ELSAN TRANSFORMER

ELSAN TRANSFORMER is at the heart of the energy sector as a brand name of **ELSAN TRAFO SANAYİ & TİCARET LİMİTED SİRKETİ** which is a family business-owned,operated and managed by generations.

SPECIALISING IN RELIABLE SOLUTIONS WITH

maximum efficiency and availability

ELSAN TRANSFORMER

WHO WE ARE

ELSAN TRANSFORMER is at the heart of the energy sector as a brand name of ELSAN TRAFO SANAYI & TICARET LIMITED SIRKET which is a family business owned, operated and managed by generations.

From the beginning of 13 years of experience,the company has been dedicated to understand customer's needs and deliver them consistenly by giving priority to make strong relotionship based on trustfulness and friendliness.

Thanks to this approach,Elsan Transformer has earned an enviable reputation for giving best quality-price rate with reliable service in a shortest time. Therefore to keep this privilege,we guard this name fiercely.


ELSAN TRANSFORMER

OUR VISION

To be besides of our customers,find logical solutions for their demands and make them satisfy by conduct our affairs with'honesty' and 'integrity'.

OUR MISSION

The most important mission for us is growing up to export markets and be a World Company.To achieve this,our activities place particular emphasis on newest ecofriendly technology,main standards, expertness, safety, product quality and delivery performance.

WE ARE ADVANCING THE FUTURE OF ENERGY.

ELSAN TRANSFORMER *has produced single and three-phase oil type distribution transformers up to 16 MVA and 36 kV.The loading capability is designed to comply with IEC 60076. Distribution transformers can be hermetically sealed or equipped with an oil conservator.*

Tanks are constructed with flexible corrugated walls(fins),which enable sufficient cooling of the transformer. These walls also compensate fort he changes in the oil volume during the operation.

The advantage of the hermetically sealed transformers prevents contact between the oil and the atmosphere thus periodic oil analysis can be avoided.

SUPERIOR QUALITY AT THE LOWEST PRICES

ELSAN TRANSFORME*R produces transformers regarding customer satisfaction,tests it according to the standards and makes it work perfectly!*

Moreover, ELSAN TRANSFORMER provides good pricing that is fairly comparable to market standard designs!.It's a 'win win 'situation.

SECRET OF OUR ACHIVEMENT!

ELSAN TRANSFORMER *gives priority to its customers so that they will not face any problem to reach the company,or taking by on a list and wait long,because we know that how important to get quick response in energy sector,so that we offer to give superior product quality and service in the shortest time as your life-time friend.*

SECRET OF OUR ACHIVEMENT!

ELSAN TRANSFORMER *has also produced special type oil immersed transformers or custom built transformers such as,*

- *Hermetic type transformer,*
- *Transformers equipped with an oil conservator,*
- *Transformers with plug-in bushing,*
- *Transformer with cable box,*

PRODUCING PROCESS

The purpose of distribution transformer is to reduce the primary voltage of the grid distribution system to the utilization voltage serving the customer.A distribution transformer is a static device constructed with two or more windings used to transfer alternating-current electric power by electromagnetic induction from one circuit to another at the same frequency but different vales of voltage and current.

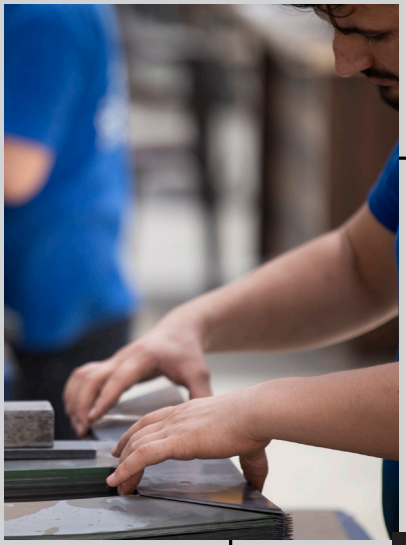
Designing and producing of every transformer has been materialized considering that customer demands and satisfaction.Through the process,all producing activities have been done by using advanced engineering applications and most recent material technology.Elsan Transformer always takes its social responsibility in transformer sector by thinking people and environment.The fundamental goal is to reach best quality and improvement level at the researching and developing departments established with experienced of years and dynamism of our young engineers.

1. Windings

Modern Winding machines are used.

Low voltage windings are made of Aluminium or Copper foil and flat conductors depending on customer choices.

The high quality Kraft paper is utilized as an insulation material between conductors.



2. Core

Transformer's core is manufactured by Grain Oriented-Cold Rolled silicon alloyed carbonless steel with low energy losses and high ferromagnetic qualification.

Cores have different dimensions,shapes and made of clean-cutted iron sheets.The magnetic field consists accumulating of iron layers.

The mounted core is pressed between core clamps.So that vibrations are reduced,noise level is minimized and high efficieny is obtained from magnetic circuit.

3. Joining

The introduction of aluminium wire,strap,strip conductors and enamel coatings requires working professianlly . Aluminium spontaneously forms an insulating oxide coating exposed to air. This oxide coating must be removed or avoided whenever an electrical connection is desired.Also,electrolytic conductor grades of aluminium are quite soft and are subject to cold flow and differential expansion problems when mechanical clamping is attempted.That's why our qualified team members always work diligently to join active part of transformer.Windings are placed into the core,tap changer,LV and HV transition and all connections of them are carried out.Some parts are added extra isolation material to prevent possible excessive voltage and other extras to make it more strengthful against mechanical resistance.

After joining ,transformers are subjected to long-timed high temperature in a cylindrical oven for drying to discard unwanted things such as;oil,stain moisture,rust and etc.

4. Painting

The transformer tanks passing the mechanical tightness test are painted with shot blasting method to make a good protection to corrosion against long-term environmental effects.

Metallic components are painted with grey color for last two steps after special protecting priming.

5. Driying and Sealing

Tank structure has a rectangular shape and its corners have been manufactured from layers which make natural cooling and extend the surface.

Each of our tanks which have been manufactured by the technical values shown in project is checked for pressured air and leakage current according to IEC standards before painting.

6. Tests

- *All transformers are subjected to the following tests;*
- *Transformer turn ratio and polarity.*
- *Winding resistance measurement.*
- *Load losses and short circuit impedance.*
- *No-Load losses and no-load current measurement.*
- *Induced voltage test.*
- *Applied power frequency withstand voltage.*
- *Measurement of insulation resistances.*

TESTS

Tests according to IEC Standard.

Rated withstand voltages,values

MSV Max.Sytem Voltage [kV rms]
LI Lightning impulse withstand voltage [kV peak]
AC Power frequency withstand voltage [kV rms]

MSV (kV)	LI (kV)	AC (kV)
3,6	40	10
7,2	60	20
12	75	28
17,5	95	38
24	125	50
36	170	70

Tolerances

No-Load Losses	[Po]	[+10%]
Load Losses	[Pk]	[+10%]
Total Losses	[Po+Pk]	[+10%]
Impedance Voltage	[Uk]	[± 10%]
Turn Ratio		[± 0,5%]

Rating

The transformer comply with all IEC standard 60076 for test requirements.

Ambient temperature and temperature-rise limits

Low voltage at		[400/416/420/433 V]
High voltage at		[3,3/6,6/12/15,8/24/36 kV]
Frequency		[50 Hz]
HV tappings		[±%5 or ±% (2x2,5)]
Vector Group	50-160 kVA	[Yzn5 or Yzn11]
	Ω200-2500 kVA	[Dyn5 or Dyn11]

The transformer are manufactured in standard version for rated values and connection as above:
On request the transformers are available for other rated values.

Efficieny (η)

$$\text{Efficiency } (\eta) = \frac{output}{output+loses} \quad , \qquad \eta = \frac{n.S.cos\varphi}{n.S.cos\varphi+Po+n^2.Pk}$$

Po = No-load losses at rated voltage [kW]
Pk = Load losses at rated power [kW]
S = Rated power [kVA]
n = Load factor [at rated full load]
Cosϕ = Power factor [0,4-1,0]

Type Tests

Type tests are tests made on transformer which is representative of other transformer to demonstrate that they comply with specified requirements not covered by routine tests.

- *Temperature rise test.*
- *Noise level test.*
- *Mechanical endurance test against short-circuit.*

Special Tests

Special tests are tests,other than routine or type tests,agreed between purchaser and us,for example;

- *Zero sequence impedance on three-phase transformers.*
- *Lightning impulse.*
- *Short-circuit test.*
- *Harmonics on the no-load current.*

Standarts

The transformer comply with all IEC standard 60076 for test requirements.

Ambient temperature and temperature-rise limits

Maximum ambient temperature	[40-55°C]
Monthly average at hottest month	[30-40°C]
Yearly average of ambient temperature	[20-30°C]
Top oil temperature rise	[60K Max.]
Average winding temperature rise	[65K Max.]

The transformers fulfill the requirements laid down for insulation system temperature 105°C (Class A)

No-Load and Exciting Current

When alternating voltage applied to a transformer winding,an alternating magnetic flux is included in the core.The alternating flux produces hysteresis and eddy currents within the electrical steel,causing heat to be generated in the core.Heating of the core due to applied voltage is called no-load losses.Other names are iron losses and core losses.

Load Losses

A transformer supplying load has current flowing in both the primary and secondary windings that will produce heat in those windings.Load losses is divided into two parts,I2R losses and stray losses.

I²R Losses

Each transformer winding has an electrical resistance that produces heat when load current flows;resistance of a winding is measured by passing dc current through the winding to eliminate inductive effects.

Stray Losses

The difference between DC and AC losses in a winding is called "stray losses".One portion stray losses is called " eddy losses" and is occured by eddy currents circulating in the windings conductors.The other portion is generated outside of the windings,in frame parts,tank walls,bushing flanges,etc.

Winding Resistance and Average Winding Temperature

The winding DC resistance at two temperatures,T1 and T2, will have values of R1 and R2,respectively,at the two temperatures.The functional relationship between winding resistance and average temperature is shown in equation:

$$\frac{R1}{R2} = \frac{T1 + Tk}{T2 + Tk}$$

Where,

R1 is the value of winding resistance,corresponding to average winding temperature of T1

R2 is the value of winding resistance,corresponding to average winding temperature of T2

Tk is 235°C for copper,225 °C for aluminium.

Condition for Parallel Operation of Transformers

For parallel connection of transformers,primary windings of the transformers are connected to source bus-bars and secondary windings are connected to the load bus-bars. Various conditions that must be fulfilled for the succesful parallel operation of transformers;

- *Same Voltage and Turns Ratio(both primary and secondary voltage rating is same)*
- *Same Percentage Impedance and X/R ratio*
- *Identical Position of Tap changer*
- *Same Phase angle shift(Same vector group)*
- *Same Frequency*
- *Same Polarity*
- *Same Phase SequenceSome of these conditions are convenient and some are mandatory.*

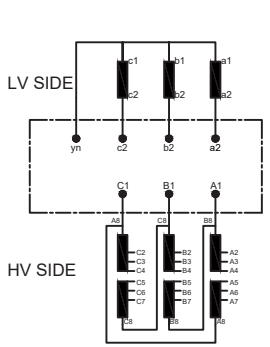
Winding Connections

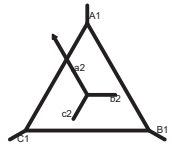
First Symbol:for HV:Always capital letters.
D=Delta,Y=Star,Z=Interconnected star,N=Neutral
Second Symbol:for Low Voltage:Always mall letters.
d=Delta,y=Star,z=Interconnected star,n=Neutral.
Third Symbol:Phase displacement expressed as the clock hour number (1,5...11)

Example-Dyn11

Transformer has a delta connected primary winding(D) a star connected secondary (y) with the star point brought out(n) and a phase shift of 30 degree leading(11).
The point of confusion is occuring in notation in a step-up transformer.As the IEC 60076-1 standard has stated,the notation is HV-LV in seguence. For example,a step-up transformer with a delta- connected primary and star-connected secondary,is not written as 'Dy11',but 'Yd11'.The 11 indicates the LV winding leads the HV by 30 degrees.

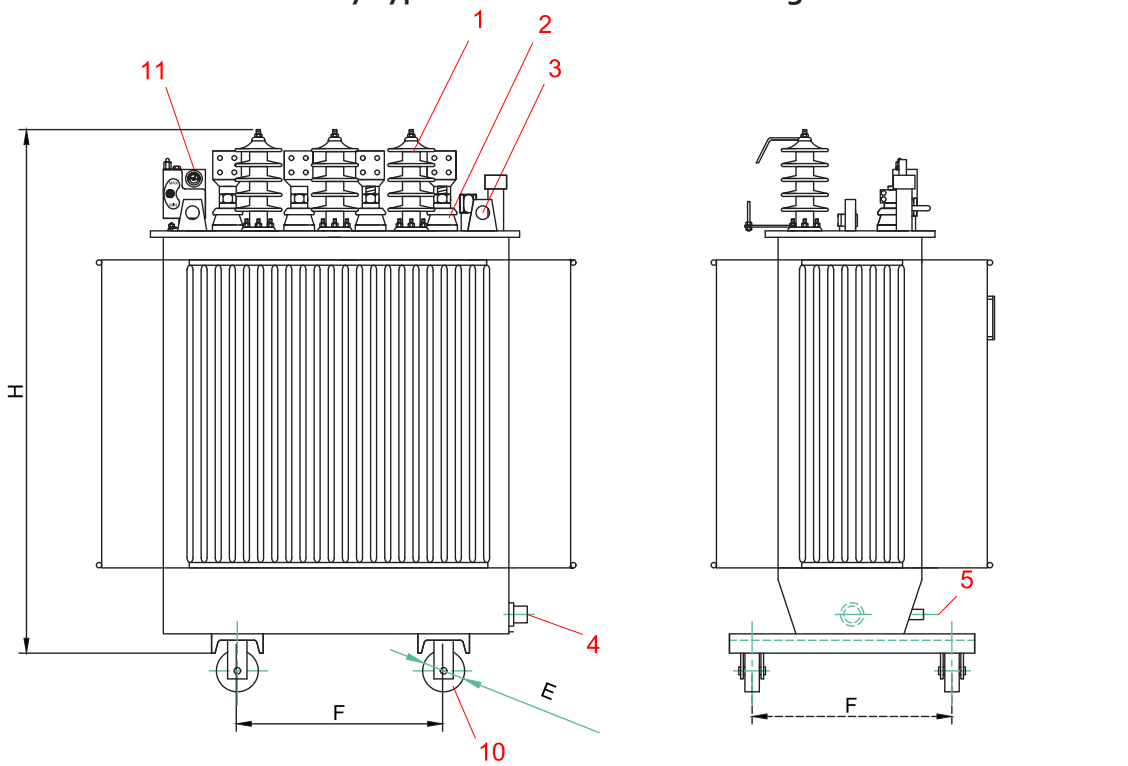
Transformers built to IEC standards usually do not have the vector group shown on their nameplate and instead a vector diagram is given to show the relationship between the primary and other windings.

