

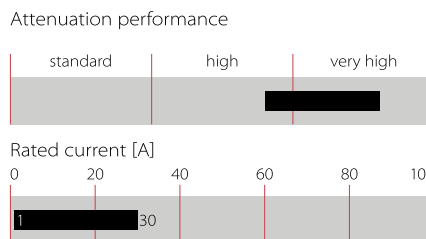
# Multi-stage AC/DC EMI Filter with Excellent Attenuation Performance



- 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



### Approvals



### 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.
- 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 and excellent thermal behaviour.
- 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 (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.

### Technical specifications

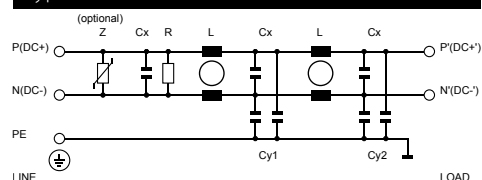
<b>Rated voltage*</b>	250 VAC, 50/60 Hz; 250 VDC
<b>Operating frequency</b>	DC to 400 Hz
<b>Rated currents</b>	1 to 30 A @ 40°C max.
<b>High potential test voltage</b>	P → PE 2000 VAC for 2 sec (equiv. cap <88 nF) P → PE 2550 VDC for 2 sec (equiv. cap >88 nF) P → PE 2500 VAC for 2 sec (B types) P → N 1100 VDC for 2 sec
<b>Temperature range (operation and storage)</b>	-25°C to +100°C (25/100/21)
<b>Certified to</b>	UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939 (applies to AC and DC applications)
<b>Flammability corresponding to</b>	UL 94 V-2 or better
<b>Surge pulse protection (Z type)</b>	Helps compliance to IEC61000-4-5 (Differential Mode only)
<b>MTBF @ 40°C/230 V (Mil-HB-217F)</b>	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

