elimsan

THE TECHNOLOGICAL POWER OF TÜRKİYE

M.V. VOLTAGE TRANSFORMERS

CURRENT TRANSFORMERS

General:

Current transformers are equipments that reduce a high value alternative current to moreless value (5A or 1A) as proportional. A measuring transformer in which the secondary current, in normal conditions of use, is substantially proportional to the primary and differs from it in phase by an angle which is approximately zero for an appropriate direction of the connections. We can arrange in order avantage of current transformers as follows:

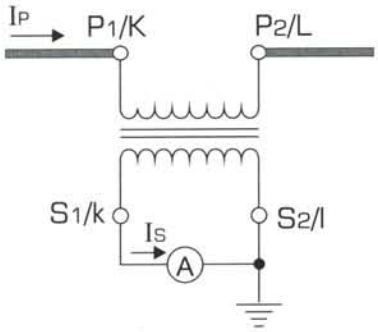
Standardization: It permits that relay and measure equipments produce as 5A and 1A.

Economic: We can use more less cross section cable in measure circuits.

Security: It permits security of people and equipments which connect secondary circuit.

A current transformer consist of primary windings, secondary windings and a magnetic core.

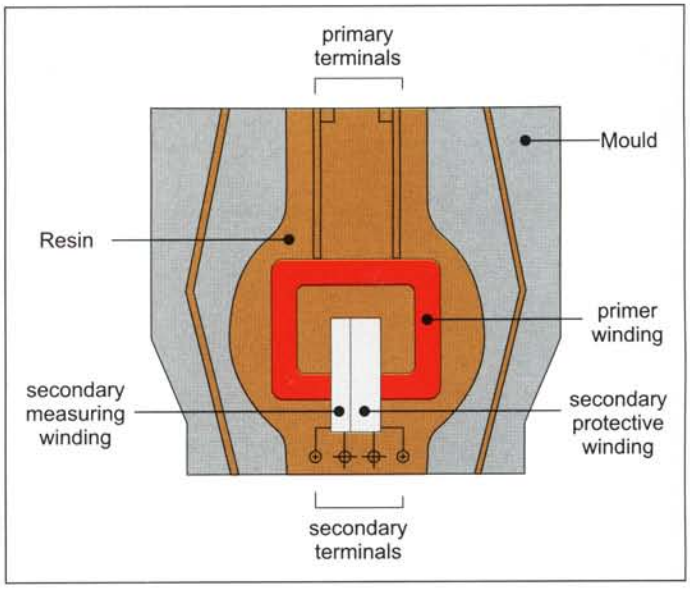
If the primary current goes in by P1/K terminal, the one having the secondary flow is named S1/k (the other two terminals are P2/L and S2/l respectively.) Therefore polarities must be marked indelibly and easily readble on the C.T. surface.



Normally S2/l must be grounded for security according to IEC standard. Thus the angle which is between primary and secondary curents is zero. If S2/l is grounded instead of S1/k, the current phase angle will be 180°. Current transformers are intended for the dual purpose of measurement and protection.

Measuring Current Transformers: Current transformers intended to supply indicating instruments, integrating meters and similar apparatus. Accuracy class and security faktor are very important elements for measuring C.T.

Protective Current Transformers: Current transformers intended to provide a supply to electrical protective relays .For protective current transformers the accuracy class in designated by the highest permissable percentage composite error at the rated accuracy limit primary current prescribed for the accuracy class concerned, followed by the letter "p" (to indicate protection).



DEFINITIONS:

Rated Transformation Ratio: The ratio of the rated primary current to the rated secondary current.

$$K_n = Ips / Isn$$

Transformation Error: The ratio of the primary current to the secondary current.

$$K = Ip / Is$$

Current Error (Ratio Error): The error which a transformer introduces into the measurement of a current and which arises when the actual transformation ratio is not equal to the rated transformation ratio. The current error, expressed in percent, is given by the formula:

$$\Sigma i\ (\%) = \frac{Kn \times Is - Ip}{Ip} \times 100$$

Where Kn is the rated transformation ratio,
Ip is the actual primary current, and
Is is the actual secondary current when
Ip is flowing under the conditions of measurement

Security Faktor (Fs):
The ratio of the rated security primer current (Ips) to the rated primary current (Ipn).

$$Fs = Ips / Ipn$$

Security of the meter connected to a current transformer is inverse proportion of the Fs. Standard Fs=5.

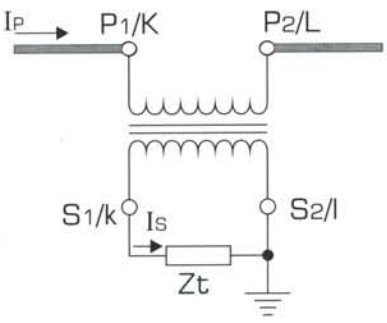
Composite Error: Under steady state conditions, the r.m.s. value of the difference between:

a. The instantaneous values of the primary current, and
b. The instantaneous values of the actual secondary current multiplied by the rated transformation ratio, the positive signs of the primary and secondary currents corresponding to the convention for terminal markings.
The composite error is generally expressed as a percentage of the r.m.s. values of the primary current according to the mathematical expression:

$$\Sigma c = \frac{100}{Ip} \sqrt{\frac{1}{T} \int_0^T (Kn \times is - ip)^2 \times dt}$$