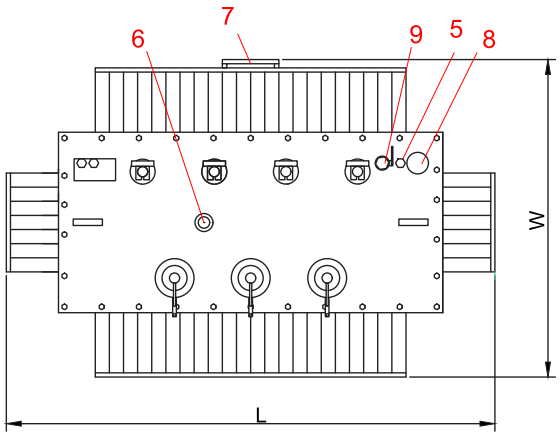




TECHNICAL SPECIFICATIONS

Three Phase Hermetically Type Transformer Outline Design





No	DESCRIPTION
1	H.V Bushing
2	L.V Bushing
3	Lifting Lugs
4	Oil Drain Valve
5	Earthing terminal
6	Off Load Tap Changer
7	Rating Plate
8	Hermetic Pressure Relay
9	Oil Filling Valve
10	Whells
11	Combined Relay(DMCR)

THREE PHASE TRANSFORMER PARAMETERS WITH HERMETICALLY SEALED TYPE

HIGH VOLTAGE up to 15 kV

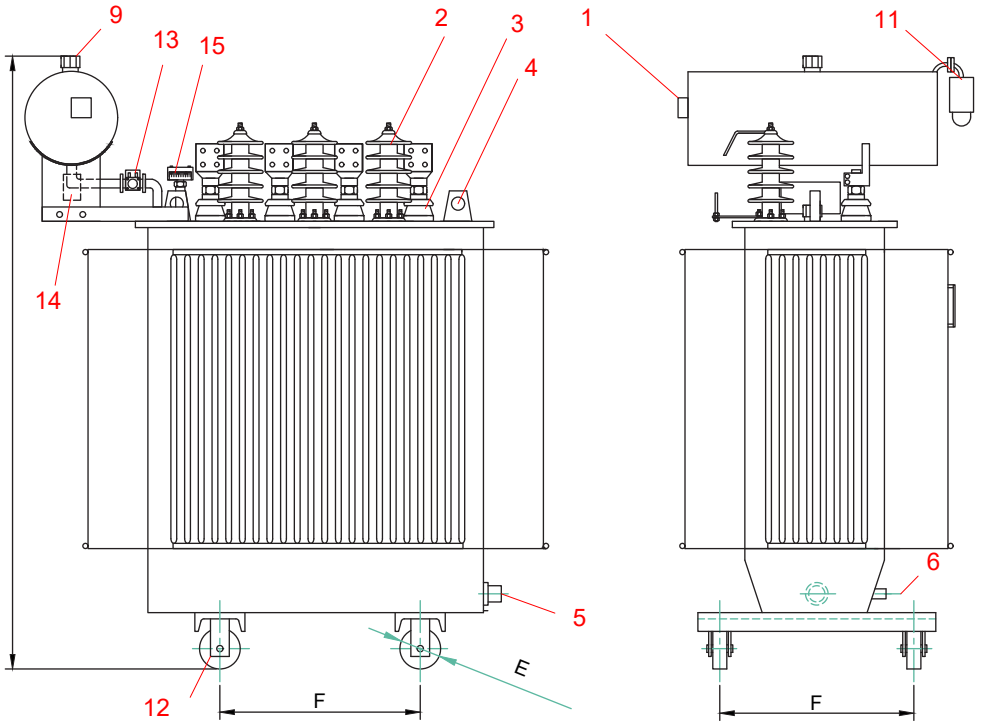
Rated Power [kVA]	50	100	160	250	400	500	630	800	1000	1250	1600	2000	2500
No Load Current [%]	2,75	2,30	2,00	1,80	1,70	1,60	1,40	1,40	1,20	1,20	1,10	1,10	0,95
Impedance Uk [%]	4,50	4,50	4,50	4,50	4,50	4,50	4,50	6,00	6,00	6,00	6,00	6,00	6,00
Vector Group [Δ-Y]	Yzn-11	Yzn-11	Yzn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11
No Load Losses [W]	230	380	520	780	1090	1120	1300	1450	1800	2250	2800	3200	3800
Full Load Losses [W]	1250	1950	2550	3500	4900	5700	6650	8700	10500	13000	17000	21000	24000
Lenght Appr. [mm]	885	955	1030	1346	1416	1456	1456	1736	1816	1827	1848	2025	21226
Width Appr. [mm]	730	740	770	726	736	846	890	816	896	946	1190	1140	1246
Height Appr. [mm]	1260	1295	1285	1475	1625	1675	1696	1855	1975	1975	2005	2125	2197
Oil Weight [kg]	147	195	215	330	340	380	560	610	730	790	1030	1175	1350
Active Part Weight [kg]	275	285	520	630	810	1021	1205	1346	1622	1845	2114	2279	2930
Total Weight [kg]	490	660	890	1090	1340	1610	2085	2330	2816	3220	4010	4780	5840
Regulation [pF=0,8]	4,260	4,161	3,830	3,719	3,615	3,558	3,520	4,145	4,469	4,462	4,477	4,468	4,409
at Full Load [pF=1,0]	2,570	2,345	1,682	1,492	1,320	1,228	1,152	1,196	1,225	1,216	1,237	1,240	1,135
Efficiency [pF=0,8]	96,43	97,16	97,85	97,90	98,16	98,32	98,44	98,45	98,49	98,49	98,47	98,53	98,62
at Full Load [pF=1,0]	97,12	97,72	98,11	98,31	98,52	98,65	98,75	98,74	98,78	98,79	98,77	98,81	98,92
Sound Level [db(A)]	50	55	58	62	65	66	67	67	68	69	70	71	72
Wheelbase [F]	520	520	520	520	670	670	670	820	820	820	820	1070	1070
Wheel diameter [E]	125	125	125	125	125	125	125	125	160	160	160	200	200

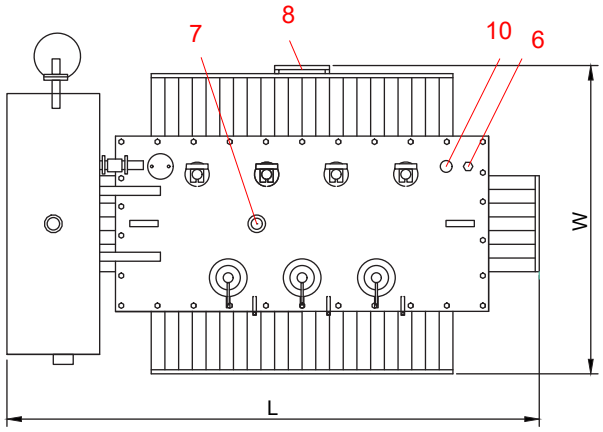
HIGH VOLTAGE from 20 kV up to 36 kV

Rated Power [kVA]	50	100	160	250	400	500	630	800	1000	1250	1600	2000	2500
No Load Current [%]	2,50	2,10	1,90	1,70	1,60	1,40	1,40	1,30	1,20	1,20	1,10	1,00	0,90
Impedance Uk [%]	4,00	4,00	4,00	4,00	4,00	4,00	4,00	6,00	6,00	6,00	6,00	6,00	6,00
Vector Group [Δ-Y]	Yzn-11	Yzn-11	Yzn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11
No Load Losses [W]	210	320	460	650	930	1090	1300	1500	1700	2100	2600	3000	3200
Full Load Losses [W]	1100	1750	2350	3250	4600	5425	6500	8500	10500	13000	17000	21000	24000
Lenght Appr. [mm]	855	890	918	1213	1336	1460	1446	1656	1771	1856	1882	1969	2147
Width Appr. [mm]	650	600	625	545	685	785	890	940	840	910	1059	1165	1264
Height Appr. [mm]	1165	1165	1310	1330	1590	1580	1740	1750	1900	1922	1930	2050	2135
Oil Weight [kg]	130	145	210	232	305	330	378	572	665	732	855	1040	1290
Active Part Weight [kg]	275	360	550	634	840	984	1120	1310	1584	1740	1900	2135	2640
Total Weight [kg]	430	580	850	980	1305	1500	1812	2165	2580	2802	3440	4384	5360
Regulation [pF=0,8]	3,720	3,576	3,429	3,335	3,247	3,208	3,175	4,133	4,469	4,463	4,478	4,447	4,409
at Full Load [pF=1,0]	2,257	1,815	1,538	1,372	1,223	1,159	1,106	1,174	1,224	1,216	1,238	1,225	1,135
Efficiency [pF=0,8]	96,84	97,48	97,85	98,08	98,32	98,40	98,47	98,51	98,49	98,52	98,50	98,53	98,62
at Full Load [pF=1,0]	97,42	97,98	98,28	98,47	98,63	98,73	98,76	98,79	98,80	98,82	98,80	98,81	98,92
Sound Level [db(A)]	55	59	62	65	66	68	69	72	73	75	75	76	78
Wheelbase [F]	520	520	520	520	670	670	670	820	820	820	820	1070	1070
Wheel diameter [E]	125	125	125	125	125	125	125	125	160	160	160	200	200

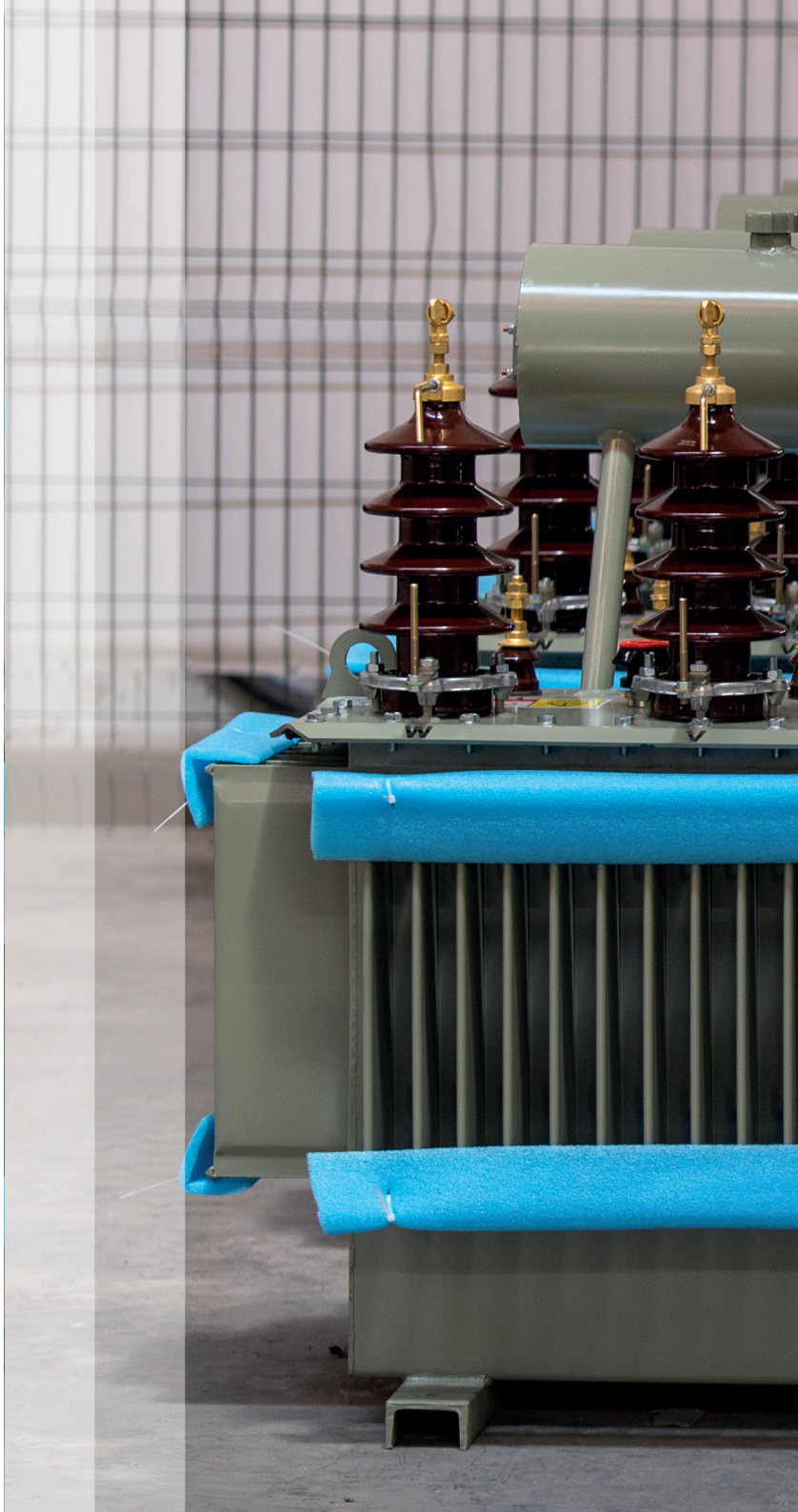
TECHNICAL SPECIFICATIONS

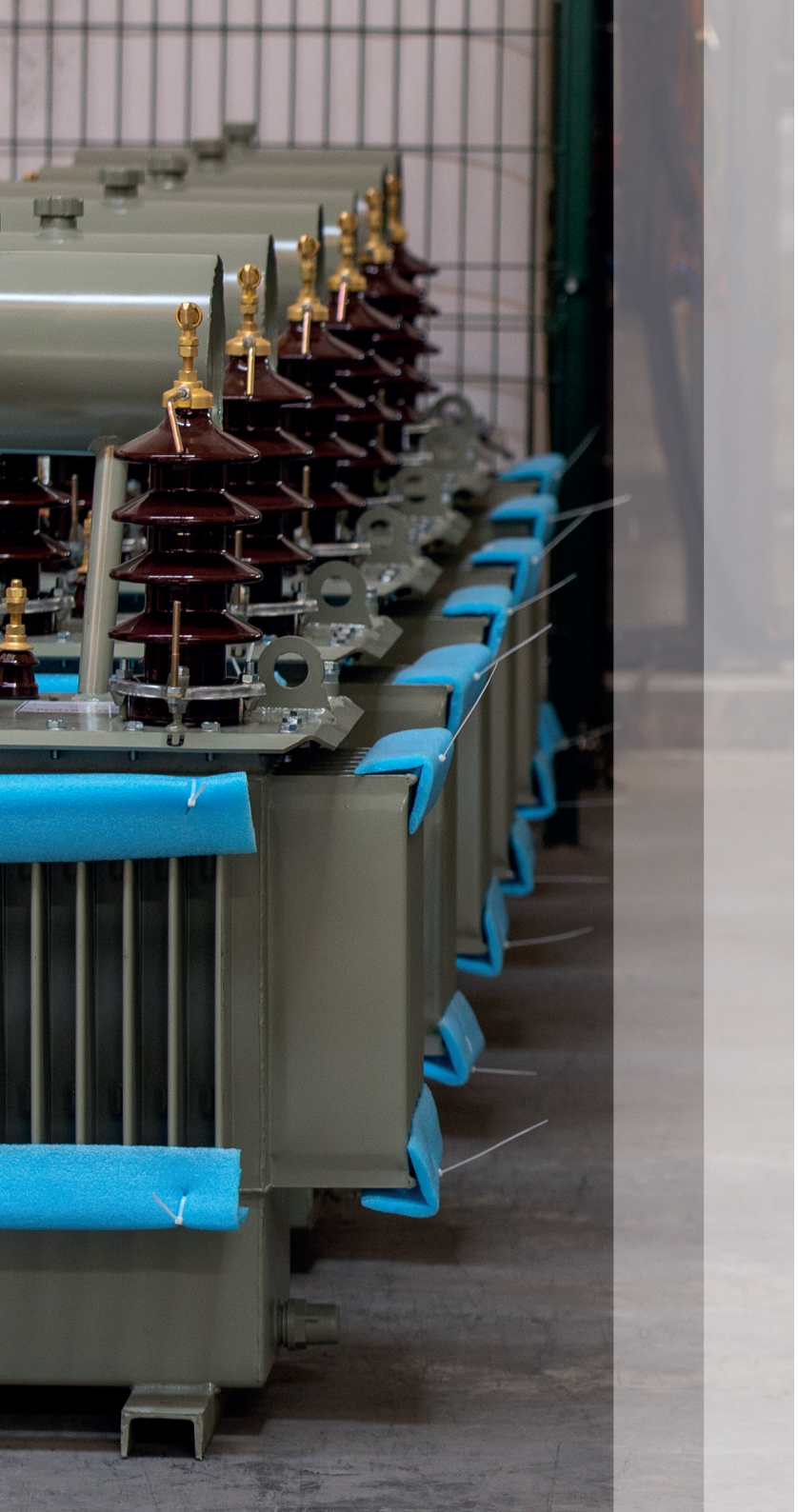
Three Phase Transformer Design With Oil Conservator Tank





