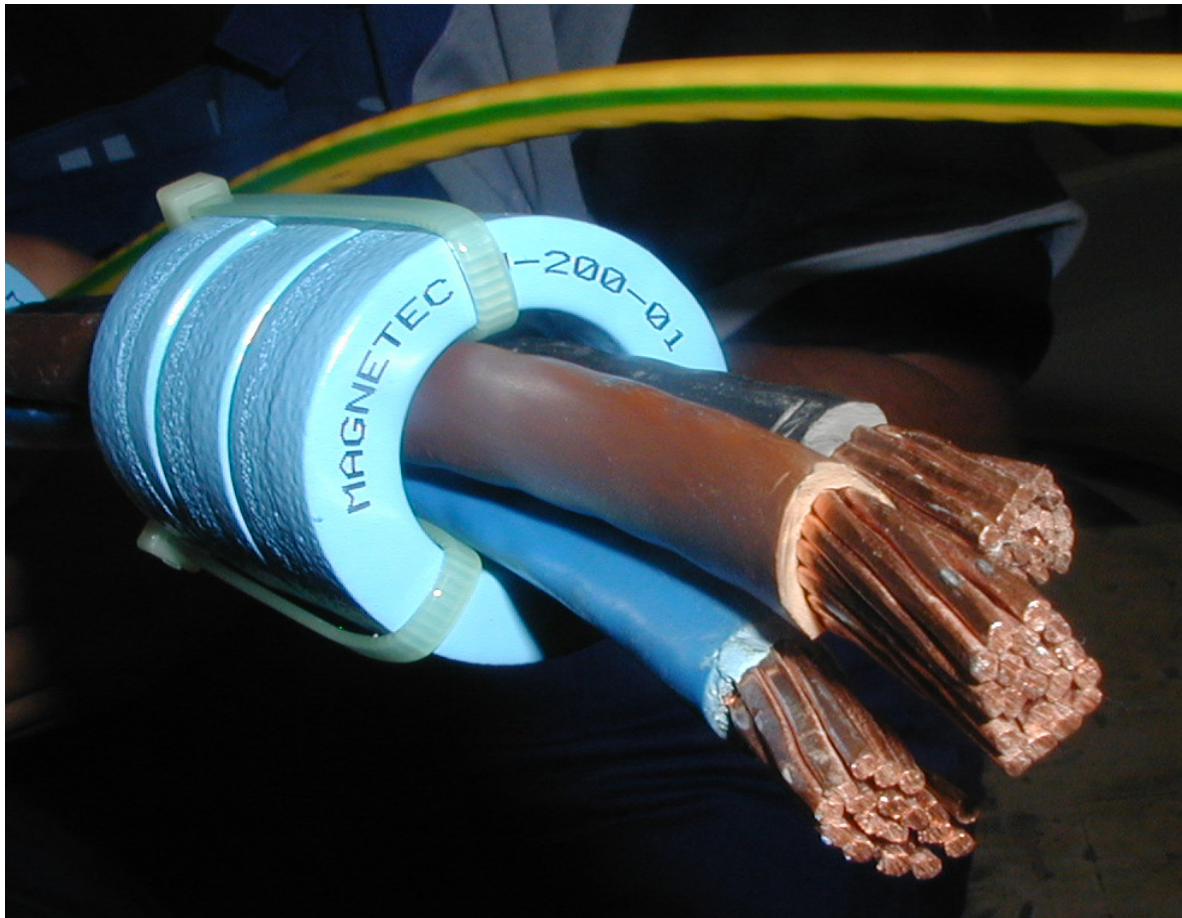


Nanocrystalline Material

For Current Transformers and Common Mode Chokes

2010 Catalog



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NANOPERM® - a softmagnetic alloy for universal use

NANOPERM® is a rapidly quenched iron based alloy with a fine crystalline microstructure. The typical grain size is only 10nm - this is why the material is called '*nanocrystalline*'. This fine material structure is the reason for extraordinary softmagnetic properties which can be controlled in a wide range by an annealing process under the presence of external magnetic fields.

Material properties of NANOPERM® (nominal values)

• Saturation flux density B _{sat}	1,2	T
• Saturation magnetostriction	< 0,5	ppm
• Specific electrical resistivity	115	μOhmcm
• Density	7,35	g/cm ³
• Curie temperature T _c	600	°C
• Min. operational temperature T _{min}	- 40	°C
• Max. operational temperature T _{max}	+ 120 (180)	°C
• Core losses (0.3T/100kHz, sine) P _v	< 110	W/kg
• Tape thickness d	17 / 23	μm
• Grain size (typ.)	10	nm
• Permeability μ	20.000 - 200.000	
• Alloy composition	Fe _{73,5} Cu ₁ Nb ₃ Si _{15,5} B ₇	

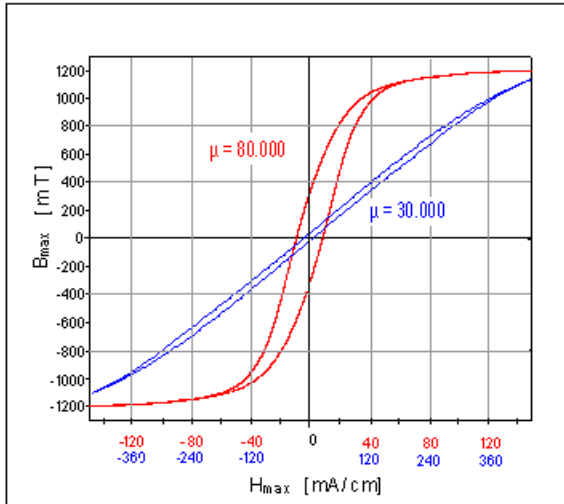
Product overview

The cores made of the nano-crystalline alloy **NANOPERM®** are conceived for the universal use in power electronics. A main application here is the *electromagnetic compatibility* (EMC). For this application, we offer wound cores in form of filter chokes, too. **NANOPERM®** cores are used in SMPS for push-pull transformers up to 200kHz and current transformers. Compared to ferrites, the **build volume** of inductive components based on **NANOPERM®** is always **significantly smaller**.