Where
Kn: The rated transformation ratio
Ip: the r.m.s. value of the primary current
ip: the instantaneous value of the primary current
is: the instantaneous value of the secondary current
T: the duration of one cycle

Bunden:
The impedance of the secondary circuit in Ohms (or in voltampers at the rated secondary current) at the relevant power factor (represented by Zt)



Rated Output:
The value of the apparent power (in voltamperes at a specified power factor) which the transformers is intended to supply to the secondary circuit at the rated secondary current and with rated burden connected to it.

$$P = Zt \times Isn^2 (VA)$$

Phase Displacement: The difference in phase between the primary current and the secondary current vectors, the direction of the vectors being so chosen that the angle is zero for a perfect transformer. It is usually expressed in minutes or centiradians.

Rated Insulation Levels.
For a given rated highest equipment voltage the insulation level shall be one of the appropriate levels given in Table I where alternative insulation levels are possible for a given rated voltage, the level should be specified by the purchaser.

Rated insulation levels for highest voltage
for equipments below 100 kV

Highest voltage for equipment Um (kV r.m.s.)	Rated power - frequancy short - duration withstand voltage (kV r.m.s.)	Rated ligtning - impulse withstand voltage (kV peak)
0,6	3	-
1,2	6	-
2,4	11	-
3,6	16	45
7,2	22	60
12	28	75
17,5	38	95
24	50	125
36	70	170
52	95	250
72,5	140	325

Table I

Lightning Impulse Test:

The test voltage shall have the appropriate value, given in Table I depending on the highest voltage for equipment and the specified insulation level.

Accuracy Class:

A designation assigned to a current transformer the errors of which remain within specified limits under prescribed conditions of use

-The standard accuracy classes for measuring C.T. are; 0,1 - 0,2 - 0,5 - 1 - 3 - 5

-The standard accurancy classes for portective C.T. are; 5P - 10 P

At measuring current transformers, for classes 0,1 to 1 the current error and phase displacement at rated frequency shall not exceed the values given in Table II when the secondary bunden is any value from 25 % to 100% of the rated burden.

Limits of error for accuracy classes 0,1 to 1

Class	± percentage current (ratio) percentage of rated current shown blow				± phase displacement at percentage of rated current shown below							
					minutes				centiradians			
	5	20	100	120	5	20	100	120	5	20	100	120
0,1	0,4	0,2	0,1	0,1	15	8	5	5	0,45	0,24	0,15	0,15
0,2	0,75	0,35	0,2	0,2	30	15	10	10	0,9	0,45	0,3	0,3
0,5	1,5	0,75	0,5	0,5	90	45	30	30	2,7	1,35	0,9	0,9
1,0	3,0	1,5	1,0	1,0	180	90	60	60	5,4	2,7	1,8	1,8

Table II

For class 3 and class 5, the current error at rated frequency shall not excead the values given in Table III when the secondary burden is any value from 50% to 100% of rated burden

Limits of error for accuracy class 3 and class 5

Class	± percentage current (ratio) error at percentage of rated current shown below	
	% 50	% 120
3 5	3 5	3 5

Table III

The secondary burden used for test purposes shall have a power factor of 0,8 lagging expect that where a burden is less than 5VA, a power factor of 1,0 shall be used. In no case shall the test burden be less than 1 VA.

For protective current transformers, at rated frequency and whith rated burden connected, the current error, phase displacement and composite error shall not exceed the values given in Table IV. For protective transformers, secondary burden must be 100% of the rated.

Limits of error for accuracy class 5P and class 10P

Accuracy Class	Current error at primary current %	Phase displacement at rated primary current		Composite error at rated accuracy limit primary current %
		minutes	centiradians	
5 P 10 P	± 1 ± 3	± 60 -	± 1,8 -	5 10

Table VI

A current transformer is defined for one the above specified accurancy classes on burden. However the same current transformer can be defined in other classes of accurancy, but then burden will be different for each class.

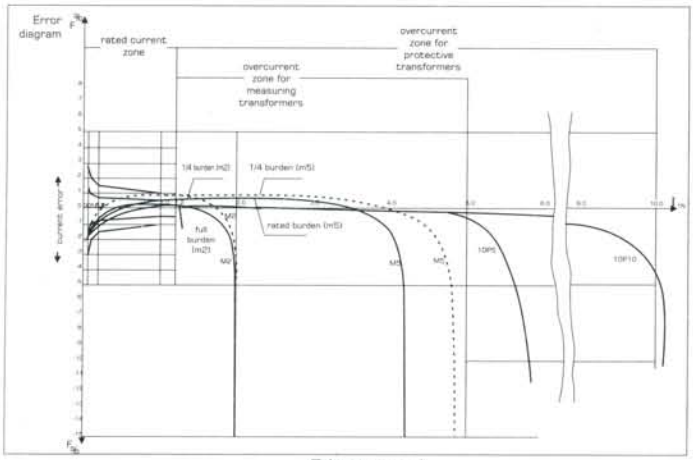


Diagram 1

Example, 100/5A, 15VA in class 0,5 current transformer will be 30 VA in class 1, or 40 VA in class 3, or 5VA in class 10 P 10, etc.