No	DESCRIPTION
1	Oil Level Indicator
2	H.V Bushing
3	L.V Bushing
4	Lifting Lugs
5	Oil Drain Valve
6	Earthing terminal
7	Off Load Tap Changer
8	Rating Plate
9	Oil Filling Hole
10	Alcohol Termometer
11	De hydrating breather
12	Whells (E)
13	Bucholz Relay
14	Terminal Box
15	Thermometer with Contacts





THREE PHASE TRANSFORMER PARAMETERS WITH OIL CONSERVATOR TANK

HIGH VOLTAGE up to 15 kV

Rated Power [kVA]	50	100	160	250	400	500	630	800	1000	1250	1600	2000	2500
No Load Current [%]	2,75	2,30	2,00	1,80	1,70	1,60	1,40	1,40	1,20	1,20	1,10	1,10	0,95
Impedance Uk [%]	4,50	4,50	4,50	4,50	4,50	4,50	4,50	6,00	6,00	6,00	6,00	6,00	6,00
Vector Group [Δ-Y]	Yzn-11	Yzn-11	Yzn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11
No Load Losses [W]	230	380	520	780	1090	1120	1300	1450	1800	2250	2800	3200	3800
Full Load Losses [W]	1250	1950	2550	3500	4900	5700	6650	8700	10500	13000	17000	21000	24000
Lenght Appr. [mm]	885	955	1030	1346	1416	1456	1456	1736	1816	1827	1848	2025	21226
Width Appr. [mm]	730	740	770	726	736	846	890	816	896	946	1190	1140	1246
Height Appr. [mm]	1260	1295	1285	1475	1625	1675	1696	1855	1975	1975	2005	2125	2197
Oil Weight [kg]	147	195	215	330	340	380	560	610	730	790	1030	1175	1350
Active Part Weight [kg]	275	285	520	630	810	1021	1205	1346	1622	1845	2114	2279	2930
Total Weight [kg]	490	660	890	1090	1340	1610	2085	2330	2816	3220	4010	4780	5840
Regulation [pF=0,8]	4,260	4,161	3,830	3,719	3,615	3,558	3,520	4,145	4,469	4,462	4,477	4,468	4,409
at Full Load [pF=1,0]	2,570	2,345	1,682	1,492	1,320	1,228	1,152	1,196	1,225	1,216	1,237	1,240	1,135
Efficiency [pF=0,8]	96,43	97,16	97,85	97,90	98,16	98,32	98,44	98,45	98,49	98,49	98,47	98,53	98,62
at Full Load [pF=1,0]	97,12	97,72	98,11	98,31	98,52	98,65	98,75	98,74	98,78	98,79	98,77	98,81	98,92
Sound Level [db(A)]	50	55	58	62	65	66	67	67	68	69	70	71	72
Wheelbase [F]	520	520	520	520	670	670	670	820	820	820	820	1070	1070
Wheel diameter [E]	125	125	125	125	125	125	125	125	160	160	160	200	200

HIGH VOLTAGE from 20 kV up to 36 kV

Rated Power [kVA]	50	100	160	250	400	500	630	800	1000	1250	1600	2000	2500
No Load Current [%]	2,50	2,10	1,90	1,70	1,60	1,40	1,40	1,30	1,20	1,20	1,10	1,00	0,90
Impedance Uk [%]	4,00	4,00	4,00	4,00	4,00	4,00	4,00	6,00	6,00	6,00	6,00	6,00	6,00
Vector Group [Δ-Y]	Yzn-11	Yzn-11	Yzn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11	Dyn-11
No Load Losses [W]	210	320	460	650	930	1090	1300	1500	1700	2100	2600	3000	3200
Full Load Losses [W]	1100	1750	2350	3250	4600	5425	6500	8500	10500	13000	17000	21000	24000
Lenght Appr. [mm]	855	890	918	1213	1336	1460	1446	1656	1771	1856	1882	1969	2147
Width Appr. [mm]	650	600	625	545	685	785	890	940	840	910	1059	1165	1264
Height Appr. [mm]	1165	1165	1310	1330	1590	1580	1740	1750	1900	1922	1930	2050	2135
Oil Weight [kg]	130	145	210	232	305	330	378	572	665	732	855	1040	1290
Active Part Weight [kg]	275	360	550	634	840	984	1120	1310	1584	1740	1900	2135	2640
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Regulation [pF=0,8]	3,720	3,576	3,429	3,335	3,247	3,208	3,175	4,133	4,469	4,463	4,478	4,447	4,409
at Full Load [pF=1,0]	2,257	1,815	1,538	1,372	1,223	1,159	1,106	1,174	1,224	1,216	1,238	1,225	1,135
Efficiency [pF=0,8]	96,84	97,48	97,85	98,08	98,32	98,40	98,47	98,51	98,49	98,52	98,50	98,53	98,62
at Full Load [pF=1,0]	97,42	97,98	98,28	98,47	98,63	98,73	98,76	98,79	98,80	98,82	98,80	98,81	98,92
Sound Level [db(A)]	55	59	62	65	66	68	69	72	73	75	75	76	78
Wheelbase [F]	520	520	520	520	670	670	670	820	820	820	820	1070	1070
Wheel diameter [E]	125	125	125	125	125	125	125	125	160	160	160	200	200

TECHNICAL SPECIFICATIONS

GENERAL SPECIFICATION

Tap changer are available in single,two and three phase applications.Multi layer types are also available.
The shaft lenght is fixed as 50,70,100 or 130 mm. Driving mechanism can be either on the edge or in the middle of the phases.Connection diagrams in page 2 can be applied in any variation to all types.
Easy assembly and compact design provides labor and cost savings.

MECHANICAL CONTROL

A notch is provided to mark each position with precision.For any operation,unscrew completely the lock nut and release the notch by applying an axial pull on the control knob.Then turn the control knob to the selected position..Engage the notch ans screw up the lock nut.The process of this operation is marked on the control knob with the ***inscription:*** *"UNSCREW 1-PULL 2-PLACE 2-SCREW1"*
Illustrated by a diagram on the lock nut.This isncription can be engraved on request in the desired language.

MATERIAL

Steel Parts : *These parts can be stainless or mild steel.Mild steel parts are cadmium on zinc plated.Upon request galvanizing is also available.*
Polyamide Parts:*These parts are NYLON 66,superior mechanical properties against all acting forces ,strong against UV lights.*
Aluminium Parts: *GAISi12Cu*
Brass Parts:*CuZN40Pb2 Ms 60 F34 DIN 17673*
Copper Parts:*E-Cu F25 DIN 40500*
Insulator Parts:*Paper phenol-plastic resin based laminates,HP 2061.5 class of DIN 7735*
**Materials can be changed on request.*

CURRENT	CONTACT INNER DIA. (For Terminals con.)
10A	Ø 2,1 mm.
30A	Ø 3,1 mm.
63A	Ø 5,1 mm.

VOLTAGE CLASS	B.I.L
15 kV	95 kV
20 kV	125 kV
30 kV	170 kV

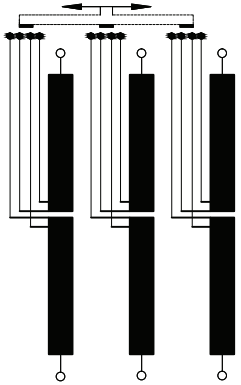
Other B.I.L values are also available upon customer request.

CONTACT TEMPERATURE RISE TESTS Temperature Rise at Rated Current:

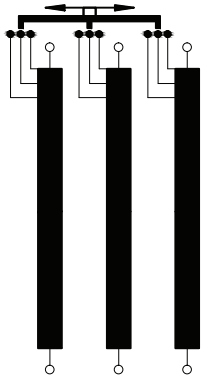
The testd are conducted by permanently applying the 30 A or 63 A rated current to a tap changer immersed in hot oil.

Short Circuit Current Resistance:

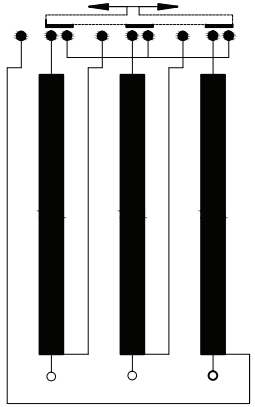
The tap changers are subjected to short-circuit tests in accordance with IEC publication 76. The contacts, weather fixed or moving have no signs of pitting. The insulation was not damaged.



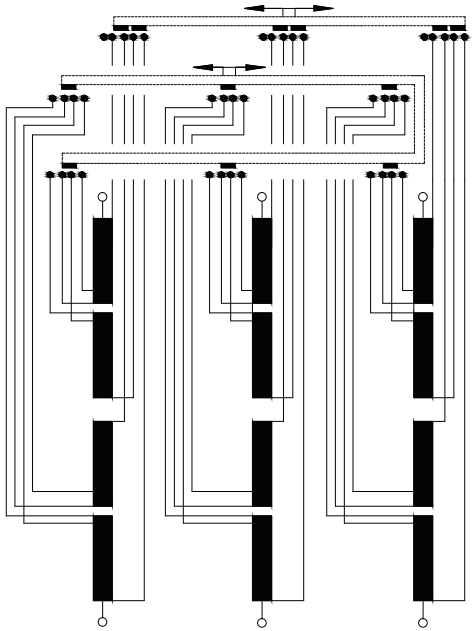
Setting for Delta Transformer



Setting for Star Transformer

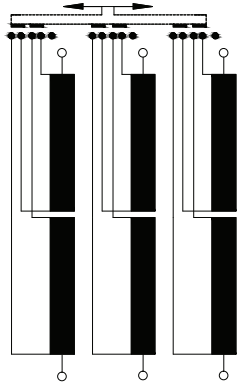


Setting for Star-Delta Coupling

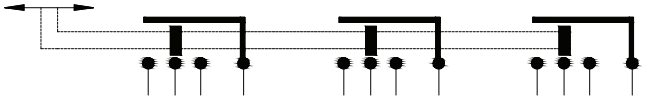


Typical combination :

- *1 stage, series - parallel coupling*
- *2 stage, delta diagram – setting ±2,5%.*

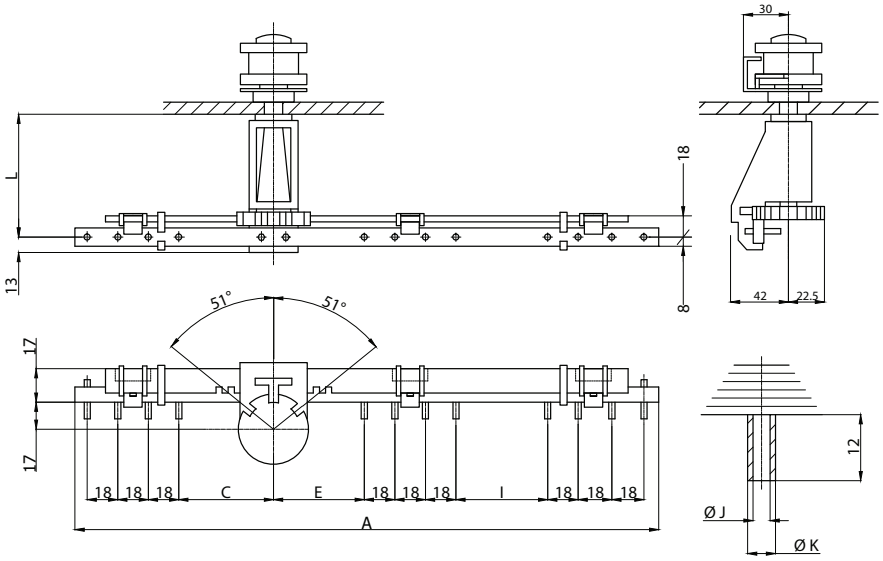


Series Parallel Coupling



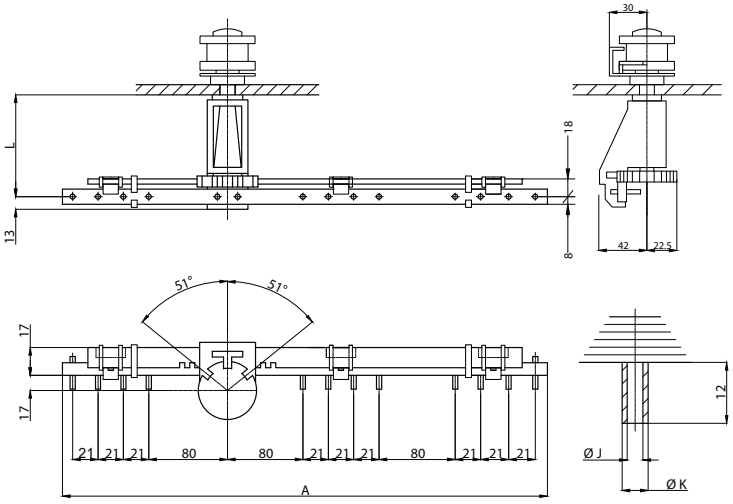
Common output per phase

TECHNICAL SPECIFICATIONS



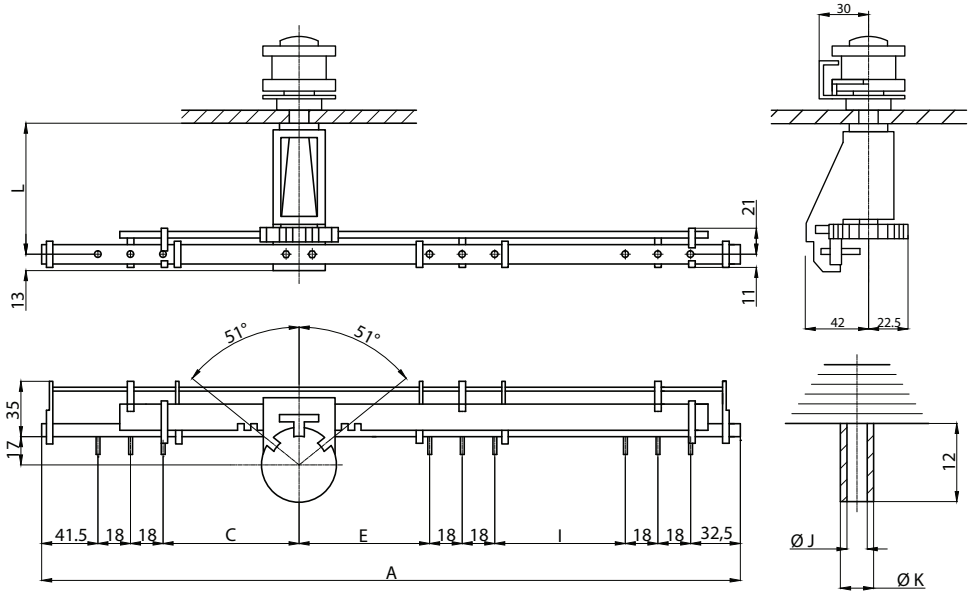
	20kV	30kV
C	55	80
E	55	80
I	55	80

	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7



	30 A	63 A
J	3,1	5,1
K	5	7

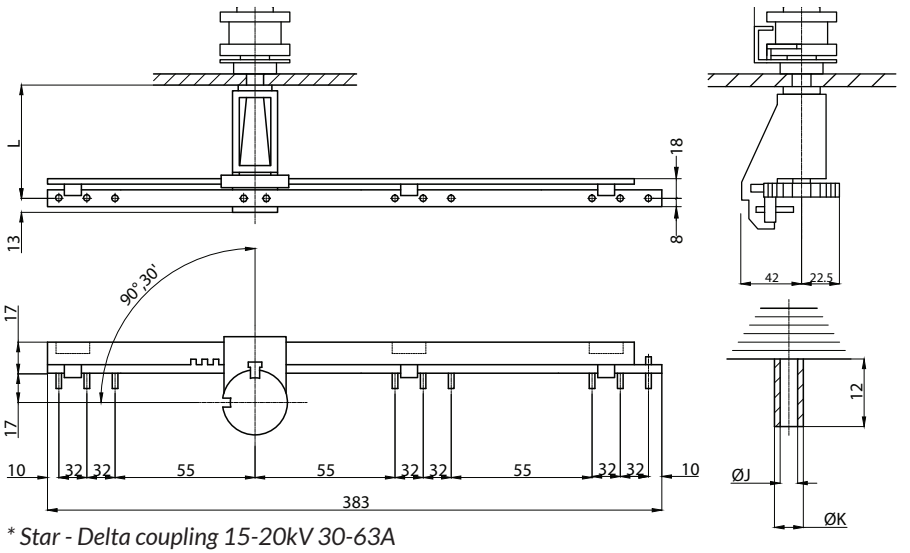
(*) Special type with 21 distance between contacts for 30 Kv