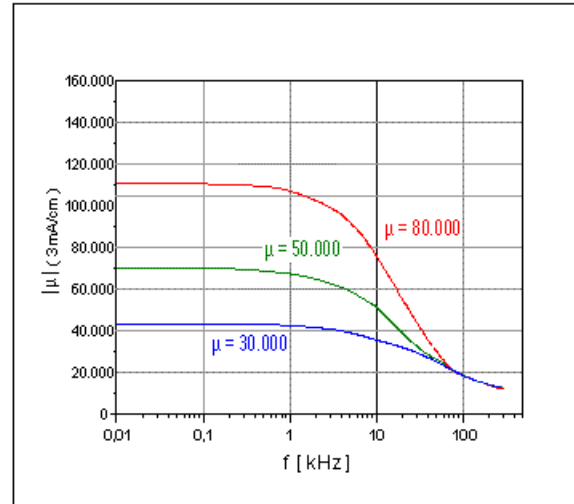
• Nanocrystalline toroidal cores	
- Material Properties of NANOPERM®	P. 2
- NANOPERM® LM tape wound cores	P. 3
- COOL BLUE® tape wound cores	P. 4
- NANOPERM® Low Cost tape wound cores	P. 5
- Standard cores made of NANOPERM®	P. 6-8
• Current compensated EMI filter chokes	
- 2- and 3-fold chokes	P. 9-10
- Design-Checklist for Common Mode Chokes	P. 11
• Tape wound cores for electronical energy meters	
- Design-Checklist for Current Transformers	P. 12
• Magnetec close to you	
	P. 13
	P. 14

®NANOPERM; COOL BLUE: Registered trademarks of MAGNETEC GmbH

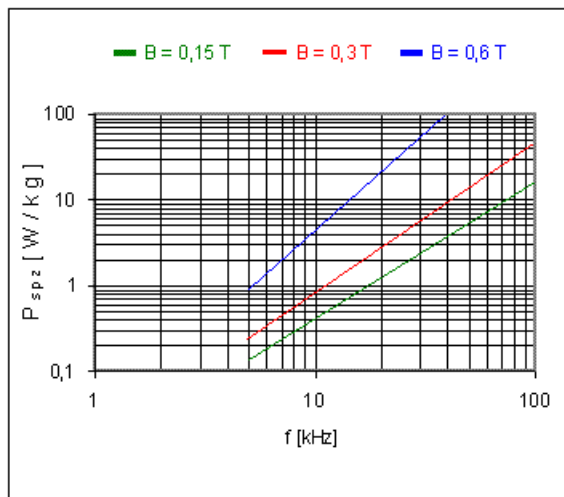
Typical material properties of NANOPERM®



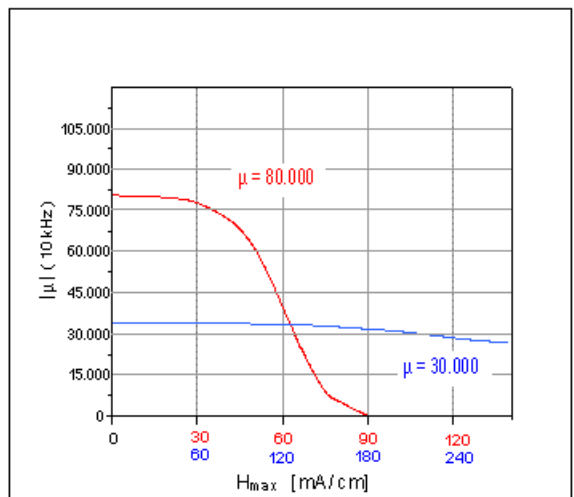
Adjustable hysteresis shapes (static, 50 Hz)



Frequency response



Losses ($B =$ unipolar peak value)



DC-behaviour










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NANOPERM® LM Cores for DC biased applications

Our **NANOPERM® LM** cores are very much advantageous in **EMC filters** for applications with a high amount of asymmetric interference current (e.g. inverter drives) concerning **smaller build volume** and/or **broadband attenuation performance** compared to the established Ferrite materials. The reason for that is, that the nanocrystalline core material offers **three times as much saturation flux density** at the same level of permeability.

