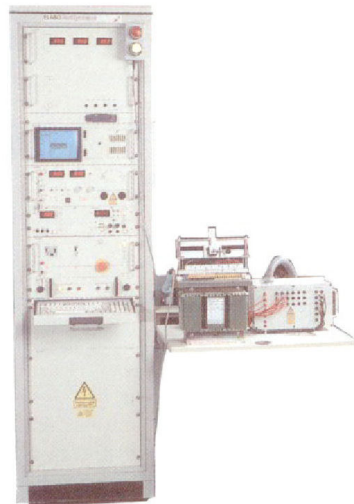


COMPANY PROFILE



Rist is a company based a few kilometers from Stuttgart, Germany, in Ostfildern, and was founded more than 60 years ago as a medium-sized company.

Our company philosophy of guaranteeing high-quality products through painstaking careful production processes and continuous quality checks continues to motivate everything that we do. Our close attention to the relevant safety regulations and manufacturing norms serves that goal.



[graphic: transformer testing station]

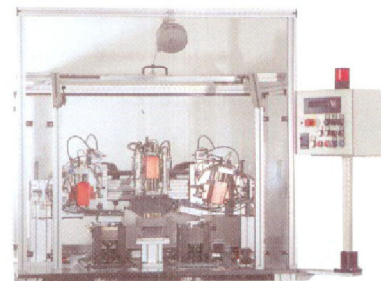
We use the most current equipment, and that is a critical factor that helps us reach our company goals.



[graphic: winding machine]

We believe that responding fast and flexibly to customer requests is the basis of trust and good collaboration. For that reason, our highest priority is to deliver our products as quickly as possible.

Rist has been a long-term and trusted partner of companies in the most diverse industries. Whether it is engineering and machine manufacturing, textile machines, the auto industry, medical technology, or modern messaging and communication technologies, Rist's transformers and coils enjoy a high degree of popularity.



[graphic: transformer box machine]

At the same time, the most important prerequisite for the success of our company continues to be the qualifications of our employees, and that is the focus of our constant attention. The qualification level of our employees is continuously maintained and improved by ongoing training measures, internal as well as external.

TECHNICAL DETAILS



Types



The transformer is one of the most important links in our energy supply chain, and has many different forms, for its multitude of uses.

Our manufacturing program includes:

- Single-phase dry-type transformers 10 VA - 10 kVA
- Three-phase current dry-type transformers 50 VA - 150 kVA
- Single-phase-three-phase transformers
- Single phase and three-phase network devices up to 60 A
- Single and three-phase chokes
- High voltage transformers

VDE Regulations



With regard to transformers with economy windings, depending on the transmission set-up, higher power throughputs can be achieved (please see the explanations on economy windings). VDE regulations 0550, 0551 (EN 60742), 0532 (EN 60076) and 0570 (EN 61 558) form the basis for our manufacture of transformers.

Nominal output



The nominal output listed in the catalog is the power in VA on the output side.

It is valid for:

- Separate winding with a power transmission
- Nominal primary power
- Continuous operation
- Nominal frequency 50/60 Hz
- Room/environmental temperature 40° C

The nominal output for single-phase transformers is calculated by the product of the nominal secondary voltage, and the nominal secondary power.

$$S \text{ (VA)} = U \text{ (V)} * I \text{ (A)}$$

For three-phase current transformers, it is the product of the nominal secondary voltage, the nominal secondary power, and a linkage effect $\sqrt{3}$:

$$S \text{ (VA)} = U \text{ (V)} * I \text{ (A)} * \sqrt{3}$$

TECHNICAL DETAILS



If there is more than one output winding, the nominal output is the sum of all the individual voltage power:

$$S \text{ (VA)} = S1 \text{ (VA)} + S2 \text{ (VA)} + \dots$$

Tappings of the secondary windings (coils) are only loadable with the voltage calculated from the secondary power and highest secondary power.

Transformer with an economy winding

For an economy winding, the leading connection is between the primary and secondary windings. The outgoing power is part inductive and part transmitted through voltage. Those are considerably smaller than transformers with separate coils. It is smaller in relation to how much less is the difference between the input voltage and output voltage is. The model size or type of power of an autotransformer is always smaller than the nominal output (throughput power), and is calculated as follows:

Determination of the type of power

$$St = S * (Uo - Uu) / Uo$$

St = Type of power

S = Nominal output

Uo = Excess voltage (power surge)

Uu = Under-voltage (power sag)

Autotransformers may not be used as protection transformers.