### 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*	Rated current @ 40°C (25°C)  [A]	Leakage current** @ 250V AC/50 Hz (@ 120V AC/60 Hz)  [mA]	Inductance  L  [mH]	Capacitance			Resistance  R  [kΩ]	Input/Output connections			Weight  [g]
				Cx  [μF]	Cy1  [nF]	Cy2  [nF]		-06	-07	-08	
<b>FN 2090-1-..</b>	1 (1.1)	0.45 (0.26)	20	0.22	2.2	1.0	680	-06	-07		73
<b>FN 2090-3-..</b>	3 (3.4)	0.45 (0.26)	14	0.33	2.2	1.0	470	-06	-07		158
<b>FN 2090-4-..</b>	4 (4.5)	0.45 (0.26)	14	0.33	2.2	1.0	470	-06	-07		176
<b>FN 2090-6-..</b>	6 (6.7)	0.61 (0.35)	8	0.47	3.3	1.0	330	-06	-07		191
<b>FN 2090-8-..</b>	8 (8.9)	0.61 (0.35)	8	0.47	3.3	1.0	330	-06	-07		330
<b>FN 2090-10-..</b>	10 (11.2)	0.61 (0.35)	8	0.47	3.3	1.0	330	-06	-07	-08	369
<b>FN 2090-12-..</b>	12 (13.4)	0.93 (0.54)	4	1	10	1.0	220	-06	-07	-08	391
<b>FN 2090-16-..</b>	16 (17.9)	0.93 (0.54)	4	1	10	1.0	220	-06	-07	n.a.	425
<b>FN 2090-20-..</b>	20 (22.4)	0.93 (0.54)	2.7	1	10	1.0	220	-06		-08	530
<b>FN 2090-30-08</b>	30 (33.5)	0.93 (0.54)	1.5	1	10	1.0	220			-08	548
<b>FN 2090 A-1-..</b>	1 (1.1)	0.13 (0.07)	20	0.22	0.47	0.47	680	-06	-07		73
<b>FN 2090 A-3-..</b>	3 (3.4)	0.13 (0.07)	14	0.33	0.47	0.47	470	-06	-07		158
<b>FN 2090 A-4-..</b>	4 (4.5)	0.13 (0.07)	14	0.33	0.47	0.47	470	-06	-07		176
<b>FN 2090 A-6-..</b>	6 (6.7)	0.13 (0.07)	8	0.47	0.47	0.47	330	-06	-07		191
<b>FN 2090 A-8-..</b>	8 (8.9)	0.13 (0.07)	8	0.47	0.47	0.47	330	-06	-07		330
<b>FN 2090 A-10-..</b>	10 (11.2)	0.13 (0.07)	8	0.47	0.47	0.47	330	-06	-07	-08	369
<b>FN 2090 A-12-..</b>	12 (13.4)	0.13 (0.07)	4	1	0.47	0.47	220	-06	-07	-08	391
<b>FN 2090 A-16-..</b>	16 (17.9)	0.13 (0.07)	4	1	0.47	0.47	220	-06	-07	n.a.	425
<b>FN 2090 A-20-..</b>	20 (22.4)	0.13 (0.07)	2.7	1	0.47	0.47	220	-06		-08	530
<b>FN 2090 A-30-08</b>	30 (33.5)	0.13 (0.07)	1.5	1	10	10	220			-08	548
<b>FN 2090 B-1-..</b>	1 (1.1)	0.00	20	0.22			680	-06	-07		73
<b>FN 2090 B-3-..</b>	3 (3.4)	0.00	14	0.33			470	-06	-07		158
<b>FN 2090 B-4-..</b>	4 (4.5)	0.00	14	0.33			470	-06	-07		176
<b>FN 2090 B-6-..</b>	6 (6.7)	0.00	8	0.47			330	-06	-07		191
<b>FN 2090 B-8-..</b>	8 (8.9)	0.00	8	0.47			330	-06	-07		330
<b>FN 2090 B-10-..</b>	10 (11.2)	0.00	8	0.47			330	-06	-07	-08	369
<b>FN 2090 B-12-..</b>	12 (13.4)	0.00	4	1			220	-06	-07	-08	391
<b>FN 2090 B-16-..</b>	16 (17.9)	0.00	4	1			220	-06	-07	n.a.	425
<b>FN 2090 B-20-..</b>	20 (22.4)	0.00	2.7	1			220	-06		-08	530
<b>FN 2090 B-30-08</b>	30 (33.5)	0.00	1.5	1			220			-08	548
<b>Enhanced performance</b>											
<b>FN 2090 KK-1-06</b>	1 (1.15)	3.46 (1.99)	20	0.22	22	22	680	-06			95
<b>FN 2090 NN-3-06</b>	3 (3.4)	15.71 (9.05)	14	0.33	100	100	470	-06			200
<b>FN 2090 NN-4-06</b>	4 (4.5)	15.71 (9.05)	14	0.33	100	100	470	-06			210
<b>FN 2090 NN-6-06</b>	6 (6.7)	15.71 (9.05)	8	0.47	100	100	330	-06			220
<b>FN 2090 NN-8-06</b>	8 (8.9)	15.71 (9.05)	8	0.47	100	100	330	-06			340
<b>FN 2090 LL-10-06</b>	10 (11.2)	5.18 (2.98)	8	0.47	33	33	330	-06		-08	470
<b>FN 2090 LL-12-06</b>	12 (13.4)	5.18 (2.98)	4	1	33	33	220	-06		-08	500
<b>FN 2090 LL-16-06</b>	16 (17.9)	5.18 (2.98)	4	1	33	33	220	-06		n.a.	530
<b>FN 2090 LL-20-..</b>	20 (23)	5.18 (2.98)	2.7	1	33	33	220	-06		-08	580
<b>FN 2090 LL-30-08</b>	30 (33.5)	5.18 (2.98)	1.5	1	33	33	220			-08	600

