Michael Riedel
Transformatorenbau GmbH

COMPLETE RANGE 14

RIEDEL – Energy for a better solution!

COMPLETE RANGE

The technical data given herein represent reference points for numerous applications areas. Special and exceptional rules also apply. The following is intended as a brief introduction to the complex topic.

CE mark

EC directives have been passed by the Council of the European Union supported by the founding agreement of the European Economic Community (EEC), particularly Article 100. These EC directives serve towards harmonisation of the legal and administrative regulations in the various European Union (EU) Member States whenever differences in national regulations result in trade barriers or otherwise inhibit the functions of the European Union's internal market. The directives are to be transposed into the respective national laws by the national legislative authorities within the specified time periods. The manufacturer must affix the CE mark to products falling under the scope of specific EU directives as a symbol of conformity. This affects products included in the directives according to the 'new conception' (passed on 07.05.1985) which state the requirements on the technical condition of products.

CE mark:  Communautés Européennes

EU directives are legally binding regulations of the European Union. Meeting of these requirements is a precondition for marketing of the products in Europe. This does not apply to the rest of the world trade market. Affixing of the CE mark confirms the compliance of the products with the corresponding basic requirements of all directives applicable to the product. The CE mark is solely directed to the monitoring authorities as verification of the conformity to the directives. However, it is often misinterpreted as a 'quality symbol'. Hence it is often frequently requested, yet with no legal basis.
Although the EC declaration of conformity of the manufacturer must only be kept available for the monitoring authorities (at least 10 years after the last time it was placed on the market), customers may request the corresponding copies from us.
The directives to be applied are derived from the EC declaration of conformity for the respective product.
The directives which are most frequently applicable for the product range of our company are:

1. **Low Voltage Directive (2006/95/EC)** of the European Parliament and the Council from 12 December 2006 for harmonisation of the legislation of the Member States regarding electrical equipment for application within certain voltage limits.
   Nearly all products in our production range fall under the scope of this Low Voltage Directive.

2. **EMC Directive (2004/108/EC)** of the European Parliament and the Council from 15 December 2004 for harmonisation of the legislation of the Member States regarding electromagnetic compatibility and for elimination of the Directive 89/336/EEC.
   Nearly all products in product groups C and D of our production range fall under the scope of this EMC Directive.

Protection classes

The protection class is a design characteristic of a device indicating the safety with regard to dangerous currents passing through the body through direct contact.

The transformers with open frame constructions intended for installation in electrical enclosures or devices do not possess a protection class, but rather can only be prepared for one.

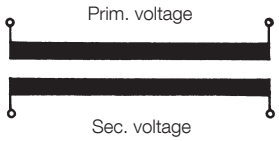
Protection class I: Device with protective earth connection and basic insulation

Protection class II: Device without protective earth connection but with double or reinforced insulation

Protection class III: Device without protective earth connection, where the protection against dangerous currents flowing through the body through direct contact is based on the supply with safety extra-low voltage (SELV) and no higher voltage than the SELV can be generated.

Transformers with separate windings

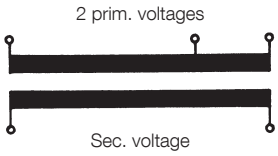
In these transformers there is no conducting connection between the individual windings. They are galvanically separated.



Taps

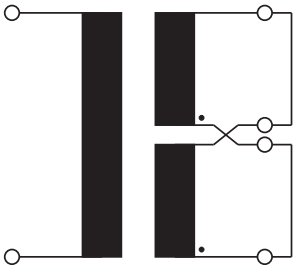
Transformers may be designed with primary as well as secondary taps.

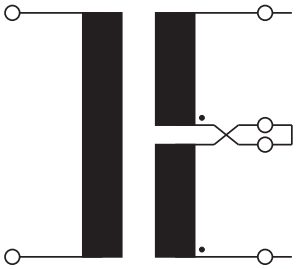
Taps on the primary side serve towards adaption and use of the transformer with various grid voltages. The increased winding space requirement frequently makes it necessary to go to the next higher transformer type here. For grid adaptations of approx. 5% this enlargement is not required.



The need for further winding space also does not arise if a second primary voltage halved results in the first (e.g. 115V — 230V).

If two equal winding parts are connected in series or parallel the transformer can be used for both secondary voltages while retaining full output. Observe stated polarity!


Transformer connected for 115V


Transformer connected for 230V

In case of several secondary voltages the rated secondary current intensity is calculated based upon the highest secondary voltage. Therefore taps can only be loaded with the current intensity calculated from the power and the highest secondary voltage.

If full power is required for each of various secondary voltages, power or current intensity must be stated individually. It necessitates additional space and possibly the next larger transformer type.

Transformers with autotransformer windings

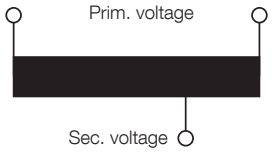
In an autotransformer winding there is a conducting connection between the primary and secondary windings. The output power is transmitted partly inductively and partly by current conduction. In part considerable size reductions compared with transformers with separate windings result. The smaller the difference between input and output voltage, the smaller the transformer.

Example:

Transformer	Nominal power	1000VA
	Undervoltage	230V
	Upper voltage	400V

$$\text{Type power N} = \text{rated power} \times \left(1 - \frac{\text{Undervoltage}}{\text{Upper voltage}}\right)$$

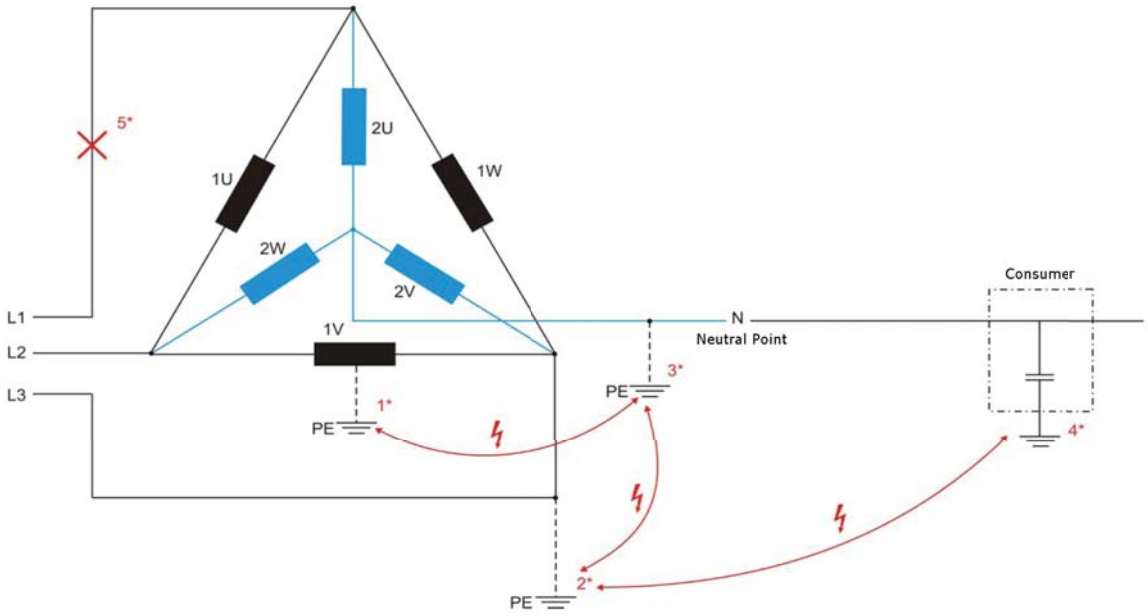
$$\text{Type power N} = 1000 \left(1 - \frac{230}{400}\right) = 1000 \times 0.425 = 425\text{VA}$$



Rather than a transformer sized for 1000VA, a transformer of size 425VA is needed.

Earthing of autotransformers in delta grids:

1U / 1V / 1W is a given delta grid (power generating plant, local company grid etc.)
2U / 2V / 2W is the autotransformer / star point to be connected.



1*) Typical North American grid with earthed centre tap of a winding (e.g. 480V yields the typical 2x240V with 180° phase offset).
Many household appliances such as washing machines, air conditioners etc. with high current draws have this network connection!)

2*) Most common network type in Asia (Japan, Korea, Taiwan, Philippines)! 3-wire lines where the green conductor is simultaneously PE and phase L3!
Should not be confused with the single-phase 3-wire line (L/N/PE)!

3*) European regulations often require an earthed neutral conductor N. If one considers the star point of the autotransformer in the delta grid there is a direct (and devastating) short circuit either through the PE conductor via L3 to N on the winding ‘2V’ or via ‘2V’ and the earthed ‘1V’.

4*) Consumers earthed on the secondary side, e.g. line filters, Y capacitors in primary switching controllers and intermediate circuits in frequency converters, also cause 3*) !!!

5*) If one phase fails on the primary side the star point can adopt a higher potential in an uncontrolled manner and will destroy the transformer or the connected consumers!

Operating modes

All of the standard transformers we manufacture are designed for **S1** continuous operation. S1 operation occurs when a transformer operates for any given time > 10min under the thermally permissible nominal current and the other nominal values. This corresponds to 100% duty cycle.

Short-time load (standard S3 with specification of duty cycle in %) – the duty cycle is calculated as follows:

$$ED = \frac{\text{Load duration in min.}}{\text{Cycle duration in min.}} \times 100\ (\%)$$

Cycle duration = idle time + load duration (load duration must not exceed 10 min.)

The type power for short-time loading is calculated as follows:

$$NT = N \times \sqrt{\frac{ED\ (\%)}{100}}$$

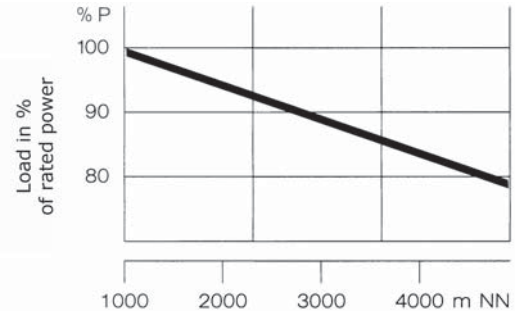
NT = type power
N = Nominal power

The additional operating modes **S2** (single load with long idle time), **S4, S5** (intermittent operation), **S6** (continuous operation with intermittent load),**S7** (uninterrupted operation with varying rated current at start and/or end of cycle) and **S8** (like S7, but with any number of variations in nominal current of specified duration and magnitude during one cycle) also exist. We can manufacture products for these operating modes upon request.

Power

All stated power data refers to collected secondary power in VA or kVA at continuous operation, excitation with nominal voltage, nominal frequency, cos phi = 1, an ambient temperature of max. 40°C and an installation altitude up to 1000 m above sea level (ASL).
Power is calculated from the product of nominal secondary voltage (volts) and nominal secondary current (amperes) in VA or kVA.

Power reduction dependent on installation altitude



Short-time rating (short-time load) of a transformer

In control circuits with mainly power demands by contactor coils and relay coils the control transformer is designed according to the possible short-time rating (initial power of coil) at cos w = 0.5 and a voltage drop of maximum 5%.

Heating

Unimpeded access of cooling air must be ensured. At ambient temperatures above 40°C rated power must be reduced according to the following chart:

°C	45	50	55	60
N (%)	95	85	80	75

Temperature rise

In general the transformers can be operated at higher power for a short time, but only if the maximum allowable average temperature rise is not exceeded and the prior continuous load was less than 100%.

Overload table:

Prior continuous load in % of rated power	Allowable duration of overload in % of rated power				
	150%	140%	130%	120%	110%
50	30min.	45min.	65min.	105min.	180min.
60	25min.	40min.	60min.	95min.	170min.
70	20min.	30min.	45min.	80min.	155min.
80	15min.	25min.	40min.	75min.	140min.
90	8min.	15min.	30min.	60min.	120min.

Temperatures

Under the nominal conditions a transformer has losses which are converted to heat. This 'self-heating' or 'overtemperature' is coupled to limit values according to the standards based on the insulation class of the insulating material and the ambient temperature. These values relate to the winding and hence the components in direct contact with it. The overtemperatures given in the following table are yielded from the average temperature rise for an ambient temperature of 40°C.

According to the standards, depending on the insulation class the 'hot spot' can lie between 5K (class A) and 15K (class H) above the table values given below. We can manufacture products with all listed insulation classes upon request.

Insulation class	Final temperature
A	105°C
E	115°C
B	120°C
F	140°C
H	175°C

We recommend that insulation class H **not** be used due to its poor efficiency.

Limits for low-voltage grids according to DIN IEC 38

In DIN IEC 38 ('IEC standard voltages') the standard voltage is specified to be single-phase 230VAC / 3-phase 400VAC. The grid tolerance is ±10%. This is taken into account in the design of all Riedel products.

Limits for nominal DC voltage according to DIN EN 61131-2

Irrespective of the load and the fluctuation in grid voltages according to DIN IEC 38 when RIEDEL power supplies are used the electronic control is supplied with a reliable operating voltage. Through the close magnetic coupling and the generous sizing RIEDEL power supplies exhibit voltage stability and comply with the limits for DC voltages given in DIN EN 61131-2.

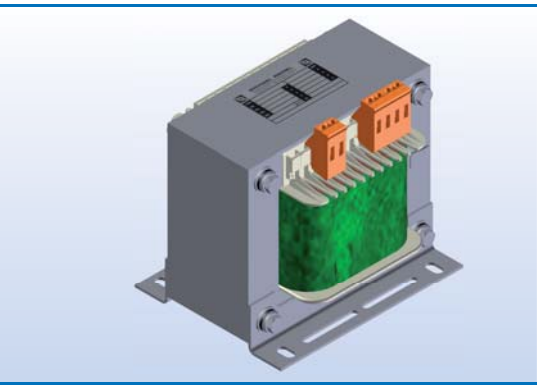
Excerpt from the standard:

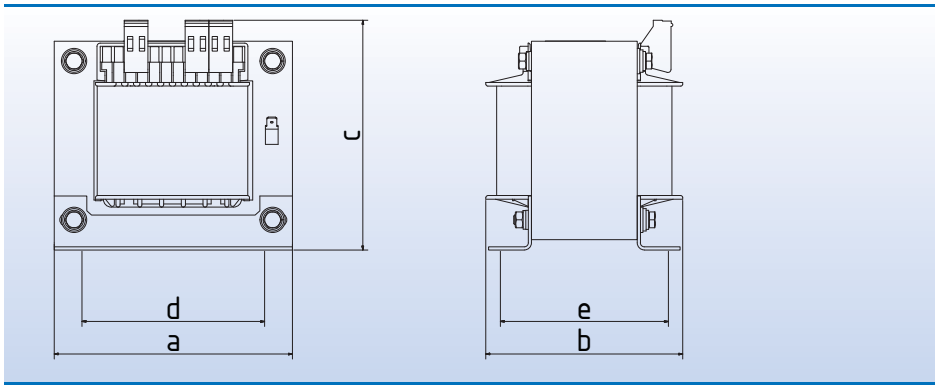
Rated value (Ve) 24VDC: 15%/+20% tolerance (min-max)
Rated value (Ve) 48VDC: -15%/+20% tolerance (min-max)

Note:

Apart from the voltage tolerances for a screen/stabilised DC voltage, an overall AC voltage component with a peak value of 5% of the rated voltage is permissible. The absolute limits are 30/19.2V DC voltage for 24VDC and 60/38.4V DC voltage for 48VDC.

SINGLE-PHASE TRANSFORMERS





Single-phase control transformers according to VDE 0570 part 2-2, EN 61558-2-2

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Only available with the given voltages; for other voltages please see identical design type REIA

General information:

- Voltage adaptation through +-5% taps on the primary side
- Compact, low-weight design
- High reliability and long life
- Low overall losses, high efficiency
- Above-averagely high power for short-time operation (S3)
- Temperature reserves, can also be loaded with full current at Ta of 60°C and class B
- High output voltage stability

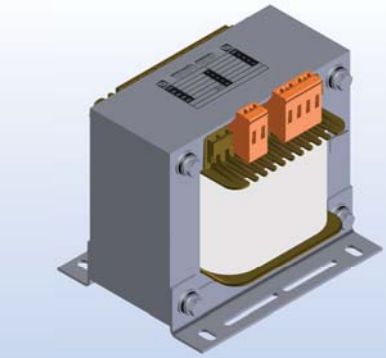
Design:

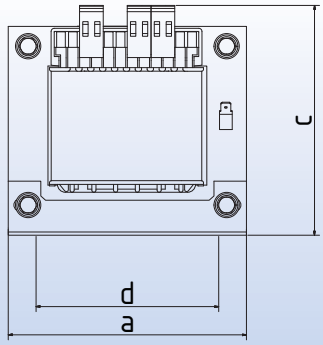
Open frame, stationary, for device installation and assembly in dry rooms, separate windings. Connection to leakage current-resistant transformer terminals with screw fastening. The transformer terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3). PE connection as 6.3x0.8mm tab connector.

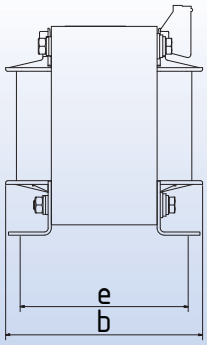
IP 00, insulation class E, max. ambient temperature of 40°C (ta40°C/E).

Type	Power VA	500//230 V Item no:	400//230 V Item no:	230//230 V Item no:	500//24 V Item no:	400//24 V Item no:	230//24 V Item no:
RSTN 50	50	0311-00000050	0312-00000050	0313-00000050	0314-00000050	0315-00000050	0316-00000050
RSTN 75	75	0311-00000075	0312-00000075	0313-00000075	0314-00000075	0315-00000075	0316-00000075
RSTN 100	100	0311-00000100	0312-00000100	0313-00000100	0314-00000100	0315-00000100	0316-00000100
RSTN 130	130	0311-00000130	0312-00000130	0313-00000130	0314-00000130	0315-00000130	0316-00000130
RSTN 200	200	0311-00000200	0312-00000200	0313-00000200	0314-00000200	0315-00000200	0316-00000200
RSTN 250	250	0311-00000250	0312-00000250	0313-00000250	0314-00000250	0315-00000250	0316-00000250
RSTN 320	320	0311-00000320	0312-00000320	0313-00000320	0314-00000320	0315-00000320	0316-00000320
RSTN 400	400	0311-00000400	0312-00000400	0313-00000400	0314-00000400	0315-00000400	0316-00000400
RSTN 500	500	0311-00000500	0312-00000500	0313-00000500	0314-00000500	0315-00000500	0316-00000500
RSTN 630	630	0311-00000630	0312-00000630	0313-00000630	0314-00000630	0315-00000630	0316-00000630
RSTN 800	800	0311-00000800	0312-00000800	0313-00000800	0314-00000800	0315-00000800	0316-00000800
RSTN 1000	1000	0311-00001000	0312-00001000	0313-00001000	–	–	–
RSTN 1100	1100	0311-00001100	0312-00001100	0313-00001100	–	–	–
RSTN 1300	1300	0311-00001300	0312-00001300	0313-00001300	–	–	–
RSTN 1600	1600	0311-00001600	0312-00001600	0313-00001600	–	–	–
RSTN 2000	2000	0311-00002000	0312-00002000	0313-00002000	–	–	–
RSTN 2500	2500	0311-00002500	0312-00002500	0313-00002500	–	–	–
RSTN 3000	3000	0311-00003000	0312-00003000	0313-00003000	–	–	–

Type	Copper kg	Total kg	Dimensions approx. in mm					
			a	b	c	d	e	Mounting
RSTN 50	0,27	1,2	78	71	89	56	46	M4
RSTN 75	0,29	1,5	85	68	93	64	47	M4
RSTN 100	0,34	2,1	85	82	93	64	61	M4
RSTN 130	0,45	2,3	96	78	104	84	60	M5
RSTN 200	0,58	2,9	96	88	104	84	70	M5
RSTN 250	0,66	3,6	96	102	104	84	84	M5
RSTN 320	0,73	4,3	105	104	110	84	85	M5
RSTN 400	1,03	5,2	120	100	120	90	82	M5
RSTN 500	1,10	6,9	120	120	120	90	102	M5
RSTN 630	1,68	7,8	150	107	145	122	84	M6
RSTN 800	2,50	10,0	150	124	145	122	101	M6
RSTN 1000	2,60	12,8	150	150	145	122	127	M6
RSTN 1100	2,80	12,7	174	128	157	135	96	M6
RSTN 1300	3,13	14,7	174	138	157	135	106	M6
RSTN 1600	3,40	16,7	174	148	157	135	116	M6
RSTN 2000	5,00	20,1	195	154	178	150	122	M8
RSTN 2500	6,00	24,0	195	176	178	150	144	M8
RSTN 3000	6,60	26,6	195	182	178	150	150	M8







Single-phase grid transformers according to VDE 0570 part 2-1, EN 61558-2-1

Single-phase control transformers according to VDE 0570 part 2-2, EN 61558-2-2

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Single-phase autotransformers *1 according to VDE 0570 part 2-13, EN 61558-2-13

Industrial control transformers UL 506 / CSA 22.2

UL-file No.:E164203 / Category: XPTQ2/8
(not „Contruction only“ or „Insulating System“)
***1 Suffix -A (RSTN UL-CSA-A) = autotransformer**

The respective version must be given with the order.

General information:

Transformers of the series RSTN UL-CSA meet national and international requirements for worldwide use.

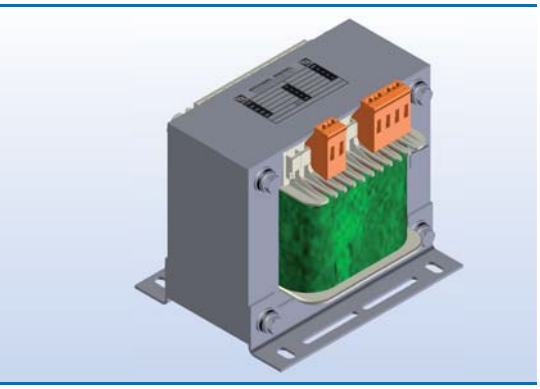
The particular advantages of the RSTN UL-CSA(-A) series

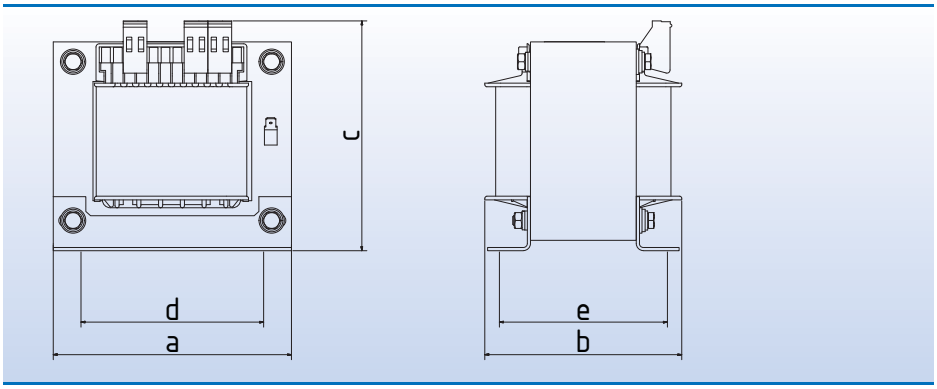
- **Variable voltages selectable** by customer
  Pri. Nominal voltage range 110V...600V incl. any number of taps possible (max. 660V)
  Sec. Nominal voltage range 12V...600V (30-700VA), 24V...600V (800-1300VA), 110V...600V (1600-3000VA), incl. any number of taps possible (max. 660V)
- max. three separate output windings on secondary side (the sum of all output windings must not exceed 600V)
- High reliability and long life
- Compact, low-weight design
- Low overall losses, high efficiency
- Above-averagely high power for short-time operation
- For control transformers: insulation system of higher quality than that specified in the standard
- High voltage stability due to lower voltage drop between no-load and load periods
- Mounting brackets according to DIN 41307
- Optional: PE screw terminal connector, PE shield and 2nd secondary winding
- **Autotransformer *1** adapted to type power

Design:

Open frame, stationary, for device installation and assembly in dry rooms, separate windings. Connection to leakage current-resistant transformer terminals with screw fastening. The transformer 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 B, max. ambient temperature of 40°C (ta40°C/B).

Type	Power VA	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
					a	b	c	d	e	Mounting
RSTN 30 UL-CSA	30	0317-00000030	0,15	1,00	66	60	80	50	40	M4
RSTN 40 UL-CSA	40	0317-00000040	0,22	1,10	66	80	72	50	52	M4
RSTN 50 UL-CSA	50	0317-00000050	0,27	1,20	78	71	89	56	45	M4
RSTN 63 UL-CSA	63	0317-00000063	0,28	1,47	78	80	89	56	54	M4
RSTN 75 UL-CSA	75	0317-00000075	0,29	1,60	85	68	93	64	47	M4
RSTN 100 UL-CSA	100	0317-00000100	0,34	2,10	85	82	93	64	61	M4
RSTN 130 UL-CSA	130	0317-00000130	0,45	2,30	96	78	104	84	60	M5
RSTN 145 UL-CSA	145	0317-00000145	0,52	2,20	85	90	93	64	69	M4
RSTN 180 UL-CSA	180	0317-00000180	0,53	3,00	105	80	110	84	62	M5
RSTN 200 UL-CSA	200	0317-00000200	0,58	2,90	96	88	104	84	70	M5
RSTN 250 UL-CSA	250	0317-00000250	0,66	3,70	96	102	104	84	84	M5
RSTN 270 UL-CSA	270	0317-00000270	0,63	3,50	105	88	110	84	69	M5
RSTN 320 UL-CSA	320	0317-00000320	0,73	4,50	105	104	110	84	85	M5
RSTN 330 UL-CSA	330	0317-00000330	1,00	4,15	120	88	120	90	70	M5
RSTN 400 UL-CSA	400	0317-00000400	1,03	5,20	120	100	120	90	82	M5
RSTN 460 UL-CSA	460	0317-00000460	1,10	6,00	120	108	120	90	90	M5
RSTN 500 UL-CSA	500	0317-00000500	1,10	6,90	120	120	120	90	102	M5
RSTN 510 UL-CSA	510	0317-00000510	1,60	6,45	135	105	131	104	86	M5
RSTN 600 UL-CSA	600	0317-00000600	1,70	7,00	135	115	131	104	96	M5
RSTN 630 UL-CSA	630	0317-00000630	1,68	7,80	150	107	145	122	84	M6
RSTN 700 UL-CSA	700	0317-00000700	1,80	7,90	135	125	131	104	106	M5
RSTN 800 UL-CSA	800	0317-00000800	2,50	10,00	150	124	145	122	101	M6
RSTN 1000 UL-CSA	1000	0317-00001000	2,60	12,80	150	150	145	122	127	M6
RSTN 1100 UL-CSA	1100	0317-00001100	2,80	12,70	174	128	157	135	96	M6
RSTN 1300 UL-CSA	1300	0317-00001300	3,13	14,70	174	138	157	135	106	M6
RSTN 1600 UL-CSA	1600	0317-00001600	3,40	16,70	174	148	156	135	116	M6
RSTN 1900 UL-CSA	1900	0317-00001900	4,00	21,10	174	168	156	135	136	M6
RSTN 2000 UL-CSA	2000	0317-00002000	4,50	22,50	195	154	178	150	122	M8
RSTN 2500 UL-CSA	2500	0317-00002500	6,00	24,60	195	176	178	150	144	M8
RSTN 3000 UL-CSA	3000	0317-00003000	6,60	26,90	195	182	178	150	150	M8





Single-phase control transformers according to VDE 0570 part 2-2, EN 61558-2-2

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Only available with the given voltages; for other voltages please see identical design type REIA

General information:

- Voltage adaptation through +-5% taps on the primary side
- Compact, low-weight design
- High reliability and long life
- Low overall losses, high efficiency
- High output voltage stability

Riedel ECOLINE Quality & Efficiency

Design:

Open frame, stationary, for device installation and assembly in dry rooms, separate windings.

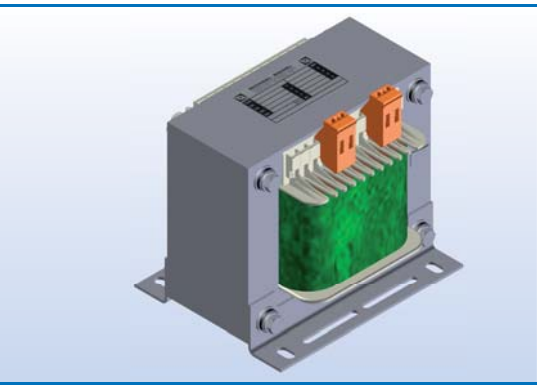
Connection to leakage current-resistant transformer terminals with screw fastening. The transformer terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3). PE connection as 6.3x0.8mm tab connector.

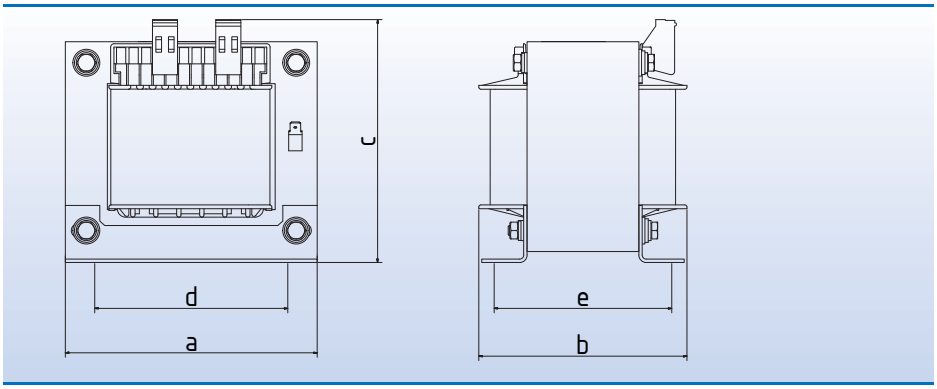
IP 00, insulation class B, max. ambient temperature 40°C (ta40°C/B)

Type	Power VA	440/460/480/500V 230V Item no:	380/400/420V 230V Item no:	220/230/240V 230 V Item no:	440/460/480/500V 24V Item no:	380/400/420V 24V Item no:	220/230/240V 24V Item no:
RSTB 50	50	0033-00000050	0032-00000050	0031-00000050	0036-00000050	0035-00000050	0034-00000050
RSTB 75	75	0033-00000075	0032-00000075	0031-00000075	0036-00000075	0035-00000075	0034-00000075
RSTB 100	100	0033-00000100	0032-00000100	0031-00000100	0036-00000100	0035-00000100	0034-00000100
RSTB 130	130	0033-00000130	0032-00000130	0031-00000130	0036-00000130	0035-00000130	0034-00000130
RSTB 160	160	0033-00000160	0032-00000160	0031-00000160	0036-00000160	0035-00000160	0034-00000160
RSTB 200	200	0033-00000200	0032-00000200	0031-00000200	0036-00000200	0035-00000200	0034-00000200
RSTB 250	250	0033-00000250	0032-00000250	0031-00000250	0036-00000250	0035-00000250	0034-00000250
RSTB 320	320	0033-00000320	0032-00000320	0031-00000320	0036-00000320	0035-00000320	0034-00000320
RSTB 400	400	0033-00000400	0032-00000400	0031-00000400	0036-00000400	0035-00000400	0034-00000400
RSTB 500	500	0033-00000500	0032-00000500	0031-00000500	0036-00000500	0035-00000500	0034-00000500
RSTB 630	630	0033-00000630	0032-00000630	0031-00000630	0036-00000630	0035-00000630	0034-00000630
RSTB 800	800	0033-00000800	0032-00000800	0031-00000800	0036-00000800	0035-00000800	0034-00000800
RSTB 1000	1000	0033-00001000	0032-00001000	0031-00001000	0036-00001000	0035-00001000	0034-00001000
RSTB 1300	1300	0033-00001300	0032-00001300	0031-00001300	-	-	-
RSTB 1600	1600	0033-00001600	0032-00001600	0031-00001600	-	-	-
RSTB 2000	2000	0033-00002000	0032-00002000	0031-00002000	-	-	-
RSTB 2500	2500	0033-00002500	0032-00002500	0031-00002500	-	-	-
RSTB 3000	3000	0033-00003000	0032-00003000	0031-00003000	-	-	-
RSTB 3300	3300	0033-00003300	0032-00003300	0031-00003300	-	-	-

Type	Copper kg	Total kg	Dimensions approx. in mm					
			a	b	c	d	e	Mounting
RSTB 50	0,22	1,20	78	71	89	56	45	M4
RSTB 75	0,26	1,50	78	80	89	56	54	M4
RSTB 100	0,34	1,60	85	68	93	64	47	M4
RSTB 130	0,40	2,10	85	82	93	64	61	M4
RSTB 160	0,53	2,30	96	78	104	84	60	M5
RSTB 200	0,63	3,00	105	80	110	84	62	M5
RSTB 250	0,66	2,90	96	88	104	84	70	M5
RSTB 320	0,84	3,50	105	88	110	84	69	M5
RSTB 400	1,20	4,15	120	88	121	90	70	M5
RSTB 500	1,30	6,00	120	108	120	90	90	M5
RSTB 630	1,50	6,90	120	120	120	90	102	M5
RSTB 800	2,00	7,00	135	115	131	104	96	M5
RSTB 1000	2,60	10,0	150	124	145	122	101	M6
RSTB 1300	2,80	12,8	150	150	145	122	127	M6
RSTB 1600	3,90	14,7	174	138	157	135	106	M6
RSTB 2000	4,30	21,1	174	168	157	135	136	M6
RSTB 2500	5,80	22,5	195	154	178	150	122	M8
RSTB 3000	6,20	24,6	195	176	178	150	144	M8
RSTB 3300	6,80	26,9	195	182	178	150	150	M8

Storage types | *for 24V types dimensions c +10mm | Subject to technical changes





Single-phase grid transformers according to VDE 0570 part 2-1, EN 61558-2-1

Single-phase control transformers according to VDE 0570 part 2-2, EN 61558-2-2

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

UL/CSA - Version see RSTN UL-CSA and RSTS UL-CSA

Available as accessories at extra charge: PE screw terminal connection completely integrated.

