Dixsen®
LOW VOLTAGE CURRENT TRANSFORMER

GENERAL

Current Transformer (C.T.) is used to transform the high AC current to small easily manageable values. They're connected with the Panel Meter or Relay and they can help to measure the current or protect the equipments. Low voltage current transformers are manufactured as of two types for measuring CT and protection CT.

MEASURING CT

Measuring current transformers are constructed to feed on other low voltage apparatus such as measuring instruments, relays, watt-hour meters (kW meter) and these type of current transformers are mainly used 0.5 and 1 class to transfer the current from highest rated current to rated secondary current.

PROTECTION CT

Protection current transformers are constructed to feed the protection relay. These type of current transformers are mainly used 5P. (Customer supplied when required.)

REFERENCE STANDARDS

IEC60044-1, VDE0414-44-1, DIN57414, BS3938, Bs7626, EN60044-1, GB1208-2009

SECURITY FACTOR

FS < 5

MAXIMUM SYSTEM VOLTGE

720V AC

TEST VOLTAGE

3kV AC(1 min.)

FREQUENCY

50/60Hz

RATED SHORT-TIME THERMAL CURRENT

Ith = 60 X In
Ith limited by cable sizes or primary bus-bar for other case

RATED DYNAMIC CURRENT

Idyn = 2.5 X Ith

CONTINUOUS OVERLOAD

1.2 X In

OPERATING TEMPERATURE

-25℃ ~ +50℃

ACCURACY

Measuring 0.5; 1.0; 3.0 (Special accuracy upon request)
Protection 5P; 10P

BURDEN

Ranging from 1.5-30VA

RATED SECONDARY CURRENT

x/5A (x/1A upon request)

RATED PRIMARY CURRENT

Ranging up to 6000A

INSULATION

Class B for Casing type CT
Class A for Taping type CT

CASING

Non-flammable, polycarbonate self extinguishing ABS/PC

TERMINAL MARKS

VO to UL94
Primary P1 & P2(K & L)
Secondary S1 & S2(K & L)

SELECTION OF THE CURRENT TRANSFORMER

To select the Current Transformer correctly, the following points should be clarified:

- The application(for measuring or protection)
- The features of the working environment (indoor or outdoor, operating temperature, air humidity etc...)
- Operation voltage and frequency
- Range of the primary current (maximum and minimum of the current to be measured)
- Dimension of the cable or bus bar
- Data of the overload
- Short circuit current
- Specification of the measuring device associated with the Current Transformer (accuracy, rated current, consumption etc...)
- The diameter and length of the cable, the cable which is used to connect the Current Transformer and associated measuring device

POWER LOSSES OF THE CT

In the practical application, the power generated by the primary current should be equal or bigger than the power requirement of the associated measuring device plus the consumption of the connecting line.

Losses in the line, PL:
This is the power lost, through heat, generated by current through the resistance RL in the cables, in the transformer's secondary circuit.

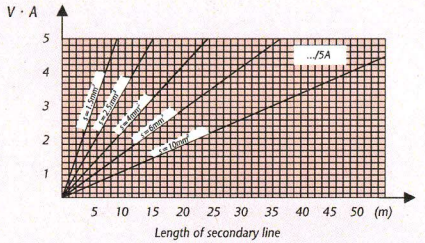
Factors to be taken into account:
Secondary current: $P_L = RL \cdot I^2$

Cable diameter: RL is inversely proportional to the square of the diameter

Cable length: RL is proportional to the length of cablir (there and back)

Power:
The nominal apparent power (V · A) with a specified power factor, which was supplied by the Current Transformer, to the secondary current with the assigned current when it is connected to its nominal load, Sc (V · A) = Zc · (/sn)² According to Standards, for apparent power greater than or equal to 5 VA, the power factor is 0.8 inductive. For apparent power less then 5 V · A the power factor is considered to be one (unity).

TABLE OF LOSSES IN THE SECONDARY LINE



ACCURACY OF A CURRENT TRANSFORMER

The percentage of error, produced in a transformer, is established by IEC60044-1. In measurement transformers: 25 % and 100 % of nominal power. In protection transformers: 100 % of nominal power.

