

RUDOLF CURRENT TRANSFORMER

■ Enhanced Quality with a Touch of Style



RUDOLFTM



CURRENT TRANSFORMER

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Company Introduction

Bridex Singapore Pte Ltd is founded in 1978 as a manufacturer of instruments transformer for the Asian market. We are the first local electrical switchgear components manufacturer that launches our own Asian identity – **RUDOLF**

Today we aim to become a knowledge-based, technology driven engineering organization, with emphasis on providing solution for electrical distribution and control, in area of instruments, distribution & protection and power quality solution in area of power quality audit & power quality system and motor controller. With our present headquarter in Singapore and subsidiaries that are located in Australia, Malaysia, Philippines and Vietnam, we are well equipped to service both local market and countries in the Asia Pacific.

Product Introduction

Rudolf, creating a world class standard in the supply of current transformer, offers a comprehension range for both the measuring and protection applications.

Ranges available are:

- Encapsulated type;
- Tape wound ring type;
- Split core encapsulated type;
- Class X tape wound ring type;

Designed to meet the highest standards in accordance to IEC 60044-1, Rudolf current transformer provides you with a world-class product manufactured with our assurance to comply with international standard.

New Products

Rudolf launched our new encapsulated current transformer. Portraying a revolutionary unique design encase using ABS/PC material, we provide enhance quality with a touch of style.

The various differentiating factors govern the manufacturing of Rudolf current transformer lie in both the choice of world-class raw material and a 100% testing to complete the supply. We are committed to provide our customer with undiscounted quality and complete assurance of compliance to international standard.

Basic Features

Correct selection of current transformer is important as the fundamental usage of CT is:

- 1) to obtain proportional current in accordance to specify accuracy and objectives;
- 2) to insulate control & measuring / protection from power circuit.

Application

Measuring current transformer is intended to supply to indicative devices, integrated meter and similar apparatus.

They are characterized by their accuracy and for saturating at moderate overcurrent. This effect protects the measuring instruments from possible overcurrent.

Protective current transformer is intended to supply to protective relays whereby accuracy of CT need to be kept especially during overload conditions.

Construction

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.

Selection criteria

- 1) Application – protection or measurement
- 2) Information on associated relay or instrument
 - nominal current
 - accuracy
 - burden
- 3) loss contribute from power loss in power line
 - distance between transformer & instruments
 - diameter of cable use for connection
- 4) environmental features
 - indoor/ outdoor
 - operating temperature
 - etc...

Important of burden

Burden is the impedance of the secondary circuit in ohms and power factor.

For the measurement instrument or protection relay operating via a transformer, in order to operate them, the primary current has to induce the power required in the secondary current of the instrument or relay.

This induced power must be equal or higher than the losses in the power line + consumption of the measurement instrument or protection relay.

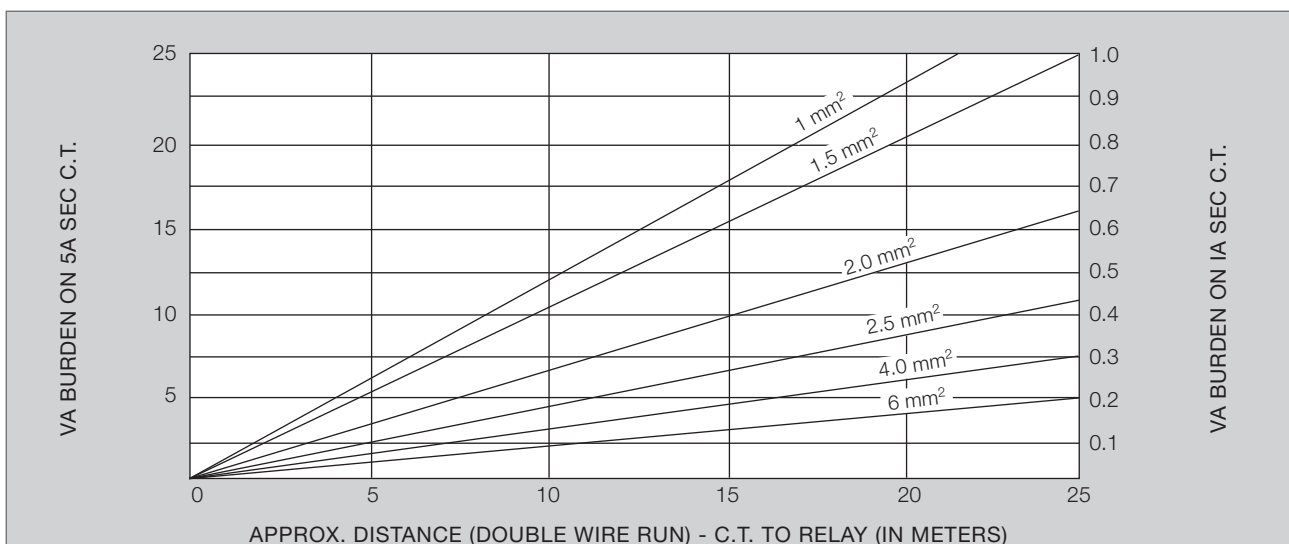
The burden imposed on a current transformer consist mainly of:

- The impedance of pilot wire between current transformer and instruments/relay
- The impedance of the instrument / relay
- The sum of the above constitute the external burden required

Table illustrating some typical instruments and its typical consumption

Instrument	Burden consumed
Moving iron instruments	0.3-15VA
Moving coil instruments	0.5VA
Analogue power meter	0.2-2.5VA
Maximum demand meter	2.5-5.0VA
Digital meter	0.5-1.0VA
Energy meter	1.0-1.5VA
Recording instruments	2.0-5.0VA

Table guide for pilot lead burden



Rudolf Current Transformer

Important of accuracy & phase angle

Current error is an error that arises when the current value of the actual transformation ratio is not equal to rated transformation ratio.

$$\text{Current error (\%)} = \{(K_n \times I_s - I_p) \times 100\} / I_p$$

K_n = rated transformation ratio

I_p = actual primary current

I_s = actual secondary current

Example:

In case of a 2000/5A class 1 5VA current transformer

$$K_n = 2000/5 = 400 \text{ turn}$$

$$I_p = 2000\text{A}$$

$$I_s = 4.9\text{A}$$

$$\text{Current error} = \{(400 \times 4.9 - 2000) \times 100\} / 2000 = -2\%$$

For protection class current transformer, the accuracy class is designed by the highest permissible percentage composite error at the accuracy limit primary current prescribed for the accuracy class concerned.

Accuracy class includes: 5P, 10P

Standard accuracy limit factor are: 5, 10, 15, 20, 30

By phase angle

Phase error is the difference in phase between primary & secondary current vectors, the direction of the vectors to be zero for a perfect transformer.

You will experience a positive phase displacement when secondary current vector lead primary current vector. Unit of scale expressed in minutes / centiradians.

Circular measure = (unit in radian) is the ratio of the distance measured along the arc to the radius.

Angular measure = (unit in degree) is obtained by dividing the angle subtended at the center of a circle into 360 deg equal division known as "degrees".

Table – limits of current error and phase displacement for measuring current transformer (Classes 0.1 To 1)

Accuracy Class	+/- percentage current (ratio) error at percentage of rated current shown below				+/- 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	0.40	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	0.90	0.45	0.30	0.30
0.5	1.50	0.75	0.50	0.50	90	45	30	30	2.70	1.35	0.90	0.90
1.0	3.00	1.50	1.00	1.00	180	90	60	60	5.40	2.70	1.80	1.80

**Table – limits of current error and phase displacement for measuring current transformer
For special application**

Accuracy Class	+/- percentage current (ratio) error at percentage of rated current shown below					+/- Phase displacement at percentage of rated current shown below									
						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	0.9	0.45	0.3	0.3	0.3
0.5S	1.50	0.75	0.50	0.50	0.50	90	45	30	30	30	2.7	1.35	0.9	0.9	0.9

Table – limits of current error for measuring current transformers (classes 3 and 5)

Accuracy Class	+/- Percentage current (ratio) error at percentage of rated current shown below	
	50	120
3	3	3
5	5	5

Table – limits of error for protection current transformer

Accuracy Class	Current error at rated primary current %	Phase displacement at rated primary current		Composite error at rated accuracy limit primary current %
		Minutes	Centiradians	
5P	+/-1	+/-60	+/-1.8	5
10P	+/-3	-	-	10

Specifications

Standard	: IEC60044-1 2003-02
Rated operational voltage (Un)	: 720V
Rated frequency	: 50/60Hz
Ambient temperature	: -5/40 deg C
Operating humidity	: up to 95% relative humidity
Rated short time thermal current (Ith)	: 50kA
Rated dynamic current (Idyn)	: 2.55 x Ith
Insulation	: between primary /secondary conductor >500mΩ : between toriod core/secondary conductor >200mΩ
Dielectric strength	: 2kV 1 minutes
Thermal class of insulation	: B
Casing	: non-flammable, polycarbonate self extinguishing ABS/PC
Index of protection – casing	: IP20
Index of protection – cover	: sealable IP20
Accuracy class	: Measuring 0.5, 1, 3 : Protection 5P, 10P
Burden	: ranging from 3 – 30VA
Rated primary current	: ranging from up to 6000A
Rated secondary current	: .../5A or .../1A

Class X Current Transformer

Class X current transformer is use in conjunction with high impedance circulating current differential protection relay, eg restricted earth fault relay. As illustrated in IEC60044-1, the class X current transformer is needed.