General information:

The transformers in the REIA series meet national, international and prepared future requirements for worldwide use. They can be delivered upon request with approval as

Grid transformers according toVDE 0570 part 2-1, EN 61558-2-1,

Control transformers according to VDE 0570 part 2-2, EN 61558-2-2, (from 30VA)

Isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4,

Safety transformers according to VDE 0570 part 2-6, EN 61558-2-6, (sum of all idle secondary voltages: max. 50V)

The respective version must be given with the order.

The particular advantages of the REIA series

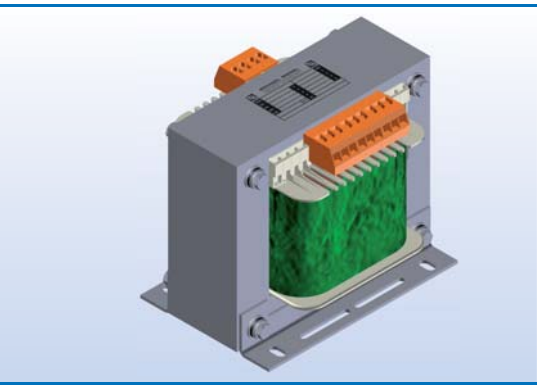
- **Variable voltages selectable** by customer
- High reliability and long life
- Compact, low-weight design
- Low overall losses, high efficiency
- Above-averagely high power for short-time operation
- High power yield in relation to volume
- High voltage stability due to lower voltage drop between no-load and load periods
- 130VA and higher-power transformers protected against bolted short circuits via insulating bushes
- Temperature reserves, can also be loaded with full current at Ta of 60°C/B

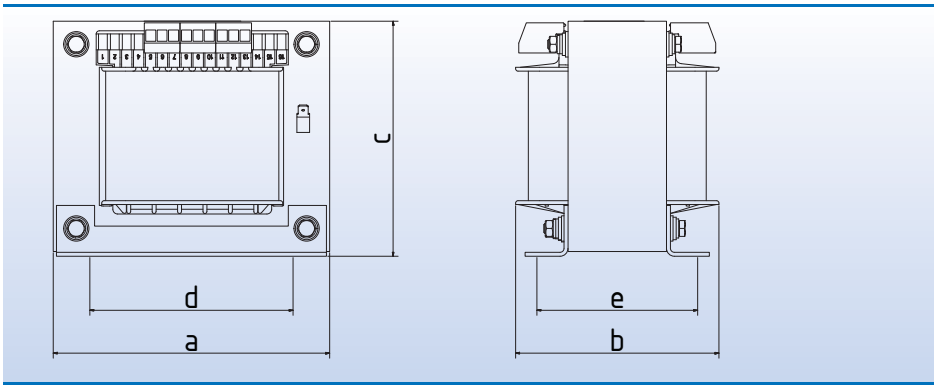
Design

Like RSTN series, normal design for transformation to max. 690V or 50A.

Other designs upon request (voltages, currents, connections, mounting etc.)

Type	Power VA	Size *)	Item no	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
REIA 15	15	EI 54/18*	0053-00000015	0,07	0,35	55	76	60	44	34	M3
REIA 18	18	EI 60/21	0053-00000018	0,08	0,45	60	65	76	44	36	M3
REIA 30	30	EI 66/23	0053-00000030	0,12	0,60	66	67	80	50	40	M4
REIA 40	40	EI 66/34	0053-00000040	0,15	0,90	66	78	80	50	52	M4
REIA 50	50	EI 78/27	0053-00000050	0,27	1,20	78	71	89	56	45	M4
REIA 63	63	EI 78/36	0053-00000063	0,28	1,47	78	80	89	56	54	M4
REIA 75	75	EI 84/29	0053-00000075	0,29	1,60	85	68	93	64	47	M4
REIA 100	100	EI 84/43	0053-00000100	0,34	2,10	85	82	93	64	61	M4
REIA 140	140	EI 96/35	0053-00000140	0,45	2,30	96	78	104	84	60	M5
REIA 145	145	EI 84/52	0053-00000145	0,52	2,20	85	90	93	64	69	M4
REIA 180	180	EI 105/37	0053-00000180	0,53	3,00	105	80	110	84	62	M5
REIA 200	200	EI 96/45	0053-00000200	0,58	2,90	96	88	104	84	70	M5
REIA 250	250	EI 96/59	0053-00000250	0,66	3,70	96	102	104	84	84	M5
REIA 270	270	EI 105/45	0053-00000270	0,63	3,50	105	88	110	84	69	M5
REIA 320	320	EI 105/60	0053-00000320	0,73	4,50	105	104	110	84	85	M5
REIA 330	330	EI 120/41	0053-00000330	1,00	4,15	120	88	121	90	70	M5
REIA 400	400	EI 120/53	0053-00000400	1,03	5,20	120	100	120	90	82	M5
REIA 460	460	EI 120/61	0053-00000460	1,10	6,00	120	108	120	90	90	M5
REIA 500	500	EI 120/73	0053-00000500	1,10	6,90	120	120	120	90	102	M5
REIA 510	510	EI 135/52	0053-00000510	1,60	6,45	135	105	131	104	86	M5
REIA 600	600	EI 135/62	0053-00000600	1,70	7,00	135	115	131	104	96	M5
REIA 630	630	EI 150N/49	0053-00000630	1,68	7,80	150	107	145	122	84	M6
REIA 700	700	EI 135/72	0053-00000700	1,80	7,90	135	125	131	104	106	M5
REIA 800	800	EI 150N/66	0053-00000800	2,50	10,00	150	124	145	122	101	M6
REIA 1000	1000	EI 150N/92	0053-00001000	2,60	12,80	150	150	145	122	127	M6
REIA 1100	1100	EI 174/62	0053-00001100	2,80	12,70	174	128	157	135	96	M6
REIA 1300	1300	EI 174/72	0053-00001300	3,13	14,70	174	138	157	135	106	M6
REIA 1600	1600	EI 174/82	0053-00001600	3,40	16,70	174	148	157	135	116	M6
REIA 1900	1900	EI 174/102	0053-00001900	4,00	21,10	174	168	157	135	136	M6
REIA 2000	2000	EI 192/82	0053-00002000	4,50	22,50	195	154	178	150	122	M8
REIA 2500	2500	EI 192/104	0053-00002500	6,00	24,60	195	176	178	150	144	M8
REIA 3000	3000	EI 192/110	0053-00003000	6,60	26,90	195	182	178	150	150	M8





Single-phase control transformers according to VDE 0570 part 2-2, EN 61558-2-2

Universal control transformers

General information:

The use of universal control transformers is recommended in cases in which the 'normal' single-phase control transformers are not used due to the demand for minimum storage requirements and maximum variability.

Voltage series:

Interchangeable input voltage connections:

AC 200/220/230/250/270/280/330/350/370/380/390/400/420/430/440/450/470/490/500/550V

Interchangeable output voltage connections:

AC 115/230V or AC 21/24/30//42/48/60V

The transformers must be operated partially in parallel or in series according to the connection diagram on the rating plate.

The particular advantages of the URST series

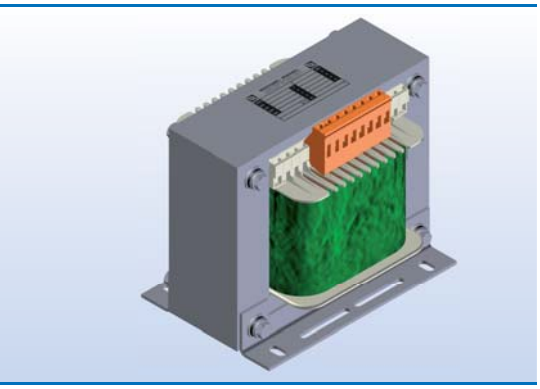
- High reliability and long life
- Variable input voltage (200...550V)
- Extended secondary range
- Compact, low-weight design
- Low overall losses, high efficiency
- Above-averagely high power for short-time operation
- High power yield in relation to volume
- High voltage stability due to lower voltage drop between no-load and load periods
- 130VA and higher-power transformers protected against bolted short circuits via insulating bushes
- Temperature reserves, can also be loaded with full current at Ta of 60°C/B

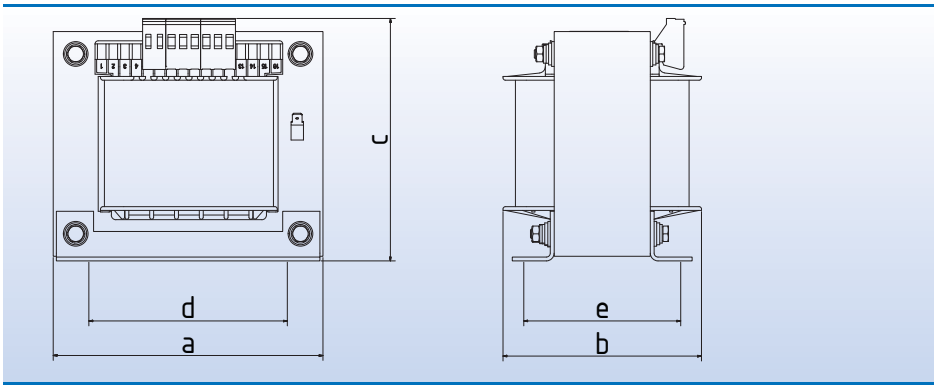
Design:

Design: Open frame, stationary, for device installation and assembly in dry rooms, separate windings. Connection 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. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

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

Type	Power VA	Copper kg	Total kg	Item no: 200..550V//230V	Item no: 200...550V//24V	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
URST 100	100	0,45	2,0	0147-00000100	0038-00000100	85	104	83	64	61	M4
URST 160	160	0,75	3,8	0147-00000160	0038-00000160	105	107	101	84	69	M5
URST 250	250	0,80	4,5	0147-00000250	0038-00000250	120	103	112	90	70	M5
URST 320	320	1,30	5,3	0147-00000320	0038-00000320	120	115	112	90	82	M5
URST 400	400	1,50	6,0	0147-00000400	0038-00000400	120	123	112	90	90	M5
URST 500	500	1,90	7,8	0147-00000500	0038-00000500	150	111	135	122	84	M6
URST 630	630	2,80	10,1	0147-00000630	0038-00000630	150	128	136	122	101	M6
URST 800	800	2,90	14,3	0147-00000800	0038-00000800	174	128	148	135	96	M6
URST 1000	1000	3,20	15,7	0147-00001000	0038-00001000	174	138	148	135	106	M6
URST 1600	1600	7,00	25,0	0147-00001600	-	195	154	169	150	122	M8
URST 2500	2500	10,00	32,4	0147-00002500	-	195	176	170	150	144	M8





Single-phase autotransformers according to VDE 0570 part 2-13, EN 61558-2-13

Single-phase autotransformers for single-phase fan motors

General information:

The transformers in the RLTS series are single-phase autotransformers with 7 steps and are specially designed for air conditioning and ventilation. They are designed as
Autotransformers according to VDE 0570

Design:

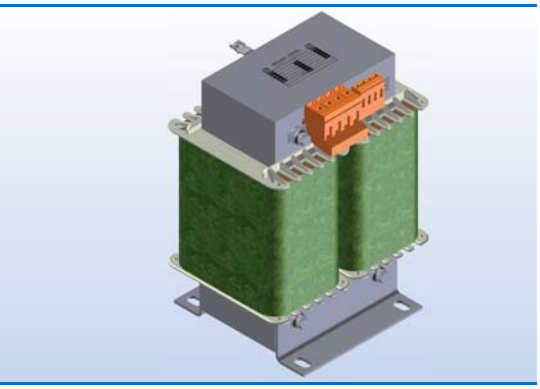
Open frame, stationary, for device installation and assembly in dry rooms, windings. Connection to leakage current-resistant transformer terminals with screw and tab connectors 2.8x0.8mm to 5A, 6.3x0.8mm to 20A. The 2.8x0.8mm tab connector must only be loaded to 5A in accordance with DIN 46249 and 6.3x0.8mm to 20A. The 0V and 230V connections are each provided only once on terminal. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

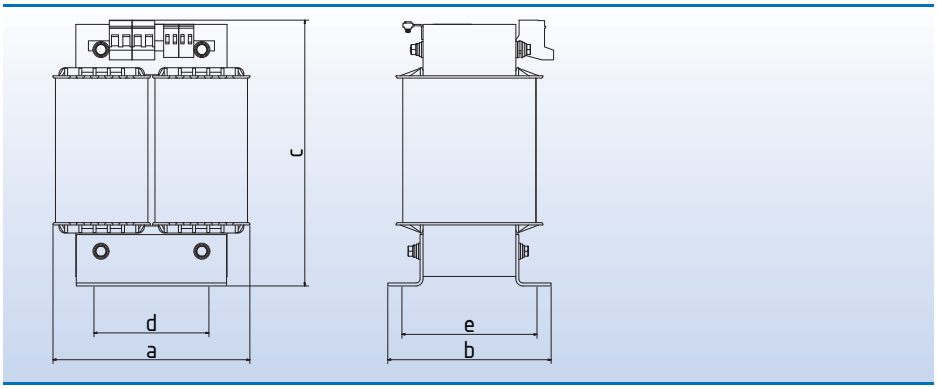
PE connection as 6.3x0.8mm tab connector.

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

Voltage range:	Input voltage:	AC 230 V
	Output voltages:	AC 80/100/125/150/175/190/230 V
Special version:	The RLTS series can also be supplied in an IP 23 enclosure with the following option.	
	Tap changer, operation signal lamps, enclosure etc. (prices upon request).	
	Other designs upon request (voltages, currents, connections, mounting etc.)	

Type	Current A	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
					a	b	c	d	e	Mounting
RLTS 80	1,45	0096-00000080	0,28	1,47	78	74	89	56	54	M4
RLTS 115	2,10	0096-00000115	0,35	2,00	85	82	93	64	61	M4
RLTS 220	4,00	0096-00000220	0,63	3,50	105	89	110	84	69	M5
RLTS 410	7,50	0096-00000410	1,10	5,50	120	100	121	90	82	M5
RLTS 600	11,00	0096-00000600	1,80	8,00	150	107	145	122	84	M6
RLTS 710	13,00	0096-00000710	2,60	10,00	150	125	145	122	101	M6
RLTS 900	16,50	0096-00000900	2,80	13,50	150	150	145	122	127	M6
RLTS 1090	20,00	0096-00001090	2,90	13,10	174	128	156	135	96	M6
RLTS 1310	24,00	0096-00001310	3,50	17,50	174	148	156	135	116	M6
RLTS 1745	32,00	0096-00001745	4,00	21,10	174	168	156	135	136	M6





Single-phase control transformers according to VDE 0570 part 2-2, EN 61558-2-2

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Fig. Upright design with transformer terminals
Only available with the given voltages; for other voltages please see identical design type RUE

Design:

Open frame, stationary, for device installation and assembly in dry rooms, separate windings. The secondary bridge can be connected with 6.3x0.8mm tab connector to 20A. The transformer terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3). From 6.3kVA with terminal blocks on top bracket.

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

Fuse recommendation:

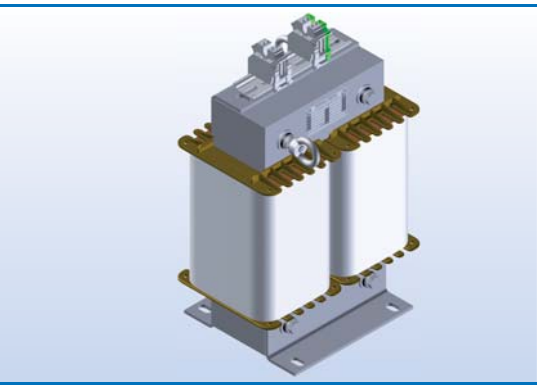
The fuse recommendations stated below apply to the secondary side of the transformer and fuse inserts according to IEC 127 / EN 60127 (At) or IEC 60269 (AgL). For this and for primary fusing please refer to the 'Fuse' section in the Accessories --> Options part of the catalogue.

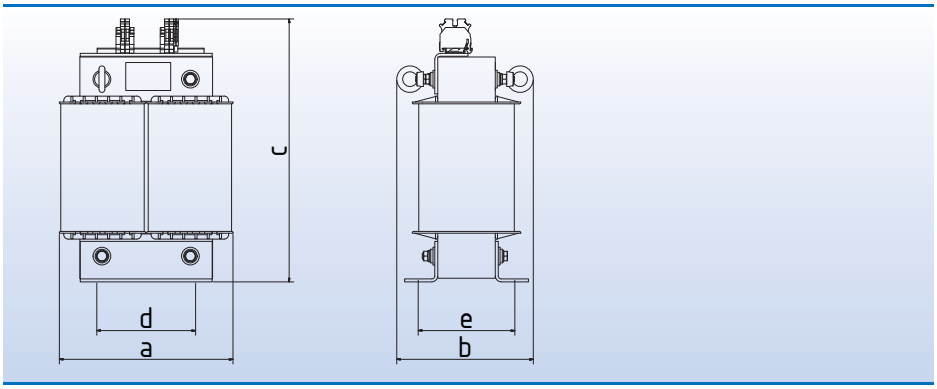
Type Primary voltage ±5%	I 1 max. in A 230V	I 1 max. in A 400V	I 1 max. in A 500V
RSTS 1200	5,72	3,30	2,65
RSTS 1500	7,00	4,00	3,30
RSTS 1800	8,18	4,94	3,95
RSTS 2000	9,50	5,50	4,35
RSTS 2200	10,30	5,98	4,78
RSTS 2500	11,70	6,70	5,43
RSTS 3000	14,00	7,90	6,49
RSTS 4200	19,70	11,40	9,12
RSTS 5000	23,70	13,70	10,90
RSTS 6300	30,00	17,50	13,80
RSTS 8000	38,20	22,10	17,60

Type Secondary voltage	I 2 in A	Fuse A 230V	I 2 in A	Fuse A 115V
RSTS 1200	5,21	4 At	10,40	8 At
RSTS 1500	6,54	5 At	13,00	10 AgL
RSTS 1800	7,82	6.3 At	15,60	16 AgL
RSTS 2000	8,70	8 At	17,40	16 AgL
RSTS 2200	9,56	8 At	19,10	16 AgL
RSTS 2500	10,80	8 At	21,70	20 AgL
RSTS 3000	13,00	10 AgL	26,00	20 AgL
RSTS 4200	18,20	16 AgL	36,50	35 AgL
RSTS 5000	21,70	20 AgL	43,40	50 AgL
RSTS 6300	27,30	25 AgL	54,70	50 AgL
RSTS 8000	34,70	35 AgL	69,50	63 AgL

Type	Power VA	KB cos φ 0.5 VA	Efficiency η < %	500//230 V Item no:	400//230 V Item no:	230//230 V Item no:
RSTS 1200	1200	3340	94,1	0021-00001200	0022-00001200	0023-00001200
RSTS 1500	1500	4640	95,0	0021-00001500	0022-00001500	0023-00001500
RSTS 1800	1800	6000	95,5	0021-00001800	0022-00001800	0023-00001800
RSTS 2000	2000	6450	95,5	0021-00002000	0022-00002000	0023-00002000
RSTS 2200	2200	7000	95,6	0021-00002200	0022-00002200	0023-00002200
RSTS 2500	2500	9075	95,8	0021-00002500	0022-00002500	0023-00002500
RSTS 3000	3000	10720	95,8	0021-00003000	0022-00003000	0023-00003000
RSTS 4200	4200	16720	96,4	0021-00004200	0022-00004200	0023-00004200
RSTS 5000	5000	20330	96,8	0021-00005000	0022-00005000	0023-00005000
RSTS 6300	6300	23450	97,0	0021-00006300	0022-00006300	0023-00006300
RSTS 8000	8000	25390	97,2	0021-00008000	0022-00008000	0023-00008000

Type	Size	Copper kg	Total kg	Dimensions approx. in mm a	b	c	d	e	Mounting
RSTS 1200	UI 120/51	4,4	13,6	158	105	213	100	79	M6
RSTS 1500	UI 120/61	4,5	15,0	158	122	213	100	89	M6
RSTS 1800	UI 120/75	5,5	17,0	158	135	213	100	103	M6
RSTS 2000	UI 132/72	5,9	20,0	172	132	231	112	102	M8
RSTS 2200	UI 150/52	6,6	21,0	195	122	257	124	94	M10
RSTS 2500	UI 150/65	7,2	24,8	195	135	264	124	107	M10
RSTS 3000	UI 150/77	7,6	28,0	195	147	264	124	119	M10
RSTS 4200	UI 150/92	9,2	31,0	195	165	264	124	134	M10
RSTS 5000	UI 150/103	12,9	38,5	195	176	264	124	145	M10
RSTS 6300	UI 180/78	16,8	48,0	236	168	364	144	140	M10
RSTS 8000	UI 180/93	20,7	57,0	236	183	372	144	155	M10





Single-phase grid transformers according to VDE 0570 part 2-1, EN 61558-2-1

Single-phase control transformers according to VDE 0570 part 2-2, EN 61558-2-2

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Single-phase autotransformers *1 according to VDE 0570 part 2-13, EN 61558-2-13

Industrial control transformers UL 5085 / CSA 22.2 allowed

UL-file No.:E164203 / Category: XPTQ2/8
(not „Contruction only“ or „Insulating System“)
***1 Suffix -A (RSTS UL-CSA-A) = Spartrafo**

General information:

The transformers in the RSTS UL-CSA series are specially approved for the North American market and meet national and international requirements for worldwide use.

The particular advantages of the RSTS UL-CSA(-A) series:

- **Variable voltages selectable** by customer
  Pri. Nominal voltage range 110V...600V incl. any number of taps possible (max. 660V)
  Sec. 10V...600V (500-3000VA), 19V...600V (4200-6300VA), 40V...600V (8000-13000VA), 80V...600V (16000-25000VA) incl. any number of taps possible (max. 660V)
- Maximum 4 separate windings with a sum lying inside the voltage range window
- High reliability and long life
- Low overall losses, high efficiency
- Above-averagely high power for short-time operation
- Upon request by the customer for secondary volltage to 50VAC (V no-load) non-isolated cable connection (optional)
- Optional: PE screw terminal connector, PE shield and 2nd secondary winding
- **Autotransformer *1** adapted to type power

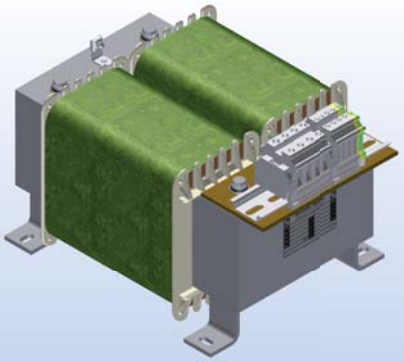
Design:

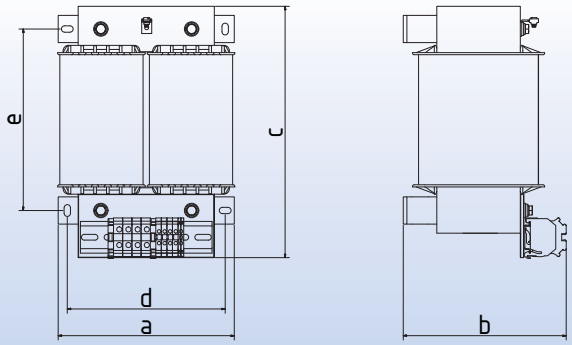
Open frame, stationary, for device installation and assembly in dry rooms, separate windings. Connection to leakage current-resistant transformer terminals with screw fastening. The transformer terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3). From 50A with terminal blocks on top bracket.

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

The respective version must be given with the order.

Type	Power VA	Size	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
RSTS 500 UL-CSA	500	UI 90/41	0055-00000500	1,50	5,2	120	85	157	66	76	M6
RSTS 630 UL-CSA	630	UI 90/51	0055-00000630	1,80	6,3	120	95	157	76	76	M6
RSTS 800 UL-CSA	800	UI 114/40	0055-00000800	2,20	7,7	154	90	198	100	95	M6
RSTS 1000 UL-CSA	1000	UI 102/57	0055-00001000	2,75	7,9	140	103	177	76	87	M6
RSTS 1200 UL-CSA	1200	UI 120/51	0055-00001200	4,85	13,6	160	105	208	100	79	M6
RSTS 1400 UL-CSA	1400	UI 114/64	0055-00001400	3,85	13,0	154	114	198	100	95	M6
RSTS 1500 UL-CSA	1500	UI 120/61	0055-00001500	4,95	15,0	160	115	208	100	89	M6
RSTS 1800 UL-CSA	1800	UI 120/75	0055-00001800	6,05	17,0	160	129	208	100	103	M6
RSTS 2000 UL-CSA	2000	UI 132/72	0055-00002000	6,45	20,0	178	132	228	112	102	M8
RSTS 2200 UL-CSA	2200	UI 150/52	0055-00002200	7,25	21,0	200	122	260	124	94	M8
RSTS 2500 UL-CSA	2500	UI 150/65	0055-00002500	7,90	24,8	200	135	260	124	107	M8
RSTS 3000 UL-CSA	3000	UI 150/77	0055-00003000	8,35	28,0	200	147	260	124	119	M8
RSTS 4200 UL-CSA	4200	UI 150/92	0055-00004200	10,10	31,0	200	162	260	124	134	M8
RSTS 5000 UL-CSA	5000	UI 150/103	0055-00005000	14,20	38,5	200	173	260	124	145	M8
RSTS 6000 UL-CSA	6000	UI 168/92	0055-00006000	16,50	42,0	228	172	287	136	144	M8
RSTS 6300 UL-CSA	6300	UI 180/78	0055-00006300	18,50	48,0	240	168	305	144	140	M8
RSTS 8000 UL-CSA	8000	UI 180/93	0055-00008000	22,75	57,0	240	183	305	144	155	M8
RSTS 10000 UL-CSA	10000	UI 210/88	0055-00010000	32,00	78,0	280	188	360	176	158	M10
RSTS 13000 UL-CSA	13000	UI 210/103	0055-00013000	36,30	89,0	280	203	360	176	173	M10
RSTS 16000 UL-CSA	16000	UI 210/133	0055-00016000	46,10	112,0	280	233	360	176	203	M10
RSTS 20000 UL-CSA	20000	UI 240/140	0055-00020000	46,20	129,0	320	250	410	196	214	M14
RSTS 25000 UL-CSA	25000	UI 240/140	0055-00025000	49,05	136,0	320	250	410	196	214	M14





Single-phase control transformers according to VDE 0570 part 2-2, EN 61558-2-2

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Fig. Horizontal design with terminal blocks
Only available with the given voltages; for other voltages please see identical design type RUE

Design:

Open frame, stationary, for device installation and assembly in dry rooms, separate windings. Connection to leakage current-resistant terminal blocks with screw connection. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).
IP 00, insulation class E, max. ambient temperature 40°C (ta40°C/E).

Fuse recommendation:

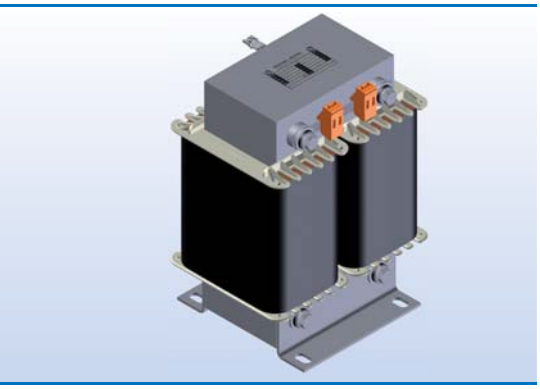
The fuse recommendations stated below apply to the secondary side of the transformer and fuse inserts according to IEC 127 / EN 60127 (At) or IEC 60269 (AgL). For this and for primary fusing please refer to the 'Fuse' section in the Accessories --> Options part of the catalogue.

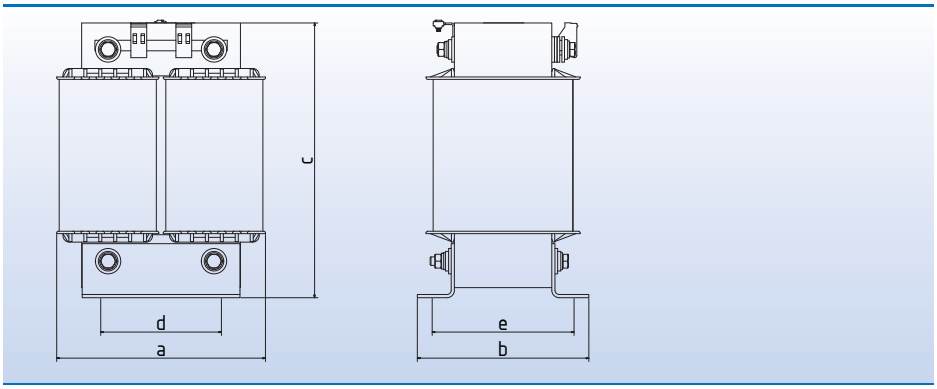
Type Primary voltage ±5%	I 1 max. in A 230V	I 1 max. in A 400V	I 1 max. in A 500V
RSTL 1200	5,72	3,30	2,65
RSTL 1500	7,00	4,00	3,30
RSTL 1800	8,18	4,94	3,95
RSTL 2000	9,50	5,50	4,35
RSTL 2200	10,30	5,98	4,78
RSTL 2500	11,70	6,70	5,43
RSTL 3000	14,00	7,90	6,49
RSTL 4200	19,70	11,40	9,12
RSTL 5000	23,70	13,70	10,90
RSTL 6300	30,00	17,50	13,80
RSTL 8000	38,20	22,10	17,60

Type Secondary voltage	I 2 in A 230V	Fuse A 230V	I 2 in A 115V	Fuse A 115V
RSTL 1200	5,21	4 At	10,40	8 At
RSTL 1500	6,54	5 At	13,00	10 AgL
RSTL 1800	7,82	6.3 At	15,60	16 AgL
RSTL 2000	8,70	8 At	17,40	16 AgL
RSTL 2200	9,56	8 At	19,10	16 AgL
RSTL 2500	10,80	8 At	21,70	20 AgL
RSTL 3000	13,00	10 AgL	26,00	20 AgL
RSTL 4200	18,20	16 AgL	36,50	35 AgL
RSTL 5000	21,70	20 AgL	43,40	50 AgL
RSTL 6300	27,30	25 AgL	54,70	50 AgL
RSTL 8000	34,70	35 AgL	69,50	63 AgL

Type	Power VA	KB cos φ 0.5 VA	Efficiency η < %	500//230 V Item no:	400//230 V Item no:	230//230 V Item no:
RSTL 1200	1200	3340	94,1	0024-00001200	0025-00001200	0026-00001200
RSTL 1500	1500	4640	95,0	0024-00001500	0025-00001500	0026-00001500
RSTL 1800	1800	6000	95,5	0024-00001800	0025-00001800	0026-00001800
RSTL 2000	2000	6450	95,5	0024-00002000	0025-00002000	0026-00002000
RSTL 2200	2200	7000	95,6	0024-00002200	0025-00002200	0026-00002200
RSTL 2500	2500	9075	95,8	0024-00002500	0025-00002500	0026-00002500
RSTL 3000	3000	10720	95,8	0024-00003000	0025-00003000	0026-00003000
RSTL 4200	4200	16720	96,4	0024-00004200	0025-00004200	0026-00004200
RSTL 5000	5000	20330	96,8	0024-00005000	0025-00005000	0026-00005000
RSTL 6300	6300	23450	97,0	0024-00006300	0025-00006300	0026-00006300
RSTL 8000	8000	25390	97,2	0024-00008000	0025-00008000	0026-00008000

Type	Size	Copper kg	Total kg	Dimensions approx. in mm					
				a	b	c	d	e	Mounting
RSTL 1200	UI 120/51	4,4	13,6	166	136	232	146	160	M6
RSTL 1500	UI 120/61	4,5	15,0	166	146	232	146	160	M6
RSTL 1800	UI 120/75	5,5	17,0	166	160	232	146	160	M6
RSTL 2000	UI 132/72	5,9	20,0	166	160	250	146	176	M6
RSTL 2200	UI 150/52	6,6	21,0	194	140	278	174	200	M6
RSTL 2500	UI 150/65	7,2	24,8	194	153	278	174	200	M6
RSTL 3000	UI 150/77	7,6	28,0	194	165	278	174	200	M6
RSTL 4200	UI 150/92	9,2	31,0	194	180	278	174	200	M6
RSTL 5000	UI 150/103	12,9	38,5	194	191	278	174	200	M6
RSTL 6300	UI 180/78	16,8	48,0	236	181	331	204	240	M8
RSTL 8000	UI 180/93	20,7	57,0	236	204	331	204	240	M8





Single-phase grid transformers according to VDE 0570 part 2-1, EN 61558-2-1

Single-phase control transformers according to VDE 0570 part 2-2, EN 61558-2-2

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Fig. RUE 4200

General information:

The transformers in the RUE series meet national, international and prepared future requirements for worldwide use. They can be delivered upon request with approval as

Grid transformers according toVDE 0570 part 2-1, EN 61558-2-1,

Control transformers according to VDE 0570 part 2-2, EN 61558-2-2,

Isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4,

Safety transformers according to VDE 0570 part 2-6, EN 61558-2-6,(sum of all idle secondary voltages: max. 50V)

The respective version must be given with the order.