Design: Cased in plastic box (material UL listed, QMFZ2 E41871 and QMFZ2 E41938)

Standard range μ 8.000

Type	Bare Core Size do x di x h [mm]	Fixed Core Size OD x ID x H [mm]	l _{fe} [cm]	a _{fe} [cm ²]	AI @ 100kHz [μH]	I _{sat} * [A]	PU [pc.]	Web-shop
M-449	25 x 16 x 10	28,2 x 13,2 x 12,6	6,3	0,34	3,19 - 6,37	6	378	
M-450	30 x 20 x 10	32,7 x 17,8 x 12,6	7,8	0,37	2,90 - 5,79	7	120	
M-451	40 x 32 x 15	43 x 28,8 x 17,2	11,3	0,46	2,39 - 4,77	11	30	
M-452	63 x 50 x 30	68,7 x 44,1 x 35	17,4	1,60	5,50 - 10,98	17	16	
M-453	80 x 63 x 30	84,7 x 57 x 35,4	22,2	1,90	5,12 - 10,22	22	12	
M-689	100 x 80 x 10	104,5 x 74,8 x 14,6	28,2	0,78	2,2 - 3,8	27		-
M-698	100 x 80 x 30	104,5 x 74,8 x 35,0	28,2	2,32	6,7 - 11,6	27	12	-
M-454	102 x 76 x 25	108,2 x 69,8 x 30,2	27,8	2,41	5,19 - 10,36	27	12	
M-455	130 x 100 x 30	135 x 94,6 x 33,8	35,9	3,33	5,55 - 11,08	35	4	
M-456	160 x 130 x 30	165,2 x 122,8 x 33,2	45,0	3,50	4,65 - 9,29	44	5	
M-457	200 x 175 x 30	208 x 166 x 37	58,0	2,72	2,81 - 5,61	57	2	
M-751	238 x 202 x 30	OVAL	69,0	4,00	4,7 - 8,1	75		-
M-582	300 x 250 x 30	304 x 246 x 36	86,2	5,60	5,2 - 9,0	85	1	-

* Saturation Current (peak value) at 1 turn

On request selected core types with permeability levels of 1.000, 2.000 und 4.000 are available.

NANOPERM®: Registered trademark of MAGNETEC GmbH

COOL BLUE® Cores to reduce motor-bearing currents



COOL BLUE® toroids made from the nano-crystalline core material **NANOPERM®** are being used increasingly to reduce damaging

motor bearing currents in modern high power inverter systems operating at high switching frequencies. As a result of these unwanted currents, the bearings corrugate, leading to electrical breakdown in the lubrication and finally to a standstill of the entire motor.

The use of **COOL BLUE®** cores not only significantly reduces the over voltage peaks at the motor terminals, but also suppresses the asymmetrical EMI currents which are generated by the parasitic capacities of the motor itself together with the motor cable. In order to achieve an efficient reduction in these destructive effects, one or more **COOL BLUE®** cores of suitable geometry have to be placed together over the connector cables in the DC-link as well as at the inverter output. In this configuration, the cores operate as a common-mode choke.

This method significantly **increases the service life of the motor bearings** and thus **reduces maintenance costs and standstill periods**.

Core fixing: Cased in plastic box (material UL listed, file no. QMFZ2 E41938)

Standard range

Type	Bare Core Size od x id x h [mm]	Fixed Core Size OD x ID x H [mm]	l _{fe} [cm]	a _{fe} [cm ²]	AI @ 10kHz [μH]	I _{sat} * [A]	Web-shop
M-112	63 x 50 x 30	68 x 43 x 36	17,7	1,44	23,3 - 46,6	4	
M-649	63 x 50 x 30	OVAL	17,7	1,44	23,3 - 46,6	4	-
M-378	75 x 50 x 30	80 x 43 x 36	19,4	2,78	37,3 - 74,6	5	-
M-113	80 x 63 x 30	85 x 57 x 35,5	22,4	1,86	24,1 - 48,2	6	
M-283	80 x 63 x 30	OVAL	22,4	1,86	24,1 - 48,2	6	
M-114	100 x 80 x 30	105 x 75 x 35	28,2	2,25	22,5 - 45,0	8	
M-284	100 x 80 x 30	OVAL	28,2	2,25	22,5 - 45,0	8	
M-142	130 x 100 x 20	OVAL	37,0	2,12	16,0 - 32,0	9	
M-115	130 x 100 x 30	135 x 94 x 34	35,9	3,33	24,6 - 52,9	9	
M-116	160 x 130 x 30	165 x 123 x 34	45,4	3,24	20,9 - 45,0	12	
M-302	160 x 130 x 30	OVAL	44,7	3,30	20,9 - 45,0	12	
M-117	200 x 175 x 30	208 x 166 x 37	58,8	2,74	12,3 - 24,6	16	
M-111	236,5 x 201 x 30	OVAL	69,6	3,94	14,5 - 29,9	20	
M-248	300 x 254 x 30	OVAL	87,1	5,20	15,8 - 31,5	22	
M-205	300 x 254 x 30	304 x 246 x 36	87,1	5,20	15,8 - 31,5	22	
M-503	500 x 450 x 30	513 x 437 x 37	149	5,60	8,0 - 20,0	40	

* Saturation Current (peak value) at 1 turn

















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NANOPERM® Low Cost Cores for small EMI Filter Chokes

This new **NANOPERM® LC** standard range is specially designed for common mode filter chokes; i.e. maximum attenuation is achieved with a minimum of material. This is an interesting alternative to existing Ferrite based solutions.

