

GENERAL INFORMATION

At present, the improvement of the energy efficiency cannot be considered a slogan anymore, but a need of our time.

TR-PA series high efficiency transformers are created for this purpose guaranteeing:

- savings in operating costs of the plant, due to low values of losses.
- consumption reduction of energy resources.
- reduction of CO₂ emissions.

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ANNUAL SAVINGS (MAXIMUM) COMPARED TO TRANSFORMERS WITH LOSSES, ACCORDING TO HD 538.1 / HD 538.2

RATED OUTPUT kVA	100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
LOW CONSUMPTION (MWh)	3,8	5,3	6,7	12,7	9,2	18,4	24,1	26,3	34,2	29,8	51,7	71,8
LOW EMISSIONS CO ₂ (T)	2,8	3,9	5,0	9,5	6,9	13,8	18,1	19,7	25,6	22,3	38,8	53,9
ENERGY SAVINGS TOE *	0,7	1,0	1,2	2,4	1,7	3,4	4,5	4,9	6,4	5,6	9,7	13,4

* TONNE OF OIL EQUIVALENT

PARTICULARITY

Reference norms :

- CEI EN 60067-1,2,3,4,5 -11
- CEI EN 50541-1

The phases of design and building, in addition to their compliance with IEC EN norms, take into account the following regulations:

- ISO 9001 : 2008 regarding the quality standards and procedures .
- ISO 14001 : 2004 regarding the environmental issues .

Easy and fast to install are suitable for use in:

- MV/LV prefabricated substation and substation with reduced dimensions.
- fire and pollution hazard areas.
- buildings with public access.

Moreover, their disposal is simple and with low environmental impact.

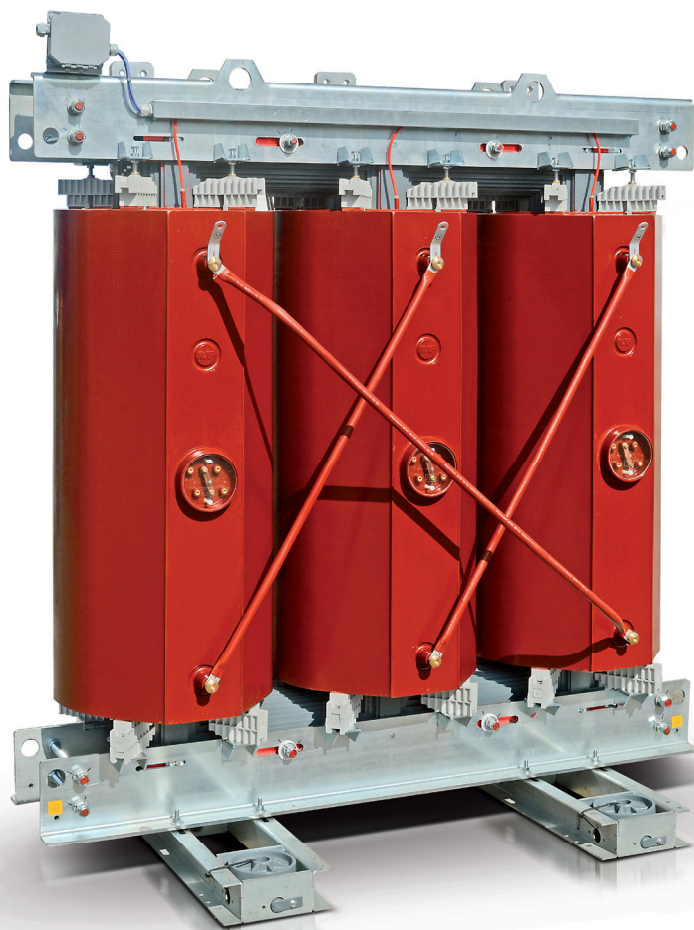
DESCRIPTION

The three-phase cast resin transformers have the following features:

- MV windings encapsulated in cast resin.
- LV windings impregnated with resin.
- Magnetic core made using magnetic grain-oriented steel sheets with low loss, and the joints are Step-Lap inserted sheet.
- Level of partial discharges < 10 pC.
- Thermal class F – Temperature rise 100 K.
- Ambient temperature ≤ 40°C, altitude ≤ 1000 m.
- Self-extinguishing with low emission of gas, classification F1.
- Resistant to thermal shock, classification C2.
- Resistant to condensation and humidity, classification E2.

