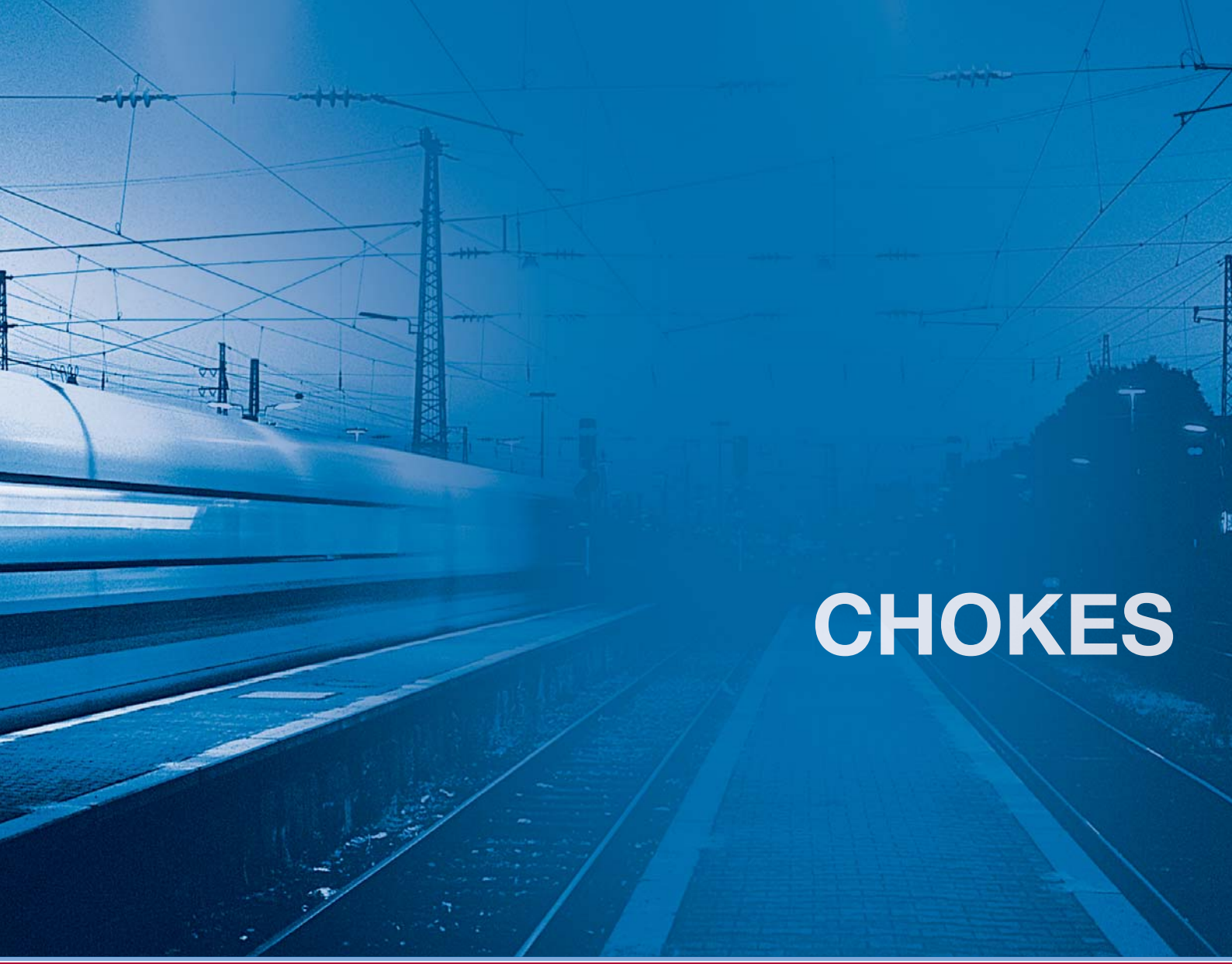


CHOKES

Choke coils:

Choke coils are inductors and hence reactance coils. The energy content of the magnetic field generated by a coil with current flowing through it is significantly increased through a high-permeability iron core.

Riedel — Choke coils are designed as iron core chokes with air gap.