Main advantages: **Small build volume/weight, high leakage inductance, high and uniform attenuation, high working temperature and good stability.**

Design: Cased in plastic box (material UL listed, file no. QMFZ2 E41938)

Standard range μ 30.000							
Type	Nom. dim. da x di x h [mm]	Phys. dim. OD x ID x H [mm]	lfe [cm]	afe [cm ²]	AI @ 10kHz [μ H]	PU [pc.]	Web-shop
M-306	16 x 11 x 5	18,4 x 8,6 x 7,0	4,19	0,1	5,9 - 11,8	990	
M-307	20 x 15 x 5	22,4 x 12,6 x 7,5	5,46	0,1	4,5 - 9,1	675	
M-308	25 x 20 x 5	27,7 x 17,1 x 7,5	7,04	0,1	3,5 - 7,0	567	
M-309	30 x 25 x 5	32,7 x 22,0 x 7,5	8,62	0,1	2,8 - 5,7	315	
M-310	40 x 35 x 5	42,5 x 31,8 x 7,5	11,8	0,1	2,1 - 4,2	216	
M-333	50 x 45 x 5	52,2 x 41,8 x 7,5	14,9	0,1	1,6 - 3,3	135	
M-334	60 x 55 x 5	62,0 x 51,6 x 7,5	17,7	0,1	1,3 - 2,8	100	
M-335	70 x 65 x 5	72,0 x 61,4 x 7,5	20,9	0,1	1,1 - 2,3	80	
Standard range μ 90.000							
Type	Nom. dim. da x di x h [mm]	Phys. dim. OD x ID x H [mm]	lfe [cm]	afe [cm ²]	AI @ 10kHz [μ H]	PU [pc.]	Web-shop
M-606	16 x 11 x 5	18,4 x 8,6 x 7,0	4,14	0,1	18,4 - 36,8	990	
M-607	20 x 15 x 5	22,4 x 12,6 x 7,5	5,39	0,1	14,1 - 28,3	675	
M-608	25 x 20 x 5	27,7 x 17,1 x 7,5	6,95	0,1	11,0 - 21,9	567	
M-609	30 x 25 x 5	32,7 x 22,0 x 7,5	8,50	0,1	9,0 - 17,9	315	
M-610	40 x 35 x 5	42,5 x 31,8 x 7,5	11,6	0,1	6,6 - 13,1	216	
M-633	50 x 45 x 5	52,2 x 41,8 x 7,5	14,7	0,1	5,2 - 10,4	135	
M-634	60 x 55 x 5	62,0 x 51,6 x 7,5	17,7	0,1	4,3 - 8,6	100	
M-635	70 x 65 x 5	72,0 x 61,4 x 7,5	20,8	0,1	3,6 - 7,3	80	

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Nanocrystalline toroids based on NANOPERM®
Standard range with **outer diameters < 30mm**

Type	Bare Core Size do x di x h [mm]	Fixed Core Size OD x ID x H [mm]	μ @10kHz	l _{fe} [cm]	a _{fe} [cm ²]	AI @10kHz [μH]	Fix*	PU [pc.]	Web-shop
M-388	10x7x5	11,4x5,4x6,3	60k	2,6	0,06	11,7-24,2	C	1280	
M-695	11x7x5	12,5x5,5x6,2	30k	2,8	0,07	6,9-13,9	E	1280	
M-073	12x8,5x6	12,9x7,6x6,7	80k	3,2	0,08	18,5-37,1	E	1100	
M-075	13x9,3x6	14x8,2x6,7	30k	3,5	0,09	5,7-13,4	E	1100	
M-104	16x10x6	17,8x8x8	25k	4,0	0,12	7,9-15,8	C	990	
M-036	16x10x6	17,8x8x8	25k	4,0	0,13	7,9-15,8	E	990	
M-125	16x10x6	17,8x8,2x8	30k	4,0	0,12	9,5-19,0	C+	360	
M-017	16x10,2x6	17,8x8,2x8	100k	4,0	0,13	30,0-60,0	C+	990	
M-060	16x10,2x6	17,8x8,2x8	100k	4,0	0,13	30,0-60,0	C	990	
M-118	16x10,2x6	18x8,5x8	90k	4,0	0,13	28,4-56,9	C+	360	
M-180	16x10x6	17,1x9,1x7,1	80k	3,9	0,15	24,5-48,0	E	990	
M-069	16x10x15	17,3x8,5x17,3	60k	4,0	0,36	> 47,0	E	650	
M-551	20x12,5x5	22,5x10,3x7	30k	5,0	0,14	7,4-14,8	C	750	
M-076	20x12,5x8	22,3x10,3x10	25k	5,0	0,22	9,7-19,5	C	525	
M-042	20x12,5x8	21,5x10,5x10,1	30k	5,0	0,24	12,6-25,3	E	288	
M-556	20x12,5x8	22,3x10,3x10	30k	5,0	0,23	12,6-25,3	C	525	
M-059	20x12,5x8	22,3x10,3x10	80k	5,1	0,24	33,0-67,0	C	525	
M-058	21,5x12,5x10	23x10,5x11,5	25k	5,3	0,36	14,0-27,0	E	240	
M-162	23x12x15	25,0x10x17	20k	5,3	0,66	25,0-43,7	E	240	
M-224	24x15x8	25,5x13,5x10	25k	6,0	0,29	10,0-21,0	E	384	
M-061	25x20x10	27,6x17,8x12,5	30k	7,1	0,20	6,6-15,0	C+	108	
M-053	25x20x10	27,6x17,8x12,5	90k	7,1	0,20	22,6-41,3	C+	378	
M-033	25x16x10	26,6x13,7x12,3	25k	6,3	0,32	11,4-22,8	E	525	
M-062	25x16x10	28x13,2x12,4	30k	6,4	0,36	13,7-27,4	C+	378	
M-074	25x16x10	28x13,2x12,4	90k	6,4	0,36	> 40,0	C+	378	
M-003	25x16x10	28x13,2x12,4	>63k	6,4	0,36	45,0-89,0	C+	378	
M-070	26x16x12	27,3x14x14	>70k	6,6	0,48	> 58,0	E	240	

* E: Epoxy / C: Plastic case / C+: Plastic case with separator holder

Preferential types in **bold** / *Italic* types are low loss high quality grade

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Note: In case of wire winding we recommend not to wound the wire directly on the epoxy coating, but to cover the core with foil first!