COMPLETION ACCESSORIES ALWAYS PROVIDED

- LV terminal connector plates
- MV voltage variation by off circuit tapplings links
- Rating plate
- Lifting lugs
- 2 earthing points
- 4 bi-directional flat rollers



RATED OUTPUT kVA		100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
NO-LOAD LOSSES	W	280	350	520	750	1.100	1.300	1.550	1.800	2.200	2.600	3.100	3.800
LOAD LOSSES AT 75 °C	W	1.575	2.275	2.975	3.950	6.200	7.000	7.875	9.625	11.375	14.000	16.625	19.250
LOAD LOSSES AT 120 °C	W	1.800	2.600	3.400	4.500	7.100	8.000	9.000	11.000	13.000	16.000	19.000	22.000
NO-LOAD CURRENT	%	1	0,9	0,8	0,8	0,8	0,6	0,6	0,6	0,6	0,6	0,4	0,4
IMPEDANCE VOLTAGE	%	6	6	6	6	6	6	6	6	6	6	6	6
INRUSH CURRENT IE/IN		11,5	10,5	10,00	9,5	9,5	9	9	8,5	8,5	8	8	7,5

EFFICIENCY AT 75°C

COSφ 1 100% LOAD	%	98,15	98,36	98,60	98,83	98,84	98,96	99,06	99,09	99,15	99,17	99,21	99,27
COSφ 1 75% LOAD	%	98,45	98,65	98,83	99,01	99,03	99,13	99,20	99,23	99,28	99,30	99,34	99,38
COSφ 0,9 100% LOAD	%	97,90	98,14	98,41	98,67	98,68	98,82	98,93	98,96	99,04	99,06	99,10	99,17
COSφ 0,9 75% LOAD	%	98,25	98,47	98,68	98,88	98,90	99,01	99,10	99,13	99,19	99,21	99,25	99,30

EFFICIENCY AT 75°C

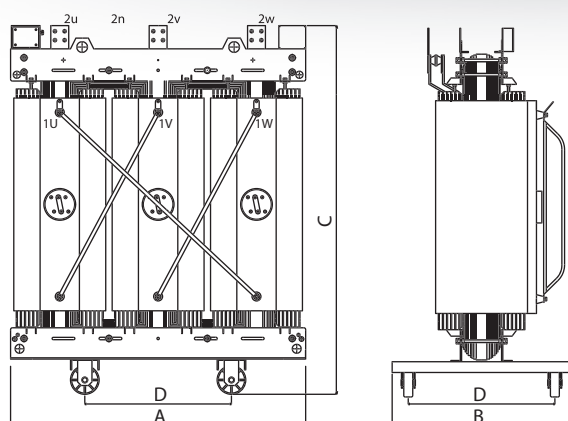
COSφ 1 100% LOAD	%	1,74	1,59	1,36	1,16	1,16	1,05	0,96	0,95	0,89	0,88	0,84	0,79
COSφ 0,9 100% LOAD	%	4,04	3,93	3,75	3,59	3,59	3,5	3,43	3,41	3,36	3,36	3,33	3,28

NOISE

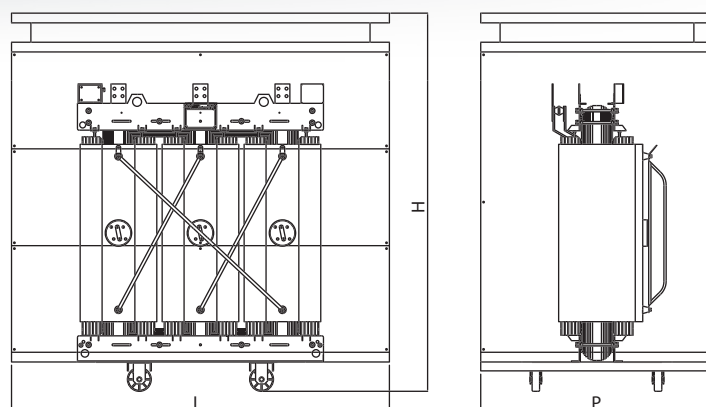
SOUND POWER LEVEL (L _{WA})	dB(A)	51	54	57	60	62	64	65	67	68	70	71	74
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SIZES AND WEIGHTS (INDICATIVE)