	20kV	30kV
C	55	91
E	55	91
I	55	91

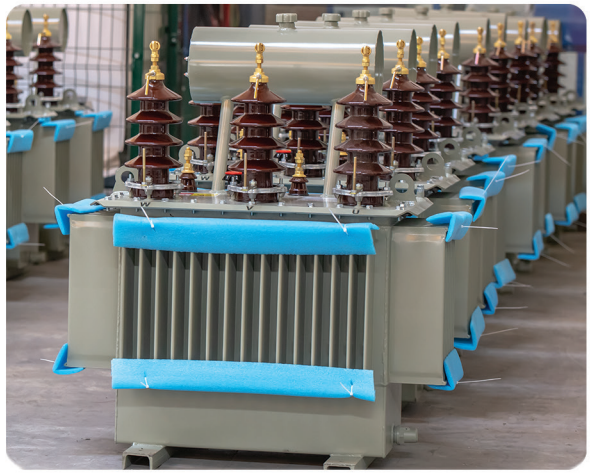
	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7

*Star diagram 20-30kV 10-30-63A 3-7 positions Setting 2.5 % per position

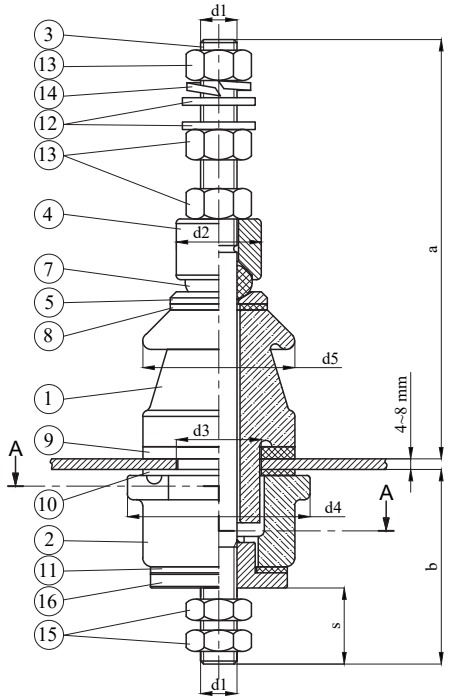


* Star - Delta coupling 15-20kV 30-63A

	30 A	63 A
J	3,1	5,1
K	5	7

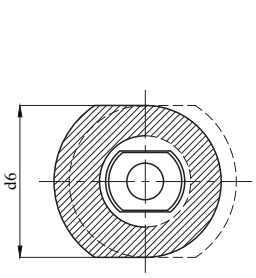


TECHNICAL SPECIFICATIONS

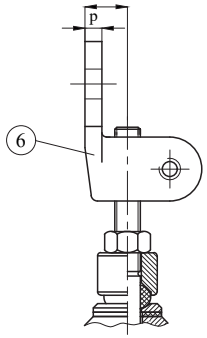


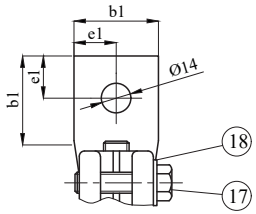
Insulation Levels acc. to IEC 60137:2017			
1	Highest Voltage (kV)	1,2	1,2
2	Rated Current (A)	250	630
3	Lightning Impulse Withstand Voltage (BIL) (kV)	20	20
4	Power Frequency Withstand Voltage (kV)	dry 10 wet 10	dry 10 wet 10
5	Creepage Distance (mm)	55	75
6	Rated Thermal Short-time Current (2s) (kA)	4,42	11,14
7	Rated Dynamic Current (kA)	15,63	39,37
8	Minimum Cantilever Withstand Load (N)	1000	1000

18	1	Washer DIN 125
17	1	Screw DIN 933
16	1	Closing Piece
15	2	Brass Lock Nut DIN 936
14	1	Spring Washer DIN 127
13	3	Brass Nut DIN 934
12	2	Brass Washer DIN 125
11	1	Internal Gasket "P"
10	1	Internal Gasket "O"
9	1	Flange Gasket "N"
8	1	Plain Gasket "M"
7	1	Ring Gasket "J"
6	1	Brass Flag DIN 43675-DP
5	1	Brass Washer "G"
4	1	Brass Washer "E"
3	1	Brass Stem "Y"
2	1	Bottom Porcelain "B"
1	1	Top Porcelain "A"
POS.	PCS.	DESCRIPTION



SECTION A-A



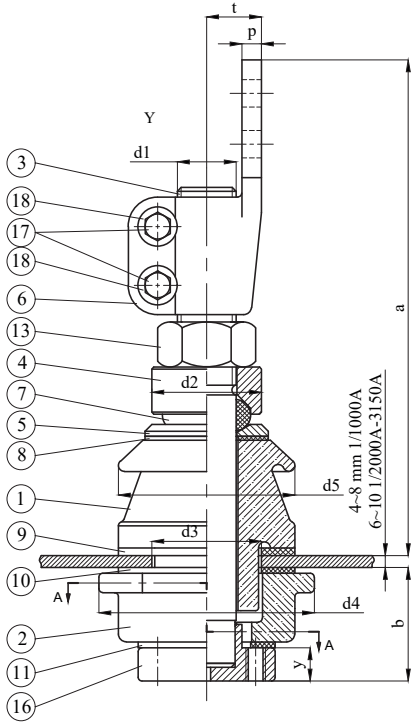


OPTIONAL FLAG

***All dimensions are "mm"

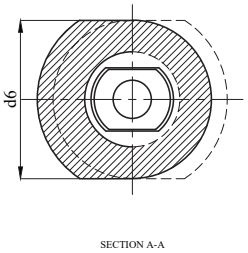
Type	Description	a max	b max	s ±0,3	d1	d2	d3	d4	d5	d6	p	t	b1	e1	Weight (~kg)
1/250A	Without Flag	138	68	25	M12x1,75	28	28	60	50	50	8	20	40	20	0.8
	With Flag														1.1
1/630A	Without Flag	178	82	37	M20x2,5	40	45	85	70	70	8	20	40	20	1.9
	With Flag														2.2

*Rated Voltage 1kV ,Current 250-630A

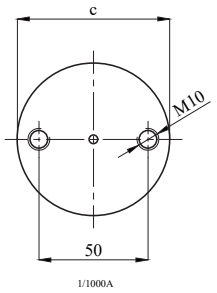


Insulation Levels acc. to IEC 60137:2017				
1	Highest Voltage (kV)	1,2	1,2	1,2
2	Rated Current (A)	1000	2000	3150
3	Lightning Impulse Withstand Voltage (BIL) (kV)	20	20	20
4	Power Frequency Withstand Voltage (kV)	dry 10 wet 10	dry 10 wet 10	dry 10 wet 10
5	Creepage Distance (mm)	75	75	75
6	Rated Thermal Short-time Current (2s) (kA)	17,68	35,36	55,68
7	Rated Dynamic Current (kA)	62,5	125	196,87
8	Minimum Cantilever Withstand Load (N)	1250	2000	3150

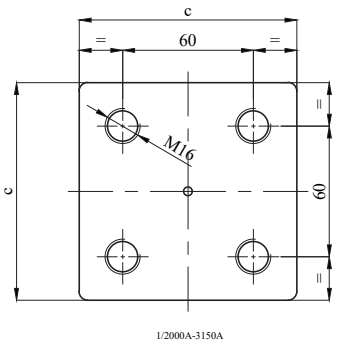
18	2	Washer DIN 125
17	2	Screw DIN 933
16	1	Brass Closing Piece
13	1	Brass Nut DIN 934
11	1	Internal Gasket "R"
10	1	Internal Gasket "X"
9	1	Flange Gasket "N"
8	1	Plain Gasket "M"
7	1	Ring Gasket "J"
6	1	Brass Flag DIN 43675
5	1	Brass Washer "G"
4	1	Brass Washer "E"
3	1	Stem "Z"
2	1	Bottom Porcelain "B"
1	1	Top Porcelain "A"
POS.	PCS.	DESCRIPTION



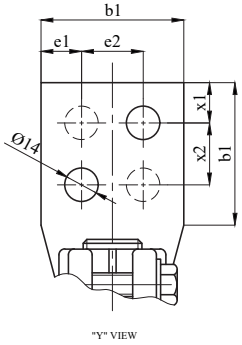
SECTION A-A



1/1000A



1/2000A-3150A

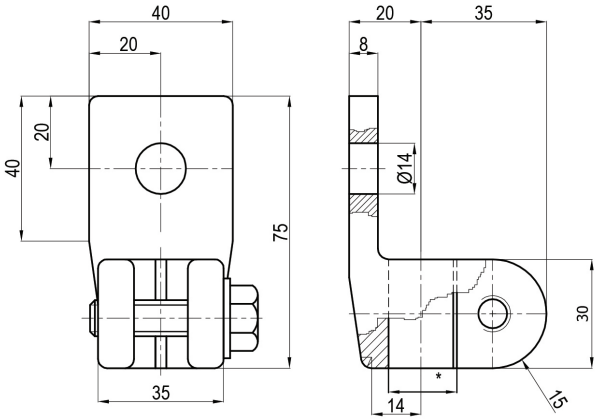


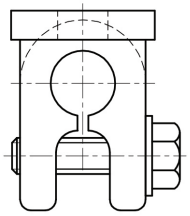
"Y" VIEW

***All dimensions are "mm"

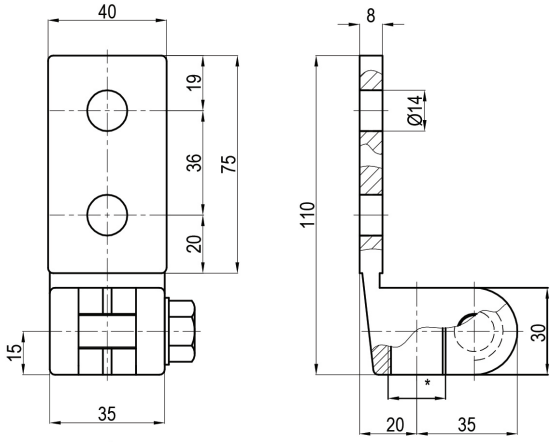
Type	a max	b max	c	y	d1	d2	d3	d4	d5	d6	p	t	b1	e1	e2	x1	x2	Weight (~kg)	Holes (Flag)
1/1000A	263	60	70	17	M30x2	56	56	110	90	90	10	28	60	17	26	17	26	4.8	2
1/2000A	340	65	100	22	M42x3	70	70	125	104	104	15	40	100	25	50	20	40	11	4
1/3150A	372	70	110	27	M48x3	80	90	150	125	125	15	45	120	30	60	20	40	15	4

*Rated Voltage 1kV, Current 1000-2000-3150 A





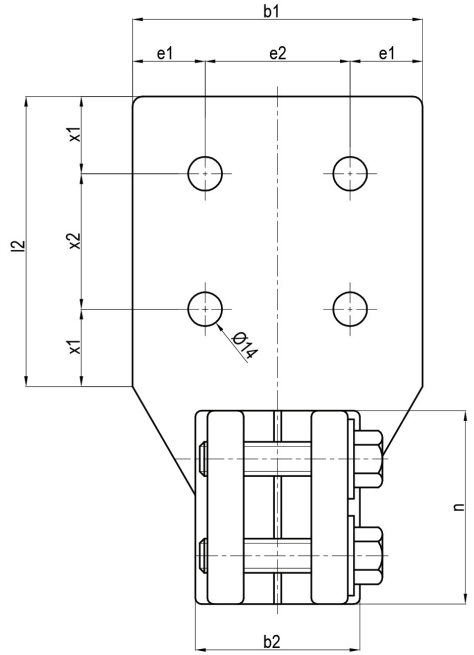
Brass Flag DIN 43675 "DP"
Material: Brass (CuZn40Pb2)

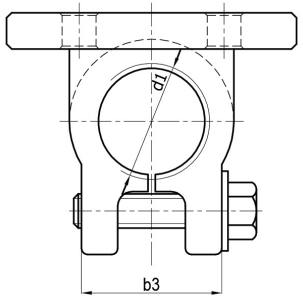


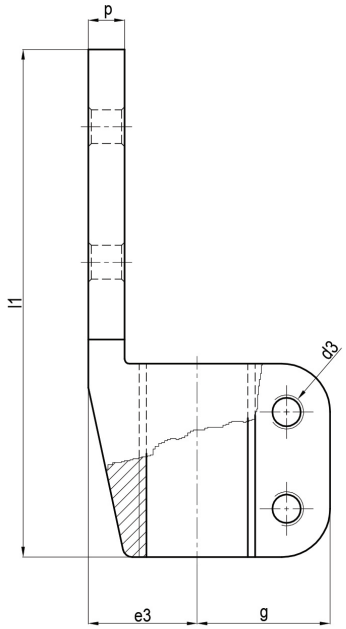
Brass Flag (modified) "AP-EL"
Material: Brass (CuZn40Pb2)

**For 250/630 A Bushings*

* M12 For DP 250A BUSHINGS
M20 For DP 630A BUSHINGS







Z: Nr. of holes (Ø14)

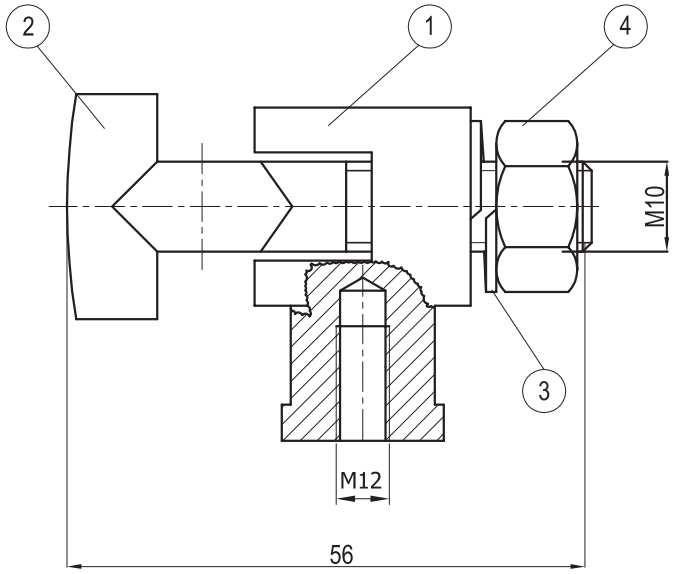
Material: Brass (Cu Zn 40 Pb2)

