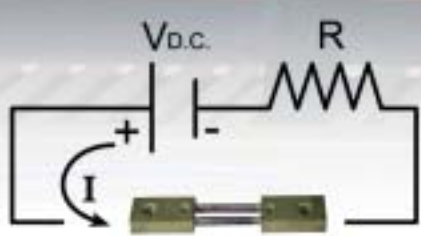
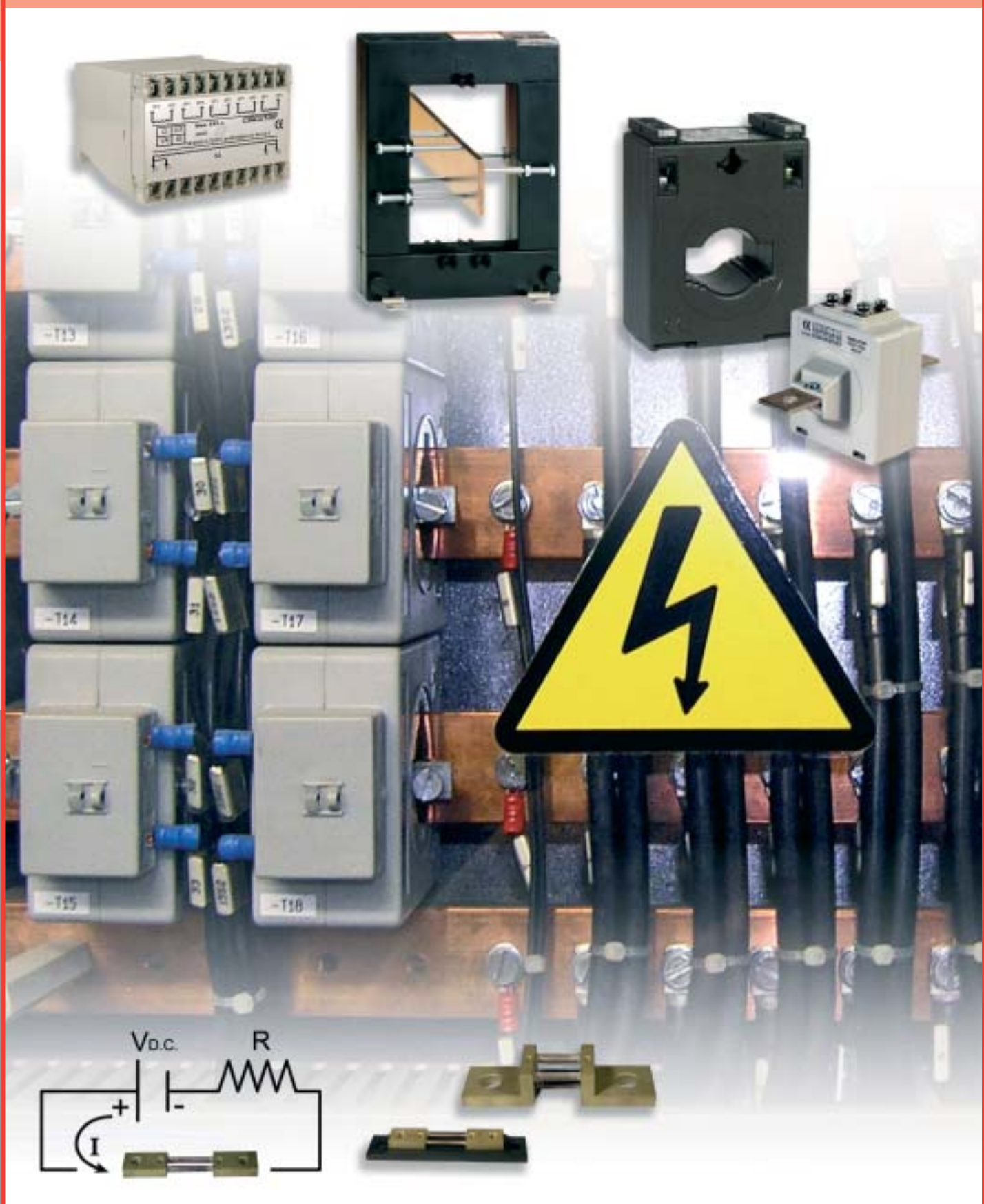