Without enclosure IP 00



With IP 31 Protective enclosure



INSULATION VOLTAGE 17,5 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.000	1.100	1.250	1.450	1.450	1.650	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	800	1.000	1.000	1.000	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.150	1.250	1.350	1.500	1.700	1.800	1.900	2.050	2.150	2.250	2.350	2.550
WHEEL INTERAXIS (D)	mm	520	520	520	670	670	820	820	820	1.000	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	1.000	1.400	1.750	2.150	2.550	2.900	3.400	3.900	4.750	6.100

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1.700	1.950	2.200	2.500	2.800
DEPTH (P)	mm	1.000	1.200	1.300	1.500	1.500
HEIGHT (H)	mm	1.850	2.000	2.400	2.650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

INSULATION VOLTAGE 24 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.100	1.150	1.250	1.450	1.650	1.650	1.650	1.900	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	1.000	1.000	1.000	1.200	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.200	1.350	1.400	1.550	1.750	1.850	1.950	2.050	2.150	2.250	2.400	2.550
WHEEL INTERAXIS (D)	mm	520	520	670	670	820	820	820	1.000	1.000	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	700	850	1.150	1.600	1.900	2.350	2.750	3.100	3.700	4.400	5.250	6.250

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1700	1950	2200	2500	2800
DEPTH (P)	mm	1000	1200	1300	1500	1500
HEIGHT (H)	mm	1850	2000	2400	2650	2900
ENCLOSURE WEIGHT	kg	220	260	320	360	400



GENERAL INFORMATION

At present, the improvement of the energy efficiency cannot be considered a slogan anymore, but a need of our time.

TR-PB series high efficiency transformers are created for this purpose guaranteeing:

- savings in operating costs of the plant, due to low values of losses.
- consumption reduction of energy resources.
- reduction of CO₂ emissions.

A

B

C

Bo Bk

ANNUAL SAVINGS (MAXIMUM) COMPARED TO TRANSFORMERS WITH LOSSES, ACCORDING TO HD 538.1 / HD 538.2

RATED OUTPUT KVA	100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
LOW CONSUMPTION (MWh)	1,4	1,5	2,0	2,3	3,5	4,4	4,4	6,1	6,1	8,8	12,3	14,9
LOW EMISSIONS CO ₂ (T)	0,7	1,1	1,5	1,7	2,6	3,3	3,3	4,6	4,6	6,6	9,2	11,2
ENERGY SAVINGS TOE *	0,2	0,3	0,4	0,5	0,7	0,8	0,8	1,2	1,2	1,6	2,3	2,8

* TONNE OF OIL EQUIVALENT

PARTICULARITY

Reference norms :

- CEI EN 60067-1,2,3,4,5 -11
- CEI EN 50541-1

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Easy and fast to install are suitable for use in:

- MV/LV prefabricated substation and substation with reduced dimensions.
- fire and pollution hazard areas.
- buildings with public access.

Moreover, their disposal is simple and with low environmental impact.