The following illustrates the method to size a class X current transformer.

Step 1: calculating knee point voltage V_{kp}

$$V_{kp} = \{2 \times I_{ft} (R_{ct} + R_w)\} / k$$

V_{kp} = required CT knee point voltage

I_{ft} = max transformer through fault in ampere

R_{ct} = CT secondary winding resistance in ohms

R_w = loop impedance of pilot wire between CT and the

K = CT transformation ratio

Step 2: calculate Transformer through fault I_{ft}

$$I_{ft} = (KVA \times 1000) / (1.732 \times V \times Impedance)$$

KVA = transformer rating in kVA

V = transformer secondary voltage

Impedance = transformer impedance

Step 3: How to obtain R_{ct}

To measure when CT is produce

Step 4: How to obtain R_w

This is the resistance of the pilot wire used to connect the 5th class X CT at the transformer star point to the relay in the LV switchboard. Please obtain this data from the Electrical contractor or consultant. We provide a table to serve as a general guide on cable resistance.

Example:

Transformer Capacity : 2500kVA

Transformer impedance : 6%

Voltage system : 22kV / 415V 3phase 4 wire

Current transformer ratio : 4000/5A

Current transformer type : Class X PR10

Current transformer V_{kp} : 185V

Current transformer R_{ct} : 1.02Ω (measured)

Pilot wire resistance R_w : 25 meters using
6.0mm sq cable
= 2 x 25 x 0.0032
= 0.16Ω

$$\begin{aligned} I_{ft} &= (kVA \times 1000) / (1.732 \times V \times impedance) \\ &= (2500 \times 1000) / (1.732 \times 415 \times 0.06) \\ &= 57,968 \text{ round up } 58,000A \end{aligned}$$

$$\begin{aligned} V_{kp} &= \{2 \times I_{ft} (R_{ct} + R_w)\} / k \\ &= \{2 \times 58000 (1.02 + 0.16)\} / 800 \\ &= 171.1\Omega \end{aligned}$$

Rudolf Class X CT with knee point voltage of 185V is suitable to be use in this application.

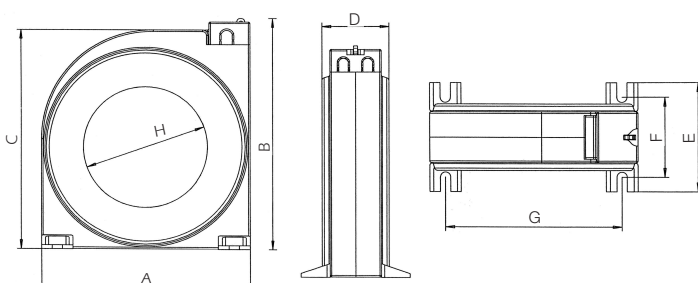
Encapsulated Current Transformer

Selection Guide

Ratio	Standard burden (VA)																	
	Accuracy class 3						Accuracy class 1						Accuracy class 0.5					
60/5A	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100/5A	3	5	-	-	-	-	3	5	-	-	-	-	-	-	-	-	-	-
120/5A	3	5	-	-	-	-	3	5	-	-	-	-	-	-	-	-	-	-
100/5A	3	5	-	-	-	-	3	5	-	-	-	-	-	-	-	-	-	-
150/5A	3	5	7.5	10	-	-	3	5	-	-	-	-	-	-	-	-	-	-
200/5A	3	5	7.5	10	15	20	-	3	5	7.5	-	-	-	3	-	-	-	-
250/5A	3	5	7.5	10	15	20	-	3	5	7.5	10	-	-	3	5	-	-	-
300/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	3	5	7.5	10	15
200/5A	3	5	7.5	10	-	-	-	3	5	7.5	-	-	-	3	-	-	-	-
250/5A	3	5	7.5	10	15	-	-	3	5	7.5	10	-	-	3	5	-	-	-
300/5A	3	5	7.5	10	15	20	-	3	5	7.5	10	15	-	3	5	7.5	-	-
400/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	3	5	7.5	10	-
500/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
600/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
400/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	-	-	3	5	7.5	10
500/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	-	3	5	7.5	10
600/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
800/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
1000/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
1200/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
1600/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
800/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
1000/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
1200/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
1600/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
2000/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
1200/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
1600/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
2000/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
2500/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
1600/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
2000/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
2500/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
3000/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10
3200/5A	3	5	7.5	10	15	20	30	3	5	7.5	10	15	20	30	3	5	7.5	10