Our range encompasses, apart from extensive specially manufactured products calculated for the concrete application cases, a standard supply range consisting of:

Single-phase line chokes
RENDr series
Nominal voltage: 230VAC, voltage drop: 4%

Single-phase double line chokes
RDNDr series
Nominal voltage: 400VAC, voltage drop: 2 x 2%

Three-phase filter circuit chokes
RFDr 7 series
Nominal voltage: 3AC 400V, choke factor: 7%

Three-phase line chokes
RNDr series
Nominal voltage: 3AC 400V, voltage drop: 4%

Line chokes

(commutation chokes)

Use of line chokes is necessary for current limitation and for suppressing line reactions and commutating dips.

The current IG limited by the line choke is calculated as follows:

$$IG = \frac{IN \times 100\ \%}{Uk}$$

For connection of converters to the AC grid inductances are always necessary on the grid side for limitation of commutating dips in grid voltage. If the converter is fed via a converter transformer its control inductance assumes the limitation. For direct connection or supply via autotransformer use of a current-limiting line current choke is absolutely necessary to comply with the criteria specified in DIN VDE 0160 part 2.

Three-phase filter circuit chokes

Three-phase filter circuit chokes are used in reactive current compensation systems. With the capacitors in the reactive current compensation system they form a series resonant circuit and thereby produce defined grid conditions. Through the choking of reactive current compensation systems resonance with the grid harmonics is avoided. The inductance of the filter circuit chokes is selected such that the resonance frequency of the series resonant circuit built from capacitor and filter circuit choke lies below the lowest frequency of the occurring harmonics.

Through increasing operation of converters and inverters harmonics occur in the grid. From operation of 6-pulse bridge circuits the grid is loaded with currents with the harmonic order

$$n = 6 \times k +/-1 \quad \text{for } k = 1, 2, 3,...$$

. The amplitudes of the currents get smaller as the harmonic order increases.

$$I_{(n)} \sim \frac{1}{n} \times I_{(1)}$$

The **choke factor p** is yielded from the relationship between reactive resistances of the filter circuit chokes to the capacitor

$$p = \frac{X_L}{X_C}$$

The **resonance frequency** for the series resonant circuit is calculated as follows:

$$f_R = \frac{f_{grid}}{\sqrt{p}}$$

In the selection of resonance frequency and hence the choke factor the ripple control frequency in the grid is to be considered and the compatibility with the energy supply company in charge to be ensured.

Design of the three-phase filter circuit chokes is based on the following premises:

Base load:

$$I1 = -1.06 \times I_{nominal} \quad \text{where} \quad I_{nominal} = \frac{N_{comp.}}{\sqrt{3} \times U_{nominal}}$$

and $N_{comp.}$ is the effective compensation power of the choked capacitor arrangement.

Harmonic content of the grid voltage

$$U_3 = 0.5\ \%\ U_{nominal} \qquad U_7 = 5\ \%\ U_{nominal}$$
$$U_5 = 5\ \%\ U_{nominal} \qquad U_{11} = 5\ \%\ U_{nominal}$$