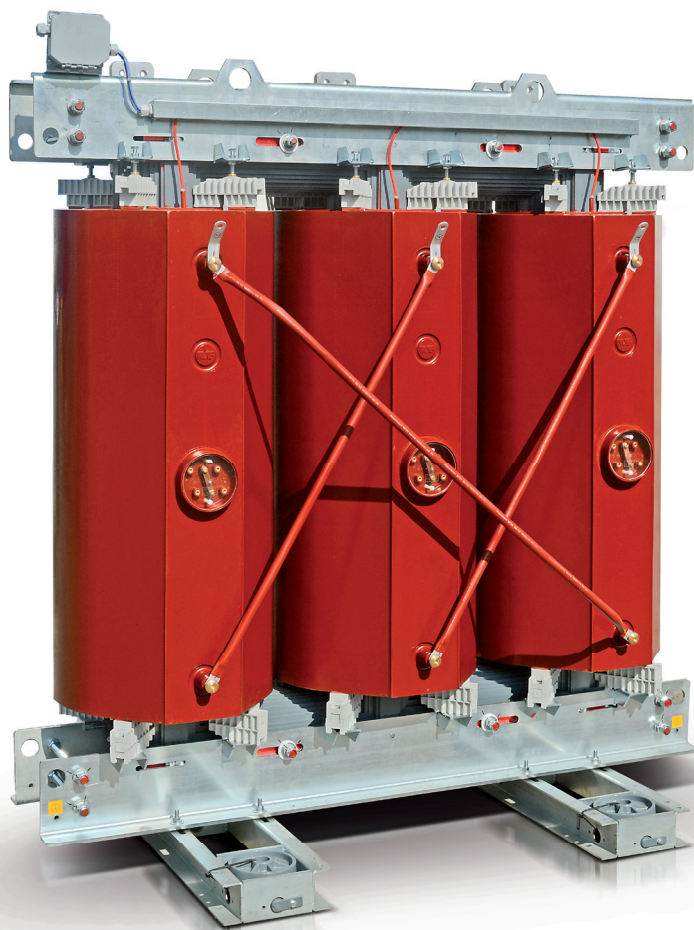
DESCRIPTION

The three-phase cast resin transformers have the following features:

- MV windings encapsulated in cast resin.
- LV windings impregnated with resin.
- Magnetic core made using magnetic grain-oriented steel sheets with low loss, and the joints are Step-Lap inserted sheet.
- Level of partial discharges < 10 pC.
- Thermal class F – Temperature rise 100 K.
- Ambient temperature ≤ 40°C, altitude ≤ 1000 m.
- Self-extinguishing with low emission of gas, classification F1.
- Resistant to thermal shock, classification C2.
- Resistant to condensation and humidity, classification E2.

ACCESSORIES ALWAYS PROVIDED

- LV terminal connector plates
- MV voltage variation by off circuit tapplings links
- Rating plate
- Lifting lugs
- 2 earthing points
- 4 bi-directional flat rollers



RATED OUTPUT kVA		100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
NO-LOAD LOSSES	W	340	480	650	940	1250	1.500	1.800	2.100	2.400	3.000	3.600	4.300
LOAD LOSSES AT 75 °C	W	1.800	2.550	3.325	4.800	6.650	8.225	9.625	11.375	14.000	15.750	20.125	24.500
LOAD LOSSES AT 120 °C	W	2.050	2.900	3.800	5.500	7.600	9.400	11.000	13.000	16.000	18.000	23.000	28.000
NO-LOAD CURRENT	%		1,2	1,4	1	0,8	0,8	0,8	0,8	0,6	0,8	0,6	0,6
IMPEDANCE VOLTAGE	%	6	6	6,00	6	6	6	6	6	6	6	6	6
INRUSH CURRENT IE/IN		12,3	12,9	12,00	11,8	11	9,6	9,4	9,2	9	8,8	8,8	8,4

EFFICIENCY AT 75°C

COSφ 1 100% LOAD	%	97,87	98,11	98,41	98,57	98,75	98,79	98,86	98,92	98,98	99,06	99,05	99,09
COSφ 1 75% LOAD	%	98,20	98,41	98,66	98,79	98,95	98,98	99,04	99,10	99,15	99,21	99,21	99,24
COSφ 0,9 100% LOAD	%	97,58	97,86	98,20	98,37	98,58	98,62	98,70	98,78	98,84	98,93	98,92	98,96
COSφ 0,9 75% LOAD	%	97,97	98,21	98,49	98,63	98,81	98,85	98,91	98,98	99,03	99,11	99,10	99,14