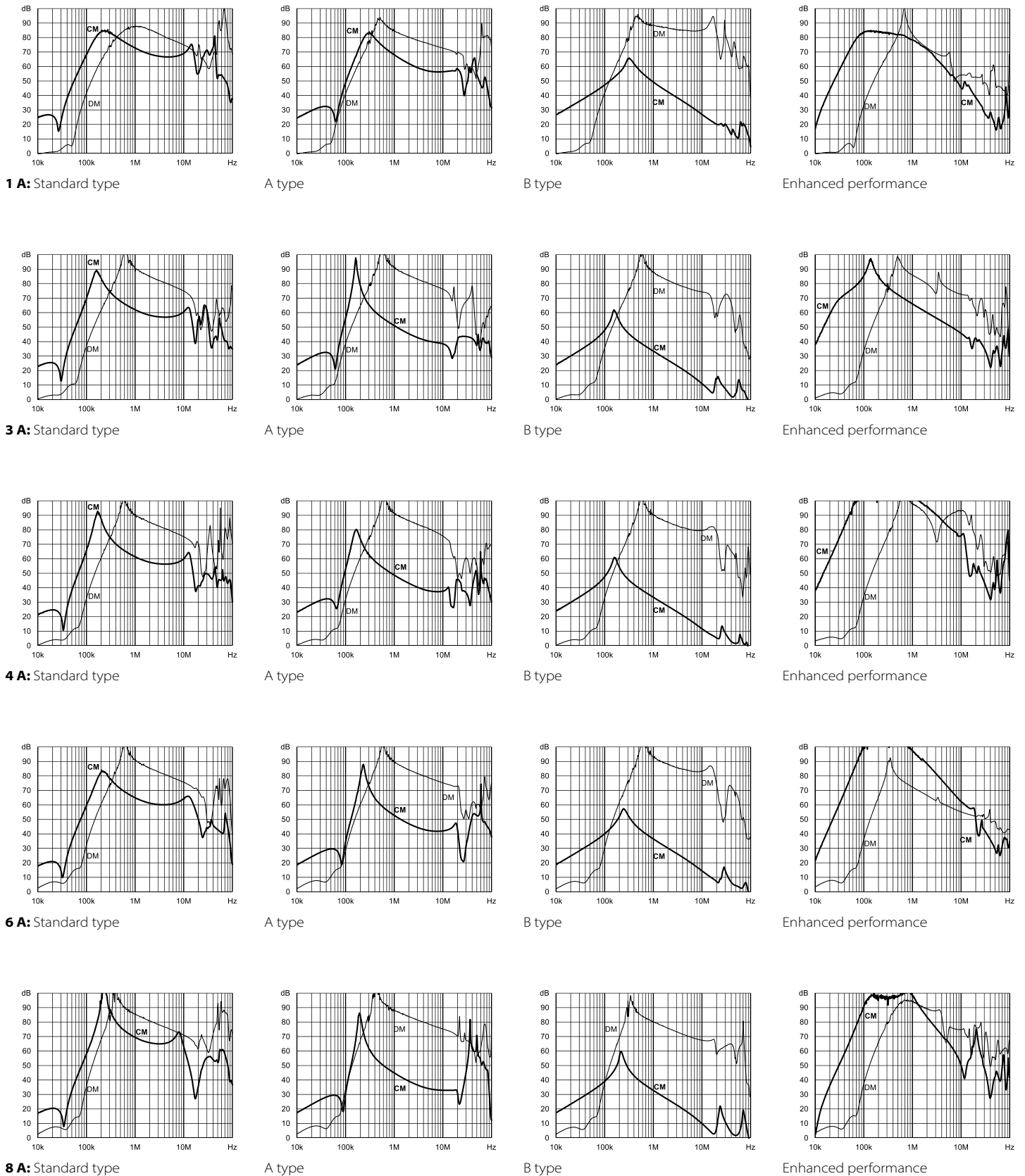
\*\* To compile a complete part number, please replace the .. with the required I/O connection style.

For surge pulse protection, please add Z (e.g. FN 2090Z-10-06, FN 2090BZ-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

