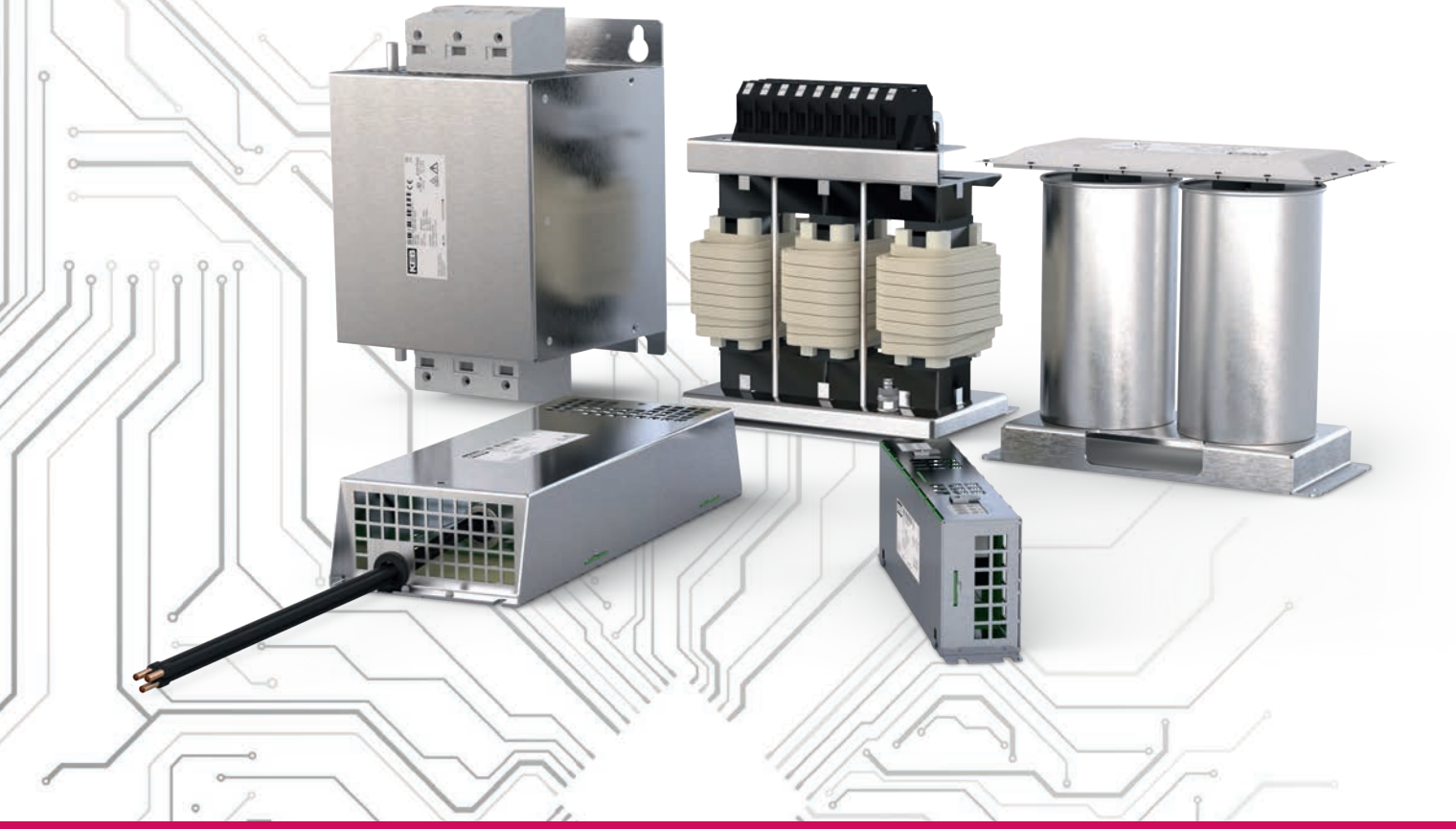


EMC **COMBILINE**

EMC SOLUTIONS

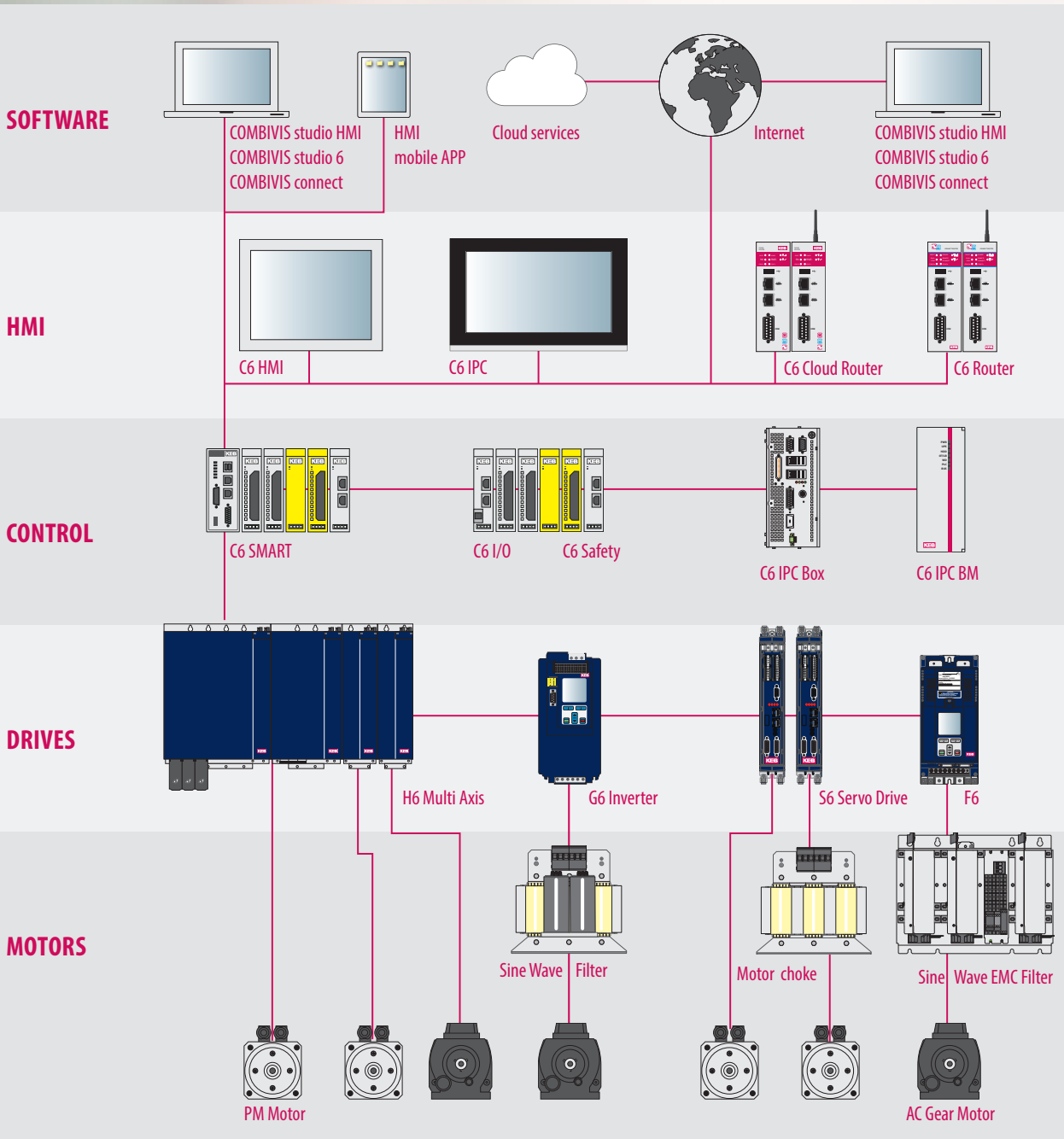
EN

CONTENTS

SYSTEM OVERVIEW

Automation **with Drive**
stands for system solutions from automation to mechanical movement. The EMC technology is integrated in the KEB portfolio and belongs to the parts that are often invisible. The practical implementation is integrated in drive controllers or alternatively as modular solution for single or combined axes.

In addition to compliance with valid standards, EMC technology has one goal: maximum operational safety of machines and systems.



ELECTROMAGNETIC COMPATIBILITY (EMC)

plays an important role in the operating safety of machines and equipment. Manufacturers and operators are required to implement the installed systems so as to achieve electrical compliance with the limits (for emissions) and requirements (for fault-free operations) set out in the standards and regulations.

To this end, the following standards must be applied as per the order below:
Product standard: This standard applies to an exactly defined application area that generally meets the special requirements of a product family.

Example: The so-called „power drives systems“ (PDS) (inverter and motor viewed in terms of a drive) belong to the product family standards EN 61800-x (-x). EN 61800-3 is the EMC standard.

Basic technical standard: This standard sets out the requirements for a specific environment.
Example: The EN 61000-6-x series applies to machine builders; it sets out the general EMC requirements for use either in a public low-voltage grid or an industrial grid.

EN 61000-6, -3 and -4	Emissions
EN 61000-6, -1 and -2	Emissions

Basic standard: This standard describes the measurement methods and instruments for the testing process itself, provides information on limits or minimum requirements without relating the same to a subsequent place of use. That is done by the basic technical standard. Basis for the EN 61000-4 -x standards series.

KEB develops, produces and supplies a comprehensive range of interference suppression components for the mains- and motor-related optimisation of operating conditions. With the help of a mobile EMC on-site service, our measurements and advisory services can assist you in selecting the proper components and their application. Calibrated measurement instruments and the relevant software can be used to prepare documents that verify compliance with EMC requirements.

NOMENCLATURE

Electrical		Mechanical	
I_N	Nominal current	Ø	Wire size
P_V	Power loss „calculated“	B	Total length from base
f_{Netz}	Mains frequency	H	Width from base
I_{ab}	Leakage current	H_1	Width from base - coil design or cable
P_{FU}	Nominal capacity drive controller [kW] or [HP]	T	Height from base - clamps
L	Inductance	a_1 a_2 a_3 a_4	Distance fastening holes
f_s	Switching frequency drive controller	d_1 d_2	Diameter fastening holes
f_{max}	Maximum motor frequency	Cu	Copper portion
U_{max}	Maximum operating voltage	m	Total weight

FILTERS AND CHOKES

The operation of variable-speed drives with intermediate voltage circuits puts stress on the mains and motor, which can be optimised with the following additional measures (depending on the place of use and type of application):

MAINS

- **Mains chokes** reduce harmonics and in-rush current to the mains and increase the service life of components in the devices.
- **Harmonics filters** reduce the harmonics resulting in sinusoidal current consumption without the voltage losses that occur with mains chokes.
- **HF filters** for high-frequency interference suppression of single and multi-axis systems
  - AC and DC standard filters reduced leakage current
  - IT networks

MOTOR

- **Output chokes** for application areas up to 100 Hz and in customer-specific solutions up to 2,000 Hz
- **Sinusoidal filters** create sinusoidal motor voltages and reduce motor losses. Available for maximum output frequencies in the range 100 Hz to 1,600 Hz.
- **Sinusoidal EMC filters** as a combination of sinusoidal filters with EMC level reduce symmetrical and asymmetrical interference and support compliance with statutory limits for installations without shielded motor cables (on request). More detailed description can be taken from the catalogue with the reference 0000000-41Z1.

MAINS CHOKES

optimise the harmonics to the mains power supply which result from the pulse-shaped charging of uncontrolled rectifiers and reduce the effective input current. This decrease in stress has the direct effect of significantly increasing the service life of the link voltage capacitors in inverters and servo drives and reducing the stress on the input rectifier.

Chokes for single-phase or three-phase units are universally designed for a frequency range of 45 - 65 Hz. Nominal inductance is determined by the 4 percent short circuit voltage at nominal current and frequency. In the area of the chokes, a sufficiently large installation space must be considered due to increased heat emission and a strong magnetic stray field.