CURRENT TRANSFORMERS AND SHUNTS





CONTENTS

Introduction			Page 3
TC	TC 5 TC 5,2 TC 6,2 TC 6 TC 8 TC 10 TC 12	Slim line current transformers	Page 7
TCH	TCH 6,2 TCH 6 TCH 8 TCH 10 TCH 12	High accuracy, slim line current transformers	Page 8
TA	TA 400 TA 500 TA 600	Current transformers	Page 9
TP	TP 23 TP 58 TP 88 TP 812 TP 816	Shared core current transformers	Page 10
	TM 45 TA 210 TW 25 TW 25m	Primary coil, DIN rail, current transformers	Page 11
TI	TI 420 TP 420 TCM 420 TCB 420	Current transformers with 4...20 mA output	Page 12
TC	TC 420 TC 020	Current transformers with built in converter	Page 13
	TRM TRP TRMC	Current measurement and protection transformers	Page 14
SHUNTS	SHP SHB SH	Shunts	Page 15
TSR	TSR	Adding transformers	Page 15
		Accessories	Page 16
		Dimensions / connections	Page 17

INTRODUCTION



When the use of electric current started, the need for measurement transformers began. In this catalogue we will refer to current transformers.

The services which a transformer must offer are:

- To insulate and to separate circuits and measuring/protection equipment etc in high voltage lines
- To prevent disturbances generated by transmitting high currents
- To reduce short circuit currents to admissible levels in sensitive measurement and protection equipment
- To obtain proportional currents (in a pre-determined range at least) up to which measurements and checks are to be made in order to transmit them to the appropriate equipment

Experience shown through a poor choice or installation of measurement/protection transformers may create situations where the installation does not operate properly as well as personnel and installation safety not being able to be guaranteed during critical periods

SELECTION



For the correct selection of measurement transformer (measurement or protection) the following must be known:

- The application for which it is intended (measurement or protection)
- Features of the operating environment, or conditions of use (indoors or outdoors, maximum operating temperature, etc.)
- The features of the line where it will be installed:
 - Size of cables or flat strip
 - Measurement margins of the measured current (maximum and minimum current)
 - Overload (range and time)
 - System voltage (low, medium or high voltage)
 - Short circuit current
 - System frequency
- Features of the associated instrument or relay (accuracy, nominal current, consumption, etc.)
- Distance between the transformer and the instrument, plus the cable diameter used for connection

THE POWER OF A TRANSFORMER



This is an important magnitude. In the transformer, the primary current has to induce the power required in the secondary to transmit the secondary current to the measurement equipment. Induced power has to be equal to or higher than losses in the line plus consumption of the measurement equipment itself.

Losses in the line, P_L :

This is the power lost through heating up due to the passage of current through the resistance R_L in the cables in the transformer's secondary circuit.

Factors to be taken into account:

- Secondary current. $P_L = R_L \cdot I^2$
- Cable diameter. R_L is inversely proportional to the square of the diameter
- Cable length. R_L is proportional to the length of cabling (there and back)

Power:

The nominal apparent power (V·A) with a specified power factor which the current transformer supplies to the secondary current with the assigned current when it is connected to its nominal load, $S_c(\text{V}\cdot\text{A}) = Z_c \cdot (I_{sn})^2$

According to Standards for apparent power higher than or equal to 5 V·A, the power factor is 0.8 inductive. For lower apparent powers the power factor is considered one.



LOSSES IN A TRANSFORMER

Example:

Suppose a transformer which has an ammeter at 10 m in the secondary. What would be the losses if this was .../5 and what if it was .../1A?

Data:

$$L_{\text{CABLE}} = 2 \cdot l = 2 \cdot 10 = 20 \text{ m}$$

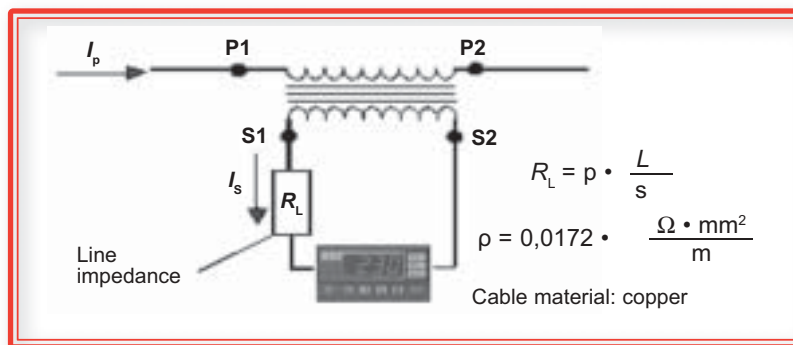
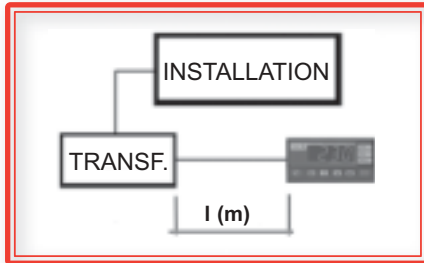
$$S_{\text{CABLE}} = 1 \text{ mm}^2$$

$$R_{\text{LINE}} = 0,0172 \cdot 20 / 1 = 0,35 \Omega$$

$$P_{\text{LINE}} = 0,35 \cdot 5^2 = 8,62 \text{ V}\cdot\text{A}$$

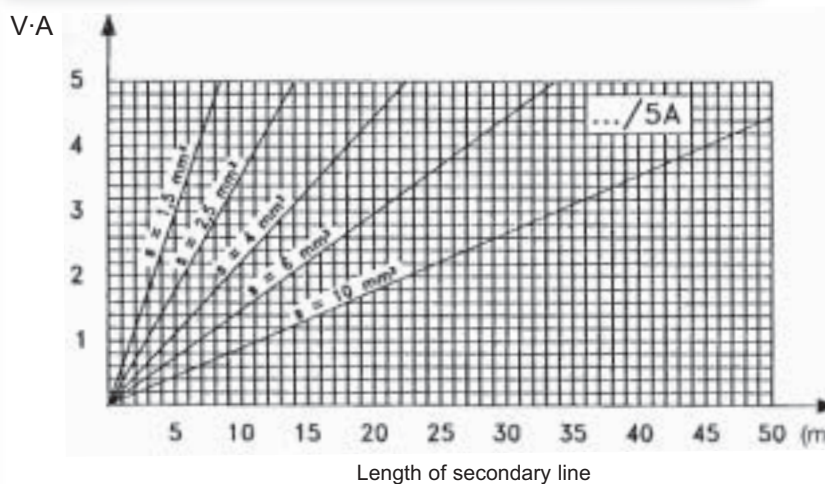
- If it was .../ 1 A

$$P_{\text{LINE}} = 0,35 \cdot 1^2 = 0,35 \text{ V}\cdot\text{A} \text{ (25 times less)}$$



EQUIPMENT	TYPICAL CONSUMPTION
Moving iron instruments	0,3 ... 15 V·A
Moving coil instruments	0,5 V·A
Analogue wattmeters	0,2 ... 2,5 V·A
Maximum Demand Indicators	2,5 ... 5,0 V·A
Digital instruments	0,5 ... 1,0 V·A
Energy meters	1,0 ... 1,5 V·A
Recording instruments	2,0 ... 5,0 V·A

TABLE OF LOSSES IN THE SECONDARY LINE



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

ACCURACY OF A TRANSFORMER



The type of error produced in a transformer is established by I.E.C. 44-1.

In measurement transformers for 25 % and 100 % of nominal power.

In protection transformers only 100 % of nominal power.

ERROR LIMITS. TABLE 1. ACCURACY CLASSES

TYPE	± % 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

ERROR LIMITS. TABLE 2. ACCURACY CLASSES

TYPE	± % 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

ERROR LIMITS. TABLE 3. ACCURACY CLASSES

Accuracy class	± % Error for % I _n	
% I _n	50	120
3	3	3
5	5	5
No phase error		

FOR PROTECTION TRANSFORMERS

TYPE	± % Error for % I _n	Phase difference ± for % I _n		Composite error
		Minutes	Centiradians	
5P	± 1	± 60	± 1,8	5
10P	± 3	---	---	10



THE TRANSFORMER WHEN SATURATED

A current transformer is saturated when its current primary or load are above its nominal values.