Obviously, burden decreases when accuracy increases. The typical curves for the different current transformers are shown in the above diagram.

Rated Highest Voltage for Equipment:

The highest r.m.s. phase - to - phase voltage for which the current transformer is designed, and which is marked on the rating plate

Rated Short - Time Thermal Current (Ith)

The r.m.s. value of the primary current which a transformer will withstand for one second without damage, the secondary winding being short-circuites.If the rated short - time thermal current is applied in three seconds instead of one second, the new short-time thermal current is calculated by the formula:

$$Ith,t_i = \frac{Ith}{\sqrt{t}} = \frac{Ith}{\sqrt{3}}$$

If we want to produce like this, short-time thermal current is multiplied by $\sqrt{t}$.

Example: If rated short-time thermal current is 16 kA in 3 second, the true Ith is calculated by the following:

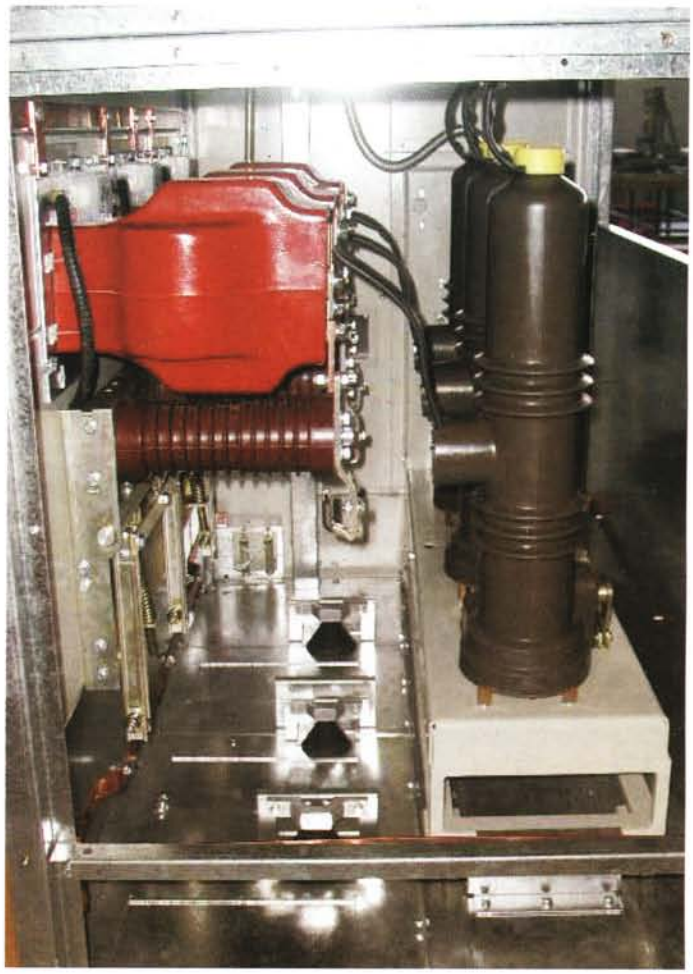
$$Ith,t_i = 16x\ \sqrt{3} = 27,68\ kA$$

Rated Dynamic Current (Idyn):

The peak value of the primary current which a transformer will withstand, without being damage electrically or mechanically by the resulting electromagnetic forces, the secondary winding being short-circuited.

$$Idyn = 2,5\ x\ Ith$$

The moulted shape in TG 21 - 02 of M.V. Current transformers is shown in the following picture:



HOW TO SELECT A CURRENT TRANSFORMER

The steps to select a current transformer from our catalugue are as follows:

1 Selection of Highest Equipment Voltage:

Rated highest equipment voltage shall be given as "V" or "kV" Example: 12 kV, 24kV, 36 kV e.t.c.

2 Selection of Rated Transformer Ratio:

a. Primary current is calculated from the following eqution:

$$Sn = \sqrt{3} \times U \times I$$

Where Sn : Rated apparent power of main distribution transformer (kVA)

Un : Rated voltage on phase to phase (kV)

I : Current on each phases (A)

The standard values, in amperes, of rated primary current are: 10 - 15 - 20 - 25 - 30 - 40 - 50 - 60 - 75 and their decimal multiples or sub-multiples

Example: For a power transformer, 34,5 kV and 250 kVA, the value of current of chosen a measuring C.T. is calculated from the following equation:

$$I = \frac{Sn}{\sqrt{3} \times Un} = \frac{250\ kVA}{\sqrt{3} \times 34{,}5\ kV} = 4{,}2\ A$$

The value of primary current of measuring C.T. shall be chosen as 5 A.