GENERAL TECHNICAL DATA

Protection class	IP20 (version 1), IP00 (version 2)
max. leakage current	0 mA
Overload	150 % - 60 sec.
Climate category	3K3 (EN 60721-3-3)
Vibration /Schock	3M4 (EN 60721-3-3)
Technical principles	EN 61558-2-20, VDE 0160

Cooling	Convection
Voltage drop	Uk = 4 %
Temperature	Storage -25 ... 70°C Operation -10 ... 45°C
Environment (IEC 664-1)	Pollution level 2
Installation position	standing or lying horizontally
Approvals	UR and cUR

USER BENEFITS

- Relieves the load on supply cables and transformers
- Protects the input rectifier of the Drive Controller from „soft“ supply networks
- Increases electrolytic capacitor life by limiting input currents

MAINS CHOKE 1-PHASE 230 V AC (U_{max} = 264 V), 50/60 HZ

Part-No.	I_N [A]	P_V [W]	f_{Netz} [Hz]	Ø [mm²]	B [mm]	H [mm]	H_1 [mm]	T [mm]	a_1 [mm]	a_3 [mm]	d_1 [mm]	d_2 [mm]	Weight Cu [kg]	Weight m [kg]
05Z1B02-1000	6	9	45-65	4	60	47	53	80	44	36	3.6	7	0.1	0.5
07Z1B02-1000	10	9	45-65	4	85	59.5	65	89	64	46.5	4.8	9	0.3	1.4
09Z1B02-1000	16	15	45-65	4	85	60	65	89	64	50	4.8	9	0.3	1.5
10Z1B02-1000	20	15	45-65	16	85	60	65	89	64	50	4.8	9	0.3	1.5
12Z1B02-1000	25	18	45-65	16	85	60	65	89	64	50	4.8	9	0.4	2.6

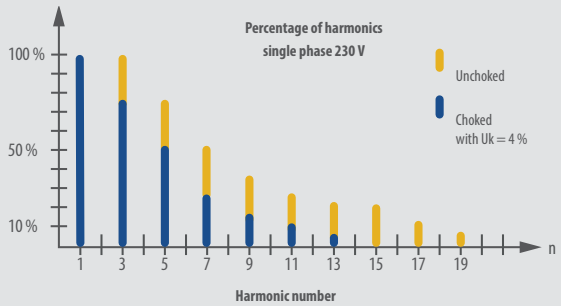
MAINS CHOKE 3-PHASES 230 V AC (U_{max} = 264 V), 50/60 HZ

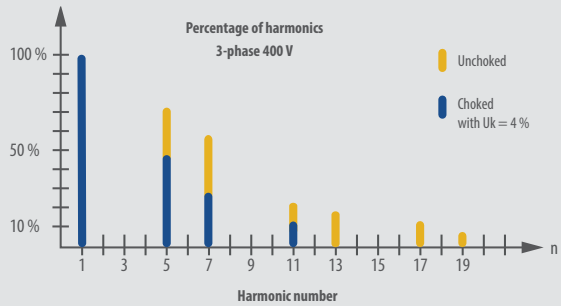
Part-No.	I_N [A]	P_V [W]	f_{Netz} [Hz]	Ø [mm²]	B [mm]	H [mm]	H_1 [mm]	T [mm]	a_1 [mm]	a_2 [mm]	a_3 [mm]	d_1 [mm]	d_2 [mm]	Weight Cu [kg]	Weight m [kg]
05Z1B03-1000	2.4	15	45-65	4	100	54	54	120	80	-	39	4,8	8	0.1	0.8
07Z1B03-1000	4.2	20	45-65	4	100	54	54	120	80	-	39	4,8	8	0.2	0.9
09Z1B03-1000	7.4	26	45-65	4	100	54	54	122	80	-	39	4,8	8	0.4	1.1
10Z1B03-1000	10.5	28	45-65	4	100	63	63	122	80	-	47	4,8	8	0.5	1.5
12Z1B03-1000	17.3	52	45-65	4	148	67	67	145	136	-	47	4,8	8	0.7	2.0
13Z1B03-1000	25.2	55	45-65	16	148	77	77	145	136	90	58	4,8	8	0.8	3.7
14Z1B03-1000	34.7	59	45-65	16	148	77	77	145	136	90	58	4,8	8	1.1	5
15Z1B03-1000	50.4	88	45-65	16	178	90	90	175	166	113	69	4,8	8	1.8	5.8
16Z1B03-1000	69.5	110	45-65	M8	219	100	130	160	201	136	70	7	12	2.8	7.4
17Z1B03-1000	88.2	125	45-65	M8	219	110	140	170	201	136	80	7	12	3.3	9.6
18Z1B03-1000	105	136	45-65	M8	219	120	150	170	201	136	90	7	12	4.2	12.1
19Z1B03-1000	121	170	45-65	M8	243	115	155	180	225	156	85	7	12	4	12.2
20Z1B03-1000	152.3	185	45-65	M8	243	126	165	180	225	156	96	7	12	4.5	15
21Z1B03-1000	189	200	45-65	M10	267	133	173	202	249	176	82	7	12	7.1	21.6

Fig. page 8

For nomenclature, see page 4

Reduction of current harmonics on the power supply by using a mains choke with Uk = 4 %.

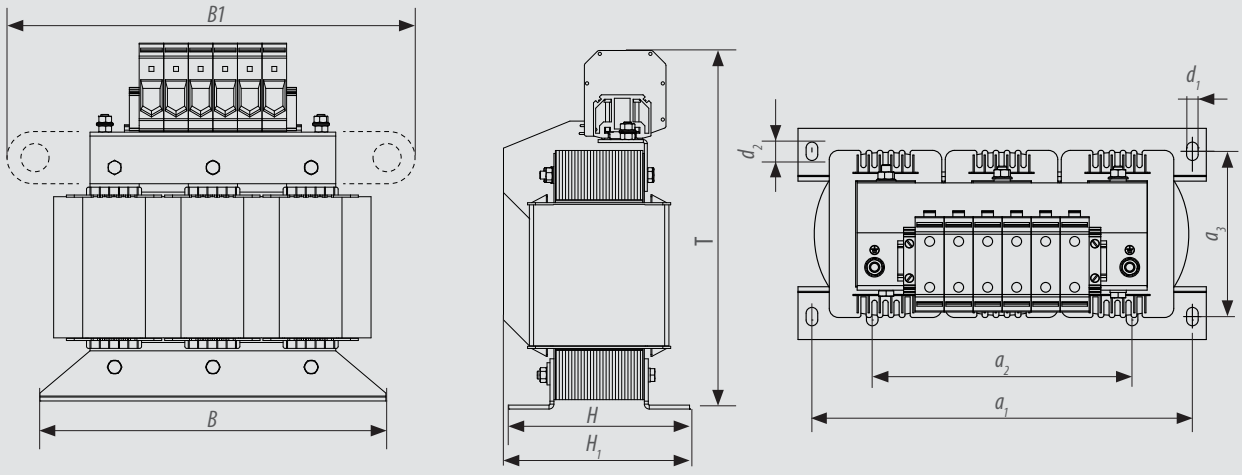




MAINS CHOKE 3-PHASES 400 V AC (U_{max} = 550 V), 50/60 HZ

Part-No.	I_N [A]	P_V [W]	f_{Netz} [Hz]	Ø [mm²]	B [mm]	H [mm]	H_1 [mm]	T [mm]	a_1 [mm]	a_2 [mm]	a_3 [mm]	d_1 [mm]	d_2 [mm]	Weight Cu [kg]	Weight m [kg]
05Z1B04-1000	1.4	10	45-65	4	100	55	55	121	80	-	40	4.8	8	0.2	0.8
07Z1B04-1000	2.7	19	45-65	4	100	55	55	121	80	-	40	4.8	8	0.3	0.9
09Z1B04-1000	4.3	23	45-65	4	100	55	55	121	80	-	40	4.8	8	0.4	1.1
10Z1B04-1000	6.1	24	45-65	4	100	64	64	121	80	-	47	4.8	8	0.5	1.5
12Z1B04-1000	10	37	45-65	4	148	68	68	145	136	90	48	4.8	8	0.8	2.1
13Z1B04-1000	12.6	48	45-65	4	148	78	78	145	136	90	59	4.8	8	0.7	2.6
14Z1B04-1000	17.3	69	45-65	4	148	77	77	145	136	90	58	4.8	8	0.9	2.8
15Z1B04-1000	25.2	86	45-65	16	178	73	87	180	166	113	55	4.8	8	1.8	4.4
16Z1B04-1000	34.7	99	45-65	16	178	88	100	178	166	113	68	4.8	8	2	5.9
17Z1B04-1000	44.1	123	45-65	16	219	101	115	215	201	136	73	7	12	2.8	8.4
18Z1B04-1000	52.5	126	45-65	35	219	111	120	220	201	136	81	7	12	3.2	10
19Z1B04-1000	63	142	45-65	35	219	121	135	220	201	136	91	7	12	3.7	12
20Z1B04-1000	79	168	45-65	35	219	121	150	220	201	136	91	7	12	3.8	12
21Z1B04-1000	95	194	45-65	M8	267	109	155	207	249	176	82	7	12	6.3	15.6
22Z1B04-1000	121	210	45-65	M8	291	129	185	215	273	185	97	10	18	6.5	19.3
23Z1B04-1000	158	240	45-65	M8	291	129	200	215	273	185	97	10	18	8.5	22
24Z1B04-1000	189	310	45-65	M10	316	153	225	235	292	200	113	10	16	8	24.8
25Z1B04-1000	221	328	45-65	M10	316	153	222	234	292	200	113	10	16	6.2	25
26Z1B04-1000	263	400	45-65	M10	352	145	210	266	328	224	105	10	16	10	31.6
27Z1B04-1000	315	440	45-65	M10	352	145	230	265	328	224	106	10	16	9	34
28Z1B04-1000	390	559	45-65	M10	388	150	245	295	364	248	112	10	16	11.7	41.5
29Z1B04-1000	485	620	45-65	M12	412	155	250	315	388	264	116	10	16	13	49.3
30Z1B04-1000	600	650	45-65	M12	412/480	174	270	315	388	264	132	10	16	13	57,7
31Z1B04-1000	660	767	45-65	M12	480/495	172	255	367	450	316	123	12	20	16,5	66
32Z1B04-1000	750	802	45-65	M12	480/495	172	265	475	450	316	123	12	20	19,5	80,5
33Z1B04-1000	840	872	45-65	M12	480/495	172	280	475	450	316	123	12	20	24	86

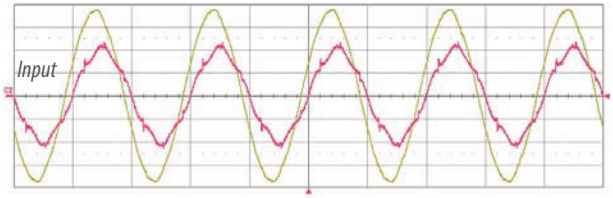
For nomenclature, see page 4



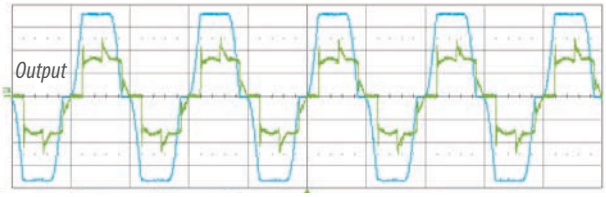
HARMONIC FILTER

The new KEB solution to reduce mains harmonics: The filters, like a mains choke, can be easily included in the electrical switching system already in the planning phase. They enable compliance with many international standards such as:

- EN 61000-3-2; up to 16 A
- EN 61000-3-12; 16 A up to 75 A
- EN 61000-3-4
- G5/4 Engineering Recommendation (GB)
- EN 12015 (Standard for lifts Europe)
- IEEE 519 - 1992 (USA)
- AS 2279 (Australia)
- Quality of Electric Energy Supply, Harmonics in Public Supply Network (China)
- COP, supply rules (Hong Kong)



Voltage and current inverter side

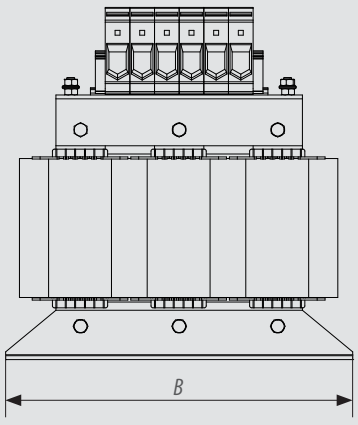


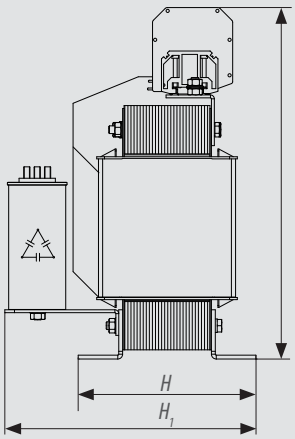
Voltage and current converter/servo

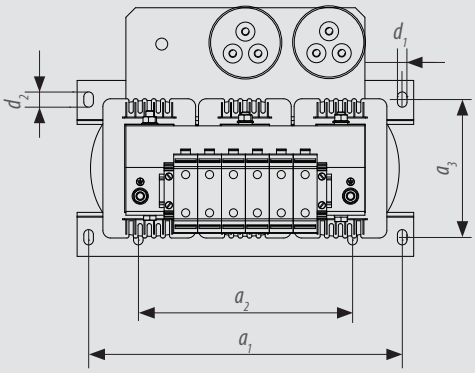
GENERAL TECHNICAL DATA

Protection rating	IP20, open types
max. leakage current	0 mA (with option HF filter ≤ 7 mA)
Overload	150 % - 60 sec.
Climate category	3K3 (EN 60721-3-3)
Vibration / Shock	Germanischer Lloyd, EN 50155
Technical principles	EN 61558-2-20, VDE 0160

Cooling	Convection
Efficiency factor	> 98 %
Temperature	Storage -25 ... 70°C Operation -10 ... 45°C
Environment (IEC 664-1)	Pollution level 2
Installation position	standing / lying with capacitor positioned below choke
480 V class	UL-, cUL- approval







A new innovative internal structure results in mains-friendly energy consumption with excellent application characteristics. In short, the COMBILINE harmonic filter is universally suited for all types of consumers with B6 inputs.

