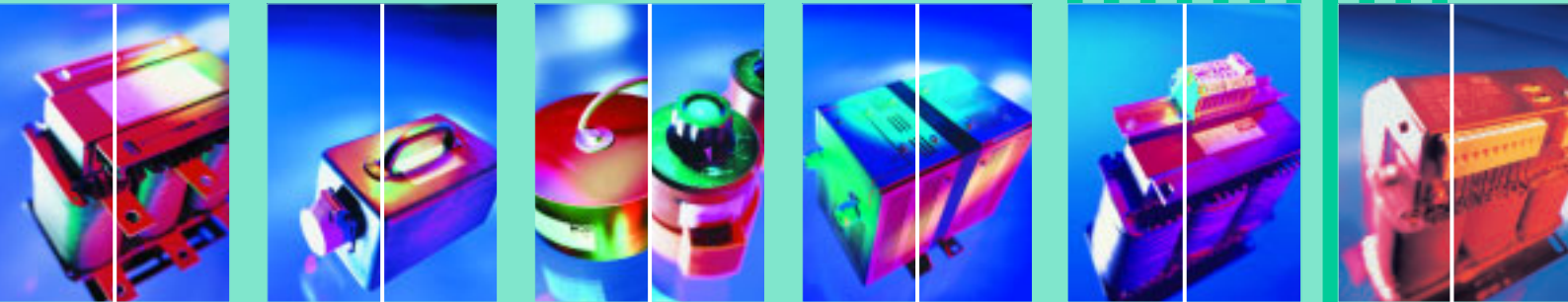




# REACTORS



## Incorporated transformers

- ➔ Single-phase transformers up to 630 kVA
- ➔ Three-phase transformers up to 1000 kVA
- ➔ Control transformers
- ➔ Safety isolating transformers
- ➔ Isolating transformers for installation in hospitals
- ➔ Insulating transformers up to 10000 V
- ➔ High current transformers up to 2000 A
- ➔ Autotransformers - starting transformers
- ➔ Variable voltage transformers for ventilation systems
- ➔ Transformers for vehicles
- ➔ Print and flat transformers
- ➔ Transformers for switched-mode power supplies

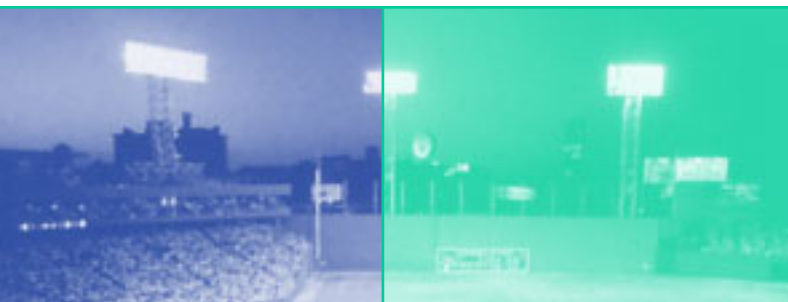


## Voltage stabilizers

- ➔ Incorporated versions up to 3000 VA
- ➔ Portable versions up to 1000 VA

## DC power supplies

- ➔ Single-phase types - unsmoothed, up to 1000 A
- ➔ Single-phase types - with C/LC smoothing, up to 1000 A
- ➔ Three-phase versions up to 1000 A
- ➔ Smoothed DC power supplies



## Ballasts for lighting equipment

- ➔ Special ballasts for gas discharge lamps up to 100 kW
- ➔ High-reactance transformers
- ➔ Controlled ballasts (transducers)
- ➔ Electronic ballasts up to 30 kW

## Resin-encapsulated transformers

- ➔ Safety isolating transformers, stationary/portable
- ➔ Isolating transformers, stationary/portable
- ➔ Roof inlet transformers
- ➔ Thawing transformers
- ➔ Antifreeze transformers
- ➔ Print and flat transformers



## Reactors and inductors

- ➔ AC reactors up to 320 kVA, single-phase
- ➔ AC reactors up to 500 kVA, three-phase
- ➔ DC reactors up to  $L^2 = 1500$  Ws
- ➔ Filter reactors - AF rejector circuits
- ➔ Transducers - reactors for switched-mode power supplies

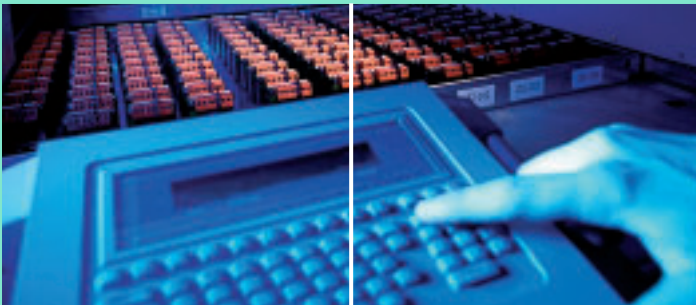
# content



<b>DGE</b>	single-phase smoothing reactors EI cores	<b>8 – 9</b>
<b>DGE</b>	single-phase smoothing reactors UI cores	<b>10 – 11</b>
<b>DNE</b>	single-phase line reactors EI cores	<b>12 – 13</b>
<b>DNE</b>	single-phase line reactors UI cores	<b>14 – 15</b>
<b>DKE</b>	single-phase commutating reactors Uk=4% at 230 V	<b>16 – 17</b>
<b>DKE</b>	single-phase commutating reactors Uk=4% at 400 V	<b>18 – 19</b>
<b>DKE</b>	single-phase commutating reactors Uk=2% at 230 V	<b>20 – 21</b>
<b>DKE</b>	single-phase commutating reactors Uk=2% at 400 V	<b>22 – 23</b>
<b>DZE</b>	single-phase link reactors vertical version	<b>24 – 25</b>
<b>DND</b>	three-phase line reactors vertical version	<b>26 – 27</b>
<b>DKD</b>	three-phase commutating reactors Uk=4% at 3x400 V	<b>28 – 29</b>
<b>DKD</b>	three-phase commutating reactors Uk=2% at 3x400 V	<b>30 – 31</b>
<b>DFD</b>	DFD three-phase filter reactors vertical version	<b>32 – 33</b>
<b>DFD</b>	DFD three-phase filter reactors horizontal version	<b>34 – 35</b>
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<b>General technical information</b>		<b>38</b>
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<b>Connection methods</b>		<b>44 – 45</b>
<b>GEH</b>	housing	<b>46</b>
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# voltage made to measure

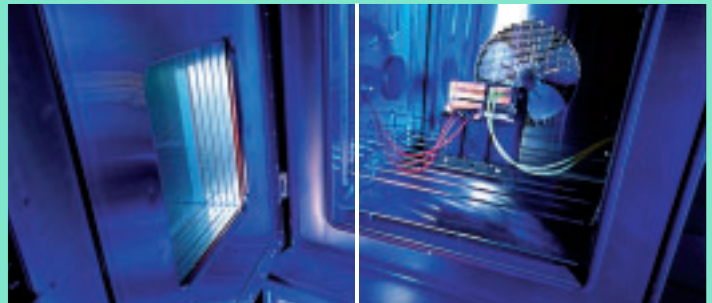
→ We warrant the safe and proper function of our transformers and inductive components for a period of up to five years.



→ The people behind SBA are the basis of our success. Custom design of solutions requires a high degree of flexibility and customer focus. The best solution to a customer's problem is always developed in a team effort. The result is the optimal design for every product. Computer-backed processes, attractive prices and high-level logistics are ideal complements of the advanced know-how of our employees. Independent, responsible action is as important as creative thinking to meet our customers' requirement profiles.

➔ SBA - an Investment in the future.

Permanent innovation and most advanced materials guarantee and constantly redefine the high quality of SBA transformers and power supplies. The heat resistant materials from SBA meet highest demands on safety, life and quality - VDE and TÜV approved. Extensive controls in all areas of production warrant the reliability of all SBA products.

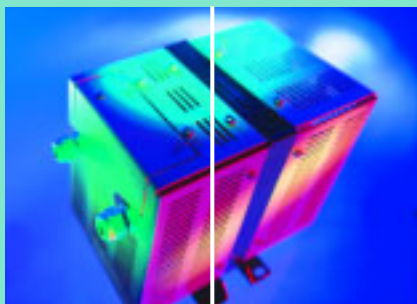


➔ Every day, new proof of SBA's performance potential is provided: Products of special design in small or medium lots permit individual solutions for diverse applications in industry - often within a few working days. SBA - with strong technology and mature products into the future.

# FOR many industries

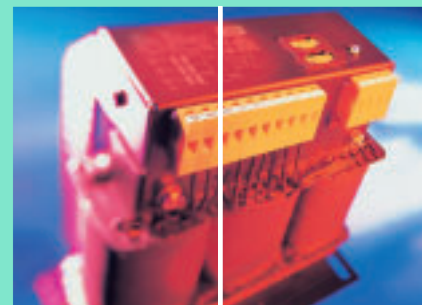
## ➔ Voltage stabilizers

- magnetic up to 3 kVA
- motor-controlled up to 1000 kVA



## ➔ DC power supplies

- non-stabilized up to 1000 A
- stabilized up to 40 A
- UPS modules for DC power supplies



## ➔ Resin-encapsulated transformers

- Safety isolating transformers (including portable versions)
- Isolating transformers (including portable versions)
- Print and flat transformers



S

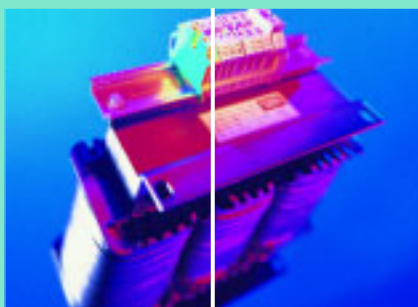
### ➔ Ring core and variable toroidal transformers

- Ring core transformers
- Variable toroidal transformers, single-phase or three-phase



### ➔ Reactors and inductors

- AC reactors up to 500 kVar
- DC reactors
- Line reactors and commutating reactors
- Filter reactors - AF rejector circuits
- Switched-mode power supply components



### ➔ Incorporated transformers

- Single-phase transformers up to 630 kVA
- Three-phase transformers up to 1000 kVA
- Isolating transformers for installation in medical equipment room
- Insulating transformers up to 10000 V
- High current transformers up to 2000 A
- Auto transformers
- Transformers for rail vehicles

### ➔ Ballasts for lighting equipment

- Special ballasts for all kinds of gas discharge lamp up to 100 kW
- High-reactance transformers
- Controlled ballasts (transducers)
- Electronic ballasts up to 30 kW

## Type DGE

Single-phase smoothing reactor to EN 61558-2-20 / VDE 0570-2-20

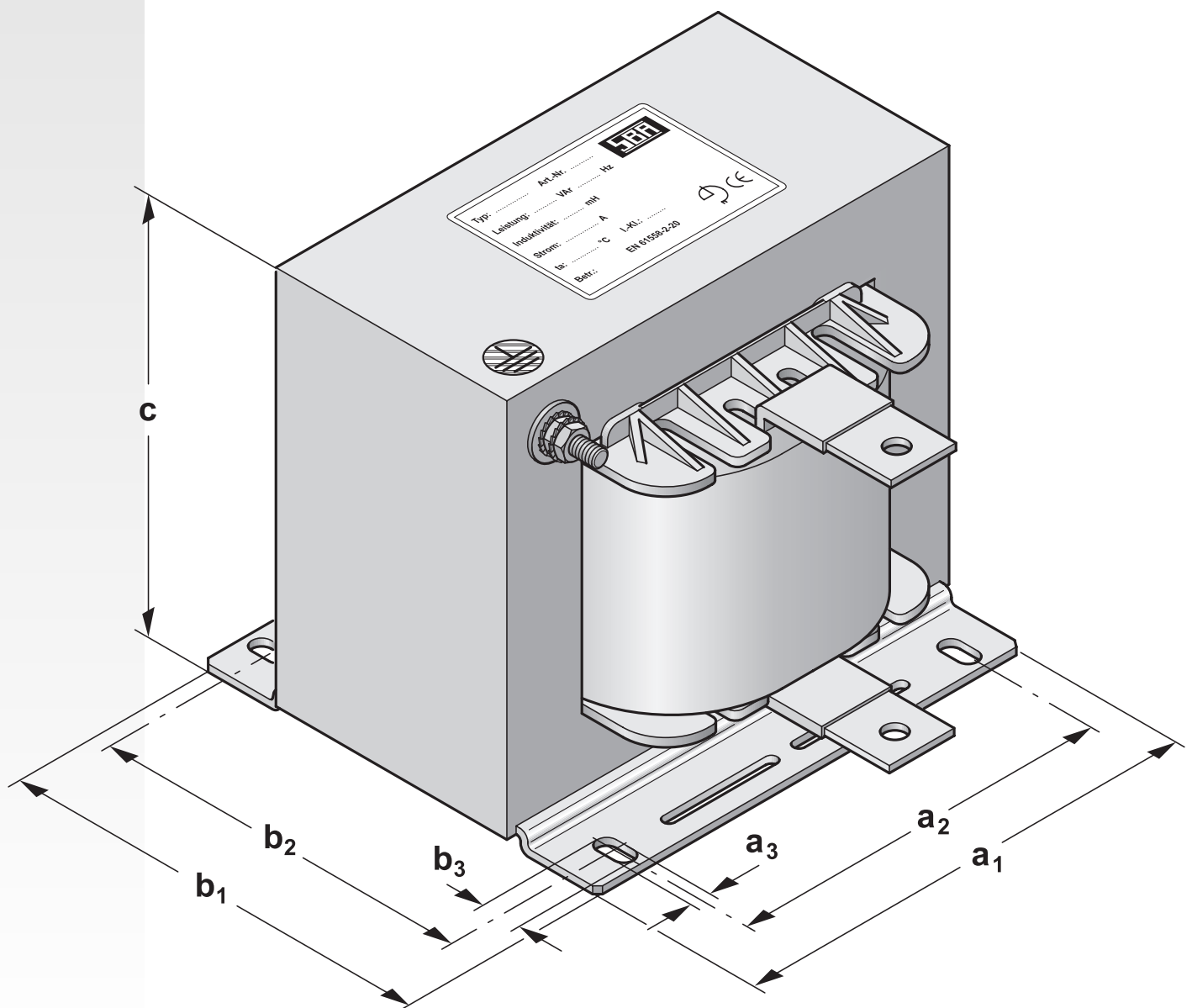
### Application

To reduce the ripple in DC circuits, e.g., of controlled power converters. This reduces the noise and heat of connected motors and also reduces motor loss.

Reduces commutator wear and thereby extends the useful life.

Parallel operation of phase-displaced power converters is possible by suppression of compensating current.

Customized specification and dimensions ensure optimal application.