b. Rated secondary currents, in amperes, are 1A and 5 A. Generally rated secondary current is chosen as 5A. If the distance where between a power transformer and the equipments is too far, secondary current may be chosen 1A. If secondary load is given in impedance (Ω) calculation to get it in VA should be as follows:

$$P(VA) = Isn^2\ (A) \times Z\ (\Omega)$$

When Isn = 5A $P\ (VA) = Isn^2 \times Z = 25 \times Z$

When Isn = 1 A $P\ (VA) = Isn^2 \times Z = Z$

3 Selection of Rated Burden:

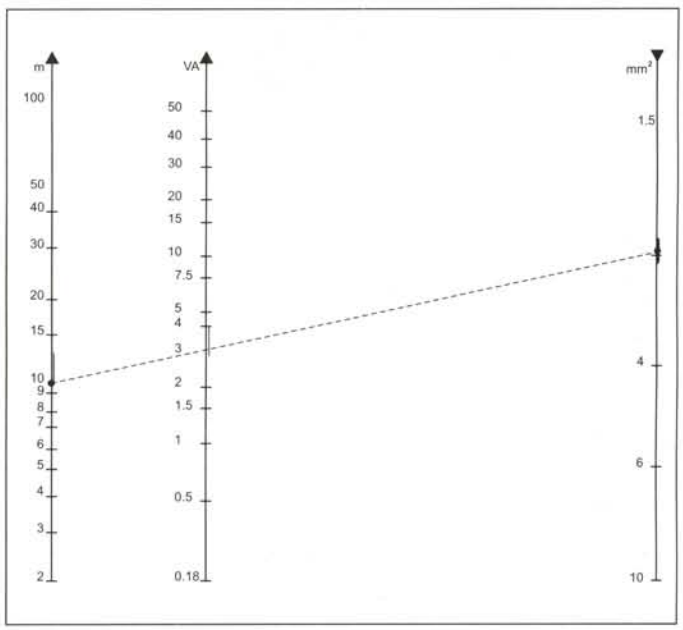
That propety of the circuit connected to the secondary winding that determines the active and reactive power at the secondary terminals.

The values of burden as voltamperes of some equipments are shown in Table V.

Ammeter with moving Iron	0,70 – 1,50 VA
Wattmeter	0,20 – 5,00 VA
CosØmeter	2,00 – 6,00 VA
Energy meters (Active-Reactive)	0,40 – 1,00 VA
Reactive Power Relays	0,40 – 1,00 VA
Overcurrent Relays	0,20 – 6,00 VA

Table V

Addition burdens because of copper wires are given in the following diagram.



4- Secletion of accuracy Class:

For measuring circuits : 0,1 - 0,2 - 0,5 - 1 - 3

For protective circuits: 5 P and 10 P

Accuracy classes of current transformers are guarantee at between 100% and 120% of rated current accarding with the standards that are shown in Table I and diagram I.Ratio error increases when the value of current decreases at 20 % and 5%.Usually for energy meter circuits are used transformer of class 0,5, for ammeters (not sensitive) are use transformer of class 1 or class3, and for protective relays are used transformer of class 5P or class 10P.

5- Selection of Security Factor (n)

Security factor is defined as Fs 5 in IEC standard and as M5 in UDE standard. For measuring transformers: $n \leq 5$

For protective transformers: $n \geq 10, 15, 20$

6- Shape and Dimension of the Primary Winding: Primary can be wound primary and bus-bur type. In case of wound primary, Ith and Idyn shall be taken into account, defined before. These values are indicated for each type and ratio in corresponding pages -For bus-bar type, size and layout of the bar or cable must be considered. In Table VI shows permissible current at 35°C for copper bars according to DIN 4370

Dimensions (mm)	Painted (A)	Unpainted (A)
20 x 5	325	295
23 x 3	300	270
30 x 5	450	400
40 x 5	600	520
40 x 10	850	760
50 x 10	1030	920
60 x 10	1200	1060
80 x 10	1560	1380
100 x 10	1880	1700

Table VI

7- Selection of Rated Thermal Current(Ith):
Rated thermal current shall be given either 100,200,300..e.t.c. times of rated current or as "kA" Example; If the short-time current on the network have being calculated as 10kA, rated thermal current equal to 10 kA (Ith=10kA). If the value of rated primary current is 100A, rated thermal current is determined from:

$$Ith = \frac{10.000A}{100A} = 100 \times In$$

8- Selection of Envionment Use:
Environment use shall be defined as indoor or outdoor. If it has being not defined, it is accepted as indoor. All the above mentined data shall be considered when the order is given

Example:
a. 0,6 kV, 200/5 A, class 0.5 Fs 5, 10VA
Ith=100xIn , for 30x10Bar.

b. 36 kV, 100/5-5, class 0,5 Fs 5 + 5P 10
30+30 VA, Ith= 100xIn, for indoor.

M.V. VOLTAGE TRANSFORMERS

General:

A measuring voltage transformer in which the secondary voltage, in normal condition of use, is substantially proportional to the primary and differs from it in phase by an angle which is approximately zero for an appropriate direction of the connections.

A voltage transformer consist of primary windings, secondary windings, and a magnetic core.

Primary Winding:

The winding intended for connection to the circuit to be measured or controlled.

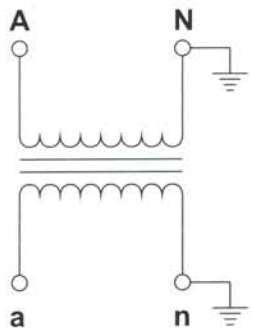
Secondary Winding:

The winding intended for connection the measuring, protection, or control devices.

Types:

According with phase numbers: There are single-phase and three-phase voltage transformers according with phase numbers. If single-phase voltage transformer is intended to connect phase to earth or phase to neutral on three-phase systems, this transformer called as "single-pole voltage transformer" or " earthed voltage transformer."

