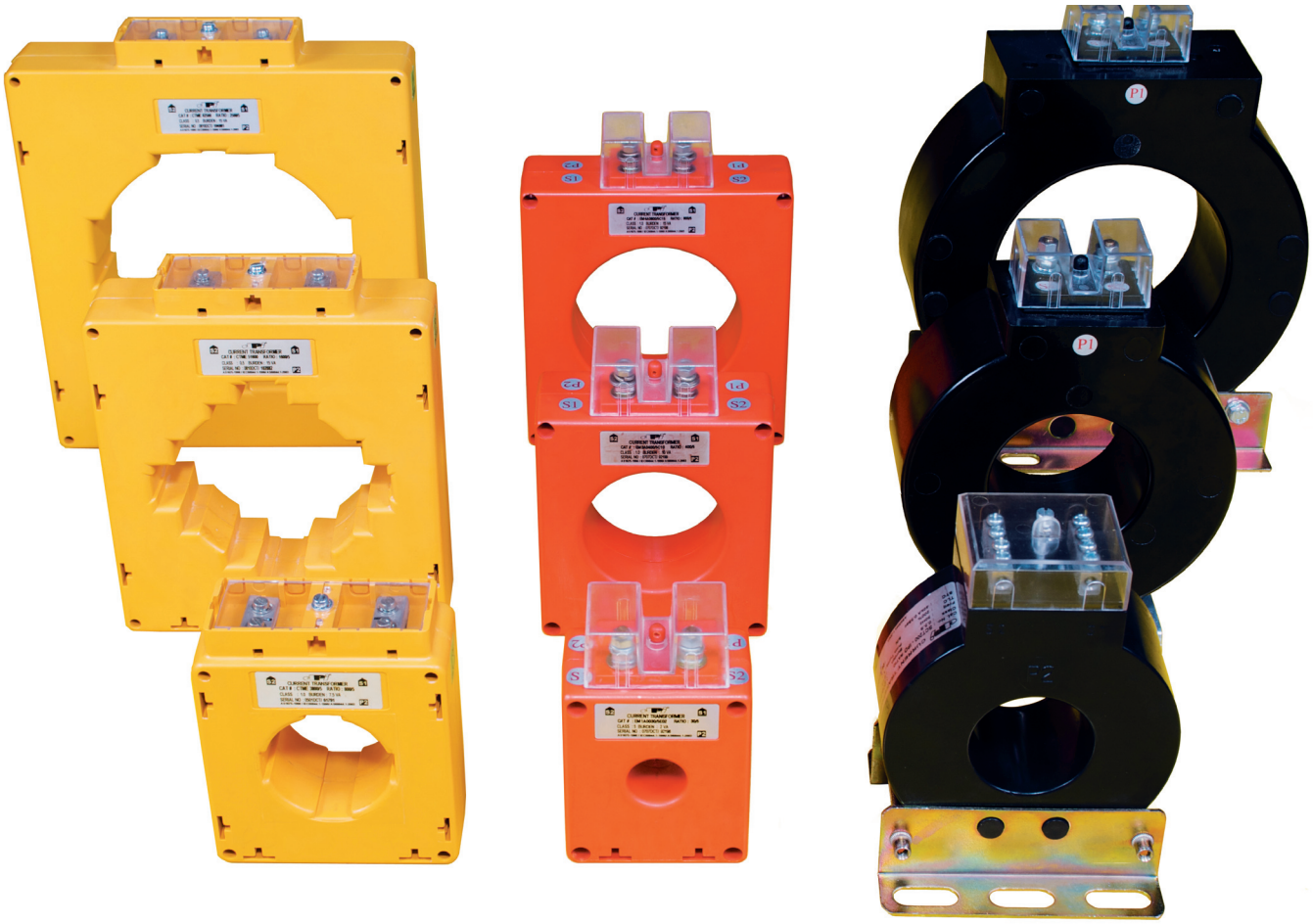
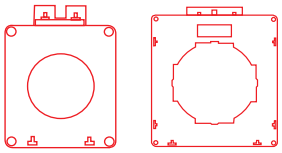
CURRENT TRANSFORMERS

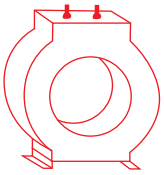


SIRIM CALIBRATION PROCEDURE
USED : CP - 446 - 355



ENCASED
CURRENT TRANSFORMERS

NATA
TYPE TESTED & CERTIFIED
LABORATORY REG. NO. 179



RESIN ENCAPSULATED
CURRENT TRANSFORMERS

ISO 9001
Registered Company
sira CERTIFICATION SERVICE
UKAS QUALITY MANAGEMENT
011

ISO 9001:2008

DPI INDUSTRIES SDN BHD

Current Transformers

Introduction

The DPI range of current transformers (CTs) incorporates the latest design technology from Australia using the most up to date software. Simple in design but comprehensive in range and dimensions, DPI range of current transformers provide the complete solutions to all switchboard manufacturers requirements.