The operating type ID (intermittent duty) makes possible, under certain conditions, smaller types. The relative duty cycle is calculated as follows:

The cycle duration (duration of the stop + duration of the load) may not exceed 10 minutes.

$$CD = (\text{Load time in min. / cycle duration in min.}) * 100 (\%)$$

TECHNICAL DETAILS



Load bearing capacity of the neutral point

For the load bearing capacity of the neutral point of the three-phase transformer, the following must be followed in order to avoid added losses and neutral point shifts:

Star-star circuit

The neutral point may only be loaded with the full nominal power (phase current), if the neutral conductor of the network feeding power in is connected to the primary-side transformer neutral point. If that is not the case, the neutral point should be loaded with approximately 10% of the phase current. For three-phase autotransformers that are in star-economy circuit, the same rule applies. Without any particular measures, for example, circuit types can be loaded up to 100 %: Dy5 with secondary led-out Y-point Yz5 with a secondary led-out Y-point.

Protection types

The IP protection type describes the touch-protection (protection against human contact), foreign object protection and the water protection of electrical controls and equipment. Based on German Industrial Norm DIN 40050, the individual protection types are defined, as follows:

IP 00 No particular protection

IP 20 Protection against introduction of a foreign object with diameter larger than 12.5 mm

IP 23 Protection against introduction of foreign objects with a diameter larger than 2.5 mm and protection against water sprays of up to 60 degrees to perpendicular

IP 54 Complete touch protection and protection against dust accumulation and splashing water.

TECHNICAL DETAILS



Special operating conditions

If unimpeded access of the cooling air can be ensured, the excess temperatures (80 degrees C for Isolation Class T 40 / B) for the transformers under normal operating conditions, defined by VDE (German Association for Electrical, Electronic & Information Technologies) 0550, may not be exceeded, assuming an environmental temperature of up to a maximum of 40 degrees Celsius.

Environmental temperature

For higher environmental temperatures, the nominal power is reduced, corresponding to the table below:

ET (C°) j	45	50	55	60	65	70
Output in % of type output	95	85	80	75	70	60

Isolation

The transformers can be used in many different environments when they are provided with a protective coating, and when they are well isolated. Coating under vacuum conditions can be provided, for example to enable the transformers to be used in tropical environments. That can almost totally reduce any negative effects of humidity.

Protection against short circuit

Transformers must be protected against short circuits that can occur during normal use, and they must be able to withstand short circuits. Those transformers are absolutely short-circuit protected which are protected in that the transformer will drop voltage internally. Those transformers are constant current transformers, in which, due to the way they are built, an ongoing short circuit of the secondary winding is made possible, without unacceptably excessive temperatures being reached.

Transformers that are conditionally short-circuit protected are those in which a short circuit protection is in the form of a safety fuse, excess temperature circuit breaker, or a temperature limiter that is built into the transformer. When there is an excessive surge of voltage, the protective device will be activated and will separate the device from the power supply, or from the source of the surge.

Transformers that are not short circuit protected are not provided with a protective device by the manufacturer.

TECHNICAL DETAILS



Protection Against Touch

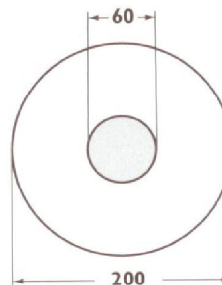
The operator of the transformers must protect the devices from overloads by means of the appropriate protective equipment, in the lead or in the dissipation of voltage. They correspond under these prerequisites again to the conditions for conditional short-circuit-protected transformers. If there is no technical reason for not doing so, the protective equipment of conditional short-circuit-protected transformers must be attached to the input circuit.

The German Professional Association of Precision Engineering and Electrotechnics has published an Accident Prevention Guide (UVV), entitled VBG 4, and the guide was written for the operators of electric facilities and equipment, and its goal is to prevent electrical accidents, by taking specific safety precautions.