One of primary windings shall be connected to earth directly on the earthed votage transformers.

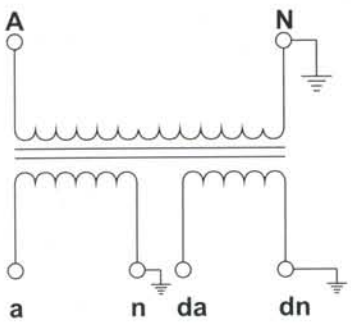


Example;

$$\frac{(A\text{-}N)}{\frac{34500/\sqrt{3}}{100/\sqrt{3}}\ V.}$$

(a-n)

In addition a residual voltage winding can be set for protection in single-pole voltage transformer. The residual voltage windings are connected in a broken delta, these windings are only loaded under fault conditions. The voltage of residual voltage winding can be either 100/3 or 110/3, and the terminals of secondary winding are called as "da" and "dn".

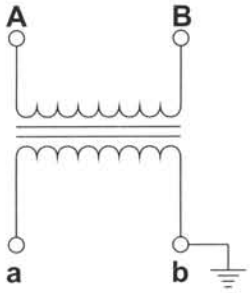


Example;

$$\frac{(A\text{-}N)}{\frac{33000/\sqrt{3}}{100/\sqrt{3}\ -\ 100/3}\ V.}$$

(a-n) (da-dn)

If single-phase voltage transformer is intended to connect phase-to -phase on three systems, this transformer is called as "double - pole voltage transformer " or " unearthed voltage transformer" Primary windings shall be insulated from earth on the unearthed voltage transformer.

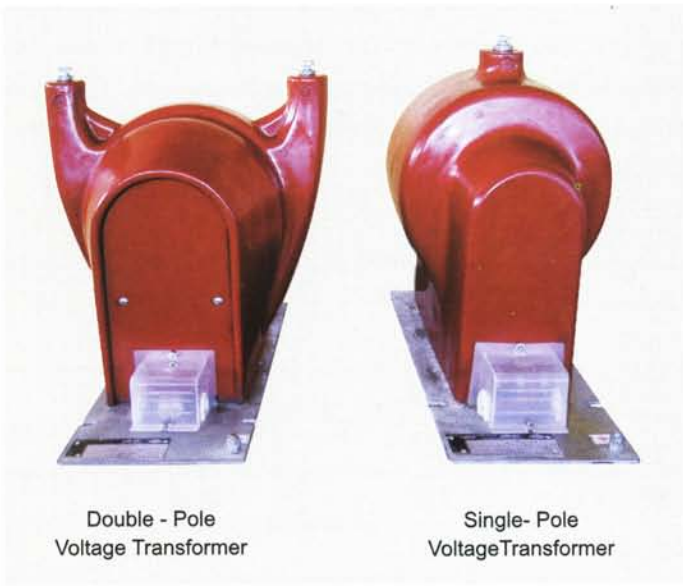


Example;

$$\frac{(A\text{-}B)}{\frac{15000}{100}\ V.}$$

(a-b)

Elimsan single-phase M.V. voltage transformers are produced as single-pole or as double-pole.



Double - Pole Voltage Transformer

Single- Pole VoltageTransformer

According with use purpose:

There are measuring and protective voltage transformers according with use purpose. A Measuring voltage transformer is intended to supply indicating instruments, integrating meters and similar apparatus. A protective voltage transformer is intended to supply electical protective equipments. Elimsan M.V. Voltage transformers are produced to supply for measuring circuits and also protection circuits as two secondary windings.

According with ratio:

There are single proportional and multiple proportional voltage transformers according with ratio.

According with environment use:

There are indoor and outdoor voltage transformers according with environment use.

DEFINITIONS:

Rated Transformation Ratio (Kn):

The ratio of the rated primary voltage to the rated secondary voltage (e.g. 500/100 V)

Voltage error (ratio error):

The error which a transformer introduces into the measurement of a voltage and which arises when the actual transformation ratio is not equal to the rated transfomation ratio

$$\Sigma i\ (\%) = \frac{Kn \times Us - Up}{Up} \times 100$$

Where:

Kn is the rated transformation ratio

Up is the actual primary voltage

Us is the actual secondary voltage when Up is applied under the conditions of measurement.

Phase displacement:

The difference in phase between the primary voltage and the secondary voltage vectors, the direction of the vectors beign so chosen that the angle is zero for a perfect transformer.

Accuracy Class:

A designation assignet to a voltage transformer, the errors of which remain within specified limits under prescribed conditions of use. The standart accuracy classes for measuring voltage transformers are : 0,1 - 0,2 - 0,5 - 1,0 - 3,0

For measuring voltage transformers, the voltage error and phase displacement at rated frequency shall not exceed the values given in Table VII for a power factor of 0,8 lagging when the secondary burden is any value from 25% to 100% of the rated burden, and the test voltage is at between 80% and 120% of rated primary voltage.