The DPI range of CTs incorporates 2 basic types of design/finishing - encased and resin encapsulated for both measurement and protection options. Dual as well as other multiple ratios are available. CTs with special requirements including Class 'X' CTs are also catered for and DPI design specialists are able to offer extensive assistance.

DPI current transformers are designed and manufactured to comply with the latest International Standards including: IEC60044-1, BSEN60044-1 and AS60044-1.

Other Features include:

- Flexible range of dimensions to cover all busbar sizes
- Core made from High Grade Oriented Silicon Steel for optimum performance
- Easy termination on secondary terminals
- 1A or 5A secondary currents
- Range of Primary Currents up to 6000A
- Dual Ratios available for all types & range
- Other multiple ratios available on request
- Various mounting arrangements available
- Fully routine tested - test results available on request

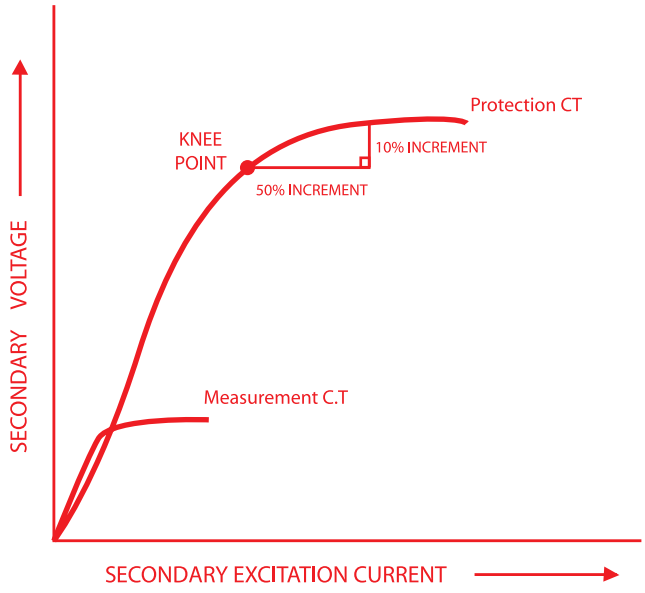


Fig. 1
Typical Magnetization Curves of Current Transformers indicating the difference in characteristics between Measurement & Protection Types

Applications of DPI Current Transformers

Measurement type CTs are required to transform the primary current at various classes of accuracy, as specified by the class designation, over a current range from 5% to 125% of its rated primary current. The design of this type of transformers requires the inclusion of a core and winding which when connected to its rated burden, will perform within the limits of errors specified by the various International Standards. It is an advantage for a Measurement Type CT to saturate above this range of primary currents to provide protection against damage to instruments by limiting the secondary current when surge currents or faults appear in the primary circuit.

Protection type CTs are required to transform the primary current to a secondary current up to a specified Accuracy Limit Factor according to the particular classification as set out in the various International Standards. A protection CT is thus required to supply the transformed primary current to the external burden without saturating, even in the presence of large line faults. Typically a protection CT is able to deliver 20 times its rated current (i.e. accuracy limit factor of 20) before beginning to saturate, within limits of the composite errors. Because of this wide operating range, protection CTs tent to have larger cross sections and heavier cores in comparison to the measurement CTs. For space and economic reasons, one should avoid over specifying protection CTs. It is always absolutely critical that the protection CTs installed are able to withstand the fault currents otherwise the CTs may be damaged during a fault occurrence and the performance of the protection relays compromised. DPI protection CTs are designed taking this into consideration.

Certain applications may require Measurement type CTs with extended performance range (1% to 125%) and Protection CTs complying with certain parameters (exciting current. knee point voltage) e.g. Class 'X' CT. All these type of CTs are available from DPI on request.