# TYP DGE SINGLE-PHASE SMOOTHING REACTORS



## Construction

- ⇒ Open construction (IP 00, incorporation up to max. IP 23)
- ⇒ Required space according to DIN 41308
- ⇒ Depending on rated current: screw terminals or flat termination with bolt
- ⇒ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ⇒ Wear-resistant, heat, UV and solvent resistant nameplate
- ⇒ **Special versions** available on request

## Specifications

Energy level	max.	10 Ws
Rated inductance	max.	1000 mH
Rated voltage	max.	1000 V DC
Frequency		0-300 Hz
Protection class		I
Protection index		IP 00
Insulation class		B
Ambient temperature	max.	40° C

## Overview

Size	Magnetic energy = $L \times I^2 \times 0,5$ Ws	Total weight appr. kg	Copper weight appr. kg	a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	Dimensions b <sub>2</sub> approx. mm	a <sub>3</sub>	b <sub>3</sub>	c	c*
037	0.08	0.5	0.12	55	47	44	36	3.6	7	65	85
038	0.13	0.6	0.16	66	53	50	40	4.8	8	55	65
039	0.20	0.9	0.18	66	65	50	52	4.8	8	55	65
040	0.25	1.2	0.25	78	61	56	49	4.8	8	70	80
041	0.32	1.5	0.28	78	71	56	58	4.8	8	70	80
042	0.40	1.6	0.35	84	64	64	50	4.8	8	75	90
043	0.50	2.0	0.40	84	77	64	64	4.8	8	75	90
071	0.64	2.3	0.52	96	81	84	64	5.8	9	85	100
072	0.80	2.8	0.65	96	89	84	73	5.8	9	85	100
073	1.00	3.6	0.72	96	103	84	87	5.8	9	85	100
074	1.30	4.2	1.05	120	93	90	74	5.8	12	105	120
075	1.60	5.2	1.15	120	101	90	85	5.8	12	105	120
076	2.00	6.6	1.40	120	121	90	104	5.8	12	105	120
077	2.50	7.7	2.00	150	113	122	90	7	15	130	140
078	3.20	9.9	2.35	150	130	122	106	7	15	130	140
079	4.00	13.1	2.50	150	155	122	133	7	15	130	140
080	5.00	13.7	3.80	174	127	135	102	7	15	150	160
081	6.40	17.2	4.20	174	147	135	122	7	15	150	160
082	8.00	20.5	4.50	174	167	135	142	7	15	150	160
083	10.00	26.0	5.50	192	190	155	154	11	18	165	180

\*Dimensions include terminals

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## Type DGE

Single-phase smoothing reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

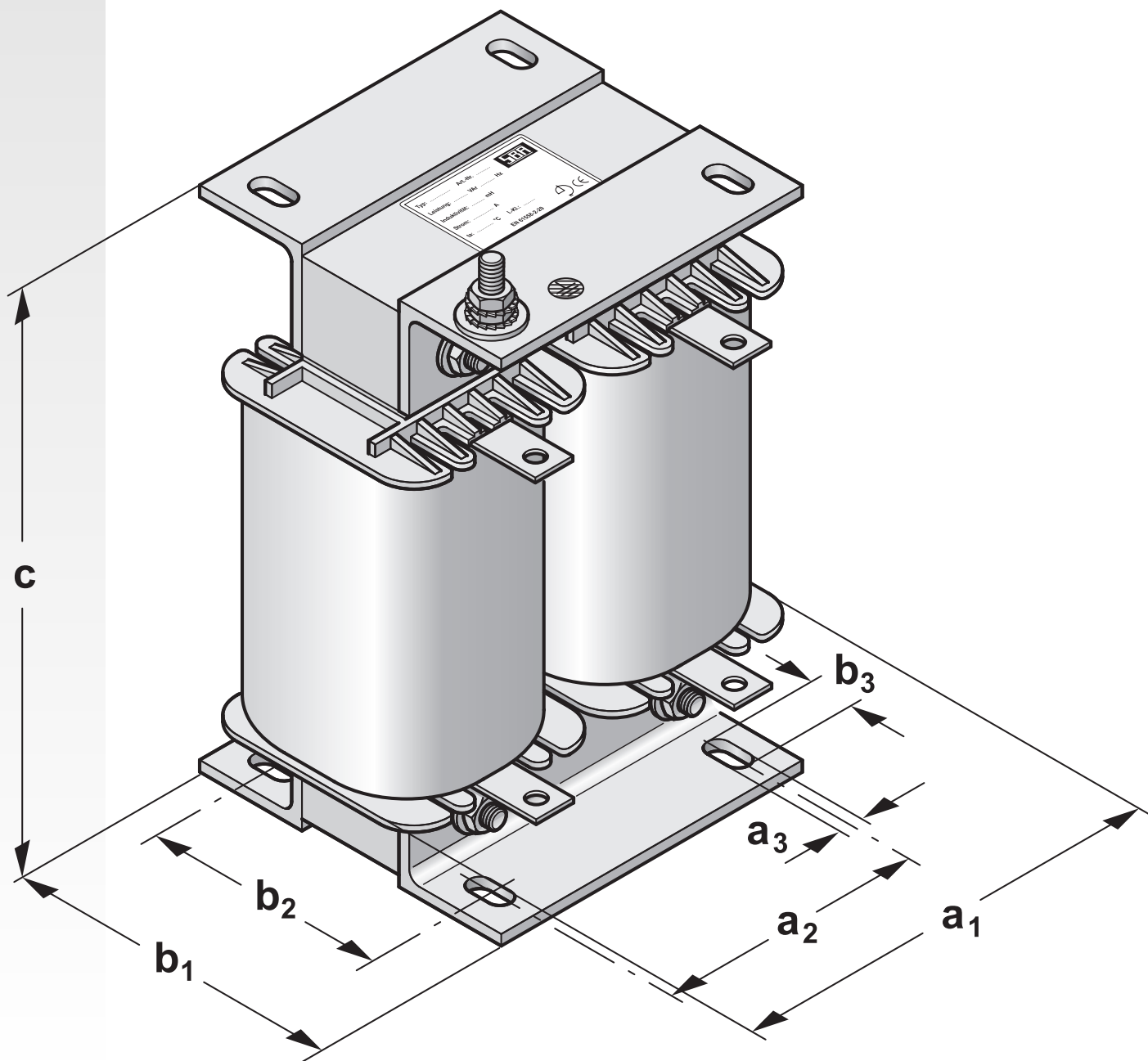
To reduce the ripple in DC circuits, e.g., of controlled power converters.

This reduces the noise and heat of connected motors and also reduces motor loss.

Reduces commutator wear and thereby extends the useful life.

Parallel operation of phase-displaced power converters is possible by suppression of compensating current.

Customized specification and dimensions ensure optimal application.



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# TYP DGE SINGLE-PHASE SMOOTHING REACTORS



## Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Resting on angular feet (DIN 41307)
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

## Specifications

Energy level	max.	640 Ws
Rated inductance	max.	1000 mH
Rated voltage	max.	1000 VDC
Frequency		0-300 Hz
Protection class		I
Protection index		IP 00
Insulation class		B/F
Ambient temperature	max.	40° C

## Overview

Size	Magnetic energy = $L \times I^2 \times 0,5$ Ws	Total weight appr. kg	Copper weight appr. kg	$a_1$	$b_1$	$a_2$	Dimensions $b_2$ approx. mm	$a_3$	$b_3$	c
123	10	24.0	8.7	196	122	124	94	10	18	260
124	12.8	30.0	10.0	196	147	124	119	10	18	260
127	20	39.0	15.0	235	153	144	125	10	18	310
128	25	45.0	16.0	235	168	144	140	10	18	310
129	32	51.0	17.0	235	183	144	155	10	18	310
130	40	61.0	24.0	275	173	176	143	12	18	360
131	50	77.0	27.0	275	203	176	173	12	18	360
133	64	88.0	36.0	313	193	196	157	13	20	420
134	80	107.0	39.0	313	220	196	184	13	20	420
135	100	128.0	43.0	313	250	196	214	13	20	420
137	128	140.0	45.0	380	500	190	450	13	13	640
139	160	170.0	53.0	380	500	190	450	13	13	640
148	200	215.0	70.0	480	500	240	450	13	13	750
141	250	275.0	81.0	480	500	240	450	13	13	750
142	320	320.0	88.0	480	500	240	450	13	13	750
146	400	380.0	141.0	600	500	300	450	13	13	810
147	500	480.0	157.0	600	500	300	450	13	13	810
145	640	560.0	165.0	600	500	300	450	13	13	810

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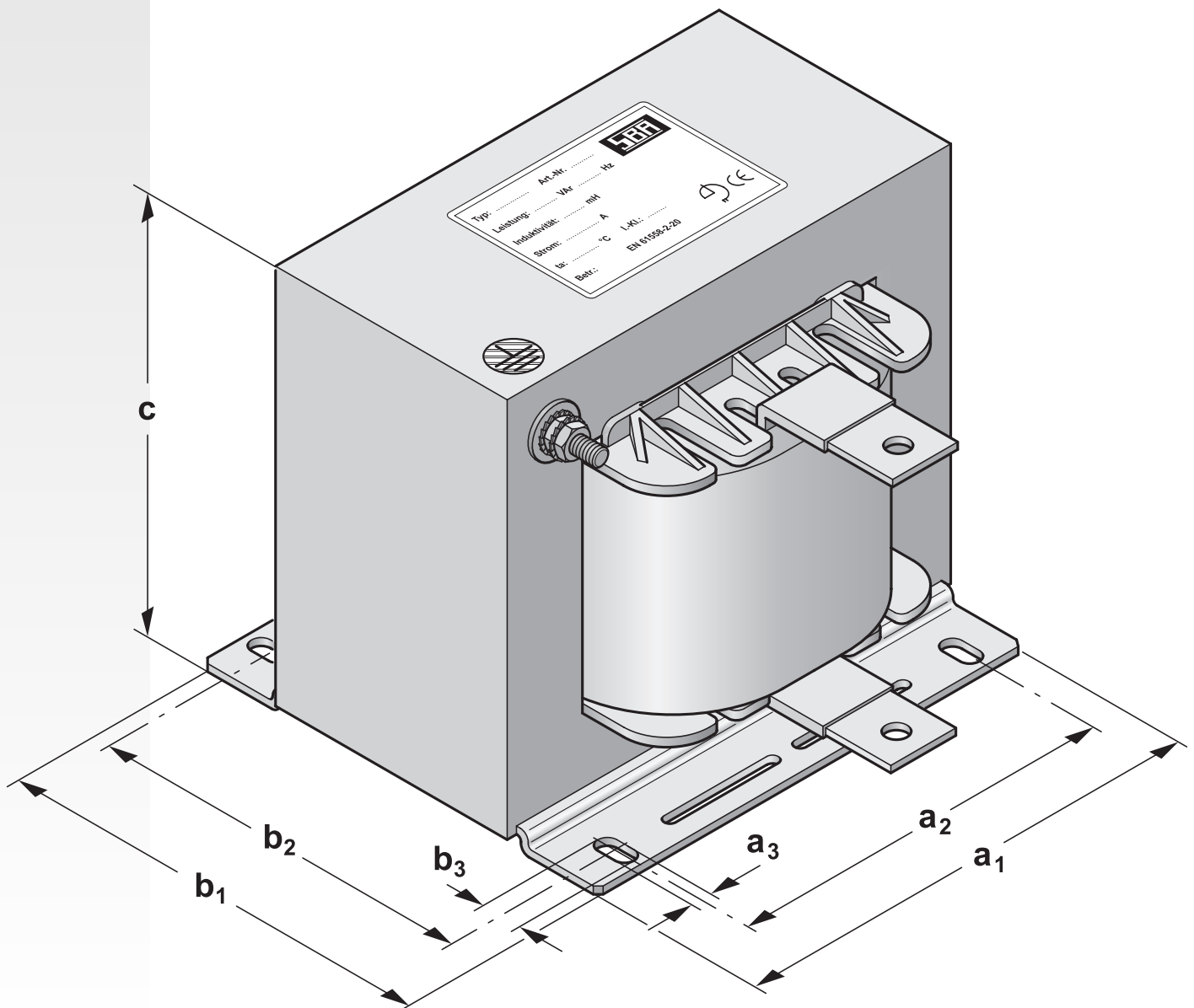
Internet: [www.sba.de](http://www.sba.de)

## Type DNE

Single-phase line reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

Reactor limiting peak current, suppressing reactions on system and commutation notches. Harmonics are substantially dampened. As discharge reactor for capacitors in compensation systems. As neutral grounding reactor to reduce neutral conductor currents in local three-phase systems. As series reactor for current limitation in discharge lamps. Customized specification and dimensions ensure optimal application.



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# TYPE DNE SINGLE-PHASE LINE REACTORS



## Construction

- ⇒ Open construction (IP 00, incorporation up to max. IP 23)
- ⇒ Required space according to DIN 41308
- ⇒ Depending on rated current: screw terminals or flat termination with bolt
- ⇒ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ⇒ Wear-resistant, heat, UV and solvent resistant nameplate
- ⇒ **Special versions** available on request

## Specifications

Supply voltage	max.	1000 V
Output	max.	2500 VAr
Current	max.	1000 A
Frequency	max	400 Hz
Protection class		I
Protection index		IP 00
Insulation class		B
Ambient temperature	max.	40° C

## Overview

Size	Design rating	Total weight appr. kg	Copper weight appr. kg	a <sub>1</sub>	b <sub>1</sub>	Dimensions					
	VAr					a <sub>2</sub>	b <sub>2</sub>	a <sub>3</sub>	b <sub>3</sub>	c	c*
037	20	0.5	0.12	55	47	44	36	3.6	7	65	85
038	32	0.6	0.16	66	53	50	40	4.8	8	55	65
039	50	0.9	0.18	66	65	50	52	4.8	8	55	65
040	63	1.2	0.25	78	61	56	49	4.8	8	70	80
041	80	1.5	0.28	78	71	56	58	4.8	8	70	80
042	100	1.6	0.35	84	64	64	50	4.8	8	75	90
043	125	2.0	0.40	84	77	64	64	4.8	8	75	90
071	160	2.3	0.52	96	81	84	64	5.8	9	85	100
072	200	2.8	0.65	96	89	84	73	5.8	9	85	100
073	250	3.6	0.72	96	103	84	87	5.8	9	85	100
074	320	4.2	1.05	120	93	90	74	5.8	12	105	120
075	400	5.2	1.15	120	101	90	85	5.8	12	105	120
076	500	6.6	1.40	120	121	90	104	5.8	12	105	120
077	630	7.7	2.00	150	113	122	90	7	15	130	140
078	800	9.9	2.35	150	130	122	106	7	15	130	140
079	1000	13.1	2.50	150	155	122	133	7	15	130	140
080	1250	13.7	3.80	174	127	135	102	7	15	150	160
081	1600	17.2	4.20	174	147	135	122	7	15	150	160
082	2000	20.5	4.50	1174	167	135	142	7	15	150	160
083	2500	26.0	5.50	192	190	155	154	11	18	165	180