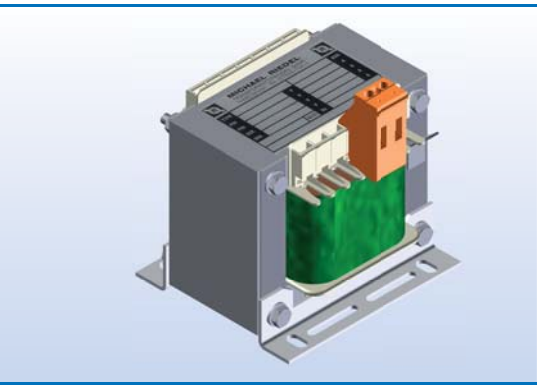
Thermal current

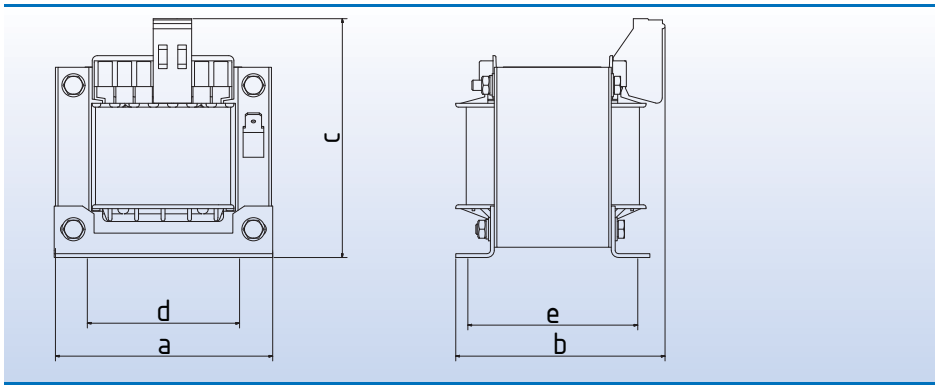
$$I_{therm} = 1{,}05 \times \sqrt{I_1^2 + I_3^2 + I_5^2 + I_7^2 + I_{11}^2}$$

Linearity

$$I_{lin} = 1.2 \times (I1 + I3 + I5 + I7 + I11)$$

where the inductance is at least 95% of its nominal value.





Single-phase line chokes according to VDE 0570 part 2-20

General information:

Use of line chokes is necessary for current limitation and for suppressing line reactions and commutating dips.

Current limitation is carried out preferentially at 25 times the value of the nominal current. For this line chokes with a short circuit voltage of 4% must be used.

The line choke must be selected according to the nominal current of the consumer.

Design:

Open frame design, stationary, for device installation and assembly in dry rooms. Connection to leakage current-resistant transformer terminals with screw fastening. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

PE connection as 6.3x0.8mm tab connector.

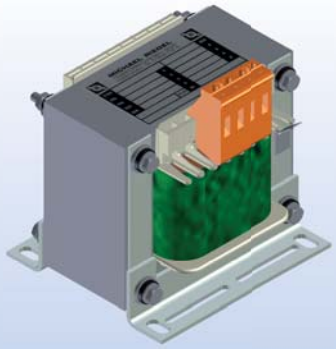
IP 00, insulation class E, max. ambient temperature of 40°C (ta40°C/E)

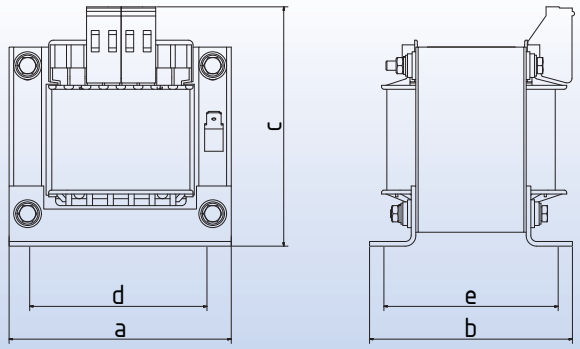
Technical data:

Nominal voltage:	AC 230V
Nominal voltage drop (Uk):	4% (4.8% at 60Hz)
Nominal frequency:	50Hz (60Hz)

Line chokes with deviating technical data available upon request.

Type	Current A	Induct. mH	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
RENDr 1	1,0	29,300	0400-00000001	0,05	0,30	48	44	66	38	34	M3
RENDr 2	2,0	14,600	0400-00000002	0,06	0,35	55	46	73	44	36	M3
RENDr 3	3,0	9,760	0400-00000003	0,07	0,38	55	46	73	44	36	M3
RENDr 4	4,0	7,320	0400-00000004	0,08	0,45	60	48	62	44	38	M3
RENDr 5	5,0	5,860	0400-00000005	0,08	0,65	60	58	62	44	48	M3
RENDr 6	6,0	4,880	0400-00000006	0,12	0,65	66	55	67	50	42	M4
RENDr 8	8,0	3,660	0400-00000008	0,12	0,90	66	67	67	50	54	M4
RENDr 10	10,0	2,930	0400-00000010	0,24	1,10	78	60	76	56	47	M4
RENDr 12,5	12,5	2,340	0400-000012,5	0,25	1,40	78	69	76	56	56	M4
RENDr 16	16,0	1,830	0400-00000016	0,25	1,90	85	76	79	64	63	M4
RENDr 20	20,0	1,460	0400-00000020	0,35	2,00	85	76	79	64	63	M4
RENDr 25	25,0	1,170	0400-00000025	0,45	2,30	96	78	92	84	62	M5
RENDr 32	32,0	0,915	0400-00000032	0,50	2,90	96	88	92	84	72	M5





Single-phase double line chokes according to VDE 0570 part 2-20

General information:

Use of double line chokes is necessary for current limitation and for suppressing line reactions and commutating dips. By dividing of the inductance to both grid supply lines symmetric connection of the consumer is achieved. About half of the voltage drop occurs on each coil section. Coil connection in series and in parallel yields additional application possibilities up to double the nominal current and half the voltage drop.

