	94 ±1	±0.5
E	44.5	49.8	49.8	49.8	56	56	56	56	56	56	±0.5
F	61	75	75	75	103	103	103	103	103	103	±0.3
G	21	27	27	27	25	25	25	25	25	25	±0.2
H	10.8	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	±0.5
I	16.8	20.8	20.8	20.8	32.4	32.4	32.4	32.4	32.4	32.4	±0.5
J	25.25	19.9	19.9	19.9	15.5	15.5	15.5	15.5	15.5	15.5	±0.5
K	5.3	5.3	5.3	5.3	4.4	4.4	4.4	4.4	4.4	4.4	
L	6.3	6.3	6.3	6.3	6	6	6	6	6	6	
M	0.7	0.7	0.7	0.7	1	1	1	1	1	1	±0.3
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	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			±0.5
P	14	14.9	14.9	14.9	18	18	18	18			±0.5
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			+5
Connection style -08											
N						M4	M4	M4	M4	M4	
Recommended torque (Nm)						1.2 - 1.3	1.2 - 1.3	1.2 - 1.3	1.2 - 1.3	1.2 - 1.3	
Earth terminal						1.5 - 1.7	1.5 - 1.7	1.5 - 1.7	1.5 - 1.7	1.5 - 1.7	

All dimensions in mm; 1 inch = 25.4 mm
Tolerances according: ISO 2768-m/EN 22768-m

Please visit www.schaffner.com to find more details on filter connectors.



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