Design:

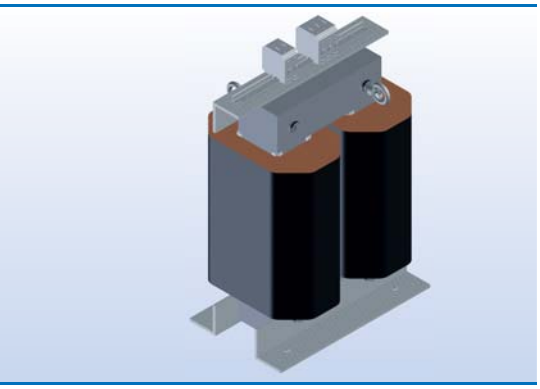
Open frame, stationary, for device installation and assembly in dry rooms, separate windings. **Variable voltages selectable** by customer. Normal design for transformation to max. 690V or 50A on transformer terminals, to 360A terminal blocks. The dimensions b and c are enlarged by this. The terminals are protected against back of hand contact according to accident prevention regulations (BGV A3).

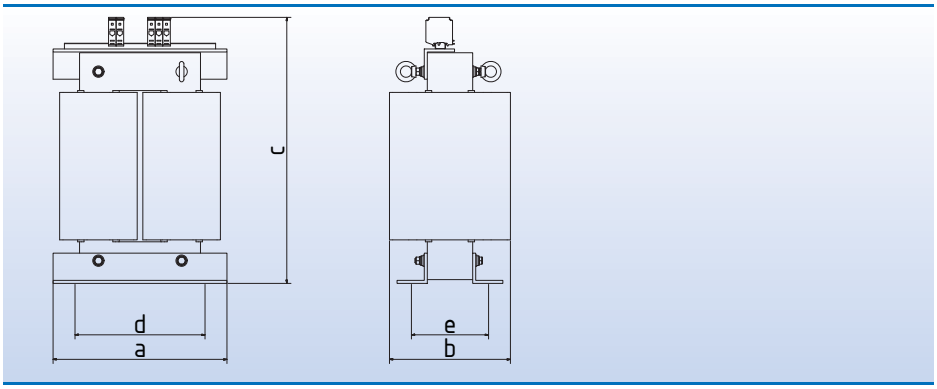
Other designs upon request (voltages, currents, connections, mounting etc.)

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

The dimensions and weights given below represent the currently valid status. Subject to change without notice.

Type	Power VA	Size	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
RUE 280	280	UI 75/41	0059-00000280	0,95	3,6	100	81	132	63	64	M5
RUE 630	630	UI 90/51	0059-00000630	1,65	6,3	120	95	157	76	76	M6
RUE 980	980	UI 102/57	0059-00000980	2,50	7,7	140	103	177	76	87	M6
RUE 1200	1200	UI 120/51	0059-00001200	4,40	13,6	160	105	208	100	79	M6
RUE 1400	1400	UI 114/64	0059-00001400	3,50	13,0	154	114	198	100	95	M6
RUE 1500	1500	UI 120/61	0059-00001500	4,50	15,0	160	115	208	100	89	M6
RUE 1800	1800	UI 120/75	0059-00001800	5,50	17,0	160	129	208	100	103	M6
RUE 2000	2000	UI 132/72	0059-00002000	5,85	20,0	178	132	228	112	102	M8
RUE 2200	2200	UI 150/52	0059-00002200	6,60	21,0	200	122	260	124	94	M8
RUE 2500	2500	UI 150/65	0059-00002500	7,20	24,8	200	135	260	124	107	M8
RUE 3000	3000	UI 150/77	0059-00003000	7,60	28,0	200	147	260	124	119	M8
RUE 4200	4200	UI 150/92	0059-00004200	9,20	31,0	200	162	260	124	134	M8
RUE 5000	5000	UI 150/103	0059-00005000	12,90	38,5	200	173	260	124	145	M8
RUE 6000	6000	UI 168/92	0059-00006000	15,00	42,0	228	172	287	136	144	M8
RUE 6300	6300	UI 180/78	0059-00006300	16,80	48,0	240	168	305	144	140	M8
RUE 8000	8000	UI 180/93	0059-00008000	20,70	57,0	240	183	305	144	155	M8
RUE 10000	10000	UI 210/88	0059-00010000	29,10	78,0	280	188	360	176	158	M10
RUE 13000	13000	UI 210/103	0059-00013000	33,00	89,0	280	203	360	176	173	M10
RUE 16000	16000	UI 210/133	0059-00016000	41,90	112,0	280	233	360	176	203	M10
RUE 20000	20000	UI 240/140	0059-00020000	42,00	129,0	320	250	410	196	214	M14





Single-phase core transformators according to VDE 0570 part 2-1, EN 61558-2-1,

Available in accordance with VDE 0532 upon request

General information:

The delta core packages in our single-phase core transformers of higher power are composed of alternating grain-oriented low-loss strip sections. The windings are vacuum-impregnated with the core and then fired for several hours in the drying kiln.

The electrical design of the transformers ensures the highest efficiency and a much lower extent of transformer heating than permitted according to VDE. The solid planning guarantees the nearly unlimited life of our transformers even if overload occurs.

Design:

Open frame, upright design, stationary, for device installation and assembly in dry rooms, separate windings, connections via robust terminal blocks (to 360A), bus bars or cable lugs (non-dimensioned).

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

Because every higher-power transformer is planned individually, the dimensions and weights given below only represent the currently valid status.

Subject to change without notice.

All types are also available as single-phase autotransformers (for calculation please see 'Transformers with autotransformer windings' in the section containing general information).

* Depending on the design and winding type for special currents all dimensions, particularly the dimension b, can be enlarged by up to 100mm! Hole pattern upon request! This can vary in terms of the thickness dimension due to production conditions.

Type	Power kVA	Item no:	Copper kg	Total kg	Dimensions approx. in mm			
					a	b*	c	c1 from 63A
REST 20	20	0058-00000020	Upon request	140	360	240	420	c+100
REST 25	25	0058-00000025	Upon request	170	360	260	420	c+100
REST 30	30	0058-00000030	Upon request	200	360	265	420	c+100
REST 40	40	0058-00000040	Upon request	250	360	265	460	c+100
REST 50	50	0058-00000050	Upon request	300	400	260	570	c+150
REST 63	63	0058-00000063	Upon request	340	400	290	570	c+150
REST 80	80	0058-00000080	Upon request	380	400	300	570	c+150
REST 100	100	0058-00000100	Upon request	440	440	320	620	c+150
REST 120	120	0058-00000120	Upon request	480	520	360	660	c+150
REST 160	160	0058-00000160	Upon request	620	520	400	660	c+150
REST 200	200	0058-00000200	Upon request	650	650	360	900	c+150
REST 250	250	0058-00000250	Upon request	860	650	420	900	c+150
REST 315	315	0058-00000315	Upon request	1040	650	470	900	c+150
REST 400	400	0058-00000400	Upon request	1150	650	500	900	c+150
REST 500	500	0058-00000500	Upon request	1350	650	550	900	c+150

THREE-PHASE TRANSFORMERS

Star point loading capacity:

For the star point loading capacity for three-phase transformers the following must be heeded for avoidance of additional losses and neutral point displacements:

In a wye-wye connection the star point can only be loaded with the full nominal current (phase conductor current) if the neutral conductor of the supply grid is rigidly connected with the primary-side transformer star point. If this is not the case, the star point can only be loaded with approx. 10% of the phase conductor current.

This rule also applies to 3-phase AC autotransformers designed with wye autotransformer connections. Alternatively, the double zigzag connection has a 100% loading capacity.

The following connection types yield a 100% star point loading capacity without any special measures: Dyn5, Dyn11, Dzn0, Yzn5, YNzn5

If 3-phase AC sets are formed from 3 single-phase transformers the star point must not be loaded.

Vector groups:

In contrast to the standardised annotation for vector groups for transformer windings (high voltage side = higher phase conductor voltage, low voltage side = lower phase conductor voltage) we connect and label our three-phase transformers using the following method which is customary worldwide and easier to understand for the user:

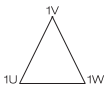
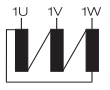
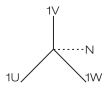
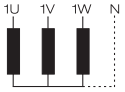
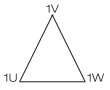
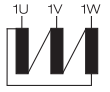
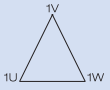
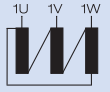
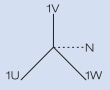
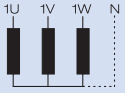
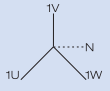
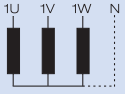
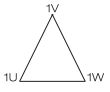
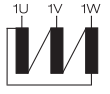
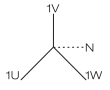
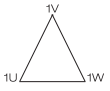
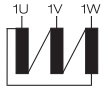
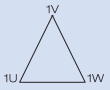
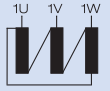
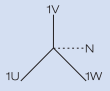
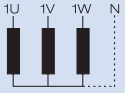
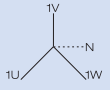
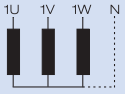
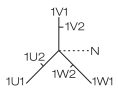
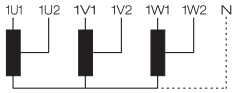
The 1st uppercase letter describes the primary (input) winding and the 2nd lowercase letter describes the secondary (output) winding. Depending on whether the star point (N) is on the primary or secondary side the vector group is supplemented by a capital or small N (examples: Dyn5, YNzn5). The last digit stands for the lagging phase position of the secondary to primary winding in the form of the clock hand model (each 30° = 1 hour).

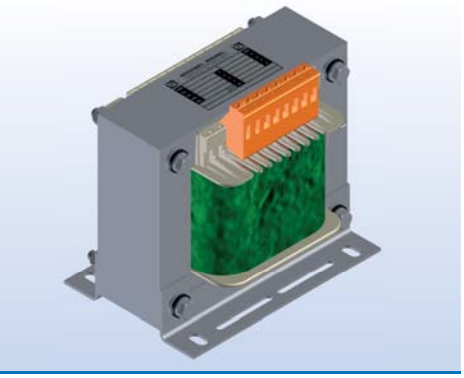
Symbols on the voltages on the rating plate provide additional identification.

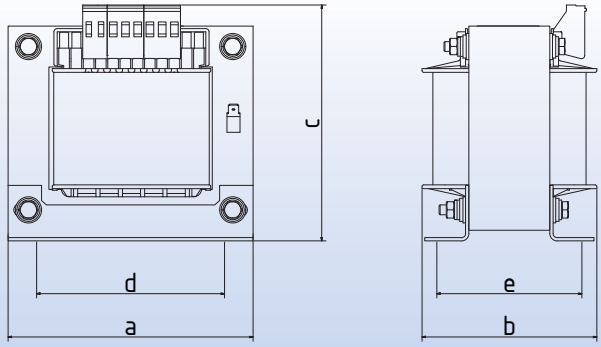
If no order specifications to the contrary with specific position assignments for high and low voltages are formulated, the above identification method is selected!

3-phase AC transformers are preferentially manufactured with Dyn5 if no specifications are available.

If higher secondary currents are required for low voltages Yd(5/11) is preferentially manufactured.

Designation		Clock hand diagram		Circuit diagram		Secondary star point
		primary	Secondary	primary	Secondary	
	Dd0					not available
0	Yy0					10% loadable
	Dz0					Fully loadable
	Dy5					Fully loadable
5	Yd5					not available
	Yz5					Fully loadable
	Dd6					not available
6	Yy6					10% loadable
	Dz6					Fully loadable
	Dy11					Fully loadable
11	Yd11					not available
	Yz11					Fully loadable
0	Ya0					10% loadable





Single-phase autotransformers according to VDE 0570 part 2-13, EN 61558-2-13

Single-phase autotransformers with open delta connection for 3-phase AC fan motors (one set composed of 2 individual transformers)

General information:

The transformers in the RDLTS series are single-phase autotransformers with 5 steps and are specially designed for air conditioning and ventilation. They are designed as Autotransformers according to VDE 0570

Design:

Open frame, stationary, for device installation and assembly in dry rooms, windings. Connection 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. The 0V and 400V connections are each provided only once on terminal. 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.

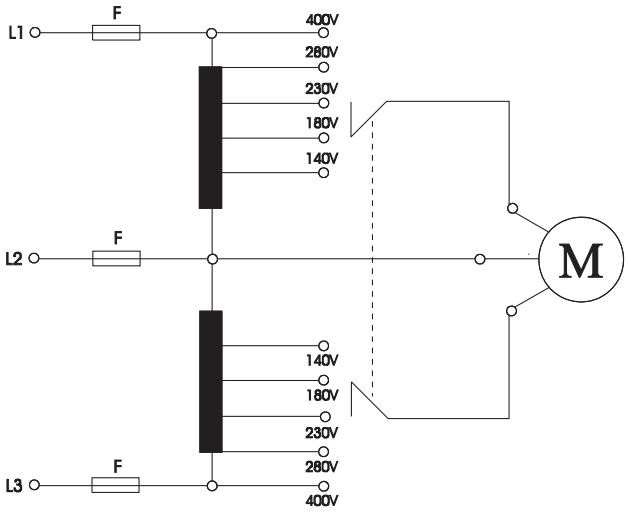
IP 00, insulation class E, max. ambient temperature 40°C (ta40°C/E).

Voltage range:

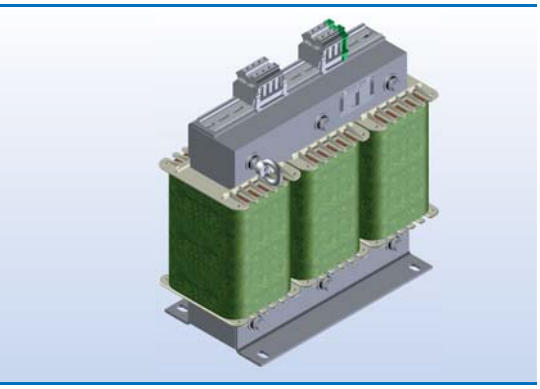
Input voltage: AC 400V 3~
Output voltages: AC 140/180/230/280/400V

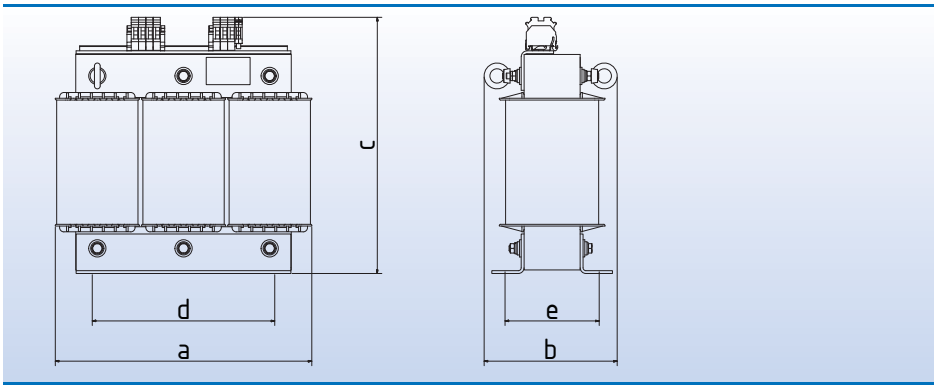
Other designs upon request (voltages, currents, connections, mounting etc.)

Open delta connection:



Type	Current A	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
					a	b	c	d	e	Mounting
RDLTS 95	1	0097-00000095	0,6	4,0	78	74	89	56	54	M4
RDLTS 190	2	0097-00000190	1,4	6,8	105	81	110	84	62	M4
RDLTS 285	3	0097-00000285	1,8	7,8	105	89	110	84	69	M4
RDLTS 380	4	0097-00000380	2,2	13,0	120	88	121	90	70	M5
RDLTS 475	5	0097-00000475	4,0	14,6	120	100	121	90	82	M5
RDLTS 660	7	0097-00000660	7,1	17,1	150	107	145	122	84	M6
RDLTS 950	10	0097-00000950	10,9	20,2	150	150	145	122	127	M6
RDLTS 1330	14	0097-00001330	12,4	28,4	174	138	157	135	106	M6
RDLTS 1800	19	0097-00001800	18,0	40,1	174	169	157	135	136	M6
RDLTS 2465	26	0097-00002465	23,0	44,0	195	175	178	150	110	M8
RDLTS 3410	36	0097-00003410	27,0	55,0	195	182	178	150	150	M8





Three-phase grid transformers according to VDE 0570 part 2-1, EN 61558-2-1,

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Three-phase autotransformers according to VDE 0570 part 2-13, EN 61558-2-13

Fig. Upright design with terminal blocks

General information:

The transformers in the DRUE series meet national and international requirements for worldwide use. They can be delivered upon request with approval as

Grid transformers according toVDE 0570 part 2-1, EN 61558-2-1,

Isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4,

Safety transformers according to VDE 0570 part 2-6, EN 61558-2-6, (sum of all idle secondary voltages: max. 50V)

Design:

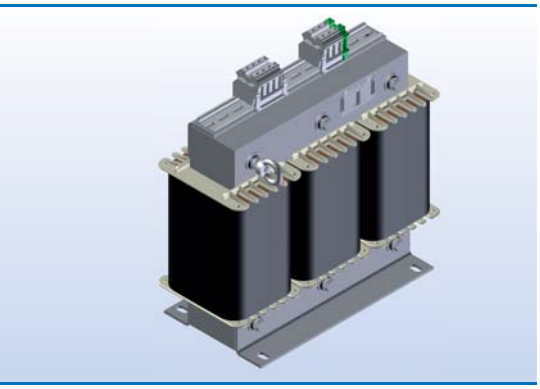
Open frame, stationary, for device installation and assembly in dry rooms, separate windings. Connection to leakage current-resistant transformer terminals with screw fastening. For over 50A leakage current-resistant terminal blocks are mounted on top brackets (note: dimensions b and c are enlarged by this). The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

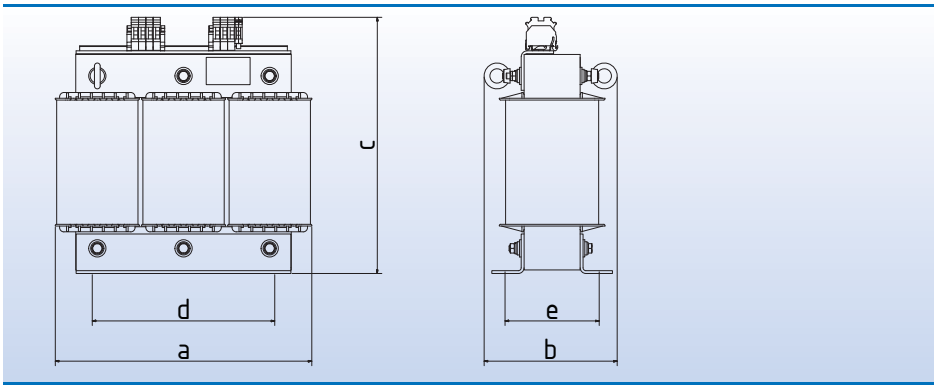
Other designs available upon request (voltages, currents, connections, mounting etc.).

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

All types are also available as 3-phase transformers (for calculation please see 'Transformers with autotransformer windings' in the section containing general information).

Type	Power VA	η ≈ %	Core	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
							a	b	c	d	e	Mounting
DRUE 50	50	85,0	3UI 48/26	0300-00000050	0,22	1,20	96	86	100	71	48	M4
DRUE 110	110	86,0	3UI 60/21	0300-00000110	0,70	1,70	120	81	110	90	39	M4
DRUE 150	150	87,0	3UI 60/31	0300-00000150	0,80	2,40	120	91	110	90	49	M4
DRUE 260	260	91,0	3UI 75/26	0300-00000260	1,10	3,90	150	86	135	113	49	M5
DRUE 410	410	92,0	3UI 75/41	0300-00000410	1,50	5,70	150	101	135	113	64	M5
DRUE 500	500	92,5	3UI 90/31	0300-00000500	2,20	6,60	180	91	155	136	57	M6
DRUE 630	630	93,5	3UI 90/41	0300-00000630	2,50	8,40	180	101	155	136	67	M6
DRUE 800	800	94,0	3UI 90/51	0300-00000800	2,80	10,20	180	111	155	136	77	M6
DRUE 1000	1000	94,0	3UI 102/46	0300-00001000	3,20	11,30	210	108	175	150	80	M8
DRUE 1100	1100	94,0	3UI 114/40	0300-00001100	4,20	13,10	228	110	195	176	71	M6
DRUE 1200	1200	94,5	3UI 102/57	0300-00001200	3,60	13,40	210	119	178	150	91	M8
DRUE 1500	1500	95,0	3UI 120/51	0300-00001500	4,60	17,00	240	121	205	185	81	M8
DRUE 1750	1750	95,5	3UI 114/64	0300-00001750	5,20	18,90	228	134	195	176	95	M6
DRUE 2000	2000	95,5	3UI 120/61	0300-00002000	6,30	21,00	240	131	205	185	91	M8
DRUE 2200	2200	96,0	3UI 120/66	0300-00002200	6,80	22,60	240	136	205	185	96	M8
DRUE 2400	2400	96,0	3UI 120/71	0300-00002400	8,00	25,00	240	141	205	185	101	M8
DRUE 2700	2700	96,5	3UI 120/75	0300-00002700	8,90	26,80	240	145	205	185	105	M8
DRUE 3000	3000	96,5	3UI 132/72	0300-00003000	8,40	29,20	265	152	230	200	102	M8
DRUE 3400	3400	96,0	3UI 150/52	0300-00003400	11,30	31,20	300	140	260	224	94	M8
DRUE 4400	4400	96,5	3UI 150/65	0300-00004400	12,20	36,60	300	153	260	224	108	M8
DRUE 5000	5000	96,6	3UI 150/77	0300-00005000	12,60	41,10	300	165	260	224	120	M8
DRUE 6000	6000	96,8	3UI 150/92	0300-00006000	15,60	49,60	300	180	260	224	134	M8
DRUE 6300	6300	96,8	3UI 168/75	0300-00006300	16,40	51,30	336	150	290	248	127	M8
DRUE 8000	8000	97,1	3UI 168/92	0300-00008000	20,20	62,50	336	170	290	248	144	M8
DRUE 8200	8200	97,0	3UI 180/78	0300-00008200	20,50	62,00	360	180	310	264	140	M8
DRUE 10000	10000	97,4	3UI 180/93	0300-00010000	26,60	76,00	360	195	310	264	155	M8
DRUE 13000	13000	97,1	3UI 210/73	0300-00013000	37,70	90,00	420	180	360	316	143	M10
DRUE 16000	16000	97,6	3UI 210/88	0300-00016000	46,80	110,00	420	195	360	316	158	M10
DRUE 18000	18000	97,8	3UI 210/103	0300-00018000	48,60	122,00	420	210	360	316	173	M10
DRUE 20000	20000	97,8	3UI 210/133	0300-00020000	49,80	144,00	420	240	360	316	203	M10
DRUE 25000	25000	98,2	3UI 210/133	0300-00025000	54,80	146,00	420	240	360	316	203	M10
DRUE 30000	30000	98,0	3UI 240/110	0300-00030000	79,40	181,00	480	240	415	356	184	M14
DRUE 36000	36000	98,1	3UI 240/140	0300-00036000	88,90	218,00	480	270	415	356	214	M14





Three-phase grid transformers according to VDE 0570 part 2-1, EN 61558-2-1,

Three-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Three-phase autotransformers according to VDE 0570 part 2-13, EN 61558-2-13

Fig. Upright design with terminal blocks

General information:

The transformers in the DRUF series meet national and international requirements for worldwide use. They can be delivered upon request with approval as

Grid transformers according toVDE 0570 part 2-1, EN 61558-2-1,

Isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4,

Safety transformers according to VDE 0570 part 2-6, EN 61558-2-6, (sum of all idle secondary voltages: max. 50V)

Design:

Open frame, stationary, for device installation and assembly in dry rooms, separate windings. Connection to leakage current-resistant transformer terminals with screw fastening. For over 50A leakage current-resistant terminal blocks are mounted on top brackets (note: dimensions b and c are enlarged by this). The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

Other designs available upon request (voltages, currents, connections, mounting etc.).

IP 00, insulation class F, ambient temperature 40°C (ta40°C/F).

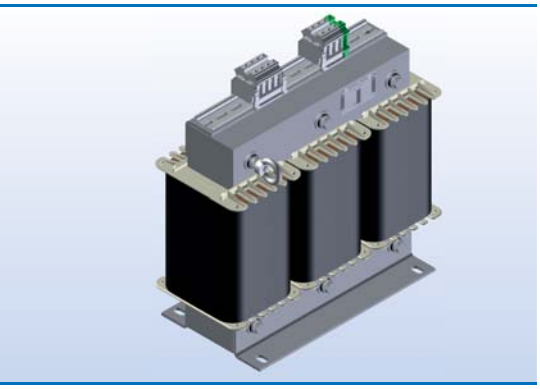
All types are also available as 3-phase transformers (for calculation please see 'Transformers with autotransformer windings' in the section containing general information).

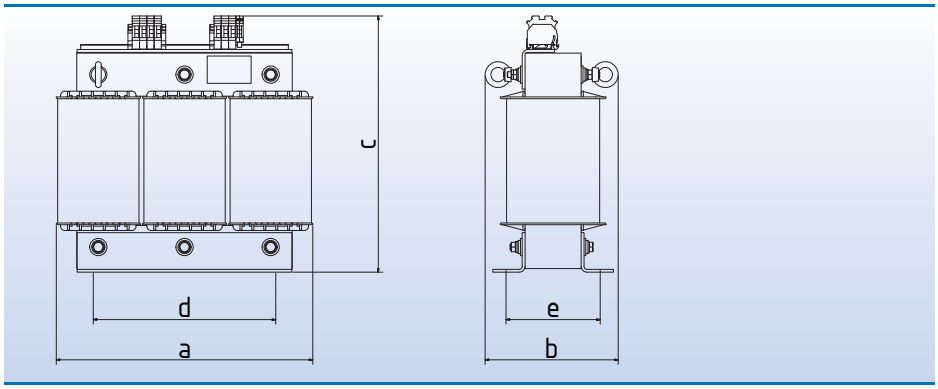
Type	Power VA	η ≈ %	Core	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
							a	b	c	d	e	Mounting
DRUF 6000	6000	95,2	3UI 150/77	0310-00006000	12,6	41,1	300	165	260	224	120	M8
DRUF 7500	7500	95,4	3UI 150/92	0310-00007500	15,6	49,6	300	180	260	224	134	M8
DRUF 8000	8000	95,6	3UI 168/75	0310-00008000	16,4	51,3	336	150	290	248	127	M8
DRUF 9600	9600	95,8	3UI 168/92	0310-00009600	20,2	62,5	336	170	290	248	144	M8
DRUF 10000	10000	95,9	3UI 180/78	0310-00010000	20,5	62,0	360	180	310	264	140	M8
DRUF 12000	12000	96,3	3UI 180/93	0310-00012000	26,6	76,0	360	195	310	264	155	M8
DRUF 16000	16000	96,8	3UI 210/73	0310-00016000	37,7	86,0	420	180	360	316	143	M10
DRUF 19000	19000	96,8	3UI 210/88	0310-00019000	46,8	110,0	420	195	360	316	158	M10
DRUF 21500	21500	97,0	3UI 210/103	0310-00021500	48,6	122,0	420	210	360	316	173	M10
DRUF 25000	25000	97,5	3UI 210/133	0310-00025000	55,6	150,0	420	240	360	316	203	M10
DRUF 30000	30000	98,0	3UI 210/133	0310-00030000	54,8	146,0	420	240	360	316	203	M10
DRUF 36000	36000	97,8	3UI 240/110	0310-00036000	79,4	181,0	480	240	415	356	184	M14
DRUF 40000	40000	97,9	3UI 240/140	0310-00040000	88,9	218,0	480	270	415	356	214	M14

DRUF 50000-100000: Design with sheet metal strip (like the RDST series), but cost-optimised.

Type	Power kVA	Item no:	Copper kg	Total kg	Dimensions approx. in mm			
					a	b*	c	c1
DRUF 50000	50	0310-00000050	94	280	550	300	470	c+100
DRUF 63000	63	0310-00000063	117	330	550	320	470	c+100
DRUF 80000	80	0310-00000080	129	385	650	310	570	c+100
DRUF 100000	100	0310-00000100	147	440	650	330	570	c+100

DRUL UL-CSA





Three-phase grid transformers according to VDE 0570 part 2-1, EN 61558-2-1,

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Three-phase autotransformers *1 according to VDE 0570 part 2-13, EN 61558-2-13

Industrial control transformers UL 5085 / CSA 22.2 allowed

Fig. Upright design with terminal blocks

UL-file No.: E164203

Category: XPTQ2/8

(not „Contruction only“ or „Insulating System“)

***1) Suffix -A (DRUL-A) = Autotransformer**

General information:

The transformers in the DRUL series are specially approved for the North American market. The also meet the requirements of EN 61558.

Industrial control transformers UL 5085 / CSA 22.2 allowed (sum of all secondary voltages: max. 600V)

Grid transformers according toVDE 0570 part 2-1, EN 61558-2-1,

Isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4,

Safety transformers according to VDE 0570 part 2-6, EN 61558-2-6, (sum of all idle secondary voltages: max. 50V)

Autotransformers *1 adapted in terms of installed capacity (current intensity max. 360A per connection terminal)

The respective version must be given with the order.

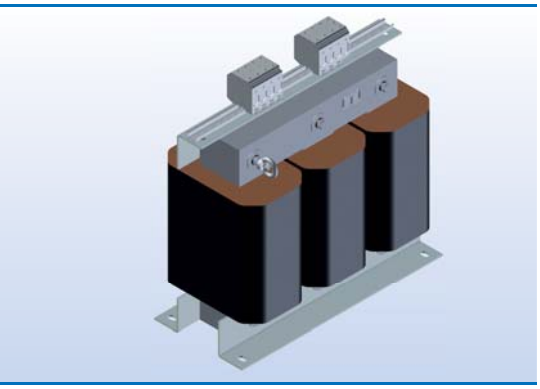
The particular advantages of the DRUL series

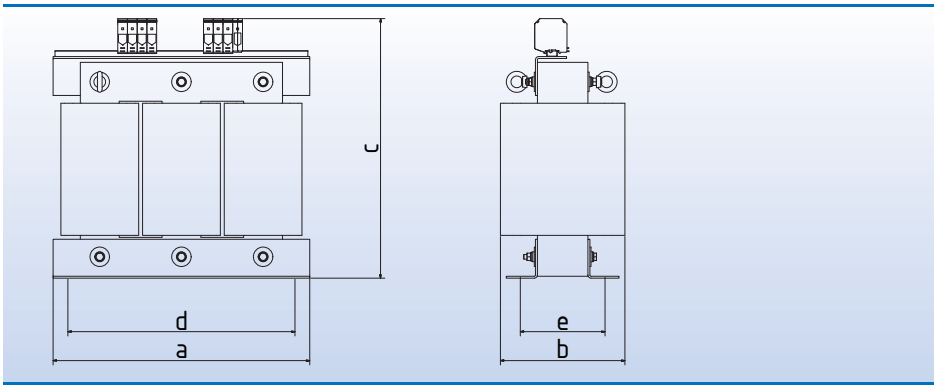
- Input voltage 3AC 200-600V freely selectable; output voltage: see table below.
- Maximum 4 voltage taps, e.g. +-5% in given voltage range optional
- Maximum 4 separate windings with a sum lying inside the voltage range window, maximum current: 360A each
- Copper shield / magnetic shield between windings (optional).
- Temperature-bimetal switch for temperature monitoring (optional).
- Upon request by the customer for secondary volltage to 50VAC (V no-load) non-isolated cable lug connection (optional).

Design:

Connection to leakage current-resistant transformer terminals with screw fastening. For over 50A terminal blocks are mounted on top brackets (note: dimensions b and c are enlarged by this). The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3). (ta40°C/F).