\*Dimensions include terminals

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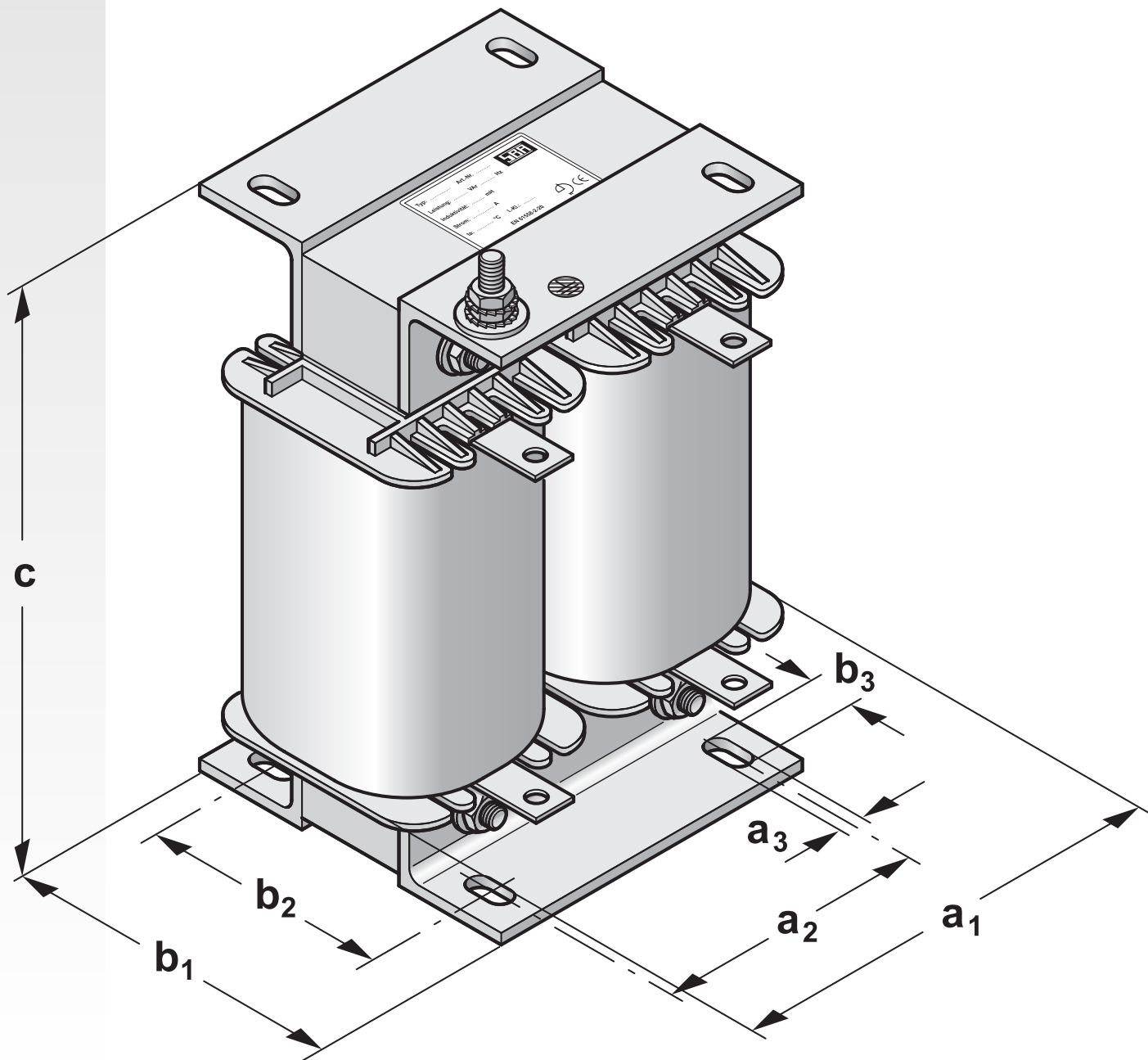
Internet: [www.sba.de](http://www.sba.de)

## Type DNE

Single-phase line reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

Reactor limiting peak current, suppressing reactions on system and commutation notches. Harmonics are substantially dampened. As discharge reactor for capacitors in compensation systems. As neutral grounding reactor to reduce neutral conductor currents in local three-phase systems. As series reactor for current limitation in discharge lamps. Customized specification and dimensions ensure optimal application.



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# TYPE DNE

## SINGLE-PHASE LINE REACTORS



### Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Resting on angular feet (DIN 41307)
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

### Specifications

Supply voltage	max.	1000 V
Output	max.	50 kVAr
Current	max.	1600 A
Frequency	max	400 Hz
Protection class		I
Protection index		IP 00
Insulation class		B/F
Ambient temperature	max.	40° C

### Overview

Size	Design rating	Total weight appr. kg	Copper weight appr. kg	a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	Dimensions			
	kVAr						b <sub>2</sub>	a <sub>3</sub>	b <sub>3</sub>	c
approx.mm										
123	2.5	24.0	8.7	196	122	124	94	10	18	260
124	3.2	30.0	10.0	196	147	124	119	10	18	260
127	5.0	39.0	15.0	235	153	144	125	10	18	310
128	6.3	45.0	16.0	235	168	144	140	10	18	310
129	8.0	51.0	17.0	235	183	144	155	10	18	310
130	10.0	61.0	24.0	275	173	176	143	12	18	360
131	12.5	77.0	27.0	275	203	176	173	12	18	360
133	16.0	88.0	36.0	313	193	196	157	13	18	420
134	20.0	107.0	39.0	313	220	196	184	13	20	420
135	25.0	128.0	43.0	313	250	196	214	13	20	420
137	32.0	140.0	45.0	380	500	190	450	13	20	640
139	40.0	170.0	53.0	380	500	190	450	13	20	640
140	50.0	215.0	70.0	480	530	240	450	13	20	640

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## Type DKE

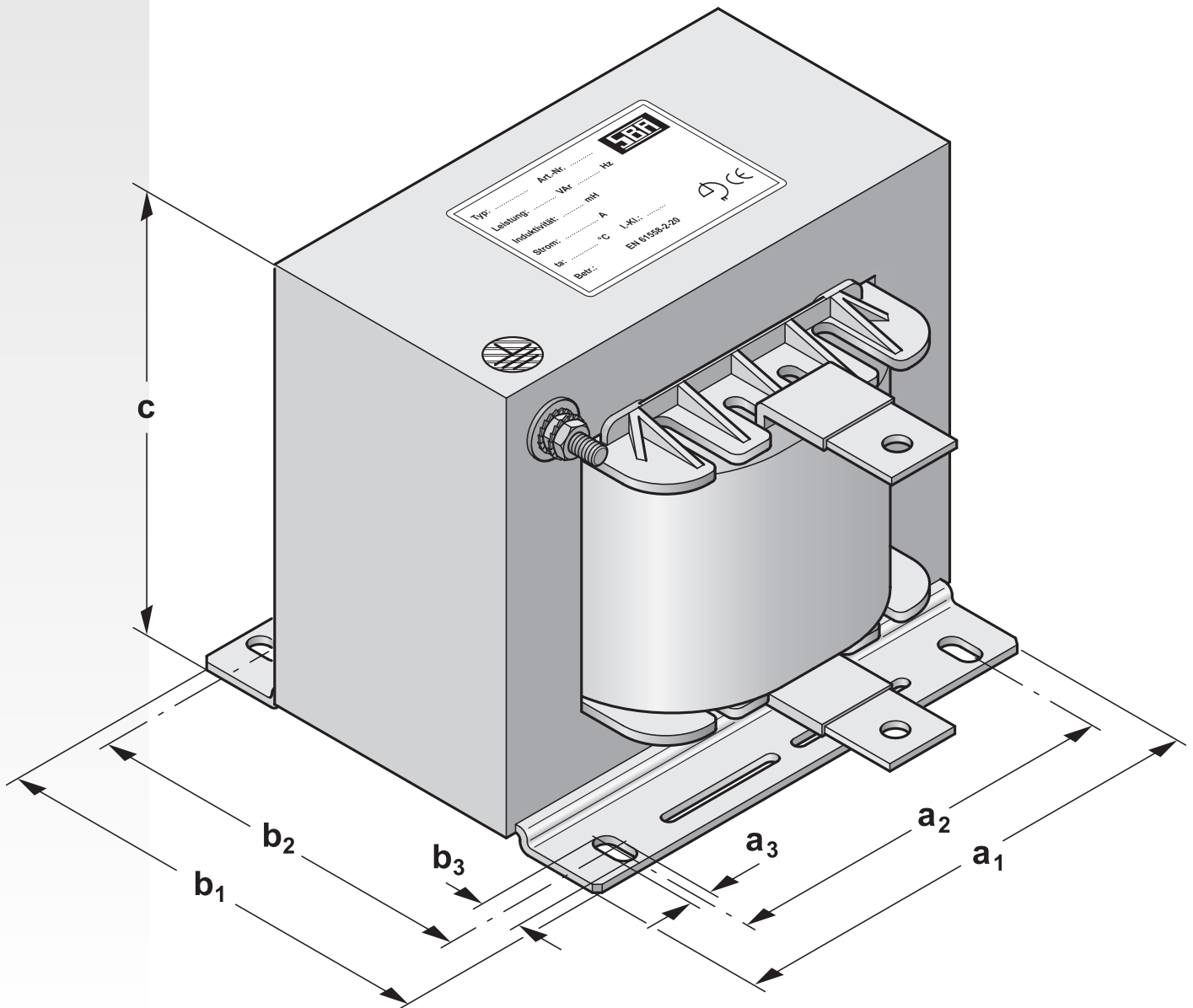
short circuit voltage at 4% to mains (230 V)

Single-phase commutating reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

As commutating reactor to limit peak current, suppress reactions on system and commutation notches. Harmonics are substantially damped.

Due to the selected reactor inductance, the short-circuit voltage matches the connected consumer, with this product: short circuit voltage at 4% to mains.



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# TYPE DKE SINGLE-PHASE COMMUTATING REACTORS



## Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Required space according to DIN 41308
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

## Specifications

Supply voltage	max.	230 V
Rated current	max.	63 A
Frequency		50-60 Hz
Protection class		I
Protection index		IP 00
Insulation class		B
Ambient temperature	max.	40° C

## Overview

**230 V single-phase system / corresponds to short circuit voltage at 4%, voltage drop of 9.2 V at  $I_N$**

Article no.	Rated current	Rated inductance at 50 Hz	Copper weight	$a_1$	$b_1$	$a_2$	Dimensions			
	$A_{eff}$	mH	approx. kg				$b_2$	$a_3$	$b_3$	c
							approx. mm			
036-0257*	2	14.70	0.08	46	45	38	34	3.6	7	78
037-0220*	4	7.33	0.12	55	47	44	36	3.6	7	85
038-0330*	6	4.88	0.16	66	53	50	40	4.8	9	65
039-0320*	8	3.66	0.18	66	65	50	52	4.8	9	65
040-0482*	10	2.93	0.25	78	61	56	49	4.8	8	80
041-0127*	16	1.84	0.28	78	71	56	58	4.8	8	80
042-0550*	20	1.46	0.35	84	64	64	50	4.8	8	90
043-0740*	25	1.17	0.40	84	77	64	64	4.8	8	90
071-0360*	35	0.84	0.52	96	81	84	64	5.8	9	100
072-0415*	40	0.73	0.65	96	89	84	73	5.8	9	100
073-0580*	50	0.59	0.72	96	103	84	87	5.8	9	105
074-0410**	63	0.47	1.05	120	93	90	74	5.8	12	104

\* Connection to terminals

\*\* Connection to flat termination with bolt

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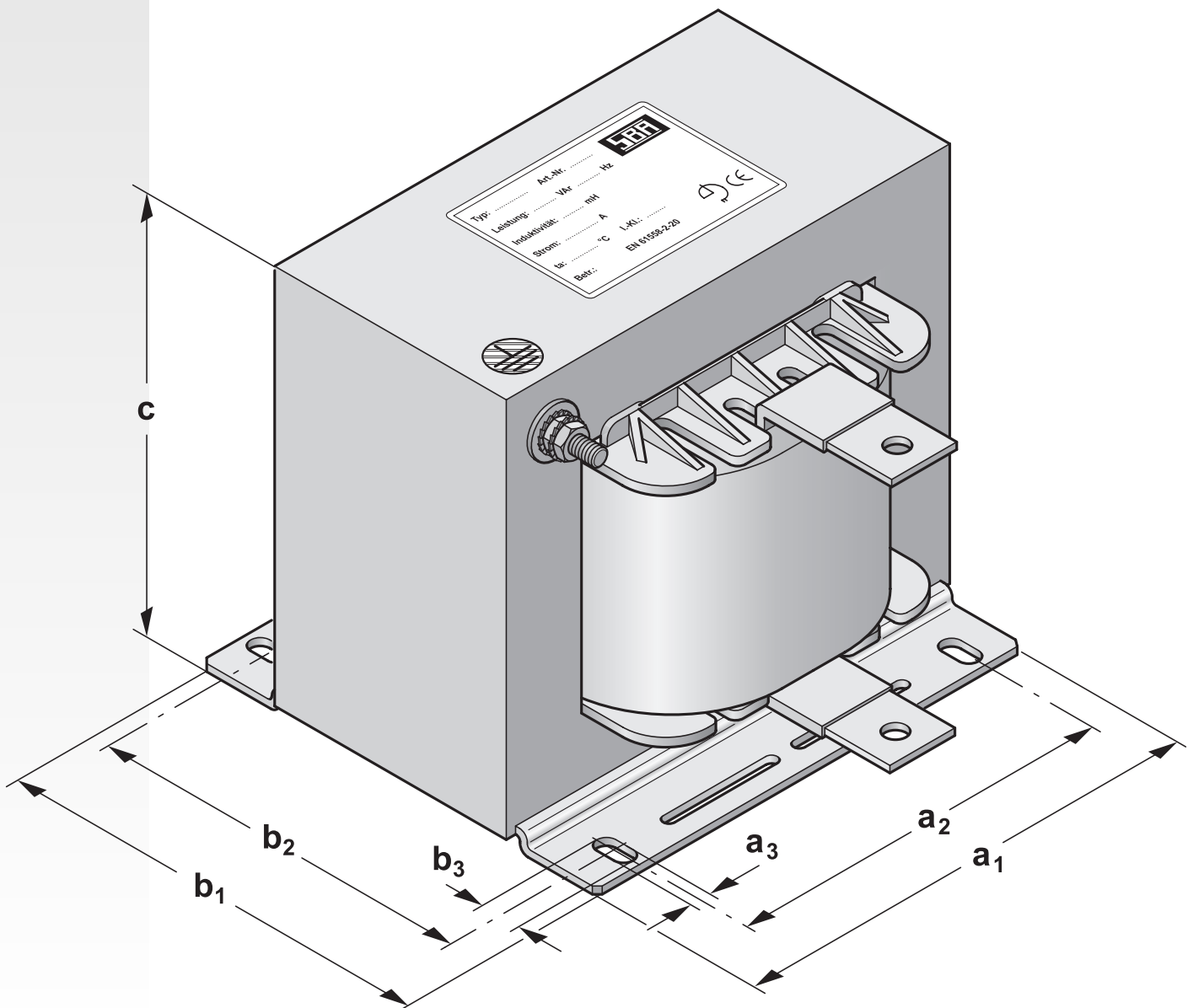
## Type DKE

short circuit voltage at 4% to mains (400 V)

Single-phase commutating reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

As commutating reactor to limit peak current, suppress reactions on system and commutation notches. Harmonics are substantially dampened. Due to the selected reactor inductance, the short-circuit voltage matches the connected consumer, with this product: short circuit voltage at 4% to mains.