### Typical filter attenuation

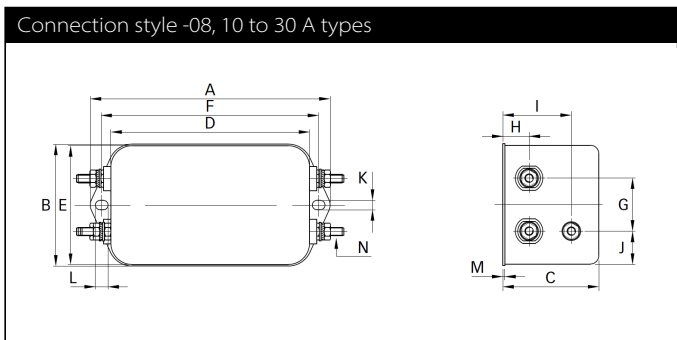
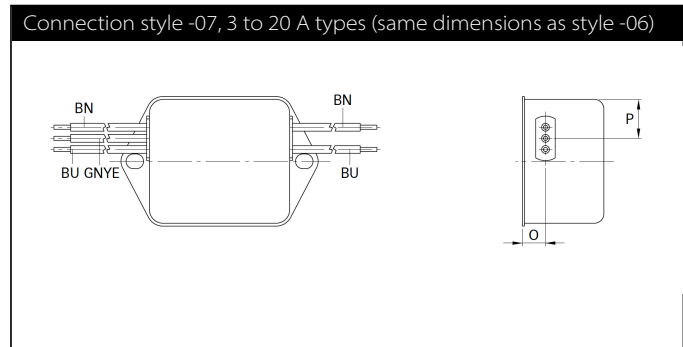
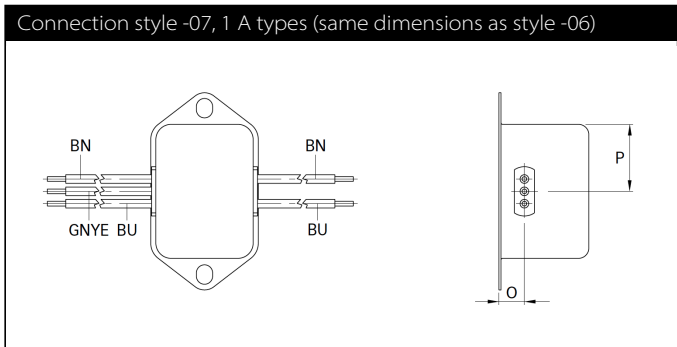
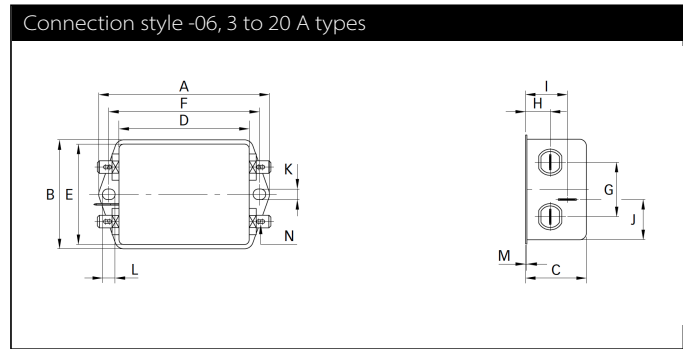
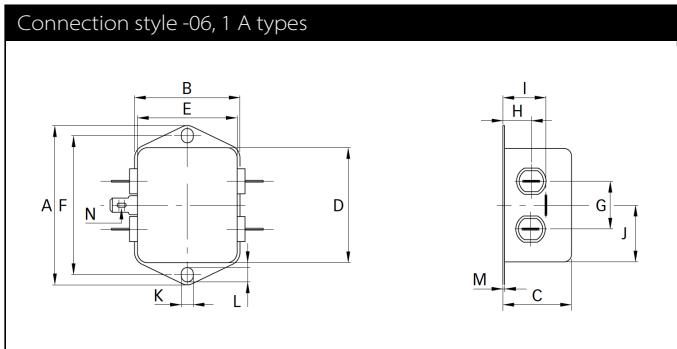
Per CISPR 17; A=50 Ω/50 Ω sym; B=50 Ω/50 Ω asym





Product selector		
	06	Faston 6.3 × 0.8 mm (spade/soldering)
	07	Wire leads
	08	Studs (M4 screws)
	1 to 60	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



## Dimensions

	1 A	3 A	4 A	6 A	8 A	10 A	12 A	16 A	20 A	30 A	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	1	1	1	1	1	1	±0.3
<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			+5
<b>Connection style -08</b>											
<b>N</b>						M4	M4	M4	M4	M4	
<b>Recommended torque (Nm)</b>						1.2 - 1.3	1.2 - 1.3	1.2 - 1.3	1.2 - 1.3	1.2 - 1.3	
<b>Earth terminal</b>						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](http://www.schaffner.com) to find more details on filter connectors.



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