



THREE-PHASE TRANSFORMERS

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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 $30^\circ = 1$ hour).

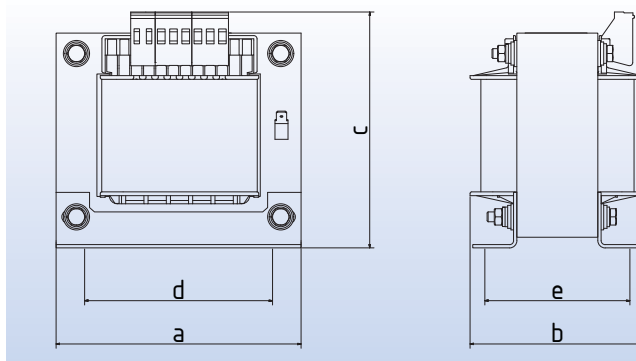
Symbols on the voltages on the rating plate provide additional identification.

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	
0	Dd0					not available
	Yy0					10% loadable
	Dz0					Fully loadable
5	Dy5					Fully loadable
	Yd5					not available
	Yz5					Fully loadable
6	Dd6					not available
	Yy6					10% loadable
	Dz6					Fully loadable
11	Dy11					Fully loadable
	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).

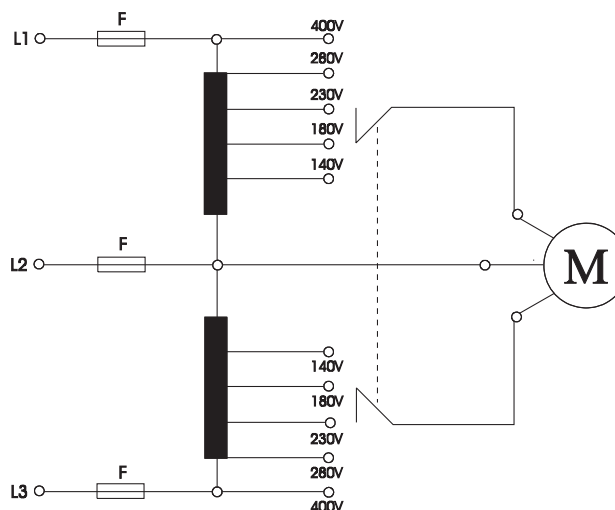
Voltage range:

Input voltage: AC 400V 3~

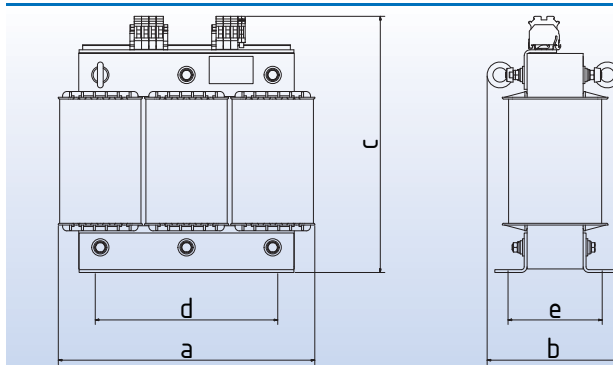
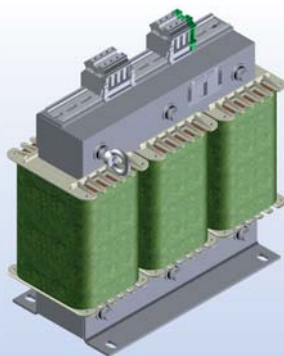
Output voltages: AC 140/180/230/280/400V

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					Mounting
a	b	c	d	e						
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,

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

Grid transformers according to VDE 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:

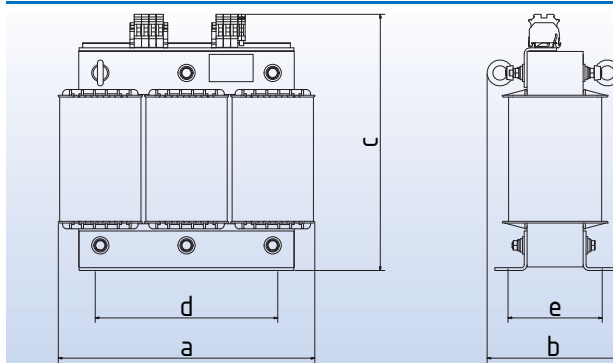
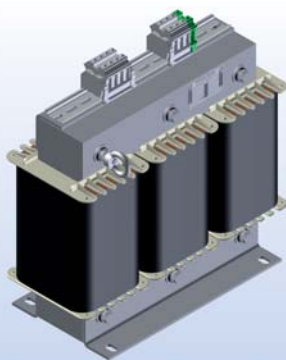
Open frame, stationary, for device installation and assembly in dry rooms, separate windings. Connection to leakage current-resistant transformer terminals with screw fastening. For over 50A leakage current-resistant terminal blocks are mounted on top brackets (note: dimensions b and c are enlarged by 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 auto-transformer windings' in the section containing general information).

Type	Power VA	$\eta \approx \%$	Core	Item no.	Copper kg	Total kg	Dimensions approx. in mm					Mounting
							a	b	c	d	e	
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 to VDE 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.).

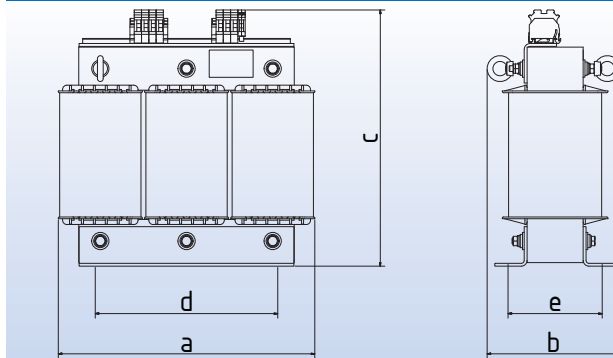
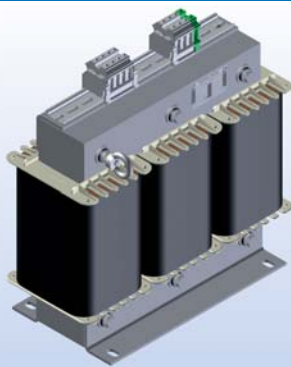
IP 00, insulation class F, ambient temperature 40°C (ta40°C/F).

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

Type	Power VA	$\eta \approx \%$	Core	Item no.	Copper kg	Total kg	Dimensions approx. in mm					Mounting
							a	b	c	d	e	
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



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 *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 „Construction 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. They 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 to VDE 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.

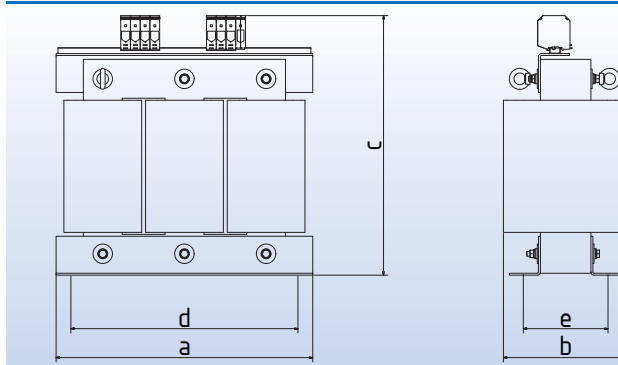
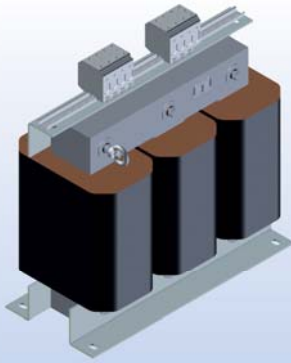
The particular advantages of the DRUL series

- Input voltage 3AC 200-600V freely selectable; output voltage: see table below.
- Maximum 4 voltage taps, e.g. $\pm 5\%$ 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 voltage 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). ($t_{a40^{\circ}\text{C/F}}$).