Current Transformers

Guide to selection of protection systems, of which the current transformers constitute a vital part, can be complex. Our suggested rating for these applications should be treated with caution as they may be subjected to variations due to relay characteristics or to components of the scheme. Relay manufacturer's recommendation should be followed.

General Type of Relay	Protection System	Typical C.T. Requirement		
		Burden (VA)	Class	Accuracy Limit Factor (ALF)
Thermal	Motor overcurrent with time delay	7.5	10P	10 to 15
Inverse Definite Min. Time Relays (I.D.M.T)	Overcurrent	15	5P	15 to 20
I.D.M.T Earth Fault Relays	Unrestricted earth fault with approx. time grading	15	10P	15
I.D.M.T Earth Fault Relays	Unrestricted earth fault where phase fault stability or accurate time grading required	15	5P	15

Burden Guide for Measuring Instrument and Protection Equipment

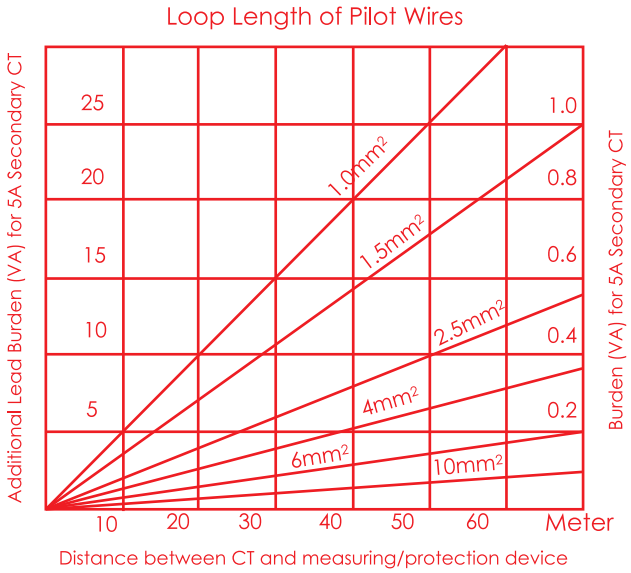
VA	Instrument
0.5	Short scale moving iron ammeters
0.75 to 1.5	240° scale moving iron ammeters
0.1 to 1	Rectified moving iron ammeters
1 to 1.25	Watt/VAr/phase angle meters
2 to 4	Recording ammeters
2 to 3.5	Maximum demand Indicators
3 to 3.5	Combined MDI & MI ammeters
0.05 to 0.2	Digital meters & Network analysers
0.05 to 0.5	Digital I.D.M.T. relays
2.5 to 3	Electro-mechanical I.D.M.T. relays
1 to 2	High set element of Electro-mechanical I.D.M.T. relays

Accuracy Guide

Application	Class of Accuracy
As a standard for testing other current transformers	Better than 0.1
Precision testing	0.1
Presicion metering	0.1 or 0.2
Tarif metering (bulk supplies)	0.2
Tarif metering (general), transducers, test equipment, control systems	0.5
Watt/VAr/Phase Angle meters, recording meters,	1
Protection Devices	5P
Industrial ammeters, maximum demand indicators	1 to 3
Approximate measurements	5

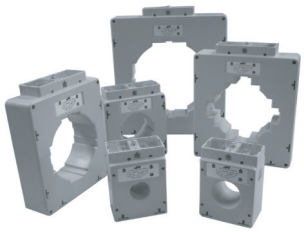
Secondary Lead Burden

The impedance of the pilot wire between the CT and Relay/Instrument will add to the total burden of the measurement or protection circuit. The impedance and hence burden can be significant for long pilot wire run and must be taken into account. This is particularly critical for class 'X' CTs. It may be advisable to use 1A secondary for extremely long pilot wire run. The chart below shows the approximate additional burden that must be added to the total CT burden for various sizes of pilot wires at varying distances.



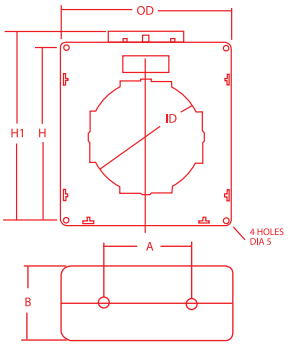
ENCASED MEASUREMENT CURRENT TRANSFORMERS (CTME SERIES)

Measurement CTs are available with the encased range.