The linearity of the current transformation between primary and secondary decreases, so that error increases. The saturation of the transformer is inversely proportional to the load (fig. 6).

The difference between measurement and protection current transformers is its behaviour with the overload which occurs in the primary.

Those used for measurement are saturated when there is an overload in order not to damage the equipment in the secondary Protection transformers are not saturated until there is a high current.

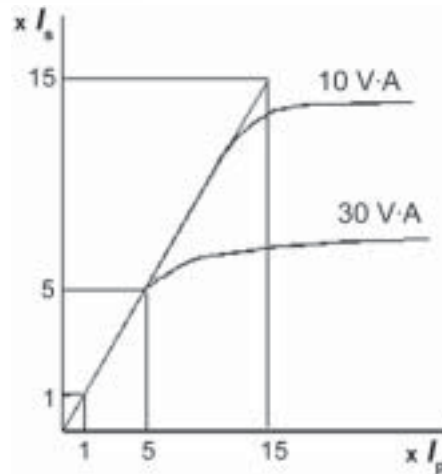
A class 5P15 protection transformer indicates that it has an accuracy error of $\pm 1\%$ and it does not become saturated until 15 times the nominal current passes through the primary.

In measurement transformers, the **SAFETY FACTOR**, F_s parameter indicates how large the primary current can be which the transformer is capable of transferring to measuring equipment.

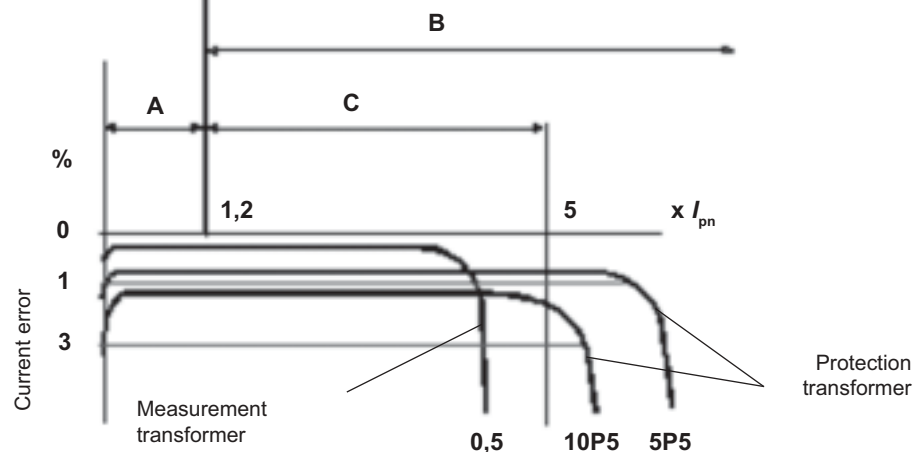


TP

FIG. 6



CLASS CURVES



TC

SLIM LINE current transformers. BERG Series

Type	TC 5	TC 5,2	TC 6,2	TC 6	TC 8	TC 10	TC 12														
Inner Ø	20	22	26	28	44	63	---														
Flat strip	25 x 5	20 x 12 25 x 10 30 x 10	30 x 10	40 x 10	60 x 12	50 x 50 60 x 30 80 x 30	3 x 100 x 10														
a b c	70 58 32	70 58 32	80,5 64 44	80,5 64 44	102 84,5 50	130 108 50	150 129 50														
Mounting	V-A	Class			Class			Class			Class			Class			Class				
		0,5	1	3	0,5	1	3	0,5	1	3	0,5	1	3	0,5	1	3	0,5	1	3		
A																					
40/5	-	-	1,5																		
50/5	-	-	3																		
60/5	-	1,25	3,5																		
75/5	-	2	3,5																		
100/5	1,5	2,5	3,75				1,75	3,75	7,5												
125/5	1,75	3,5	5	-	1,5	2	3,75	7,5	10												
150/5	2,5	3,5	5	1	2	2,5	5	7,5	10	1	3,5	5									
200/5	3,75	5	5	2,5	3	3,5	7,5	10	10	3,5	5	7,5									
250/5	5	7,5	7,5	3,5	3,75	5	7,5	10	15	5	7,5	10									
300/5				3,5	3,75	5	10	10	15	5	7,5	10									
400/5				3,5	5	7,5	10	10	15	5	7,5	10	5	7,5	10						
500/5				5	7,5	10	15	15	20	7,5	10	15	7,5	10	15						
600/5				5	7,5	10	15	20	25	7,5	10	15	10	15	20						
750/5										10	15	20	15	20	25						
800/5										10	15	20	15	20	30						
1 000/5													15	20	30	10	15	20			
1 200/5													15	20	30	10	15	20			
1 500/5													15	20	30	15	20	25	15	20	30
1 600/5													15	20	30	15	20	25	15	20	30
2 000/5																15	20	25	15	20	30
2 500/5																15	20	30	20	30	40
3 000/5																15	20	30	30	40	60
4 000/5																			35	40	60