Accuracy class	Voltage (ratio) error	Phase displacement	
		minutes	centiradians
0,1	± 0,1	5	± 0,15
0,2	± 0,2	± 10	± 0,3
0,5	± 0,5	± 20	± 0,6
1,0	± 1,0	± 40	± 1,2
3,0	± 3,0	undecided	undecided

Table VII

The standard accuracy classes for protective voltage transformers are

3P - 6P

For protective voltage transformers, the voltage error and phase displacement at rated frequency shall not exceed the values given in Table VIII for a power factor of 0,8 langing when the secondary burden is any value from 25% to 100% of rated burden, and the voltage is at 5% of rated primary voltage .

Accuracy class	Voltage error (ratio error)	Phase displacement	
		minute	centiradians
3 P	± 3,0	± 120	± 3,5
6 P	± 6,0	± 240	± 7,0

Table VIII

Rated Voltage factor:

The voltage factor is determined by the maximum operating voltage which, in turn, is dependent on the system and the voltage transformer primary winding earthing conditions. The standard voltage factors approprite to the different earthing conditions are given below, together with the permissible duration of maximum operating voltage i.e.(rated time)

For double-pole voltage transformers :

1,2 x Un continuous

For single - pole voltage transformers:

1,2 x Un continuous and,

1,9 x Un 30 second or

1,9 x Un 8 hours (if the neutral is earthed by the coil)

Insulation Requirements:

Rated insulation levels, primary windings: The choice of the insulation level for transformers having highest voltage for equipment equal to or above 3,6 kV shall be made in according with IEC Publication 71: Insulation Co-ordination. For transformers having highest voltage for equipment beloew 3,6 kV the insulation level is determined by the rated-frequency short-duration withstand voltage. For windings having highest voltage for equipment in the range 3,6 kV ≤ Um 300 kV, the rated insulation withstand voltages, shall be one of those given in Table I.

Insulation requirements for secondary windings:

The secondary winding insulation shall be capable for withstanding a rated power-frequency short-duration withstand voltage of 3 kV r.m.s.for 1 min.

Rated output: The value of the apparent power (in voltamperes at a specified power factor) which the transformer is intended to supply to the secondary circuit at the rated secondary voltage and with rated burden connected to it.

How to Mount:

Double pole voltage tranformer shall be connected phase to phase on three-phase systems. Single - pole V.T. can be connected phase-to-earth or phase-to-neutral on three systems.

HOW TO SELECT A VOLTAGE TRANSFORMER:

1.Rated Primary Voltage:

The value rated primary voltage shall be given as "kV" or "V" Example, at single-pole V.T. the phase - to - earth (nevtral) voltage can be

$$\frac{12}{\sqrt{3}}\ \text{kV},\ \frac{36}{\sqrt{3}}\ \text{kV}, \ldots\text{e.t.c.}$$

At double-pole V.T. the phase-to-phase can be 12kV, 36 kV.....e.t.c.

2. Rated Secondary Voltage:

The value rated secondary voltage shall be given as "kV" or "V" Example, At single-pole V.T. the secondary voltage must be either $\frac{100}{\sqrt{3}}$ kV or $\frac{110}{\sqrt{3}}$ kV

($\frac{100}{3}$ or $\frac{110}{3}$ for the residual voltage winding)

At double-pole V.T. the secondary voltage must be either 100V or 110V. If there are a lot of devices on the secondary circuit, or the distance of devices is too far from the transformer, the secondary voltage can be 200 V.

3-Rated Output:

Rated output shall be given as "VA" for each secondary windings

4-Accuracy class:

For measuring circuits: 0,1 - 0,2 - 0,5 - 1,0 - 3,0

For protective circuits: 3P or 6P

5-Rated Thermal Output:

Rated thermal output shall be given as "VA" if it is necessary. Example, 400VA, 600VA.....etc.

6-Environment Use:

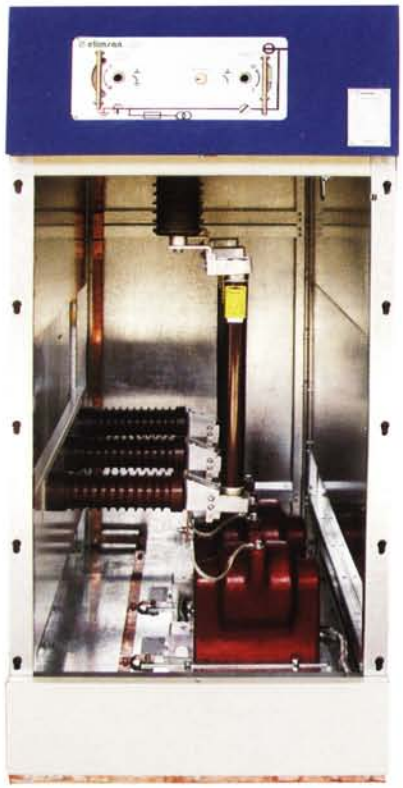
Environment use shall be defined as indoor or outdoor. All the above mentioned data shall be considered when the order is given.

$\frac{36}{\sqrt{3}} / \frac{0,1}{\sqrt{3}} - \frac{0,1}{3}$ kV , 36 / 0,1 kV

Class: 0,5 + 3 P
Rated output: 60 + 30 VA
(Single-pole)

Class:: 1
Rated output: 60 VA gibi
(Double-pole)

The moulted shape in TG21-44 of M.V. Voltage transformers is shown in the following picture.