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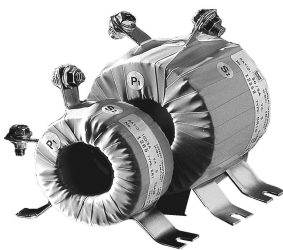
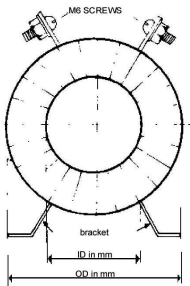
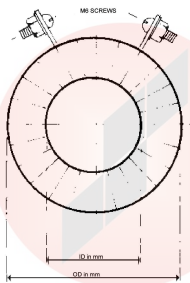
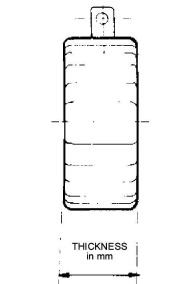
Dimension Drawing



Case type	Dimension							
	A	B	C	D	E	F	G	H
RE01	88	106	98	43	70	52	68	18
RE11	88	106	98	43	70	52	68	27
RE31	92	110	102	43	70	52	72	43
RE51	117	135	127	43	70	52	97	63
RE61	131	149	141	43	70	52	111	77
RE71	142	160	152	43	70	52	95	86
RE81	170	193	185	43	70	52	95	111

Rudolf Current Transformer

Tape Wound Ring Type (measuring current transformer)

	Type	Class 3.0							Class 1.0							Class 0.5							Approx. Wt. In Kg Per 10mm C.T. Thickness
		Ratio	ID	OD	VA	3	5	15	3	5	7.5	10	15	20	30	5	7.5	10	15	20	30		
	SR 1	60/5A	30	70	Thickness in mm	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.100		
		100/5A	30	70		35	40	-	40	-	-	-	-	-	-	-	-	-	-	-	0.103		
		120/5A	30	70		35	40	-	40	40	-	-	-	-	-	-	-	-	-	-	0.104		
		150/5A	30	70		30	35	-	35	40	-	-	-	-	-	-	-	-	-	-	0.105		
		200/5A	28	70		30	30	-	30	35	40	-	-	-	-	-	40	-	-	-	-	0.106	
	SR 2	150/5A	40	80	Thickness in mm	40	40	-	40	-	-	-	-	-	-	-	-	-	-	-	0.122		
		200/5A	40	80		30	30	-	30	40	40	-	-	-	-	-	-	-	-	-	-	0.123	
		250/5A	40	80		30	30	40	30	35	40	-	-	-	-	40	-	-	-	-	-	0.124	
		300/5A	40	80		30	30	40	30	30	35	40	40	-	-	30	40	40	-	-	-	0.125	
		400/5A	40	80		30	30	35	30	30	30	35	35	40	-	30	35	40	40	-	-	0.127	
	SR 3	200/5A	45	85	Thickness in mm	35	40	-	40	40	-	-	-	-	-	-	-	-	-	-	0.128		
		250/5A	45	85		30	35	40	30	35	40	-	-	-	-	40	-	-	-	-	-	0.129	
		300/5A	45	85		30	30	40	30	30	35	40	-	-	-	35	40	40	-	-	-	0.130	
		400/5A	45	85		30	30	35	30	30	30	35	35	40	-	35	35	40	40	-	-	0.132	
			SR 4	400/5A		58	95	Thickness in mm	30	30	40	30	30	30	35	40	40	-	30	35	40	40	-
500/5A	58			95	30	30	35		30	30	30	30	35	40	-	30	35	35	40	-	-	0.154	
600/5A	57			95	30	30	35		30	30	30	30	35	40	40	30	30	35	40	40	-	0.155	
800/5A	55			98	30	30	30		30	30	30	30	30	35	40	30	30	30	35	40	40	0.160	
	SR 5			600/5A	70	109	Thickness in mm		30	30	40	30	30	30	35	40	-	-	30	35	35	40	-
		800/5A	70	109	30	30		30	30	30	30	30	35	40	40	30	30	30	35	40	-	0.164	
		1000/5A	68	110	30	30		30	30	30	30	30	35	40	40	30	30	30	35	40	40	0.168	
		1200/5A	67	112	30	30		30	30	30	30	30	35	30	30	30	30	30	35	40	40	0.182	
			SR 6	800/5A	85	122		Thickness in mm	30	30	30	30	30	30	30	35	40	30	30	30	35	40	-
1000/5A	83			122	30	30	30		30	30	30	30	35	40	30	30	30	35	40	40	0.230		
1200/5A	83			125	30	30	30		30	30	30	30	35	30	30	30	30	30	35	40	40	0.240	
1600/5A	82			126	30	30	30		30	30	30	30	35	30	30	30	30	30	35	40	40	0.260	
	SR 7			1200/5A	110	147	Thickness in mm		30	30	35	30	30	30	30	40	40	40	30	30	30	40	40
		1600/5A	110	150	30	30		30	30	30	30	30	35	40	30	30	30	30	35	40	40	0.342	
		2000/5A	108	150	30	30		30	30	30	30	30	35	35	30	30	30	30	35	35	35	0.350	
		2500/5A	106	154	30	30		30	30	30	30	30	35	35	30	30	30	30	35	35	35	0.410	
			SR 8	1600/5A	120	157		Thickness in mm	30	30	30	30	30	30	30	35	40	40	30	30	35	35	40
2000/5A	120			160	30	30	30		30	30	30	30	35	40	30	30	30	35	35	40	40	0.420	
2500/5A	118			162	30	30	30		30	30	30	30	35	40	30	30	30	35	35	40	40	0.460	
3000/5A	116			164	30	30	30		30	30	30	30	35	40	30	30	30	35	35	40	40	0.502	
	SR 9			2000/5A	130	168	Thickness in mm		30	30	30	30	30	30	30	35	40	40	30	30	30	35	35
		2500/5A	130	170	30	30		30	30	30	30	30	35	40	30	30	30	35	35	40	40	0.500	
		3000/5A	128	172	30	30		30	30	30	30	30	35	40	30	30	30	35	35	40	40	0.530	
		3500/5A	126	174	30	30		30	30	30	30	30	35	40	30	30	30	35	35	40	40	0.570	
			SR 10	2500/5A	140	178		Thickness in mm	30	30	30	30	30	30	30	35	40	40	30	30	30	35	35
3000/5A	140			180	30	30	30		30	30	30	30	35	40	30	30	30	35	35	40	40	0.562	
3500/5A	138			182	30	30	30		30	30	30	30	35	40	30	30	30	35	35	40	40	0.580	
4000/5A	136			184	30	30	30		30	30	30	30	35	40	30	30	30	35	35	40	40	0.605	