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# SINGLE-PHASE COMMUTATING REACTORS



## Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Required space according to DIN 41308
- ➔ screw terminals
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

## Specifications

Supply voltage	max.	400 V
Rated current	max.	50 A
Frequency		50-60 Hz
Protection class		I
Protection index		IP 00
Insulation class		B
Ambient temperature	max.	40° C

## Overview

**400 V three-phase system between 2 phases / corresponds to short circuit voltage at 4%, voltage drop of 16 V at I<sub>N</sub>**

Article no.	Rated current A <sub>eff</sub>	Rated inductance at 50 Hz mH	Copper weight ca. kg	a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	Dimensions b <sub>2</sub> approx. mm	a <sub>3</sub>	b <sub>3</sub>	c
036-0305	1	50.9	0.35	46	45	38	34	3.6	7	78
037-0207	2	25.5	0.50	55	47	44	36	3.6	7	85
038-0425	4	12.8	0.65	66	53	50	40	4.8	9	65
039-0325	5	10.2	0.90	66	65	50	52	4.8	9	65
040-0545	6	8.5	1.20	78	61	56	49	4.8	8	80
041-0141	10	5.1	1.50	78	71	56	58	4.8	8	80
042-0555	12	4.2	1.60	84	64	64	50	4.8	8	90
043-0745	15	3.4	2.00	84	77	64	64	4.8	8	90
071-0292	20	2.5	2.30	96	81	84	64	5.8	9	100
072-0420	25	2.0	2.80	96	89	84	73	5.8	9	100
073-0585	30	1.7	3.60	96	103	84	87	5.8	9	100
074-0415	35	1.5	4.20	120	93	90	74	5.8	12	120
075-0535	40	1.3	5.20	120	101	90	85	5.8	12	120
076-0585	50	1.0	6.60	120	121	90	104	5.8	12	120

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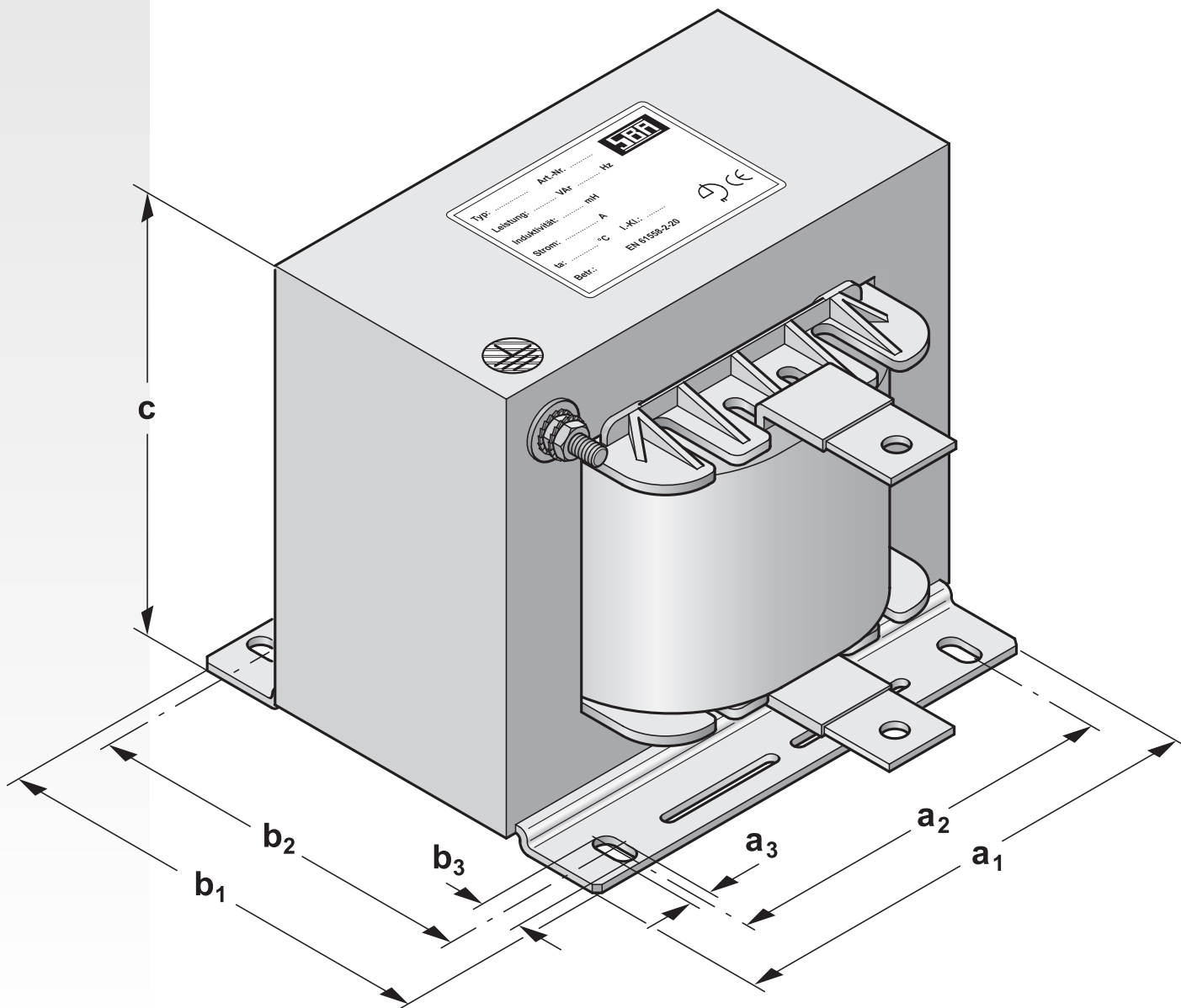
Internet: [www.sba.de](http://www.sba.de)

## Type DKE      short circuit voltage at 2% to mains (230 V)

Single-phase commutating reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

As commutating reactor to limit peak current, suppress reactions on system and commutation notches. Harmonics are substantially dampened. Due to the selected reactor inductance, the short-circuit voltage matches the connected consumer, with this product: short circuit voltage at 2% to mains.



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# TYPE DKE SINGLE-PHASE COMMUTATING REACTORS



## Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Required space according to DIN 41308
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

## Specifications

Supply voltage	max.	230 V
Rated current	max.	125 A
Frequency		50-60 Hz
Protection class		I
Protection index		IP 00
Insulation class		B
Ambient temperature	max.	40° C

## Overview

**230 V single-phase system / corresponds to short circuit voltage at 2%, voltage drop of 4.6 V at I<sub>N</sub>**

Article no.	Rated current A <sub>eff</sub>	Rated inductance at 50 Hz mH	Copper weight appr. kg	a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	Dimensions b <sub>2</sub> approx. mm	a <sub>3</sub>	b <sub>3</sub>	c
036-0310*	4	3.60	0.35	46	45	38	34	3.6	7	78
037-0225*	8	1.80	0.50	55	47	44	36	3.6	7	85
038-0430*	12	1.20	0.65	66	53	50	40	4.8	9	65
039-0330*	16	0.90	0.90	66	65	50	52	4.8	9	65
040-0550*	20	0.72	1.20	78	61	56	49	4.8	8	80
041-0160*	32	0.45	1.50	78	71	56	58	4.8	8	80
042-0560*	40	0.36	1.60	84	64	64	50	4.8	8	100
043-0750*	50	0.29	2.00	84	77	64	64	4.8	8	100
071-0365**	70	0.20	2.80	96	89	84	73	5.8	9	84
072-0425**	80	0.18	2.80	96	89	84	73	5.8	9	84
073-0590**	100	0.14	3.60	96	103	84	87	5.8	9	84
074-0420**	125	0.11	4.20	120	93	90	74	5.8	12	104

\* Connection to terminals

\*\* Connection to flat termination with bolt

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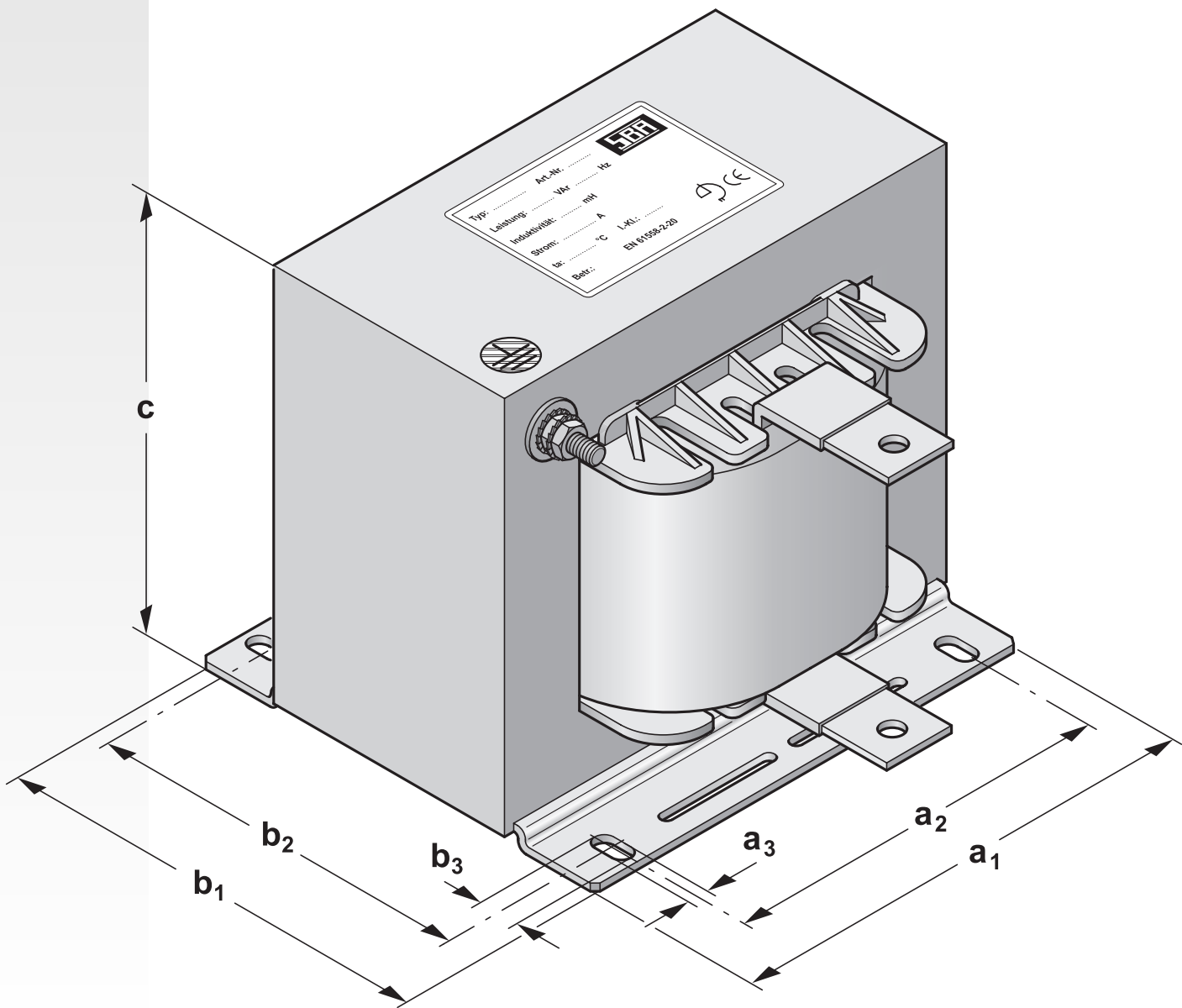
Internet: [www.sba.de](http://www.sba.de)

## Type **DKE**      short circuit voltage at 2% to mains (400 V)

Single-phase commutating reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

As commutating reactor to limit peak current, suppress reactions on system and commutation notches. Harmonics are substantially dampened. Due to the selected reactor inductance, the short-circuit voltage matches the connected consumer, with this product: short circuit voltage at 2% to mains.



# TYPE DKE SINGLE-PHASE COMMUTATING REACTORS



## Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Required space according to DIN 41308
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

## Specifications

Supply voltage	400 V
Rated current	max. 70 A
Frequency	50-60 Hz
Protection class	I
Protection index	IP 00
Insulation class	B
Ambient temperature	max. 40° C

## Overview

**400 V three-phase system between 2 phases / corresponds to short circuit voltage at 2%, voltage drop of 8 V at I<sub>N</sub>**

Article no.	Rated current A <sub>eff</sub>	Rated inductance at 50 Hz mH	Copper weight appr.. kg	a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	Dimensions b <sub>2</sub> approx. mm	a <sub>3</sub>	b <sub>3</sub>	c
036-0315*	2	12.70	0.35	46	45	38	34	3.6	7	78
037-0230*	4	6.30	0.50	55	47	44	36	3.6	7	85
038-0435*	8	3.50	0.65	66	53	50	40	4.8	8	65
039-0315*	10	2.50	0.90	66	65	50	52	4.8	8	65
040-0555*	12	2.10	1.20	78	61	56	49	4.8	8	80
041-0165*	20	1.30	1.50	78	71	56	58	4.8	8	80
042-0565*	24	1.05	1.60	84	64	64	50	4.8	8	90
043-0755*	30	0.85	2.00	84	77	64	64	4.8	8	90
071-0370*	40	0.63	2.80	96	89	84	73	5.8	9	100
072-0430*	50	0.51	2.80	96	89	84	73	5.8	9	100
073-0595**	63	0.40	3.60	96	103	84	87	5.8	9	84
074-0425**	70	0.36	4.20	120	93	90	74	5.8	12	104

\* Connection to terminals

\*\* Connection to flat termination with bolt

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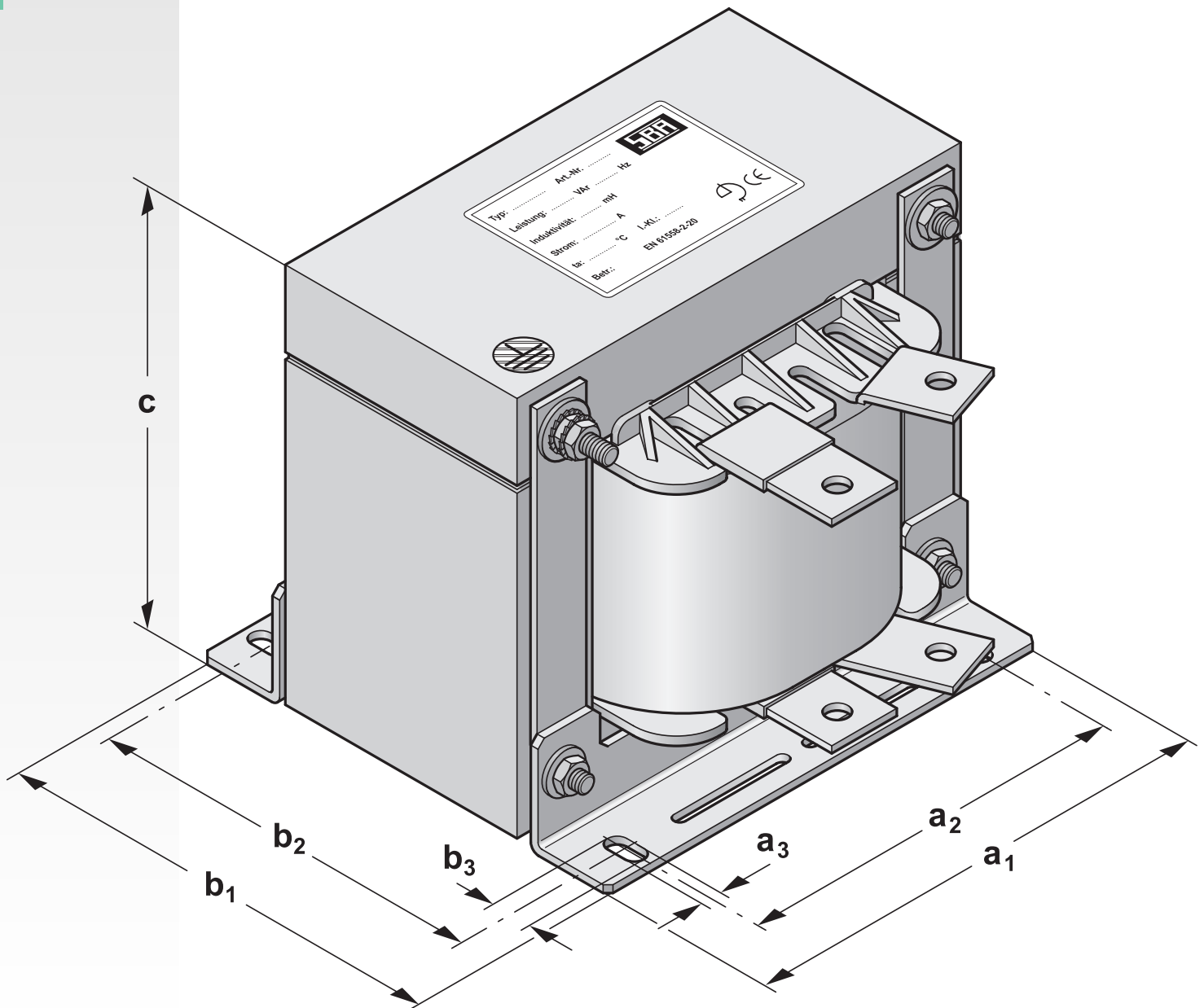
Internet: [www.sba.de](http://www.sba.de)

## Type DZE

Single-phase link reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

The single-phase link reactor is intended for installation in the DC circuit of frequency converters. This reduces the harmonics component and improves the efficiency. It avoids system asymmetry at the input side of power system managed converters and the output side of self-commutated inverters for speed control. This improves the smooth running of drives and extends their life. The linear nature of the reaction parameters far beyond the rated current range ensures safe function also in limit areas. As loss is reduced and the efficiency of drives improved, less energy is consumed and the system environment minded.