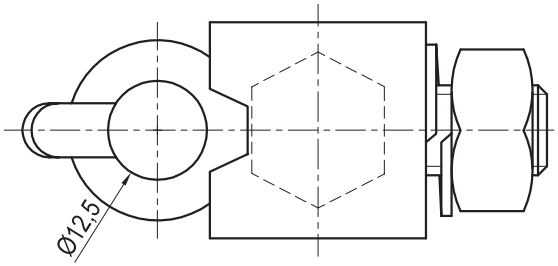
Type	b1	b2	b3	d1	d3	e1	e2	e3	g	l1	l2	n	p	x1	x2	z
EP 1000	60	45	36	M30x2	M10	17	26	28	40	130	60	60	10	17	26	2
FP 2000	100	58	45	M42x3	M12	25	50	40	55	190	100	80	15	20	40	4
FP 3150	120	68	58	M48x3	M12	30	60	45	55	210	120	80	15	20	40	4

**For 1000-2000-3150 A Bushings*

SPECIAL CONNECTORS

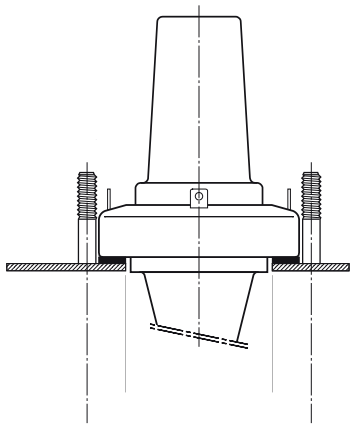
ANSI Clamp Set M12 - Type: B-250





Pos.	Description	Material
1	Ansi Clamp M10	Brass
2	Eye Bolt M10	Brass
3	Spring Washer	S/Steel
4	Nut M10	Brass

1	PROTECTIVE COVER
2	CONNECTION INTERFACE
3	STUD SCREW
4	FIXING NUTS
5	ALU-CLAMPING E DIN 42538
6	GASKET
7	TRANSFORMER
8	CONNECTION BOLTS
9	FIXING SHOE
10	EARTH JUMPER
11	FIXING FLANGE A DIN 42538

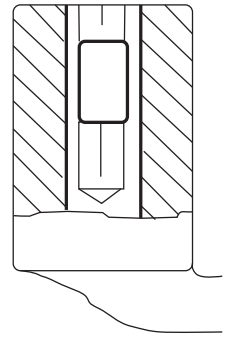


STANDARD	A	B	C	D	E	FIXING STUDS		TYPE
DIN 42538	123	76	55	25	M10		4	A
DIN 42538	140	87	55	25	M10	6	B	

CONTACT SYSTEMS

E TYPE CONTACT SYSTEM

1	PROTECTIVE COVER
2	CONNECTION INTERFACE
3	STUD SCREW
4	FIXING NUTS
5	ALU-CLAMPING E DIN 42538
6	GASKET
7	TRANSFORMER
8	CONNECTION BOLTS
9	FIXING SHOE
10	EARTH JUMPER
11	FIXING FLANGE A DIN 42538

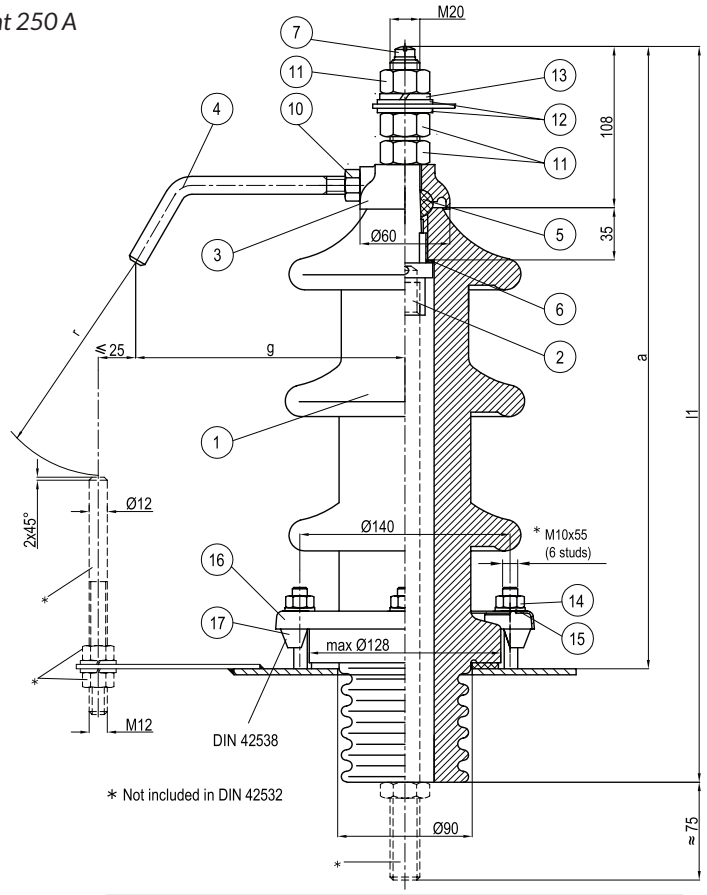


SLIDING TYPE CONTACT

TRANSFORMER BUSHINGS - DIN 42532

INDOOR & OUTDOOR - Rated Current 630A

**Rated Current 250 A*



Type	Class Outdoor (f)	Class Indoor (i)	a	r	g	l1	⊗	# S
10 Ni 630	-	10 N	292	85	165	353	170	2
10 Nf 630	10 N	-	342	85	180	403	305	2
20 Ni 630	-	20 N	342	155	165	403	305	2
20 Nf 630	20 N	-	417	155	180	493	440	3
30 Ni 630	-	30 N	417	220	165	493	440	3
30 Nf 630	30 N	-	522	220	200	618	662	4

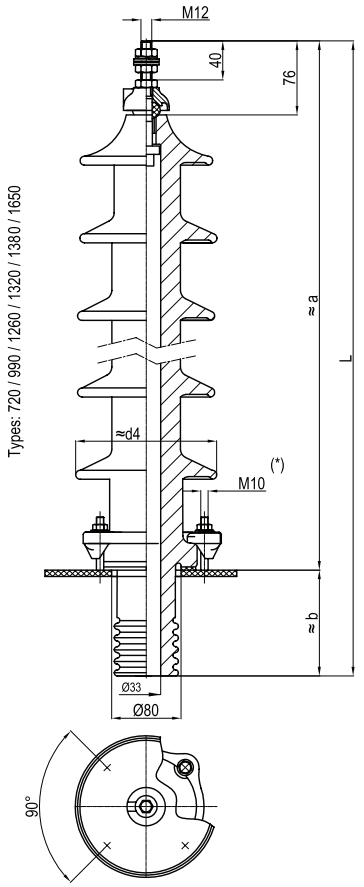
Type	Rated Voltage (kV)	Max. Voltage (kV)	Lightning Impulse (kV)	Power Frequency Withstand (kV) Dry	Wet
10 Ni/Nf	10	12	75	30	28
20 Ni/Nf	20	24	125	55	50
30 Ni/Nf	30	36	170	77	70

⊗ : Creepage Distance (mm)
S : Number of Sheds

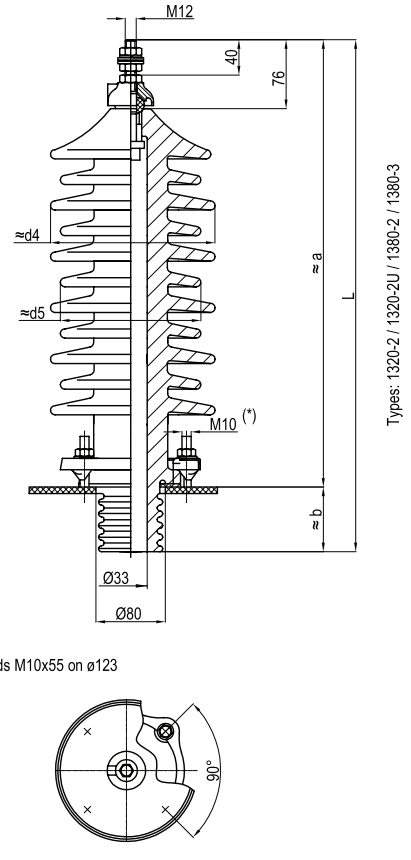
OUTDOOR TRANSFORMER BUSHINGS

Special Applications - Rated Current 250A

Form 1



Form 2



(*) Studs M10x55 on ø123

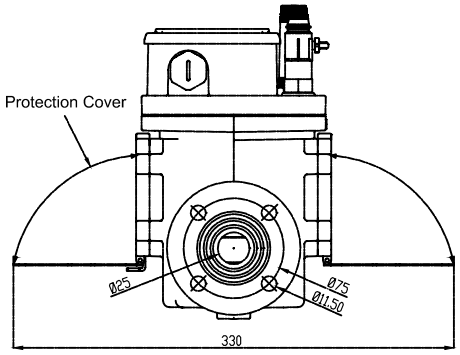
Type	Rv	Mv	a	b	L	d4	d5	⊗	# S
30/250-720	30	36	485	76	561	170	-	720	5
30/250-990	30	36	536	96	632	190	-	990	6
30/250-1260	30	36	545	77	622	175	-	1260	10
30/250-1320	30	36	575	91	666	180	-	1320	11
30/250-1320-2	30	36	460	91	551	200	180	1320	11
30/250-1320-2U	30	36	460	186	646	200	180	1320	11
30/250-1380	30	36	525	91	616	185	-	1380	10
30/250-1380-2	30	36	460	91	551	200	180	1380	11
30/250-1380-3	30	36	460	126	586	200	180	1380	11
30/250-1650	30	36	645	96	741	185	-	1650	13

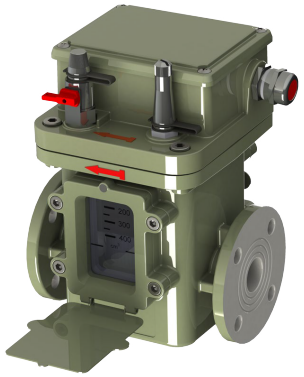
Rv : Rated voltage (kV)
Mv : Max. voltage (kV)
⊗: Creepage Distance (mm)
S : Number of Sheds

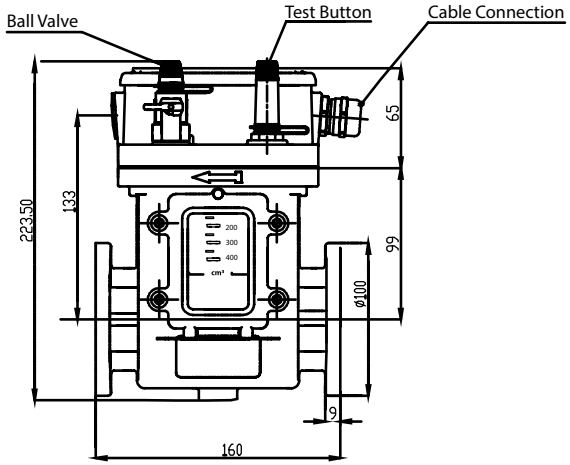
TECHNICAL SPECIFICATIONS

Relay MBP in Accordance with EN 50216-2

MBP 25-F16



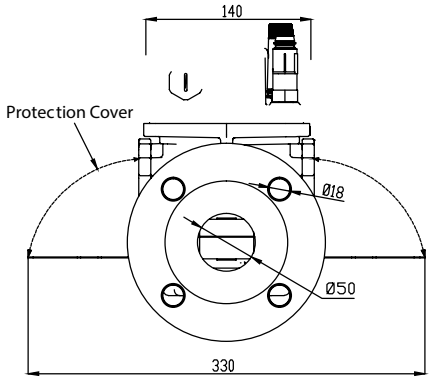


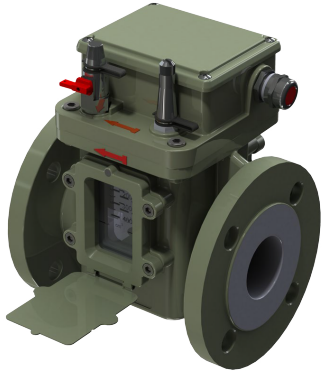


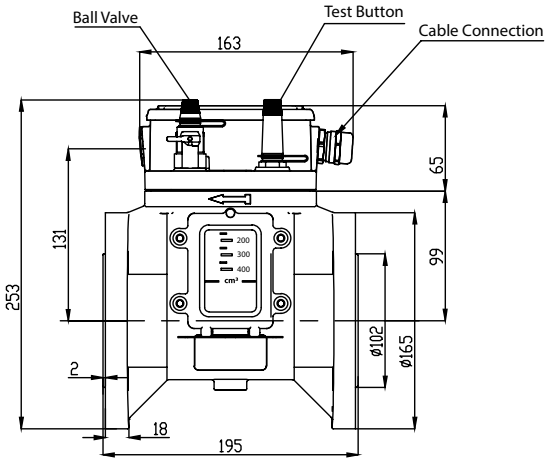
Type	Type Number	Connection	Nominal Pipesize (mm)	Weight (kg)	Transformer Power Class
MBP 1	MBP25-F16 (DR 25)	Flange Connection	25	4,2	≤ 5 MVA

Relay MBP in Accordance with EN 50216-2

MBP 50-F100



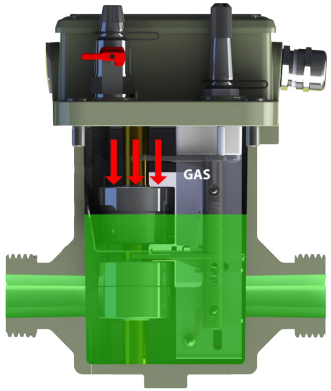




Type	Type Number	Connection	Nominal Pipesize (mm)	Weight (kg)	Transformer Power Class
MBP 4	MBP50-F100 (DR 50)	Flange Connection	50	5,8	≤ 5 MVA ≥ 10 MVA

Relay MBP

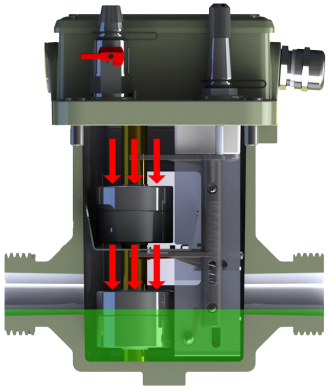
Functions



In case of gas accumulation

Reason: Gas arises in the insulating liquid

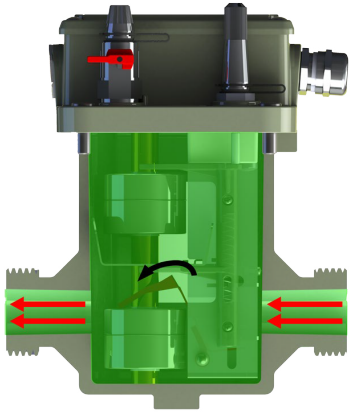
- Gas moves upwards, accumulates in the Buchholz Relay and displaces the insulating liquid
- The upper float moves downwards and activates the upper reed switch
- The lower float remains unaffected



In case of dropping oil level

Reason: Leakage

- If the insulating liquid level drops the upper float moves downwards and switches the upper reed contact
- If further insulating liquid level decrease occurs, the pipeline and expansion tank get empty
- The lower float moves downwards and actuates the lower reed switch which can be used to deactivate the transformer
- Visual oil level indication from two sides