The active parts (hazardous parts that can be touched) of electrical equipment and devices must be protected in such a way with respect to their voltage, frequency, use and their location, so that they cannot be directly touched, and that is done by isolating them, by where they are set up and positioned, in their assembly, or by means of devices that are physically attached to them.

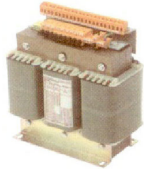
It is essential that active parts within a circumference of 30 mm of the relevant operating part be “finger-safe” (not be able to be touched by the fingers). For the remaining area up to 100 mm distance around the operating parts, “back of the hand” safety is proscribed.

Devices and equipment that are operated with protective extra-low voltage up to 25 V AC or 60 V DC, are to be protected “against direct touch”.



[diagram: “finger-touch safe” 60, “Back of the hand” safe: 200]

TECHNICAL DETAILS



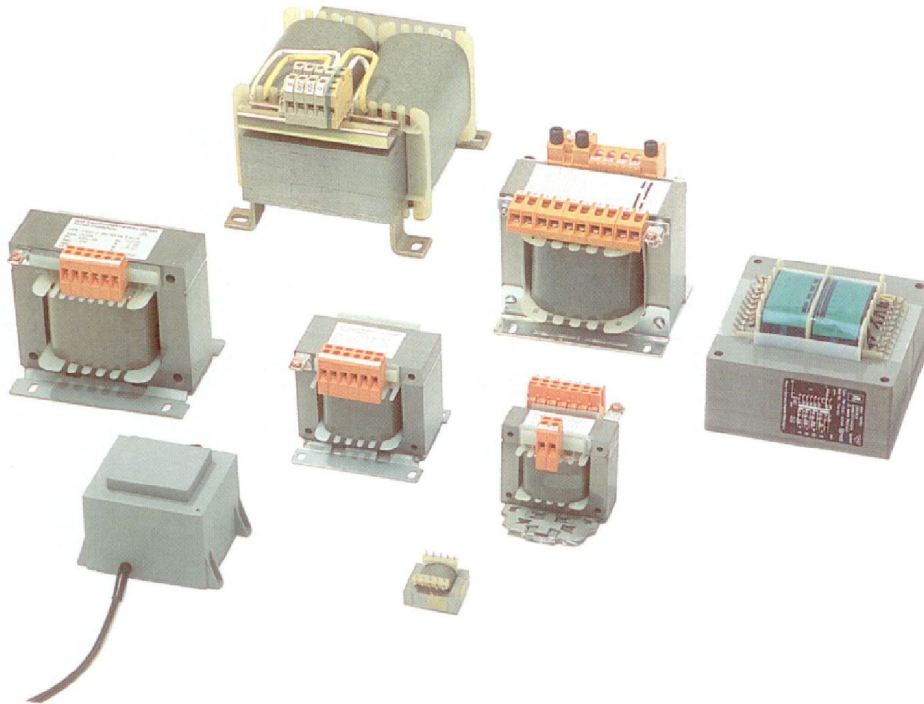
The circuit group describes the circuit of the coil and its phasing length with respect to each other. It consists of a large and a small letter as well as a number. The large number is the input winding, and the small letter is the output winding. Three-phase transformers are as a rule manufactured as star-star circuits, if the customer does not specifically request something else. The most common circuit groups are listed below.

Description		Direction hand	Circuit image	Secondary neutral point
Nr.	Circuit Group			
0	Dd0			Not available
	Yy0			10 % loadable
	Dz0			Fully loadable
5	Dy5			Fully loadable
	Yd5			Not loadable
	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

PRODUCTS



SINGLE-PHASE TRANSFORMERS



[graphic: single-phase transformers based on VDE 0550/3 and single-phase separate transformers, based on VDE 0550, 0551, 0570]

Characteristics

Isolation Class T 40 / B

Open design

With separate coils

Foot piece

Creeping current-safe transformer clamp

“Back of the hand” and finger-touch safe, based on UVV (VBG 4)