Nanocrystalline toroids based on NANOPERM®
Standard range with **outer diameters 30mm - 50mm**

Type	Bare Core Size do x di x h [mm]	Fixed Core Size OD x ID x H [mm]	μ @10kHz	lfe [cm]	afe [cm ²]	AL @10kHz [μ H]	Fix*	PU [pc.]	Web-shop
M-091	30x17x8	31,6x15,7x10,3	30K	7,2	0,42	15,3-30,5	E	180	-
M-498	30x25x8	32,0x23,0x10,0	30K	8,6	0,15	4,4-9,0	E	280	-
M-123	30x20x10	32,7x17,8x12,6	30K	7,8	0,40	13,6-27,2	C+	210	
M-421	30x20x10	32,0x18,0x12,0	45K	7,7	0,36	18,6-37,3	E	210	-
M-016	30x20x10	32,7x17,8x12,6	90K	7,8	0,38	40,0-80,0	C+	210	
M-102	30x20x10	32,9x17,7x12,6	90K	7,8	0,38	40,0-80,0	C	210	
M-030	30x20x15	32,3x17,5x17,3	30K	7,9	0,57	17,4-39,0	E	108	
M-046	31,5x20x15	32,9x18,5x17,2	>60K	8,0	0,67	> 66,0	E	175	-
M-045	34x24x15	35,5x22,0x17,5	30K	9,0	0,60	16,7-32,0	E	175	-
M-014	40x32x15	42,3x29,1x17,3	30K	11,3	0,44	10,7-21,4	E	120	-
M-294	40x32x15	43,0x28,8x17,2	30K	11,3	0,48	10,7-21,4	C	120	
M-087	40x32x15	42,3x29,1x17,3	30K	11,3	0,48	10,7-21,4	E+	96	
M-151	40x32x15	42,3x29,1x17,3	40K	11,3	0,44	16,0-30,0	E	120	-
M-295	40x32x15	43,0x28,8x17,2	40K	11,3	0,48	16,0-30,0	C	120	-
M-381	40x32x15	43,0x28,8x17,2	>90K	11,3	0,47	> 33,0	C	120	
M-039	40x25x15	41,8x23,2x17,2	>70K	10,0	0,88	> 70,0	E	120	-
M-157	40x25x15	41,8x23,2x17,2	>70K	10,2	0,90	> 70,0	E+	96	
M-083	40x25x15	43,5x22,5x18,5	>80K	10,0	0,88	> 75,0	T	96	
M-006	40x25x15	42,3x22,4x17,3	30K	9,9	0,80	22,0-44,0	E	120	
M-382	40x25x15	43,5x22,5x18,5	30K	9,9	0,87	21,9-43,8	C	96	
M-044	45x30x20	47,5x28,0x22,2	>60K	11,8	1,20	> 75,0	E	60	-
M-047	50x40x15	52,3x37,1x17,3	20K	14,1	0,60	6,6-15,0	E	60	-
M-081	50x32x15	52,5x29,5x17,3	20K	12,5	1,00	12,6-29,4	E	75	-
M-011	50x40x20	52,3x37,1x22,3	30K	14,1	0,73	12,6-28,4	E	60	
M-227	50x40x20	52,3x37,1x22,3	30K	14,1	0,80	12,6-28,4	E+	60	
M-367	50x40x20	52,3x37,1x22,8	~25K	14,1	0,73	10,4-20,8	C	60	-
M-023	50x40x20	52,3x37,1x22,3	>60K	14,1	0,80	> 40,0	E	60	-
M-356	50x40x20	52,5x36,9x22,5	>60K	14,1	0,80	> 40,0	E+	60	-
M-049	50x40x20	OVAL	30K	14,1	0,80	12,6-28,4	E	70	
M-134	50x40x20	OVAL	45K	14,1	0,80	20,0-40,0	E	70	
M-127	50x40x20	OVAL	>60K	14,1	0,80	> 40,0	E	70	-
M-176	50x40x25	52,7x37,8x28,6	55K	14,1	1,00	34,4-68,7	E+	60	
M-177	50x40x25	52,7x37,8x28,6	30K	14,1	0,91	18,7-37,5	E+	30	
M-475	50x40x25	53,6x35,9x29,5	30K	14,1	0,91	18,7-37,5	C+	30	

E: Epoxy / E+: Epoxy + foil / C: Plastic case / C+: Plastic case with spacer holder

Preferential types in **bold** / *italic* types are low loss high quality grade

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Note: In case of wire winding we recommend not to wound the wire directly on the epoxy coating, but to cover the core with foil first!