Type	Power VA	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
					a	b	c	d	e	Mounting
DRUL 110 UL-CSA	110	0323-00000110	0,8	1,7	120	81	110	90	39	M4
DRUL 150 UL-CSA	150	0323-00000150	0,9	2,4	120	91	110	90	49	M4
DRUL 260 UL-CSA	260	0323-00000260	1,2	3,9	150	86	135	113	49	M5
DRUL 410 UL-CSA	410	0323-00000410	1,7	5,7	150	101	135	113	64	M5
DRUL 500 UL-CSA	500	0323-00000500	2,4	6,6	180	91	155	136	57	M6
DRUL 630 UL-CSA	630	0323-00000630	2,8	8,4	180	101	155	136	67	M6
DRUL 800 UL-CSA	800	0323-00000800	3,1	10,2	180	111	155	136	77	M6
DRUL 1000 UL-CSA	1000	0323-00001000	3,5	11,3	210	108	175	150	80	M8
DRUL 1100 UL-CSA	1100	0323-00001100	4,6	13,1	228	110	195	176	71	M6
DRUL 1200 UL-CSA	1200	0323-00001200	4,0	13,4	210	119	175	150	91	M8
DRUL 1500 UL-CSA	1500	0323-00001500	5,1	17,0	240	121	205	185	81	M8
DRUL 1750 UL-CSA	1750	0323-00001750	5,7	18,9	228	134	195	176	95	M6
DRUL 2000 UL-CSA	2000	0323-00002000	6,9	21,0	240	131	205	185	91	M8
DRUL 2200 UL-CSA	2200	0323-00002200	7,5	22,6	240	136	205	185	96	M8
DRUL 2400 UL-CSA	2400	0323-00002400	8,8	25,0	240	141	205	185	101	M8
DRUL 2700 UL-CSA	2700	0323-00002700	9,8	26,8	240	145	205	185	105	M8
DRUL 3000 UL-CSA	3000	0323-00003000	9,2	29,2	265	152	230	200	102	M8
DRUL 3400 UL-CSA	3400	0323-00003400	12,4	31,2	300	140	260	224	94	M8
DRUL 4400 UL-CSA	4400	0323-00004400	13,4	36,6	300	153	260	224	108	M8
DRUL 5000 UL-CSA	5000	0323-00005000	15,0	41,1	300	153	260	224	108	M8
DRUL 6000 UL-CSA	6000	0323-00006000	13,9	41,1	300	165	260	224	120	M8
DRUL 7500 UL-CSA	7500	0323-00007500	17,2	49,6	300	180	260	224	134	M8
DRUL 8000 UL-CSA	8000	0323-00008000	18,0	51,3	336	150	290	248	127	M8
DRUL 9600 UL-CSA	9600	0323-00009600	22,2	62,5	336	170	290	248	144	M8
DRUL 10000 UL-CSA	10000	0323-00010000	22,6	62,0	360	180	310	264	140	M8
DRUL 12000 UL-CSA	12000	0323-00012000	29,3	76,0	360	195	310	264	155	M8
DRUL 16000 UL-CSA	16000	0323-00016000	41,5	90,0	420	180	360	316	143	M10
DRUL 19000 UL-CSA	19000	0323-00019000	51,5	110,0	420	195	360	316	158	M10
DRUL 21500 UL-CSA	21500	0323-00021500	53,5	122,0	420	210	360	316	173	M10
DRUL 25000 UL-CSA	25000	0323-00025000	60,3	150,0	420	240	360	316	203	M10
DRUL 30000 UL-CSA	30000	0323-00030000	60,3	146,0	420	240	360	316	203	M10
DRUL 36000 UL-CSA	36000	0323-00036000	87,3	181,0	480	240	415	356	184	M14
DRUL 40000 UL-CSA	40000	0323-00040000	97,8	218,0	480	270	415	356	214	M14
DRUL 50000 UL-CSA	50000	0323-00050000	99,0	220,0	480	270	415	356	214	M14





Three-phase grid transformers according to VDE 0570 part 2-1, EN 61558-2-1,

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Three-phase autotransformers according to VDE 0570 part 2-13, EN 61558-2-13

Available in accordance with VDE 0532 upon request.

Fig. Upright design with terminal blocks

General information:

The delta core packages of our three-phase core transformers of higher power are composed of alternating layers of sheet metal strips. The windings are vacuum-impregnated with the core and then fired for several hours in the drying kiln.

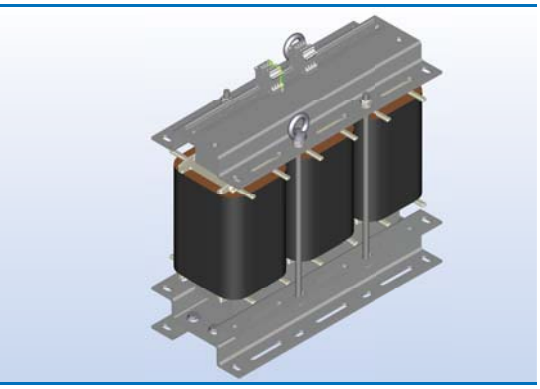
Special features of the RDST series:

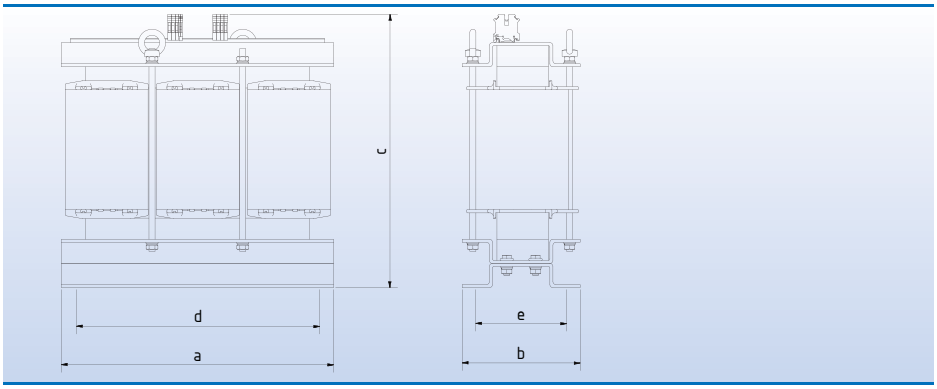
- Core transformers with dry design according to EN 61558 / VDE 0570
- Designed for maximum efficiency
- The solid planning guarantees the nearly unlimited life of our transformers even if overload occurs
- Connections up to 415A to terminal blocks, additionally bolts, bus bars or cable lugs (non-dimensioned)
- Insulation classF
- Individual planning and hence changes in dimensions and weights possible
- Loss-optimised series

All types are also available as 3-phase transformers (for calculation please see 'Transformers with autotransformer windings' in the section containing general information).

* Depending on the design and winding type for special currents all dimensions, particularly the dimension b, can be enlarged by up to 100mm!
Dimensions d and e upon request

Type	Power kVA	Item no:	Copper kg	Total kg	Dimensions approx. in mm			
					a	b*	c	c1 from 63A
RDST 40	40	0335-00000040	85	180	550	220	460	c+100
RDST 50	50	0335-00000050	91	210	550	270	460	c+100
RDST 63	63	0335-00000063	113	250	550	300	470	c+100
RDST 80	80	0335-00000080	121	260	650	300	570	c+100
RDST 100	100	0335-00000100	137	300	650	320	570	c+100
RDST 125	125	0335-00000125	176	380	720	320	570	c+150
RDST 160	160	0335-00000160	239	510	720	380	620	c+150
RDST 170	170	0335-00000170	265	560	800	360	680	c+150
RDST 200	200	0335-00000200	287	630	800	400	680	c+150
RDST 250	250	0335-00000250	312	680	800	450	760	c+150
RDST 320	320	0335-00000320	345	840	1060	420	900	c+150
RDST 400	400	0335-00000400	381	1090	1060	470	900	c+150
RDST 500	500	0335-00000500	428	1170	1060	520	900	c+150
RDST 630	630	0335-00000630	485	1580	1060	600	900	c+150
RDST 800	800	0335-00000800	708	1800	1060	710	900	c+150





Three-phase grid transformers according to VDE 0570 part 2-1, EN 61558-2-1,

Single-phase isolation transformers according to VDE 0570 part 2-4, EN 61558-2-4

Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Three-phase autotransformers according to VDE 0570 part 2-13, EN 61558-2-13

Fig. DRET 100

General information:

The Michael Riedel Transformatorenbau GmbH with the new RET series connects high quality requirements of the Riedel products with an energy efficient design. The transformers in the DRET series meet national and international requirements for worldwide use.

The particular advantages of the DRET series:

- **Variable voltages** selectable by customer
- Loss-optimised design through innovative RET - core technology
- Reduction of the noise emissions through special core nesting
- Designed for maximum efficiency
- Insulation class B (ta = 40°C / B) also for large outputs

Design:

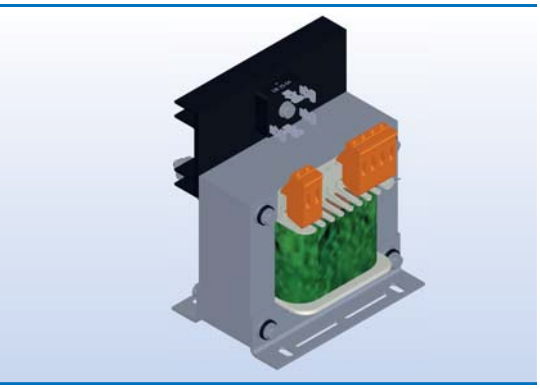
Open frame design, stationary, for device installation and assembly in dry rooms. Connection to leakage current-resistant transformer terminals with screw fastening. The transformer terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3). Starting at 50A with terminal blocks on top brackets, starting at 415A on copper flat connections.

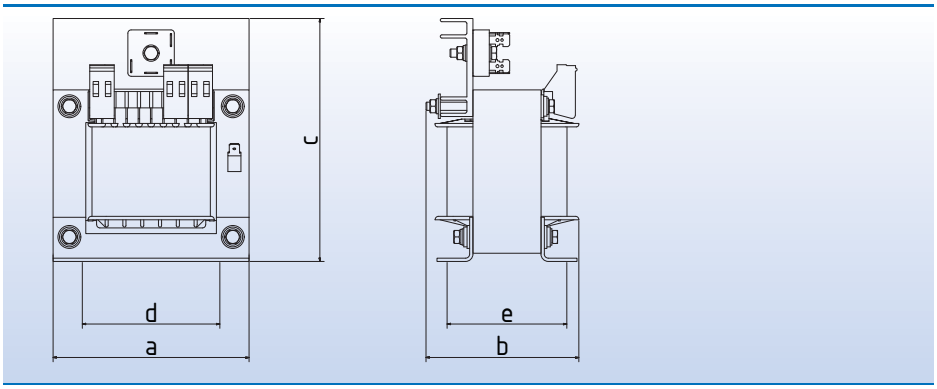
IP00, suitable for installation up to Protection class IP 23 with natural air self-cooling, insulation class B, max. ambient temperature 40°C.

Type	Power KVA	η %	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
DRET 1	1,0	95,50	0340-00000001	3,80	14	204	145	253	184	96	M6
DRET 2	2,0	96,25	0340-00000002	6,80	22	240	149	283	220	101	M8
DRET 3	3,0	96,67	0340-00000003	8,50	30	264	169	301	244	116	M8
DRET 4	4,0	96,88	0340-00000004	12,60	37	300	163	340	275	110	M8
DRET 5	5,0	97,10	0340-00000005	15,70	46	300	177	340	275	124	M8
DRET 6	6,0	97,42	0340-00000006	16,00	52	300	191	340	275	139	M8
DRET 7	7,0	97,64	0340-00000007	19,30	59	300	203	340	275	150	M8
DRET 8	8,0	97,88	0340-00000008	26,10	72	336	199	372	311	143	M8
DRET 9	9,0	97,89	0340-00000009	27,90	72	360	201	395	335	136	M10
DRET 10	10,0	98,05	0340-00000010	32,60	85	360	215	395	335	151	M10
DRET 12	12,0	98,08	0340-00000012	41,70	100	450	205	452	420	140	M10
DRET 16	16,0	98,28	0340-00000016	57,70	129	450	220	459	420	155	M10
DRET 20	20,0	98,40	0340-00000020	60,10	143	450	235	452	420	170	M10
DRET 25	25,0	98,40	0340-00000025	70,40	177	450	265	452	420	200	M10
DRET 30	30,0	98,63	0340-00000030	84,90	206	540	290	507	500	190	M12
DRET 35	35,0	98,71	0340-00000035	96,50	232	540	310	507	500	210	M12
DRET 40	40,0	98,50	0340-00000040	96,80	249	540	320	507	500	220	M12
DRET 45	45,0	98,78	0340-00000045	102,60	276	540	340	514	500	240	M12
DRET 50	50,0	98,50	0340-00000050	125,00	293	540	320	559	500	220	M12
DRET 63	63,0	98,73	0340-00000063	145,00	375	660	330	617	620	225	M12
DRET 70	70,0	98,79	0340-00000070	155,00	417	660	350	617	620	245	M12
DRET 80	80,0	98,81	0340-00000080	168,00	424	660	330	687	620	225	M12
DRET 90	90,0	99,02	0340-00000090	201,50	478	660	340	709	620	235	M12
DRET 100	100,0	98,85	0340-00000100	182,00	474	660	350	709	620	245	M12
DRET 125	125,0	99,00	0340-00000125	240,00	572	660	370	723	620	265	M12
DRET 150	150,0	98,97	0340-00000150	268,90	639	720	350	873	680	235	M14
DRET 175	175,0	98,91	0340-00000175	272,10	692	720	370	894	680	255	M14
DRET 200	200,0	99,03	0340-00000200	274,00	743	720	390	894	680	275	M14
DRET 250	250,0	99,06	0340-00000250	338,10	886	840	400	992	800	270	M14
DRET 300	300,0	99,00	0340-00000300	378,80	996	840	422	994	780	293	M16
DRET 350	350,0	99,07	0340-00000301	386,10	1068	840	462	994	780	333	M16
DRET 400	400,0	99,13	0340-00000400	565,00	1474	1020	452	1104	960	318	M16
DRET 450	450,0	99,17	0340-00000450	580,00	1575	1020	472	1104	960	338	M16
DRET 500	500,0	99,20	0340-00000500	730,00	1771	1020	492	1104	960	352	M16

* The table shows typical key values of transformers with an input and output voltage of 3AC 400 V. However, the given values can deviate depending on the choice of voltage.

DC SUPPLIES
BATTERY CHARGERS





Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Fig. GGT 320

Design:

Open frame, stationary, for device installation and assembly in dry rooms, separate windings. 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). All types are designed for use with bridge rectifiers with ohmic loads.

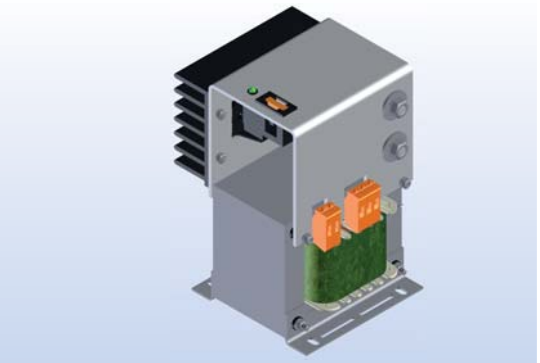
With load-side (downstream) rectifier and varistor

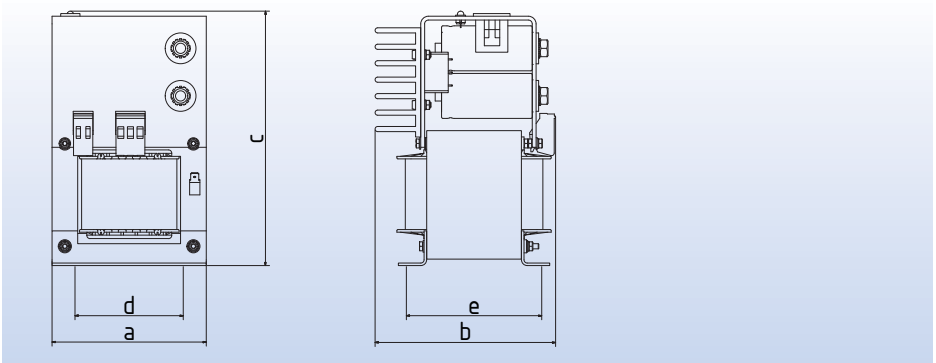
Ripple: 48%; retrofitting with capacitor is not possible.

Pri: AC 220/230/240V or 380/400/420V, sec.: DC 24V

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

Type	Power VA	Watts for DC 24V	Current A	Item no: Pri: AC 400V	Item no: Pri: AC 230V	Copper kg	Total kg	Dimensions approx. in mm					
								a	b	c	d	e	Mounting
GGT 100	100	72	3	0170-00000100	0171-00000100	0,35	2,30	84	76	100	64	61	M4
GGT 130	130	96	4	0170-00000130	0171-00000130	0,53	3,30	100	77	104	84	61	M5
GGT 200	200	144	6	0170-00000200	0171-00000200	0,63	3,70	100	87	150	84	71	M5
GGT 320	320	216	9	0170-00000320	0171-00000320	1,03	5,60	120	93	150	90	70	M5
GGT 400	400	288	12	0170-00000400	0171-00000400	1,10	7,60	120	108	160	90	82	M5
GGT 500	500	360	15	0170-00000500	0171-00000500	1,68	9,00	120	125	160	90	102	M5
GGT 630	630	432	18	0170-00000630	0171-00000630	1,77	11,80	135	138	175	104	97	M5





Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Fig. GGTN 360

Design:

Covered design, stationary, for device installation and assembly in dry rooms, separate windings. 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). All types are designed for use with bridge rectifiers with ohmic loads.

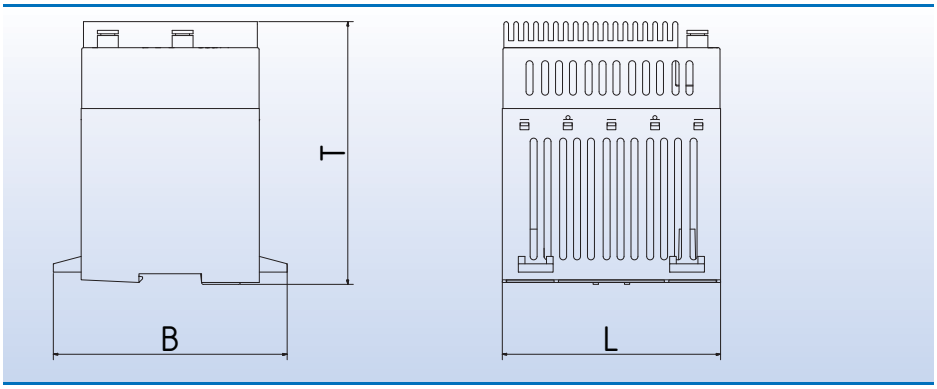
With load-side (downstream) rectifier, capacitor and protection circuit, LED status display, DIN 72581/3C tab connector protection

Ripple < 5%,

Pri: AC 230/400V, sec.: DC 24V

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

Type	Power VA	Watts for DC 24V	Current A	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
							a	b	c	d	e	Mounting
GGTN 72	100	72	3	0172-00000072	0,34	2,20	96	93	135	64	61	M4
GGTN 144	200	144	6	0172-00000144	0,58	3,20	96	93	146	84	70	M5
GGTN 240	333	240	10	0172-00000240	1,00	5,10	120	130	196	90	70	M5
GGTN 360	500	360	15	0172-00000360	1,10	8,20	120	141	196	90	102	M5



Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Unregulated

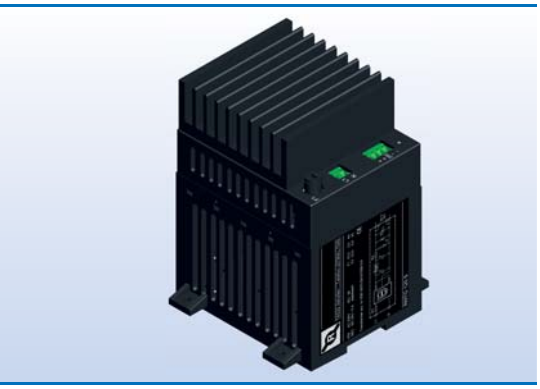
General information:

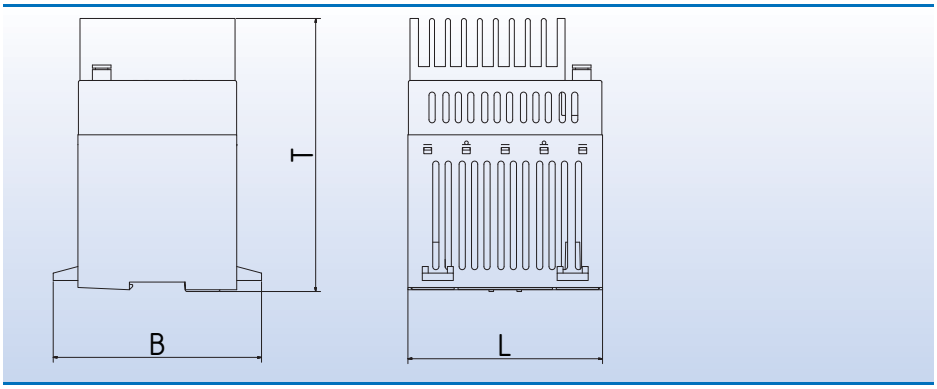
The compact, space-saving power supply units with modern industrial designs in the RNTU series offer extensive protection against contact through the closed construction. The power supply units meet the requirements for protection against dangerous currents flowing through the body according to VDE 0106 part 101 and can be quickly and easily snapped on to a support rail in a modular manner (DC 5A and higher: should be additionally fixed by screws). Devices of the same type can be connected in parallel at max. 90% loading per device. The built-in fuses (see table) serve solely towards short-circuit protection and guarantee safe operation even in worst-case conditions. The devices may only be loaded with the given nominal current.

Brief dips in grid voltage are bypassed through generously sized capacitors.

The RNTU series can be supplied with the specifications given below as well as with various primary voltages to max. 400VAC and secondary voltages from 10VDC to 60VDC at extra charge. The specified currents must not be exceeded.

Technical data for type	RNTU 24S	RNTU 48S	RNTU 72S	RNTU120S	RNTU 180S	RNTU 240S
Grid input voltage	230VAC **or** 400VAC					
Input fuse AC 230V AC 400V	5x20mm 0.4Atr. external	5x20mm 0.8Atr. external	5x20mm 1.25Atr. external	5x20mm 2.0A slow external	6.3x32mm 2.5Atr. 1.6Atr.	6.3x32mm 4.0A slow 2.5Atr.
Frequency	50 / 60Hz					
Output voltage	24VDC **or** 12VDC					
Output fuse	5x20mm 1.25Atr.	5x20mm 2.5Atr.	5x20mm 4.0A slow	5x20mm 6.3Atr.	6.3x32mm 10Atr.	6.3x32mm 12Atr.
Power	24W	48W	72W	120W	180W	240W
Allowable continuous output current	DC 1A	DC 2A	DC 3A	DC 5A	DC 7.5A	DC 10A
Ripple	< 5%					
Ambient temperature range	–10°C / +60°C					
Installation position	any					
Connection type	screw connection, protected against finger contact according to accident prevention regulations (BGV A3)					
Connection data	fine-strand max. 2.5 mm²					
Installation	Support rail mounting (DIN EN 60715), from RNTU 120S with additional screw fastening, can be mounted in rows with separation distance > 8mm					
Protection class	IP 20					
Protection class	Protection class II					
Insulation class	E					
Dimensions approx. in mm Length L Width W Installation depth D	77 62,5 122	77 62,5 122	82 90 128	134 125 153	157 175 185	157 175 185
Item no: AC 230V / DC 12V	0223-0000024S	0223-0000048S	0223-0000072S	0223-0000120S	0223-0000180S	0223-0000240S
Item no: AC 230V / DC 24V	0224-0000024S	0224-0000048S	0224-0000072S	0224-0000120S	0224-0000180S	0224-0000240S
Item no: AC 400V / DC 24V	0226-0000024S	0226-0000048S	0226-0000072S	0226-0000120S	0226-0000180S	0226-0000240S
Copper weight in kg	0,12	0,2	0,36	0,6	0,97	1,18
Total weight in kg	0,95	1,2	2,35	3,9	5,2	6,3





Single-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

regulated

General information:

High-precision, discrete-design series regulator, with fine adjustment.

The compact, space-saving power supply units with modern industrial designs in the RNTG series offer extensive protection against contact through the closed construction. The power supply units meet the requirements for protection against dangerous currents flowing through the body according to VDE 0106 part 101 and can be quickly and easily snapped on to a support rail in a modular manner (DC 5A and higher: should be additionally fixed by screws).

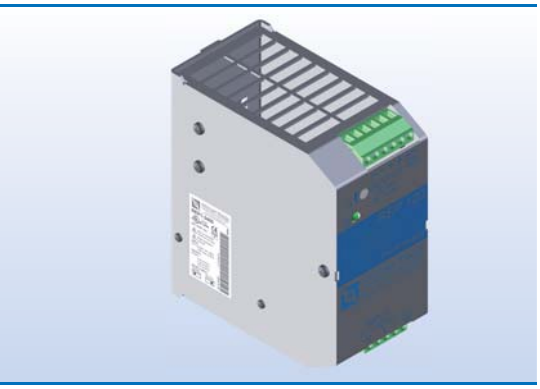
Devices of the same type can be connected in parallel at max. 80% loading per device.

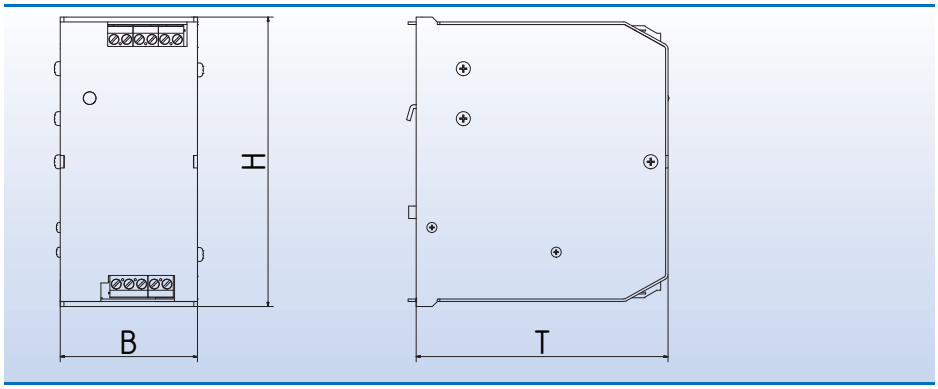
The built-in fuses (see table) serve solely towards short-circuit protection and guarantee safe operation even in worst-case conditions. The devices may only be loaded with the given nominal current.

Brief dips in grid voltage are bypassed for up to 10ms at nominal operating conditions.

The RNTG series can be supplied with the specifications given below as well as with various primary voltages to max. 400VAC and secondary voltages from 5VDC to 30VDC at extra charge. The specified currents must not be exceeded.

Technical data for type	RNTG 12S	RNTG 24S	RNTG 48S	RNTG 72S	RNTG 120S
Grid input voltage	AC 230V				
Input fuse	5x20mm 0.2Atr.	5x20mm 0.4Atr.	5x20mm 0.8Atr.	5x20mm 1.25Atr.	5x20mm 2.0A slow
Frequency	50 / 60Hz				
Output voltage	24VDC, duplicated, adjustment range: +/- 2 V				
Output fuse	5x20mm 0.7A fast-acting	5x20mm 1.25A fast-acting	5x20mm 2.5A fast-acting	5x20mm 3.15A fast-acting	6.3x32mm 5.0A fast-acting
Power	12W	24W	48W	72W	120W
Allowable continuous output current	DC 0.5A	DC 1A	DC 2A	DC 3A	DC 5A
Ripple	< 2mV eff.				
Load regulation	< 0,1%				
Stability under constant conditions	< 0,1%				
Ambient temperature range	–10°C / +40°C				
Decrease in output	from 40°C > 1.5% / degree				
Installation position	any				
Connection type	screw connection, protected against finger contact according to accident prevention regulations (BGV A3)				
Connection data	fine-strand max. 2.5 mm^2				
Installation	Support rail mounting (DIN EN 60715), from RNTG 120S with additional screw fastening, can be mounted in rows with separation distance > 8mm				
Protection class	IP 20				
Protection class	Protection class II				
Insulation class	E				
Dimensions approx. in mm Length L Width W Installation depth D	77 62,5 122	77 62,5 122	82 90 138	82 90 153	134 125 178
Item no:	0225-0000012S	0225-0000024S	0225-0000048S	0225-0000072S	0225-0000120S
Copper weight in kg	0,12	0,36	0,6	0,97	1,18
Total weight in kg	0,9	0,95	1,9	2,6	4,3





Primary side-controlled switched-mode power supplies

Fig. REP1-2405

UL-file No.: E242971

General information:

REP power supplies are high-quality switched-mode power supplies for top-hat rail mounting. They feature a compact, smart design and a robust metal enclosure.

The output voltage can be adjusted quickly and easily (DC 22V to DC 27V) and exhibits high stability even when there are temperature fluctuations and load changes. Apart from short-circuit protection with 3 different output protection modes, overload and overvoltage protection on the output ensure a high degree of safety.

Special features of the REP series:

- Parallel connection of additional REP power supplies of the same design is an easy way of increasing the output power (max. 4 units / 280-500W version)
- Series connection possible to DC 110V
- 1.5 times nominal current for 3min.
- 3 times nominal current for 300ms.

Alternatives:

Series REP is available also in DC 12V

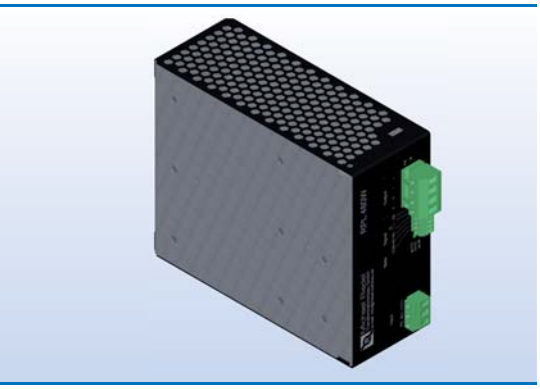
REP1-1206 (output DC 12V/6A)	Art.-No.: 0540-00001206
REP1-1214 (output DC 12V/14A)	Art.-No.: 0540-00001214

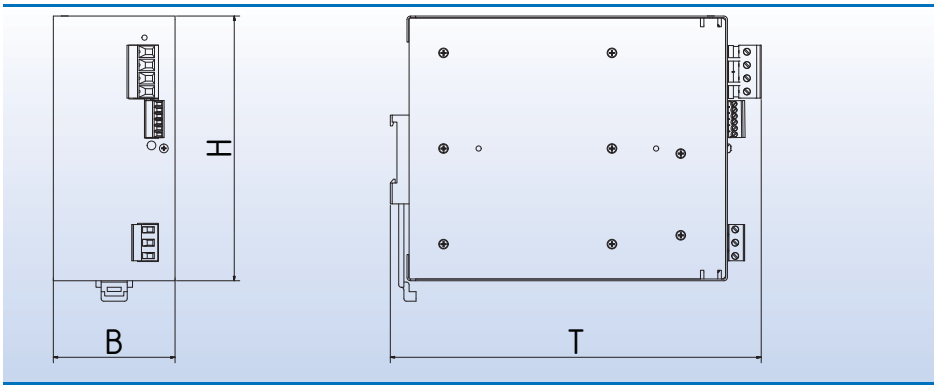
or in DC 48V

REP1-483.75 (output DC 48V/3.75A)	Art.-No.: 0540-00483.75
REP1-4807 (output DC 48V/7A)	Art.-No.: 0540-00004807
REP1-4812.5 (output DC 48V/12.5A)	Art.-No.: 0540-00004812.5

No UL-approbation available for versions DC 12V and DC 48V
For further information please see www.riedel-trafobau.de

Type	REP1-2403	REP1-2405	REP1-247.5	REP1-2414	REP1-2425	REP2-2405	REP2-247.5	REP2-2414	REP3-2425
Power	40–70W	95–120W	120–180W	240–336W	480–600W	95–120W	120–180W	240–330W	480–600W
INPUT	1-phase					2-phase			3-phase
Nominal voltage	AC 115–230V	AC 115/230V input selectable				AC 230/400/500V input selectable			3AC 400–500V
Voltage range	AC 90–264V	AC 90 – 135V AC 180 – 264V				AC 187 – 264V AC 330 – 550V			3AC 330–550V
Internal fuse	4A	4A	4A	6.3A	10A	4A	4A	4A	6.3A
Recommended external fuse	6A	10A	10A	16A	16A	10A	10A	16A	16A
Nominal voltage	DC 24V								
Adjustment range (Vadj)	DC 22 – 27V								
Continuous current at 24V < 40°C (In)	2.0A (115) – 3.0A (230)	5.0A	7.5A	14A	25A	5.0A	7.5A	14A	25A
Continuous current at 24V < 50°C (In)	1.5A (115) – 2.5A (230)	4.5A	6.0A	12A	22A	4.5A	6.0A	12A	22A
Continuous current at 24V < 60°C (In)	–	4.0A	5.0A	10A	20A	4.0A	5.0A	10A	20A
Power boost current (at 24VDC 60°C ≥ 3min.)	3.5A	5.0A	7.5A	14A	25A	5.0A	7.5A	14A	25A
Grid failure bypass time (min. VAC) 24VDC	typically 20msec								
Ripple	≤ 80mVpp								
Efficiency (50% of In)	≥ 88%	≥ 91%	≥ 91%	≥ 91%	≥ 92%	≥ 91%	≥ 91%	≥ 91%	≥ 92%
Power loss at max. load (W)	6	11	17	28	54	11	17	28	54
Ambient temp. during operation	-25 – +70°C								
Reduction in power at Ta > / (In)	> 50° 2.5% °C	> 60° 2.5% °C							
Protection class (EN/IEC 60529)	IP 20								
Connection data, fine-strand	2.5mm				4mm	2.5mm			4mm
Protection class (PE connected)	I								
Dimensions approx. in mm (WxHxD)	50x120x50	55x110x105		72x115x135	85x120x140	55x110x105		72x115x135	85x120x140
Item number:	0540-00016024	0540-00019024	0540-00117024	0540-00128024	0540-00150024	0541-00029024	0541-00217024	0541-00228024	0542-00350024
Total weight in kg	approx. 0.30	approx. 0.50	approx. 0.60	approx. 0.72	approx. 1.10	approx. 0.50	approx. 0.60	approx. 0.72	approx. 1.00





Primary side-controlled switched-mode power supplies

Fig. RPL 2420W

General information:

RPL Riedel **P**ri **L**ine

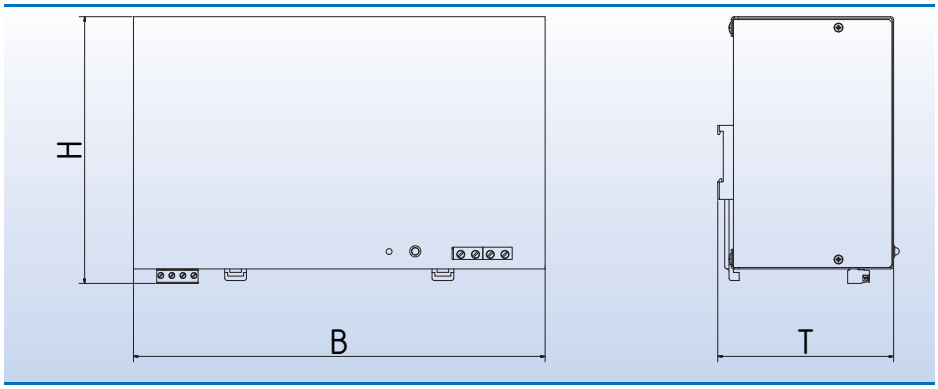
Primary side-controlled power supplies do not require grid transformers and are compact and light.