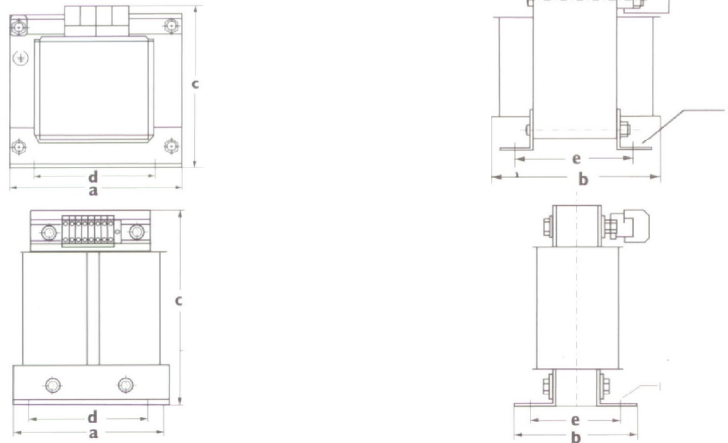
Corrosion protection through complete impregnation coating

IP 00, appropriate for the protection up to protection type IP 54.

PRODUCTS



SINGLE-PHASE TRANSFORMERS



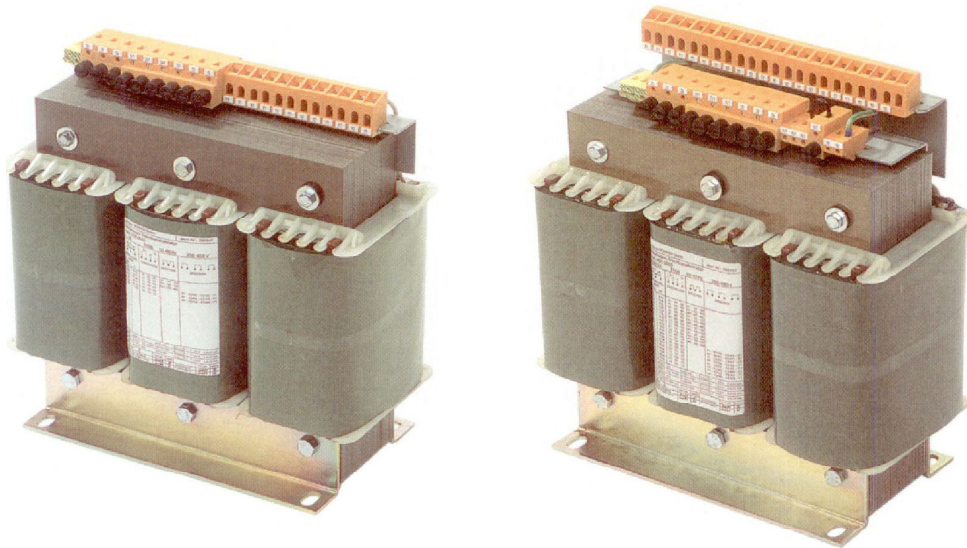
power	dimension approx.						copper weight	summary weight
VA	a	b	c	d	e	f	Kg	Kg
25	66	58	75	50	44	4,50	0,15	0,70
40	66	70	75	50	55	4,50	0,20	0,95
63	80	60	90	56	47	4,50	0,28	1,20
80	85	56	95	64	51	4,50	0,40	1,60
120	85	76	95	64	63	4,50	0,55	2,10
160	96	90	100	84	70	5,50	0,62	2,80
200	105	85	108	80	63	5,80	0,63	2,90
250	105	90	108	80	70	5,80	0,75	3,40
300	120	100	115	90	73	5,80	1,00	3,90
400	120	105	115	90	86	5,80	1,15	4,60
500	135	105	125	104	80	7,00	1,45	5,60
630	150	115	140	122	90	7,00	1,70	7,30
750	150	120	140	122	90	7,00	2,00	7,60
800	150	130	140	122	106	7,00	2,40	10,20
1200	150	130	140	122	115	7,00	2,80	11,70
1600	175	128	155	146	106	7,00	3,10	12,50
2000	175	150	155	146	126	7,00	4,30	17,00
2500	175	170	155	146	147	7,00	4,80	21,00
3000	200	178	270	140	134	11,00	9,00	29,80
4000	200	175	300	140	145	11,00	11,00	34,80
5000	230	180	320	190	135	11,00	13,60	40,20
6300	230	190	320	190	152	11,00	17,00	46,90
10000	280	240	355	239	165	11,00	22,00	61,50

primary voltage : 100..500V +/- 5%
 secondary voltage : 100...500 V

PRODUCTS



THREE-PHASE AUTOTRANSFORMERS



[graphic: Three-phase autotransformer, based on VDE 0550]