Nanocrystalline toroids based on NANOPERM®
Standard range with **outer diameters > 50mm**

Type	Bare Core Size do x di x h [mm]	Fixed Core Size OD x ID x H [mm]	μ @10kHz	lfe [cm]	afe [cm ²]	AL @10kHz [μ H]	Fix*	PU [pc.]	Web-shop
M-623	55x40x25	57,5x37,1x27,8	20k	14,6	1,40	17,4-34,8	E	30	
M-012	60x40x15	62,3x37,1x17,3	30k	15,5	1,20	17,4-39,0	E	60	
M-476	60x40x30	63,5x35,5x35	30k	15,7	2,40	34,8-78,0	C+	20	
M-124	60x40x30	62,3x37,1x35	30k	15,7	2,40	34,8-78,0	E+	30	
M-018	63x50x20	65,5x46,6x22,8	30k	17,7	0,95	13,2-29,7	E	40	
M-068	63x50x25	65,6x47x27,5	25k	17,7	1,19	16,0-34,5	E	30	
M-088	63,5x51x25	65,5x48x27,3	85k	17,9	1,25	45,0-100	E	30	
M-112	63x50x30	68x43x36	30k	17,7	1,44	23,3-46,6	C	16	
M-649	63x50x30	OVAL	30k	17,7	1,44	23,3-46,6	C	-	-
M-378	75x50x30	80x43x36	30k	19,4	2,78	37,3-74,6	C	24	-
M-022	80x63x20	83x59,5x22,8	30k	22,4	1,28	15,1-30,1	E	20	
M-113	80x63x30	85,0x57x35,5	30k	22,4	1,86	24,1-48,2	C	12	
M-283	80x63x30	OVAL	30k	22,4	1,86	24,1-48,2	C	12	
M-226	100x80x20	104x75x23	30k	28,2	1,46	12,6-28,3	E+	16	-
M-094	100x80x25	104x75x28	25k	28,2	1,83	15,6-31,2	E+	12	
M-653	100x80x25	105,5x75x29,6	25k	28,2	1,83	15,6-31,2	C	12	
M-114	100x80x30	105x75x35	30k	28,2	2,25	22,5-45,0	C	12	
M-284	100x80x30	OVAL	30k	28,2	2,25	22,5-45,0	C	12	
M-152	100x80x30	104x75x33	>50k	27,8	2,24	> 55,0	E	12	-
M-071	100x75x25	108x70x29	>50k	27,3	2,52	> 55,0	E	12	
M-276	102x76x25	108,1x70x30,3	>50k	27,4	2,32	> 55,0	C	12	
M-142	130x100x20	OVAL	30k	37,0	2,12	16,0-32,0	C	12	
M-028	130x100x25	134,5x95x28,5	30k	36,0	2,85	18,6-42,0	E	6	
M-115	130x100x30	135x94x34	30k	35,9	3,33	24,6-52,9	C	6	
M-043	160x130x25	165x123x30	20k	45,4	2,74	10,0-20,0	C	6	
M-116	160x130x30	165x123x34	30k	45,4	3,24	20,9-45,0	C	5	
M-302	160x130x30	OVAL	30k	44,7	3,30	20,9-45,0	C	4	
M-117	200x175x30	208x166x37	30k	58,8	2,74	12,3-24,6	C	2	
M-111	236,5x201x30	OVAL	30k	69,6	3,94	14,5-29,9	C	2	
M-248	300x254x30	OVAL	30k	87,1	5,20	15,8-31,5	C	5	
M-205	300x254x30	304x246x36	30k	87,1	5,20	15,8-31,5	C	1	
M-503	500x450x30	513x437x37	30k	149	5,60	8,0-20,0	C	1	

* E: Epoxy / E+: Epoxy + foil / C: Plastic case / C+: Plastic case + spacer holder

Preferential types in **bold** / **COOL BLUE®** types in blue

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Note: In case of wire winding we recommend not to wound the wire directly on the epoxy coating, but to cover the core with foil first!

2-fold current compensated RFI suppression chokes for mains filters

Our chokes are based on toroidal tape wound cores based on nanocrystalline soft-magnetic material **NANOPERM®**. They combine **high attenuation levels** with **small build volume**. Compared to conventional ferrite solutions, a size reduction of up to 80% can be achieved!














The design is according to *EN60938-1* for 230V mains voltage, the max. working temperature is at 120°C (in special cases up to 180°C).

The rated currents are valid typically for 50-60°C ambient temperature. If the ambient temperature is lower or a forced air cooling is present, the allowable currents are significantly higher. Higher short term overcurrents are allowed, too.

The standard tolerance of the nominal inductance is -30%/+50%.

We offer to provide samples upon request. Ask for 2-phase versions via checklist (see page 11).

Standard range

Type	In [A]	Ln @ 10kHz [mH]	Ls [µH]	Rcu [mOhm]	Dimensions W x D x H [mm]	PU [pc.]	Web-shop
MB-090	2,6*	25	17	85	22 x 22 x 12,7	300	
MB-031	3,6*	11	8	40	22 x 22 x 12,7	300	
MB-002	4	71	55	65	34 x 19 x 35,5	120	
MB-018	4	6,8	8	23	22 x 22 x 12,7	300	
MB-040	5	7,5	10	20	22 x 12 x 25	360	
MB-006	6	32	24	27	34 x 19 x 35,5	120	
MB-009	8	18	13	17	34 x 19 x 35,5	120	-
MB-039	8,5	8,0 (100kHz)	20	21	34 x 19 x 35,5	120	
MB-022**	8,5	0,33 (100kHz)	4	8,5	34 x 19 x 35,5	120	-
MB-032	10*	2,8	3	7	22 x 12 x 25	360	
MB-027	10	12	9	12	34 x 20 x 31	120	-
MB-003	10	12	9	12	34 x 19 x 35,5	120	
MB-184	16	3,0	12	2,5	30 x 20 x 30	120	-
MB-007	16	6	5	6	34 x 19 x 35,5	120	
MB-020	20	33	12	8	59 x 59 x 33,5	24	-
MB-021**	20	1,6	8	8	59 x 59 x 23	40	-
MB-008	25	0,5	1	2	34 x 19 x 35,5	120	
MB-005	25*	2,5	5	4	34 x 19 x 35,5	120	
MB-015	28*	1,7	2	1,7	34 x 19 x 35,5	120	
MB-033	30	1,0	2	2	34 x 19 x 35,5	120	-