Special features of the RPL series:

- Universal input (AC or DC for 1-phase or 3AC or DC for 3-phase units) with wide input voltage range
- Wide output voltage range with adjustment via potentiometer on front side
- RPL series power supply units can be used as chargers (type …WL)
- Temperature-controlled battery charging can be accomplished through simple repositioning of the jumper for 250W alternating current, 480W alternating current or 480W 3-phase alternating current or implementation of the –T option for other chargers combined with attachment of a temperature sensor (NTC resistance: 10kΩ) to the battery. This leads to optimised battery charging if there are large fluctuations in ambient temperature and a higher battery life expectancy, among other things
- Can be connected in series and in parallel
- 25% peak power boost for 4s
- Overload, short-circuit, overvoltage and overtemperature protection
- Three-colour status LED, for devices with 125W and higher:
  green – voltage stabilisation,
  red - current limitation,
  yellow – device connected to grid, output voltage switched off
- Potential-free fault signal contact (changeover)

Overview of basic equipment in RPL series

Output power		Power supplies with nominal output voltage			Chargers with nominal output voltage		
		DC 12V	DC 24V	DC 48V	13.7VDC	27.4VDC	54.8VDC
Single-phase units for connection to grids with voltages of 100-240VAC							
30W	Type Item no:	RPL 122.5W 0500-0000122.5W	RPL 241.25W 0500-0000241.25W	RPL 480.65W 0500-000480.65W	RPL 122.5WL 0520-000122.5WL	RPL 241.25WL 0520-00241.25WL	RPL 480.65WL 0520-00480.65WL
60W	Type Item no:	RPL 1205W 0500-000001205W	RPL 242.5W 0500-0000242.5W	RPL 481.25W 0500-000481.25W	RPL 1205WL 0520-00001205WL	RPL 242.5WL 0520-000242.5WL	RPL 481.25WL 0520-00481.25WL
125W	Type Item no:	RPL 1210W 0500-000001210W	RPL 2405W 0500-000002405W		RPL 1210WL 0520-00001210WL	RPL 2405WL 0520-00002405WL	
250W	Type Item no:	RPL 1220W 0500-000001220W	RPL 2410W 0500-000002410W	RPL 4805W 0500-000004805W	RPL 1220WL 0520-00001220WL	RPL 2410WL 0520-00002410WL	RPL 4805WL 0520-00004805WL
480W	Type Item no:		RPL 2420W 0500-000002420W	RPL 4810W 0500-000004810W		RPL 2420WL 0520-00002420WL	RPL 4810WL 0520-00004810WL
960W	Type Item no:		RPL 2440W 0500-000002440W			RPL 2440WL 0520-00002440WL	
Single-phase units for connection to grids with voltages of 220-400VAC							
30W	Type Item no:	RPL 122.5W1 0500-000122.5W1	RPL 241.25W1 0500-00241.25W1		RPL 122.5W1L 0520-00122.5W1L	RPL 241.25W1L 0520-0241.25W1L	
3-phase AC units for connection to grids with nominal voltages of 3AC 380-480V							
250W	Type Item no:		RPL 2410WD 0505-00002410WD			RPL 2410WDL 0525-0002410WDL	
480W	Type Item no:		RPL 2420WD 0505-00002420WD			RPL 2420WDL 0525-0002420WDL	
960W	Type Item no:		RPL 2440D 0505-000002440D			RPL 2440DL 0525-00002440DL	



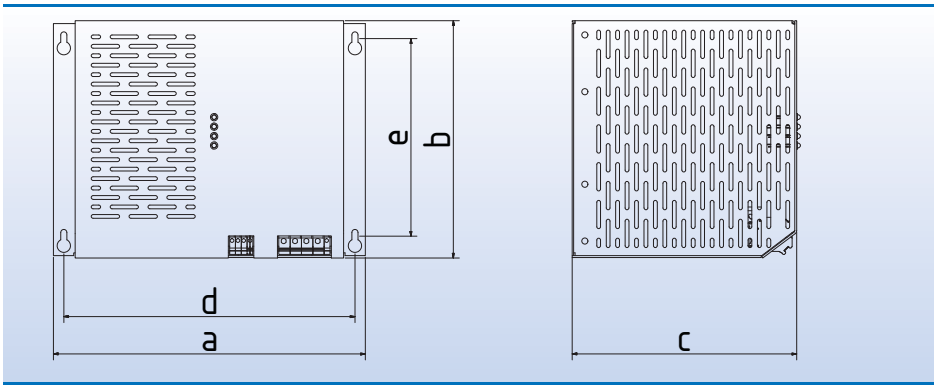
Primary side-controlled switched-mode power supplies

Fig. RPL 2440D

Options:

-S: Decoupling diode (series diode) on output for easy construction of redundant and UPS systems;
-U: 0-10VDC analogue input for adjustment of output voltage from 0 to Vout max;
-D: Overload shutdown, saving shutdown in case of overload;
-P: Symmetric power distribution in parallel operation;
-T: Temperature-controlled charging;
-F: Remote switch-on / switch-off;
-A: Fault signal contact (alarm);
-M: Minus temperature range.
only relevant for RPL 2440D because other units are designed for minus temperature ranges as a standard feature;
-C: Grid upper wave limit according to EN 61000-3-2 class C (lighting equipment).

Type		Input	Output		Special features	Options (see above)	Dimensions (WxHxD)/Weight
			Nominal voltage / current	Adjustment range			
RPL 1-phase units							
30W	RPL 122.5W RPL 241.25W RPL 480.65W	AC 85-264V DC 100-375V	DC 12V/2,5A DC 24V/1.25A DC 48V/0.65A	DC 10-15V DC 21-29V DC 45-58V	plastic enclosure, 1-colour status LED	S S S	40x80x85mm 0.15kg
30W1	RPL 122.5W1 RPL 241.25W1	AC 196-460V DC 230-650V	DC 12V/2,5A DC 24V/1.25A	DC 10-15V DC 21-29V	plastic enclosure, 1-colour status LED	S S	40x80x85mm 0.16kg
60W	RPL 1205W RPL 242.5W RPL 481.25W	AC 90-264V DC 100-375V	DC 12V/5A DC 24V/2.5A DC 48V/1.25A	DC 11-15V DC 21-29V DC 45-58V	Fault signal contact, 1-colour status LED	S, T, F S, T1, F S, T1, F	50x106x87mm 0.42kg
125W	RPL 1210W RPL 2405W	AC 90-264V DC 100-375V	DC 12V/10A DC 24V/5A	DC 9-15V DC 21-29V	power boost: 20%, 4s bonus time, remote on/off, fault signal contact, 3-colour status LED	S1, U1, D1, T1 S, U, D, T	63x137x114mm 0.63kg
250W	RPL 1220W RPL 2410W RPL 4805W	AC 85-264V DC 88-375V	DC 12V/20A DC 24V/10A DC 48V/5A	DC 9-15V DC 21-29V DC 45-58V	active PFC, power boost: 20%, 4s bonus time, remote on/off, fault signal contact, temperature-controlled charging possible, 3-colour status LED	S, U, D, P, C S, U, D, P, C S, U, D, P, C	67x153x141mm 1.17kg
480W	RPL 2420W RPL 4810W	AC 85-264V DC 88-375V	DC 24V/20A DC 48V/10A	DC 21-29V DC 45-58V	active PFC, power boost: 20%, 4s bonus time, remote on/off, fault signal contact, temperature-controlled charging possible, 3-colour status LED	S, U, D, P S, U, D, P	70x152x185mm 1.6kg
960W	RPL 2440W	AC 90-264V DC 120-375V	DC 24V/40A	DC 21-29V	active PFC, fault signal contact, remote on/off, 3-colour status LED		285x174x110mm 3.3kg
RPL 3-phase units							
250W	RPL 2410WD	3AC 340-575V DC 450-820V	DC 24V/10A	DC 21-29V	passive PFC, power boost: 20%, 4s bonus time, remote on/off, fault signal contact, 3-colour status LED	S, D, P, T	67x157x141mm 1.1kg
480W	RPL 2420WD	3AC 340-575V DC 450-820V	DC 24V/20A	DC 21-29V	passive PFC, power boost: 20%, 4s bonus time, remote on/off, fault signal contact, temperature-controlled charging possible, 3-colour status LED	S, U, D, P	70x152x185mm 1.5kg
960W	RPL 2440D	3AC 340-460V DC 450-650V	DC 24V/40A	DC 23-28V	passive PFC, 3-colour status LED	A, T, M	285x174x110mm 3.35kg



Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

regulated

General information:

The switched-mode power supplies in the RSNT 20–60 G series are equipped with a three-phase isolation transformer and a load-side (downstream) switching controller. The interference level is significantly below the allowable interference limits specified in VDE 0875 part 11, EN 55011 limit curve B.

The patent-protected switching concept developed in-house achieves an extremely low interference level. No filters or shields are necessary.

The switched-mode power supplies have overload and short-circuit protection and can be connected in parallel without limitations. Through internal electronic fusing the devices are always operated in the safe operating area (SOA protection).

Via two light diodes the current operating status is displayed: green indicates constant voltage mode and yellow indicates constant current mode.

Design

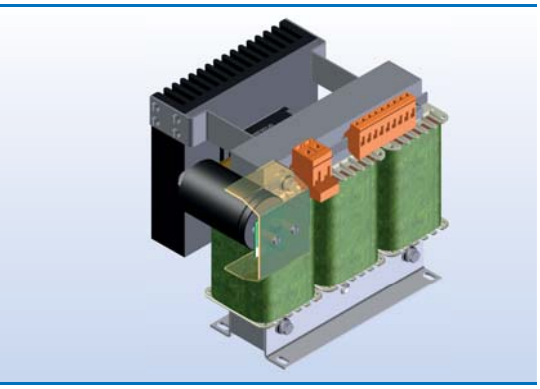
Stable sheet metal steel enclosure with integrated mounting holes for device installation and assembly in dry rooms,

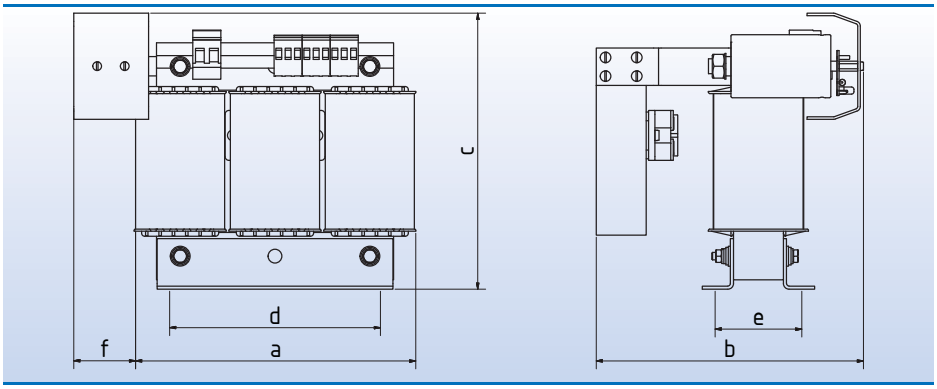
Pri., sec. connection and PE via terminal blocks with screw connection. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

Secondary voltage: max. 0-60VDC.

Devices can be freely combined as masters and slaves (Vmax = 200VDC)

Technical data for type	RSNT 20G	RSNT 30G	RSNT 40G	RSNT 50G	RSNT 60G
Grid input voltage	3AC 400V				
Grid input voltage range	+15% to –15%				
Frequency	50Hz / 60Hz				
Input current	1.3A	2.0A	2.6A	3.2A	3.7A
Output voltage	24VDC, stablised, duplicated, externally adjustable in range 0-30VDC, real low drop				
Adjustable output current adjustable	0...20A	0...30A	0...40A	0...50A	0...60A
Ripple	< 30m Veff.				
Short-circuit protection	Constant current mode				
Dynamic load control	< 100mVss / 500us.				
Stability under constant conditions	< 0,05%				
Line regulation	< 0,05%				
Overtemperature protection	thermal switch-off if device temperature > 85°C				
Ambient temperature	-10... +40°C				
Installation position	vertical installation				
Cooling	convection			forced cooling	
Connection type	screw connection, protected against finger contact according to accident prevention regulations (BGV A3)				
Connection data	fine-strand max. 4/10mm²			fine-strand max. 4/16mm²	
Installation	enclosure base keyhole mounting brackets				
Protection class	IP 20				
Protection class	I				
Dimensions approx. in mm (a x b x c)	250 x 202 x 200		300 x 220 x 222	330 x 250 x 237	
Mounting hole pattern dimensions in approx. mm (d x e)	228 x 161		278 x 179	308 x 209	
Item number:	0229-00000020	0229-00000030	0229-00000040	0229-00000050	0229-00000060
Copper insert weight in kg	3,4	3,8	5,8	8,5	8,5
Total weight in kg	13,0	21,0	22,5	25,0	26,5
Options Remote control 0-10V	for V/ I				
Remote control 4mA-20mA	for V/ I				
Switch-off input	yes, for shutdown connect terminal to 0V				
Potential-free group fault signal contact	for errors (overtemperature, undervoltage and overload)				





Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Fig. RDRK 40K

General information:

Standard design:

3-phase AC isolation transformer with load-side (downstream) 3-phase AC bridge rectifier,
Input 3AC 380/400/420V

Output: 24VDC, ripple < 5%

Capacitor version (K):

3-phase AC isolation transformer with load-side (downstream) 3-phase AC bridge rectifier and capacitor input 3AC 380/400/420V

Output: 24VDC, ripple < 2%

The RDRK series has been developed especially for use of programmable logic controllers (PLCs). The transformers are very well-sized and exhibit voltage stability. This produces an especially flat characteristic curve between no load and load so that no overvoltages or undervoltages critical for PLC occur even if grid voltage fluctuations occur.

The rectifiers are protected from temporary current surges and voltage spikes.

The protective circuit of the capacitor version is achieved via a protective circuit board which contains the corresponding varistor, film capacitor and discharge resistor.

Design:

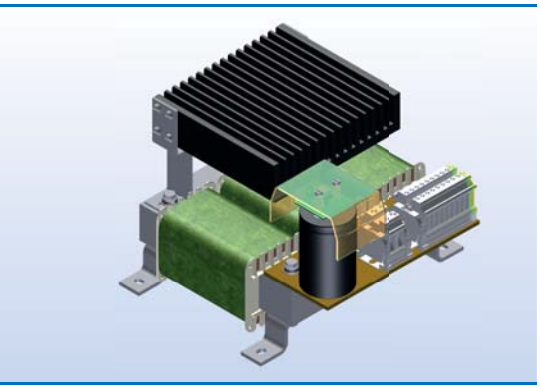
Open frame, upright design, stationary, for device installation and assembly in dry rooms, separate windings, all connections via leakage current-resistant screw terminal blocks. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

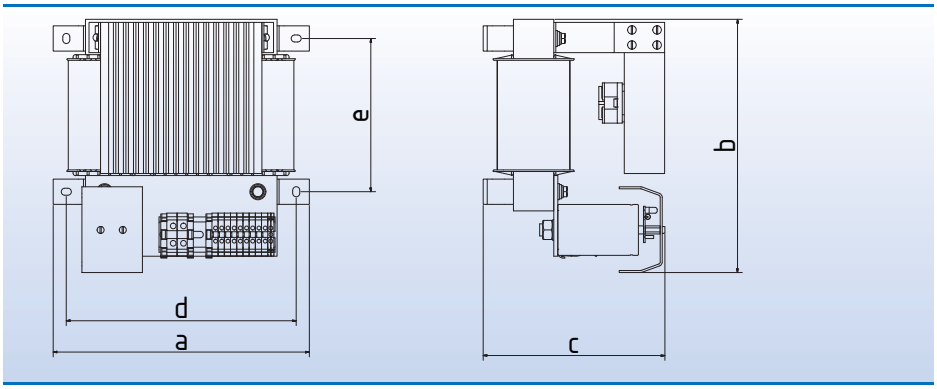
IP 00, insulation class E, max. ambient temperature 40°C (ta40°C/E)

For design with capacitor the dimensions are slightly different. The mounting dimensions remain unchanged.

Other designs upon request (fuses, voltages, connections, etc.)

Type	Current ADC	Item no. without capacitor	Item no. with capacitor	Copper kg	Total kg	Dimensions approx. in mm						
						a	b	c	d	e	f	Mounting
RDRK 2,5 (K)	2,5	0177-000002,5	0177-00002,5K	0,7	2,5	130	75	160	84	46	45	M5
RDRK 5 (K)	5	0177-00000005	0177-0000005K	0,8	3,0	130	85	165	84	56	45	M5
RDRK 7.5 (K)	7,5	0177-000007,5	0177-00007,5K	1,2	4,4	155	70	195	90	55	55	M5
RDRK 10 (K)	10	0177-00000010	0177-0000010K	1,4	6,0	155	85	195	90	70	55	M5
RDRK 16 (K)	16	0177-00000016	0177-0000016K	2,3	7,0	190	170	165	128	72	60	M6
RDRK 20 (K)	20	0177-00000020	0177-0000020K	2,5	8,4	190	180	165	128	82	60	M6
RDRK 25 (K)	25	0177-00000025	0177-0000025K	3,0	11,3	190	190	165	128	92	70	M6
RDRK 30 (K)	30	0177-00000030	0177-0000030K	4,0	11,4	190	190	165	128	92	70	M6
RDRK 40 (K)	40	0177-00000040	0177-0000040K	5,8	16,6	230	190	210	176	71	70	M6
RDRK 60 (K)	60	0177-00000060	0177-0000060K	7,2	26,3	290	200	240	190	120	85	M10





Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Fig. RDRKL 40K

General information:

Standard design:

3-phase AC isolation transformer with load-side (downstream) 3-phase AC bridge rectifier,
Input 3AC 380/400/420V
Output: 24VDC, ripple < 5%

Capacitor version (K):

3-phase AC isolation transformer with load-side (downstream) 3-phase AC bridge rectifier and capacitor
Input 3AC 380/400/420V
Output: 24VDC, ripple < 2%

Like the RDRK series, the RDRKL series has been developed especially for use of programmable logic controllers (PLCs). The transformers are very well-sized and exhibit voltage stability. This produces an especially flat characteristic curve between no load and load so that no overvoltages or undervoltages critical for PLC occur even if grid voltage fluctuations occur.

The rectifiers are protected from temporary current surges and voltage spikes.

The protective circuit of the capacitor version is achieved via a protective circuit board which contains the corresponding varistor, film capacitor and discharge resistor.

Design:

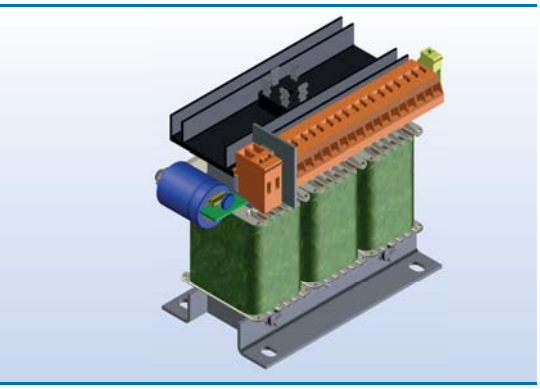
Open frame, horizontal design, stationary, for device installation and assembly in dry rooms, separate windings, all connections via leakage current-resistant screw terminal blocks. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

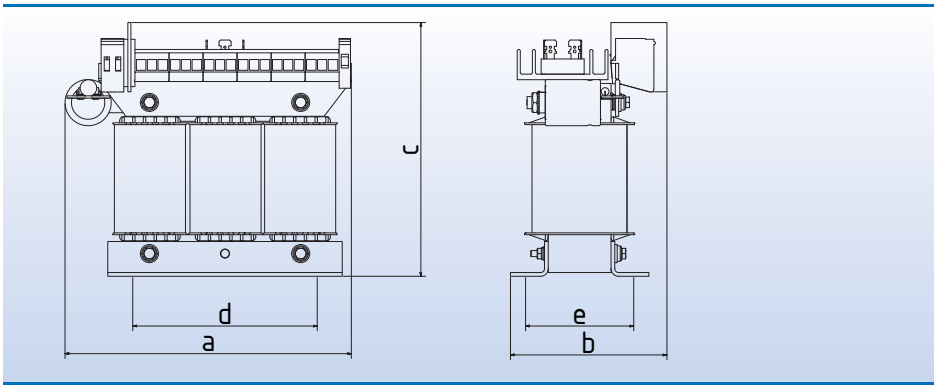
IP 00, insulation class E, max. ambient temperature 40°C (ta40°C/E)

For design with capacitor the dimensions are slightly different. The mounting dimensions remain unchanged.

Other designs upon request (fuses, voltages, connections, etc.)

Type	Current ADC	Item no. without capacitor:	Item no. with capacitor:	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
RDRKL 10 (K)	10	0178-00000010	0178-0000010K	1,4	6,0	156	165	160	140	100	M5
RDRKL 16 (K)	16	0178-00000016	0178-0000016K	2,5	8,6	206	200	190	184	120	M6
RDRKL 20 (K)	20	0178-00000020	0178-0000020K	2,8	10,4	206	200	200	184	120	M6
RDRKL 25 (K)	25	0178-00000025	0178-0000025K	3,0	10,8	206	200	200	184	120	M6
RDRKL 30 (K)	30	0178-00000030	0178-0000030K	4,0	11,0	206	220	200	184	120	M6
RDRKL 40 (K)	40	0178-00000040	0178-0000040K	5,8	17,0	254	240	230	228	152	M6
RDRKL 60 (K)	60	0178-00000060	0178-0000060K	7,2	26,1	290	260	230	258	160	M8
RDRKL 90 (K)	90	0178-00000090	0178-0000090K	10,5	38,0	300	300	240	258	176	M8
RDRKL 120 (K)	120	0178-00000120	0178-0000120K	13,5	43,0	380	325	240	298	200	M8





Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Fig. RDRKU 5

General information:

3-phase AC isolation transformer with load-side (downstream) 3-phase AC bridge rectifier and capacitor

Interchangeable inputs: 3AC 210/220/230/240/255/265/275/290/300/360/380/400/420/440/460/480/500/520V

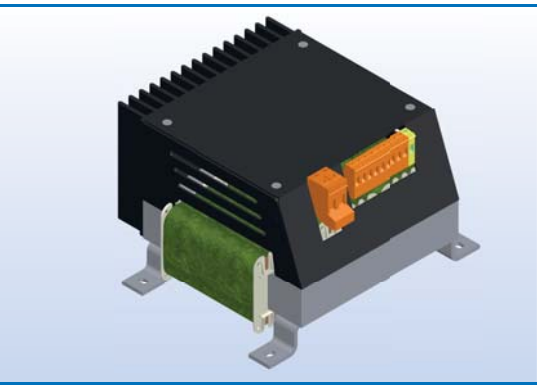
Output: 24VDC, ripple < 2%

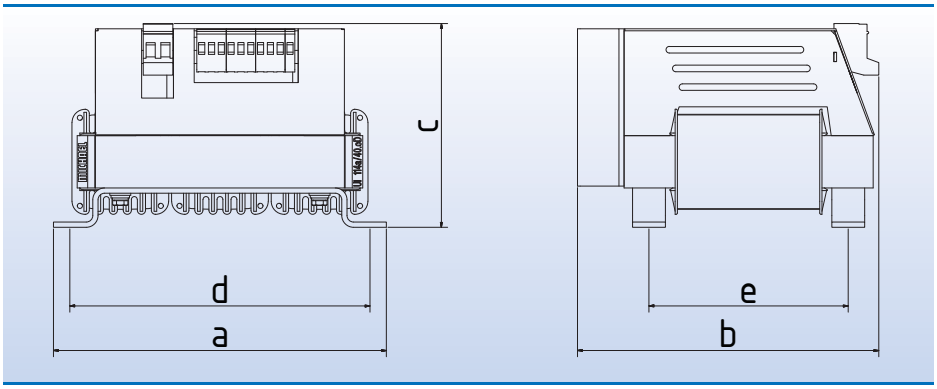
Design:

Open frame, stationary, for device installation and assembly in dry rooms, separate windings. Connection 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. The terminals are protected against back of hand and finger contact according to accident prevention regulations (BGV A3).

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

Type	Current ADC	Size	Item no:	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
RDRKU 5	5	3UI 75/26	0062-00000005	1,5	4,9	200	90	195	130	57	M6
RDRKU 10	10	3UI 75/41	0062-00000010	2,0	7,0	200	115	195	130	72	M6
RDRKU 15	15	3UI 90/41	0062-00000015	3,0	8,0	230	175	195	170	68	M6
RDRKU 20	20	3UI 90/51	0062-00000020	3,5	11,5	230	195	195	170	78	M6
RDRKU 25	25	3UI 90/51	0062-00000025	4,0	12,0	230	195	195	170	78	M6





Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Fig. RDRKN 40

General information:

Standard design:

3-phase AC isolation transformer with load-side (downstream) 3-phase AC bridge rectifier,
Input 3AC 380/400/420V

Output: 24VDC, ripple < 5%

Capacitor version (K):

3-phase AC isolation transformer with load-side (downstream) 3-phase AC bridge rectifier and capacitor
Input 3AC 380/400/420V

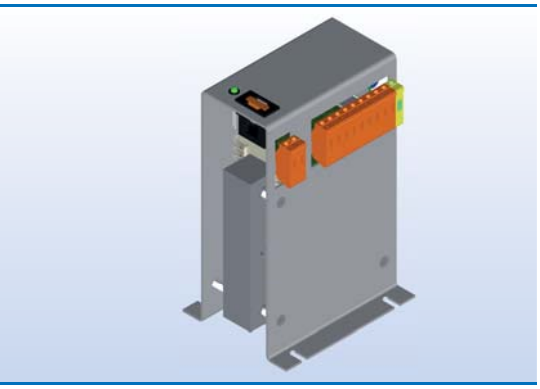
Output: 24VDC, ripple < 2%

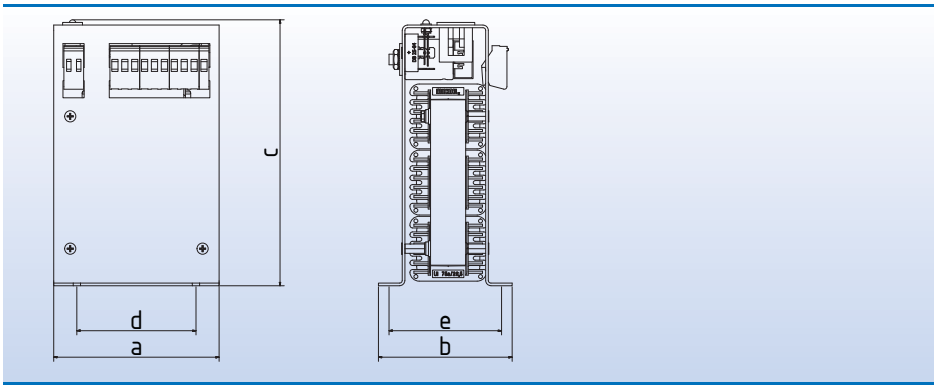
Design:

Closed frame, stationary, for device installation and assembly in dry rooms, separate windings. 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).

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

Type	Current ADC	Item no. without capacitor:	Item no. with capacitor:	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
RDRKN 10 (K)	10	0227-00000010	0228-0000010K	1,6	4,9	156	165	110	140	100	M5
RDRKN 16 (K)	16	0227-00000016	0228-0000016K	1,9	6,5	156	165	125	140	100	M5
RDRKN 20 (K)	20	0227-00000020	0228-0000020K	2,4	9,8	206	190	140	184	120	M6
RDRKN 25 (K)	25	0227-00000025	0228-0000025K	3,2	10,7	206	200	160	184	120	M6
RDRKN 30 (K)	30	0227-00000030	0228-0000030K	3,9	11,5	206	200	160	184	120	M6
RDRKN 40 (K)	40	0227-00000040	0228-0000040K	5,8	16,3	254	235	155	228	152	M6
RDRKN 60 (K)	60	0227-00000060	0228-0000060K	7,2	23,8	254	235	180	228	152	M6





Three-phase safety transformers according to VDE 0570 part 2-6, EN 61558-2-6

Fig. RDRKS 7,5

General information:

The RDRKS series with modern industrial design was developed in consideration of the following aspects:

- Optimal layout for minimal footprint
- Easy installation via open slot
- Compact, low-weight design
- High reliability and long life
- Favourable price-to-performance ratio
- Low overall losses

Input: 3AC 380/400/420V

Output: 24VDC, with load-side (downstream) 3-phase AC bridge rectifier, varistor, resistor, LED, universal car tab connect fuse, ripple < 5%

or

24VDC, with load-side (downstream) 3-phase AC bridge rectifier, varistor, resistor, LED, universal car tab connect fuse, electrolyte capacitor, ripple < 2% (capacitor version).

Design:

Covered design, stationary, for device installation and assembly in dry rooms, separate windings, mounting via open slot integrated into cover. 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).

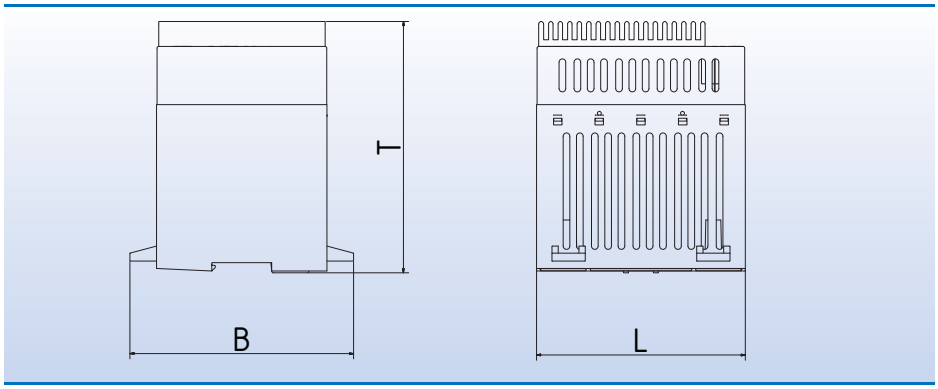
IP 00, insulation class E, max. ambient temperature 40°C (ta40°C/E).

Other voltages available upon request.