FEATURES	
Frequency	50 / 60 Hz
Assigned insulating voltage	10 kV
Short-circuit thermal current, I_{th}	$60 I_n$
Dynamic current, I_{dyn}	$2,5 I_{th}$
Higher voltage for the material	0,72 kV a.c.
Thermal class	B (130 °C)
Encapsulated in self-extinguishing plastic	VO
Safety factor	FS 5
Sealed secondary terminals	Yes

CODE TABLE											
A	TC 5	TC 5.2	TC 6.2	TC 6	TC 5.2	TC 6.2	TC 6	TC 8	TC 10	TC 12	
40/5	M70311				400/5	M70327	M70347	M70335	M70361		
50/5	M70312				500/5	M70328	M70348	M70336	M70362		
60/5	M70313				600/5	M70329	M70349	M70337	M70363		
75/5	M70314				750/5			M70338	M70364		
100/5	M70315		M70341		800/5			M70339	M70365		
125/5	M70316	M70322	M70342		1000/5				M70366	M70373	
150/5	M70317	M70323	M70343	M70331	1200/5				M70367	M70374	
200/5	M70318	M70324	M70344	M70332	1500/5				M70368	M70375	M70383
250/5	M70319	M70325	M70345	M70333	1600/5				M70369	M70376	M70384
300/5		M70326	M70346	M70334	2000/5					M70377	M70385
					2500/5					M70378	M70386
					3000/5					M70379	M70387
					4000/5						M70388

ACCESSORIES



DIN rail









Terminals cover

Certificate



TCH

SLIM LINE current transformers. HIGHLY ACCURATE

															
Type	TCH 6.2	TCH 6	TCH 8	TCH 10	TCH 12										
Inner Ø	26	28	44	63	-										
Flat strip	30 x 10	40 x 10	60 x 12	50 x 50 60 x 30 80 x 30	3 x 100 x 10										
	80,5	80,5	102	130	150										
	64	64	84,5	108	129										
	44	44	50	50	50										
V-A	Class			Class			Class			Class					
	0,2S	0,2	0,5S	0,2S	0,2	0,5S	0,2S	0,2	0,5S	0,2S	0,2	0,5S	0,2S	0,2	0,5S
100/5	1	1,5	2,5												
150/5	2,5	3,5	3,5	1	1,25	1,5									
200/5	3,5	5	5	1,25	1,5	2									
250/5	5	5	5	1,5	1,75	2,25									
300/5	5	5	5	1,75	2	2,5									
400/5	7,5	7,5	7,5	1	5	5									
500/5				5	7,5	7,5									
600/5				5	7,5	7,5	5	10	10						
750/5				7,5	10	10	7,5	10	10						
800/5				7,5	10	10	7,5	10	10						
1 000/5							10	15	15	7,5	10	10			
1 200/5							10	15	15	10	10	10			
1 500/5							10	15	15	10	10	15	10	15	15
1 600/5							10	15	15	10	10	15	10	15	15
2 000/5										10	10	15	10	15	15
2 500/5										10	10	15	15	20	20
3 000/5										10	10	15	20	25	25
4 000/5													25	30	30

FEATURES	
Frequency	50...60 Hz
Assigned insulating voltage	10 kV
Short-circuit thermal current, I_{th}	60 I_n
Dynamic current, I_{dyn}	2,5 I_{th}
Higher voltage for the material	0,72 kV a.c.
Thermal class	B (130 °C)
Encapsulated in self-extinguishing plastic	VO
Safety factor	FS 5 / 10
Sealed secondary terminals	Yes