Characteristics

Isolation class T 40 / B

Open design

Standing or lying

Separate coils

Foot piece

“Back of the hand” and finger-touch safe, based on the German accident prevention norm UVV (VBG 4)

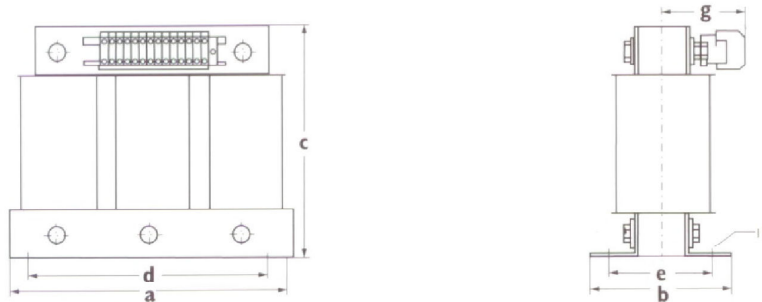
Corrosion protection by complete impregnation (coating) IP00

Appropriate for up to protection type IP 54

PRODUCTS



THREE-PHASE AUTOTRANSFORMERS



power	dimension approx.	mm						copper weight	summary weight
VA	a	b	c	d	e	f	g	Kg	Kg
50	100	56	100	73	42	4,30	35	0,60	1,42
120	120	71	110	81	55	5,50	45	0,77	2,40
180	150	58	135	113	49	5,80	35	0,95	3,70
250	150	83	135	113	65	5,80	40	1,30	5,10
350	180	101	165	136	66	6,50	55	1,50	6,10
500	180	101	165	136	76	6,50	60	2,00	6,40
750	205	106	180	156	62	6,50	55	2,60	8,70
1000	205	125	180	156	83	6,50	65	3,60	12,60
1300	240	140	215	185	84	8,50	80	4,50	17,40
1700	240	150	215	185	94	8,50	80	6,20	21,00
2500	265	162	235	200	102	8,50	90	8,80	25,40
3200	300	135	265	224	107	10,00	75	10,50	38,00
4400	300	147	265	224	119	10,00	80	11,20	40,00

Construction for winding ratio max. 550 V and max. 60 A

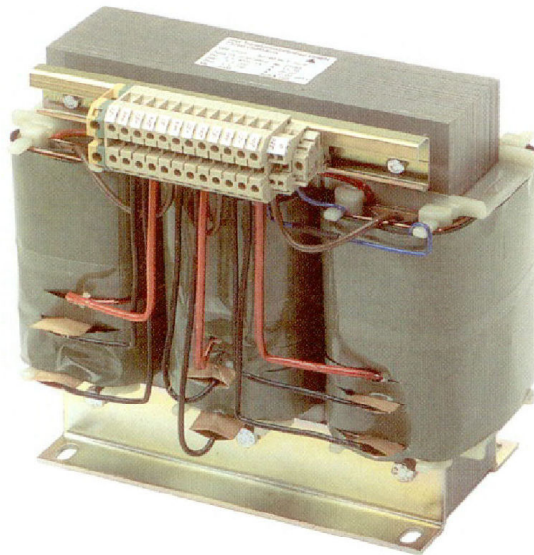
6300	350	180	300	248	130	10,00	130	17,30	58
8000	360	200	330	264	155	10,00	150	18,00	69
10000	390	180	350	260	100	11,00	140	18,00	71
13000	390	200	350	260	115	11,00	150	31,50	76
16000	470	200	400	400	120	13,00	150	40,20	98
20000	470	220	400	400	135	13,00	170	47,00	118
25000									
31000									
40000									
50000									

Construction more than 25000 VA, please contact us.