Type	Current ADC	Item no. without capacitor	Item no. with capacitor	Copper kg	Total kg	Dimensions approx. in mm					
						a	b	c	d	e	Mounting
RDRKS 7,5 (K)	7,5	0256-000007,5	0257-00007,5K	1,2	3,8	125	105	200	90	90	M5
RDRKS 10 (K)	10	0256-00000010	0257-0000010K	1,6	4,4	125	105	200	90	90	M5
RDRKS 15 (K)	15	0256-00000015	0257-0000015K	1,8	6,3	125	130	200	90	115	M5
RDRKS 20 (K)	20	0256-00000020	0257-0000020K	2,4	9,0	190	130	200	150	115	M6
RDRKS 25 (K)	25	0256-00000025	0257-0000025K	3,2	10,8	190	165	200	150	135	M6
RDRKS 30 (K)	30	0256-00000030	0257-0000030K	3,9	11,5	190	165	200	150	135	M6

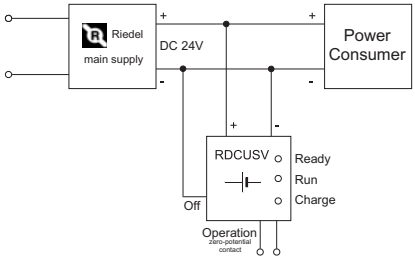
Storage types | (K) - Capacitor version | Subject to technical changes

UNINTERRUPTIBLE POWER SUPPLIES



DC UPS modules

Fig. RDCUSV 10D



General information:

We have to live with problems in today's electricity networks. They can last as long as 10% of total operating time. Voltage fluctuations and dips occur; in rarer cases even total failures occur, e.g. due to lightning strikes or errors in maintenance work. The corresponding UPS system provides protection from such problems.

In accordance with EN 61131-2 / part 2 (limits for nominal DC voltage at 24VDC) the operating voltage for electronic controls is currently 24VDC (20.4VDC - 28.8VDC eff.). Power supplies must be designed accordingly.

In combination with our DC voltage power supplies we offer DC UPS modules for this. They can be easily connected in parallel on the secondary side and ensure safe protection of your controls and easy handling.

The patented technology of our DC UPS modules eliminates the necessity for switching controllers such as boost converters. EMC problems hence do not arise.

All Riedel DC-USV modules have a compact construction with rechargeable battery inside the enclosure and are easy to install.

The DC UPS modules can be snapped on to DIN EN 60715 support rails. The module is available in versions 24VDC 3A 30sec, 24VDC 10A 30sec, 24VDC 20A 30sec and 24VDC 40A 30sec. Additional versions are available upon request.

They are connected in parallel to the DC voltage output of a 24VDC power supply unit (see block circuit diagram) and the terminal 'OFF' connected to the minus terminal for use.

The 'OFF' connection must be opened during switch-off of the system via the NO auxiliary contact of the main switch for deactivating the UPS module!

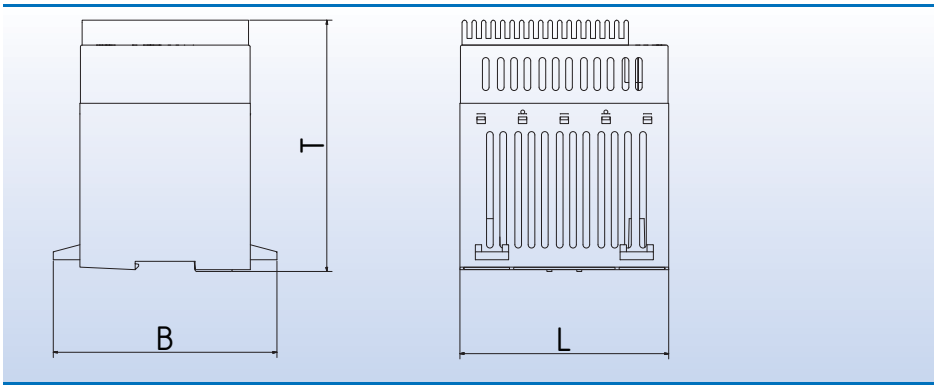
Option

Switch-off of back-up time limit, enabling longer UPS times

Back-up times

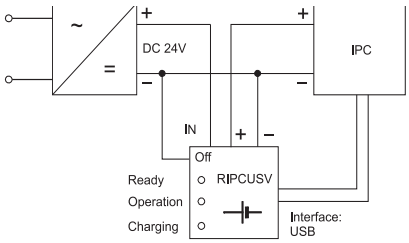
	RDCUSV 10D / 16D	RDCUSV 20D	RDCUSV 40D
6min	8.0A	16.0A	25.0A
10min	5.9A	11.0A	16.0A
30min	2.3A	5.0A	7.5A
60min	1.8A	3.0A	4.2A
120min	0.75A	2.0A	2.2A
240min	0.4A	1.0A	1.3A

Type		RDCUSV 10D	RDCUSV 16D	RDCUSV 20D	RDCUSV 40D
Maximum current consumption		DC 10A	DC 16A	DC 20A	DC 40A
Back-up time at max. current		factory-set to 30s (other back-up times adjustable via DIP switch)			
Maximum current consumption after deep discharge		1 A		2 A	3 A
Back-up ready for 1 cycle after deep discharge		after 5 min.			
Loading method		IV characteristic curve			
Operating voltage threshold		22VDC **or** 20.6VDC			
Deep discharge protection		Switch-off threshold: 17VDC			
Battery type		lead acid			
Signal output		potential-free loading up to 24VDC / 500mA			
Ambient temperature		0 - 40°C			
Installation position		any installation position			
Connection type		print terminals			
Connection data		fine-strand max. 2.5mm²			fine-strand max. 4mm²
Installation		support rail mounting (DIN EN 60715), can be mounted in rows with separation distance > 8mm			
Protection class		IP 20			
Protection class		SELV			
Weight in kg		approx. 3.5		approx. 4.4	approx. 6.5
Item number:	22.0 V	0250-0000010D	0250-0000016D	0250-0000020D	0250-0000040D
	20.6 V	0251-0000010D	0251-0000016D	0251-0000020D	0251-0000040D
Dimensions in mm (L / W / D)		125 / 134 / 153		175 / 155 / 192	200 / 180 / 185



DC UPS modules

Fig. RIPCUSV 10D with USB interface



General information:

To supplement the RDCUSV series we offer the RIPCUSV 10D. These RIPCUSV modules are equipped with a USB interface. It can be combined with a 24VDC-supplied industrial PC (IPC) with a Microsoft Windows NT/2000/XP/Vista/W7 operating system to construct a computer-controlled uninterruptible power supply. The UPS communicates with the IPC via the interface. After the UPS time has elapsed the IPC receives a signal on the basis of which it shuts down the system. As soon as the computer has been shut down this is reported to the UPS which then switches off the supply voltage for the computer. Comprehensive software is included with the unit.

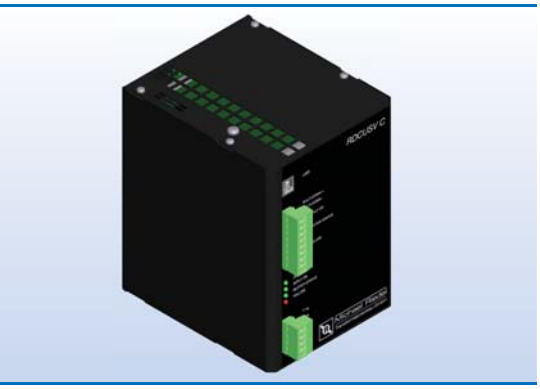
The patented technology of our DC UPS modules eliminates the necessity for switching controllers such as boost converters. EMC problems hence do not arise.

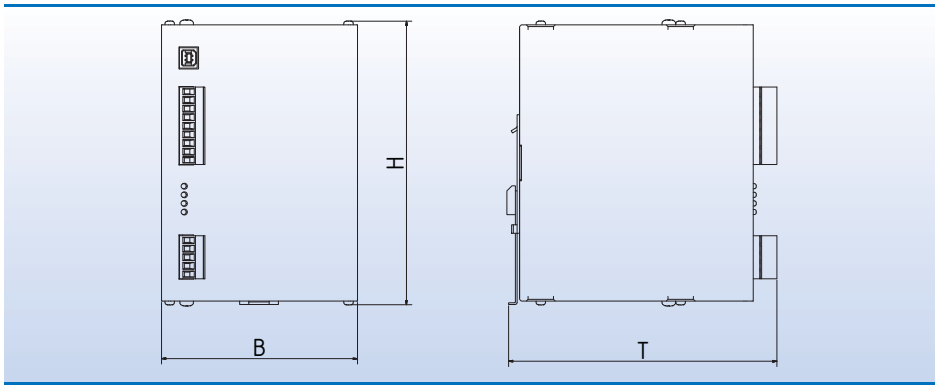
All Riedel IPC UPS modules have a compact construction with rechargeable battery inside the enclosure and are easy to install. The IPC UPS modules can be snapped on to support rails. They are connected to the DC voltage output of a 24VDC power supply unit (see block circuit diagram) and the terminal 'OFF' connected to the minus terminal for use.

The electronics of the module monitors the output voltage and connects the rechargeable battery when the value goes below the preset threshold. The internal rechargeable battery is used as a supply source for the consumer over a defined period of time with a maximum current of 10A which is limited internally. The output voltage is adjusted to the threshold value. For visual indication there are LEDs signalling readiness (green), UPS operation (yellow) and rechargeable battery undervoltage (red).

Function:
- Output voltage stabilised in case of grid failure (20.6VDC)
- Adjustable boot time bridging (2-5min.)
- Adjustable UPS time (1s to 60min), afterwards signal to IPC via **USB interface** or RS232
- Switch-off of UPS by signal from computer; automatic switch-off after an adjustable waiting time (30s to 10min)
- Short circuit-proof
- Automatic switch-off in following cases:
  - Rechargeable battery undervoltage (17VDC)
- Automatic charging
  - IV characteristic curve
- Daily test of rechargeable batteries (automatic) and notification in case of defects.
- Software offers possibility of automatic script execution
- Extensive software log function

Type	RIPCUSV 10D
Input voltage	DC 22V ... DC 31.0V
Maximum current consumption	DC 10A
Back-up time	minimum 10min. at 5A
Maximum current consumption after deep discharge	1 A
Back-up ready for 1 cycle after deep discharge	after 5 min.
Loading method	IV characteristic curve
Deep discharge protection	Switch-off threshold: 17VDC
Battery type	lead acid
Signal output	potential-free loading up to 24VDC / 50mA
Ambient temperature	0 - 40°C
Installation position	any installation position
Connection type	print terminals
Connection data	fine-strand max. 2.5mm^2
Installation	support rail mounting (DIN EN 60715), can be mounted in rows with separation distance > 8mm
Protection class	IP 20
Protection class	I
Weight in kg	approx. 2.4
Item number:	0254-0000010D
Dimensions in mm (L / W / D)	125 / 134 / 153





DC UPS modules

CE

Power supply with ultracapacitor back-up

General information:

The RDCuSV C series DC back-up module has an ultracapacitor as an energy storage device inside the enclosure. This capacitor is charged during normal operation by an external regulated DC power supply unit. If the DC supply is interrupted the energy of the ultracapacitors is released in a controlled manner. The load is fed from the back-up module until it has been completely discharged. The back-up time is dependent upon the state of charge of the capacitor and the load current.

The back-up module has the following features:

- long-life ultracapacitors for maintenance-free operation
- Microcontroller-assisted charging and discharging of ultracapacitors
- Parameterisation via uSB interface
- Operational and state of charge monitoring via potential-free contacts and LEDs

Type	RDCUSV 3C1	RDCUSV 5C5	RDCUSV 10C10	RDCUSV 20C8
Nominal input voltage	DC 24V ± 10%	DC 12/24V ± 12.5%		DC 24V ± 10%
Min. charging voltage	DC 23.7V	DC 11.9/23.9V		DC 23.4V
Rated input current	3A	5A	10A	20A
max. switch-on current	-	35A / 2ms		
Output voltage in back-up mode	DC 23,0V ± 2%	DC 23.2V ± 2%		
Output current	DC 3A	DC 5A	DC 10A	DC 20A
Limiting current monitoring	-	DC 5.3A ± 0.1A	DC 10.3A ± 0.1A	-
Switch-off if limit exceeded	-	after 1.5sec.		-
current limitation	-	1,05 ... 12 x OI nominal		-
Efficiency	> 90%			
Energy content	1kJ	5kJ	10kJ	8kJ
Back-up time	dependent upon load			
Protection class	IP20			
Storage temperature	-20 ... +60°C	-40 ... +60°C		
Operating temperature	-20 ... +60°C	-40 ... +60°C		
Input fuse	4AT (internal)	15A (internal)		25A (internal)
Output fuse	3.15AT (external)	15A (internal), 10AT (external)		25A (internal), 20AT (external)
Capacitor circuit fuse	-	25A (internal)		30A (internal)
LED display:	Operation IV o.k. Uc >	green LED lights up if system voltage available green LED lights up if external supply available green LED lights up if energy in capacitor > 80%		
LED display:	green LED goes out if: energy in capacitor 30% LED blinks slowly (0.8Hz): during charging, until 80% of capacitor energy reached LED blinks rapidly (3.2 Hz): if capacitor discharged	Error red LED lights up if - overvoltage on internal capacitor - over- or undervoltage on IV terminal - overcurrent on output		
Relay outputs	potential-free relay contact, NO 30VDC / 0.5A	potential-free relay contact, NO 30VDC / 0.5A grid/ /mains, NO 30VDC / 0.5A Uc /Vcap </>, NO 30VDC / 0.5A error, changeover 30VDC / 0.5A		
USB communication	-	for parameterisation and for operation with shutdown software for PC		
shutdown terminal (emergency stop)	-	abort of UPS operation, potential-free switching input switching level: DC 24V (DC 6-45V)		
Standards and regulations	EN 50178 / EN 60950			
Connection, input/output	spring terminals, 1mm²	spring terminals, 2.5mm²		plug-in terminals, 4mm²
Connection, C extension	spring terminals, 1mm²	-	-	plug-in terminals, 4mm²
Connection, signalling terminals	spring terminals, 1mm²			plug-in terminals, 1.5mm²
Item no:	0246-000003C1	0246-000005C5	0246-00010C10	0246-000020C8
Dimensions (H/W/D)	95 x 60 x 125mm	165 x 130 x 145mm	165 x 114 x 145mm	192 x 84 x 192mm
Weight	0.8kg	2.0kg	2.5kg	2.9kg

AC UPS systems

Fig. Power Vario, DPA UPScale RI, Power Value/ Scale, Power Wave (left to right).

General information:

Static converter for 1- and 3-phase grids as problem solver for

- Voltage and frequency adaptation 16 2/3 / 50 / 60Hz out of country or in test field
- Voltage stabilisation to +/- 20% if there are grid voltage fluctuations
- UPS operation with any back-up times

Riedel supplies complete engineering from the problem to the finished new grid including grid adaptation, buffering and grid distribution to your machines or test stations. We offer individualised or modular building block system solutions. Interfaces for your process connection are available and are adapted to your environment.

Type	PowerVario	PowerValue™ 11	PowerValue™ 31
Enclosure / cabinet type	19" or upright unit, multifunctional	upright unit / individual block	
Output power	1-10kVA	7,5-12kVA	7,5-20kVA
Parallel connection possible to	4 modules of 4.5 or 6kVA	-	
Output	220/230/240V single-phase		
Classification according to IEC/EN 62040-3	VFI-SS-111		
Operating mode	on-line / continuous operation		
Energy efficiency	to 92%	to 95%	
Power density per m2	to 3 kVA per HU (19")	to 44kVA/m²	
Max. weights without batteries dependent upon cabinet type	to 29.7kg	to 204kg	
Battery housing	in UPS enclosure		
Service bypass / revision switch	Option	standard	
Slot for network card	integrated		
Network cards SNMP/ModBus/contacts	Option		
RS-232 interface	standard		
Line reactions THDI	< 6%	< 12%	< 25%, optionally 12%
Reactive current compensation / PFC	standard		
Scalable / extendable (n+1)	Yes	-	
Slide-in modules, can be extended during running operations	only 4-5 and 6kVA	-	

Type	PowerScale	PowerWave 33	DPA UPScale RI™	Conceptpower Modular
Enclosure / cabinet type	upright unit / individual block		Slide-in modules / rack	
Output power	10-40kW	60-300kVA per individual block	10-40kW per rack	80-300kVA per cabinet
Powers of individual slide-in modules	-		10/20kW	80/100kVA
Max. power per system rack	-		20 or 40kW	300kVA
Max. power per rack with n+1 redundancy	-		to 20kW	to 200kVA
Parallel connection possible to	20 systems	10 systems	2 modules	10 modules
Output	380/220; 400/230; 415/240V three-phase			
Classification according to IEC/EN 62040-3	VFI-SS-111			
Operating mode	on-line / continuous operation			
Energy efficiency	to 96.5%	to 95.5%	to 95.5%	to 95%
Power density per m2	to 100kW/m²	to 363kW/m²	to 122kW/m²	to 197kW/m²
Max. weights without batteries dependent upon cabinet type	to 145kg	from 230kg to 410kg	from 59kg to 136kg	to 700kg
Battery housing	in UPS enclosure	battery cabinet or frame or in UPS enclosure for 60-100kVA	UPS battery cabinet or frame	battery cabinet or frame
Service bypass / revision switch	standard			
Slot for network card	integrated			
Network cards SNMP/ModBus/contacts	Option			
RS-232 interface	standard			
Line reactions THDI	< 3%	< 3.5%	< 3%	< 7-9%
Reactive current compensation / PFC	standard			-
Scalable / extendable (n+1)	Yes (horizontal)		Yes (horizontal + vertical)	
Slide-in modules, can be extended during running operations	-		Yes	
central monitoring with NewavewatchTM via TCP/IP, analogue, ISDN or GSM	Option			-

VARIABLE RATIO RING TRANSFORMERS

General information:

Our variable ratio ring transformers are manufactured according to the currently valid VDE/EN/IEC provisions. They are designed for continuous operation and self-cooling by natural convection. To nominal currents of 2A insulation materials of class E are used; above this class B is used.

Connection and fusing

The grid voltage should not exceed the nominal input voltage given on the rating plate continuously by more than 6% because otherwise a higher winding voltage excessively heats up the contact point of the current collector. The variable ratio ring transformers are designed for frequencies of 50/60Hz and can be operated to 400Hz. We recommend a fuse or an overcurrent circuit breaker on the secondary side for protection against overload or short circuit.

Protective devices on the input side must be sized such that they are not triggered by the inrush current surge. This inrush current surge — due to use of core material of high quality (permeability) — can mainly occur in an unloaded transformer if the switch-on operation is carried out at zero voltage. For low grid impedances an inrush current up to 20 x (IN) can be reached in the respective half-wave (10ms at 50Hz).

Hence on the input side slow-acting fuses are to be provided.

Installation and cooling

Operation with the rated power is possible at a maximum ambient temperature of 40°C and up to a height of 1000m above sea level.

For installation in an enclosure self-heating of the variable transformer and any other heat-radiating devices must not lead to inside temperatures higher than 40°C. If the ambient temperature exceeds 40°C, the variable transformer must be cooled externally via fans or the nominal current must be reduced by 20% per 10K temperature rise.

Maintenance

This is limited to elimination of contamination on the contact track and inspection of the current collectors for smooth running.

Every approx. 6 months - longer or shorter depending upon operating conditions - the variable transformer must be maintained as follows:

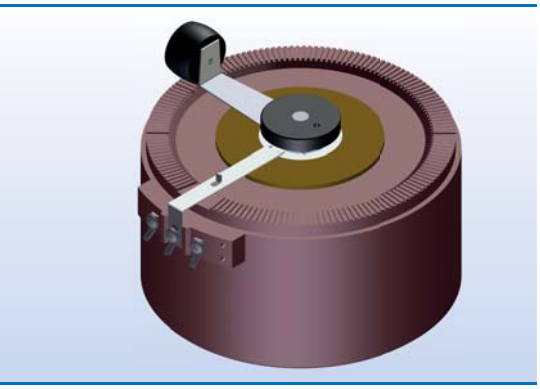
Dust on contact track must be removed by brush or blowing off.

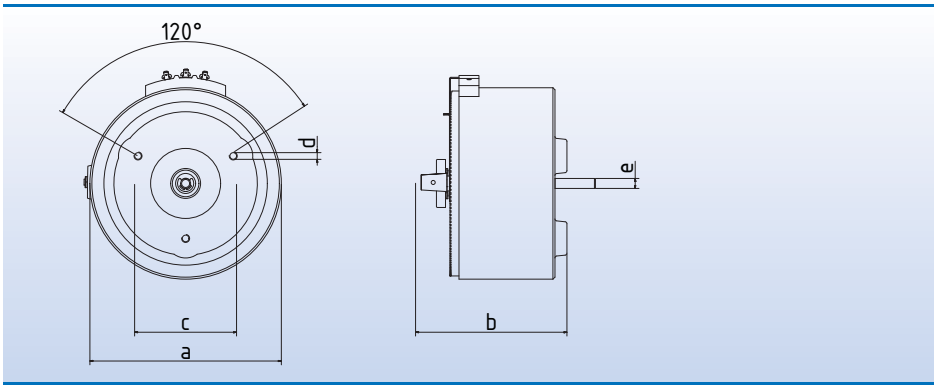
The contact track can be wiped off with a cloth dipped in spirit. Black smooth tracks on the contact track coming from the contact roll do not cause any harm, however. An oxide layer caused by overload or an agressive atmosphere must be removed via a fine sandpaper and the grinding dust must be removed.

Carbon rolls must not be out of round and must be able to be rotated easily when the current collector is adjusted.

Jammed, out-of-round or damaged carbon rolls must be replaced.

The carbon roll bearing must not be lubricated!





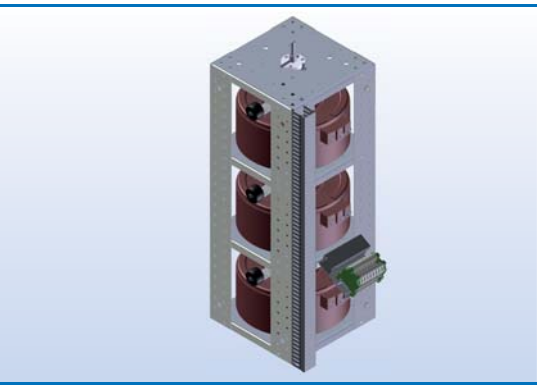
Single-phase variable ratio ring auto-transformers according to VDE 0552/69

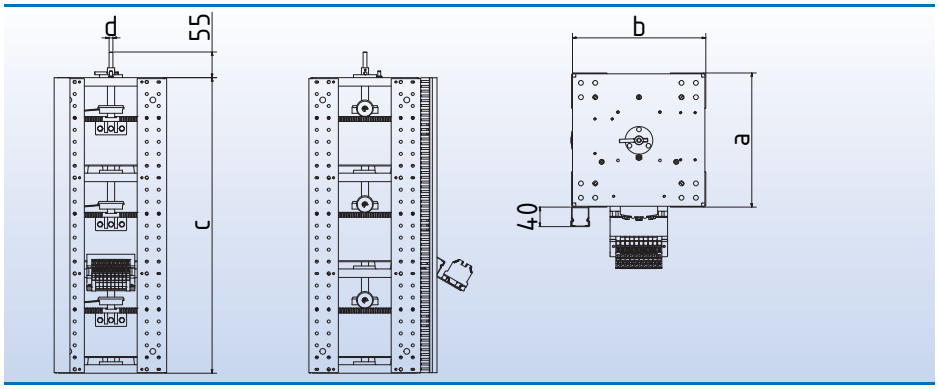
Design:

Open frame, stationary, for device installation and assembly in dry rooms, windings in autotransformer connection, connection to screw terminals. 3-point front fastening, size 65-95 central fastening.
IP 00, to 2A insulation class E, above: insulation class B, max. ambient temperature of 40°C (ta40°C/B).
Version with separate winding available upon request.

Type	Current A	230V 0-230V Item no:	Current A	230V 0-260V Item no:	Current A	230V 0-300V Item no:	Current A	400V 0-400V Item no:
RRSP	1,00	0185-00000**65**	0,50	0186-00000**65**	1,00	0187-00000**94**	0,80	0188-00000**94**
RRSP	1,25	0185-00000**75**	0,80	0186-00000**75**	1,25	0187-00000**95**	1,00	0188-00000**95**
RRSP	2,00	0185-00000**85**	1,00	0186-00000**85**	1,60	0187-00000**114**	1,60	0188-00000**114**
RRSP	2,50	0185-00000**94**	1,60	0186-00000**94**	2,00	0187-00000**115**	2,00	0188-00000**115**
RRSP	3,20	0185-00000**95**	2,00	0186-00000**114**	3,20	0187-00000**116**	2,50	0188-00000**116**
RRSP	4,00	0185-00000**114**	4,00	0186-00000**115**	5,00	0187-00000**136**	4,00	0188-00000**136**
RRSP	5,00	0185-00000**115**	5,00	0186-00000**116**	6,30	0187-00000**157**	5,00	0188-00000**137**
RRSP	6,30	0185-00000**116**	6,30	0186-00000**136**	8,00	0187-00000**178**	6,30	0188-00000**157**
RRSP	8,00	0185-00000**136**	8,00	0186-00000**137**	10,00	0187-00000**218**	8,00	0188-00000**178**
RRSP	10,00	0185-00000**137**	10,00	0186-00000**157**	12,50	0187-00000**257**	10,00	0188-00000**217**
RRSP	12,50	0185-00000**157**	12,50	0186-00000**178**	16,00	0187-00000**258**	12,50	0188-00000**257**
RRSP	16,00	0185-00000**178**	16,00	0186-00000**218**	20,00	0187-00000**298**	16,00	0188-00000**258**
RRSP	20,00	0185-00000**217**	20,00	0186-00000**258**	25,00	0187-00000**358**	20,00	0188-00000**358**
RRSP	25,00	0185-00000**257**	25,00	0186-00000**297**	32,00	0187-00002**912**	25,00	0188-00002**512**
RRSP	32,00	0185-00002**507**	40,00	0186-00002**512**	63,00	0187-00003**515**	40,00	0188-00002**912**
RRSP	40,00	0185-00002**907**	50,00	0186-00002**912**			50,00	0188-00003**515**
RRSP	50,00	0185-00002**512**	63,00	0186-00003**515**				
RRSP	63,00	0185-00002**912**						
RRSP	100,00	0185-00003**515**						

Type	Copper kg	Total kg	Dimensions approx. in mm				
			a	b	c	d	e
RRSP 65	0,040	1,20	74	75	26	M4	6
RRSP 75	0,070	1,50	86	75	26	M4	6
RRSP 85	0,120	2,00	96	76	26	M4	6
RRSP 94	0,160	2,20	106	68	26	M4	6
RRSP 95	0,250	2,60	106	78	26	M4	6
RRSP 114	0,300	3,30	131	90	80	M6	6
RRSP 115	0,370	4,00	131	105	80	M6	6
RRSP 116	0,450	4,70	131	115	80	M6	6
RRSP 136	0,900	6,20	148	120	110	M8	10
RRSP 137	1,000	7,30	148	130	110	M8	10
RRSP 157	1,200	9,30	170	130	110	M8	10
RRSP 178	1,600	13,00	190	150	110	M8	10
RRSP 217	2,150	16,00	230	155	150	M8	10
RRSP 218	2,250	17,00	230	165	150	M8	10
RRSP 257	3,150	19,00	270	155	150	M8	10
RRSP 258	3,300	21,00	280	165	150	M8	10
RRSP 297	4,500	21,00	320	160	150	M8	10
RRSP 298	4,800	28,00	320	180	150	M8	10
RRSP 358	5,600	34,00	390	180	150	M10	10
RRSP 2507	3,250	20,00	270	210	150	M8	10
RRSP 2907	4,500	26,00	315	225	150	M8	10
RRSP 2512	6,000	39,00	270	270	150	M8	10
RRSP 2912	8,000	46,00	315	280	150	M8	10
RRSP 3515	10,000	78,00	385	350	150	M10	10





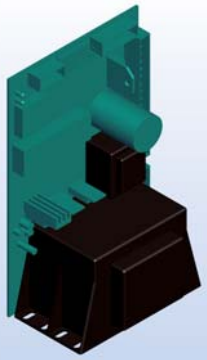
Three-phase variable ratio ring autotransformers according to VDE 0552/69

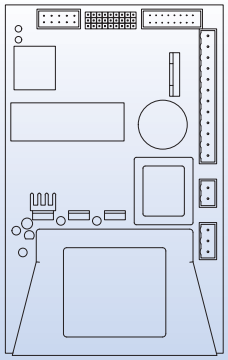
Design:

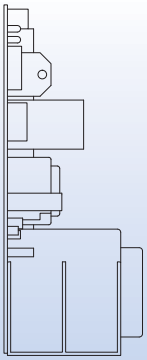
Open frame, stationary, for device installation and assembly in dry rooms, windings in autotransformer connection, connection to screw terminals.
IP 00, to 2A insulation class E, above: insulation class B,
max. ambient temperature 40°C (ta40°C/B).
Higher currents, other voltages or version with separate winding available upon request.

Type	Current 3 x A	3 x 400V 3 x 0-400V Item no:	Current 3 x A	3 x 400V 3 x 0-450V Item no:	Current 3 x A	3 x 400V 3 x 0–520V Item no:
RDRSP 73	0,8	0189-00000073	–	–	–	–
RDRSP 74	1,0	0189-00000074	0,5	0190-00000074	–	–
RDRSP 84	1,6	0189-00000084	0,8	0190-00000084	–	–
RDRSP 94	2,5	0189-00000094	1,6	0190-00000094	1,0	0191-00000094
RDRSP 95	3,2	0189-00000095	2,0	0190-00000095	1,25	0191-00000095
RDRSP 114	4,0	0189-00000114	–	–	1,6	0191-00000114
RDRSP 115	5,0	0189-00000115	4,0	0190-00000115	2,0	0191-00000115
RDRSP 116	6,3	0189-00000116	5,0	0190-00000116	2,5	0191-00000116
RDRSP 136	8,0	0189-00000136	6,3	0190-00000136	5,0	0191-00000136
RDRSP 137	10,0	0189-00000137	8,0	0190-00000137	–	–
RDRSP 157	12,5	0189-00000157	10,0	0190-00000157	6,3	0191-00000157
RDRSP 178	16,0	0189-00000178	12,5	0190-00000178	8,0	0191-00000178
RDRSP 217	20,0	0189-00000217	–	–	–	–
RDRSP 257	25,0	0189-00000257	–	–	12,5	0191-00000257
RDRSP 2507	32,0	0189-00002507	–	–	–	–
RDRSP 2907	40,0	0189-00002907	–	–	–	–
RDRSP 2512	50,0	0189-00002512	40,0	0190-00002512	–	–
RDRSP 2912	63,0	0189-00002912	50,0	0190-00002912	32,0	0191-00002912
RDRSP 3515	100,0	0189-00003515	63,0	0190-00003515	63,0	0191-00003515

Type	Copper kg	Total kg	Dimensions approx. in mm			
			a	b	c	d
RDRSP 73	0,11	5,5	155	155	300	6
RDRSP 74	0,12	5,8	155	155	300	6
RDRSP 84	0,27	6,7	155	155	300	6
RDRSP 94	0,48	7,9	155	155	300	6
RDRSP 95	0,75	9,5	155	155	320	6
RDRSP 114	0,90	11,5	175	175	330	6
RDRSP 115	1,11	14,0	175	175	360	6
RDRSP 116	1,35	16,5	175	175	390	6
RDRSP 136	2,70	24,0	240	240	435	10
RDRSP 137	3,00	27,0	240	240	485	10
RDRSP 157	3,60	30,0	240	240	485	10
RDRSP 178	4,80	44,0	260	260	535	10
RDRSP 217	6,50	55,0	240	240	618	10
RDRSP 257	9,50	66,0	315	315	618	10
RDRSP 2507	9,80	70,0	390	390	695	10
RDRSP 2907	13,50	88,0	390	390	695	10
RDRSP 2512	18,00	140,0	390	390	920	10
RDRSP 2912	24,00	160,0	390	390	920	10
RDRSP 3515	32,40	260,0	405	405	1070	10



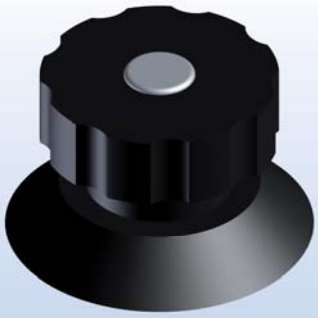


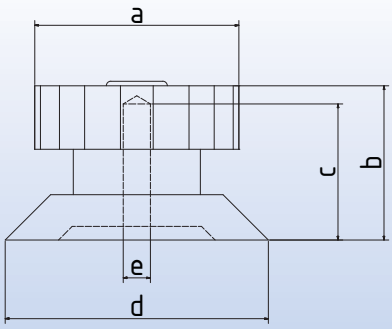


Design:

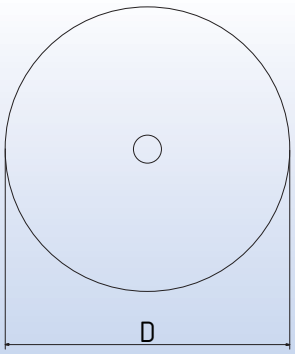
Various motor drives and controls are available as options for all single- and three-phase variable ratio ring transformers. Please specify clearly when ordering. Please be aware that the dimensions are different for versions with motor and control card. Please contact us directly for these.
Additional options and versions upon request.