* forced cooling only / ** capable for high imbalance currents

Preferential types in **bold**

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3-fold current compensated RFI suppression chokes for mains filters

Our chokes are based on toroidal tape wound cores based on nanocrystalline soft-magnetic material **NANOPERM®**. They combine **high attenuation levels** with **small build volume**. Compared to conventional ferrite solutions, a size reduction of up to 80% can be achieved!






The design is according to *EN60938-1* for 500V mains voltage, the max. working temperature is at 120°C (in special cases up to 180°C).

The rated currents are valid typically for 50-60°C ambient temperature. If the ambient temperature is lower or a forced air cooling is present, the allowable currents are significantly higher. Higher short term overcurrents are allowed, too.

The standard tolerance of the nominal inductance is -30%/+50%.

We offer to provide samples upon request. Ask for 3-phase versions via checklist (see page 11).

Standard range

Type	In [A]	Ln @ 10kHz [mH]	Ls [mH]	Rcu [mOhm]	Pin Ø [mm]	Dimensions W x D x H [mm]	PU [pc.]	Web-shop
MB-050**	8	11	40	14	1,6	59 x 59 x 28	32	-
MB-052**	14	4	20	7	1,8	73 x 73 x 27	24	
MB-037	16	4,4	12	5,5	1,4	48 x 48 x 26	45	
MB-043	25	1,5	12	2,8	2,5	51 x 51 x 39	-	-
MB-053**	18	3	15	4,5	2,24	73 x 73 x 35	24	
MB-054	27	3,2	9	2,6	3,0	73 x 73 x 35	24	
MB-091	30	3,2	5	1,8	2,5	51 x 51 x 39	-	-
MB-157	36*	6,2	22	5,5	2,36	75 x 75 x 34	18	
MB-047	50*	4	18	3,2	3	73 x 73 x 70	-	-
MB-056**	60	3,6	15	1,3	9,3	115 x 115 x 50	4	-
MB-057	100	2,5	10	0,7	11,5	130 x 130 x 55	2	-
MB-058**	160	2	10	0,5	22,5	158 x 158 x 75	2	-

* forced cooling only / ** capable for high imbalance currents

Preferential types in **bold**

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Checkliste zur Auslegung von Stromkompensierten Filterdrosseln Design Check List for Common Mode Chokes

Kunde / Customer	
Bearbeiter / Person in charge	
Anwendung / Application	

Datum / Date	
Telefon / Phone	
E-Mail / e-Mail	

Störquelle / Type of interfering device

Schaltnetzteil / Switch Mode Power Supply	
Frequenzumrichter / Frequency converter	
Sonstiges / Others	

1-phasig / single phase	
3-phasig / 3-phase	
Sonstiges / Others	

Betriebsdaten @ RT 25°C / Operational data @ RT 25°C

Betriebsspannung / Operating voltage	U_{op} [V]:	
Betriebsfrequenz / Operating frequency	f_{op} [Hz]:	
Nennstrom / Nominal current	I_n [A]:	
Max. Strom / Max. current	I_{max} [A]:	
Unsymmetriestrom / Unbalance current	I_{unb} [mA]:	
Max. Umgebungstemperatur / Max. ambient temperature	T_u [°C]:	
Schaltfrequenz / Switching frequency	f_s [Hz]:	

Kühlung / Cooling

Freie Konvektion / Free Convection	
Zwangskühlung / Forced cooling	[m/s]:

Drosselabmessungen / Choke dimensions

Max. Abmaße / Max. Outer dimensions	[mm]:	
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Drosselausführung / Choke position

Stehend / Upright	
Liegend / Flat	

Weitere Angaben zur Drossel / Additional informations about the choke

Nenninduktivität pro Wicklg. / Nominal inductance per winding	[mH]:	
Nenninduktivität pro Wicklg. / Nominal inductance per winding	[mH]:	
Widerstand pro Wicklg. / Copper resistance per winding	[Ω]:	

	@ f_1 [kHz]:	
	@ f_2 [kHz]:	

Allgemeine Produktinfo / General product infos

Bedarf pro Jahr / Quantity per year	
Zielpreis pro Stück / Target price per piece	
Serienstart / Start of serie production	

Bemusterung / Samples

Anzahl Muster / Sample quantity	
Liefertermin / Delivery date	

Bemerkungen / Remarks

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Nanocrystalline cores and current transformers made of NANOPERM® LM for electronic watt-hour meters

Our tape wound cores for electrical watt-hour-meters are mainly based on nanocrystalline material **NANOPERM® LM**.

Due to the **variable permeability levels, low losses** and **very high linearity**, they are suitable for electrical watt-hour meters for *household* according to IEC IEC 62053-21, -23 (**DC capable**) and they offer significantly **cost advantages** compared to Co-amorphous cores.