TAPE WOUND RING TYPE (Measuring Current Transformer) - extended range																							
Type	Class				3.0					1.0						0.5				Approx. Wt. In Kg Per 10mm C.T. Thickness			
	Ratio	ID	OD	VA	5	7.5	10	15	20	3	5	7.5	10	15	20	30	5	7.5	10		15		
SR 1S	60/5A	30	85	Thickness in mm	40	70	90	-	-	60	70	-	-	-	-	-	-	-	-	-	-	0.401	
	100/5A	30	85		35	40	50	70	-	35	40	50	70	90	-	-	-	90	-	-	-	0.403	
	120/5A	30	85		30	35	40	50	60	-	35	40	50	70	80	-	-	70	-	-	-	0.410	
	150/5A	30	85		30	30	35	40	-	30	30	35	40	50	-	-	40	40	-	-	-	0.410	
SR 2S	150/5A	40	85	Thickness in mm	30	35	40	50	-	30	35	40	50	60	-	-	50	60	-	-	-	0.284	
	200/5A	40	85		30	30	35	40	50	30	30	35	40	50	50	-	40	40	50	50	-	0.290	
	250/5A	40	85		30	30	30	35	40	30	30	30	35	40	40	-	30	35	40	50	-	0.294	
	300/5A	40	85		30	30	30	30	35	30	30	30	30	35	40	-	30	35	35	40	-	0.295	
SR 3S	200/5A	45	85	Thickness in mm	30	30	35	40	50	30	30	35	40	50	60	-	40	40	50	60	-	0.278	
	250/5A	45	85		30	30	30	35	40	30	30	30	35	40	50	-	35	35	40	50	-	0.284	
	300/5A	45	85		30	30	30	30	40	30	30	30	30	35	40	-	30	35	35	40	-	0.286	

Subjected to change without prior notice

Tape wound ring type (protection current transformer)