Type	Description
AC-motor	AC motor 230VAC. (control via, e.g., on/off button)
DC-motor	DC motor with control card with external actual value (control via potentiometer or 0-10VDC)
DC motor with control card	DC motor with control card with internal actual value (control via potentiometer or 0-10VDC)
Interface	RS232/485 interface for control card

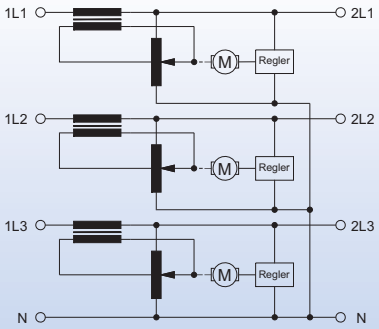


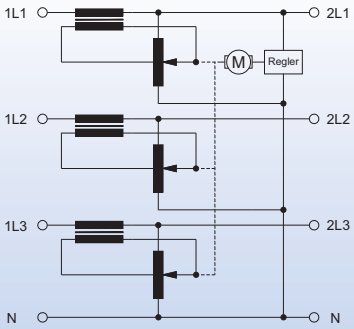


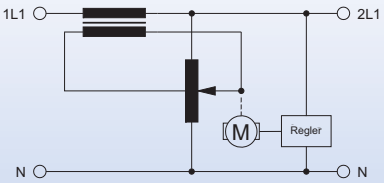
Type	Item no:	Dimensions approx. in mm				
		a	b	c	d	e
REK 30–40–6	0084-00000001	38	28	12	41	6
REK 30-60–6	0084-00000002	48	34	28	58	6
REK 30-60-10	0084-00000003	48	34	28	58	10
REK 30-90-6	0084-00000004	76	40	28	90	6
REK 30-90-10	0084-00000005	76	40	28	90	10



Type	Item no:	Diameter mm	Label
RES 31-60-100	0085-00000001	60	0-100%
RES 31-60-230	0085-00000002	60	0-230V
RES 31-90-100	0085-00000003	92	0-100%
RES 31-90-230	0085-00000004	92	0-230V
RES 31-130-100	0085-00000005	132	0-100%
RES 31-130-230	0085-00000006	132	0-230V







Single-phase and 3-phase voltage stabiliser according to VDE 0552/69

RSKH in output range from 1kVA:

Riedel RSKH voltage stabilisers are used as line-side (upstream) series elements in grids with fluctuating voltages. At the output of the voltage stabiliser a constant voltage which is independent of fluctuations in the grid is available to the consumer.

Design:

Riedel voltage stabilisers consist of a variable transformer with motor drive and a booster transformer as well as an electronic controller. As soon as this controller records a voltage deviation from the set point on the output of the stabiliser the motor of the variable transformers becomes activated by the controller and a voltage is induced in the primary winding of the booster transformer. As a result the secondary winding adds or subtracts voltage to or from the grid. This continues until the output voltage corresponds to its set point.

The controller itself works as a proportional control amplifier with PI control and is located on a plug-in card which contains the power supply unit and the actual value processing unit. The set point setting for adaptation to the dynamic behavior of the control path is made via multi-turn trimmer. The motor of the variable transformer is controlled in a contactless manner, with the adjustment speed dependent upon the nominal voltage (i.e. high control speed at high deviation and low control speed at low deviation). This yields a high control accuracy without control oscillations.

Technical data:

Nominal input voltages:	all typical low-voltage grids
Grid voltage fluctuations:	e.g. ±10%, ±15%, ±20%...
Grid frequency:	50/60 Hz or 400 Hz
Output precision:	±1%
Loading type:	ohmic, inductive or capacitive
Efficiency:	98-99% depending upon controller type
Duty cycle:	S1 Operation (100%)
Protection class:	IP 00

Main applications:

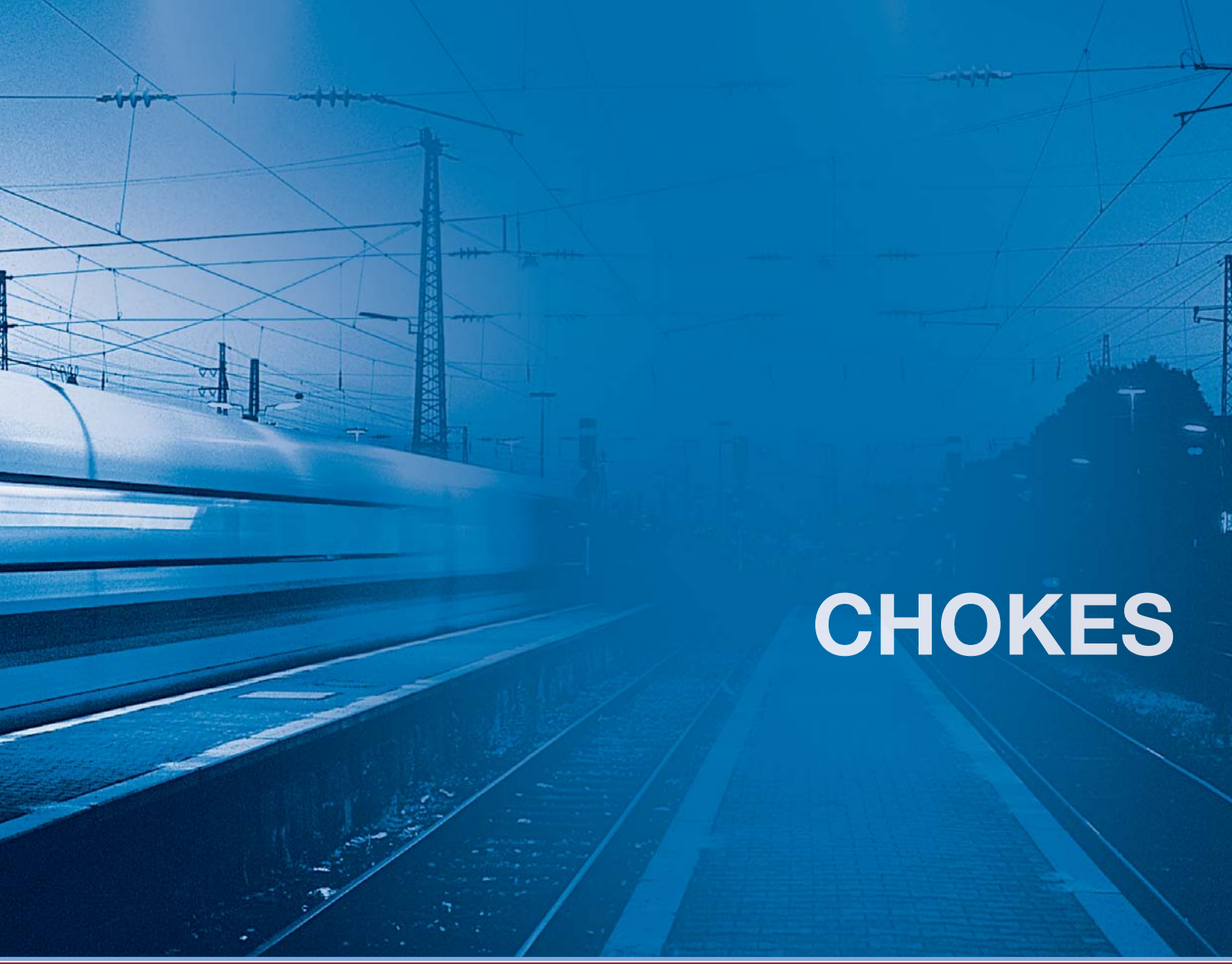
machine controls	data processing systems
test field and laboratory	medical electronics
monitoring systems	remote signalling systems
process controls	remote controls
air traffic controls	furnace heaters

Possible options:

Protection class to max. IP 65, analogue or digital measuring instruments, main switch and fuse, galvanic separation, maintenance service etc.

Principle schematic:

see above: 3-phase AC grid with single-phase control, 3-phase AC grid with master control, single-phase grid (from left to right)



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

$U_3 = 0.5\ \%\ U_{nominal}$ $\quad$ $U_7 = 5\ \%\ U_{nominal}$

$U_5 = 5\ \%\ U_{nominal}$ $\quad$ $U_{11} = 5\ \%\ U_{nominal}$

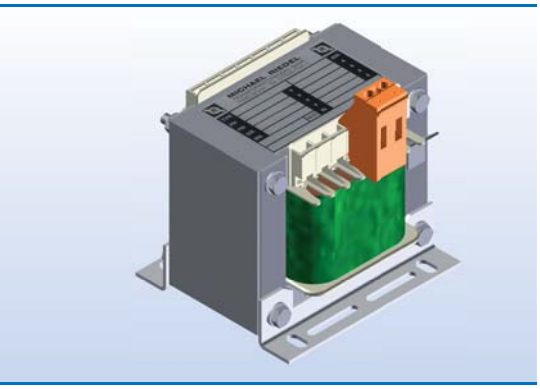
Thermal current

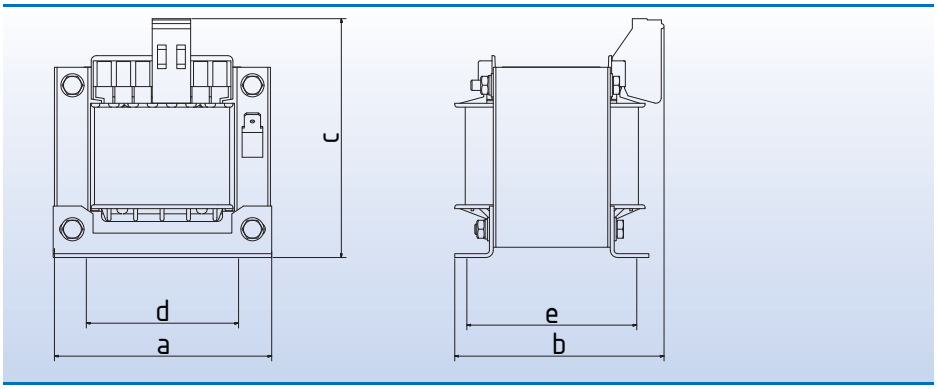
$$I_{therm} = 1{,}05 \times \sqrt{I_1^2 + I_3^2 + I_5^2 + I_7^2 + I_{11}^2}$$

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.

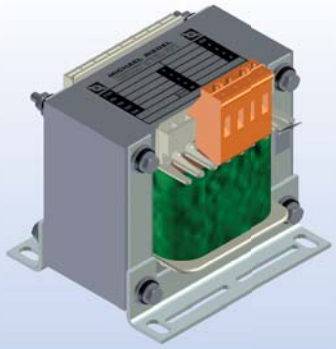
IP 00, insulation class E, max. ambient temperature of 40°C (ta40°C/E)

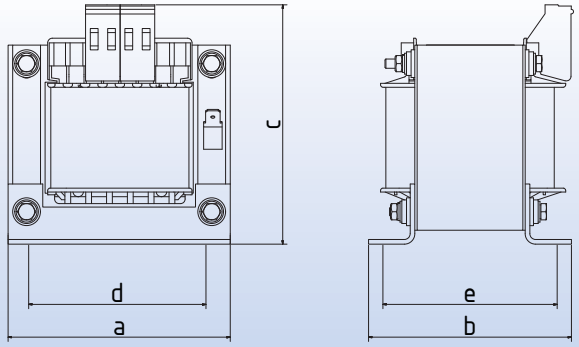
Technical data:

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.

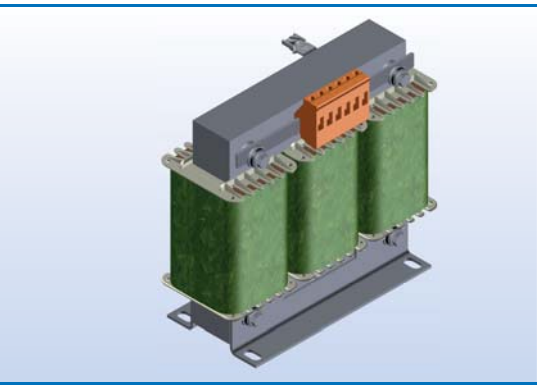
IP 00, insulation class E, max. ambient temperature of 40°C (ta40°C/E)

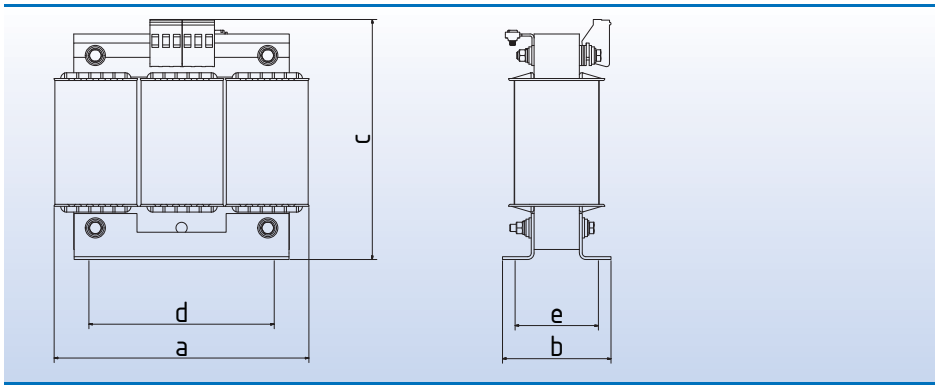
Technical data:

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.

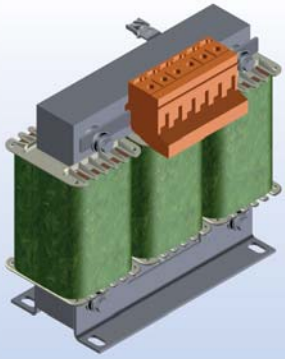
IP 00, insulation class E, max. ambient temperature of 40°C (ta40°C/E)

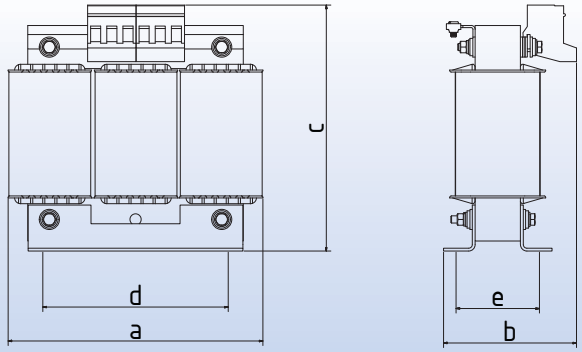
Technical data:

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.

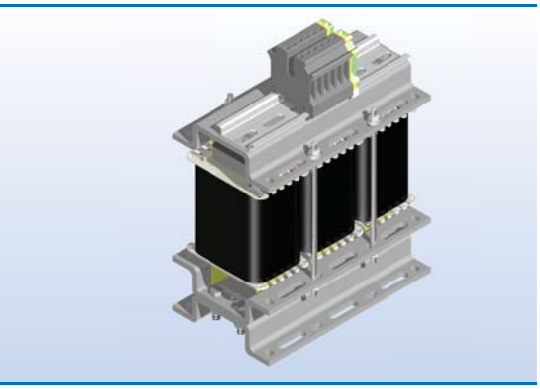
IP 00, insulation class E, from 250A insulation class F, max. ambient temperature of 40°C (ta40°C)

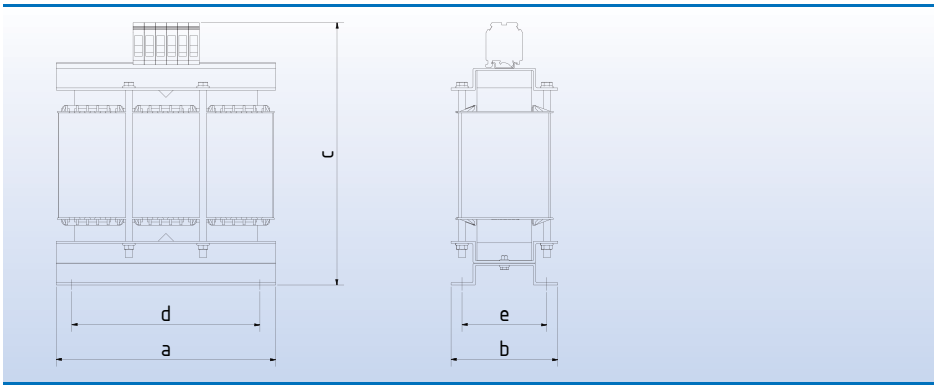
Technical data:

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





Three-phase motor chokes for operation on frequency converters according to VDE 0570 part 2-20, EN 61558-2-20

CE

Motor choke (series RDMDr):

The motor chokes are supplied standard up to a nominal voltage of 3AC 690 V and a nominal current up to 1200 A.
In addition the noise emission is significantly reduced due to a unique core geometry.
The use of RDMDr is recommended for motor cable supply lines of up to 150 m length.

Technical data:

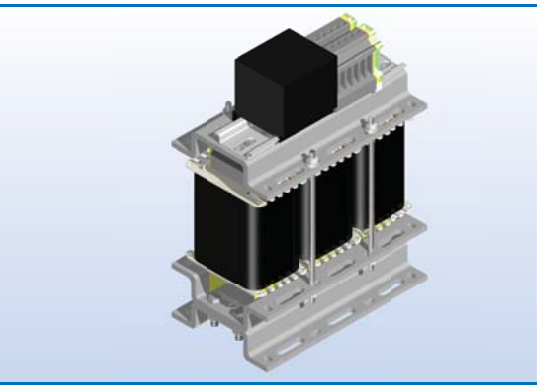
Rated voltages:	3AC 400V to 3AC 690V (higher voltages available on request)
Rated current:	up to 1200 A (higher currents available on request)
Frequency:	50Hz to 60Hz (higher frequencies available on request)
Cycle frequencies (PWM):	1.5kHz up to 8.0kHz
Ambient temperature:	ta = 40°C / F, S1/100% ED
Cooling types:	AN
Protection class:	IP00 (higher protection classes available on request)
Design:	compact, open design for installation in dry rooms

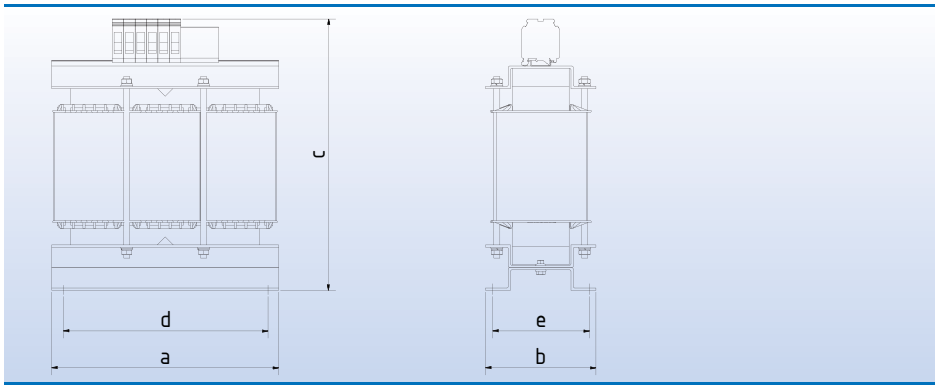
Advantages:

- Low noise filter due to new core geometry (verified by noise level measurements on the Aalen Hochschule)
- Reduction of overvoltages on the motor insulation (longer motor running times)
- Lower noise development on motor

Type	Current A	Induct. mH	Item no:	PWM kHz	Copper kg	Total kg	Dimensions approx. in mm					
							a	b	c	d	e	Mounting
RDMDr 24	24	0,766	0440-00000024	≥ 4,0 kHz	1,2	5,2	150	89	210	135	75	M5
RDMDr 32	32	0,574	0440-00000032	≥ 4,0 kHz	1,6	5,7	150	89	210	135	75	M5
RDMDr 38	38	0,484	0440-00000038	≥ 4,0 kHz	2,3	6,2	150	89	210	135	75	M5
RDMDr 44	44	0,418	0440-00000044	≥ 4,0 kHz	2,5	6,4	150	89	210	135	75	M5
RDMDr 61	61	0,301	0440-00000061	≥ 4,0 kHz	2,8	7,3	180	85	240	165	67	M6
RDMDr 73	73	0,252	0440-00000073	≥ 3,0 kHz	3,2	8,5	180	95	245	165	77	M6
RDMDr 90	90	0,204	0440-00000090	≥ 3,0 kHz	3,3	10,2	180	105	250	165	87	M6
RDMDr 106	106	0,173	0440-00000106	≥ 3,0 kHz	3,4	14,1	228	100	290	208	75	M6
RDMDr 147	147	0,125	0440-00000147	≥ 3,0 kHz	6,7	18,9	240	105	330	220	77	M8
RDMDr 177	177	0,104	0440-00000177	≥ 3,0 kHz	7,4	22,0	240	115	330	220	87	M8
RDMDr 212	212	0,087	0440-00000212	≥ 3,0 kHz	10,1	28,4	240	135	340	220	107	M8
RDMDr 260	260	0,071	0440-00000260	≥ 3,0 kHz	12,6	34,7	300	125	415	275	99	M8
RDMDr 315	315	0,058	0440-00000315	≥ 3,0 kHz	13,8	48,6	300	155	425	275	124	M8
RDMDr 395	395	0,047	0440-00000395	≥ 3,0 kHz	21,6	62,6	360	165	478	335	121	M8
RDMDr 480	480	0,038	0440-00000480	≥ 1,5 kHz	23,7	80,4	360	260	380	335	151	M8
RDMDr 600	600	0,031	0440-00000600	≥ 1,5 kHz	26,4	124,8	420	280	420	390	170	M10
RDMDr 658	658	0,028	0440-00000658	≥ 1,5 kHz	32,5	136,4	420	310	420	380	200	M10
RDMDr 745	745	0,025	0440-00000745	≥ 1,5 kHz	34,7	144,5	480	265	480	440	160	M14
RDMDr 800	800	0,023	0440-00000800	≥ 1,5 kHz	49,9	179,0	480	295	480	440	190	M14
RDMDr 880	880	0,021	0440-00000880	≥ 1,5 kHz	Customer-specific - only on request							
RDMDr 990	990	0,019	0440-00000990	≥ 1,5 kHz	Customer-specific - only on request							
RDMDr 1120	1120	0,016	0440-00001120	≥ 1,5 kHz	Customer-specific - only on request							

The given values are typical characteristic values and can deviate depending on manufacture !





Three-phase motor filter for operation on frequency converters according to VDE 0570 part 2-20, EN 61558-2-20

CE

Motor filter (series RDMF):

The motor filters RDMF from Michael Riedel Transformatorenbau GmbH reduce the voltage increase speeds to less than 500V/µs. The motor filters are supplied standard up to a nominal voltage of 3AC 690 V and a nominal current up to 1200A. In addition the noise emission is significantly reduced due to a unique core geometry. The use of RDMF is recommended for motor cable supply lines of up to 250 m length.

Technical data:

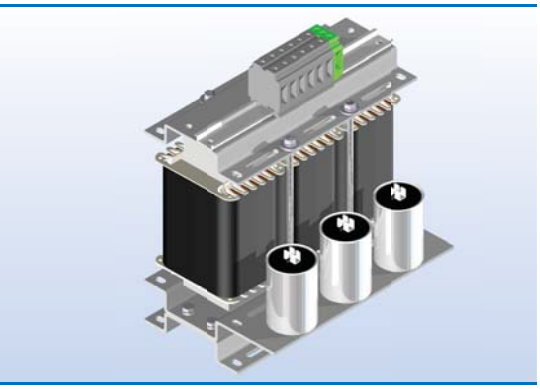
Rated voltages:	33AC 400V to 3AC 690V (higher voltages available on request)
Rated current:	up to 1200 A (higher currents available on request)
Frequency:	50Hz to 60Hz (higher frequencies available on request)
Cycle frequencies (PWM):	1.5kHz up to 8.0kHz
Ambient temperature:	ta = 40°C / F, S1/100% ED
Cooling types:	AN
Protection class:	IP00 (higher protection classes available on request)
Design:	compact, open design for installation in dry rooms

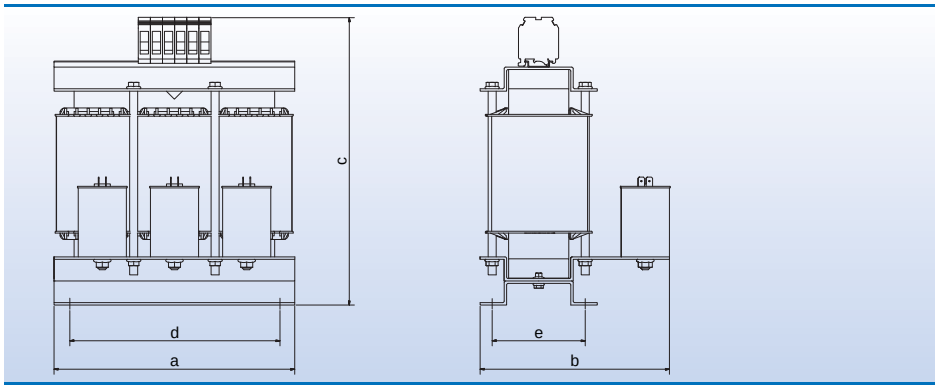
Advantages:

- Low noise filter due to new core geometry (verified by noise level measurements on the Aalen Hochschule)
- Reduction of overvoltages on the motor insulation (longer motor running times)
- Long motor feed lines possible
- Lower noise development on motor

Type	Current A	Induct. mH	Item no:	PWM kHz	Copper kg	Total kg	Dimensions approx. in mm					
							a	b	c	d	e	Mounting
RDMF 24	24	11	0445-00000024	≥ 4,0 kHz	1,2	5,2	150	89	210	135	75	M5
RDMF 32	32	15	0445-00000032	≥ 4,0 kHz	1,6	5,7	150	89	210	135	75	M5
RDMF 38	38	18,5	0445-00000038	≥ 4,0 kHz	2,3	6,2	150	89	210	135	75	M5
RDMF 44	44	22	0445-00000044	≥ 4,0 kHz	2,5	6,4	150	89	210	135	75	M5
RDMF 61	61	30	0445-00000061	≥ 4,0 kHz	2,8	7,3	180	85	240	165	67	M6
RDMF 73	73	37	0445-00000073	≥ 3,0 kHz	3,2	8,5	180	95	245	165	77	M6
RDMF 90	90	45	0445-00000090	≥ 3,0 kHz	3,3	10,2	180	105	250	165	87	M6
RDMF 106	106	55	0445-00000106	≥ 3,0 kHz	3,4	14,1	228	100	290	208	75	M6
RDMF 147	147	75	0445-00000147	≥ 3,0 kHz	6,7	18,9	240	105	330	220	77	M8
RDMF 177	177	90	0445-00000177	≥ 3,0 kHz	7,4	22,0	240	115	330	220	87	M8
RDMF 212	212	110	0445-00000212	≥ 3,0 kHz	10,1	28,4	240	135	340	220	107	M8
RDMF 260	260	132	0445-00000260	≥ 3,0 kHz	12,6	34,7	300	125	415	275	99	M8
RDMF 315	315	160	0445-00000315	≥ 3,0 kHz	13,8	48,6	300	155	425	275	124	M8
RDMF 395	395	200	0445-00000395	≥ 3,0 kHz	21,6	62,6	360	165	478	335	121	M8
RDMF 480	480	250	0445-00000480	≥ 1,5 kHz	23,7	80,4	360	260 *	460 *	335	151	M8
RDMF 600	600	315	0445-00000600	≥ 1,5 kHz	26,4	124,8	420	280 *	500 *	390	170	M10
RDMF 658	658	355	0445-00000658	≥ 1,5 kHz	32,5	136,4	420	310 *	500 *	380	200	M10
RDMF 745	745	400	0445-00000745	≥ 1,5 kHz	34,7	144,5	480	265 *	560 *	440	160	M14
RDMF 800	800	450	0445-00000800	≥ 1,5 kHz	49,9	179,0	480	295 *	560 *	440	190	M14
RDMF 880	880	500	0445-00000880	≥ 1,5 kHz	Kundenspezifisch - nur auf Anfrage							
RDMF 990	990	560	0445-00000990	≥ 1,5 kHz	Kundenspezifisch - nur auf Anfrage							
RDMF 1120	1120	630	0445-00001120	≥ 1,5 kHz	Kundenspezifisch - nur auf Anfrage							

The given values are typical characteristic values and can deviate depending on manufacture !
*) Starting with a current intensity > 415 A the width and height of the filter can deviate depending on the design !





Three-phase sine filter for operation on frequency converters according to VDE 0570 part 2-20, EN 61558-2-20

CE

Sinus filter (series RDSF):

The sine filter series RDSF (output filter for frequency converter) from Michael Riedel Transformatorenbau GmbH are tailor-made for the technical requirements of modern drives (FC). By using modern frequency converters in motor control, high harmonic components result with the cycled output voltages. These „harmonic components“ additionally load the motor insulation, which leads to shorter motor lifetimes. Through the use of the RDSF sine filters these additional losses are reduced even when using longer motor feed lines and thus help to prevent premature failures and costly downtimes.

Technical data:

Rated voltages:	3AC 400V to 3AC 690V (higher voltages available on request)
Rated current:	up to 1200 A (higher currents available on request)
Frequency:	50Hz to 60Hz (higher frequencies available on request)
Cycle frequencies (PWM):	1.5kHz up to 8.0kHz
Ambient temperature:	ta = 40°C / F, S1/100% ED
Cooling types:	AN
Protection class:	IP00 (higher protection classes available on request)
Design:	compact, open design for installation in dry rooms

Advantages:

- Low noise filter due to new core geometry (verified by noise level measurements on the Aalen Hochschule)
- Reduction of overvoltages on the motor insulation (longer motor running times)
- Long motor feed lines possible
- Lower noise development on motor

Type	Current A	Induct. mH	Item no:	PWM kHz	Copper kg	Total kg	Dimensions approx. in mm					
							a	b	c	d	e	Mounting
RDSF 8	8	4,0	0450-00000008	≥ 5,0 kHz	1,2	11,6	180	160 *	210	135	75	
RDSF 16	16	8,0	0450-00000016	≥ 5,0 kHz	3,0	11,6	180	160 *	250	165	77	
RDSF 24	24	11,0	0450-00000024	≥ 4,0 kHz	3,5	11,6	180	160 *	250	165	87	
RDSF 32	32	15,0	0450-00000032	≥ 4,0 kHz	4,5	11,6	180	160 *	250	165	87	
RDSF 38	38	18,5	0450-00000038	≥ 4,0 kHz	6,3	18,2	240	180 *	280	220	111	
RDSF 44	44	22,0	0450-00000044	≥ 4,0 kHz	7,7	29,8	240	190 *	280	220	111	
RDSF 61	61	30,0	0450-00000061	≥ 4,0 kHz	12,6	36,4	300	200 *	350	275	97	
RDSF 73	73	37,0	0450-00000073	≥ 3,0 kHz	13,9	48,6	300	240 *	350	275	97	
RDSF 90	90	45,0	0450-00000090	≥ 3,0 kHz	14,5	52,3	300	240 *	350	275	97	
RDSF 106	106	55,0	0450-00000106	≥ 3,0 kHz	21,2	78,9	360	250 *	410	335	136	
RDSF 147	147	75,0	0450-00000147	≥ 3,0 kHz	24,1	84,4	360	270 *	410	335	151	
RDSF 177	177	90,0	0450-00000177	≥ 3,0 kHz	27,2	120	420	320 *	500	380	170	
RDSF 212	212	110	0450-00000212	≥ 3,0 kHz	34,2	135	420	350 *	500	380	200	
RDSF 260	260	132	0450-00000260	≥ 3,0 kHz	54,5	188	480	360 *	580	440	190	
RDSF 315	315	132	0450-00000315	≥ 3,0 kHz	60,4	195	480	360 *	590	440	190	
RDSF 395	395	160	0450-00000395	≥ 3,0 kHz	74,2	230	480	390 *	590	440	220	
RDSF 480	480	200	0450-00000480	≥ 1,5 kHz	Customer-specific - only on request							
RDSF 600	600	315	0450-00000600	≥ 1,5 kHz	Customer-specific - only on request							
RDSF 658	658	355	0450-00000658	≥ 1,5 kHz	Customer-specific - only on request							
RDSF 745	745	400	0450-00000745	≥ 1,5 kHz	Customer-specific - only on request							
RDSF 800	800	450	0450-00000800	≥ 1,5 kHz	Customer-specific - only on request							
RDSF 880	880	500	0450-00000880	≥ 1,5 kHz	Customer-specific - only on request							
RDSF 990	990	560	0450-00000990	≥ 1,5 kHz	Customer-specific - only on request							
RDSF 1120	1120	630	0450-00001120	≥ 1,5 kHz	Customer-specific - only on request							
RDSF 1260	1260	710	0450-00001260	≥ 1,5 kHz	Customer-specific - only on request							

The given values are typical characteristic values and can deviate depending on manufacture !
*) The range of the sine filters vary depending on the choice of resonance frequency!

ENCLOSURE

Protective systems:

The protection classes are given by abbreviations always composed of the same letters 'IP' and two code digits indicating the protection level (according to EN 60529).