Main features include:-

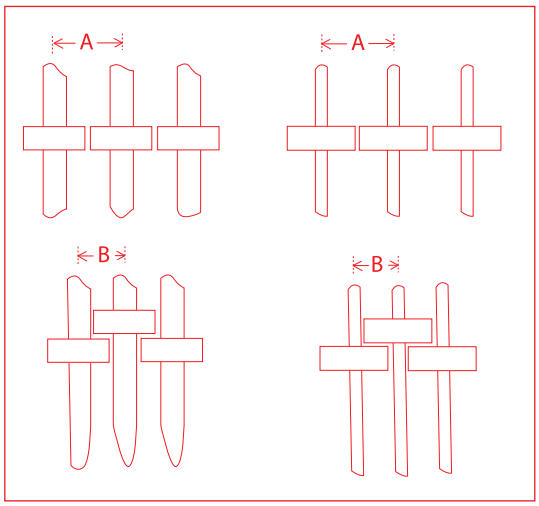
Tough & robust being made from high impact flame retardant materials and can be mounted directly on busbars operating at temperature of 105°C
Clear terminal cover with sealing facility as standard for all frame sizes.
Choice of mounting arrangements - foot or busbar.
Choice of terminations - direct clamp of cable or cable lug
Choice of cable direction with knockouts provided in terminal shrouds.
Clip-on mounting feet and busbar clamps available on request at no extra charge



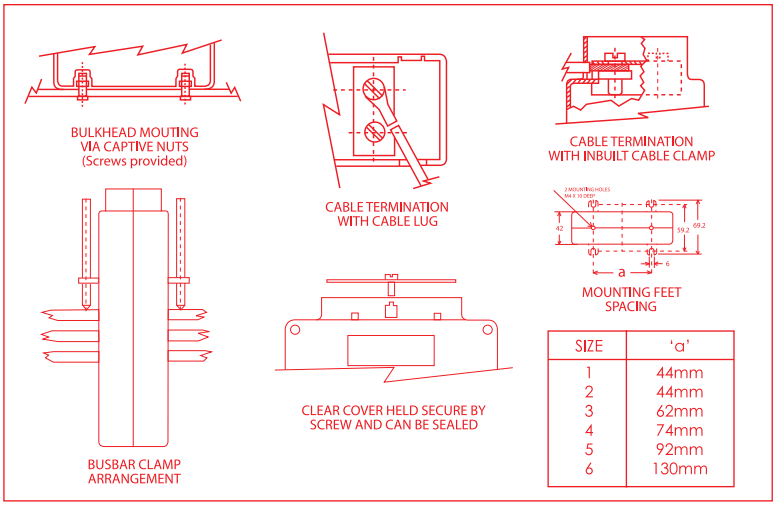
Frame Size	OD	ID	H	H1	A	B
CTME1	65	22	87	74	44	42
CTME2	65	33	87	74	44	42
CTME3	97	51	115	102	62	42
CTME4	128	82	157	144	74	42
CTME5	147	102	175	162	92	42
CTME6	192	126	220	207	130	42

All dimensions in mm

ALTERNATIVE ARRANGEMENTS OF CT'S AND BUSBARS



CONNECTION AND MOUNTING VARIATIONS



SIZE	'a'
1	44mm
2	44mm
3	62mm
4	74mm
5	92mm
6	130mm

ORDERING CODE FOR CTME MCTs

Product Code	Frame Size	Primary Ratio	To	Second Full Amps	Class	Burden (VA)
CTME	3	0500	/	5	C	15

Frame Size
From 1 to 6

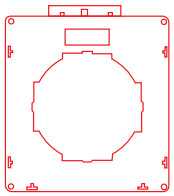
Secondary Full AMPS
1 = 1A
5 = 5A

Class
METERING
B = Class 0.5
C = Class 1
D = Class 3
E = Class 5

Burden (VA)
02 = 2.5VA
05 = 5.0VA
07 = 7.5VA
10 = 10VA
15 = 15VA

CTME MEASUREMENT CURRENT TRANSFORMERS

Performance chart to IEC60044-1 & BSEN60044-1.
Standard (Nameplate) Rating is per as high-lighted box given in the chart below.
Example : CTME 3-0500/5C15 has a name plate rating of Class 1, 15VA as per shaded square.