Type	Class/ALF				5P5						5P10					5P15				Approx. Wt. In Kg Per 10mm C.T. Thickness
	Ratio	ID	OD	VA	5	7.5	10	15	20	30	5	7.5	10	15	20	5	7.5	10	15	
PR 1	100/5A	30	95	Thickness in mm	50	65	80	100	130	-	85	100	-	-	-	-	-	-	-	0.403
	120/5A	30	95		50	60	70	100	120	-	80	100	-	-	-	-	-	-	-	0.406
	150/5A	30	95		40	50	60	80	110	-	70	90	110	-	-	-	-	-	-	0.410
	200/5A	28	95		40	40	40	55	65	-	50	65	75	-	-	-	-	-	-	0.415
PR 2	150/5A	40	100	Thickness in mm	50	60	70	85	105	-	80	100	110	120	-	-	-	-	-	0.330
	200/5A	40	100		40	40	50	65	75	110	55	70	85	115	-	-	-	-	-	0.333
	250/5A	40	95		40	40	50	60	75	-	50	70	85	110	-	75	100	-	-	0.292
	300/5A	40	95		35	40	40	60	65	90	50	60	70	100	-	70	85	110	-	0.295
PR 3	200/5A	45	95	Thickness in mm	40	55	65	80	110	115	75	95	115	-	-	-	-	-	-	0.278
	250/5A	45	95		40	50	60	70	85	110	60	85	90	115	-	85	110	-	-	0.284
	300/5A	45	95		35	40	40	60	70	95	50	65	85	100	-	70	95	-	-	0.286
	400/5A	45	95		35	40	40	60	60	85	60	60	70	90	-	65	80	100	-	0.292
PR 4	400/5A	58	100	Thickness in mm	35	40	50	60	70	95	60	70	80	105	-	75	95	115	-	0.231
	500/5A	58	100		35	40	40	60	60	80	50	60	70	90	110	70	85	100	-	0.251
	600/5A	57	100		30	35	40	50	60	70	50	55	60	80	95	65	75	90	110	0.261
	800/5A	55	104		30	30	35	40	50	60	40	50	55	65	80	55	65	75	95	0.271
PR 5	600/5A	70	114	Thickness in mm	35	35	40	50	55	70	50	55	65	80	100	70	80	90	115	0.283
	800/5A	70	114		35	35	35	40	45	55	40	50	50	60	75	50	60	70	85	0.294
	1000/5A	68	116		35	35	35	35	40	50	40	40	50	55	65	50	60	70	80	0.360
	1200/5A	67	117		35	35	35	35	40	40	35	40	40	50	60	40	50	60	70	0.326
PR 6	800/5A	85	125	Thickness in mm	35	35	35	40	50	60	40	50	55	65	85	60	70	80	95	0.316
	1000/5A	83	127		35	35	40	40	40	60	40	50	50	65	75	50	60	70	85	0.333
	1200/5A	83	128		35	35	35	35	40	40	35	35	40	45	60	40	50	60	65	0.351
	1600/5A	82	130		35	35	35	35	35	40	35	35	35	40	50	40	50	50	65	0.378
PR 7	1200/5A	110	152	Thickness in mm	35	35	35	35	40	50	40	40	50	45	65	50	60	65	80	0.421
	1600/5A	110	155		35	35	35	35	35	40	35	35	40	40	50	35	50	50	60	0.434
	2000/5A	108	158		30	30	30	30	30	40	35	35	35	40	40	35	40	50	50	0.443
	2500/5A	106	162		30	30	30	30	30	35	35	35	35	40	40	35	40	40	50	0.462
PR 8	1600/5A	120	165	Thickness in mm	35	35	35	35	40	40	35	40	40	45	60	50	50	60	70	0.491
	2000/5A	120	165		35	35	35	35	35	40	35	35	40	40	45	40	40	50	55	0.502
	2500/5A	118	168		35	35	35	35	35	40	35	35	35	40	40	35	40	50	50	0.528
	3000/5A	116	170		35	35	35	35	35	40	35	35	35	40	40	35	40	40	50	0.562
PR 9	2000/5A	130	175	Thickness in mm	35	35	35	35	35	40	35	35	40	40	50	40	50	50	60	0.538
	2500/5A	130	175		35	35	35	35	35	40	35	35	40	40	40	40	40	50	55	0.564
	3000/5A	128	178		35	35	35	35	35	40	35	35	35	40	40	35	40	40	50	0.602
	3500/5A	126	180		35	35	35	35	35	40	35	35	35	40	40	35	40	40	40	0.624
PR 10	2500/5A	140	185	Thickness in mm	35	35	35	40	40	40	35	35	40	40	50	40	40	55	60	0.630
	3000/5A	140	185		35	35	35	35	35	40	35	35	35	40	40	35	40	40	50	0.656
	3500/5A	138	188		35	35	35	35	35	40	35	35	35	40	40	35	40	40	40	0.684
	4000/5A	136	190		35	35	35	35	35	40	35	35	35	40	40	35	35	40	40	0.712

Subjected to change without prior notice

Rudolf Current Transformer

Tape wound ring type (protection current transformer)