Note: With.../1A transformers losses are reduced 25 times

ERROR LIMITS. ACCURACY CLASSES OF MEASURING CT

Accuracy Classes	± % Error for % I_n				Phase Difference ± for % I_n							
					Minutes				Centiradians			
	5	20	100	120	5	20	100	120	5	20	100	120
0,1	0.40	0.20	0.10	0.10	15	8	5	5	0.45	0.24	0.15	0.15
0,2	0.75	0.35	0.20	0.20	30	15	10	10	0.9	0.45	0.30	0.30
0,5	1.50	0.75	0.50	0.50	90	45	30	30	2.7	1.35	0.90	0.90
1,0	3.00	1.50	1.00	1.00	180	90	60	60	5.4	2.70	1.80	1.80

Accuracy Classes	± % Error for % I_n					Phase Difference ± for % I_n									
						Minutes					Centiradians				
	1	5	20	100	120	1	5	20	100	120	1	5	20	100	120
0,2S	0.75	0.35	0.20	0.20	0.20	30	15	10	10	10	0.90	0.45	0.30	0.30	0.30
0,5S	1.50	0.75	0.50	0.50	0.50	90	45	30	30	30	2.70	1.35	0.90	0.90	0.90

Accuracy Classes	± % Error for % I_n	
% In	50	120
3	3	3
5	5	5

No. phase error

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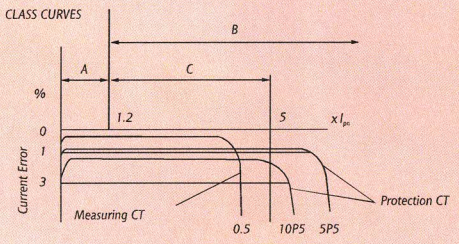
• ERROR LIMITS. ACCURACY CLASSES OF PROTECTION CT

Accuracy Classes	± % Error for % In	Phase Difference ± for % I_n		Composite Error
		Minutes	Centiradians	
5P	± 1	± 60	± 1.8	5
10P	± 3	--	--	10

• SATURATED CONDITION OF CT

The current transformer is saturated if the primary current, passing through the CT, is greater than the nominal rating of the CT.
The linearity of CT, between the primary and secondary sides decreases, so error increases. The saturation of the CT is inversely proportional to the load (Fig. 1).
The difference between measuring and protection current transformers is their behavior when an overload occurs on the primary side. Measuring CT is saturated when there is a primary current overload. In order to protect the equipment, on the secondary side, protection CT will not saturate until there is a very high current on the primary side. A Class 5P15 protection transformer indicates that it has an accuracy rating of ± 1% that it does not become saturated until the primary current reaches 15 times the nominal current rating of the CT.
In measuring transformers, the SAFETY FACTOR "FS" parameter indicates the excessive amperage on the primary side current in relation to the current sent to the measuring device on the secondary side.

FIG.1



A: Rated Current Zone.
B: Overcurrent zone for protectiong CT.
C: Max. Overcurrent zone for measuring CT.

Instrument	Burden Consumed
Moving iron instruments	0.3-15VA
Moving coil instruments	0.5VA
Analogue power meter	0.2-2.5VA
Maximum Demand Ammeter	2.5-5.0VA
Digital Meter	0.5-1.0VA
Energy Meter	1.0-1.5VA
Recording Instruments	2.0-5.0VA

• APPLICATION NOTE

If the primary current is too small, to keep the same accuracy and output, we can add primary winding, but the rated turns ratio should be the same. For example, if the primary current is 50A, we can use 100/5A Current Transformer with the primary current be turned twice which help to keep the samerated turns ratio(1:50 = 2:100).

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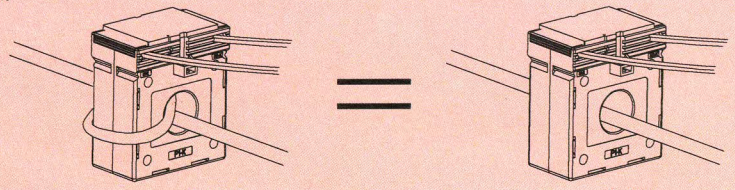
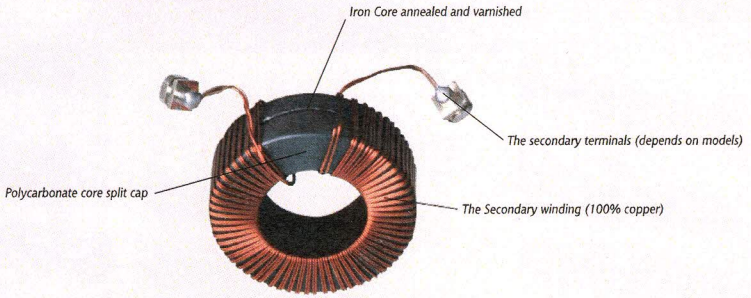
DEMO



• CONSTRUCTION

CT consist of primary winding, secondary winding, magnetic core and insulated body. The high-grade silicon steel core is annealed, varnished then insulated with polycarbonate core caps. The secondary winding is toroidally wound by high precision semi-automatic machinery. For the tape wound ring type current transformer, the PEW coated windings are then covered with elephantite paper, varnished and double-tapped with PVS tapes. For the encapsulated type current transformer, the windings are enclosed in a compact and heat resistant split cap.