Protection levels for contact and foreign object protection

First code digit	Extent of protection Name	Explanation
0	No protection	No particular protection against direct bodily contact with active parts No protection against penetration of solid foreign objects.
2	Protection from medium-sized foreign objects	Protection against contact with active parts by fingers. Protection against penetration of solid foreign objects of diameter greater than 12mm.
4	Protection from grain-shaped foreign objects	Protection against contact with active parts by tools, wires or similar objects of thickness greater than 1mm. Protection against penetration of solid foreign objects of diameter greater than 1 mm.
5	Protection against dust accumulation	Complete protection against contact with active parts. Protection against damaging dust accumulation. Penetration of dust is not completely prevented, but the dust must not impair functioning.
6	Protection against dust entry	Complete protection against contact with active parts. Protection against penetration of dust.

Protection levels for water protection

Second code digit	Extent of protection Name		Explanation
0	No protection		No particular protection
1	Protection against vertically falling water drops		Water drops that fall vertically must not have any damaging effect.
3	Protection against spray water		Water that falls at any angle up to 60° to vertical must not have any damaging effect.
4	Protection against splashing water		Water splashing from all directions must not have any damaging effect.
5	Protection against water jets		A water jet from a nozzle directed at the transformer from all directions must not have any damaging effect.
6	Flood protection		Water must not penetrate into the transformer in a damaging amount in the case of temporary flooding.
7	Immersion protection		Water must not penetrate in a damaging amount if the transformer is immersed into water under the specified pressure and time conditions.

For firedamp and explosion-proof transformers respectively the abbreviations 'SCH' and 'EX' are also used.

Protection classes

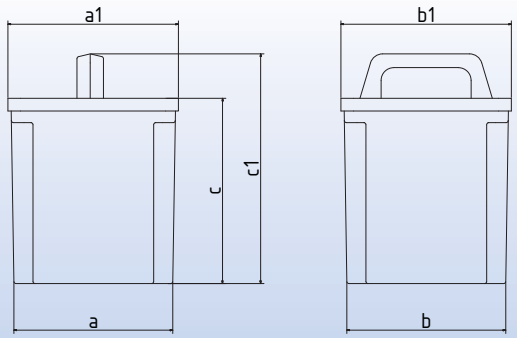
The protection class is a design characteristic of a device indicating the safety with regard to dangerous currents passing through the body through direct contact.

The transformers with open frame constructions intended for installation in electrical enclosures or devices do not possess a protection class, but rather can only be prepared for one.

Protection class I: Device with protective earth connection and basic insulation

Protection class II: Device without protective earth connection but with double or reinforced insulation

Protection class III: Device without protective earth connection, where the protection against dangerous currents flowing through the body through direct contact is based on the supply with safety extra-low voltage (SELV) and no higher voltage than the SELV can be generated.



CE

Portable plastic enclosure for electrical equipment

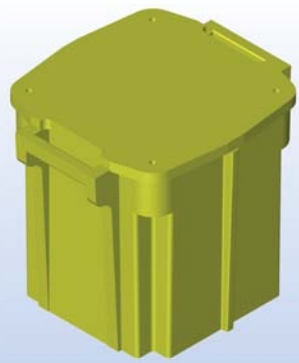
Design:

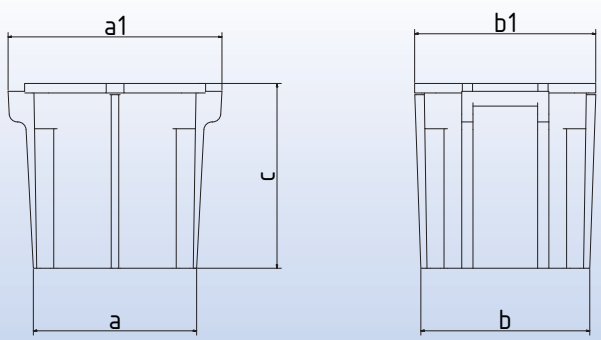
The portable enclosures of the RG 601 - RG 801 series are made from glass fibre-reinforced polyester resin and are hence stable and impact-resistant. The enclosures have been designed especially for use of electrical devices, are self-extinguishing and are non-hygroscopic. A neoprene seal between the cover and the enclosure provides the corresponding seal. In an immersion test in water no penetration of moisture was detected up to a depth of 1m over a period of 8 days.

Temperature resistance: -32°C to 220°C.

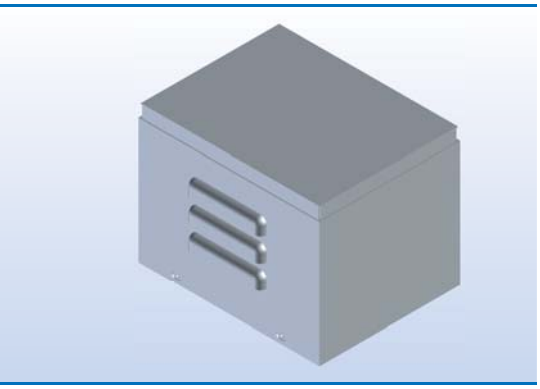
The enclosures are designed with protection class IP 67 and are available in the colour yellow. Other colours available upon request.
The enclosures can be supplied with boreholes and cutouts according to the drawing at extra charge.

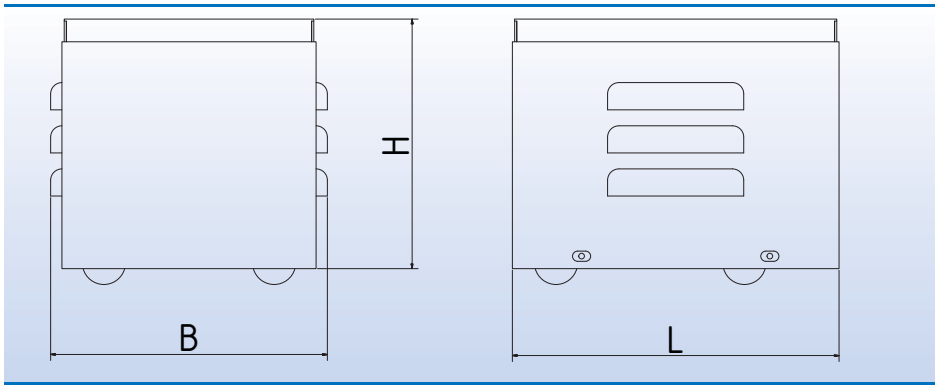
Type	Item no: + colour	Total kg	Dimensions approx. in mm						
			a	b	c	a1	b1	c1	Thickness
RG 601	0790-00000001	1,11	156	150	176	166	166	219	3
RG 701	0790-00000002	1,76	176	176	217	192	192	259	3





Type	Item no: + colour	Total kg	Dimensions approx. in mm						
			a	b	c	a1	b1	c1	Thickness
RG 801	0790-00000003	4,16	240	250	280	310	265	–	4



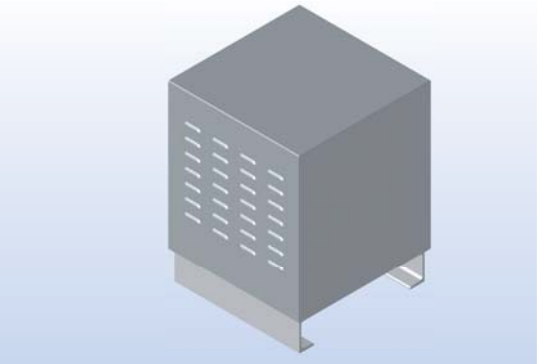


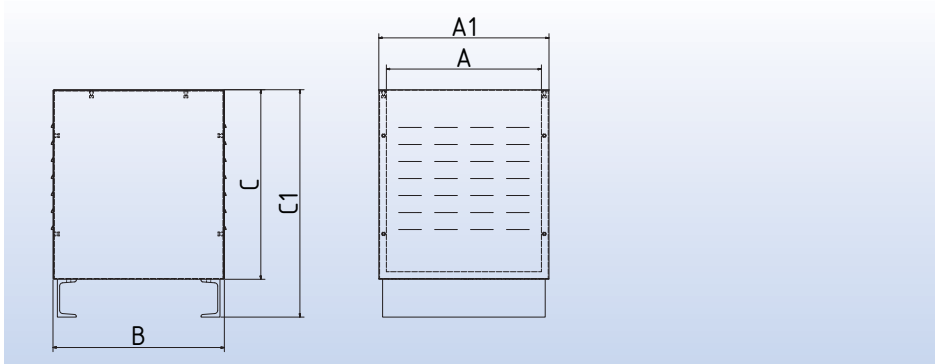
CE

Upright enclosure
Material: St. 1203
Plastic-coated RAL 7035
Protection class: IP 23

Optional:
The following can be supplied at extra charge:
– For size 1 and up: available with handle
– With MG cable entries according to customer specification
– Additional holes

Type	Item no: + colour	Total kg	Dimensions approx. in mm		
			L	B	H
RG 0	0800-00000000	0,46	120	95	90
RG 1	0800-00000001	0,67	140	110	110
RG 2	0800-00000002	1,45	180	180	150
RG 3	0800-00000003	1,60	180	180	190
RG 4	0800-00000004	2,70	250	220	190
RG 4a	0800-0000004a	3,05	310	220	190



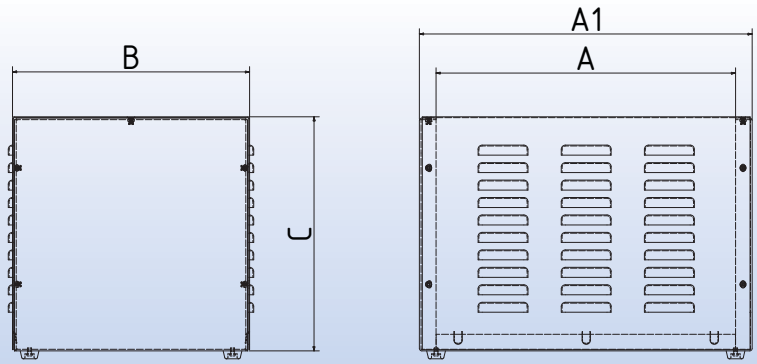


CE

Upright enclosure
Material: St. 1203
Plastic-coated RAL 7035
Protection class: IP 23

Optional:
The following can be supplied at extra charge:
– With MG holes according to customer specification
– With MG cable entries according to customer specification
– With other colours, e.g. RAL 6011/9001

Type	Item no:	Total kg	Dimensions approx. in mm						
			a	b	c	a1	c1	Hole pattern	Mounting
RG 300	0860-00000300	26	340	380	400	380	500	320x300	Ø13
RG 310	0860-00000310	36	410	450	500	450	600	390x370	Ø13
RG 320	0860-00000320	56	560	600	600	600	700	540x520	Ø13



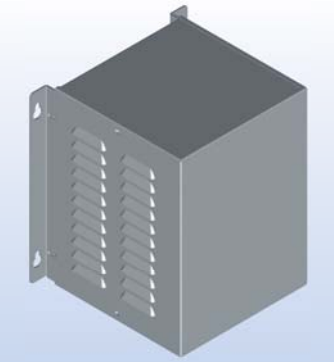
Optional:

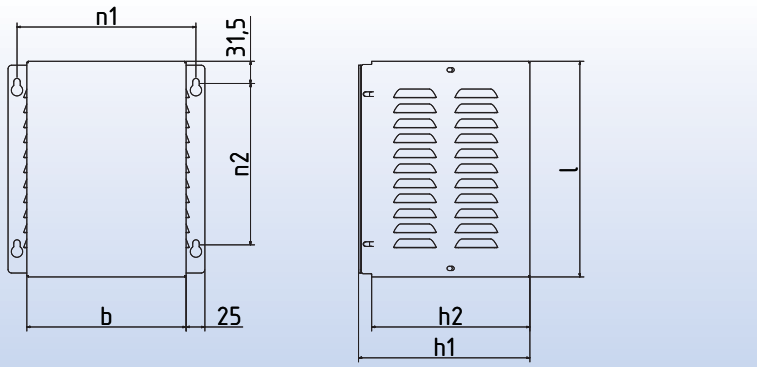
The following can be supplied at extra charge:

– Upper enclosure section also available without air slit
– With MG cable entries according to customer specification
– Additional holes

Upright enclosure
Material: St. 1203
Plastic-coated RAL 7035
Protection class: IP 23

Type	Item no:	Total kg	Dimensions approx. in mm			
			A	A1	B	C
RG 20	0830-00000020	0,67	94	118	90	110
RG 21	0830-00000021	0,92	114	138	110	130
RG 22	0830-00000022	1,21	134	158	130	150
RG 23	0830-00000023	2,24	174	198	160	200
RG 24	0830-00000024	2,61	224	248	180	180
RG 25	0830-00000025	3,79	274	298	220	220
RG 26	0830-00000026	5,61	334	358	250	300
RG 27	0830-00000027	7,02	374	398	280	280
RG 28	0830-00000028	10,17	454	478	350	300
RG 29	0830-00000029	11,96	534	558	380	300





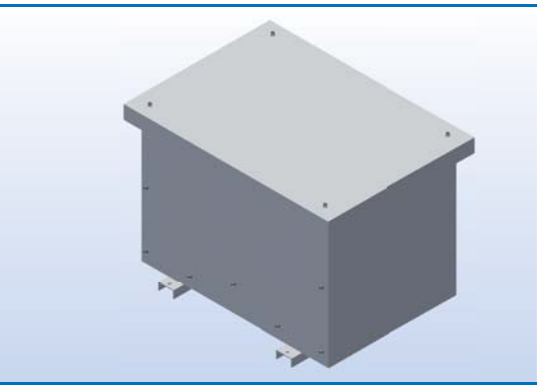
Optional:

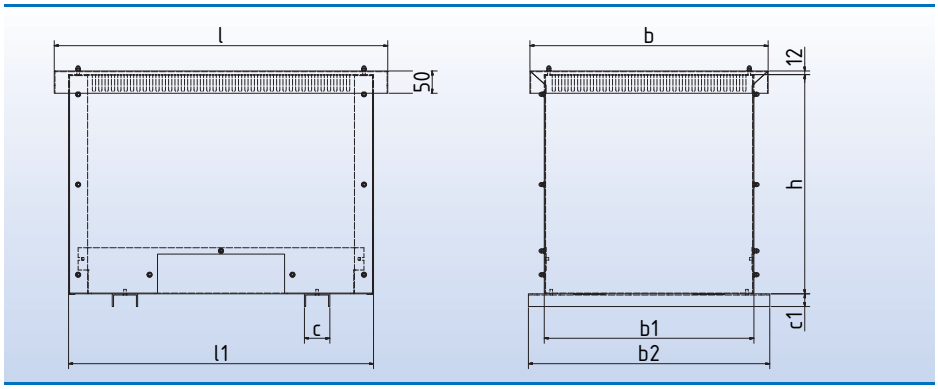
The following can be supplied at extra charge:

– With MG holes according to customer specification
– With MG cable entries according to customer specification
– With other colours, e.g. RAL 6011/9001

Wall-mount enclosure
Material: St. 1203
Plastic-coated RAL 7035
Protection class: IP 23

Type	Item no:	Total kg	Dimensions approx. in mm					
			l	b	h1	h2	n1	n2
RG 20 W	0831-00000020	0,67	122	93	130	110	116	48
RG 21 W	0831-00000021	0,92	142	113	150	130	136	68
RG 22 W	0831-00000022	1,21	162	133	170	150	156	88
RG 23 W	0831-00000023	2,24	202	163	220	200	186	128
RG 24 W	0831-00000024	2,61	252	183	200	180	206	178
RG 25 W	0831-00000025	3,79	302	223	240	220	246	228
RG 26 W	0831-00000026	5,61	362	253	320	300	276	288
RG 27 W	0831-00000027	7,02	402	283	300	280	306	328
RG 28 W	0831-00000028	10,17	482	353	320	300	376	408
RG 29 W	0831-00000029	11,96	562	383	320	300	406	488





CE

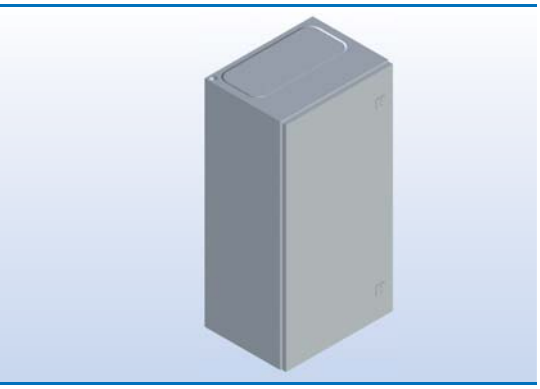
Upright assembly set enclosure
Material: St. 1203
Plastic-coated RAL 7035

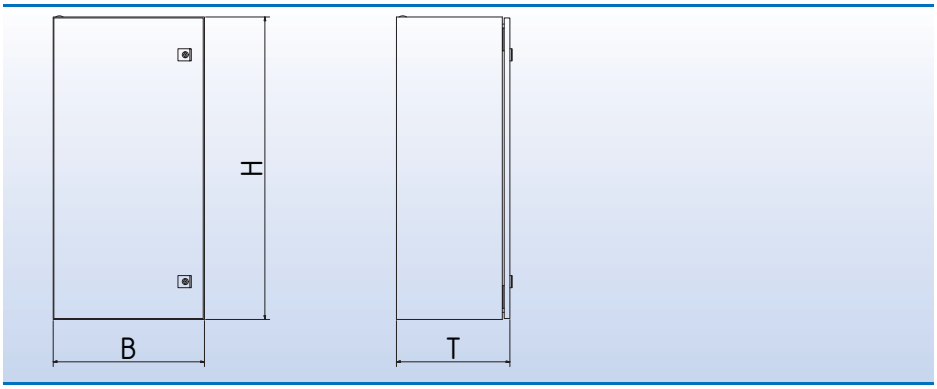
Optional:

The following can be supplied at extra charge:
– with MG holes according to customer specification
– with MG cable entries according to customer specification
– with other colours, e.g. RAL 6011/9001

Available in versions:
IP 02 - Without perforated panel
IP 23 - With perforated panel
IP 54 - With closed baseplate and hollow profile seal
Material: EPDM quality self-adhesive

Type	Item no:			Total kg max.	Dimensions approx. in mm								
	IP 02	IP 23	IP 54		l	l1	b	b1	b2	h	c	c1	s
RG 110	0840-0110IP02	0840-0110IP23	0840-0110IP54	23	550	460	490	400	500	480	45	30	3
RG 120	0840-0120IP02	0840-0120IP23	0840-0120IP54	28	610	520	540	450	550	560	45	30	3
RG 130	0840-0130IP02	0840-0130IP23	0840-0130IP54	20	610	520	430	340	440	420	45	30	3
RG 140	0840-0140IP02	0840-0140IP23	0840-0140IP54	26	670	580	490	400	500	480	45	30	3
RG 150	0840-0150IP02	0840-0150IP23	0840-0150IP54	32	770	680	540	450	550	560	45	30	3
RG 160	0840-0160IP02	0840-0160IP23	0840-0160IP54	44	855	765	620	530	630	620	55	100	5
RG 165	0840-0165IP02	0840-0165IP23	0840-0165IP54	47	855	765	620	530	630	820	55	100	5
RG 170	0840-0170IP02	0840-0170IP23	0840-0170IP54	60	1050	960	750	660	760	690	55	100	5
RG 175	0840-0175IP02	0840-0175IP23	0840-0175IP54	63	1050	960	750	660	760	890	55	100	5
RG 180	0840-0180IP02	0840-0180IP23	0840-0180IP54	77	1150	1060	850	760	860	800	55	100	5
RG 185	0840-0185IP02	0840-0185IP23	0840-0185IP54	80	1150	1060	850	760	860	1000	55	100	5
RG 190	0840-0190IP02	0840-0190IP23	0840-0190IP54	116	1340	1250	850	760	860	1250	55	100	5
RG 210	0840-0210IP02	0840-0210IP23	0840-0210IP54	41	750	660	580	490	590	590	55	100	5
RG 220	0840-0220IP02	0840-0220IP23	0840-0220IP54	58	840	750	490	400	500	800	55	100	5
RG 230	0840-0230IP02	0840-0230IP23	0840-0230IP54	50	940	850	640	550	650	730	55	100	5
RG 240	0840-0240IP02	0840-0240IP23	0840-0240IP54	76	1090	1000	590	500	600	1000	55	100	5
RG 250	0840-0250IP02	0840-0250IP23	0840-0250IP54	109	1290	1200	790	700	800	1100	55	100	5





CE

Universal Rittal steel cabinets
(for floor installation or wall mounting)
Material: St. 1203
Plastic-coated RAL 7035

Design:

Cabinet with galvanised preinstalled mounting plate, powder-coated in structural RAL7035, type RAE in IP66/ NEMA4, types RCM and RTS in IP55/ NEMA12, door stop right (left upon request), flange plate in enclosure base, standard delivery from 600mm height standing with cast iron U base 100mm in same RAL7035

Special versions:

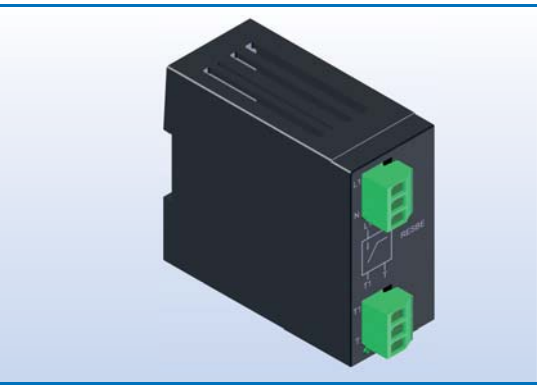
Other dimensions and colours, cable glands, earthing strips, installed transformer and accessories, installable base, wall suspension, fan, label, safety accessories

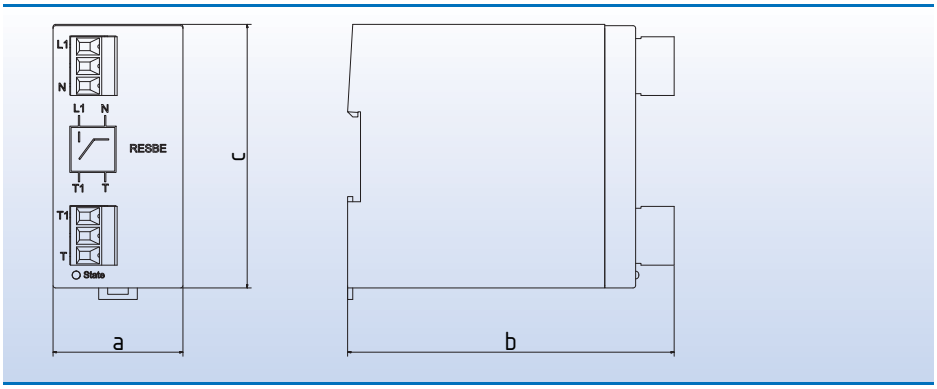
Optional:

- Available upon request
- Heavy-load fastening for transformer
- Cast iron U base: 100mm
- Frame base: 100mm
- Frame base: 200mm
- Wall holder set

Type	Item no:	Total kg	Dimensions approx. in mm			
			Height	Width	Depth	Doors
RAE 1032	0861-00001032	4,0	300	200	120	1
RAE 1035	0861-00001035	4,5	300	200	155	1
RAE 1036	0861-00001036	6,1	300	300	155	1
RAE 1033	0861-00001033	7,0	300	300	210	1
RAE 1380	0861-00001380	9,8	380	380	210	1
RAE 1034	0861-00001034	8,8	400	300	210	1
RAE 1045	0861-00001045	13,0	500	400	210	1
RAE 1050	0861-00001050	16,8	500	500	210	1
RAE 1350	0861-00001350	19,6	500	500	300	1
RAE 1038	0861-00001038	15,6	600	380	210	1
RAE 1338	0861-00001338	19,4	600	380	350	1
RAE 1360	0861-00001360	28,4	600	600	350	1
RAE 1055	0861-00001055	33,9	600	800	300	1
RAE 1057	0861-00001057	31,2	700	500	250	1
RAE 1376	0861-00001376	36,0	700	600	350	1
RAE 1073	0861-00001073	44,5	700	760	300	1
RAE 1058	0861-00001058	33,6	800	600	250	1
RCM 5110	0861-00005110	37,1	800	600	400	1
RCM 5111	0861-00005111	46,6	1000	600	400	1
RCM 5114	0861-00005114	54,2	1000	800	300	1
RCM 5115	0861-00005115	58,0	1000	800	400	1
RCM 5113	0861-00005113	53,2	1200	600	400	1
RTS 8615	0861-00008615	74,5	1200	600	500	1
RCM 5117	0861-00005117	67,5	1200	800	400	1
RTS 8815	0861-00008815	92,1	1200	800	500	1
RCM 5120	0861-00005120	81,7	1200	1000	400	2
RCM 5123	0861-00005123	96,9	1200	1200	400	2
RTS 8215	0861-00008215	140,0	1200	1200	500	2
RTS 8645	0861-00008645	86,0	1400	600	500	1
RTS 8845	0861-00008845	107,5	1400	800	500	1
RCM 5121	0861-00005121	90,3	1400	1000	400	2
RTS 8245	0861-00008245	163,5	1400	1200	500	2
RTS 8665	0861-00008665	100,0	1600	600	500	1
RTS 8865	0861-00008865	103,0	1600	800	500	1
RTS 8265	0861-00008265	159,3	1600	1200	500	2
RTS 8686	0861-00008686	96,8	1800	600	600	1
RTS 8886	0861-00008886	120,3	1800	800	600	1
RTS 8286	0861-00008286	179,9	1800	1200	600	2
RTS 8606	0861-00008606	104,0	2000	600	600	1
RTS 8806	0861-00008806	130,5	2000	800	600	1
RTS 8006	0861-00008006	161,2	2000	1000	600	2
RTS 8206	0861-00008206	194,6	2000	1200	600	2

ACCESSORIES





Inrush current limiters

CE

RESBE and RESBD single-phase and 3-phase

General information:

When energy consumers are switched on inrush current surges can arise and lead to undesired activation of fuse elements. In such cases use of inrush current limiters is useful for enabling selective fusing.

Through line-side (upstream) installation of our inrush current limiters from the RESBE and RESBD series commercially available fuses and line circuit breakers can be used.

The RESBE and RESBD series has been realised through our patent application 'Inrush current limitation with time-controlled second switching element'.

To eliminate the bypass current surge the load duty cycle should be longer than the duration of the inrush current limitation. If this cannot be implemented, we recommend the 'release output' option for the loads with a release input or with a remote input/output.

ELECTRICAL SPECIFICATIONS	RESBE 230V 4A	RESBE 230V 10A	RESBE 230V 16A	RESBE 115V 16A	RESBE 400V 16A	RESBE 208V 16A	RESBD 400V 16A	RESBD 208V 16A
Nominal voltage Vnom	AC 230V			AC 115V	AC 400V	AC 208V	3AC 400V	3AC 208V
Voltage range Vmin-Vmax	AC 195-264V			AC 85-132V	AC 340-460V	AC 176-240V	3AC 340-460V	3AC 176-240V
Frequency	45-65Hz							
Overvoltage protection	Varistor						Varistors	
Continuous current Imax	4A	10A	16A					
Maximum inrush current surge, typical (@Ta=25°C/Umax)	<8A <5ms	<18A <5ms	<36A <5ms	<18A <5ms	<32A <5ms	<32A <5ms	<32A <5ms	<17A <5ms
Maximum inrush current surge, typical (@Ta=60°C/Umax)	<18A <5ms	<56A <5ms	<104A <5ms	<53A <5ms	<96A <5ms	<96A <5ms	<96A <5ms	<44A <5ms
Duration of current limitation	<1s							
Maximum switching frequency	30 1/h							
Protection class	IP 20							
Ambient temperature	0 to 60°C							
Installation position	any							
Weight	250g	240g			250g	240g	260g	
Dimensions in mm (W x H x D)	51 x 105 x 127							
Article no.	0202-00000007	0202-00000008	0202-00000009	0202-00000010	0202-00000011	0202-00000012	0202-00000013	0202-00000014
OPTIONS (at extra charge)								
Release output for connection of load	DC 3-30V							
Other voltages	yes							
Other frequencies	$16^{2/3}$ - 400Hz							
Duration, adjustable on delivery	0.2 - 1s							

Fusing:

For fusing a transformer the following points should be considered.

1. Selection of the fuse media is determined by the rating data such as allowable voltage and current as well as their activation characteristic curve and breaking capacity.
   It must be considered that depending on the fuse selected a back-up protection (back-up fuse) may need to be provided to cover the entire current/time spectrum.
2. For stating the fuse value normally differentiation must be made between the primary side and the secondary side of a transformer.

The 'reliable activation' of a fuse in connection with a transformer can most easily be realised via the secondary side because the rated current can be selected to be close to the nominal current of the fuse. This then protects the transformer reliably against short circuit and excessive overload on the output. The overcurrent protection of a transformer, e.g., in a turn-to-turn fault, can only be realised via the primary-side fuse. However, the fuse value must usually be designed to be several times higher than the rated current of the transformer would demand due to the inrush. For this reason the fuse solely represents a short-circuit protection and less of an overload protection.

However, aids such as inrush current limiters can provide help to select the fuse value to be close to the rated current of the transformer.

There is a causal relationship between fuse value, fuse type, (large) line length, ambient temperature and allowable transformer temperature (according to standard) for achiving optimal protection and operating conditions. The recommended fuse values on the rating plates and data sheets for our transformers solely refer to protection of the transformer and must be placed immediately behind or in front of the transformer. In case of deviating nominal conditions (e.g. ambient temperature) the fuse values must be corrected. Our fuse recommendations are primarily based on equipment protection fuses (electrical fuses), circuit breakers and motor circuit breakers. Optimal protection is offered by commercially available transformer circuit breakers because they have been adapted for the switch-on characteristics of a transformer.

Note: For primary-side fusing of variable ratio ring transformers and transformers with multiple output voltages or output coils the current transformation at overload must be considered.

Fuses

If stated types are not availabe, alternative types.

Type	Phases	Type	Current	max. voltage
Motor circuit breaker	3	PKZM0-6,3	4...6,3A	690V
Motor circuit breaker	3	PKZM0-10	6,3…10A	690V
Motor circuit breaker	3	PKZM0-12	8…12A	690V
Motor circuit breaker	3	PKZM0-16	10…16A	690V
Motor circuit breaker	3	PKZM0-20	16…20A	690V
Motor circuit breaker	3	PKZM0-25	20…25A	690V
Motor circuit breaker	3	PKZM0-32	25…32A	690V
Motor circuit breaker	3	PKZM4-40	32…40A	690V
Motor circuit breaker	3	PKZM4-50	40…50A	690V
Motor circuit breaker	3	PKZM4-58	50…58A	690V
Motor circuit breaker	3	PKZM4-63	55…65A	690V
Motor circuit breaker	3	NZMB1-A63	50…63A	690V
Motor circuit breaker	3	NZMB1-A80	63…80A	690V
Motor circuit breaker	3	NZMB1-A100	80…100A	690V
Motor circuit breaker	3	NZMB1-A125	100…125A	690V
Motor circuit breaker	3	NZMB1-A160	125…160A	690V
Motor circuit breaker	3	NZMB2-A200	160…200A	690V
Motor circuit breaker	3	NZMB2-A250	200…250A	690V
Motor circuit breaker	3	NZMB2-A300	240…300A	690V
Load interrupter NH00	3	---	to160A	690V
Load interrupter NH1	3	---	to 250A	690V
Load interrupter NH2	3	---	to 400A	690V
Load interrupter NH3	3	---	to 630A	690V
Load interrupter NH4a	3	---	to 1600A	690V
Fuse D02	3	---	to 63A	500V
Fuse D02	1	---	to 63A	500V
Fuse 5x20mm	1	---	to 16A	230V
Fuse 6.3x32mm	1	---	to 16A	500V

Main switch:

max. voltage 600V

Type	max. current
HLT 20	20 A
HLT 25	25 A
HLT 32	32 A
HLT 40	40 A
HLT 63	63 A
HLT 80	80 A
HLT 100	100 A
HLT 125	125 A
HLT 180	180 A
HLT 250	250 A

Measuring devices:

max. voltage: 700V, current: 600A transformer incl.

Type	Dimensions
analogue - voltage	96 x 96mm
analogue - current	96 x 96mm
digital - voltage	96 x 48mm
digital - current	96 x 48mm
digital - universal (U,I,P,THD)	96 x 96mm

Fan + exit filter:

Type (Rittal)	Air volumem³/h
SK 3237.100	20
SK 3238.100	55
SK 3239.100	105
SK 3240.100	160
SK 3241.100	230
SK 3243.100	555
SK 3244.100	700

Cable glands:

Available in M16, M20, M25, M32, M40, M50 and M63, each in plastic or brass.

PRODUCT OVERVIEW

- Single-phase and 3-phase transformers to 630 kVA
- Chokes and choke filter systems
- High-current supplies and coils
- Thyristor controllers
- Voltage stabilisers
- Single- and three-phase power supplies (stabilised and non-stabilised)
- Chargers
- AC- and DC UPS modules / systems
- Primary and secondary side-controlled switched-mode power supplies
- Variable ratio ring transformers
- Inrush current limiters for transformers and power supplies
- Voltage- and temperature-monitoring modules
- Customer-specific developments

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