THE BENEFITS ARE

- Compact design
- No tendency to oscillate with dynamic load cycles
- Lower voltage loss as compared to mains chokes
- Allows multiple parallel consumers per unit
- Optimised configuration for generators in isolated operations
- Protection for drives in „soft“ and „overshooting“ mains
- Increased service life for DC link capacitors
- In the case of plant modernization/expansion no further compensation systems necessary

HARMONIC FILTER 3-PHASES 400 V AC (U_{max} = 440 V), 50 HZ - THDI < 15 % / PWHD < 39 %

Part-No.	I_N	P_{FU}	P_V	Ø	B	H	H_1	T	a_1	a_2	a_3	d_1	d_2	Weight	
	[A]	[kW]	[W]	[mm²]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Cu [kg]	m [kg]
07Z1C04-1001	2.4	0.75	40	4	148	69	134	163	136	90	51	4.8	8	0.7	2.6
10Z1C04-1001	6.1	2.2	65	4	178	75	128	168	166	113	56	4.8	8	1.6	4.8
12Z1C04-1001	10	4	90	4	175	90	145	220	168	113	75	4.8	10	2.2	6.8
13Z1C04-1001	12.6	5.5	105	4	219	102	155	233	202	136	73	7	12	3.5	8.7
14Z1C04-1001	17.3	7.5	135	4	243	105	185	260	225	145	75	7	12	4.2	11.5
15Z1C04-1001	25.2	11	165	16	267	109	174	280	249	176	78	7	12	5.8	16.3
16Z1C04-1001	34.7	15	210	16	291	130	205	275	275	185	97	10	18	7.6	22.6
17Z1C04-1001	44.1	18.5	255	16	291	140	215	280	275	185	110	10	18	9.3	27
18Z1C04-1001	52.5	22	295	35	316	152	256	300	292	200	112	10	16	11.2	33
19Z1C04-1001	63	30	360	35	316	163	260	297	292	200	124	10	16	12.7	38.7

HARMONIC FILTER 3-PHASES 400 V AC (U_{max} = 440 V), 50 HZ - THDI < 8 % / PWHD < 15 %

Part-No.	I_N	P_{FU}	P_V	Ø	B	H	H_1	T	a_1	a_2	a_3	d_1	d_2	Weight	
	[A]	[kW]	[W]	[mm²]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Cu [kg]	m [kg]
09Z1C04-1000	4.3	1.5	60	4	178	90	142	170	166	113	71	4.8	8	1.4	5.8
12Z1C04-1000	10	4	110	4	219	121	170	233	201	136	91	7	12	3.4	11.5
13Z1C04-1000	12.6	5.5	130	16	243	115	195	230	225	144	86	7	12	4.2	13.4
14Z1C04-1000	17.3	7.5	180	16	291	118	192	256	273	185	86	10	18	6.6	18.3
15Z1C04-1000	25.2	11	190	16	291	140	214	257	273	185	106	10	18	9	25.5
16Z1C04-1000	34.7	15	260	16	352	145	240	324	328	224	106	10	16	15	38.5
17Z1C04-1000	44.1	18.5	270	35	352	170	261	324	328	224	131	10	16	15	47.1
18Z1C04-1000	52.5	22	285	35	352	185	260	337	328	224	147	10	16	15	54.6
19Z1C04-1000	63	30	420	35	352	193	355	326	328	224	155	10	16	22	63
20Z1C04-1000	79	37	430	50	388	183	296	360	364	248	144	10	16	23.5	72.6
21Z1C04-1000	95	45	520	50	412	193	320	405	388	264	153	10	16	29.5	96
22Z1C04-1000	121	55	590	50	412	214	378	404	388	264	175	10	16	36	107.7
23Z1C04-1000	158	75	785	95	480	245	416	475	450	316	193	12	20	42.2	162
24Z1C04-1000	189	90	950	95	552	241	515	522	516	356	184	14.5	24	50.8	182.5
25Z1C04-1000	221	110	1145	150	552	275	550	520	525	360	215	14.5	24	60.4	244
26Z1C04-1000	263	132	1360	150	552	294	567	545	516	356	236	14.5	24	63.4	241.5
27Z1C04-1000	315	160	1480	240	552	315	635	550	515	355	255	14.5	24	72.9	294
28Z1C04-1000	390	200	1650	2x150	651	264	530	629	620	460	214	14.5	24	98.2	353
29Z1C04-1000	485	250	1800	2x240	660	350	633	620	620	460	288	14.5	24	126.4	513

HARMONIC FILTER 3-PHASES 480 V–CLASS (U_{max} = 528 V), 60 HZ - THDI < 8 % / PWHD < 15 %

Part-No.	I_N	P_{FU}	P_V	Ø	B	H	H_1	T	a_1	a_2	a_3	d_1	d_2	Weight	
	[A]	[HP]	[W]	[mm²]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Cu [kg]	m [kg]
19Z1C05-1000	46	40	750	M8	352	169	175	325	328	224	128	10	16	16	44.5
20Z1C05-1000	57	50	900	M8	352	185	220	325	328	224	147	10	16	15	55
21Z1C05-1000	69	60	1100	M8	352	193	230	326	328	224	155	10	16	15	64
22Z1C05-1000	90	75	1500	M8	480	200	240	400	468	344	151	10	16	21	93
23Z1C05-1000	115	100	1900	M10	492	202	250	450	468	344	164	10	16	25	106
24Z1C05-1000	150	125	2400	M10	645	248	310	520	626	466	188	14	24	26	165
25Z1C05-1000	190	150	2300	M10	662	248	310	525	626	466	190	14	24	40	180
27Z1C05-1000	220	200	3100	M10	662	278	315	515	626	356	218	14	24	40	230
28Z1C05-1000	300	250	3500	M12	662	298	360	525	626	466	240	14	24	53	258
29Z1C05-1000	360	300	4200	M16	662	318	380	535	626	466	258	14	24	55	280
30Z1C05-1000	410	350	4400	M16	645	330	400	520	626	466	258	14	24	58	285

For nomenclature, see page 4

CENTRAL HF FILTERS

The E6 high-frequency (HF) filter can be used as a central switch cabinet filter, collection filter and for the suppression of individual devices.

- Large rated voltage range 0 - 550 V
- Rated currents from 12 - 330 A, in eight sizes
- Compact design in book form with small footprint
- High saturation resistance. Shielded motor cable lengths up to 100 m and 300 m
- An especially wide damping area due to newly developed filter components
- The filters are designed for low leakage current in operation with frequency converters. With the same applications, the leakage current will be reduced to as low as 1/10 as compared to standard filters
- Operation at AC/DC sensitive RCDs with small triggering level 30/300 mA for people and fire protection
- High short overload capacity

THREE-WIRE INPUT HF FILTERS

- for connecting three-phase consumers

FOUR-WIRE HF FILTERS

- for connecting single and three-phase consumers (three-phase plus neutral wire)

Calculation of total length:

$$\textit{total length} = \sum_{I=1}^{n} \textit{motor cable length} \; {}^{*}\sqrt{n[\textit{number of motor cables}]}$$

CENTRAL HF FILTERS **SERIES E6**

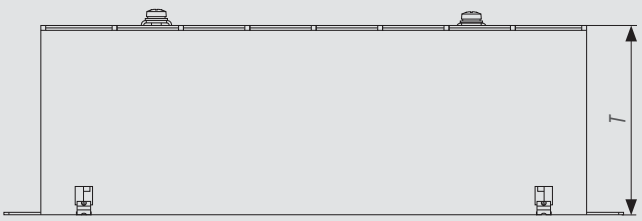
THREE-WIRE HF-FILTER 3-PHASES 400/480 V AC (U_{max} = 550 V), 50/60 HZ ± 10 %

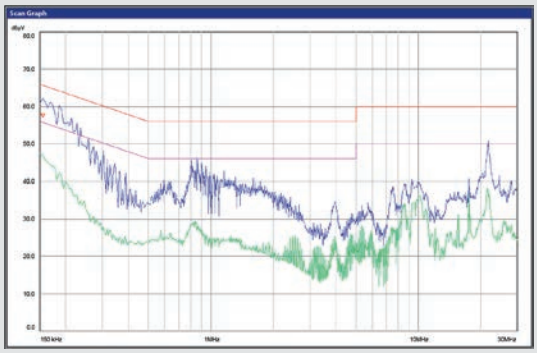
Part-No.	I_N [A]	P_V [W]	I_{ab} [mA]	Suppression degree / Motor cable length	Ø [mm²]	B [mm]	H [mm]	T [mm]	a_1 [mm]	a_2 [mm]	D [mm]	Weight m [kg]
12E6T60-3000/3050(*)	12	8	<3	C1/50 m , C2/100 m	6	45	252	77	237	25	5.5	0.9
14E6T60-3000/3050(*)	22	14	<3	C1/50 m , C2/100 m	6	55	252	92	237	25	5.5	1.3
16E6T60-3000/3050(*)	43	18	<3	C1/50 m , C2/100 m	16	65	252	106	237	30	5.5	1.8
18E6T60-3000/3050(*)	65	27	<3	C1/50 m , C2/100 m	25	130	240	142	220	100	9	3.9
20E6T60-3000/3050(*)	100	54	<3	C1/50 m , C2/100 m	50	160	240	142	220	130	9	5
22E6T60-3000	150	80	<3	C1/50 m , C2/100 m	95	200	321	190	260	150	11	9
22E6T60-3100	150	160	<3	C1/500 m	95	200	501	190	440	150	11	15.1
24E6T60-3001	200	100	<3	C1/50 m , C2/100 m	M10	200	280	190	260	150	11	8.5
24E6T60-3100	200	180	<3	C1/500 m	95	200	501	190	440	150	11	15.5
27E6T60-3000	330	160	<3	C2/100 m	M10	250	370	194	320	200	11	22.5

FOUR-WIRE HF-FILTER 3-PHASES 400/480 V AC (U_{max} = 550 V), 50/60 Hz ± 10 %

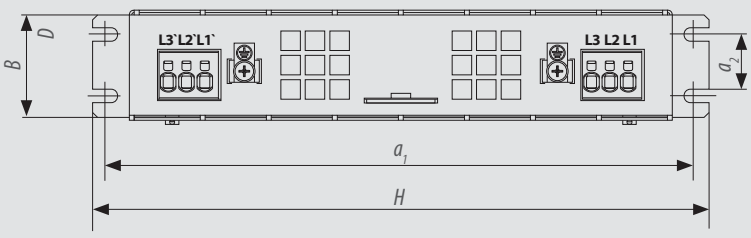
Part-No.	I_N [A]	P_V [W]	I_{ab} [mA]	Suppression degree / Motor cable length	Ø [mm²]	B [mm]	H [mm]	T [mm]	a_1 [mm]	a_2 [mm]	D [mm]	Weight m [kg]
14E6T60-4100	22	20	<3	C2/300 m	6	60	275	150	258	106	6.5	2.1
16E6T60-4100	43	22	<3	C2/300 m	10	70	330	160	288	106	6.5	3.2
18E6T60-4100	65	50	<3	C2/300 m	16	80	385	200	335	170	6.5	4.7
20E6T60-4100	100	80	<3	C2/300 m	25	91	458	240	395	200	6.5	6.7
22E6T60-4100	150	100	<3	C2/300 m	50	120	466	240	395	200	6.5	9.7

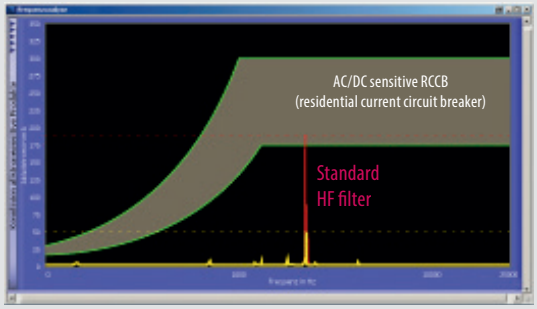
For nomenclature, see page 4
(*) For IT networks





EMC characteristic





Comparison leakage currents

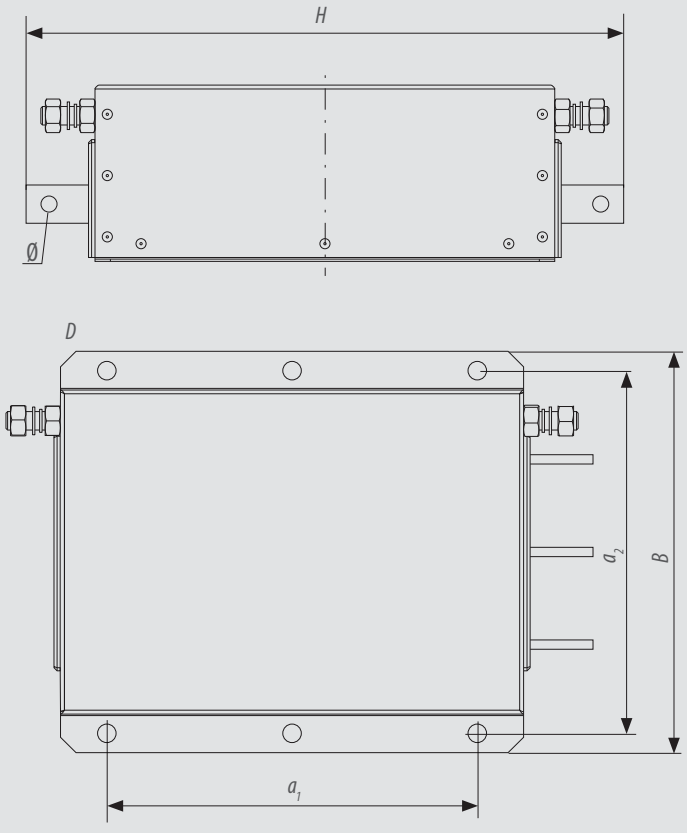
THREE-WIRE HF-FILTER 3-PHASES 400/480 V AC (U_{max} = 528 V), 50/60 HZ ± 10 %