VOLTAGE DROP AT 75°C

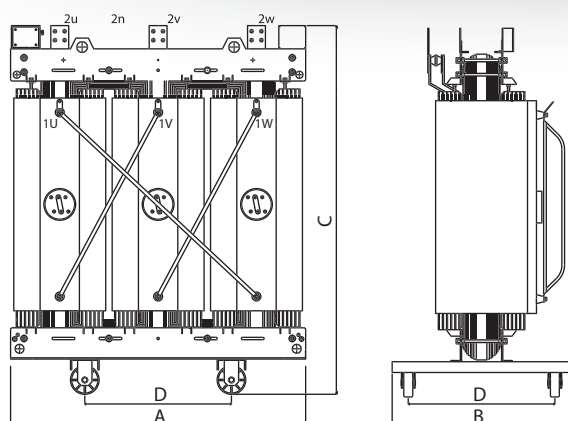
COSφ 1 100% LOAD	%	1,96	1,76	1,50	1,37	1,23	1,2	1,14	1,09	1,05	0,96	0,98	0,95
COSφ 0,9 100% LOAD	%	4,21	4,06	3,86	3,76	3,64	3,62	3,57	3,53	3,5	3,43	3,44	3,42

NOISE

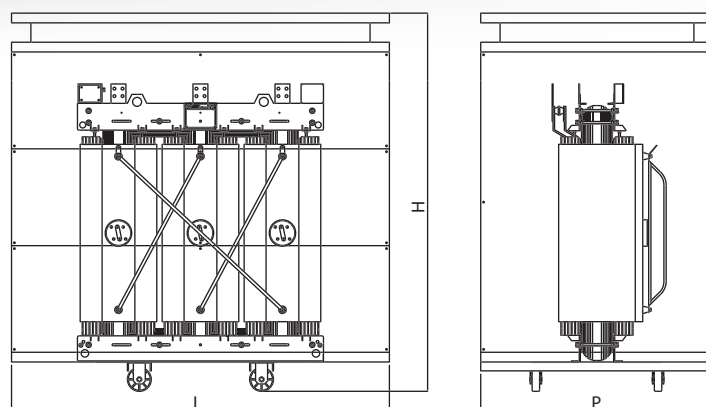
SOUND POWER LEVEL (LwA)	dB(A)	51	54	57	60	62	64	65	67	68	70	71	74
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SIZES AND WEIGHTS (INDICATIVE)

Without enclosure IP 00



With IP 31 Protective enclosure



INSULATION VOLTAGE 17,5 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.000	1.100	1.250	1.250	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	650	800	800	1.000	1.000	1.000	1.200	1.200	1.200
HEIGHT (C)	mm	1.100	1.200	1.350	1.500	1.700	1.800	1.850	2.050	2.150	2.250	2.350	2.400
WHEEL INTERAXIS (D)	mm	520	520	520	520	670	670	820	820	820	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	550	700	900	1.200	1.600	1.900	2.300	2.600	3.150	3.800	4.450	5.40

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1.700	1.950	2.200	2.500	2.800
DEPTH (P)	mm	1.000	1.200	1.300	1.500	1.500
HEIGHT (H)	mm	1.850	2.000	2.400	2.650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

INSULATION VOLTAGE 24 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.100	1.150	1.250	1.450	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	800	800	1.000	1.000	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.150	1.300	1.400	1.550	1.750	1.900	1.950	2.050	2.150	2.400	2.400	2.450
WHEEL INTERAXIS (D)	mm	520	520	670	670	820	820	820	820	1.000	1.000	1.000	1.000
WHEEL WIDTH	mm	40	40	40	40	50	50	50	50	50	50	50	50
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	900	1.350	1.750	2.000	2.450	2.700	3.400	3.900	4.750	6.050

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1700	1950	2200	2500	2800
DEPTH (P)	mm	1000	1200	1300	1500	1.500
HEIGHT (H)	mm	1850	2000	2400	2650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400



GENERAL INFORMATION

The new IEC EN 50541-1 has been prepared with the mission to improve the efficiency of the transformers.

This results in transformers with better efficiency which guarantee to our customers:

- savings in operating costs of the plant, due to low values of losses.
- consumption reduction of energy resources.