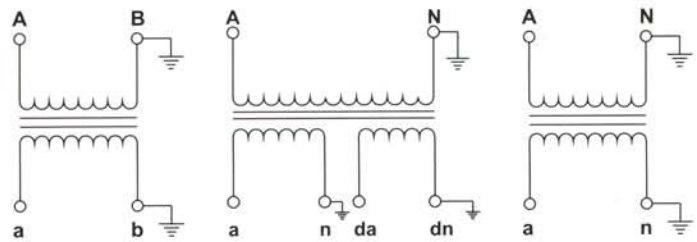
Voltage Transformer User Guide:

1-Never short-circuit the secondary terminals of voltage transformers. Otherwise voltage transformer may burn.

2-Make earth connection to one of the secondary terminals and to the body of transformer for securance.There are marking and elements for earth connection on the body of transformer.

3-Before operating, clean the transformers completely with a piece of dry cloth. After operating, it will dirts on the insulated parts of transformer once in every 6 mounths by deenergizing the transformer.

4-Be careful that there is no louse connection, at primary and secondary terminals.

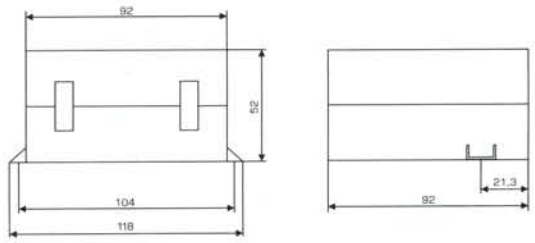
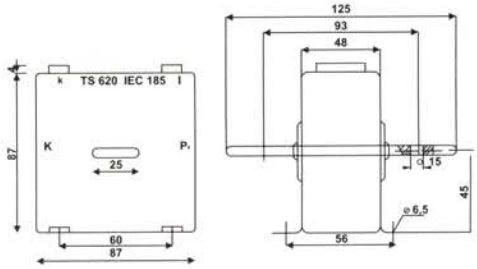
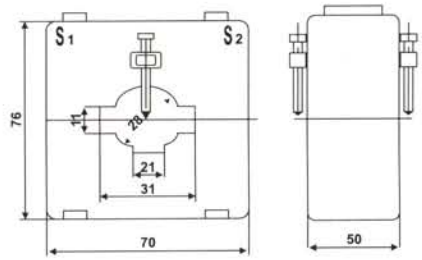
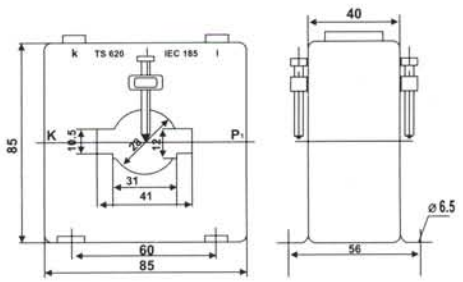
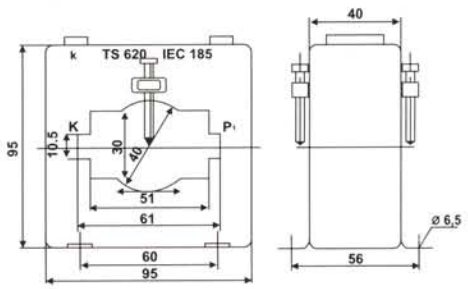
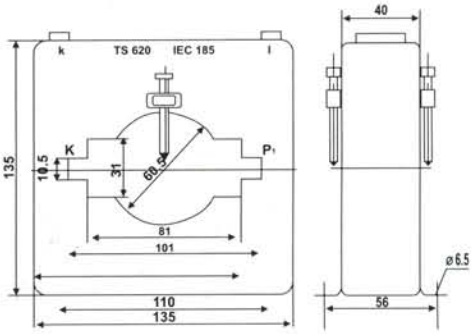


double - pole voltage transformer

single - pole with the residual voltage winding voltage transformer

single - pole voltage transformer

L.V. CURRENT TRANSFORMER (IEC 44-1, TS 620)

Code	Current Ratio (A)	Burden (VA)	Accuracy Class (CL)	
AA 414 B4	10 / 5 15 / 5 20 / 5	5 , 10 5 , 10 5 , 10	0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3	 WOUND PRIMARY
AA 414B	25 / 5 30 / 5 40 / 5 50 / 5 60 / 5 75 / 5 100 / 5 150 / 5	5 , 10 5 , 10 5 , 10 5 , 10 5 , 10 5 , 10 5 , 10 , 15 5 , 10 , 15	0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3	 WOUND PRIMARY
AA 315	100 / 5 100 / 5 150 / 5 200 / 5	5 10 5 , 10 5 , 10	0,5 , 1 , 3 3 0,5 , 1 , 3 0,5 , 1 , 3	 CABLE: ∅ 28 mm. BAR: 30 x 10 mm.
AA 414	250 / 5 300 / 5 400 / 5 500 / 5	5 , 10 , 15 5 , 10 , 15 5 , 10 , 15 5 , 10 , 15	0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3	 CABLE: ∅ 28 mm. BAR: 40 x 10 mm.
AA 614	600 / 5 800 / 5 1000 / 5	5 , 10 , 15 5 , 10 , 15 5 , 10 , 15	0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3	 CABLE: ∅ 40 mm. BAR: 60 x 10 mm. 50 x 30 mm.
AA 014	1200 / 5 1500 / 5 2000 / 5 2500 / 5 3000 / 5	15 15 15 15 15	0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3 0,5 , 1 , 3	 CABLE: ∅ 60 mm. BAR: 100 x 10 mm. 80 x 30 mm.