Current limitation is carried out preferentially at 25 times the nominal current. For this line chokes with a short circuit voltage of 4% (2 x 2%) must be used.

The grid choke must be selected according to the nominal current of the consumer.

Design:

Open frame design, stationary, for device installation and assembly in dry rooms. Connection to leakage current-resistant transformer terminals with screw fastening. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

Coil consisting of 2 equivalent coil sections isolated from each other.

PE connection as 6.3x0.8mm tab connector.

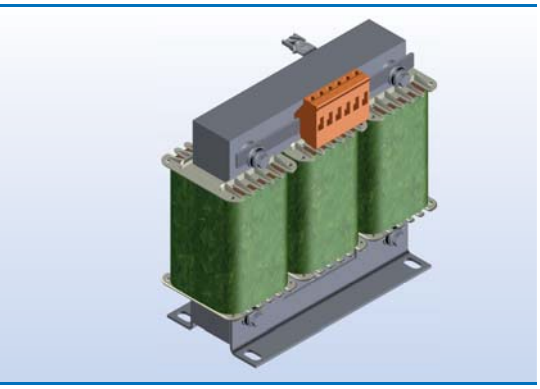
IP 00, insulation class E, max. ambient temperature of 40°C (ta40°C/E)

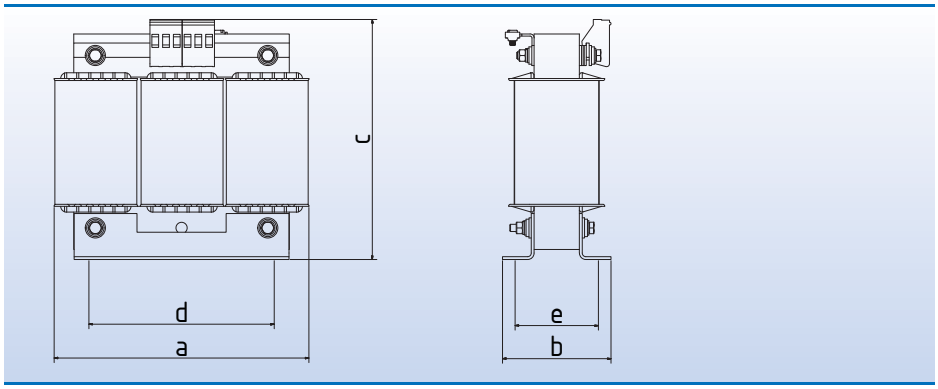
Technical data:

Nominal voltage:	AC 400V
Nominal voltage drop (Uk):	2 x 2% (2 x 2.4% at 60Hz)
	(Series connection of sub-coils: 4%)
	(Parallel connection of sub-coils: 1%)
Nominal frequency:	50Hz (60Hz)

Double line chokes with deviating technical data available upon request.

Type	Current A	Induct. mH	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
RDNDr 2	2	2 x 12,70	0410-00000002	0,07	0,45	60	48	62	44	38	M3
RDNDr 3	3	2 x 8,49	0410-00000003	0,08	0,65	60	58	62	44	48	M3
RDNDr 4	4	2 x 6,37	0410-00000004	0,08	0,85	66	67	67	50	54	M4
RDNDr 5	5	2 x 5,09	0410-00000005	0,12	0,90	66	67	67	50	54	M4
RDNDr 6	6	2 x 4,24	0410-00000006	0,24	1,10	78	60	76	56	47	M4
RDNDr 8	8	2 x 3,18	0410-00000008	0,25	1,40	78	69	76	56	56	M4
RDNDr 10	10	2 x 2,55	0410-00000010	0,25	1,90	85	76	79	64	63	M4
RDNDr 12,5	12,5	2 x 2,04	0410-000012,5	0,35	2,20	96	78	92	84	62	M5
RDNDr 16	16	2 x 1,59	0410-00000016	0,40	2,80	96	88	92	84	72	M5
RDNDr 20	20	2 x 1,27	0410-00000020	0,50	3,50	96	102	92	84	86	M5
RDNDr 25	25	2 x 1,02	0410-00000025	0,70	3,60	105	86	110	84	70	M5
RDNDr 32	32	2 x 0,796	0410-00000032	0,80	4,50	105	101	110	84	85	M5