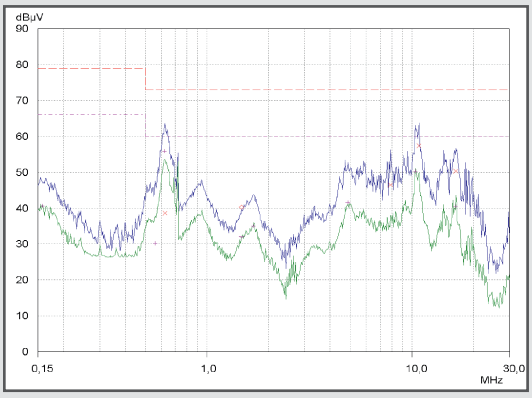
Part-No.	I_N [A]	P_V [W]	I_{ab} [mA]	Suppression degree / Motor cable length	Ø [mm²]	B [mm]	H [mm]	T [mm]	a_1 [mm]	a_2 [mm]	D [mm]	Weight m [kg]
28U5A0W-3000	410	50	60	C2/30 m	M10	260	385	115	240	120	12	18.5
28U5A0W-3020(*)	410	50	60	C2/30 m	M10	260	385	115	240	120	12	18.5
30U5A0W-3000	650	50	60	C2/30 m	M10	390	135	240	120	255	12	21.5
30U5A0W-3020(*)	650	50	60	C2/30 m	M10	390	135	240	120	255	12	21.5
32U5A0W-3000	1000	90	<20	C2/30 m	M14	280	458	185	290	255	12	33.5

(*) For IT networks

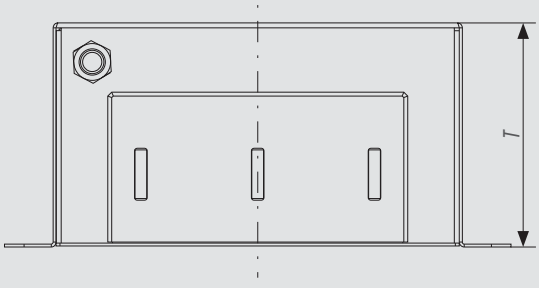
In insulated grids, insulation resistance is continuously monitored against ground. During this monitoring process, the discharge resistors used in the filters falsify this measurement and they must be suppressed during normal operations.

This function is fulfilled internally by the space-saving IT-HF filters and, in addition to the appropriate attenuation, they also offer the characteristic of low leakage currents. Depending on the capacity, they are designed as submounted or side-mounting filters.





EMC characteristic

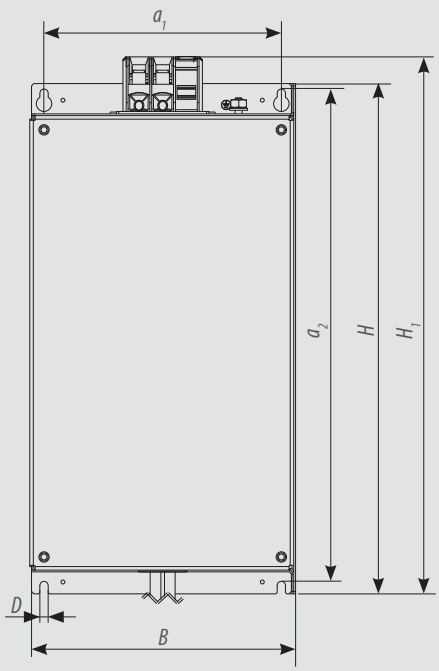


SUBMOUNTED FILTERS **SERIES E6**

EXCLUSIVELY FOR DRIVE CONTROLLER COMBIVERT F6

- Large rated voltage range 0 - 550 V
- Rated currents from 21 - 121 A, in five steps
- Compact design in book form with small mounting area
- Space-saving submounted filters. No additional space required in the control cabinet
- Ready for connection
- High saturation resistance. Shielded motor cable lengths up to 100 m
- An especially wide damping area due to newly developed filter components
- The filters are designed for low leakage current in operation with frequency inverters. With the same applications, the leakage current will be reduced to as low as 1/10 as compared to standard filters.
- Operation on all-current sensitive FI circuit breakers with low tripping threshold of 30/300 mA for personal and fire protection
- High short overload capacity
- Compatible with IT utility networks
- Approvals: UL and cUL

Part-No.	I_N [A]	P_V [W]	I_{ab} [mA]	Suppression degree / Motor cable length	Ø [mm²]	B [mm]	H [mm]	H_1 [mm]	T [mm]	a_1 [mm]	a_2 [mm]	a_3 [mm]	D [mm]	Weight m [kg]
14E6T60-1050	21	22	2.1	C1/50m C2/100m	6	130	325	341	65	100	314	-	5.5	2
16E6T60-1050	43	31	2.1	C1/50m C2/100m	16	130	325	341	65	100	314	-	5.5	2.5
18E6T60-1050	59	40	2.1	C1/50m C2/100m	35	170	405	-	85	125	390	50	7	5.5
20E6T60-1050	82	82	2.1	C1/50m C2/100m	35	170	405	-	85	125	390	50	7	6.5
22E6T60-1050	121	109	2.1	C1/50m C2/100m	50	224	430	452.5	100	200	415	75	7	10.5

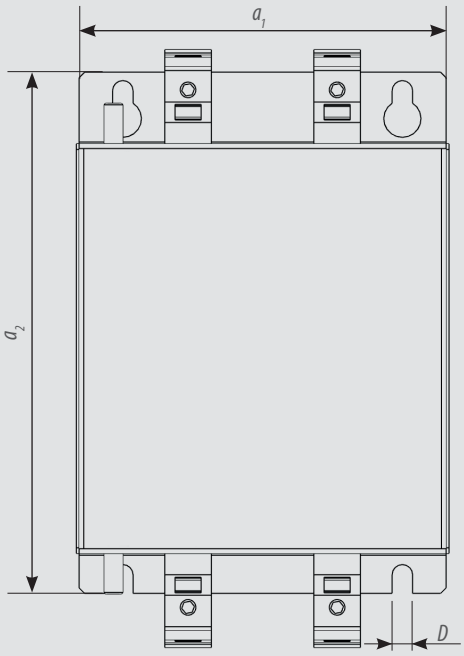


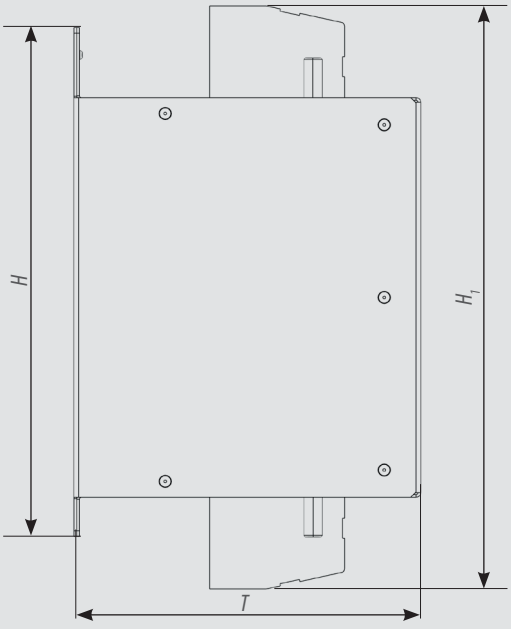
DC FILTERS

The DC high-frequency (HF) filters are designed to suppress interference from individual devices. This allows larger DC supply networks to be set up, as well as cross-machine DC supply networks. Individual interference suppression allows motors with longer cable lengths to be operated without disturbing the DC supply network.

- Large rated voltage range 150 - 850 V
- Rated currents from 65 - 650 A
- Compact design
- High saturation resistance. Shielded motor cable lengths up to 100 m
- An especially wide damping area due to newly developed filter components
- High short overload capacity

Part-No.	I_N [A]	P_V [W]	I_{ab} [mA]	Suppression degree / Motor cable length	Ø [mm²]	B [mm]	H [mm]	H_1 [mm]	T [mm]	a_1 [mm]	a_2 [mm]	D [mm]	Weight m [kg]
18E6T60-7B00	65	27	3	C1/50m C2/100m	25	130	240	-	142	100	220	9	3.6
20E6T60-7B00	100	40	3	C1/50m C2/100m	50	160	240	-	145	130	220	9	4.3
24E6T60-7B00	200	70	3	C1/50m C2/100m	95	200	280	321	190	150	260	11	8
28E5T60-7A00	410	50	60	C2/30m	M10	260	300	390	115	235	240	12	17.9
30E5T60-7A00	650	50	60	C2/30m	M10	260	300	390	135	235	240	12	21.2





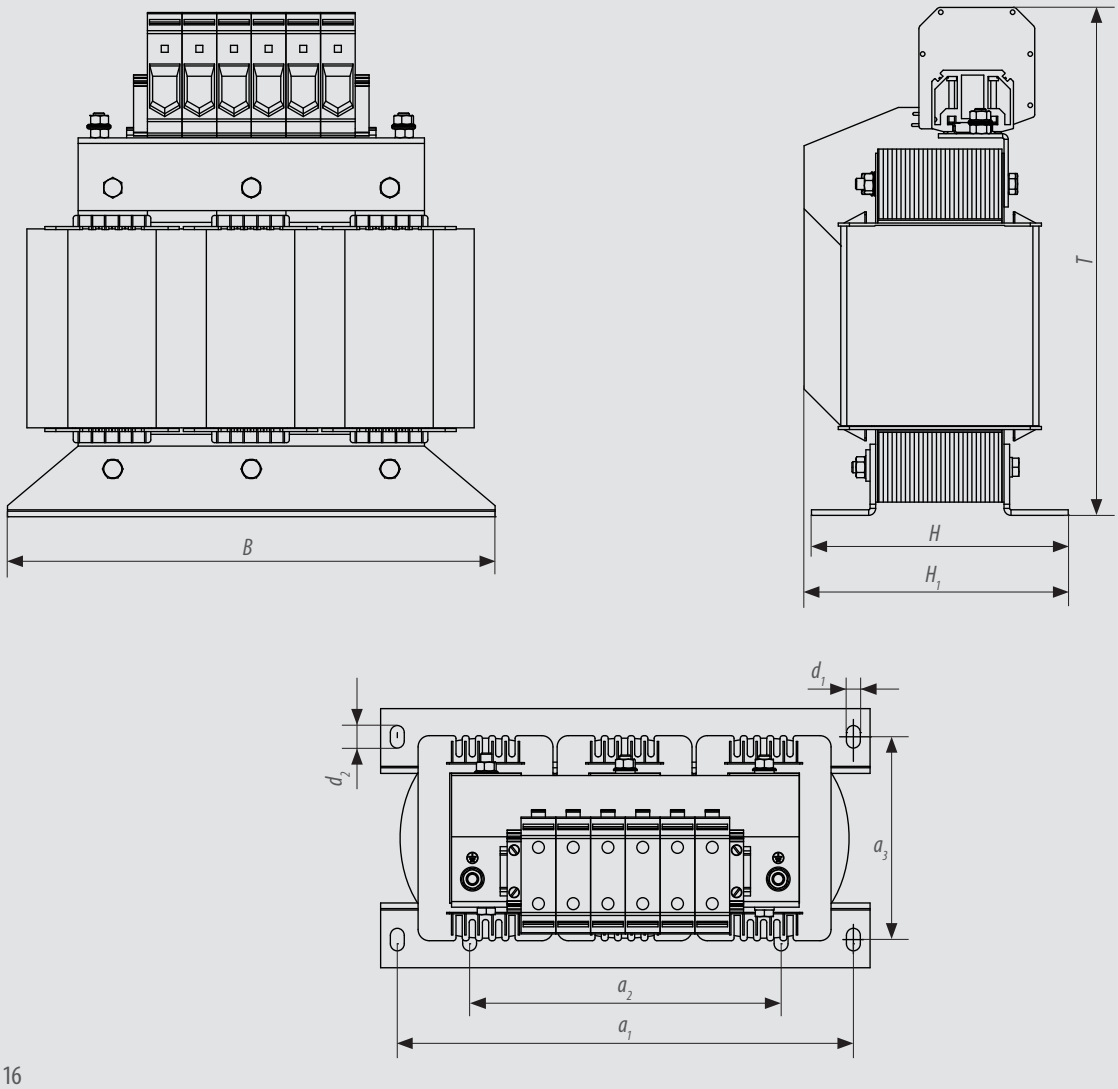
MOTOR CHOKES

present a cost-effective option for reducing the voltage rise rate dV/dt in order to avoid the premature ageing of the coil insulation in AC motors.