M.V. CURRENT TRASFORMER
(IEC 44-1)

Rated short time thermal current

Ith=100 In

Rated Dynamic Current

Idyn=2,5 Ith

Insulation Level

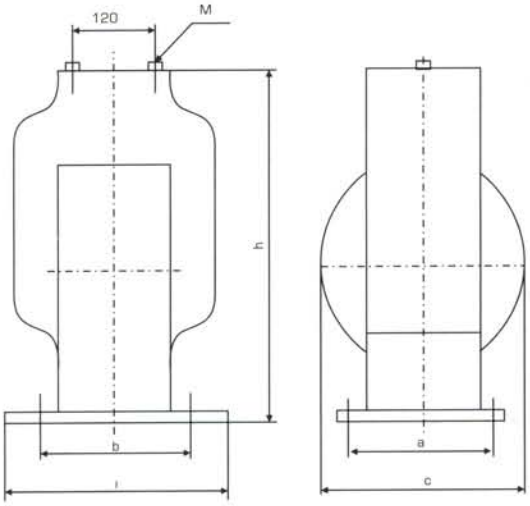
E

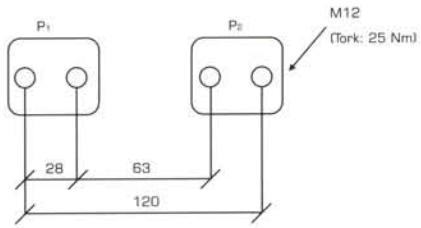
Ambient temperature

-5 ..... + 35 °C

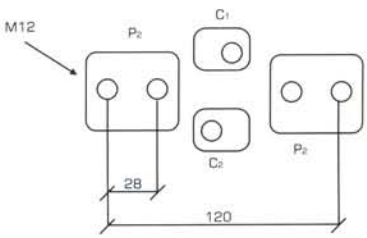
Standard

TS, IEC, VDE, ANSI





Single Proportional Primary Terminals



Multiple Proportional Primary Terminals

Type	Rated Highest Equipment Voltage max. (kV)	Max. Rated primary Current (A)	Numbers of secondary windings	Dimentions (mm))					Weight (kg)
				a	c	b	ı	h	
OAN 12	3,6 24	2500 veya 2X600 A	1	117	185	184	310	260	10,5
OAN 24	3,6 24	2500 veya 2X600 A	2	117	185	184	310	260	21
OAN 36	36	2500 veya 2X600 A	2	117	195	184	310	360	28
OAN 36-2	36	2500 veya 2X600 A	1	117	220	184	310	360	24
OAN 36-3	36	2500 veya 2X600 A (500 In)	2	158	220	225	360	370	36,5

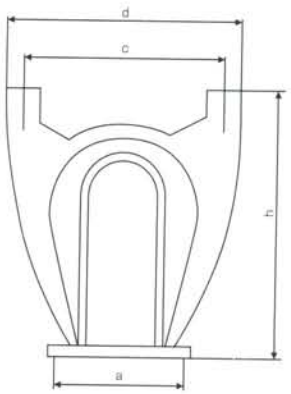
M.V. VOLTAGE TRANSFORMER

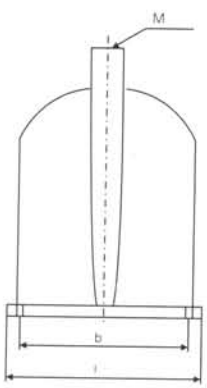
(IEC 44-2, TS 718)

2OGN 36

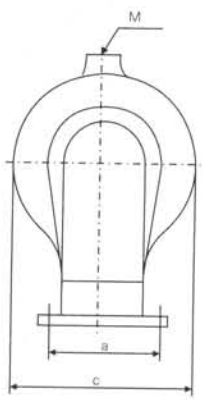
2OGN 24

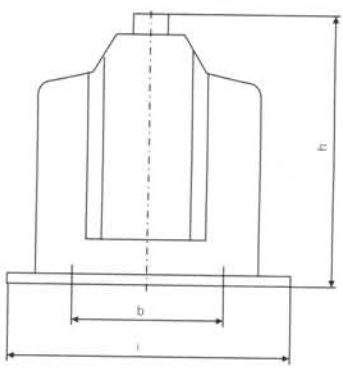
OGN 36





2OGN 36 - 2OGN 24





OGN 36

Type	Rated Highest Equipment Voltage max. (kV)	Max. Rated primary Current (A)	Dimentions (mm)						Weight (kg)
			a	c	b	d	l	h	
2OGN 24	24	$24 \ , \ \frac{24}{\sqrt{3}}$	145	210	255	255	450	335	38
OGN 36	36	$\frac{36}{\sqrt{3}}$	168	230	350	-	505	375	53
2OGN 36	36	36	186	320	420	380	540	395	65