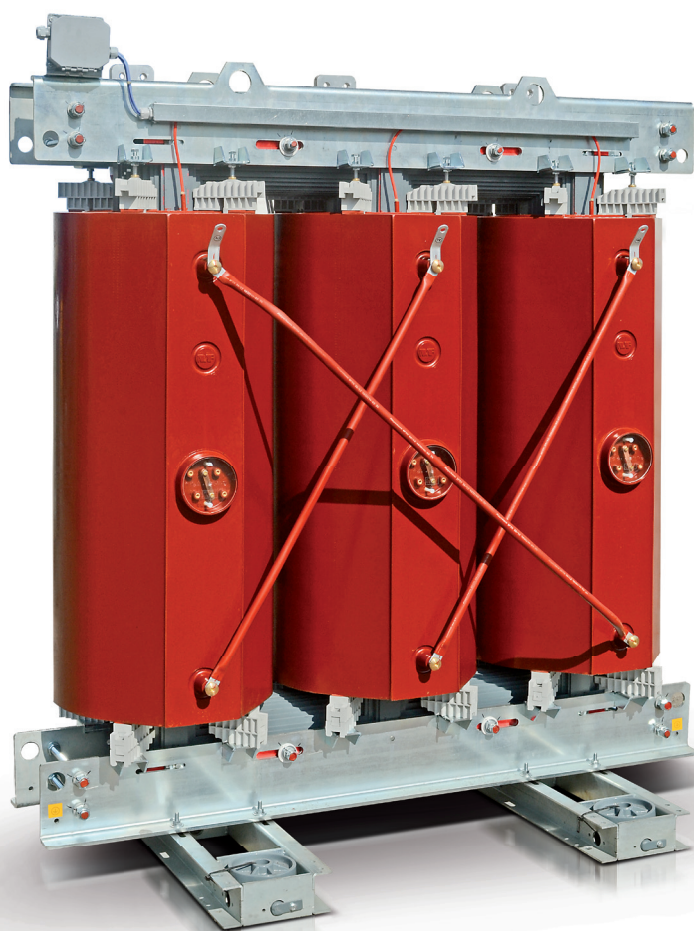
A

B

C

Co Bk

RATED OUTPUT kVA	100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
EFFICIENCY AT 75°C												
COSφ 1 100% LOAD	97,79	98,04	98,35	98,52	98,70	98,74	98,82	98,88	98,94	99,02	99,00	99,04
COSφ 1 50% LOAD	98,21	98,42	98,65	98,81	98,86	99,00	99,07	99,11	99,18	99,21	99,20	99,24



PARTICULARITY

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ACCESSORIES ALWAYS PROVIDED

- LV terminal connector plates
- MV voltage variation by off circuit tapplings links
- Rating plate
- Lifting lugs
- 2 earthing points
- 4 bi-directional flat rollers

RATED OUTPUT kVA		100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
NO-LOAD LOSSES	W	460	650	880	1.200	1.650	2.000	2.300	2.800	3.100	4.000	5.000	6.000
LOAD LOSSES AT 75 °C	W	1.800	2.550	3.325	4.800	6.650	8.225	9.625	11.375	14.000	15.750	20.125	24.500
LOAD LOSSES AT 120 °C	W	2.050	2.900	3.800	5.500	7.600	9.400	11.000	13.000	16.000	18.000	23.000	28.000
NO-LOAD CURRENT	%	1,4	1,4	1,2	1	0,8	0,8	0,8	0,8	0,7	0,7	0,6	0,6
IMPEDANCE VOLTAGE	%	6	6	6	6	6	6	6	6	6	6	6	6
INRUSH CURRENT IE/IN		10,5	10,5	10,5	10	10	9,5	9,5	9	9	8,5	8,5	8,5

EFFICIENCY AT 75°C

COSφ 1 100% LOAD	%	97,79	98,04	98,35	98,52	98,70	98,74	98,82	98,88	98,94	99,02	99,00	99,04
COSφ 1 75% LOAD	%	98,07	98,29	98,55	98,72	98,87	98,91	98,98	99,03	99,09	99,15	99,14	99,17
COSφ 0,9 100% LOAD	%	97,55	97,83	98,17	98,36	98,56	98,60	98,69	98,76	98,83	98,91	98,90	98,94
COSφ 0,9 75% LOAD	%	97,87	98,11	98,40	98,58	98,75	98,79	98,87	98,92	98,99	99,06	99,04	99,08