- Increase total inductance at output
- Reduce current ripples
- Reduce the rise rate of the edges (dV/dt) of the IGBTs
- Increase the service life of motor coils
- Reduce the peak value of the current and reduce the stress on IGBTs in inverters
- Are suitable for applications with long motor cables (> 15 m)
- Approvals series Z2 UR and cUR or UL and cUL

The basic series is designed for applications with output frequencies of up to 100 Hz.

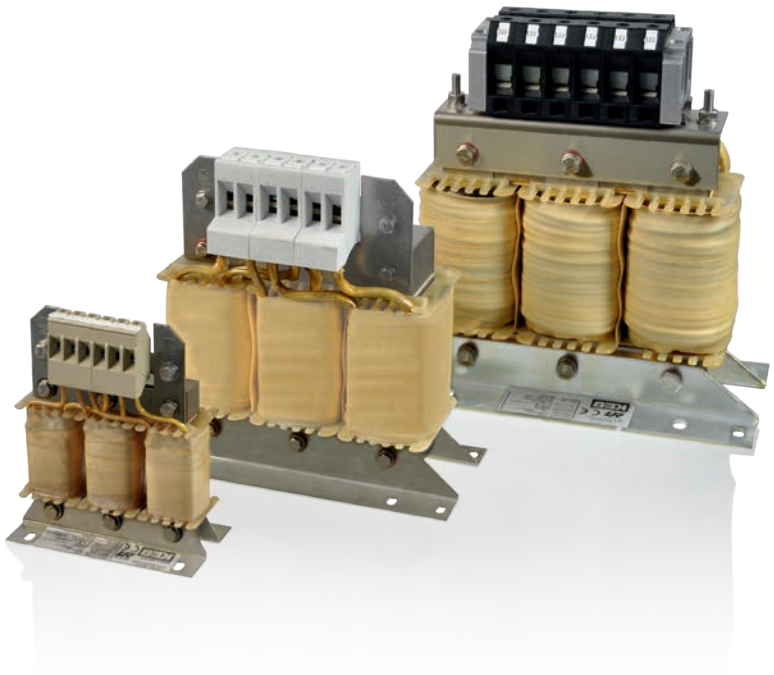
Additional versions are available for frequency ranges 200 Hz to 1,600 Hz as customer-specific designs.



MOTOR CHOKE 3-PHASES 400 V AC (U_{max} = 550 V), 100 Hz

Part-No.	I_N [A]	L [mH]	P_V [W]	Ø [mm²]	B [mm]	H [mm]	H_1 [mm]	T [mm]	a_1 [mm]	a_2 [mm]	a_3 [mm]	d_1 [mm]	d_2 [mm]	Weight Cu [kg]	Weight m [kg]	f_s [kHz]
05Z1F04-1010	1.3	11.3	8	4	100	55	H	121	80		40	4.8	8	0.2	0.8	2
07Z1F04-1010	2.6	5.6	15	4	100	55	H	121	80		40	4.8	8	0.2	1.0	2
09Z1F04-1010	4.1	3.18	15	4	100	53	H	121	80		37	4.8	8	0.4	1.1	2
10Z1F04-1010	5.8	2.06	17	4	100	63	H	121	80		47	4.8	8	0.4	1.4	2
12Z1F04-1010	9.5	1.26	24	4	148	68	H	145	136	90	47	4.8	8	0.5	1.8	2
13Z1F04-1010	12	1	31	4	148	78	H	145	136	90	59	4.8	8	0.5	2.5	2
14Z1F04-1010	16.5	0.72	37	4	148	78	H	145	136	90	59	4.8	8	0.6	2.8	2
15Z1F04-1010	24	0.5	47	10	178	72	H	178	166	113	53	4.8	8	1.3	3.9	2
16Z1F04-1010	33	0.36	54	10	178	100	H	180	166	113	68	4.8	8	1.5	5.9	2
17Z1F04-1010	42	0.28	65	16	219	100	105	215	201	136	70	7	12	1.9	6.6	2
18Z1F04-1010	50	0.24	65	35	219	110	110	220	201	136	81	7	12	2.4	8.5	2
19Z1F04-1010	60	0.2	67	35	219	121	130	225	201	136	91	7	12	2.6	10.1	2
20Z1F04-1010	75	0.16	79	35	243	115	130	243	225	156	85	7	12	3.6	12	2
21Z1F04-1010	90	0.13	105	M8 (35)	267	109	155	207	249	176	78	7	12	3.6	15.6	2
22Z1F04-1010	115	0.1	137	M8 (50)	291	129	185	215	273	185	97	10	18	3.6	15.5	2
23Z1F04-1010	150	0.08	170	M8 (70)	291	130	183	216	273	185	97	10	18	5.1	17	2
24Z1F04-1010	180	0.07	210	M10(70)	316	153	225	233	292	200	113	10	16	5.2	24	2
25Z1F04-1010	210	0.06	270	M10(70)	316	153	196	234	292	200	113	10	16	5.8	23.4	2
26Z1F04-1010	250	0.05	380	M10(120)	352	145	230	270	328	224	105	10	16	8.2	29.8	2
27Z1F04-1010	300	0.04	420	M10(150)	352	147	235	272	328	224	110	10	16	12.0	35.5	2
28Z1F04-1010	370	0.03	450	M10(150)	388	151	245	300	364	248	112	10	16	10.3	40	2
29Z1F04-1010	460	0.03	550	M12(185)	412	155	245	325	388	264	116	10	16	11.0	48.2	2

For nomenclature, see page 4



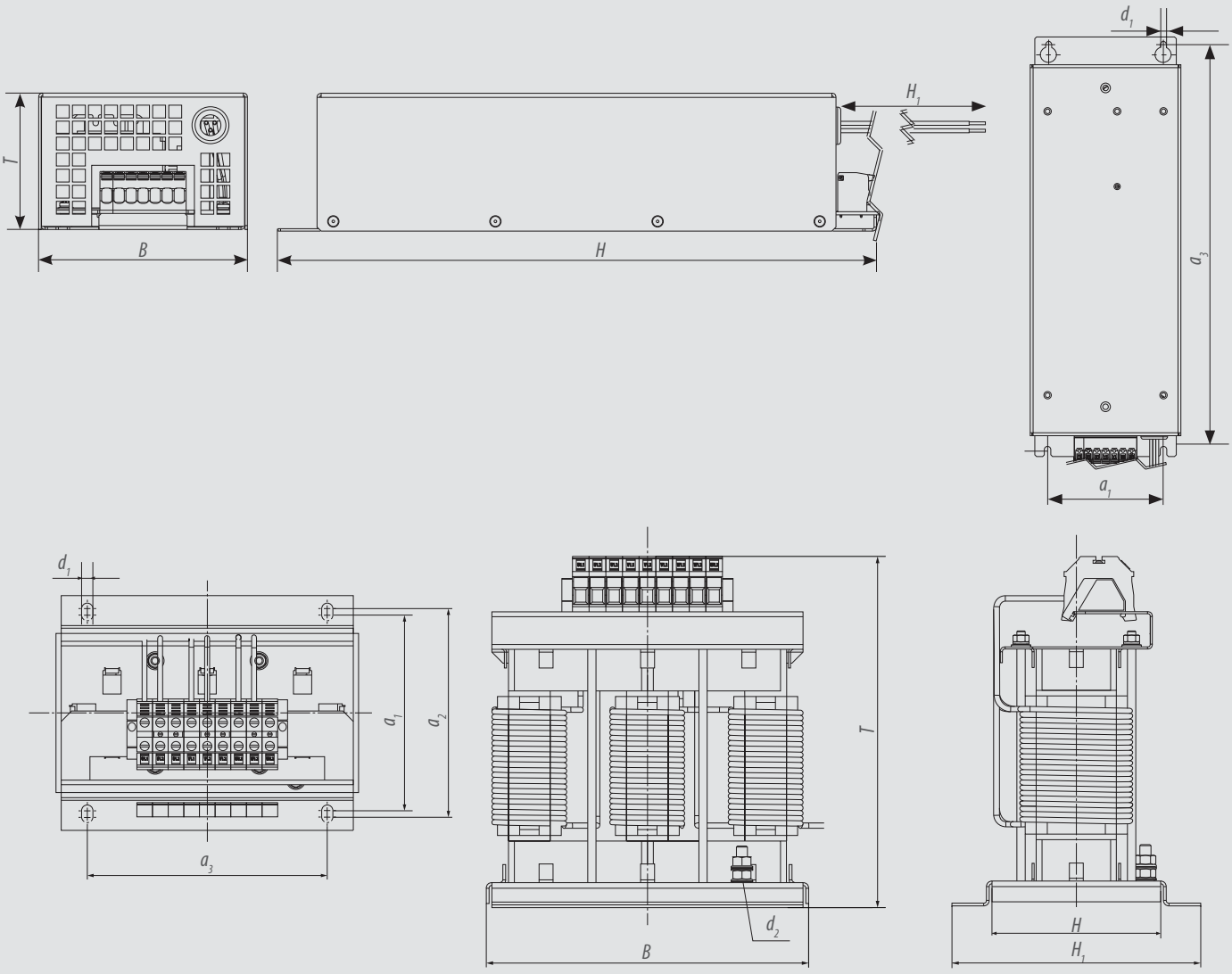
MOTOR CHOKE 3-PHASES 400 V AC (U_{max} = 550 V), 1,600 Hz

Part-No.	I_N [A]	L [mH]	P_V* [W]	Ø [mm²]	B [mm]	H [mm]	H_1 [mm]	T [mm]	a_1 [mm]	a_2 [mm]	a_3 [mm]	d_1 [mm]	d_2 [mm]	Weight Cu [kg]	Weight m [kg]	f_s [kHz]	Uk %
07Z2F04-1003	2.6	3.5	18	6	130	371	400	85	100	-	350	5.5	-	-	3.5	5 - 16	20
09Z2F04-1003	4.1	2.2	32	6										-	3.9	5 16	20
10Z2F04-1003	5.8	1.5	48	6										-	4.1	5 - 16	20
12Z2F04-1003	9.5	0.967	99	6										-	4.7	5 - 16	20
13Z2F04-1003	12	0.766	35	10	168	160	160	280	135	145	120	7	6.5	0.9	5.2	5 - 16	20
14Z2F04-1003	16.5	0.557	44	10	168	160	160	280	135	145	120	7	6.5	1	5.5	5 - 16	20
15Z2F04-1003	24	0.383	66	10	168	160	160	310	135	145	120	7	6.5	1.8	6.6	5 - 16	20
16Z2F04-1003	33	0.278	102	10	168	160	160	315	135	145	120	7	6.5	2.1	7.0	5 - 16	20
17Z2F04-1003	42	0.219	115	16	232	180	180	255	150	160	184	8.5	8.5	2	10.0	5 - 16	20
18Z2F04-1003	50	0.184	92	16	245	180	180	260	150	160	184	8.5	8.5	3.5	11.2	5 - 16	20
19Z2F04-1003	60	0.153	124	35	250	180	190	270	150	160	184	8.5	8.5	3.5	11.7	5 - 16	20

The output and switching frequency should be in a ratio of at least 1:10.

(*) P_V at an output frequency of 800 Hz

For nomenclature, see page 4

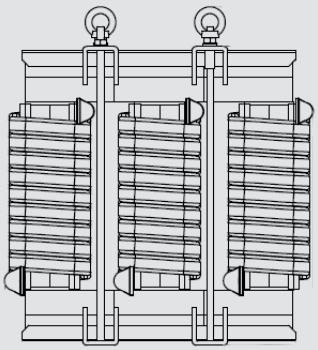


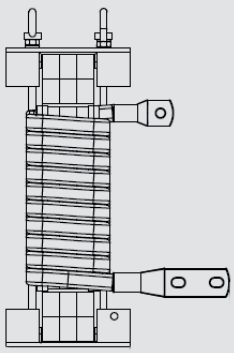
MOTOR CHOKE 3-PHASES 400 V AC (U_{max} = 550 V), 1,600 Hz

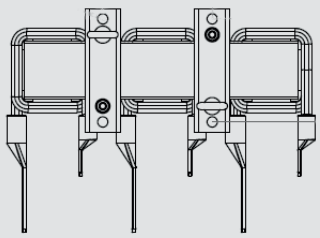
Part-No.	I_N [A]	L [mH]	P_V* [W]	Ø [mm²]	B [mm]	H [mm]	H_1 [mm]	T [mm]	a_1 [mm]	a_2 [mm]	a_3 [mm]	d_1 [mm]	d_2 [mm]	Weight Cu [kg]	Weight m [kg]	f_s [kHz]	Uk %
20Z2F04-1003	75	0.123	152	25	313	180	205	275	150	160	244	8.5	8.5	4.1	15	5-16	20
21Z2F04-1003	90	0.102	147	35	335	180	220	275	150	160	244	8.5	8.5	5.8	17.3	5-16	20
22Z2F04-1003	115	0.080	224	35	335	180	240	265	150	160	244	8.5	8.5	6.2	17	5-16	20
23Z2F04-1003	150	0.082	264	50	370	170	250	405	140	310	120	15	10.5	11.5	32.0	5-16	20
24Z2F04-1003	180	0.068	390	70	365	170	270	415	140	310	120	15	10.5	11.5	32.8	5-16	20
25Z2F04-1003	210	0.058	430	70	350	170	270	425	140	310	120	15	10.5	11	35.0	5-16	20
26Z2F04-1003	250	0.049	492	95	370	170	300	435	140	310	120	15	10.5	16.5	41.0	5-16	20
27Z2F04-1003	300	0.041	515	95	465	180	300	440	150	400	160	15	10.5	17.5	45.0	5-8	20
28Z2F04-1003	370	0.033	515	120	450	180	325	465	150	400	160	15	10.5	17.5	58.5	5-8	20
29Z2F04-1003	460	0.027	777	150	460	180	330	480	150	400	160	15	10.5	21	62.0	5-8	20
30Z2F04-1003	570	0.021	963	240	465	180	350	500	150	400	160	15	10.5	29	72	5-8	20

(*) P_V at an output frequency of 800 Hz, from 23Z2 at a frequency of 600 Hz
For nomenclature, see page 4

The output and switching frequency should be in a ratio of at least 1:10.