Type	Class/ALF				10P5						10P10					10P15				Approx. Wt. In Kg Per 10mm C.T. Thickness
	Ratio	ID	OD	VA	5	7.5	10	15	20	30	5	7.5	10	15	20	5	7.5	10	15	
PR 1	100/5A	30	95	Thickness in mm	50	60	75	100	130	-	85	100	-	-	-	-	-	-	-	0.403
	120/5A	30	95		50	60	70	95	120	-	80	105	-	-	-	-	-	-	-	0.406
	150/5A	30	95		40	50	60	80	110	-	65	90	110	-	-	-	-	-	-	0.410
	200/5A	28	95		40	40	40	55	65	-	50	60	70	-	-	-	-	-	-	0.415
PR 2	150/5A	40	100	Thickness in mm	50	55	65	85	100	-	75	100	110	120	-	-	-	-	-	0.330
	200/5A	40	100		40	40	50	60	70	-	55	70	85	110	-	-	-	-	-	0.333
	250/5A	40	95		40	40	50	60	70	-	50	70	85	110	-	75	95	-	-	0.292
	300/5A	40	95		35	40	40	60	65	85	50	60	70	95	-	70	85	105	-	0.295
PR 3	200/5A	45	95	Thickness in mm	40	50	60	80	100	115	75	95	110	-	-	-	-	-	-	0.278
	250/5A	45	95		40	50	60	70	85	110	60	75	90	115	-	85	110	-	-	0.284
	300/5A	45	95		35	40	40	60	70	95	50	65	80	100	-	70	90	-	-	0.286
	400/5A	45	95		35	40	40	60	60	85	50	55	65	85	-	65	80	95	-	0.292
PR 4	400/5A	58	100	Thickness in mm	35	40	40	60	70	90	60	65	80	100	-	75	95	110	-	0.231
	500/5A	58	100		35	40	40	60	60	80	50	60	70	85	110	70	80	95	-	0.251
	600/5A	57	100		35	35	40	50	50	70	50	50	60	80	90	60	75	85	110	0.261
	800/5A	55	104		35	35	35	40	50	60	40	50	50	60	80	55	65	75	90	0.271
PR 5	600/5A	70	114	Thickness in mm	35	35	40	50	50	70	50	55	60	80	95	70	80	90	110	0.283
	800/5A	70	114		35	35	35	40	40	55	40	40	50	60	70	50	60	70	85	0.294
	1000/5A	68	116		35	35	35	35	40	50	35	40	50	55	65	50	55	65	80	0.360
	1200/5A	67	117		35	35	35	35	35	40	35	40	40	50	60	40	50	55	65	0.326
PR 6	800/5A	85	125	Thickness in mm	35	35	35	40	50	60	40	50	55	65	80	60	65	75	95	0.316
	1000/5A	83	127		35	35	40	40	40	60	40	40	50	60	75	50	60	70	80	0.333
	1200/5A	83	128		35	35	35	35	40	40	35	35	40	45	60	40	50	60	65	0.351
	1600/5A	82	130		35	35	35	35	35	40	35	35	35	40	50	40	50	50	65	0.378
PR 7	1200/5A	110	152	Thickness in mm	35	35	35	35	40	50	40	40	50	45	65	50	60	65	80	0.421
	1600/5A	110	155		35	35	35	35	35	40	35	35	35	40	50	35	50	50	60	0.434
	2000/5A	108	158		30	30	30	30	30	30	35	35	35	40	40	35	40	50	50	0.443
	2500/5A	106	162		30	30	30	30	30	30	35	35	35	35	40	35	40	40	50	0.462
PR 8	1600/5A	120	165	Thickness in mm	30	30	30	35	35	40	35	40	40	45	60	50	50	55	65	0.491
	2000/5A	120	165		30	30	30	35	35	40	35	35	35	40	50	40	40	50	50	0.502
	2500/5A	118	168		30	30	30	35	35	35	35	35	35	40	40	35	40	40	50	0.528
	3000/5A	116	170		30	30	30	35	35	35	35	35	35	40	40	35	40	40	50	0.562
PR 9	2000/5A	130	175	Thickness in mm	30	30	30	35	35	40	35	35	40	40	50	40	50	50	60	0.538
	2500/5A	130	175		30	30	30	35	35	40	35	35	35	40	40	35	40	40	50	0.564
	3000/5A	128	178		30	30	30	35	35	35	35	35	35	40	40	35	40	40	50	0.602
	3500/5A	126	180		30	30	30	35	35	35	35	35	35	40	40	35	40	40	40	0.624
PR 10	2500/5A	140	185	Thickness in mm	35	35	35	35	40	40	35	35	40	40	50	35	40	50	60	0.630
	3000/5A	140	185		35	35	35	35	35	40	35	35	35	40	40	35	40	40	50	0.656
	3500/5A	138	188		35	35	35	35	35	35	35	35	35	40	40	35	35	40	40	0.684
	4000/5A	136	190		35	35	35	35	35	35	35	35	35	40	40	35	35	40	40	0.712