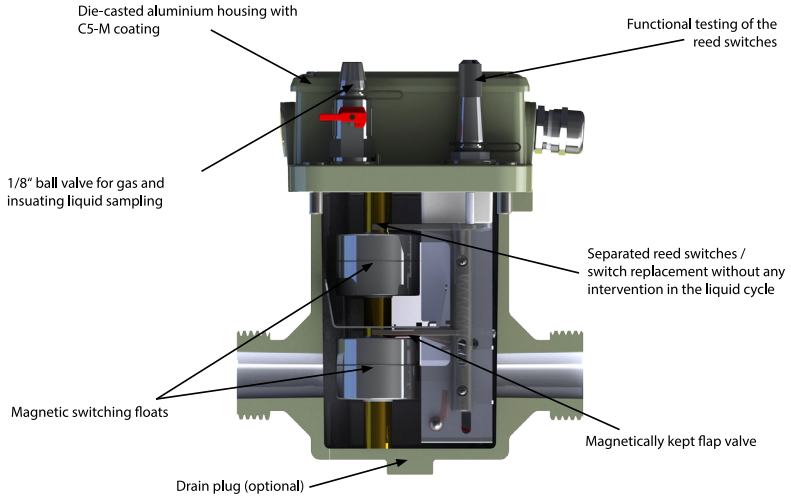


In case of increased insulating liquid flow

Reason: Because of sudden occuring event a pressure wave moves in the direction of the expansion tank

- A sudden pressure wave occurs and moves within insulating liquid
- The Flap valve moves in the direction of the pressure wave and actuates the lower reed contact which can deactivate the transformer
- After decrease of the pressure wave the flap valve moves back to its origin position

Benefits at a Glance



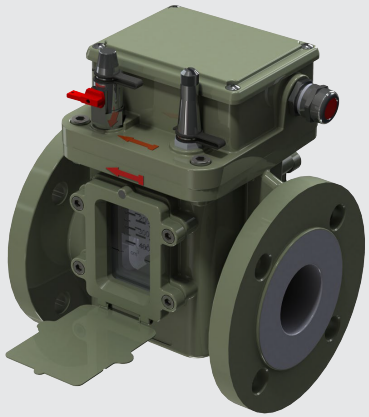
Connection Sheme
(when ordering please select)

Yellow 13 14 Lower (Trip)	Single Contact Lower Float 1 Normally Open Contact	01	Yellow 11 12 Lower (Trip)	Red 21 22 Upper (Alarm)	2 Normally Open Contacts 1 Normally Contact Lower 1 Normally Contact Upper	03
Yellow 14 11 12 Lower (Trip)	Single Contact Lower Float 1 Changeover Contact (SPDT)	02	Yellow 14 11 12 Lower (Trip)	Red 24 21 22 Upper (Alarm)	2 Changeover Contacts (SPDT) 1 Changeover Contact Lower 1 Changeover Contact Upper	04

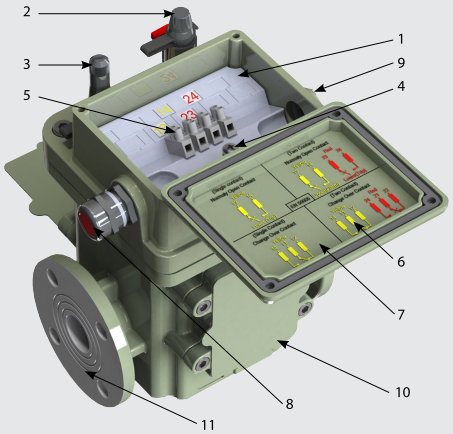
TECHNICAL SPECIFICATIONS

Description, Flange- and Threaded Connection

Buchholz Relay with flange connection



Buchholz Relay with threaded connection



Item	Descriptions
1	Terminal box
2	1/8" sampling valve
3	Test button
4	Earthing screw
5	Luster terminal
6	Connection sheme
7	Terminal box cover
8	Cable gland
9	Blind plug
10	Protection cover
11	Flange or threaded Connection

Parameters and Technical Data

Parameters	Technical Data
	Materials
Housing	Aluminium / C5-M powder coating / coated RAL 7033 (standard, others upon request)
	Reed switch
Switching element	Power reed contact switches
number of switching contacts	Upon request up to 2 NO or 2 CO (SPDT) contacts per function
Insensitivity to magnetic fields	25 mT
Switching voltage max.	240 V DC / V AC
Carry current max.	3 A
Switching current max. / 24 V DC	3 A
Switching current max. / 240 V AC	0,4 A
Contact rating max.	100 W / VA
Minimum applicable load	3 W; 125 mA / 24 V DC
	Key figures
Nominal pipe diameter	DN25 / DN50 / DN80 / G 1½" threaded connection
Ambient temperature	- 30 °C / + 55 °C (DIN EN 60068-2-78 : 2002-09)
Temperature of the insulating liquid	- 30 °C / + 115 °C (low temperature design upon request)
Degree of protection	IP 65
Gas volume for response	200 cm^3 - 300 cm^3
Viscosity of the insulating liquid	< 1100 mm^2/s
Cable gland	M 20 x 1,5 (others upon request)
Nominal installation position	0° - 5° (ascending towards expansion tank)
	Tests
Vibration resistance	DIN EN 60068-2-6; 2 - 200 Hz; 7 mm; 20 m/s^2
Shock resistance	DIN EN 60068-2-27; 1/2 sin; 250 m/s^2; 11 ms
Pressure resistance	250 kPa
Vacuum resistance	< 2,5 kPa
	Flap valve
Flap valve	Magnetically held
Response time	< 0,5 s
Insulating liquid flow speed	0,65 m/s, 1 m/s, 1,5 m/s, 2 m/s, (each ±15%)

APPLICATION AND CONSTRUCTION

Form-A

Oil Level Indicators are used in transformers of Powers less than 5000 kVA for the purpose of monitoring their oil level. Indicator part has no contact with the oil.Liquid level indicators do not allow oil leakage at temperatures of 110 °C,0.5 bar effective pressure and vacuum.

Case:*Injected Aluminum,electrostatic powder painted (RAL 7033 or RAL 7001)Indicator dial:Aluminum sheet,coated with black paint and yellow serigraphy.*

Pointer:*Yellow painted brass*

Indicator glass:*Polycarbonate(UV resistant)*

Joint Gasket*:Nitrile Rubber,hardness:70 Shore A*

Float:*Oil resistant,closed cellular type special plastic foam.*

Form-B

Oil Level Indicators are used in transformers of Powers greater than 5000 kVA for the purpose of monitoring their oil level.

Structurally this product consists of two basic parts; the isolated flange and the indicator.Indicator unit has no contact with oil.

Indicator unit has ventilation holes which are located on the upper and bottom rear sides in order to prevent the condensed water accumulation.

Isolation Flange:*Injected Aluminum*

Indicator Unit: *Injected Aluminum,painted with RAL 7033 or RAL 7001*

Indicator Dial:*Aluminum sheet,coated with black eloxal and yellow serigraphy*

Pointer:*Yellow painted brass*

Indicator glass:*Polycarbonate(UV resistant)*

Float:*Oil resistant,closed cellular type special plastic foam.*

Contacts:*Switches in compliance with UL,CSA and VDE standard*

Outer screws:*Stainless steel*

OPERATION PRINCIPLE

Form-A

The radial movement of the float is transmitted magnetically to the pointer.the magnet connected to the float-lever mechanism,drives the polarized indicator magnet connected to the pointer.

Form-B

The float movement associated with the oil level is radially transmitted to the magnetic coupling system of the indicator via the float lever.A magnet connected to the float –lever mechanism,drives the polarized indicator magnet connected to the pointer.

If requested ,this movement can be axially transmitted through a special joint equipped with a gear system.the models equipped with electric contacts,oparate in accordance with the position of the calibrated pointer.

Types and contact system

Liquid level indicators can,on request,be manufactured in form single ot double contacts.As cable connection system,cable-plug or terminal box type connection units are available.

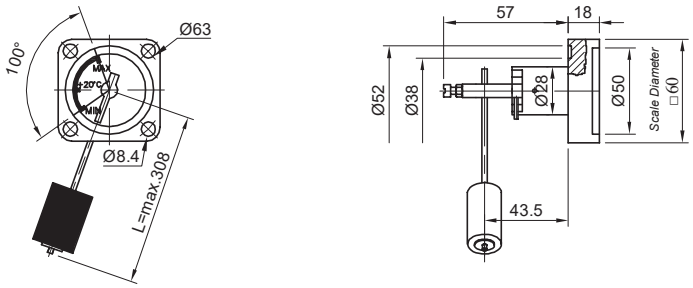
Form-B Liquid Level Indicators are classified according to their contact types as follows;

Type B0,without contacts

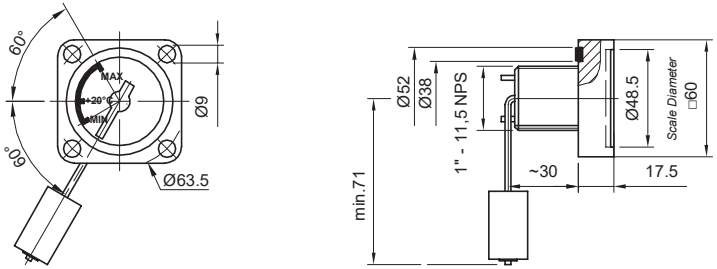
Type B1,single contact,for warning the lowest oil level

Type B2,double contacts,for warning both the lowest and highest oil levels.

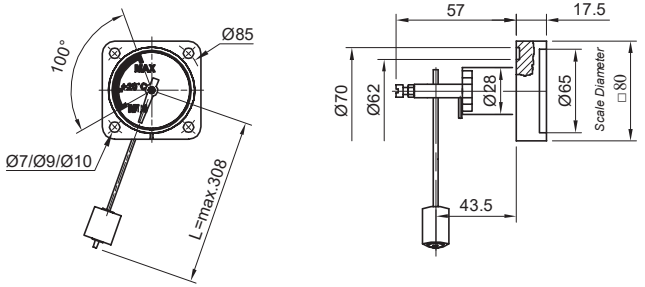
KSS A **Code : 511** ***Standard Type* - DIN 42569)**



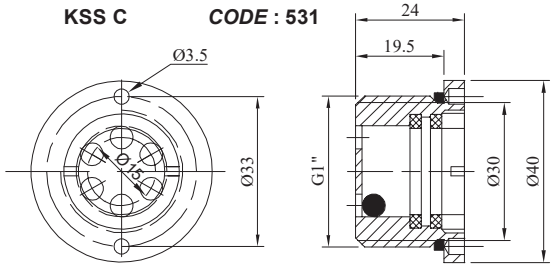
KSS J **Code : 512 (*Screw Type*)**



KSS B **Code : 521**



KSS C **CODE : 531**



TECHNICAL SPECIFICATIONS

KSS C type oil level indicators are used for indication of the oil level in the transformer tank.

TECHNICAL SPECIFICATIONS

APPLICATION
This thermometer is designed for indication of oil temperature in both transformers with expansion conservator or hermetically sealed type transformers.
It is fitted with two electric switches and maximum indicating pointer.The thermometer operates efficiently under very hot and very cold weather conditions.

CONSTRUCTION
All components are surface treated or made of corrosion resistant materials.The temperature sensing element is a bimetal helix.Setting of the contacts is indicated on the indicating scale.

Case
The casted aluminum alloy with electrostatic powder paint.Clear transparent plastic window of UV-resistant polycarbonate.Weatherproof according to DIN 40050 protection class IP 43-IP 55.

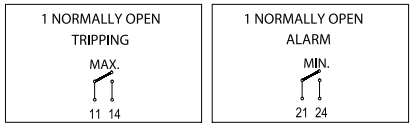
Switches
Two micro switches rated at 5 A 250 VAC or 0.2 A 250 VDC.
Eelectrically separeted switching circuits.The switches close on temperature rise.Insulation tested to ground at 2000 V for 1 minute.

Maximum indicating pointer
Resettable from the outside by means of a knob.

Measuring range
10-120 °C

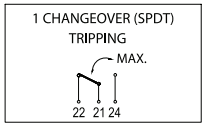
Measuring and switching accuracy
± 5°C between 50 °C and 120 °C

1 Contact Alternatives

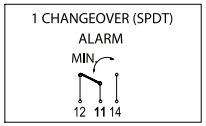


CODE NO: 01

CODE NO: 02

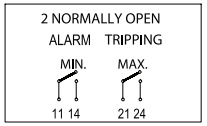


CODE NO: 03

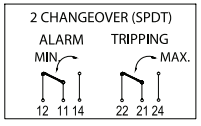


CODE NO: 04

2 Contact Alternatives



CODE NO: 05



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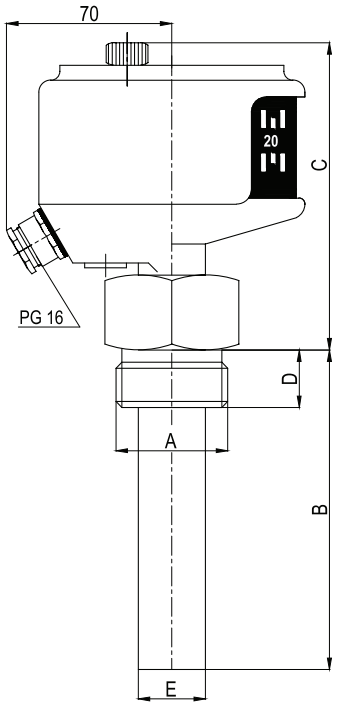
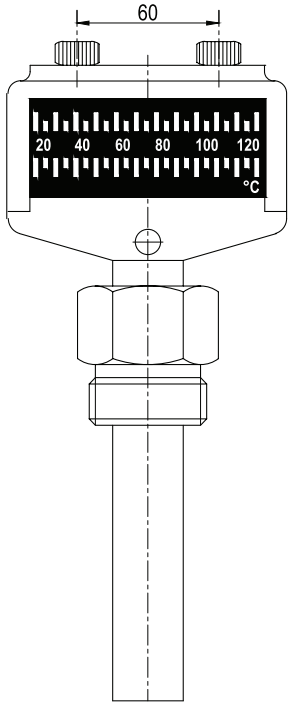
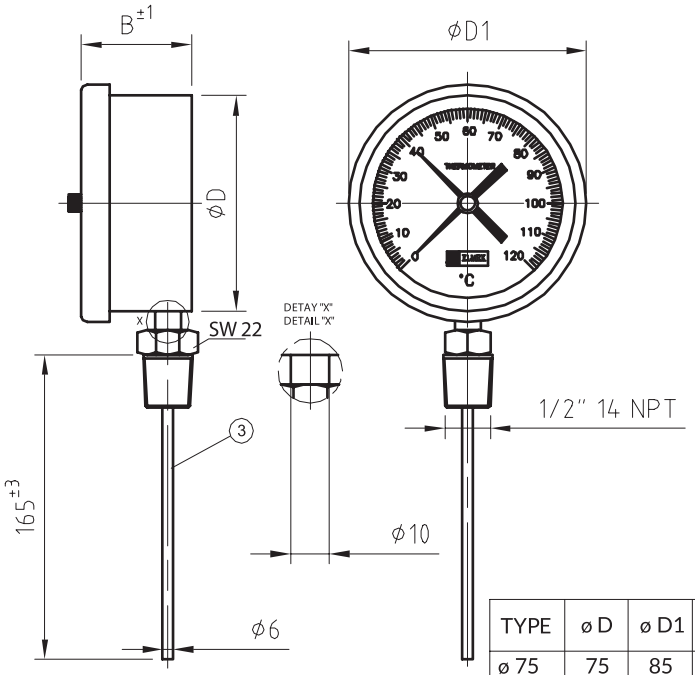




Varianten | Types				Maße | Dimensions				
Mit Kontakt | With contact	Code No.	Ohne Kontakt | Without contact	Code No.	A	B±1	C	D	Ø E
MBTC 14	MT 11	MBT0 14	MT 41	R ½"	106	117	12	15
MBTC 16	MT 21	MBT0 16	MT 51	R 1"	106	117	12	17
MBTCA 16	MT 31	MBT0A 16	MT 61	R ¾"	106	117	12	17