SINUSOIDAL FILTERS

are low-pass filters that filter out the switching frequency from the PWM (pulse width modulation) - output signal of the inverter. Sinusoidal voltage with a small ripple occurs at the output, which results in a sinusoidal motor current. This is why the use of sinusoidal filters at the output is not associated with the supplementary losses in the motor's stator and rotor which otherwise occur with inverter operations.

KEB SINUSOIDAL FILTERS

- Reduce supplementary losses in the motor during direct inverter operations. This is a particular requirement for older motors that are not designed for inverter operations, as well as used specialty motors and medium-frequency motors
- Reduce discharge currents driven by pulse frequency in the case of long cable lengths. The sinusoidal output voltages between the phases and the significant dV/dt reduction in the voltages phase to ground reduce the capacitive currents. Sinusoidal filters are recommended for up to 500 m motor cable lengths, depending on the type of drive. Lengths exceeding 500 m require an additional EMC level
- Increase the service life of motor insulation. High dV/dt at the output of the frequency inverter puts stress on the motor coils. Combined with long cable lengths, it is possible that the high rise of voltage (dV/dt) and non-adjusted impedances of inverter, motor cable and motor result in overstressing. Their peaks may increase to double the value of the DC link voltage (approx. 1,600 V). The sinusoidal filter reduces the PWM signal of the frequency inverter to sinusoidal sizes, preventing overstressing and a smaller rise of voltage at the motor coil
- Reduce bearing currents in the motor. The filter reduces the high-frequency portions in the output voltage of the inverter, which in turn reduces the high-frequency portions of the voltage at the motor so as to result in a reduction of bearing currents
- Reduce motor noise, which is lessened due to the sinusoidal voltage between the phases
- Reduce high-frequency transient emissions and improve the entire EMC load on the equipment
- Improve motor efficiency

AVAILABLE SOLUTIONS

- Sinusoidal filter xxZ1G04-1000 to 50/100 Hz output frequency
- Sinusoidal filter xxZ1G04-1001 to 200 Hz output frequency
- Sinusoidal filter up to 1,600 Hz output frequency consisting of motor choke, capacitor module and cable set

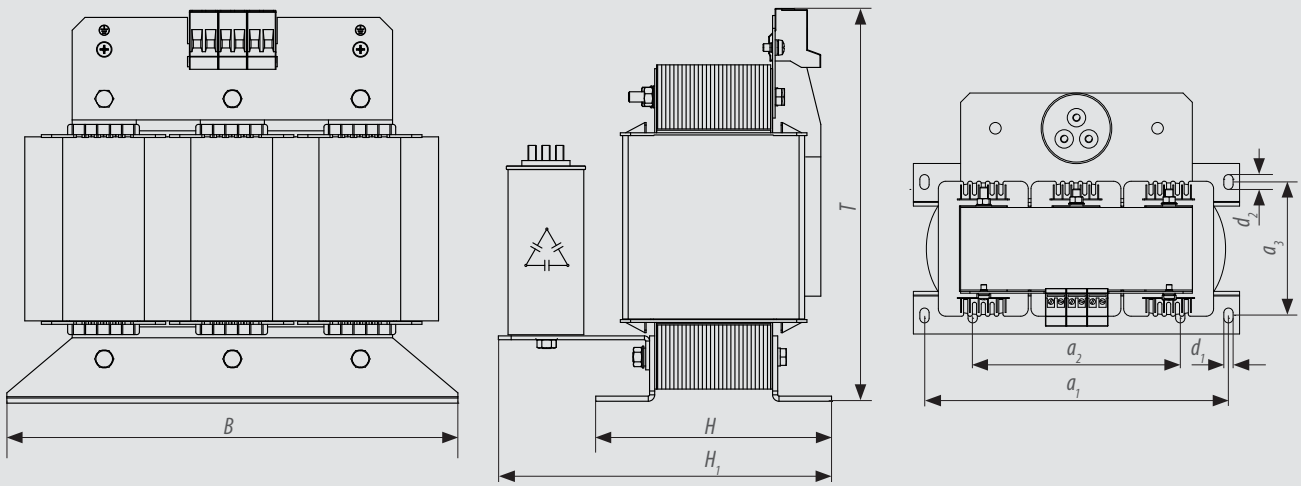
SINUSOIDAL FILTER 3-PHASES 400 V AC (U_{max} = 500 V), f_{max} 100 Hz

P_{FU} [kW]	Part-No.	I [A]	$I_{max.}$ [A]	P_V [W]	f_s [kHz]	B [mm]	H [mm]	T [mm]	a_1 [mm]	a_2 [mm]	a_3 [mm]	d_1 [mm]	d_2 [mm]	Ø [mm²]	Weight Cu [kg]	Weight m [kg]	Uk %
0.37	05Z1G04-1000	1.3	2.3	25.9	4-16	100	110	120	80	-	96	4.8	8	4	0.3	1.1	4
0.75	07Z1G04-1000	2.6	4.7	27.9	4-16	100	125	135	80	-	110	4.8	8	4	0.4	1.7	4
1.5	09Z1G04-1000	4.1	7.4	36.7	4-16	148	132	150	136	90	49	4.8	8	4	0.9	2.5	4
2.2	10Z1G04-1000	5.8	10.4	42.4	4-16	148	143	142	136	90	60	4.8	8	4	1	3.1	4
4	12Z1G04-1000	9.5	17	48.2	4-16	178	125	167	166	113	56	4.8	8	4	1.8	4.5	4
5.5	13Z1G04-1000	12	21.6	67.2	4-16	178	145	178	166	113	71	4.8	8	10	2.1	6.4	4
7.5	14Z1G04-1000	16.5	29.7	86.8	4-16	219	145	207	201	136	74	7	12	10	2.9	8.2	4
11	15Z1G04-1000	24	36	95	4-16	243	180	225	225	156	79	7	12	10	3.8	11.5	4
15	16Z1G04-1000	33	49.5	130.2	4-16	267	172	260	249	176	81	7	12	16	5.5	15.6	4
18.5	17Z1G04-1000	42	63	136.6	4-16	291	197	272	273	185	100	10	18	35	7.4	21.8	4
22	18Z1G04-1000	50	75	189.1	4-16	291	221	277	273	185	113	10	18	35	8.5	27.7	4
30	19Z1G04-1000	60	90	190.3	4-16	316	230	305	292	200	116	10	16	35	10.7	32.5	4
37	20Z1G04-1000	75	112	201.6	4-16	352	265	332	328	224	135	10	16	35	11	41.5	4
45	21Z1G04-1000	90	135	205.2	4-16	352	282	358	328	224	148	10	16	50	13.8	48.6	4
55	22Z1G04-1000	115	172	230	4-16	388	288	395	364	248	148	10	16	95	20	67.2	4
75	23Z1G04-1000	150	225	265	4-16	412	317	416	388	264	138	10	16	M10 (120)	26	72.5	4
90	24Z1G04-1000	180	270	270	4-16	412	358	412	388	264	184	10	16	M10 (120)	34	99.6	4
110	25Z1G04-1000	210	263	335	4-16	480	340	467	450	316	157	12	20	M12 (185)	36	120.5	4
132	26Z1G04-1000	250	313	480	4-16	480	365	464	450	316	170	12	20	M12 (185)	42	129	4
160	27Z1G04-1000	300	375	503	4-16	480	390	470	450	316	195	12	20	M12 (185)	47	156	4
200	28Z1G04-1000	370	463	600	2-16	552	575	526	516	356	244	14.5	24	M16 (300)	83	272	4
250	29Z1G04-1000	460	575	630	2-16	555	600	545	516	356	262	14.5	24	M16 (300)	80	275	4
315	30Z1G04-1000	570	712	950	2-16	660	501	645	620	460	214	14.5	24	2xM16 (300)	115	355	4
355	31Z1G04-1000	630	787	1550	2-16	660	560	645	620	460	250	14.5	24	2xM16 (300)	126	400	4
400	32Z1G04-1000	710	887	1750	2-16	660	618	645	620	460	270	14.5	24	2xM16 (300)	130	420	4

For nomenclature, see page 4

PLEASE NOTE

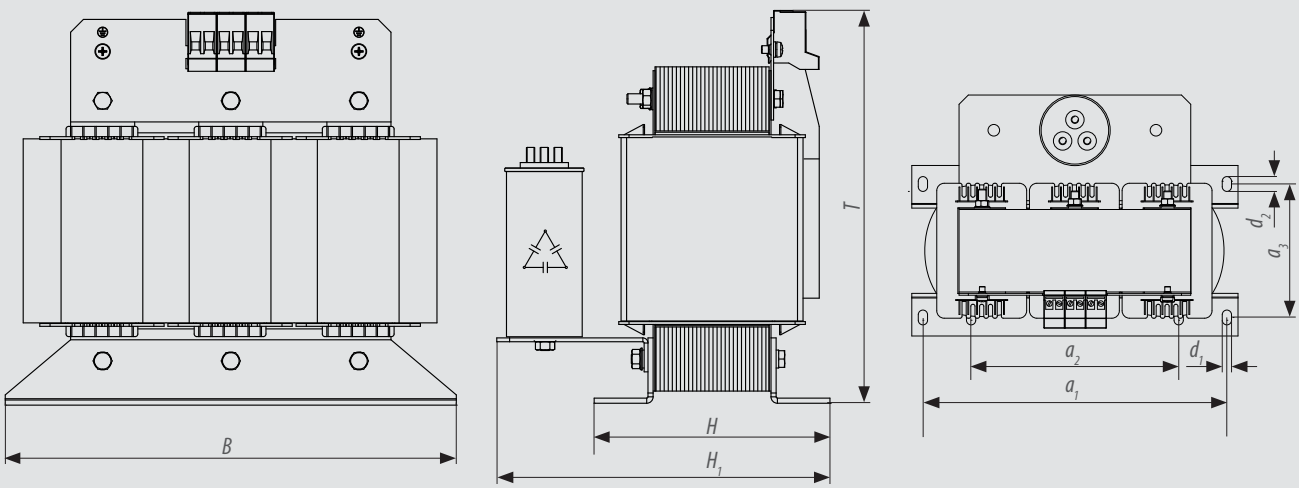
The sinusoidal filters have been designed for permissible switching and output frequency areas - values that deviate from this range will cause damage to the filters.