Subjected to change without prior notice

Split Core Type

The connection of a current transformer is done in series with the feeder wires, which must be interrupted. The subsequent connecting up of current transformers in already existing units or distributor or main boxes involves problems which are widely known and can cause a great deal of extra wage costs and time. Our TP transformer with separated core can solve this problem in a simple manner in the following way:

- It is a simple application, as the current circuit to be measured must not be interrupted. The separate measuring core of the transformer enables it to be subsequently moulded at any time. This constructive design enables the transformer to be applied universally.
- Its shape and the generous dimensions of the through channel facilitate the insertion of large cables and bars.
- It is fully isolated with self-extinguishing ABS casing UL94 V-O. Its secondary connections can be capped with a bridge facility, thereby protecting the current transformer when the secondary circuits is open.

There are 5 different dimensions and current strengths from 100A to 5000A and with the outputs .../5A, ...1A , and ...A/1.5 V. Other outputs in voltage and current may be obtained on request.

Split Core Series

	Ratio	Burden (VA)			Dimension of case unit (mm)									Weight (Kg)
		Class 0.5	Class 1.0	Class 3.0	a	b	c	d	e	f	g	h	i	
TP 23	100/5A	-	-	1.5	20	30	51	89	110	34	47	40	32	0.75
	150/5A	-	-	2										
	200/5A	-	1.5	2.5										
	250/5A	-	2	4										
	300/5A	1.5	4	6										
	400/5A	2.5	6	10										
TP 58	250/5A	1	2	4	50	80	78	114	145	32	32	32	33	0.90
	300/5A	1.5	3	6										
	400/5A	1.5	3	10										
	500/5A	2.5	5	15										
	600/5A	2.5	5	17.5										
	700/5A	3	6	18										
	800/5A	3	7	18										
	1000/5A	5	10	20										
TP 88	250/5A	1	2	4	80	80	108	144	145	32	32	32	33	1.00
	300/5A	1.5	3	6										
	400/5A	1.5	3	10										
	500/5A	2.5	5	15										
	600/5A	2.5	5	17.5										
	750/5A	3	6	18										
	800/5A	3	7	18										
	1000/5A	5	10	20										
TP 812	500/5A	-	4	12	80	120	108	144	185	32	32	32	33	1.20
	600/5A	-	5	14										
	750/5A	3	6	17										
	800/5A	3	7	18										
	1000/5A	5	9	20										
	1200/5A	6	11	24										
	1250/5A	7	15	28										
	1500/5A	8	17	30										
TP 816	1000/5A	10	15	20	80	160	120	184	245	52	47	52	38	3.50
	1500/5A	15	20	25										
	2000/5A	15	20	25										
	2500/5A	15	20	25										
	3000/5A	20	25	30										
	4000/5A	20	25	30										
	5000/5A	20	25	30										

Subjected to change without prior notice

Ordering Information

NRE - 3Z0 - 3Z0 - 0060 - 1B

B = cw bracket
1 = /1A
B1 = cw bracket & /1A

Type

for tape wound

for encapsulated

1 = SR/PR1	A = SR/PR10	0 = RE01
2 = SR/PR2	C = SR/PR11	1 = RE11
3 = SR/PR3	D = SR/PR12	3 = RE31
4 = SR/PR4	E = SR/PR13	5 = RE51
5 = SR/PR5	F = SR/PR14	6 = RE61
6 = SR/PR6	G = SR/PR15	7 = RE71
7 = SR/PR7	H = SR/PR16	8 = RE81
8 = SR/PR8		
9 = SR/PR9		

Primary ratio

0060 = 60/5A

Burden/Rs for class X secondary resistance

3Z0 = 3VA
5Z0 = 5VA
7Z5 = 7.5VA
010 = 10VA
015 = 15VA
020 = 20VA

Accuracy/Kpv for class X knee point Volt

<i>metering</i>	<i>protection</i>
3Z0 = class 3	S05 = 5P5
1Z0 = class 1	S10 = 5P10
0Z5 = class 0.5	T05 = 10P5
0Z2 = class 0.2	T10 = 10P10
	T20 = 10P20

Application

NRE = metering encapsulated
NRM = metering tape wound
NRP = protection tape wound
NRX = class X



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