EFFICIENCY AT 75°C

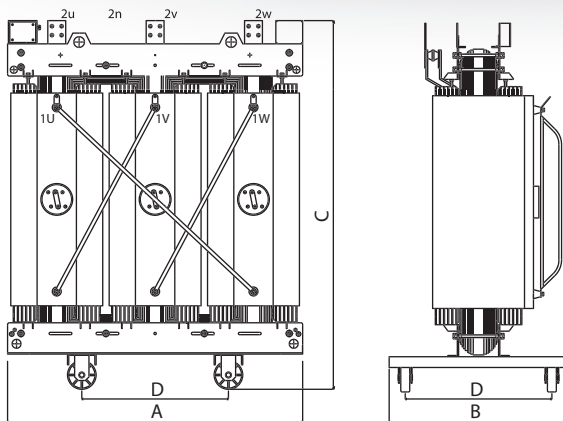
COSφ 1 100% LOAD	%	1,96	1,76	1,50	1,37	1,23	1,2	1,14	1,09	1,05	0,96	0,98	0,95
COSφ 0,9 100% LOAD	%	4,21	4,06	3,86	3,76	3,64	3,62	3,57	3,53	3,5	3,43	3,44	3,42

NOISE

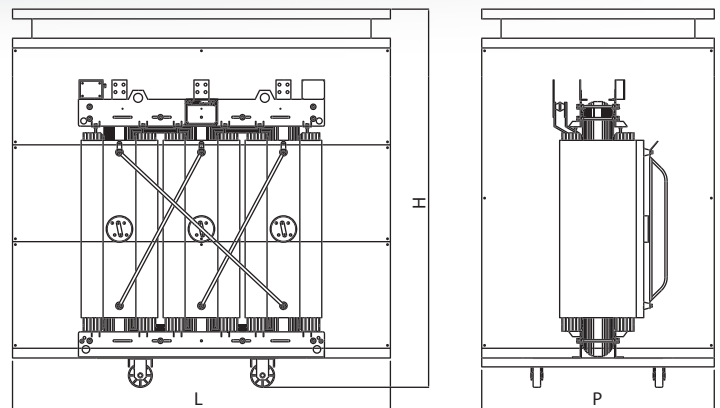
SOUND POWER LEVEL (LwA)	dB(A)	59	62	65	68	70	72	73	75	76	78	81	83
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SIZES AND WEIGHTS (INDICATIVE)

Without enclosure IP 00



With IP 31 Protective enclosure



INSULATION VOLTAGE 17,5 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.000	1.100	1.250	1.250	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	650	800	800	1.000	1.000	1.000	1.200	1.200	1.200
HEIGHT (C)	mm	1.100	1.200	1.350	1.500	1.700	1.800	1.850	2.050	2.150	2.250	2.350	2.400
WHEEL INTERAXIS (D)	mm	520	520	520	520	670	670	820	820	820	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	500	700	900	1.200	1.600	1.900	2.300	2.600	3.150	3.800	4.450	5.350

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1.700	1.950	2.200	2.500	2.800
DEPTH (P)	mm	1.000	1.200	1.300	1.500	1.500
HEIGHT (H)	mm	1.850	2.000	2.400	2.650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

INSULATION VOLTAGE 24 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.100	1.150	1.250	1.250	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	800	800	1.000	1.000	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.150	1.300	1.400	1.550	1.750	1.900	1.950	2.050	2.150	2.400	2.400	2.450
WHEEL INTERAXIS (D)	mm	520	520	670	670	820	820	820	820	1.000	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	900	1.300	1.700	2.000	2.400	2.700	3.300	3.900	4.650	5.850

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1700	1950	2.200	2500	2.800
DEPTH (P)	mm	1000	1200	1.300	1500	1.500
HEIGHT (H)	mm	1850	2000	2.400	2650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