A. Permalloys Core
B. Silicon Core

• KIND REMINDER:

- Improper selection, installation or operation can cause danger to personal security!
- Don't open the secondary circuit when the current is available in the primary circuit. Or it will cause high voltage which is dangerous to personal security!
- Resistance of current transformer is very low, so that secondary winding of current transformer can be operated as a shortcircuit, when required in test operation. Otherwise, this condition causes high voltage and can be dangerous during usage.
- When selecting a current transformer, it is important to consider the power absorbed by the cables connected betweent the CT secondary terminals and the measuring instrument.The resultant cable burden should be added to the equipment burden, and the total should not exceed the available VA of the CT.
- P1 (K) must face the supply feeder, and P2 (L) must face the load. It is also important to ensure that secondary connections are made in accordance with instrument diagrams. The secondary terminals of the CT must NOT be open-circuited on load as dangerously high voltages may be present under these conditions. It is recommended that one side of the secondary windings is earthed.

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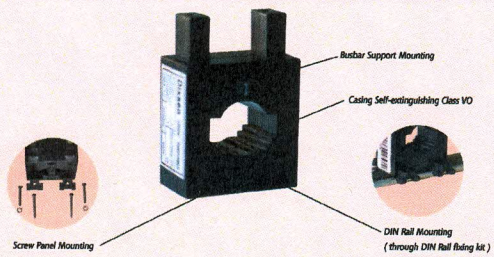
• FEATURE

DX Series



Ref.	Model	Ratio (A)	Burden(VA) Class:0.5	Burden(VA) Class:1.0	Case Qty.(Pcs)	Item Code
DX-20	DX-20	50/5	-	1.5 (ZT)	100	820300505
	DX-20	60/5	-	1.5 (ZT)	100	820300605
	DX-20	75/5		1.5	100	820300755
	DX-20	100/5	1.5	2.5	100	820301005
	DX-20	150/5	1.5	2.5	100	820301505
DX-30	DX-30	100/5	1	2	100	830301005
	DX-30	150/5	1.5	2.5	100	830301505
	DX-30	200/5	2.5	3.75	100	830302005
	DX-30	250/5	2.5	3.75	100	830302505
	DX-30	300/5	2.5	3.75	100	830303005
	DX-30	400/5	2.5	3.75	100	830304005
	DX-30	500/5	2.5	3.75	100	830305005

Note: Class/VA rating must be mentioned when ordering.

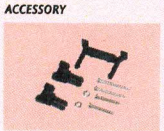
Ref.	Model	Ratio (A)	Burden(VA) Class:0.5	Burden(VA) Class:1.0	Case Qty.(Pcs)	Item Code
DX-40	DX-40	150/5	1.5	2.5	40	840301505
	DX-40	200/5	2.5	3.75	40	840302005
	DX-40	250/5	3.75	5	40	840302505
	DX-40	300/5	5	7.5	40	840303005
	DX-40	400/5	5	7.5	40	840304005
	DX-40	500/5	5	7.5	40	840305005
	DX-40	600/5	5	7.5	40	840306005
	DX-40	800/5	5	7.5	40	840308005
	DX-40	1000/5	5	7.5	40	840310005

Note: Class/VA rating must be mentioned when ordering.

Ref.	Model	Ratio (A)	Burden(VA) Class:0.5	Burden(VA) Class:1.0	Case Qty.(Pcs)	Item Code
DX-20L	DX-20L	50/5	-	1.5 (ZT)	100	820400505
	DX-20L	60/5	-	1.5 (ZT)	100	820400605
	DX-20L	75/5	-	1.5	100	820400755
	DX-20L	100/5	1.5	2.5	100	820401005
	DX-20L	150/5	1.5	2.5	100	820401505
DX-30L	DX-30L	100/5	1.5	2.5	100	830401005
	DX-30L	150/5	1.5	3.75	100	830401505
	DX-30L	200/5	2.5	3.75	100	830402005
	DX-30L	250/5	2.5	3.75	100	830402505
	DX-30L	300/5	3.75	5	100	830403005
	DX-30L	400/5	3.75	5	100	830404005
	DX-30L	500/5	3.75	5	100	830405005

Note: Class/VA rating must be mentioned when ordering.

• ACCESSORY



DX-20/30/40/20L/30L

A