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# TYPE DZE

## SINGLE-PHASE LINK REACTORS



### Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Required space according to DIN 41308
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

### Specifications

Supply voltage	400 V
Saturation at	> $1,5 \times I_{Nom}$
Current	max. 250 A
Frequency	50 Hz
Protection class	I
Protection index	IP 00
Insulation class	B
Ambient temperature	max. 40° C

### Overview

Article no.	Rated current A <sub>eff</sub>	Rated inductance at mH 2x	Total weight appr. kg	Copper weight appr. kg	a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	Dimensions b <sub>2</sub> approx. mm	a <sub>3</sub>	b <sub>3</sub>	c
073-5...	23	2.20	3.6	0.72	96	103	84	84	5.8	11	103
073-5...	48	1.40	3.6	0.72	96	103	84	84	5.8	11	103
001-5...	40	0.50	6.3	0.95	105	154	84	110	5.8	11	89
001-5...	53	0.55	9.5	2.50	135	155	104	104	5.8	11	120
001-5...	66	0.35	9.5	2.50	135	155	104	104	5.8	11	120
078-5...	120	0.12	9.9	2.35	150	130	122	101	7.0	13	132
079-5...	140	0.12	13.1	2.50	150	155	122	126	7.0	13	132
083-5...	190	0.19	26.0	5.50	192	190	150	150	10.0	18	175

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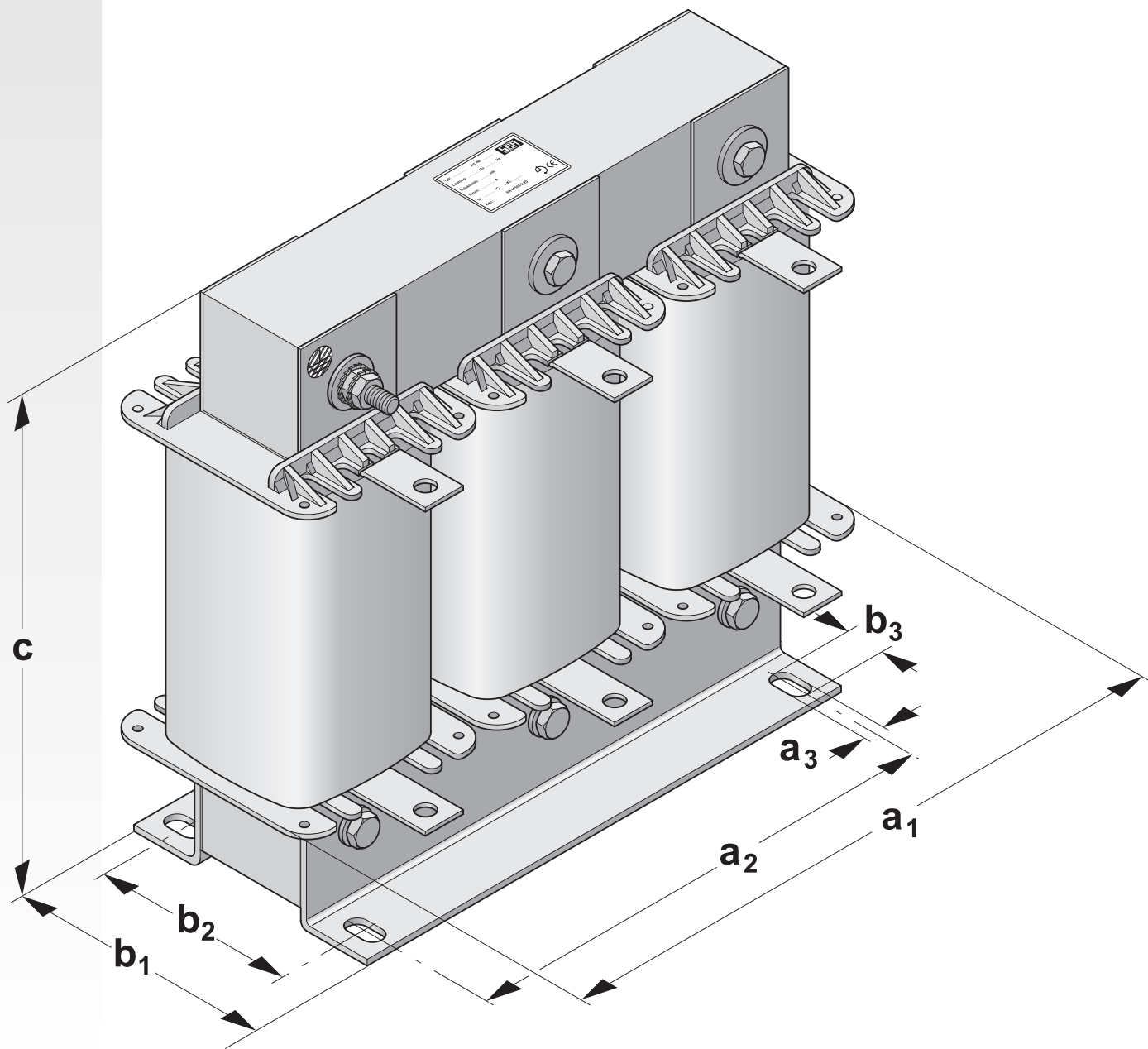
Internet: [www.sba.de](http://www.sba.de)

## Type DND

Three-phase line reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

As series reactor limiting peak current, suppressing reactions on system and commutation notches. Harmonics are substantially dampened. The use as motor reactor in converter service ensures reduction of the flank steepness and therefore less motor wear and running noise. The use of individual reactors is possible. The selection of the reactor's inductance enables current limitation to be adapted to the requirements with low loss.



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# TYPE DND

## THREE-PHASE LINE REACTORS



### Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Resting on angular feet (DIN 41307)
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

### Specifications

Supply voltage	max. 3 x 1000 V AC
Output	max. 160 kVAr
Rated current	max. 1600 A
Frequency	50-60 Hz
Protection class	I
Protection index	IP 00
Insulation class	B/F
Ambient temperature	max. 40° C

### Overview

Size	Design rating VAr	Total weight appr. kg	Copper weight appr. kg	a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	Dimensions b <sub>2</sub> a <sub>3</sub> b <sub>3</sub> c			
							approx. mm			
205	40	1.1	0.3	95	48	50	34	4	7	90
206	63	2.0	0.4	95	57	50	43	4	7	90
207	125	2.6	0.8	120	82	81	46	6	8	110
208	160	4.2	1.0	120	92	81	57	6	8	110
209	250	5.0	1.4	150	101	106	61	7	13	135
210	400	6.0	1.8	150	116	106	76	7	13	135
211	500	7.5	2.6	180	106	106	66	7	13	160
212	800	12.0	3.8	180	126	106	86	7	13	160
215	1250	16.0	5.0	228	110	176	71	7	13	210
216	1600	20.0	6.0	228	134	176	95	7	13	210
221	2000	23.0	6.8	264	136	200	76	10	18	240
222	2500	26.0	8.7	264	162	200	102	10	18	240
223	3200	33.0	13.5	300	152	224	94	10	18	270
224	5000	48.0	14.5	300	177	224	119	10	18	270
227	8000	53.0	21.0	360	183	264	125	10	18	320
228	10000	62.0	26.0	360	198	264	140	10	18	320
229	12000	72.0	32.0	360	213	264	165	10	18	320
230	12500	90.0	33.0	420	213	316	143	13	20	370
231	16000	110.0	36.0	420	243	316	173	13	20	370
233	20000	125.0	42.0	480	233	356	157	13	20	420

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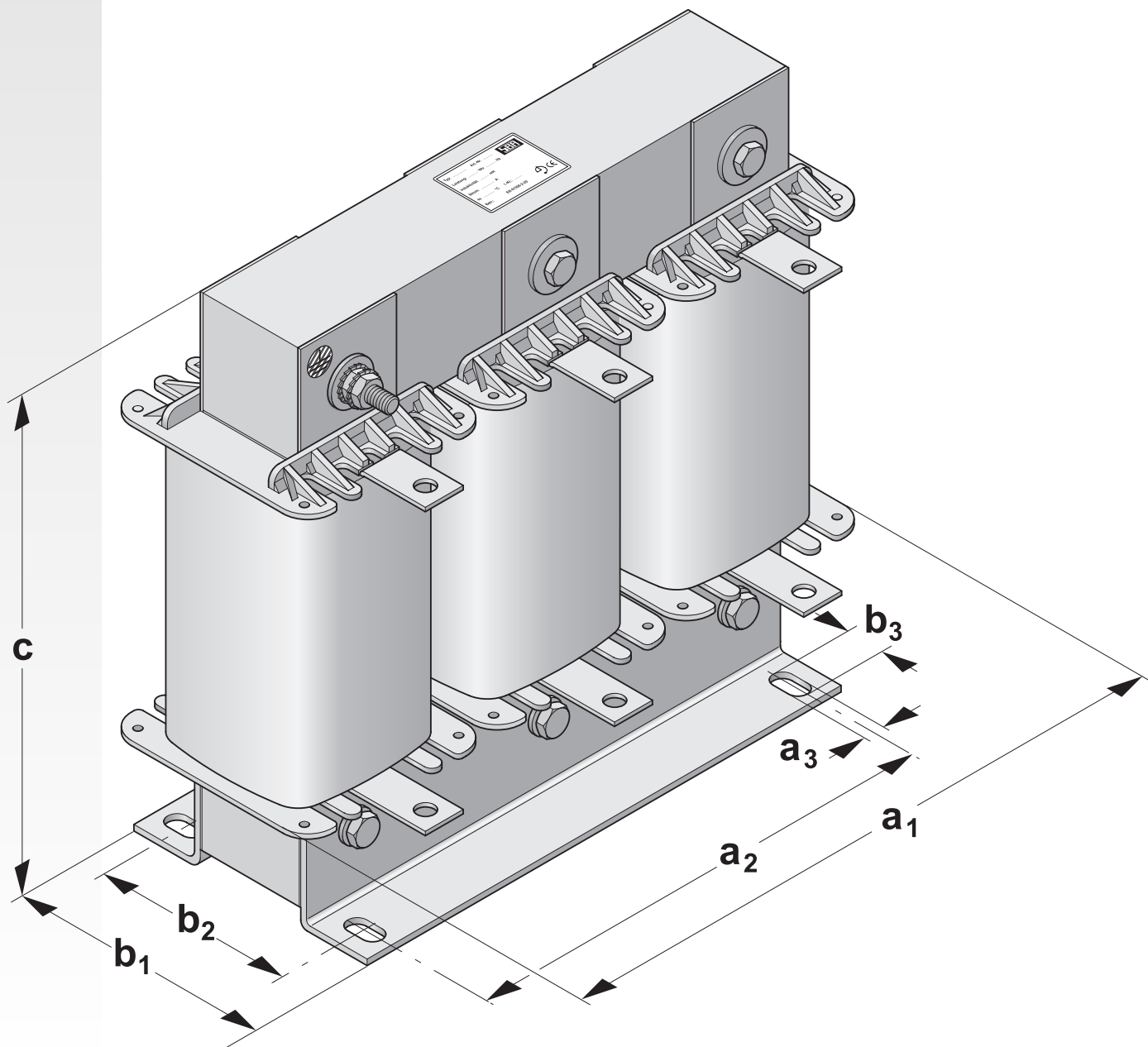
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## Type DKD    short circuit voltage at 4%

Three-phase commutating reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

As commutating reactor limiting peak current, suppressing reactions on system and commutation notches. Harmonics are substantially dampened. The use as motor reactor in converter service ensures reduction of the flank steepness and therefore less motor wear and running noise. The use of individual reactors is possible. Due to the selected reactor inductance, the short-circuit voltage matches the connected consumer, with this product: short circuit voltage at 2% .



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# TYPE DKO THREE-PHASE COMMUTATING REACTORS



## Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Resting on angular feet (DIN 41307)
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

## Specifications

Output range	max.	160 kVAr
Supply voltage		3 x 400 V
Rated current	max.	1000 A
Frequency		50-60 Hz
Short-circuit voltage		$u_k = 4\%$ (9.2 V)
Protection class		I
Protection index		IP 00
Insulation class		B/F
Ambient temperature	max.	40° C

## Overview

**3 x 400 V three-phase system / corresponds to short circuit voltage at 4%, voltage drop of 9.2 V at  $I_N$**

Article no.	Rated current	Rated inductance at 50 Hz	Total weight	Copper weight	$a_1$	$b_1$	Dimensions				
	$A_{eff}$	mH	appr. kg	appr. kg			$a_2$	$b_2$	$a_3$	$b_3$	c
approx. mm											
205-0081*	4	7.300	1.1	0.3	95	48	50	34	4	7	116
206-0081*	6	4.860	2.0	0.4	95	57	50	43	4	7	116
207-0131*	10	2.940	2.6	0.8	120	82	81	46	6	8	134
208-0177*	16	1.840	4.2	1.0	120	92	81	57	6	8	134
209-0303*	25	1.130	5.0	1.4	150	101	106	61	7	13	172
210-0237*	40	0.730	6.0	1.8	150	116	106	76	7	13	172
211-0366*	50	0.590	7.5	2.6	180	106	106	66	7	13	188
212-0649*	63	0.470	12.0	3.8	180	126	106	86	7	13	188
215-0577*	80	0.370	16.0	5	228	110	176	71	7	13	257
215-0443*	100	0.290	16.0	5	228	110	176	71	7	13	257
216-0407*	125	0.236	20.0	6	228	134	176	95	7	13	257
221-0275**	160	0.180	23.0	6.8	264	136	200	76	10	18	240
222-0320**	250	0.120	26.0	8.7	264	162	200	102	10	18	240
223-0289**	315	0.092	33.0	13.5	300	152	224	94	10	18	270
224-0673**	400	0.073	48.0	14.5	300	177	224	119	10	18	270
227-0600**	500	0.059	54.0	22	360	183	264	125	10	18	320
228-0353**	630	0.046	62.0	26	360	198	264	140	10	18	320
229-0138**	800	0.036	72.0	32	360	213	264	155	10	18	320
231-0244**	1000	0.029	110.0	36	420	243	316	173	13	20	370