SINUSFILTER 3-PHASES 400 V AC (U_{max} = 500 V), f_{max} 200 Hz

P_{FU} [kW]	Part-No.	I [A]	$I_{max.}$ [A]	P_V [W]	f_s [kHz]	B [mm]	H [mm]	T [mm]	a_1 [mm]	a_2 [mm]	a_3 [mm]	d_1 [mm]	d_2 [mm]	Ø [mm²]	Weight Cu [kg]	Weight m [kg]	Uk %
0.37	05Z1G04-1001	1.3	2.3	7.5	4-16	100	110	120	80	-	95	4.8	8	4	0.2	0.75	4
0.75	07Z1G04-1001	2.6	4.7	10	4-16	100	125	135	80	-	110	4.8	8	4	0.5	1.6	4
1.5	09Z1G04-1001	4.1	7.4	20	4-16	148	130	160	136	90	49	4.8	8	4	0.8	2.2	4
2.2	10Z1G04-1001	5.8	10.4	35	4-16	148	141	142	136	90	59	4.8	8	4	1	3.2	4
4	12Z1G04-1001	9.5	17	42	4-16	178	140	195	166	113	55	4.8	8	4	1.8	4.3	4
5.5	13Z1G04-1001	12	21.6	48	4-16	178	153	191	166	113	70	4.8	8	4	2.1	6.5	4
7.5	14Z1G04-1001	16.5	29.7	60	4-16	219	148	205	201	136	73	7	12	16	2.7	7.6	4
11	15Z1G04-1001	24	36	80	4-16	243	188	245	225	156	75	7	12	16	3.8	11.5	4
15	16Z1G04-1001	33	49.5	120	4-16	291	190	260	273	185	91	10	18	16	4.2	15	4
18.5	17Z1G04-1001	42	63	150	4-16	291	198	275	273	185	99	10	18	35	6.3	20.2	4
22	18Z1G04-1001	50	75	160	4-16	291	225	280	273	185	115	10	18	35	6.7	25	4
30	19Z1G04-1001	60	90	165	4-16	316	235	300	292	200	128	10	16	35	10	34.3	4
37	20Z1G04-1001	75	112	170	4-16	325	224	320	328	224	135	10	16	35	11	37	4
45	21Z1G04-1001	90	135	180	4-16	325	250	380	328	224	135	10	16	50	12	43	4
55	22Z1G04-1001	115	172	186	4-16	388	268	425	364	248	149	10	16	95	20	66.5	4
75	23Z1G04-1001	150	225	190	4-16	388	300	440	364	248	155	10	16	95	22.1	87	4
90	24Z1G04-1001	180	270	193	4-16	412	342	450	388	264	160	10	16	M12 (185)	33	92.3	4
110	25Z1G04-1001	210	263	201	4-16	412	362	465	388	264	165	10	16	M12 (185)	35	120.3	4
132	26Z1G04-1001	250	313	218	4-16	480	348	470	450	316	168	12	20	M12 (185)	44	123.8	4
160	27Z1G04-1001	300	375	280	4-16	480	449	505	450	316	198	12	20	M12 (185)	47	147	4
200	28Z1G04-1001	370	463	290	4-16	552	506	515	516	356	205	14.5	24	M16 (300)	50	200	4
250	29Z1G04-1001	460	575	320	4-16	552	580	515	516	356	240	14.5	24	2xM12 (185)	63	230	4

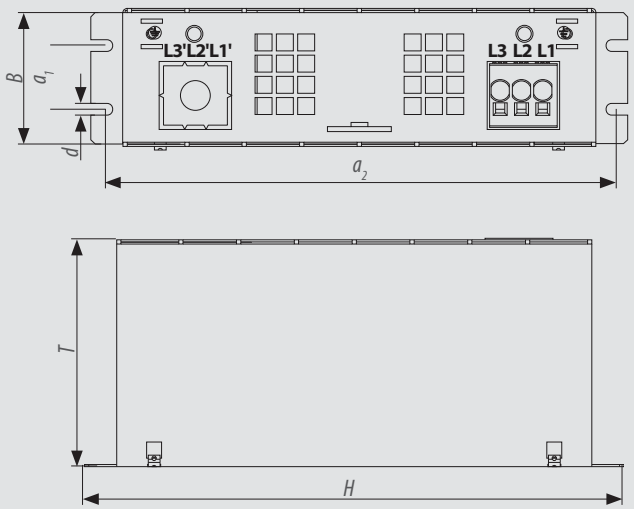
For nomenclature, see page 4



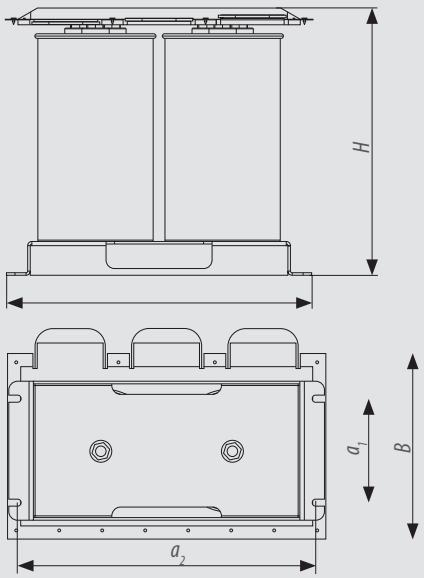
Part-No	C (µF)	ill.	H mm	B mm	T mm	a_1 mm	a_2 mm	d mm	m kg
00Z2G24-0005	0.0226	1	252	65	106	30	237	5.5	1.6
00Z2G24-0015	0.05	1	252	65	106	30	237	5.5	1.6
00Z2G24-0025	0.073	1	252	65	106	30	237	5.5	1.6
00Z2G24-0035	0.11	1	252	65	106	30	237	5.5	1.6
00Z2G24-0045	0.157	1	252	65	106	30	237	5.5	1.6
00Z2G24-0055	0.227	1	252	65	106	30	237	5.5	1.6
00Z2G24-0065	0.33	1	252	65	106	30	237	5.5	1.6
00Z2G24-0006	0.49	1	252	65	106	30	237	5.5	1.6
00Z2G24-0016	0.67	1	252	65	106	30	237	5.5	1.6
00Z2G24-0007	0.82	1	252	65	106	30	237	5.5	1.6
00Z2G24-0017	1	1	252	65	106	30	237	5.5	1.6
00Z2G24-0027	1.15	1	252	65	106	30	237	5.5	1.6
00Z2G24-0037	1.33	1	252	65	106	30	237	5.5	1.6
00Z2G24-0047	1.67	1	252	65	106	30	237	5.5	1.6
00Z2G24-0057	2	1	252	65	106	30	237	5.5	1.6
00Z2G24-0001	8	2	315	360	160	120	340	8	4
00Z2G24-0011	10	2	315	360	160	120	340	8	4.5
00Z2G24-0021	12	2	315	360	160	120	340	8	4.5
00Z2G24-0031	15	2	315	360	160	120	340	8	4.5
00Z2G24-0041	33	2	315	360	160	120	340	8	5
00Z2G24-0051	3.6	2	315	360	160	120	340	8	2
00Z2G24-0061	4.7	2	315	360	160	120	340	8	2
00Z2G24-0002	18	2	315	220	360	120	340	8	8
00Z2G24-0012	20	2	315	220	360	120	340	8	8
00Z2G24-0022	25	2	315	220	360	120	340	8	8
00Z2G24-0032	30	2	315	220	360	120	340	8	8
00Z2G24-0042	41	2	315	220	360	120	340	8	10
00Z2G24-0052	45	2	315	220	360	120	340	8	10
00Z2G24-0062	66	2	315	220	360	120	340	8	11.5
00Z2G24-0003	38	2	315	270	360	270	340	8	12
00Z2G24-0013	45	2	315	270	360	270	340	8	12
00Z2G24-0023	76	2	315	270	360	270	340	8	15.5
00Z2G24-0033	78	2	315	270	360	270	340	8	15.5
00Z2G24-0043	99	2	315	270	360	270	340	8	17.5
00Z2G24-0004	52	2	315	270	360	270	340	8	16
00Z2G24-0014	132	2	315	270	360	270	340	8	26.5

For nomenclature, see page 4

ill. 1



ill. 2



POSSIBLE COMPOSITION OF THE SINUSOIDAL **FILTERS SERIES Z2**

	MOTOR CHOKE		CAPACITOR ASSEMBLY AND CABLE SET				
Size	Current in A	material number	0 ... 600 Hz @ f_s = 6 kHz	0 ... 800 Hz @ f_s = 8 kHz	0 ... 1000 Hz @ f_s = 10 kHz	0 ... 1200 Hz @ f_s = 12 kHz	0 ... 1600 Hz @ f_s = 16 kHz
07	2.6	07Z2F04-1003	-	00Z2G24-0006 (00Z2T09-0002)*	00Z2G24-0065 (00Z2T09-0002)*	00Z2G24-0055 (00Z2T09-0002)*	00Z2G24-0035 (00Z2T09-0002)*
09	4.1	09Z2F04-1003	-	00Z2G24-0016 (00Z2T09-0002)*	00Z2G24-0007 (00Z2T09-0002)*	00Z2G24-0065 (00Z2T09-0002)*	00Z2G24-0055 (00Z2T09-0002)*
10	5.8	10Z2F04-1003	-	00Z2G24-0017 (00Z2T09-0002)*	00Z2G24-0007 (00Z2T09-0002)*	00Z2G24-0006 (00Z2T09-0002)*	00Z2G24-0055 (00Z2T09-0002)*
12	9.5	12Z2F04-1003	-	00Z2G24-0047 (00Z2T09-0002)*	00Z2G24-0037 (00Z2T09-0002)*	00Z2G24-0007 (00Z2T09-0002)*	00Z2G24-0006 (00Z2T09-0002)*
13	12	13Z2F04-1003	-	00Z2G24-0057 (00Z2T09-0002)*	00Z2G24-0047 (00Z2T09-0002)*	00Z2G24-0017 (00Z2T09-0002)*	00Z2G24-0006 (00Z2T09-0002)*
14	16.5	14Z2F04-1003	-	00Z2G24-0051 (00Z2T09-2010)*	00Z2G24-0057 (00Z2T09-0002)*	00Z2G24-0047 (00Z2T09-0002)*	00Z2G24-0016 (00Z2T09-0002)*
15	24	15Z2F04-1003	-	00Z2G24-0061 (00Z2T09-2010)*	00Z2G24-0051 (00Z2T09-2010)*	00Z2G24-0057 (00Z2T09-0002)*	00Z2G24-0017 (00Z2T09-0002)*
16	33	16Z2F04-1003	-	00Z2G24-0061 (00Z2T09-2010)*	00Z2G24-0061 (00Z2T09-2010)*	00Z2G24-0051 (00Z2T09-2010)*	00Z2G24-0037 (00Z2T09-0002)*
17	42	17Z2F04-1003	-	00Z2G24-0001 (00Z2T09-2010)*	00Z2G24-0061 (00Z2T09-2010)*	00Z2G24-0051 (00Z2T09-2010)*	00Z2G24-0047 (00Z2T09-0002)*
18	50	18Z2F04-1003	-	00Z2G24-0001 (00Z2T09-2010)*	00Z2G24-0001 (00Z2T09-2010)*	00Z2G24-0061 (00Z2T09-2010)*	00Z2G24-0057 (00Z2T09-0002)*
19	60	19Z2F04-1003	-	00Z2G24-0011 (00Z2T09-2010)*	00Z2G24-0001 (00Z2T09-2010)*	00Z2G24-0061 (00Z2T09-2010)*	00Z2G24-0051 (00Z2T09-2010)*
20	75	20Z2F04-1003	-	00Z2G24-0021 (00Z2T09-1010)*	00Z2G24-0001 (00Z2T09-1010)*	00Z2G24-0001 (00Z2T09-1010)*	00Z2G24-0051 (00Z2T09-1010)*
21	90	21Z2F04-1003	-	00Z2G24-0031 (00Z2T09-1010)*	00Z2G24-0011 (00Z2T09-1010)*	00Z2G24-0001 (00Z2T09-1010)*	00Z2G24-0051 (00Z2T09-1010)*
22	115	22Z2F04-1003	-	00Z2G24-0002 (00Z2T09-1010)*	00Z2G24-0021 (00Z2T09-1010)*	00Z2G24-0011 (00Z2T09-1010)*	00Z2G24-0061 (00Z2T09-1010)*
23	150	23Z2F04-1003	00Z2G24-0041 (00Z2T09-0025)*	00Z2G24-0002 (00Z2T09-1010)*	00Z2G24-0021 (00Z2T09-1010)*	00Z2G24-0011 (00Z2T09-1010)*	00Z2G24-0061 (00Z2T09-1010)*
24	180	24Z2F04-1003	00Z2G24-0042 (00Z2T09-0025)*	00Z2G24-0012 (00Z2T09-1025)*	00Z2G24-0031 (00Z2T09-1025)*	00Z2G24-0021 (00Z2T09-1010)*	00Z2G24-0001 (00Z2T09-1010)*
25	210	25Z2F04-1003	00Z2G24-0052 (00Z2T09-0035)*	00Z2G24-0022 (00Z2T09-1025)*	00Z2G24-0012 (00Z2T09-1025)*	00Z2G24-0021 (00Z2T09-1025)*	00Z2G24-0001 (00Z2T09-1010)*
26	250	26Z2F04-1003	00Z2G24-0062 (00Z2T09-0035)*	00Z2G24-0041 (00Z2T09-0025)*	00Z2G24-0012 (00Z2T09-0025)*	00Z2G24-0031 (00Z2T09-0025)*	00Z2G24-0001 (00Z2T09-0010)*
27	300	27Z2F04-1003	00Z2G24-0062 (00Z2T09-0070)*	00Z2G24-0041 (00Z2T09-0070)*	00Z2G24-0032 (00Z2T09-0035)*	00Z2G24-0012 (00Z2T09-0025)*	00Z2G24-0011 (00Z2T09-0010)*
28	370	28Z2F04-1003	00Z2G24-0033 (00Z2T09-0070)*	00Z2G24-0052 (00Z2T09-0070)*	00Z2G24-0032 (00Z2T09-0070)*	00Z2G24-0022 (00Z2T09-0035)*	00Z2G24-0021 (00Z2T09-0025)*
29	460	29Z2F04-1003	00Z2G24-0043 (00Z2T09-0095)*	00Z2G24-0062 (00Z2T09-0070)*	00Z2G24-0003 (00Z2T09-0070)*	00Z2G24-0032 (00Z2T09-0070)*	00Z2G24-0031 (00Z2T09-0025)*
30	570	30Z2F04-1003	00Z2G24-0014 (2x00Z2T09-0070)*	00Z2G24-0062 (00Z2T09-0095)*	00Z2G24-0004 (00Z2T09-0095)*	00Z2G24-0003 (00Z2T09-0070)*	00Z2G24-0002 (00Z2T09-0035)*