Finish: *Encapsulated in plastic case* (Material UL-listed, File-Nr. E41871)

Cores with other dimensions or permeability levels are also available upon request as well as complete wound transformers (see checklist on page 13).

Current transformer cores (1600 < μ < 3400) - DC capable

Type	Nom. dim. da x di x h [mm]	μ @ 50Hz, H = 1A/cm	l _{fe} [cm]	a _{fe} [cm ²]	I _p [A]	Fix	PU [pc.]
M-389	19,1 x 15,2 x 6	3400	5,4	0,09	0,25 - 20	Case	675
M-749	20 x 15,3 x 6	3400	5,5	0,12	0,5 - 40	Case	-
M-375	22 x 17 x 6	2000	6,1	0,12	0,5 - 60	Case	675
M-361	25 x 20,1 x 6	1600	7,1	0,11	1 - 100	Case	567
M-391	30 x 24,8 x 6	1600	8,6	0,12	1 - 120	Case	315
M-433	35,5 x 30,5 x 6	1900	10,4	0,12	1 - 160	Case	216

NEW: Current transformers, DC capable

Type	I _p max [A rms]	IDC,max [A peak]	N1 : N2	Phi (I) [°]	L [H]	R _{cu} [Ohm]	R _b [Ohm]	Abmessungen Da x Di x H [mm]	Type
MB-389	20	20	1:2500	4,8	4,4	< 80	37,5	28,5x5,0x14,0	Pins
MB-489									Wire
MB-749	40	40	1:2500	3,8	4,8	< 83	12,5	28,0x5,5x16,0	Pins
MB-849									Wire
MB-375	60	60	1:2500	4,9	2,9	< 67	12,5	30,5x8,5x14,0	Pins
MB-475									Wire
MB-361	100	100	1:2500	5,1	1,9	< 50	7,5	34,0x11,5x14,0	Pins
MB-461									Wire
MB-391	120	120	1:2500	4,3	1,7	< 36	6,25	39,0x12,0x17,5	Pins
MB-491									Wire

Types in grey are preliminary

I_p max / IDC max: Max. AC primary current / Max. hw rectified AC amplitude without saturation
 Phi (I) : Max. phase error for I < I_{p,max}
 L : Nom. inductance for I < I_{p,max}
 R_{cu} / R_b : Winding resistance / Burden resistor

Checkliste zur Dimensionierung von Stromwandlern (50/60Hz) Design check list for Current Transformers (50/60Hz)

Kunde / Customer		Datum / Date	
Bearbeiter / Person in charge		Telefon / Phone	
Anwendung / Application		E-Mail / e-Mail	

Gewünschtes Produkt / Required product

Kern / Core	<input type="checkbox"/>	Max. Abmessungen des Kerns / Max. core dimensions	D _A [mm]	
		Min. Durchmesser des Kernlochs / Min. hole diameter	D _I [mm]	
		Kernhöhe / Core height	h [mm]	
Bewickelter Kern / Wire wound core	<input type="checkbox"/>	Max. Abmessungen des CTs / Max. dimensions of wound core	D _A [mm]	
		Min. Durchmesser des CTs / Min. hole diameter of wound core	D _I [mm]	
		Höhe des bewickelten Kerns / Height of wound core	h [mm]	

Betriebsdaten @ Raumtemperatur 25°C / Operational data @ room temperature 25°C

Strom-Meßbereich / Current range		I _N [A _{eff}]: von / from		<input type="text"/>	bis / to	<input type="text"/>
Genauigkeit im Strom-Meßbereich / Accuracy in the current range	Phasenfehler / Phase error		φ [°]:		<input type="text"/>	
	Amplitudenfehler / Amplitude error		F(I) [%]:		<input type="text"/>	
Variation im Strom-Meßbereich / Variation in the current range	Phasenschwankung / Phase variation		Δφ [°]:		<input type="text"/>	
	Linearität / Linearity		ΔΦ(I) [%]:		<input type="text"/>	
Spannung am Bürdenwiderstand bei Maximalaussteuerung (I _{max}) / Voltage across burden resistor at maximum current (I _{max})			U _B [V _{eff}]:		<input type="text"/>	
Bürdenwiderstand / Burden resistor			R _B [Ω]:		<input type="text"/>	
Übersetzungsverhältnis / Transformation ratio		N _{prim} []:	<input type="text"/>	N _{sec} []:	<input type="text"/>	
Gleichstromtoleranz / DC tolerance	<input type="checkbox"/>	Max. Ampl. des hw-gleichgerichteten Stromes/ Max. amplitude of a halfrectified current		I _{max} [A]:		<input type="text"/>
		dabei max. Amplitudenfehler / corresponding amplitude error		F(I _{max}) [%]:		<input type="text"/>
Einsatztemperaturbereich / Ambient temperature range	Tmin [°C]:	<input type="text"/>	Δφ [°]:	<input type="text"/>	F(I) [%]:	<input type="text"/>
	Tmax [°C]:	<input type="text"/>	Δφ [°]:	<input type="text"/>	F(I) [%]:	<input type="text"/>

Allgemeine Produktinfos / General product infos

Bedarf pro Jahr / Quantity per year	
Zielpreis pro Stück / Target price per piece	
Serienstart / Start of serie production	

Bemusterung / Samples

Musteranzahl / Sample quantity	
Liefertermin / Delivery date	

Bemerkungen / Remarks

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