\* Connection to terminals

\*\* Connection to flat termination with bolt

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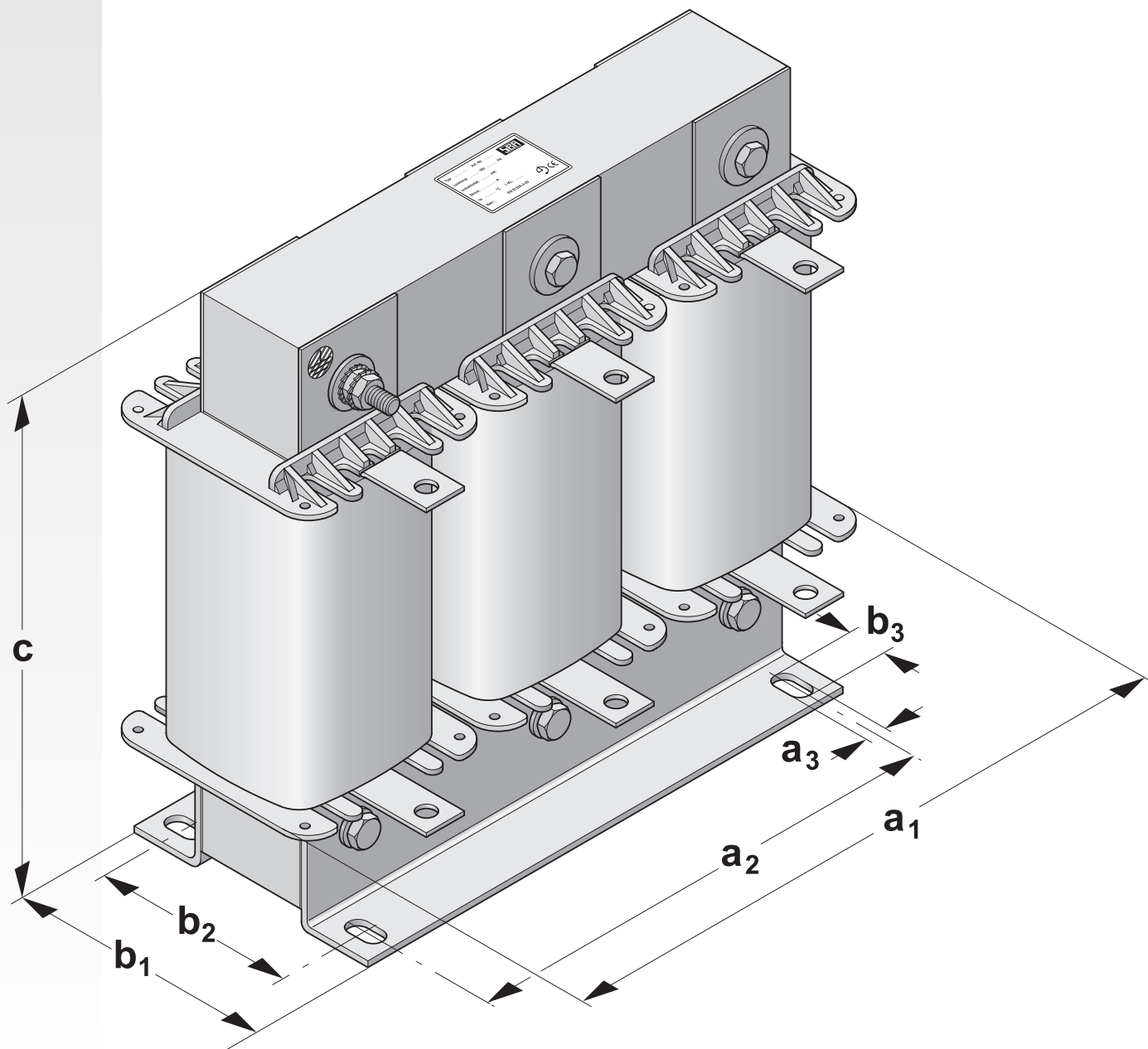
Internet: [www.sba.de](http://www.sba.de)

## Type DKD    short circuit voltage at 2%

Three-phase commutating reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

As commutating reactor limiting peak current, suppressing reactions on system and commutation notches. Harmonics are substantially dampened. The use as motor reactor in converter service ensures reduction of the flank steepness and therefore less motor wear and running noise. The use of individual reactors is possible. Due to the selected reactor inductance, the short-circuit voltage matches the connected consumer, with this product: short circuit voltage at 2% .



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# TYPE DKO THREE-PHASE COMMUTATING REACTORS



## Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Resting on angular feet (DIN 41307)
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

## Specifications

Output range	max.	160 kVAr
Supply voltage		3 x 400 V
Rated current	max.	1000 A
Frequency		50-60 Hz
Short-circuit voltage		$U_K = 2\%$ (4.6 V)
Protection class		I
Protection index		IP 00
Insulation class		B/F
Ambient temperature	max.	40° C

## Overview

**3 x 400 V three-phase system / corresponds to short circuit voltage at 2%, voltage drop of 4.6 V at  $I_N$**

Article no.	Rated current	Rated inductance at 50 Hz	Total weight	Copper weight	$a_1$	$b_1$	Dimensions				
	$A_{eff}$	mH	appr. kg	appr. kg			$a_2$	$b_2$	$a_3$	$b_3$	c
							approx. mm				
205-0089*	4	3.500	1.1	0.3	95	48	50	34	4	7	116
205-0079*	6	2.330	1.1	0.3	95	48	50	34	4	7	116
206-0078*	10	1.470	2.0	0.4	95	57	50	43	4	7	116
207-0157*	16	0.920	2.6	0.8	120	82	81	46	6	8	134
208-0187*	25	0.590	4.2	1.0	120	92	81	57	6	8	134
209-0358*	40	0.370	5.0	1.4	150	101	106	61	7	13	172
210-0276*	50	0.300	6.0	1.8	150	116	106	76	7	13	172
211-0430*	63	0.230	7.5	2.6	180	106	106	66	7	13	188
212-0650*	80	0.180	12.0	3.8	180	126	106	86	7	13	188
212-0552*	100	0.147	12.0	3.8	180	126	106	86	7	13	188
215-0463*	125	0.118	16.0	5.0	228	110	176	71	7	13	257
215-0578*	160	0.092	16.0	5.0	228	110	176	71	7	13	257
216-0408**	250	0.059	20.0	6.0	228	134	176	95	7	13	210
221-0314**	315	0.047	23.0	6.8	264	136	200	76	10	18	240
222-0482**	400	0.037	26.0	8.7	264	162	200	102	10	18	240
222-0414**	500	0.029	26.0	8.7	264	162	200	102	10	18	240
223-0405**	630	0.023	33.0	13.5	300	152	224	94	10	18	270
224-0674**	800	0.018	48.0	14.5	300	177	224	119	10	18	270
227-0601**	1000	0.015	54.0	22.0	360	183	264	125	10	18	320

\* Connection to terminals

\*\* Connection to flat termination with bolt

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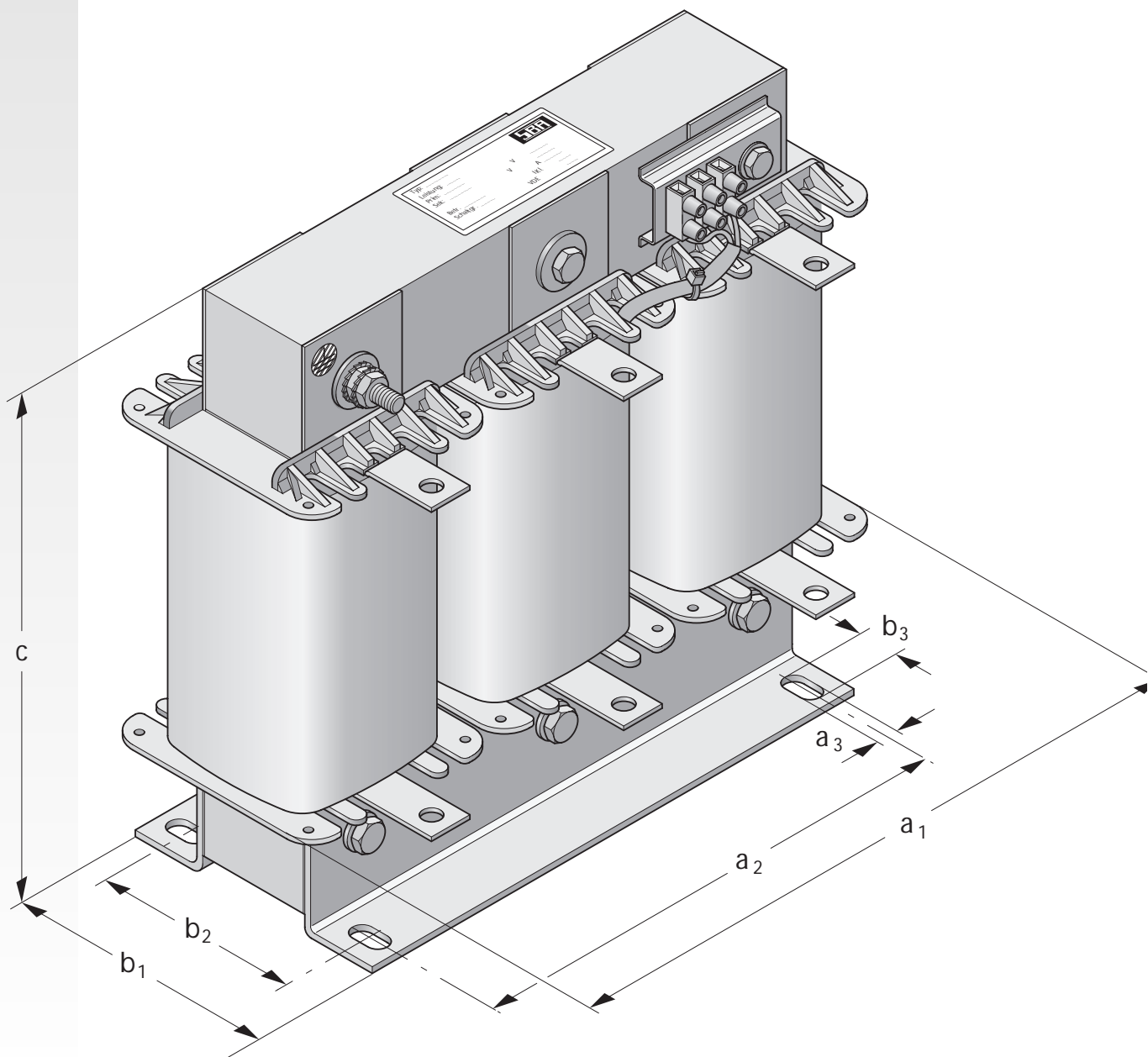
## Type DFD

Vertical version

Three-phase filter reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

Use in reactive current compensation systems for defined elimination of harmonics. Connected in series with capacitors, the reactor can be matched optimally to the conditions of the system, depending on the dominating harmonics. The impedance characteristics of the system improve. Filter reactors prevent loss due to capacitor overload.



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# TYPE DEF

## THREE-PHASE FILTER REACTORS



### Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Resting on angular feet (DIN 41307)
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Integrated thermal switch (breaking at 250 V/2.5 A)
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

### Specifications

System compensation	up to	75 kVAr
Inductance balancing	± 3 % rel. to	$I_{Nom}$
Supply voltage		3 x 400 V
Frequency		50 Hz
Protection class		I
Protection index		IP 00
Insulation class		B/F
Ambient temperature		max. 40° C, max. 50° C, resp.

### Overview

more data, see pages 36 - 37

Size	Weight kg	$a_1$	$b_1$	$a_2$	Dimensions $b_2$ approx. mm	$a_3$	$b_3$	c
208	4.2	120	92	81	57	6	8	112
209	5.0	150	81	106	61	7	13	142
210	6.0	150	96	106	76	7	13	142
211	7.5	180	86	106	66	7	13	162
212	12.0	180	106	106	86	7	13	162
215	16.0	228	90	176	71	7	13	205
216	20.0	228	114	176	95	7	13	205
221	23.0	264	106	200	76	10	18	235
222	26.0	264	132	200	102	10	18	235
223	33.0	300	122	224	94	10	18	270
224	48.0	300	147	224	119	10	18	270
228	62.0	360	168	264	140	10	18	320

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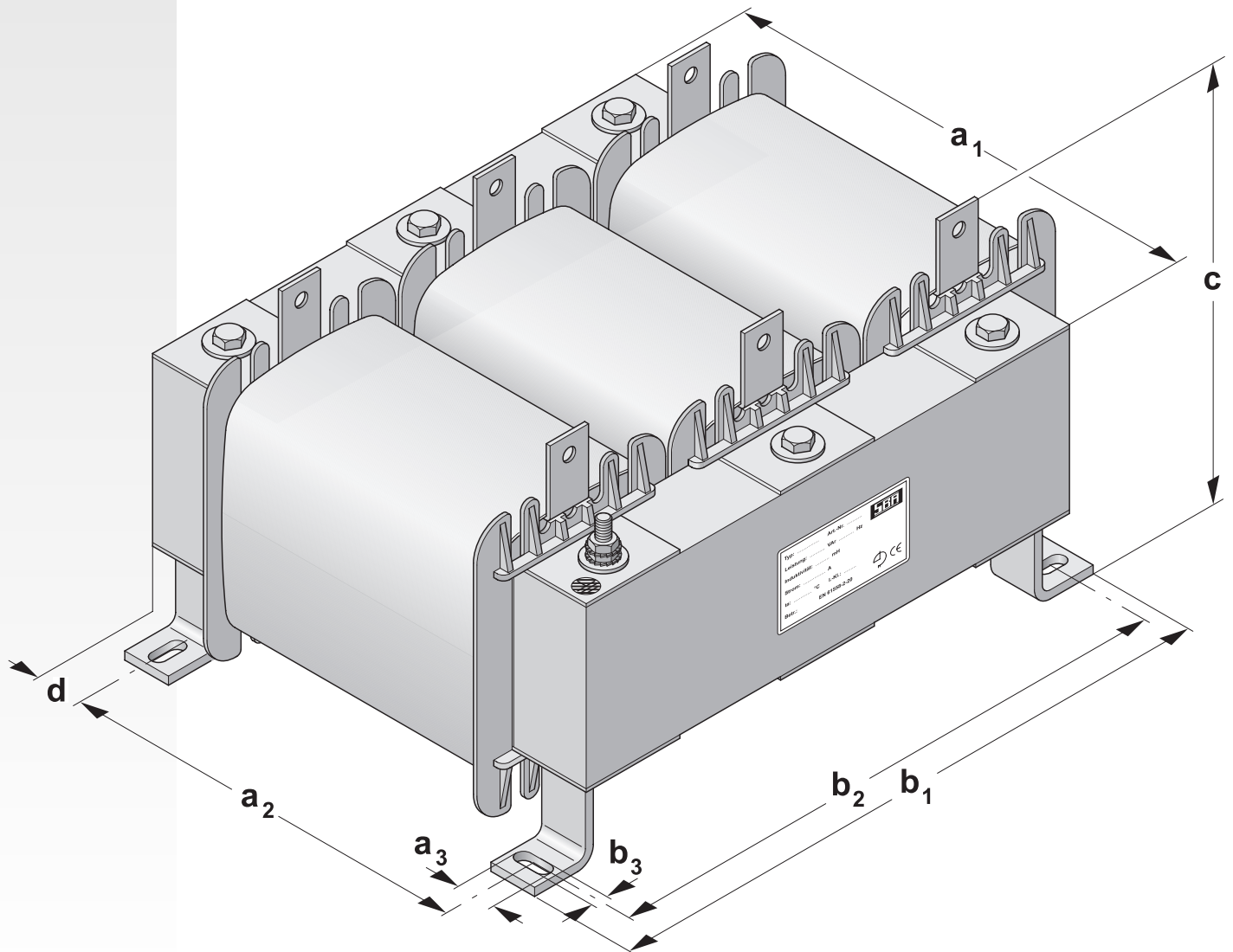
## Type DFD

Horizontal version

Three-phase filter reactor to EN 61558-2-20 / VDE 0570-2-20

### Application

Use in reactive current compensation systems for defined elimination of harmonics. Connected in series with capacitors, the reactor can be matched optimally to the conditions of the system, depending on the dominating harmonics. The impedance characteristics of the system improve. Filter reactors prevent loss due to capacitor overload.