PRODUCTS



SINGLE-PHASE AND THREE-PHASE AUTOTRANSFORMERS



[graphic: Three-phase autotransformer, based on VDE 0550]

Characteristics

Isolation class T 40 / B

Open design

Standing or lying

Separate coils

Foot piece

“Back of the hand” and finger-touch safe, based on the German accident prevention norm

UVV (VBG 4)

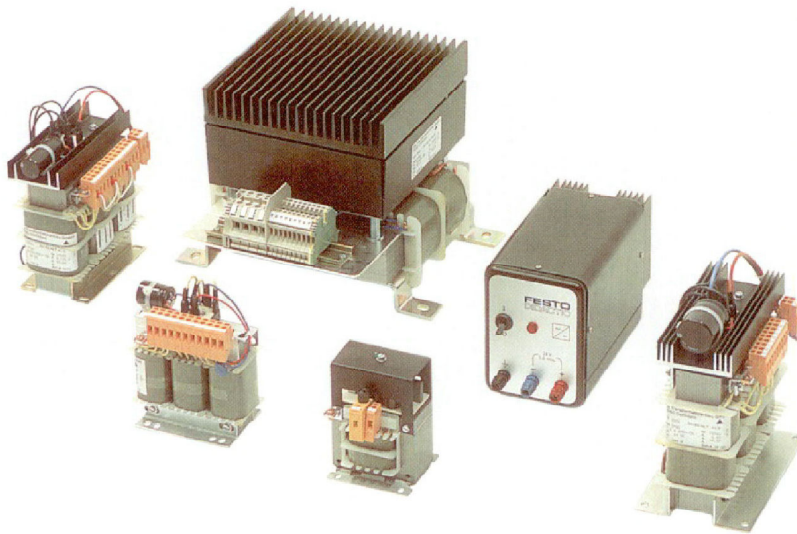
Corrosion protection by complete impregnation (coating)

Appropriate for up to protection type IP 54

PRODUCTS



RECTIFIER (CONVERTER) NETWORK DEVICES



[graphic: single-phase and three-phase network devices based on VDE 0550, 0551, 0570]

Characteristics

Isolation Class T 40 / B

Open design

Standing

With separate windings

Foot piece

Creeping current-safe transformer clamps

“Back of the hand” and finger-touch safe, based on UVV (VBG 4)

Corrosion protection through complete impregnation coating

IP 00

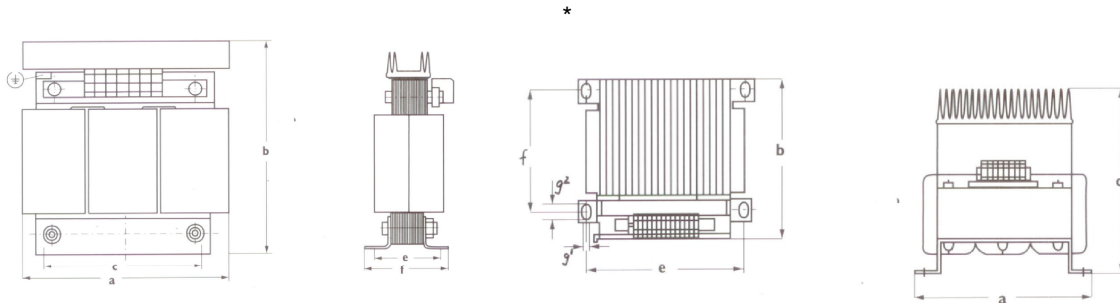
Appropriate for protection up to protection type IP 54

Residual ripple < 2.5 %

PRODUCTS



RECTIFIER (CONVERTER) NETWORK DEVICES



power	dimension approx.	mm				copper weight	summary weight
A	a	b	c	e	f	Kg	Kg
6	120	140	80	55	70	0,80	3,00
10	150	190	113	65	85	1,40	6,10
16	180	220	136	67	110	2,40	7,30
20	180	220	160	96	120	2,70	8,40

*power	dimension approx.	mm				copper weight	summary weight	
A	a	b	c	e	f	g1	g2	Kg
20	205	205	190	184	120	7	10	2,70
25	205	205	195	184	120	7	10	3,00
30	254	225	190	228	136	7	10	4,10
40	254	225	210	228	136	7	10	4,80
50	290	255	215	258	160	9	14	5,60
60	290	260	220	258	160	9	14	6,60

primary voltage : 3 x 400 V AC +/- 5%
 secondary voltage : 24 V DC