Type	Power VA	Secondary voltage	Core	Item no.	Copper kg	Total kg	Dimensions approx. in mm					
							a	b	c	d	e	Mounting
DRUL 110	110	10-600	3UI 60/21	0323-00000110	0,8	1,7	120	81	110	90	39	M4
DRUL 150	150	10-600	3UI 60/31	0323-00000150	0,9	2,4	120	91	110	90	49	M4
DRUL 260	260	10-600	3UI 75/26	0323-00000260	1,2	3,9	150	86	135	113	49	M5
DRUL 410	410	10-600	3UI 75/41	0323-00000410	1,7	5,7	150	101	135	113	64	M5
DRUL 500	500	10-600	3UI 90/31	0323-00000500	2,4	6,6	180	91	155	136	57	M6
DRUL 630	630	10-600	3UI 90/41	0323-00000630	2,8	8,4	180	101	155	136	67	M6
DRUL 800	800	10-600	3UI 90/51	0323-00000800	3,1	10,2	180	111	155	136	77	M6
DRUL 1000	1000	10-600	3UI 102/46	0323-00001000	3,5	11,3	210	108	175	150	80	M8
DRUL 1100	1100	10-600	3UI 114/40	0323-00001100	4,6	13,1	228	110	195	176	71	M6
DRUL 1200	1200	10-600	3UI 102/57	0323-00001200	4,0	13,4	210	119	175	150	91	M8
DRUL 1500	1500	10-600	3UI 120/51	0323-00001500	5,1	17,0	240	121	205	185	81	M8
DRUL 1750	1750	10-600	3UI 114/64	0323-00001750	5,7	18,9	228	134	195	176	95	M6
DRUL 2000	2000	10-600	3UI 120/61	0323-00002000	6,9	21,0	240	131	205	185	91	M8
DRUL 2200	2200	10-600	3UI 120/66	0323-00002200	7,5	22,6	240	136	205	185	96	M8
DRUL 2400	2400	10-600	3UI 120/71	0323-00002400	8,8	25,0	240	141	205	185	101	M8
DRUL 2700	2700	10-600	3UI 120/75	0323-00002700	9,8	26,8	240	145	205	185	105	M8
DRUL 3000	3000	10-600	3UI 132/72	0323-00003000	9,2	29,2	265	152	230	200	102	M8
DRUL 3400	3400	10-600	3UI 150/52	0323-00003400	12,4	31,2	300	140	260	224	94	M8
DRUL 4400	4400	10-600	3UI 150/65	0323-00004400	13,4	36,6	300	153	260	224	108	M8
DRUL 5000	5000	10-600	3UI 150/65	0323-00005000	15,0	41,1	300	153	260	224	108	M8
DRUL 6000	6000	10-600	3UI 150/77	0323-00006000	13,9	41,1	300	165	260	224	120	M8
DRUL 7500	7500	20-600	3UI 150/92	0323-00007500	17,2	49,6	300	180	260	224	134	M8
DRUL 8000	8000	20-600	3UI 168/75	0323-00008000	18,0	51,3	336	150	290	248	127	M8
DRUL 9600	9600	20-600	3UI 168/92	0323-00009600	22,2	62,5	336	170	290	248	144	M8
DRUL 10000	10000	20-600	3UI 180/78	0323-00010000	22,6	62,0	360	180	310	264	140	M8
DRUL 12000	12000	40-600	3UI 180/93	0323-00012000	29,3	76,0	360	195	310	264	155	M8
DRUL 16000	16000	40-600	3UI 210/73	0323-00016000	41,5	90,0	420	180	360	316	143	M10
DRUL 19000	19000	40-600	3UI 210/88	0323-00019000	51,5	110,0	420	195	360	316	158	M10
DRUL 21500	21500	40-600	3UI 210/103	0323-00021500	53,5	122,0	420	210	360	316	173	M10
DRUL 25000	25000	40-600	3UI 210/133	0323-00025000	60,3	150,0	420	240	360	316	203	M10
DRUL 30000	30000	80-600	3UI 210/133	0323-00030000	60,3	146,0	420	240	360	316	203	M10
DRUL 36000	36000	80-600	3UI 240/110	0323-00036000	87,3	181,0	480	240	415	356	184	M14
DRUL 40000	40000	80-600	3UI 240/140	0323-00040000	97,8	218,0	480	270	415	356	214	M14
DRUL 50000	50000	80-600	3UI 240/140	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,

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



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 class F
- 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