# TYPE DFD

## THREE-PHASE FILTER REACTORS



### Construction

- ➔ Open construction (IP 00, incorporation up to max. IP 23)
- ➔ Resting on angular feet (DIN 41307)
- ➔ Depending on rated current: screw terminals or flat termination with bolt
- ➔ Integrated thermal switch (breaking at 250 V/2.5 A)
- ➔ Very low-noise due to special core assembly and high-grade vacuum impregnation in black polyester impregnating resin
- ➔ Wear-resistant, heat, UV and solvent resistant nameplate
- ➔ **Special versions** available on request

### Specifications

System compensation	up to	75 kVAr
Inductance balancing	± 3 % zu	$I_{Nom}$
Supply voltage		3 x 400 V
Frequency		50 Hz
Protection class		I
Protection index		IP 00
Insulation class		B/F
Ambient temperature		max. 40° C bzw. max. 50° C

### Overview

more data, see pages 36 - 37

Size	Weight kg	a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	Dimensions b <sub>2</sub> approx.mm	a <sub>3</sub>	b <sub>3</sub>	c
208*	4.2	165	120	83	133	8	6	88
209*	5.0	170	185	103	165	10	7	85
210*	6.0	170	185	103	165	10	7	115
211*	7.5	195	206	125	184	10	7	110
212*	12.0	195	206	125	184	10	7	130
215*	16.0	240	254	157	228	10	7	124
216**	20.0	200	254	157	228	10	7	143
221**	23.0	230	290	181	258	14	9	131
222**	26.0	230	290	181	258	14	9	157
223**	33.0	260	330	205	298	14	9	143
224**	48.0	260	330	205	298	14	9	168
228**	62.0	310	394	245	358	14	9	214

\* Connection to terminals

\*\* Connection to flat termination with bolt

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## Type DFD

Three-phase filter reactor to EN 61558-2-20 / VDE 0570-2-20

Thermal Design:

$$1,05 \times I_{eff} \text{ where } I_{eff} = \sqrt{I_1^2 + I_3^2 + I_5^2 + I_7^2}$$

Magnetic linearity:

$$1,05 \times (I_1 + I_3 + I_5 + I_7) \text{ where } L > 0,95L_{nom}$$

Fundamental component:

1.06 times the rated current of the 1st fundamental

Harmonic component:

3rd harmonic 150 Hz at 0.5%

5th harmonic 250 Hz at 5.0%

7th harmonic 350 Hz at 5.0%

## Overview

Reactor factor: 5.67%

Size	Reactive power kVAr	Inductance (phase) mH	Capacitance (star) µF	Current A	Thermal current A	Total loss W	Insu- lation- class
208	2.5	12.3	46.9	3.82	4.6	35	T40/B
210	5	6.13	93.9	7.65	9.2	40	T40/B
212	10	3.06	187.8	15.30	18.4	68	T40/B
215	12.5	2.45	234.7	19.10	23.0	80	T40/B
215	15	2.04	281.6	23.00	27.6	100	T40/B
216	20	1.53	375.5	30.60	36.8	101	T40/B
216*	25	1.23	469.4	38.30	46.0	114	T40/B
221*	30	1.02	563.3	45.90	55.2	142	T40/B
222*	40	0.77	751.0	61.20	73.6	162	T40/B
224*	50	0.61	938.8	76.50	92.0	200	T40/B
224*	75	0.41	1408.0	114.80	138.0	250	T40/B

\*Connection to flat termination with bolt

# TYPE DFD

## THREE-PHASE FILTER REACTORS



### Overview

Reactor factor: 7%

Size vertical version	Size horizontal version	Reactive power kVAr	Inductance (phase) mH	Capacitance (star) µF	Current A	Thermal current A	Total loss W	Insu- lation class
208-5024	208-5006	2.5	15.30	46.3	3.82	4.2	32	T50/B
209-5008	209-5010	5	7.67	92.6	7.65	8.4	49	T50/B
211-5012	211-5030	10	3.84	185.1	15.30	16.9	65	T50/B
212-5018	212-5028	12.5	3.07	231.4	19.10	21.1	69	T50/B
215-5018	215-5068	15	2.56	277.7	23.00	25.3	76	T50/B
215-5016	215-5076	20	1.92	370.2	30.60	33.7	100	T50/B
216-5015*	216-5025	25	1.53	462.8	38.30	42.2	130	T50/B
216-5046*	216-5031	30	1.28	555.3	45.90	50.6	116	T50/B
221-5009*	221-5019	40	0.96	740.4	61.20	67.5	138	T50/B
223-5009*	223-5010	50	0.77	925.6	76.50	84.3	160	T50/B
224-5124	224-5119	75	0.51	1389.0	114.80	127.0	230	T40/B

\*Connection to flat termination with bolt

### Overview

Reactor factor: 14%

Size	Reactive power kVAr	Inductance (phase) mH	Capacitance (star) µF	Current A	Thermal current A	Total loss W	Insu- lation- class
209	2.5	33.20	42.8	3.82	4.0	45	T40/B
212	5	16.60	85.6	7.65	8.1	53	T40/B
215	10	8.30	171.2	15.30	16.2	78	T40/B
215	12.5	6.64	214.0	19.10	20.2	93	T40/B
216	15	5.53	256.8	23.00	24.3	89	T40/B
216*	20	4.15	342.4	30.60	32.3	118	T40/B
221*	25	3.32	427.9	38.30	40.4	120	T40/B
222*	30	2.77	513.5	45.90	48.5	140	T40/B
224*	40	2.07	684.7	61.20	64.6	181	T40/B
224*	50	1.66	855.9	76.50	80.8	190	T40/B
228*	75	1.11	1284.0	114.80	121.0	412	T40/B

\*Connection to flat termination with bolt

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## General technical information

Reactors are electromagnetic components which due to the wide variability of their technical parameters can be used in many DC and AC applications. They act as energy storage mechanism, current limiter, system quality improver and suppressor of energy-rich harmonic components and their reactions on the supplying system. High-grade core materials ensure low-loss operation and long life of all reactors.

Vacuum impregnation in high-quality resin is standard and reduces the noise caused by the extremely short remagnetizing processes. Any customized product which is not part of our standard range can be made in high quality and within short time.

We have all required computer programs to translate the customer's specifications into the required production documents.

Commonly, reactors can stand brief high overload as indicated in the table but will need a sufficiently long period to cool down after this.

**DC smoothing reactors** reduce ripple in the DC circuits of current converters. Smoothing reactors can "fill" energy gaps by supplying the magnetic energy they store.

A connected motor drive will run smoother and at lower loss and also with less noise.

**System reactors** of which single-phase and three-phase versions are available, are mostly needed in AC environments.

Used as series reactor, they help achieve a defined current limitation at relatively low loss. As motor reactor, reactions on the system are mitigated and commutation notches as well as harmonic content dampened significantly. To ensure optimal function of a system, the inductance of a system reactor must usually be adapted to the purpose for which it is used.

Special versions of system reactors include discharge reactors for the rapid transfer of voltage to compensation capacitors, and neutral grounding reactors for integration in separate TN systems.

**Commutating reactors** are available as single-phase or three-phase version. Commutation is the term to describe an extremely sudden current transition between the different power valves and current power converters. A short-circuit condition would occur for the brief time of overlap. Due to its inductance, a series-connected commutating reactor reduces the rate at which the current rises and thereby prevents these brief system notches. According to VDE 0160, the input-side short-circuit voltage should at least be 4%, and on this basis a series with  $u_k=4\%$  is available for the standard voltages. If in addition an autotransformer with the common  $u_k=4\%$  should be connected in series, a series with  $u_k=2\%$  is also made.

**Link reactors** are generally used in the DC circuit of frequency converters, where they suppress commutation notches. A link reactor consists of two identical windings on a common core with magnetic coupling. All parameters, such as inductance, linearity or operating current, very much depend on the specific conditions in which the reactors are used. Due to the high currents involved, line reactor connections are in most cases made with marked solid copper terminal leads.

**Filter reactors** are used in compensation systems in combination with capacitors for reactive-power compensation.

Reactive power from inductive consumers, such as motors, fluorescent lamps, etc., put a reactive power load on the supplying systems which oscillates between the consumer and the energy supplier for no purpose and causes additional line loss with all known negative effects. The local compensation of such current portions saves cost and also improves the quality of the system by eliminating undesired current harmonics, provided the right type of reactor is installed. Filter reactors are available in a series from 2.5 kVAR to 75 kVAR with different chokes.

**Special-purpose reactors** are generally made to customer specifications. They include ring core reactors, interference suppression coils and energy storage reactors mostly of small size and high-quality full resin encapsulation. Line reactors for gas discharge lamps are made in the output range of up to 100 kW. Current dividing reactors, mostly in generator-fed systems, avoid generator overload.

# General technical information

Important technical terms will be explained in the following passages. Depending on the proposed use, additional or different definitions may be required. The following explanations are therefore not exhaustive..

## Connection symbols

Reactors from SBA are single-phase in IO or IIO and three-phase in IIIO.

## Laws and regulations

Unless required otherwise, we make our transformers to reflect state-of-the art and comply with the following laws and regulations:

DIN EN 61558-2-20 / VDE 0570 part 2-20 / 04.01 / IEC 61558-2-20  
 DIN EN 61558-1 / VDE 0570 part 1 / 07.98 / IEC 61558-1

## Insulation classes

The provisions of IEC 60085 and IEC 60216 describe the heat resistance if insulation classes.

Insulation class	Highest permitted temperature at rated service conditions
A	105 °C
E	120 °C
B	130 °C
F	155 °C
H	180 °C

## Reduction factor (f)

The reduction factor, f, indicates the possible reduction of the size in comparison with continual service.

DR	%	100	80	70	60	50	40	30	20	15	10
f		1	0,89	0,84	0,77	0,71	0,63	0,55	0,45	0,39	0,35

## Protection class

The protection class is a design feature of a product which designates safety against shock current.

Protection class I: Product with safety ground terminal and basic insulation

Protection class II: Product without safety ground terminal and double or extra strong insulation.

## Operating mode

The output ratings and rated currents in this catalog are for continuous service.

## Required space

DIN standard 41307 applies to the uniform screw-on size and fastening brackets.

## Duty ratio, DR

The duty ratio (DR) of a transformer is the ratio between load time and cycle duration. Unless specified otherwise, the cycle duration is 10 min.

$$DR = \frac{t_{on}}{t_{on} + t_{off}} \times 100\%$$

## Current norms and glossary of terms

### Short time operation

If the load in continuous service is smaller than the rated output, the reactor can be overloaded for short periods provided it does not heat to more than the permitted overtemperature.

Previous continuous load in % of rated output	Permitted duration (in minutes) of load in % of the rated output				
	150%	140%	130%	120%	110%
50	25	30	40	50	80
60	20	25	30	40	65
70	15	20	25	30	50
80	10	15	20	23	35
90	5	10	15	15	20

#### Overload-resistant reactor:

This is a reactor in which the temperature does not exceed the defined limits when the reactor is under overload and which when the overload ends continues to meet all requirements of the applicable norm.

#### Non-inherently overload-resistant reactor

This is an overload-resistant reactor which is equipped with a protection mechanism that opens the electric circuit or reduces the current in the circuit when the reactor is overloaded and which when the overload is removed or the protection mechanism reset or replaced and continues to meet all requirements of the applicable norm.

#### Inherently overload-resistant reactor

This is a reactor without a protection mechanism in which the temperature due to the construction of the reactor does not exceed the defined limit when the reactor is under overload and which after the overload is removed continues to function and to meet all requirements of the applicable norm.

#### Reactor without overload resistance

This is a reactor which it is protected against exceedingly high temperature by a protection mechanism that is not integrated in the reactor and which when the overload is removed or the protection mechanism reset or replaced continues to meet all requirements of the applicable norm.

#### Fail-safe reactors

A reactor which when not used to as intended permanently drops out by interrupting the defective circuit and which is not a danger for the user or the environment.

#### Reactor

An apparatus consisting of one or several windings with frequency-depending impedance and working on the principle of self-induction, in which a magnetized current generates a magnetic field that passes through a magnetically active core or through air.

#### AC reactor

A reactor in which the magnetized current generates an magnetic alternating field whose polarity changes as a function of the frequency.

#### Premagnetized reactor

A reactor in which the magnetizing direct current generates a magnetic field of single polarity while a superimposed alternating current changes the magnetic field as a function of amperage and frequency



## Current norms and glossary of terms

The protection type marking consists of a code of two constant letters, viz. „IP“ and two digits, e.g., IP23.

First digit	Protection	
	Description	Explanation
0	No protection	No protection against contact of live parts
2	Protection against medium-size foreign objects	Protection against contact of live parts by fingers Protection against entry of foreign objects greater than 12 mm
4	Protection against granular foreign objects	Protection against contact of live parts by fingers with tools, wires or the like of more than 1 mm thickness
5	Protection against deposits of dust	Complete protection against contact with live parts. Protection against harmful dust deposits. The penetration of dust is not completely prevented but the dust must not affect operation.
6	Protection against penetration of dust	Complete protection against contact with live parts. Protection against penetration of dust

Second digit	Protection	
	Description	Explanation
0	No protection	No protection available
1	Protection against drops of water falling vertically	Drops of water falling vertically shall have no harmful effect
3	Protection against spray water	Water falling from any angle less than 60 degrees from vertical shall have no harmful effect.
4	Protection against splash water	Water splashing from any direction shall have no harmful effect
5	Protection against water jets	A jet of water from a nozzle directed at the transformer from any direction shall have no harmful effect
6	Protection against flooding	No harmful amount of water to which the transformer is exposed during a temporary flooding must enter.
7	Protection against immersion... (atm(g))	If the transformer is immersed in water under specified pressure and time, no harmful amounts of water must enter the transformer

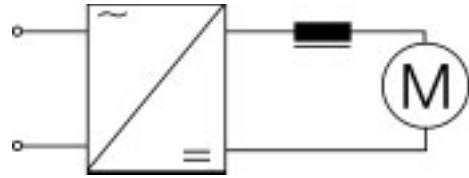
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## Sample applications

### DGE single-phase smoothing reactor

Advantages if used as **armature reactor**

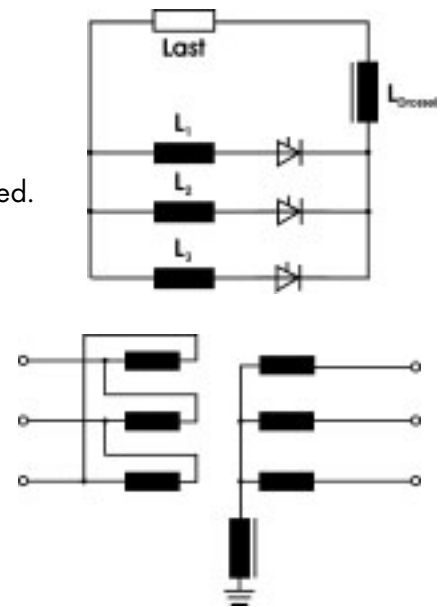
- Less running noise
- Less wear
- Reduced motor loss
- Limitation of starting current



### Special reactor

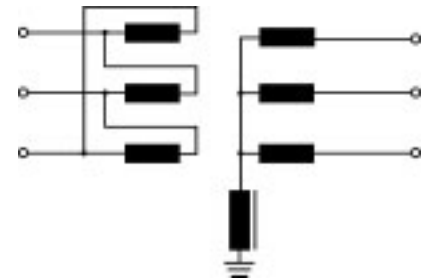
Advantages if used as **gap reactor**

- Current pulses with mainly ohmic load conditions in DC circuits are avoided.
- Internal short circuits during commutation are prevented.
- Motor running noise is reduced (less wear)
- Output loss is reduced.