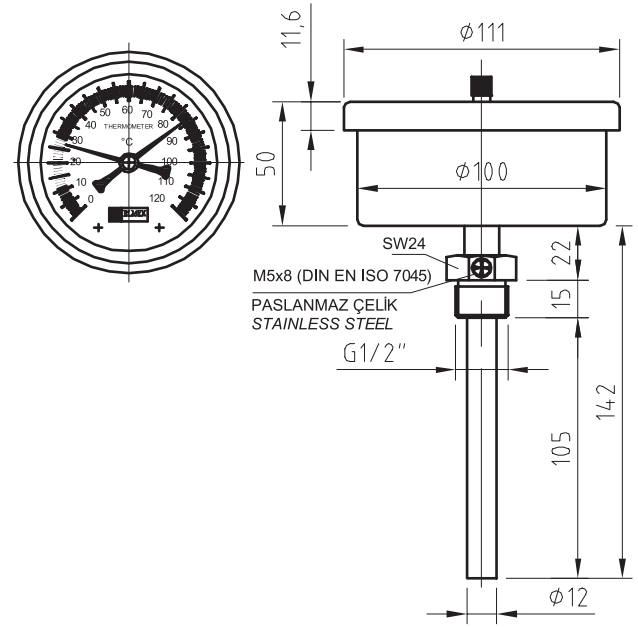
TYPE	ø D	ø D1	B	KOD / *CODE*
ø 75	75	85	48	410RT0075
ø 100	100	110	50	410RT0100

CONSTRUCTIVE SPECIFICATIONS:

Heat Sensor	*: Bimetal*
Sensor Tube	*: Stainless Steel*
Case	*: Stainless Steel*
Window	*: Thermoplastic resin.*

TECHNICAL SPECIFICATIONS:

Accuracy	*: 1.25 % F.S., (DIN 16203)*
Mounting	*: Use with thermometer pocket. Weld thermometer pocket onto transformer, Put the thermometer in to the pocket by using spanner. When mounting do never screw it by holding from its case.*
Operating Range	*: Use 3/4 of full scale, short time peaks up to the full scale*
Measuring Range	*: 0 + 120 °C, Other measururing units can be printed on the dial, depending on the requirements.*



CONSTRUCTIVE SPECIFICATIONS

Thermowell Connection:	*G 1/2" Zinc coated steel (only 50mm. brass material)*
Heat sensor	*: Bimetal - Helical Spring*
Sensor Tube	*: Brass material*
Case	*: Steel, Zinc Coated*
Front Ring	*: Chrome plated steel*
Window	*: Glass or acyrilic plastik*

TECHNICAL SPECIFICATIONS

Accuracy	*: 2.0 % F.S., (DIN 16203)*
Mounting	*: Thermowell is mounted to the place where it is going to measure temperature. Put the sensor tube into the thermovil. When mounting do never screw it by holding from its case. Screw it by a spanner from the thermowell.*
Operating Range	*: Use 3/4 of full scale.Short time peaks up to the full scale.*
Measuring Range	*: 0+120 °C Other measururing units can be printed on the dial, depending on the requirements.*

TECHNICAL SPECIFICATIONS

APPLICATION

Pressure Safety Valves are used to prevent the rapid build up of pressure within the transformer tank that might cause an explosion hazard.They are designed to operate and discharge any pressure greater than their set value to the atmosphere.

CONSTRUCTION

This valve type consist of a flanged body and a corrosion proof aluminum alloy disc/ sleeve arrangement.The disc/sleeve is attached to a central rod which is spring loaded.The valve has two gaskets,one is of a special design that is fully compressed by the disk under normally closed conditions,and the other is a lateral o-ring that operates on the sleeve part of the disc.

Valves are designed such that the operating components are mounted inside the valve body.Hence the mechanism is protected from external insluences.They have an additional outside cover made of aluminium which further increases the protection against the atmospheric conditions.

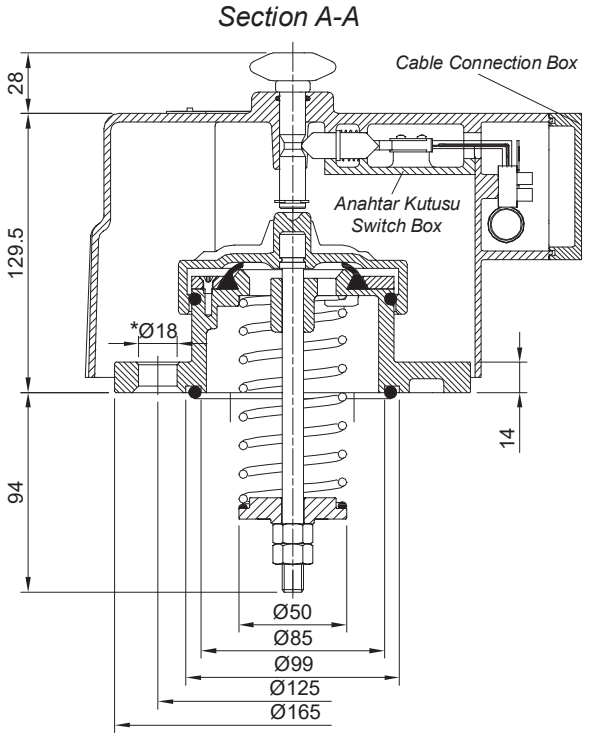
They have also a visual operation indicator on the top section.

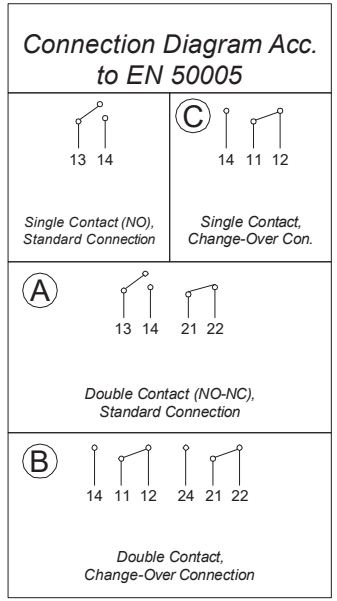
The external surfaces are protected against all climatic conditions.Steel parts are stainless or nickel plated steel and those parts in aluminium alloy are additionaly protected with two layers of special paint.Hence the valves are suitable for operating in temperatures between -25 °C and +100 °C.

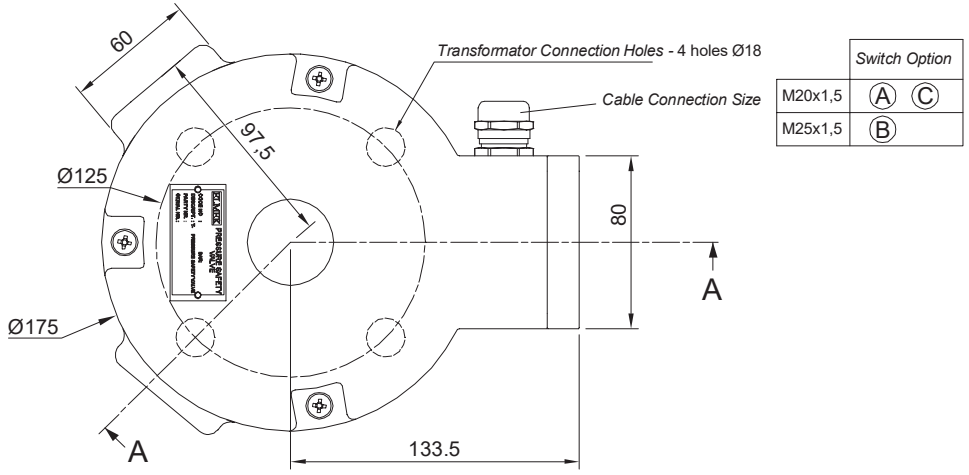
Valves can be calibrated to operate any pressure between 0.3 and 0.7 bar.

An optional switch is available which is operated by the same rod as the visual indicator and can be used to electrically trigger a warning locally or remotly.The switch is protected by a watertight box,and remains pressed until the visual indicator reset manually.The switch characteristics are as follows:

AC 220/380 V-5/3 A







	Switch Option
M20x1,5	A C
M25x1,5	B

APPLICATION

Moisture holders are used to take out the moisture of the air that enters the expansion vessel when the transformer is operating.In this way it hinders water condensation in the expansion vessel and operation safety of the transformer is increased.

CONSTRUCTION

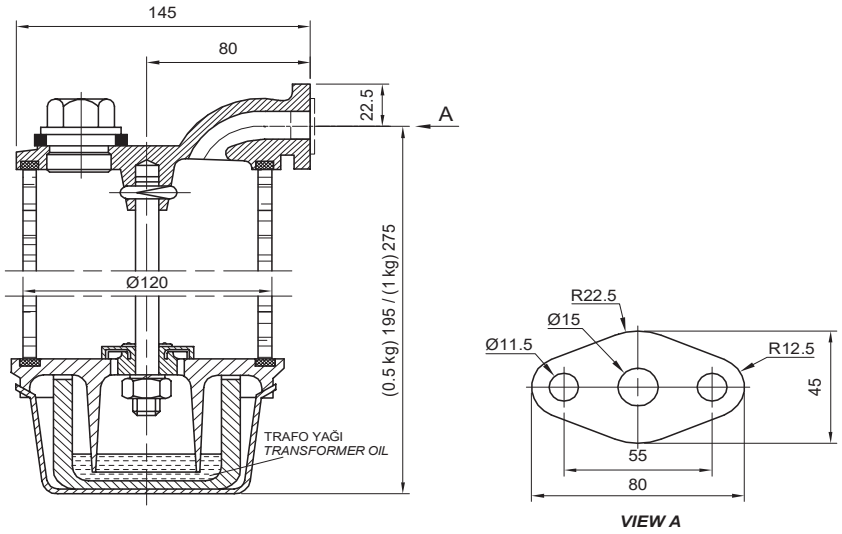
Moisture holders of 0,5-1 kg (Form A,B,C)
The top and the bottom sections are casted aluminium and electrostatic powder painted.
The shafts are made of nickel plated steel and sieves are made of zinc sheet.
Container cylinder is glass or polycarbonate depending on the customers request.
Oil bowl is of polycarbonate and the bowl holder is made of CrNi material

Moisture holders NAK 0.15 kg
The top flange is casted aluminium and electrostatic powder painted.
Container cylinder and oil bowl is made of polycarbonate.

Moisture holders of Types NAK 1.2 to 2.4 kg (DIN 42562)
All the flanges are GG-14 casting and coated with a special wet paint having high resistance against corrosion.The upper connection flange and its pipe are made of St 37 material.
Container cylinder and oil bowl is made of glass.the oil bowl dome can be Ms 63 brass or aluminium depending on the request.

MOISTURE HOLDERS

TYPE / FORM		CODE NO	SILICAGEL CAPACITY (kg)	TRANSFORMER OIL CAPACITY (max.) (kg)
NAK 0.5 kg (DIN 42 567)	FORM A	311A	0.5	1800
	FORM B	311B		
	FORM C	311C		
NAK 1.0 kg (DIN 42 567)	FORM A	321A	1.0	3600
	FORM B	321B		
	FORM C	321C		
NAK 0.15 KG		301B	0.15	600
NAK 1.2 KG (DIN 42562)		341	1.2	4500
NAK 2.4 KG (DIN 42562)		351	2.4	9000
NAK 3.6 KG (DIN 42562)		361	3.6	13500
NAK 4.8 KG (DIN 42562)		371	4.8	18000
FORM D		341D	0.72	2600
		351E	5.0	18000
		361D	10.0	36000
		371D	25.2	90000
		381D	43.2	155000



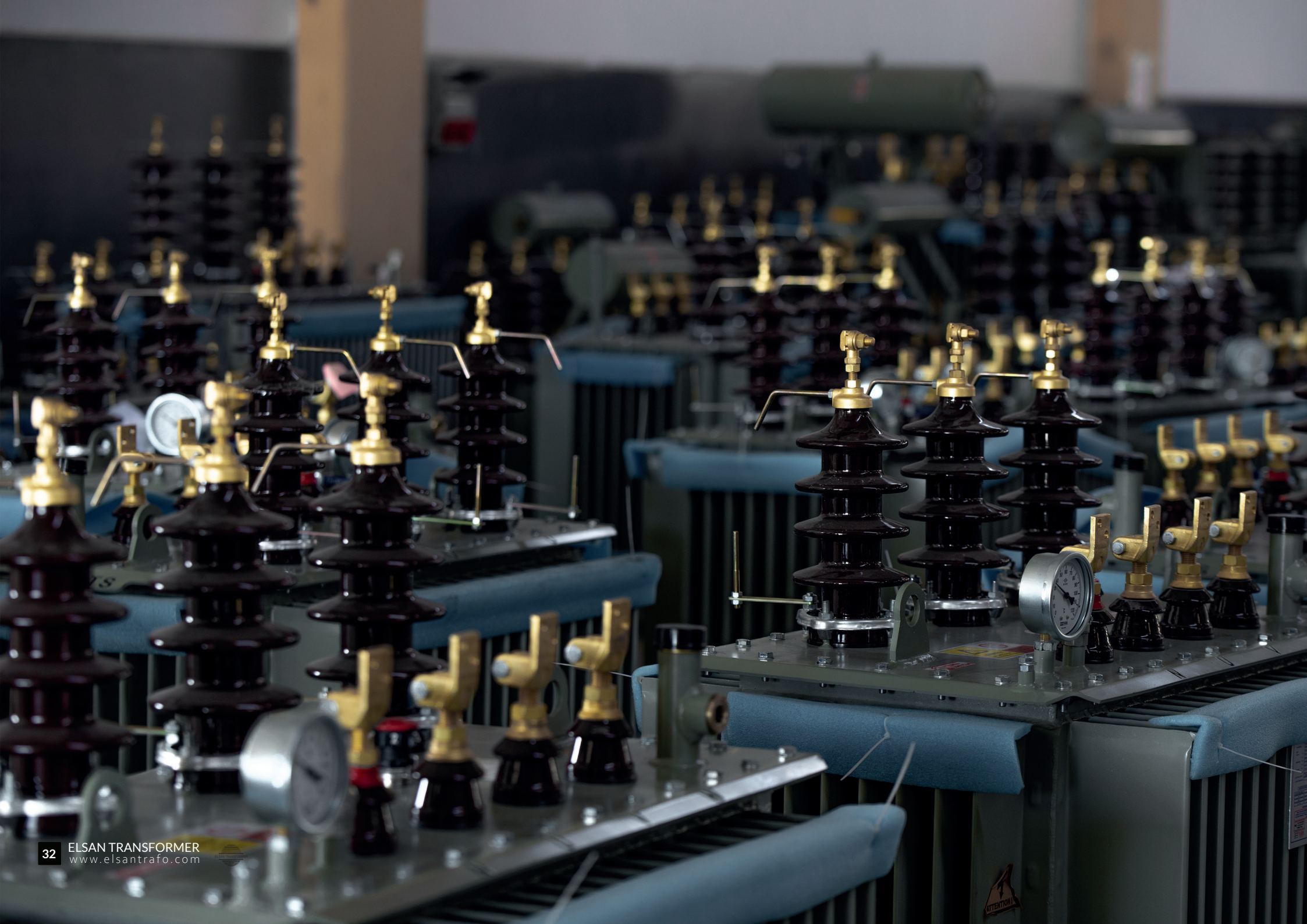
OPERATION PRINCIPLE

Dehydrating breathers are mounted to the transformers expansion tank and holds the moisture of the air enetering in the tank when the transformer is operating.When the transformer gets air in,an air flows from ambient to the bowl.The oil layer in the bowl prevents the dryer material from continuous contact with the damp external air and cleans the air flowing in.