Indicates the performance specifications which can be achieved by the particular frame size at that particular ratio.

Indicates standard stock CT for that particular frame size & ratio.

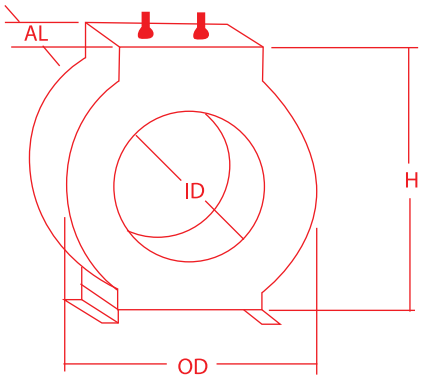
Frame Size	Ratio		Class 5					Class 3					Class 1					Class 0.5				
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
CTME1	50/5A																					
	60/5A																					
	75/5A																					
	100/5A																					
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
CTME2	75/5A																					
	100/5A																					
	150/5A																					
	200/5A																					
	250/5A																					
	300/5A																					
	400/5A																					
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
CTME3	150/5A																					
	200/5A																					
	300/5A																					
	400/5A																					
	500/5A																					
	600/5A																					
	750/5A																					
	800/5A																					
	1000/5A																					
	1200/5A																					
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
CTME4	300/5A																					
	400/5A																					
	600/5A																					
	630/5A																					
	750/5A																					
	800/5A																					
	1000/5A																					
	1200/5A																					
	1250/5A																					
	1500/5A																					
	1600/5A																					
	2000/5A																					
	1000/1A																					
	1250/1A																					
	1600/1A																					
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
CTME5	1200/5A																					
	1500/5A																					
	1600/5A																					
	2000/5A																					
	2500/5A																					
	1600/1A																					
	2000/1A																					
	2500/1A																					
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
CTME6	1500/5A																					
	1600/5A																					
	2000/5A																					
	2500/5A																					
	3000/5A																					
	3200/5A																					
	4000/5A																					
	2000/1A																					
	3200/1A																					
	4000/1A																					

RESIN ENCAPSULATED CURRENT TRANSFORMERS

Both measurement and protection CTs are available with the resin encapsulated range. They are the RM_CT range of resin encapsulated measurement CTs and the RP_CT range of resin encapsulated protection CTs.

Main features include:-

- Robust construction and better insulation.
- Withstand higher temperature rise.
- Clear terminal cover with sealing facilities available on request.
- Foot mounting facilities available on request.
- Busbar clamps available on request.



Frame Size	OD	ID	H	AL
RM1A	83	28	91	38
RM2A	83	42	91	38
RM3A	94	57	105	28
RM4A	120	82	138	28
RM5A	153	114	170	28
RM6A	175	138	198	38
RP1B	150	34	166	63
RP2B	150	42	166	63
RP3B	156	57	172	58
RP4B	173	82	190	44
RP5B	196	114	214	44
RP6B	220	138	260	44

All dimensions in mm

ORDERING CODE FOR RESIN ENCAPSULATED CTs

Type	Frame Size	Frame Variation	Primary Ratio	To	Second Full Amps	Class	Burden (VA)
R M	5	A	2 5 0 0	/	5	C	1 5

Type
RM = Measurement
RP = Protection

Frame Size
From 1 to 6

Frame Variation
A = Single Shell Measurement
B = Single Shell Protection
C = Double Shell Measurement
D = Double Shell Protection

Secondary Full AMPS
1 = 1A
5 = 5A

Class

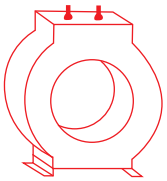
METERING
A = Class 0.2
B = Class 0.5
C = Class 1
D = Class 3
E = Class 5

PROTECTION
F = Class 5P10
G = Class 10P10
H = Class 5P15
I = Class 10P15
J = Class 5P20
K = Class 10P20

Burden (VA)
02 = 2.5VA
05 = 5.0VA
07 = 7.5VA
10 = 10VA
15 = 15VA

RESIN ENCAPSULATED MEASUREMENT CURRENT TRANSFORMERS

6 frames sizes (RM-1A to RM-6A) for primary currents from 30A to 4000A. Accuracy classes from 0.2, 0.5, 1, 3, 5 & Specials. Performance chart to IEC60044-1 and BSEN60044-1 based on 5A secondary.