Three-phase filter circuit chokes according to VDE 0570 part 2-20

Adapted-output

General information:

Three-phase filter circuit chokes are used in reactive current compensation systems. With the capacitors in the reactive current compensation system they form a series resonant circuit and thereby produce defined grid conditions.

Three-phase filter circuit chokes with adapted outputs ensure the specified compensation reactive power when interconnected with capacitors of the given capacity.

Three-phase filter circuit chokes without adapted outputs are designed according to the capacitors used and lead to deviating compensation reactive powers.

For frequently selected chokes of 7% the series resonant circuit formed from the filter circuit choke and the compensating capacitors yields a resonance frequency of 189Hz.

Design:

Open frame upright design, stationary, for device installation and assembly in dry rooms. Connection up to 12.5kVAr to leakage current-resistant transformer terminals with screw and tab connectors 2.8x0.8mm to 5A, 6.3x0.8mm to 20A. The 2.8x0.8mm tab connector must only be loaded to 5A in accordance with DIN 46249 and 6.3x0.8mm to 20A. Above 12.5kVAr to 25kVAr universal terminal blocks with screw connection and at 30kVAr and above pressed cable lugs are used. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

With temperature switch in middle coil.

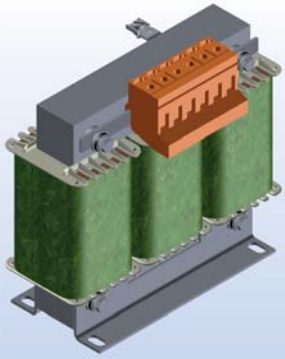
IP 00, insulation class E, max. ambient temperature of 40°C (ta40°C/E)

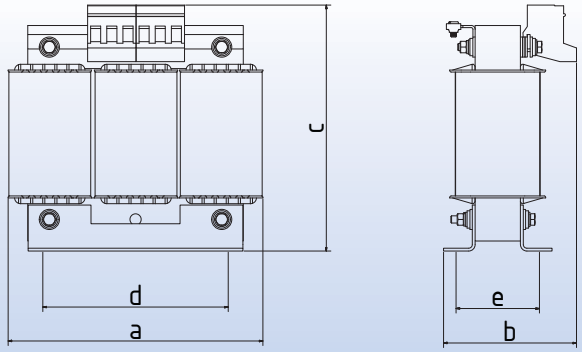
Technical data:

Nominal voltage:	3AC 400V
Choke factor:	7%
Resonance frequency:	189Hz
Nominal frequency:	50Hz
50Hz current:	1 .06 x nominal current
150Hz current:	0.04 x nominal current
250Hz current:	0.31 x nominal current
350Hz current:	0.13 x nominal current

Filter circuit chokes with deviating technical data available upon request.

Type	Current A	Induct. mH	Reactive power kVAr	Capacity: µF	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
								a	b	c	d	e	Mounting
RFDr 7/2,5	3,6	15,34	2,5	46,3	0420-000002,5	0,8	2,0	125	73	115	90	39	M4
RFDr 7/5	7,2	7,67	5,0	92,5	0420-00000005	0,9	5,0	155	92	140	113	49	M6
RFDr 7/7,5	10,8	5,11	7,5	138,8	0420-000007,5	1,2	5,3	155	92	140	113	49	M6
RFDr 7/10	14,4	3,84	10,0	185,0	0420-00000010	1,8	9,0	190	102	165	136	57	M6
RFDr 7/12,5	18,0	3,07	12,5	231,3	0420-000012,5	2,6	9,5	190	102	165	136	57	M6
RFDr 7/15	21,7	2,56	15,0	277,5	0420-00000015	3,5	10,5	190	102	210	136	57	M6
RFDr 7/17,5	25,3	2,19	17,5	323,8	0420-000017,5	3,5	15,0	210	117	230	175	97	M6
RFDr 7/20	28,9	1,92	20,0	370,0	0420-00000020	4,5	16,0	210	117	230	150	80	M6
RFDr 7/25	36,1	1,53	25,0	462,5	0420-00000025	4,8	19,0	230	148	240	176	95	M6
RFDr 7/30	43,3	1,28	30,0	555,1	0420-00000030	6,5	20,5	230	148	205	176	95	M6
RFDr 7/40	57,7	0,96	40,0	740,1	0420-00000040	10,0	28,0	240	146	215	190	120	M8
RFDr 7/50	72,2	0,77	50,0	925,1	0420-00000050	10,5	33,0	265	152	235	200	102	M8