If the Operation temperature of the transformer decreases,the volume of the isolation oil gets smaller. During this lessening,an amount of air equal to the lessening amount is absorbed in to the oil bowl through air holes.This air then transfer to the expansion vessel and contacts with oil layer.During this transfer,air contacts with the dryer material(silica gel) and leaves its moisture there.With the heating of the oil in the transformer tank,the air inside flows out from the opposite direction of the dehydrating breathers.Dehydrating breathers are protected by being coated and painted against corrosion.During whole this operation (air get in&get out) there will be bubble ocur in the oil bowl.The size of silica gel pieces put into the dehydrating breathers should be around 3 mm.

Capacities
In the selection of the size of the dehydrating breathers,various factors such as oil volume in the transformer,required life of the silica gel charge ,operating cycle of the transformer,temperature and moisture contents of the ambient air should be taken into consideration by the transformer designer.For average operating conditions,the models and recommended transformer oil capacities are given in the table.

QUANTITY 0,5 KG.	QUANTITY 1 KG	DESCRIPTION	SPECIFICATION
1	1	Top section	1 DIN 42 567
1	1	Bottom section	3 DIN 42 567
1	1	Oil bowl	92x6x66 - 3 DIN 42 567
1	1	Holder	5 DIN 42 567
1	1	Sieve	45x1x6 - 5 DIN 42 567
1	-	Glass cylinder	120x5x100 - 6 DIN 42 567
-	-	Glass cylinder	120x5x180 - 6 DIN 42 567
1	1	Bridging plug	12x125 - 7 DIN 42 567
-	-	Bridging plug	12x205 - 7 DIN 42 567
2	2	Gasket	124x4x106 DIN 42 567
1	1	Gasket	29x39x3 NBR
1	1	Plug	R 1" DIN 910
1	1	Nut	M 12 DIN 934 - 4D
1	1	Spring washer	B 12 DIN 127
2	2	Rivet	2,3x5 DIN 1476
1	1	Pin	4x24 DIN 1471



TÜRK STANDARDLARI ENSTİTÜSÜ
TÜRK STANDARDLARINA UYGUNLUK BELGESİ

TURKISH STANDARDS INSTITUTION
CERTIFICATE OF CONFORMITY TO TURKISH STANDARDS

Markanın Tanımı / Description of the Mark

BELGE NUMARASI / REFERENCE NUMBER OF LICENCE	0293276-TSE-01/01
BELGENİN İLK VERİLİŞ TARİHİ / DATE OF FIRST ISSUE OF LICENCE	15.01.2021
BELGENİN SON GEÇERLİLİK TARİHİ / LICENCE VALID UNTIL	15.01.2023
BELGE SAHİBİ KURULUŞUN ADI / NAME OF THE LICENCE HOLDER	ELSAN TRAFO SANAYİ VE TİCARET LİMİTED ŞİRKETİ
BELGE SAHİBİ KURULUŞUN ADRESİ / ADRESS OF THE LICENCE HOLDER	SARAYALTI MAH. SANAYİ CAD. NO:57 SURUÇ ŞANLIURFA/TÜRKİYE
ÜRETİM YERİ ADI / NAME OF THE MANUFACTURING PLACE	ELSAN TRANSFORMATÖR SAN. VE TİC LTD. ŞTİ
ÜRETİM YERİ ADRESİ / ADRESS OF THE MANUFACTURING PLACE	KOÇÖREN OSB MAH. 111. CADDE NO:6 EYYUBİYE / ŞANLIURFA ŞANLIURFA / TÜRKİYE
İPTAL EDİLEN BELGE NUMARASI (Varsa) / INDICATION OF SUPERSEDED LICENCE (if any)	
TESCİLLİ TİCARİ MARKASI / REGISTERED TRADE MARK	-
İLGİLİ TÜRK STANDARDI / RELATED TURKISH STANDARD	TS EN 60076-1 / 18.12.2013
BELGE KAPSAMI / SCOPE OF LICENCE	DEĞİŞİK GERİLİM DEĞERLERİNE AYARLANABİLEN GÜÇ TRANSFORMATÖRÜ ANMA GÜÇ ARALIĞI : 50 kVA'DAN(50 kVA DAHİL) 2500kVA'YA KADAR (2500kVA DAHİL) EN BÜYÜK ÇALIŞMA GERİLİMİ : 36 KV ANMA FREKANS : 50 HZ

e-imzalı/e-signed

04.01.2022

Belgelendirme Merkezi Başkanı Adına
SOYDAN CERAN
ELEKTROTEKNİK SEKTÖRÜ MÜDÜRÜ

*Bu belge, belgelendirilen ürünün, üretim yerinin Üretim/ürünün belirtildiği şartları karşıladığını da gösterir.
*Bu belge, hiç bir surette tahvil edilemez, kısmen veya okunmasını zorlaştıracak şekilde çoğaltılamaz, kazıntı ve silinti yapılamaz.
*TSE ELEKTROTEKNİK SEKTÖRÜ MÜDÜRLÜĞÜ * Adres: Necatibey Cad.No:112 06100 Bakanlıklar/ANKARA * Telefon: 0 312 416 63 96* Faks: 0312-416 66 17
*TSE BELGELENDİRME MERKEZ BAŞKANLIĞI: Adres: Necatibey Cad. No:112 06100 Bakanlıklar/ANKARA – Telefon: 0 312 416 64 81 / 416 64 27, Faks:0 312 416 66 17 E-posta: belb@tse.org.tr , web: www.tse.org.tr

https://evrakkontrol.tse.org.tr/BelgeDogrulama.aspx?p=q3ha4e5y adresinden belgenin doğruluğunu ve geçerliliğini sorgulayınız.

1 / 1

Türk Akreditasyon Kurumu

AKREDİTASYON SERTİFİKASI

Deney Laboratuvarı olarak faaliyet gösteren,

Elsan Trafo Sanayi Ticaret Limited Şirketi

Merkez Adres: KOÇÖREN MAH. 111. CAD. NO:6/3 EYYÜBİYE Şanlıurfa / Türkiye

TÜRKAK tarafından yapılan denetim sonucunda TS EN ISO/IEC 17025:2017 standardına göre Ek'te yer alan kapsamlarda akredite edilmiştir.

Akreditasyon No : AB-1700-T

Akreditasyon Tarihi : 09.04.2022

Revizyon Tarihi / No : 09.04.2022 / 00

Bu Sertifika, yukarıda açık adı ve adresi yazılı Kuruluşun TS EN ISO/IEC 17025:2017 Standardına, İlgili Yönetmelik ve Tebliğlere uygunluğunu sürdürmesi halinde **08.04.2026** tarihine kadar geçerlidir.

Gülden Banu Müderrisoğlu
Genel Sekreter

Türk Akreditasyon Kurumu (TÜRKAK) ISO/IEC 17025 olanında Avrupa Akreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile çok taraflı anlaşma (MLA/MRA) imzalamıştır.

Bu belge 5070 sayılı elektronik imza kanununa göre Gülden Banu Müderrisoğlu tarafından güvenli elektronik imza ile imzalanmıştır. E-imzalı belgeyi doğrulamak için QR kodunu kullanabilirsiniz.

F701-040 +90 312 410 82 00 - www.turkak.org.tr

KEMA Labs

KEMA TYPE TEST CERTIFICATE OF DIELECTRIC PERFORMANCE

Object	A three-phase oil-immersed distribution transformer with off-load tap changer		**1084-22**
Type	distribution transformer	**Serial No.**	7564/01
Rated power	1000 kVA		
Rated voltage	11 kV ± 2 x 2,5% / 416 V		
Connection symbol	Dyn11		
Rated frequency	50 Hz		
Manufacturer	Elsan Trafo Sanayi ve Ticaret Limited Şirketi, 1 Organize Sanayi Bölgesi Mah. 111, Cadde No 6, Şanlıurfa, Türkiye *)		
Client	Elsan Trafo Sanayi ve Ticaret Limited Şirketi, 1 Organize Sanayi Bölgesi Mah. 111, Cadde No 6, Şanlıurfa, Türkiye		
Tested by	KEMA B.V., Klingelbeekseweg 195, Arnhem, The Netherlands		
Date of tests	1 to 6 April 2022		

The test object, constructed in accordance with the description, drawings and photographs incorporated in this certificate has been subjected to the series of proving tests in accordance with

IEC 60076-1:2011, **IEC 60076-3**:2013, **IEC 60076-10**:2016

This Type Test Certificate has been issued by KEMA Labs following exclusively the STL Guides.

The results are shown in the record of Proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above Standard(s) and to justify the ratings assigned by the manufacturer as listed on page 5.

This Certificate applies only to the object tested. The responsibility for conformity of any object having the same type references as that tested rests with the Manufacturer.
*) as declared by the manufacturer

This Certificate consists of 20 pages in total.

KEMA B.V.

Bas Verhoeven
Director, High-Voltage Laboratory

Arnhem, 28 June 2022

KEMA Labs

KEMA TYPE TEST CERTIFICATE OF SHORT-CIRCUIT PERFORMANCE

Object	A three-phase oil-immersed distribution transformer with off-load tap changer		**2095-22**
Type	distribution transformer	**Serial No.**	7564/01
Rated power	1000 kVA		
Rated voltage	11 kV ± 2 x 2,5% / 416 V		
Connection symbol	Dyn11		
Rated frequency	50 Hz		
Manufacturer	Elsan Trafo Sanayi ve Ticaret Limited Şirketi, 1 Organize Sanayi Bölgesi Mah. 111, Cadde No 6, Şanlıurfa, Türkiye *)		
Client	Elsan Trafo Sanayi ve Ticaret Limited Şirketi, 1 Organize Sanayi Bölgesi Mah. 111, Cadde No 6, Şanlıurfa, Türkiye		
Tested by	KEMA B.V., Klingelbeekseweg 195, Arnhem, The Netherlands		
Date of tests	30 March to 20 June 2022		

The object, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with

IEC 60076-5:2006

This Certificate has been issued by KEMA Labs following exclusively the STL Guides and Procedures.

The results are shown in the record of proving tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above standard(s) and to justify the ratings assigned by the manufacturer as listed on page 6.

This Certificate applies only to the object tested. The responsibility for conformity of any object having the same type references as that tested rests with the Manufacturer.
*) as declared by the manufacturer

This Certificate consists of 46 pages in total.

KEMA B.V.

Shankar Subramany
Director, High-Power Laboratory

Arnhem, 28 June 2022

KEMA Labs

KEMA TEST REPORT

1085-22

Object	A three-phase oil-immersed distribution transformer with off-load tap changer		
Type	distribution transformer	**Serial No.**	7564/01
	11 kV ± 2 x 2,5% / 416 V – 1000 kVA – Dyn11 – 50 Hz		
Client	Elsan Trafo Sanayi ve Ticaret Limited Şirketi, 1 Organize Sanayi Bölgesi Mah. 111, Cadde No 6, Şanlıurfa, Türkiye		
Manufacturer	Elsan Trafo Sanayi ve Ticaret Limited Şirketi, 1 Organize Sanayi Bölgesi Mah. 111, Cadde No 6, Şanlıurfa, Türkiye *)		
Tested by	KEMA B.V., Klingelbeekseweg 195, Arnhem, The Netherlands		
Date of tests	4 April 2022		
Test specification	The tests have been carried out in accordance with client's instructions.		

This report applies only to the object tested. The responsibility for conformity of any object having the same type references as that tested rests with the manufacturer.
*) as declared by the manufacturer

This report consists of 13 pages in total.

KEMA B.V.

Bas Verhoeven
Director, High-Voltage Laboratory

Arnhem, 28 June 2022

IQR

CERTIFICATE

ELSAN TRAFO SANAYİ VE TİCARET LİMİTED ŞİRKETİ

KOÇÖREN OSB MAH. 111. CAD. NO:6
EYYÜBİ / ŞANLIURFA / TÜRKİYE

Has been assessed and found to Comply with the Requirements of:
Denetlenmiş ve aşağıdaki standardın gerekliliklerine uygunluğu görülmüştür:

ISO 10002:2018

The Customer Satisfaction and Complaint Management System is applicable to:
Müşteri Memnuniyeti ve Şikayet Yönetim Sistemi:

MANUFACTURE, INSTALLATION AND MAINTENANCE OF DISTRIBUTION AND POWER TRANSFORMER

DAĞITIM VE GÜÇ TRANSFORMATÖRÜ İMALATI, MONTAJI VE BAKIMI

Certificate Number: ISO-04867
Belge Numarası: ISO-04867

Initial Certification Date: 07.01.2021
İlk Belgelendirme Tarihi: 07.01.2021

Certification Period: 3 Years
Belgelendirme Periyodu: 3 Yıl

Certificate Validity Date: 06.01.2023
Belge Geçerlilik Tarihi: 06.01.2023

IQR Sertifikasyon Onayı

IQR ULUSLARARASI BELGELENDİRME HİZMETLERİ LTD.ŞTİ.
Beşevler Mah. Kocayunus Sk. No:3 Arslan Han Plaza K:2 Nilüfer / BURSA
Tel.: +90.224.266 00 16 Faks: +90.224.249 41 13 www.iqrcert.com e-posta: info@iqrcert.com

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IQR

CERTIFICATE

ELSAN TRAFO SANAYİ VE TİCARET LİMİTED ŞİRKETİ

KOÇÖREN OSB MAH. 111. CAD. NO:6
EYYÜBİ / ŞANLIURFA / TÜRKİYE

Has been assessed and found to Comply with the Requirements of:
Denetlenmiş ve aşağıdaki standardın gerekliliklerine uygunluğu görülmüştür:

ISO 9001:2015

The Quality Management System is applicable to:
Kalite Yönetim Sistemi:

MANUFACTURE, INSTALLATION AND MAINTENANCE OF DISTRIBUTION AND POWER TRANSFORMER

DAĞITIM VE GÜÇ TRANSFORMATÖRÜ İMALATI, MONTAJI VE BAKIMI

Certificate Number: QMS-12360
Belge Numarası: QMS-12360

Initial Certification Date: 07.01.2021
İlk Belgelendirme Tarihi: 07.01.2021

Certification Period: 3 Years
Belgelendirme Periyodu: 3 Yıl

Certificate Validity Date: 06.01.2023
Belge Geçerlilik Tarihi: 06.01.2023

IQR Sertifikasyon Onayı

IAS ACCREDITED Management Systems Certification Body MSCB-135

IQR ULUSLARARASI BELGELENDİRME HİZMETLERİ LTD.ŞTİ.
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IQR

CERTIFICATE

ELSAN TRAFO SANAYİ VE TİCARET LİMİTED ŞİRKETİ

KOÇÖREN OSB MAH. 111. CAD. NO:6
EYYÜBİ / ŞANLIURFA / TÜRKİYE

Has been assessed and found to Comply with the Requirements of:
Denetlenmiş ve aşağıdaki standardın gerekliliklerine uygunluğu görülmüştür:

ISO 14001:2015

The Environmental Management System is applicable to
Çevre Yönetim Sistemi:

MANUFACTURE, INSTALLATION AND MAINTENANCE OF DISTRIBUTION AND POWER TRANSFORMER

DAĞITIM VE GÜÇ TRANSFORMATÖRÜ İMALATI, MONTAJI VE BAKIMI

Certificate Number: EMS-12360
Belge Numarası: EMS-12360

Initial Certification Date: 07.01.2021
İlk Belgelendirme Tarihi: 07.01.2021

Certification Period: 3 Years
Belgelendirme Periyodu: 3 Yıl

Certificate Validity Date: 06.01.2023
Belge Geçerlilik Tarihi: 06.01.2023

IQR Sertifikasyon Onayı

IAS ACCREDITED Management Systems Certification Body MSCB-135

IQR ULUSLARARASI BELGELENDİRME HİZMETLERİ LTD.ŞTİ.
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ELSAN TRANSFORMER

Keep in Touch

Koçören 1. OSB Mah. 111. Cad. No: 6 Eyyübiye /ŞANLIURFA

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+90 0532 262 96 00

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info@elsantrafo.com