### Neural grounding reactor

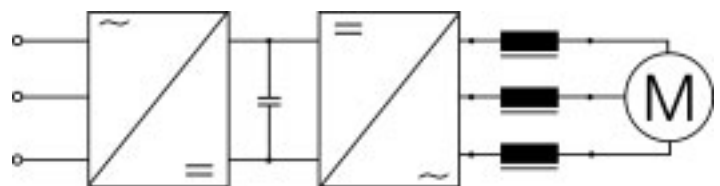
- Reduces short-circuit power
- Reduces harmonics



### DWD three-phase AC reactors

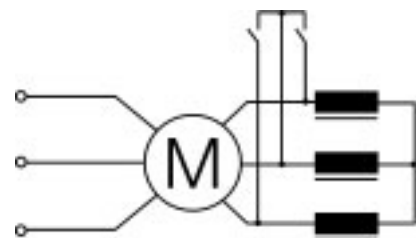
#### Motor reactor

- Reduces running noise
- Reduces wear
- Reduces flank steepness



#### Starting reactor

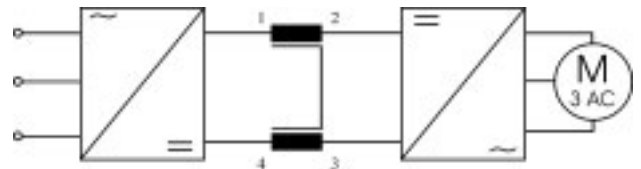
- Reduces the starting current
- Low-noise, soft start
- Brief system notches are avoided
- Reduces reaction on system



# Sample applications

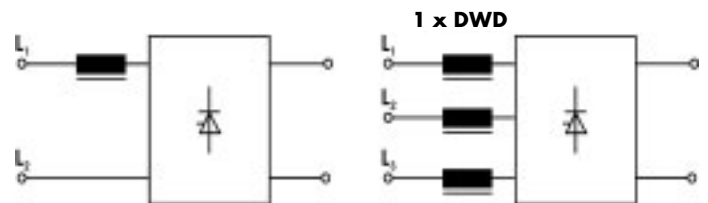
## Link reactor

- Improves efficiency
- Suppresses commutation gaps in DC circuits
- Improves the smooth running of drives



## Commutating reactors, single-phase or three-phase

- Avoids reactions on system
- For norm-complying setting of the short-circuit voltage
- Dampens harmonics
- Flank steepness of commutation processes is reduced



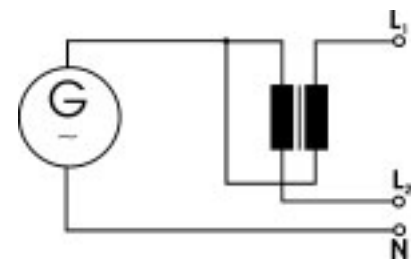
## Lamp ballast reactors

- Limits the lamp current
- Reduces the operation loss of discharge lamps
- Extends the lamps life due to adapted reactor parameters



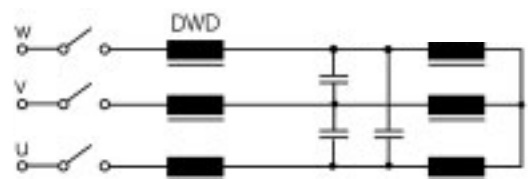
## Current dividing reactors

- Avoids extreme system load
- Prevents distribution of harmonics by the division of the system
- Choking of the short-circuit current and at the same time stabilization of the voltage in the unaffected partial system



## Filter reactor

- Cuts electricity bills by compensation of reactive power content
- Reduces the system load
- Extracts undesired harmonic content



## Connection methods

### General installation conditions

Due to scatter, a minimum distance of 50 mm must be maintained to adjacent metal conductors. Generally, all reactors are designed for installation at altitudes up to 1000 m above sea level.

### Terminals

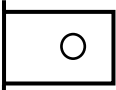
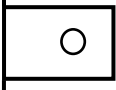
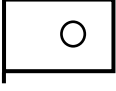
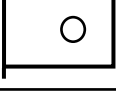
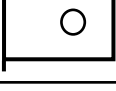
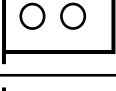
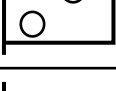
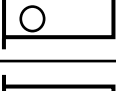
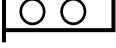
The data in the table below refer only to the core dimensions without terminals or Cu rails. Depending on the type of connection (terminal clamp or Cu rail), the projection size must be considered as a function of the current.

<b>Standard version</b> max. terminal current to EN 50 019 <b>A</b>	max. terminal current to IEC 60 947-7-1 <b>A</b>	<b>Max.</b> conductor cross section, flexible <b>mm<sup>2</sup></b>	<b>Projection or height of</b> terminal Distance. c to max. height <b>mm</b>
38	57	6	55
57	76	10	55
72	101	16	65
112	150	35	70
135	150	50	85
210	232	95	95
265	309	150	120
300	415	240	135

## Connection methods

### CU-Rails

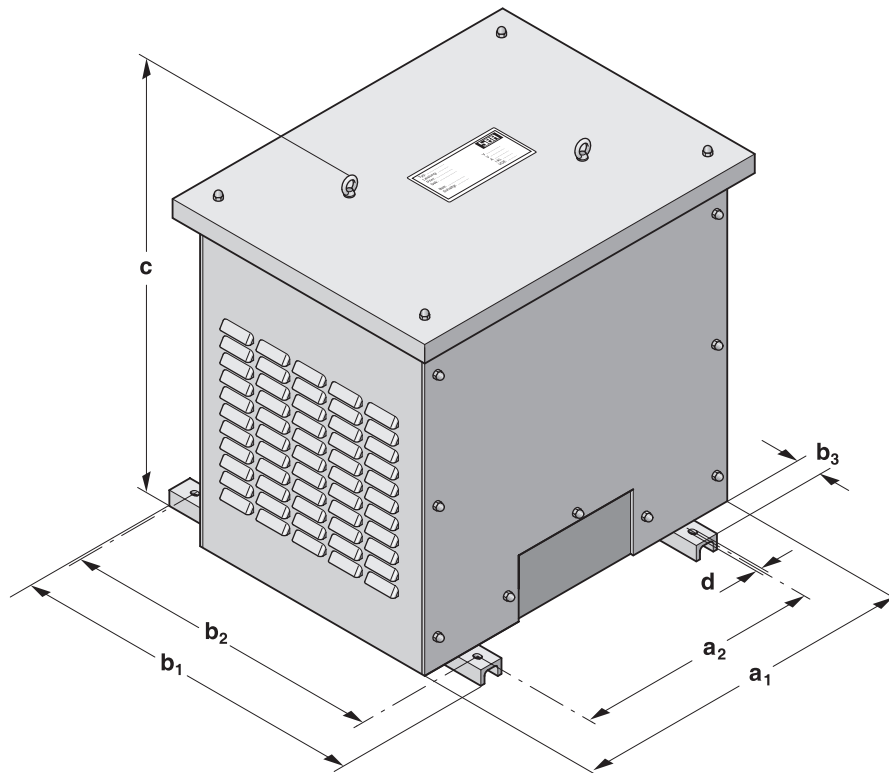
The data in the table below refers only to the core dimensions without terminals or Cu rails. Depending on the type of connection (terminal clamp or Cu rail), the projection size must be considered as a function of the current.

Current A	Hole mm	Prepared for screws	Arrangement	Projection of Cu rail rel. to b <sub>1</sub> mm
63	6.6	1x(M6)		20
100	9.0	1x(M8)		25
200	11.0	1x(M10)		30
400	14.0	1x(M12)		50
630	14.0	1x(M12)		50
1000	2x14.0	2x(M12)		90
1250	2x14.0	2x(M12)		70
1600	2x14.0	2x(M12)		70
2000	4x14.0	4x(M12)		90

## Type GEH

### Application

for installation of reactors to comply with protection type IP 23 and IP 54, resp.  
 Material: 1.5 mm sheet steel, plastic coated, finish: RAL 7032  
 pebble gray



### Übersicht

Housing size	SBA reactor housing	a <sub>1</sub>	a <sub>2</sub>	b <sub>1</sub>	Dimensions approx. mm	b <sub>2</sub>	b <sub>3</sub>	d	c
110/1	127-...,128-...,129-...	520	144	500		460	50	11x15	570
110/2	130-...,131-...,	520	176	500		460	50	11x15	570
120	133-...,134-...,135-...,	580	196	550		510	50	11x15	650
130	223-...,224-...	580	224	440		400	50	11x15	510
140/1	227-...,228-...	640	264	500		460	50	11x15	570
140/2	230-...,231-...	640	316	500		460	50	11x15	570
150	233-...,234-...,235-...,	740	356	550		510	50	11x15	650
160	233-...,234-...,235-...,	825	356	630		590	50	11x15	710
230	249-...,237-...,239-...	910	380	650		610	50	11x15	825
240	248-...,241-...,242-...	1060	480	600		560	50	11x15	1100
250	246-...,247-...,245-...,	1260	600	800		760	50	11x15	1200

# General Terms of Business 01/2002

## I. General

By placing the order, the buyer accepts these "General Terms of Business" as exclusive basis for transaction of business. Buyer's terms, if any, are hereby expressly excluded and do not apply even in absence of our express objection. Any other agreements are only valid if made in writing.

## II. Prices

Our prices are without obligation and quoted ex works without packaging and in EURO currency, exclusive of value-added tax, which will be charged at the rate applicable at the time of delivery. Copper prices of 150.00 EUR or more for each 100 kg lead to price adjustment prorated the specified weight.

## III. Terms of payment/setting off

1. Payment due to us is defined in calendar terms (§ 286 cl. 2 no. 1 BGB - German Civil Code) and mature 30 days after invoice date.

All payments must be made free supplier's point of payment; discount at 2% can be deducted from all payments made within 10 days of the invoice date.

Deliveries to unknown buyers are only made COD.

2. The buyer can only set off payments which are not in dispute or are the subject of a final court judgment.

## IV. Contract conclusion /deliveries

1. 1. Orders to agents, any collateral agreement, amendments and modifications are only binding on us if made in writing.

2. 2. Dimensions, output data and illustrations correspond to the specified products; deviations are expressly reserved.

3. All shipments are made ex works at buyer's risk. The risk passes to buyer when the consignment in a state ready for use has been shipped or collected. This also applies to all shipments made free, in our own fleet of trucks or if the goods are consigned to buyer's order. Partial shipments which the buyer can reasonably be expected to accept are permitted.

4. Goods shall be accepted immediately upon completion. If buyer delays acceptance, we can charge warehousing cost at 0.5% of the invoice amount for every month, including fractions thereof, subject to a maximum of 5% of the value of the goods.

5. All shipments are made by the agreed date as far as possible. We are responsible for delays only in cases of intent or gross negligence and if acting under the constraints of law provided the buyer can submit proof of the damage caused. The damage is limited to 5% of the value partial delivery or delivery which is delayed. Force majeure is cause for a reasonable extension of the delivery period.

## V. Liability for defects

We are responsible for defects as defined in §§ 434, 435 BGB as follows:

1. All parts or services which become unusable or whose usability is substantially limited for reasons before the passing of risk, in particular due to defects of type, defective material or poor workmanship, within 60 months - irrespective of the operating time - calculated from the date at which the risk passed, shall at buyer's option be repaired free, delivered new or made new. Any defect must be communicated to us in writing without delay. The term for electronic devices is 36 months. If buyer's choice (repair or replacement) entails unreasonably high cost, we can refer the buyer to a version which is less expensive for us.

2. Buyer must allow us reasonable time and opportunity for repairing a defect. Otherwise we are released from our liability for the defect.

3. Any other claims by buyer on us are excluded unless such claims are substantiated in applicable law. Damage claims on grounds of impossibility of performance for which we are responsible or due to unavoidable statutory requirements are limited to 10 % of the value of that part of the delivery which cannot be used as intended.

## VI. Retention of title

1. All goods shipped remain our property until full payment of all amounts due to us from the business transaction with the buyer is made or if payment is made by check or draft until paid. The buyer can dispose of the goods in the ordinary course of business.

2. 2. The retention of title also extends to the full value of all products made by processing, mingling or combining our goods and we are also considered to be the maker of these products. If in the processing, mingling or combination of our goods with goods belonging to a third party that party's title survives, we acquire co-ownership in the new goods in the value represented by the respective invoice amounts of the processed goods.

3. 3. Buyer assigns to us all claims on third parties created by the sale of the processed goods as security in the full amount or in the amount of our co-ownership (sub-article 2). Buyer can collect these amounts for our account until cancellation or completion of buyer's payments to us.

4. Any seizure by a third party of goods or moneys belonging to us must be communicated to us by buyer in writing without delay.

5. 5. The goods and payment claims in lieu of goods must not be pledged or offered as security or assigned unless full payment has been made to us.

6. 6. If the value of the securities exceeds the amount due to us by more than 20%, we will release an appropriate part of the securities in our option if so requested by the buyer

## VII. Place of performance / legal venue

1. Place of performance for supplies and payments is Heiligenstadt/Ofr. or Jena.

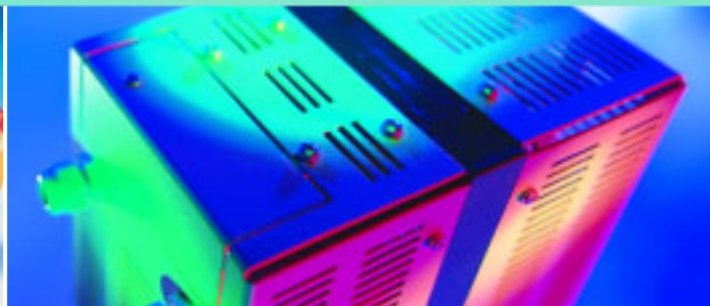
2. If the buyer is a general merchant, the legal venue, including for summary proceedings, is Bamberg or Jena.

3. The contract is subject to material German law to the exclusion of the UN Convention on Contracts for the International Sale of Goods (CISG).

## VIII. Severability

If a provision of these General Terms of Business should be or become invalid, such invalidity does not affect the other provisions. The provision lacking validity will be replaced by another provision which as nearly as possible reflects the original intention. If this is not possible, the contract is invalid if continuing it would entail unreasonable hardship for either party.

# WWW.SBA.DE



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