Three-phase line chokes according to VDE 0570 part 2-20

General information:

Use of line chokes is necessary for current limitation and for suppressing line reactions and commutating dips.

Current limitation is carried out preferentially at 25 times the value of the nominal current. For this line chokes with a short circuit voltage of 4 % must be used.

The line choke must be selected according to the nominal current of the consumer.

Design:

Open frame upright design, stationary, for device installation and assembly in dry rooms, strong base bracket for mounting. Connection to leakage current-resistant transformer terminals with screw fastening. Above 50A screw block terminals or cable lugs are used. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

For terminal connection of 50A and higher the dimensions b and c change.

IP 00, insulation class E, from 250A insulation class F, max. ambient temperature of 40°C (ta40°C)

Technical data:

Nominal voltage:	3AC 400V
Nominal voltage drop (Uk):	4% (4.8% at 60Hz)
Nominal frequency:	50Hz (60Hz)

Line chokes with deviating technical data available upon request.

Type	Current A	Induct. mH	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
RNDr 2,5	2,5	11,73	0430-000002,5	0,2	1,0	78	62	75	50	38	M4
RNDr 4	4	7,33	0430-00000004	0,3	1,3	96	55	90	71	39	M4
RNDr 6	6	4,90	0430-00000006	0,4	1,7	96	64	90	71	48	M4
RNDr 8	8	3,67	0430-00000008	0,6	1,9	120	58	118	90	39	M4
RNDr 10	10	2,94	0430-00000010	0,6	2,8	120	58	118	90	39	M4
RNDr 13	13	2,26	0430-00000013	0,8	3,0	120	68	118	90	49	M4
RNDr 16	16	1,84	0430-00000016	0,9	3,4	150	69	138	113	50	M5
RNDr 20	20	1,47	0430-00000020	1,2	3,7	150	69	138	113	50	M5
RNDr 25	25	1,18	0430-00000025	1,2	5,1	150	84	138	113	65	M5
RNDr 30	30	0,98	0430-00000030	1,5	5,4	150	102	138	113	65	M5
RNDr 40	40	0,74	0430-00000040	2,7	6,8	180	92	160	136	57	M6
RNDr 50	50	0,59	0430-00000050	2,7	8,2	180	102	160	136	67	M6
RNDr 60	60	0,49	0430-00000060	3,1	9,8	180	96	205	136	77	M6
RNDr 80	80	0,37	0430-00000080	3,5	13,0	210	106	234	175	86	M6
RNDr 90	90	0,33	0430-00000090	4,0	14,0	210	117	234	175	97	M6
RNDr 100	100	0,29	0430-00000100	4,3	16,0	210	117	234	175	97	M6
RNDr 120	120	0,25	0430-00000120	5,9	18,0	228	154	195	176	95	M8
RNDr 140	140	0,21	0430-00000140	7,5	22,0	240	159	205	185	91	M8
RNDr 160	160	0,184	0430-00000160	7,7	25,0	240	159	205	185	91	M8
RNDr 180	180	0,163	0430-00000180	8,5	29,0	240	164	205	185	96	M8
RNDr 200	200	0,147	0430-00000200	10,0	30,0	240	164	205	185	96	M8
RNDr 250	250	0,117	0430-00000250	8,5	30,0	300	227	260	224	94	M8
RNDr 315	315	0,093	0430-00000315	10,1	37,0	300	240	260	224	108	M8
RNDr 400	400	0,074	0430-00000400	11,3	47,0	300	300	260	224	145	M8
RNDr 500	500	0,059	0430-00000500	14,0	57,0	360	280	310	264	140	M8