Indicates the performance specifications which can be achieved by the particular frame size at that particular ratio.

Indicates standard stock CT for that particular frame size & ratio.

Frame Size	Ratio		Class 5					Class 3					Class 1					Class 0.5					Class 0.2				
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RM1A	30/5A (P=3)																										
	60/5A (P=2)																										
	100/5A																										
	150/5A																										
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RM2A	100/5A																										
	150/5A																										
	200/5A																										
	250/5A																										
	300/5A																										
	400/5A																										
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RM3A	500/5A																										
	600/5A																										
	800/5A																										
	1000/5A																										
	1200/5A																										
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RM4A	600/5A																										
	800/5A																										
	1000/5A																										
	1200/5A																										
	1600/5A																										
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RM5A	1600/5A																										
	2000/5A																										
	2500/5A																										
	3000/5A																										
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RM6A	2000/5A																										
	2500/5A																										
	3000/5A																										
	4000/5A																										

RESIN ENCAPSULATED PROTECTION CURRENT TRANSFORMERS

6 frame sizes (RP-1B to RP-6B) for primary currents from 60A to 4000A. Accuracy classes from 5P, 10P & Specials.

Frame Size	Ratio		Class 10P10					Class 5P10					Class 10P15					Class 5P15					Class 10P20					Class 5P20				
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RP1B	60/5A																														
	100/5A																														
	150/5A																														
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RP2B	100/5A																														
	150/5A																														
	200/5A																														
	250/5A																														
	300/5A																														
	400/5A																														
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RP3B	500/5A																														
	600/5A																														
	800/5A																														
	1000/5A																														
	1200/5A																														
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RP4B	600/5A																														
	800/5A																														
	1000/5A																														
	1200/5A																														
	1600/5A																														
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RP5B	1600/5A																														
	2000/5A																														
	2250/5A																														
	2500/5A																														
	3000/5A																														
		VA	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15	2.5	5	7.5	10	15
RP6B	2000/5A																														
	2500/5A																														
	3000/5A																														
	4000/5A																														

Specifications and Ordering Information

Current Transformers

Performance Data (to IEC60044-1, BSEN60044-1 & AS60044-1)

	Encased	Resin Encapsulted
Temperature Range °C	-20 to +70	-20 to +80
Insulation Class	B	F
Dielectric Strength kV/min	3.0	3.0
Nominal Frequency Hz	50/60	50/60
Nominal Strenght (A.C primary) V	720	720
Degree of Protection	IP40	IP40
Rated Short Circuit Thermal Current (Ith)	60 X rated primary current for 1 second	
Rated Dynamic Current (Idyn)	2.5 X Ith	

ORDERING INFORMATION

General information required when ordering DPI CTs:

- Current Ratio/Ratios (Primary/Secondary currents)
- Accuracy Class & Burden at each ratio
- Dimensional Restrictions
- Voltage of System
- Preferred Finish (Encased or Resin Encapsulated)
- Required Short Time Thermal Current
- Relevant International Standards
- Mounting Accessories
- Any other special requirement

SPECIAL CTs (CLASS 'X')

The selection charts show the standard range of DPI CTs. However Special CTs are available due to the highly flexible manufacturing facilities at DPI. These CTs can be designed and manufactured to meet individual requirements. Additional information required for Special CTs:

- Knee Point Voltage
- Exciting Current at knee point voltage
- Resistance of CT secondary windings at 75 °C
- Burden of pilot wire loop resistance (from CT to device)
- Any other special requirement

SAFETY PRECAUTIONS

It is important to ensure that the secondary terminal of the current transformer shall not be open-circuited while the primary supply is energised. Otherwise a high voltage will be developed between the secondary terminals. The secondary terminals should be shorted if the CT is not in use.

DPI INDUSTRIES SDN BHD
(262006-T)
34-2, Jalan 3/146, Bandar Tasik Selatan, 57000 Kuala Lumpur. Malaysia.
Tel: +60 3 9057 8949 Fax: +60 3 9057 8946 Email: sales@dpisb.com
www.dpisb.com

Sole Agent:

RICKSON ENGINEERING LTD
21/F Sun Hing Ind. Bldg., 46 Wong Chuk Hang Road, Hong Kong.
Tel: +852 3120 7500 Fax: +852 3120 7511 Email: sales@rickson.com.hk
www.rickson.com.hk