** Recommended cable set*

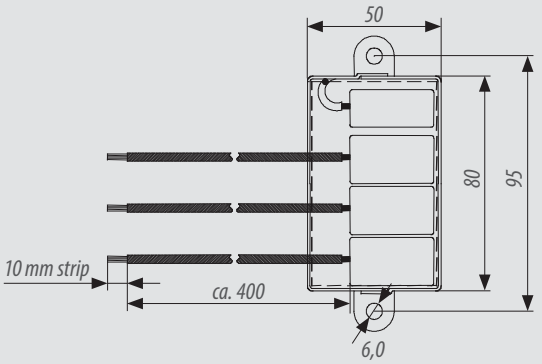
LOW AND HIGH FREQUENCY FILTER COMBINATION

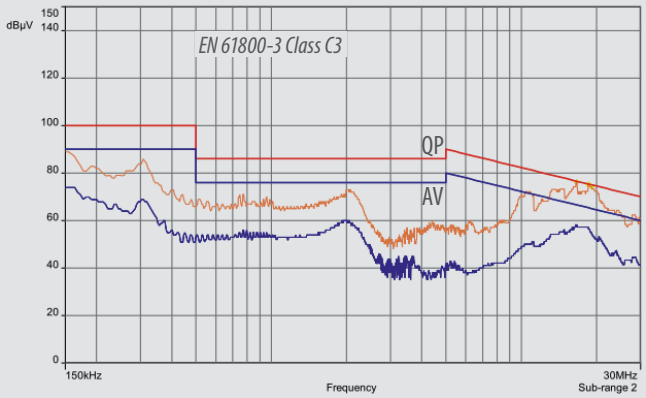
- Compact and flexible design
- Reduces the harmonic current harmonics generated by the inverter on the supply network
- Reduces the conducted interference to a value after 61800-3 C3
- Available for motor powers from 37 kW to 315 kW

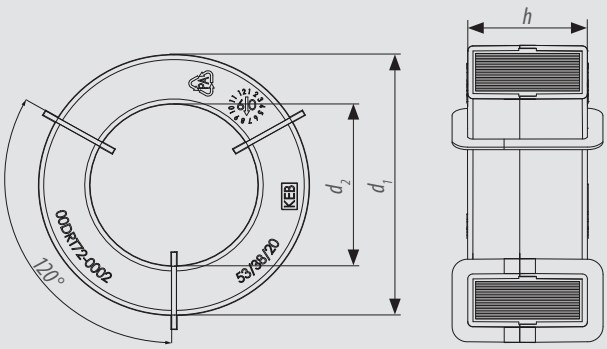
Unit size	Rated motor power [kW]	Cable cross-section [mm²]	Mains choke	Capacitor assembly	„Hight Performance" Ring core		Ring core size [mm]
					L1	L2	d1/d2/h
20	37	35	20Z1B04-1000	00E4061-1908	0090363-4000		57/33/25
21	45	50	21Z1B04-1000				
22	50		22Z1B04-1000				
23	75	95	23Z1B04-1000		0090366-6000		85/55/35
24	90		24Z1B04-1000				
25	110		25Z1B04-1000				
26	132	120	26Z1B04-1000		0090366-7000		110/74/35
27	160	150	27Z1B04-1000				
28	200	2x95	28Z1B04-1000		0090366-8000		142/95/37
29	250	2x120	29Z1B04-1000		0090366-9000		174/117/38
30	315	2x150	30Z1B04-1000				

RECOMMENDED

cable set 00E4061-1908



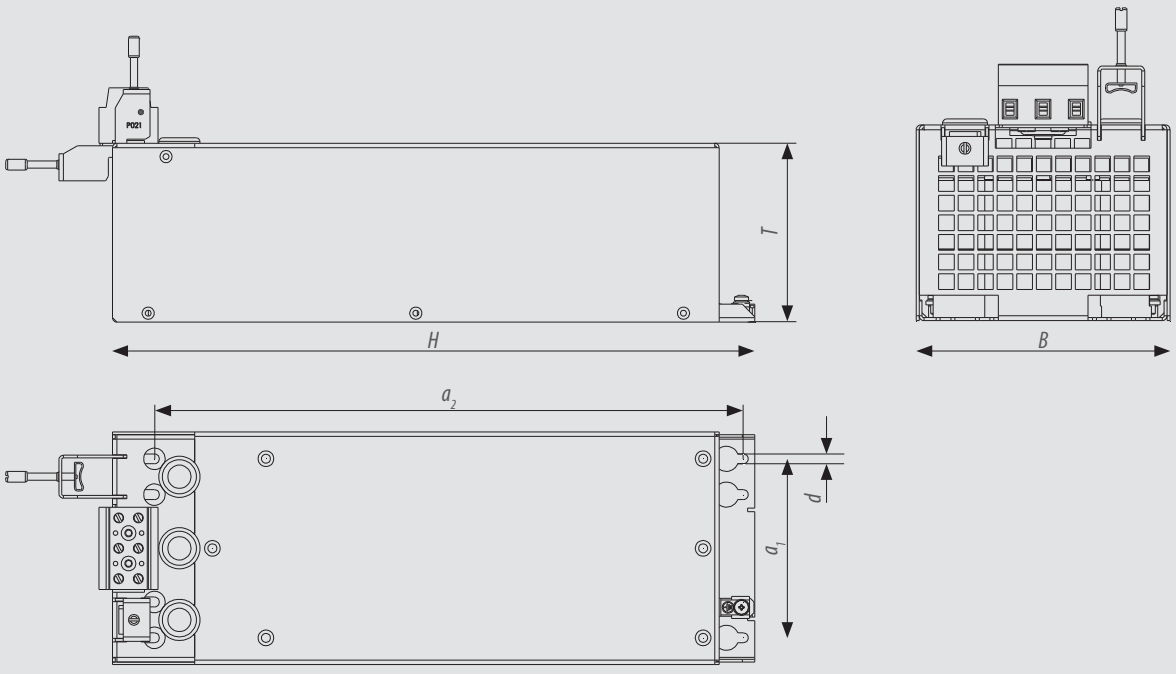




dV/dt MOTORFILTERS EXCLUSIVE FOR FREQUENCY INVERTER COMBIVERT G6

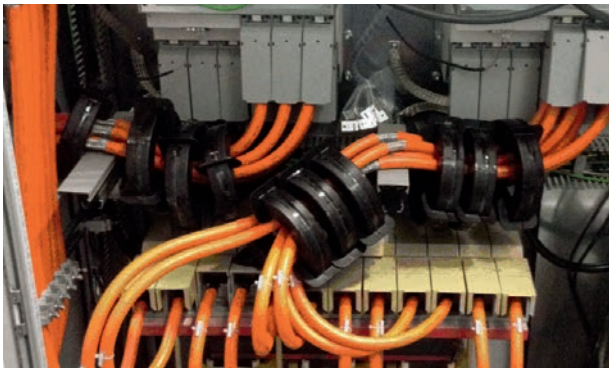
- Maximum dV/dt = 500 V/µs
- Maximum motor cable length: up to 200 m
- Maximum voltage at motor Ph/PE: 1,000 V
- Protects the motor windings and reduces the bearing currents
- Compact design, available as submounted version

Part-No.	Housing	I_N (A)	P_V (W)	f_{max}	f_s (Hz)	U_{drop} (V)	suppression degree	B mm	H mm	T mm	a_1 mm	a_2 mm	d mm	m kg
14E6T60-10G1	C	16.5	49	200	2-4	21.7	C1/100 m, C2/200 m	130	360	100	100	330	5.5	5.2
15E6T60-10G1	C	24	75	200	2-4	21.7	C1/100 m, C2/200 m	130	360	100	100	330	5.5	5.4
16E6T60-10G1	E	33	72	200	2-4	13.2	C1/100 m, C2/200 m	170	412	100	140	400	5.5	6.2

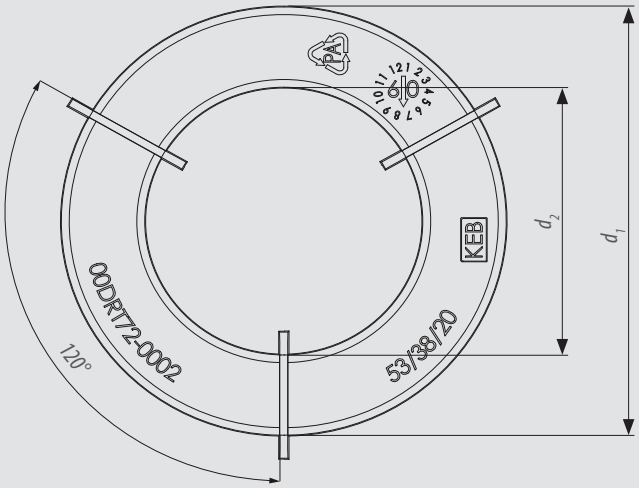


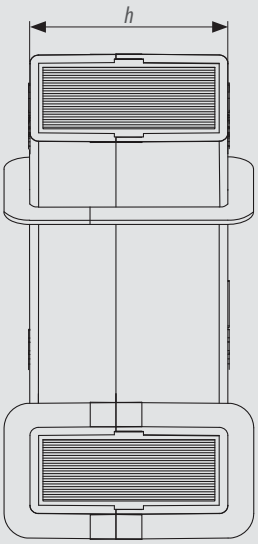
HIGHLY EFFICIENT CORES

- Reduction of the dV/dt's on the motor cables
- Reduction of bearing currents
- Improved EMC by smoothing the interference on the motor cables
- Effect can be increased by the number of turns on a core or the number of cores used



Part-No.	Dimensions [mm]			AI [µH]	*** Can be used up to a current (A) / No. of turns (N) / Cable cross-section (mm^2)	m
	d_1	d_2	h	@ 2 kHz minimum value		kg
0090 363-2000	39	20	18	69.4	9.5 A/N = 3/1.5 mm^2	0.062
0090 363-4000	57	34	25	59.3	16.5 A/N = 2/2.5 mm^2	0.2
0090 363-5000	70	45	30	68.5	33 A/N = 2/6 mm^2	0.22
0090 366-6000	85	55	35	77.1	60 A/N = 2/16 mm^2	0.44
0090 366-7000	110	74	35	76.3	150 A/N = 1/95 mm^2	0.78
0090 366-8000	142	95	37	65.0	300 A/N = 1/150 mm^2	1.20
0090 366-9000	174	117	38	51.0	>300 A/N = 1/>185 mm^2	1.80





KEB PROVIDES SECURITY

DRIVES, EMC ADVISORY AND EMC FILTERS WITH DELIVERIES FROM ONE SOURCE.

EC DIRECTIVE 2004/108/EC

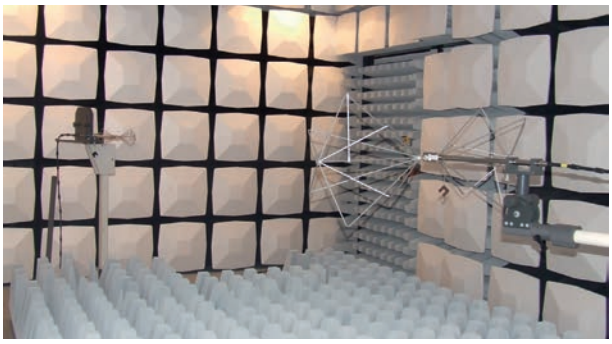
The directive requires every machine manufacturer to design the installation of electrical systems in compliance with EMC legislation. In many cases, this means that individual CE-labelled components must be inspected for their interaction in the equipment or machine. For this purpose, KEB offers a service that includes advisory services and the testing of electrical equipment.Our extensive experience in the development and application of drive controllers in a variety of different industrial areas, combined with modern mobile measurement devices, are the ideal prerequisites for rapid on-site assistance.

THE ADVANTAGES

- No expensive investments into measurement devices, buildings, installations and staff
- No training for complex standards
- Standards-appropriate on-site measurements
- Extensive measurement protocol
- Support already provided during development phase
- Advisory services for practical wiring
- Benefit from long-standing KEB experience
- Cost-effective

1. IN-HOUSE ABSORBER BUILDING

- Transient emissions / interference pursuant to EN 61800-3;
  Physical dimensions 3 m test section 2000 x 2000 mm quiet zone
  Test object weight up to 1 tonne
- For connected loads to 60 kVA 230/400/480/690 V



2. INSTALLATION ADVISORY SERVICES

for optimising electrical switching systems

3. EMC MEASUREMENTS

on location: conducted measurement and determination of transient emissions

KEB SERVICE

PERFORMANCE AND COMPETENCE

AFTER-SALES CUSTOMER SUPPORT

- start-up support
- EMC service
- mains analysis
- Insulation, heat or vibration measurements
- conversion of old product series

MAINTENANCE AND REPAIRS

- rush or standard service

COMPONENT AND SPACE PART SUPPLY

- used and new parts for the exchange

PREVENTIVE MAINTENANCE

- forming and cleaning, inspection, functional analysis

CUSTOMER SPECIFIC SERVICE

- individual service support
- system optimisation

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