CODE TABLE					
A	TCH 6.2	TCH 6	TCH 8	TCH 10	TCH 12
100/5	M70441				
150/5	M70443	M70431			
200/5	M70444	M70432			
250/5	M70445	M70433			
300/5	M70446	M70434			
400/5	M70447	M70435			
500/5		M70436			
600/5		M70437	M70463		
750/5		M70438	M70464		
800/5		M70439	M70465		
1 000/5			M70466	M70473	
1 200/5			M70467	M70474	
1 500/5			M70468	M70475	M70483
1 600/5			M70469	M70476	M70484
2 000/5				M70477	M70485
2 500/5				M70478	M70486
3 000/5				M70479	M70487
4 000/5					M70488

ACCESSORIES



DIN rail




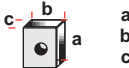


Terminals cover

Certificate

TA400 , TA500 , TA600

Current transformers

									
Type	TA 400	TA 500	TA 600						
Inner Ø	100 x 20	100 x 30	125 x 60						
	165 95 59	185 115 63	196 124 62						
Mounting									
A \ V-A	Class			Class			Class		
	0,5	1	3	0,5	1	3	0,5	1	3
750/5	15	20	30						
800/5	15	20	30						
1 000/5	15	20	30				15	20	30
1 200/5	15	20	30						
1 500/5	15	30	40	15	30	40	15	20	30
2 000/5	20	40	50	20	40	50	15	20	30
2 500/5				20	40	50	20	30	40
3 000/5				20	45	60	30	40	60
4 000/5				35	50	70	35	50	70
5 000/5							40	60	80

FEATURES	
Frequency	50...60 Hz
Assigned insulating voltage	3 kV
Short-circuit thermal current, I_{th}	60 I_n
Dynamic current, I_{dyn}	2,5 I_{th}
Higher voltage for the material	0,72 kV a.c.
Thermal class	105 °C
Encapsulated in self-extinguishing plastic	VO
Safety factor	< 5
Sealed secondary terminals	Yes
Standards	IEC 44-1, UNE 21 088-1, UL 94, VDE 0414

CODE TABLE			
A	TA 400	TA 500	TA 600
750/5	M70594		
800/5	M70595		
1 000/5	M70596		M705B1
1 200/5	M70597		
1 500/5	M70598	M705A4	M705B3
2 000/5	M70599	M705A6	M705B5
2 500/5		M705A7	M705B6
3 000/5		M705A8	M705B7
4 000/5		M705A9	M705B8
5 000/5			M705B9

ACCESSORIES









DIN rail

Certificate



TP

SHARED CORE current transformers

															
Type	TP-23	TP-58	TP-88	TP-812	TP816										
Inner Ø	20 x 30	50 x 80	80 x 80	80 x 120	80 x 160										
	110 89 58	145 114 50	145 144 50	185 144 50	245 184 70										
Mounting															
A \ V-A	Class			Class			Class			Class			Class		
	0,5	1	3	0,5	1	3	0,5	1	3	0,5	1	3	0,5	1	3
100/5	-	-	1,5												
150/5	-	-	2												
200/5	-	1,5	2,5												
250/5	-	2	4	1	2	4	1	2	4						
300/5	1,5	4	6	1,5	3	6	1,5	3	6						
400/5	2,5	6	10	1,5	3	10	1,5	3	10						
500/5				2,5	5	15	2,5	5	15	-	4	12			
600/5				2,5	5	17,5	2,5	5	17,5	-	5	14			
750/5				3	6	18	3	6	18	2,5	6	17			
800/5				3	7	18	3	7	18	3	7	18			
1 000/5				5	10	20	5	10	20	5	9	20	10	15	20
1 200/5										6	11	24			
1 250/5										7	15	28			
1 500/5										8	17	30	15	20	25
2 000/5													15	20	25
2 500/5													15	20	25
3 000/5													20	25	30
4 000/5													20	25	30
5 000/5													20	25	30

FEATURES

Assigned insulation level	3 kV
Assigned short-circuit thermal current (I_{th})	60 I_n
Assigned dynamic current (I_{dyn})	2,5 I_{th}
Higher voltage for the material (U_m)	0,72 kV a.c.
Thermal class	A (105 °C)
Response in frequencies	Lineal 50...60 Hz
Transformation ratio, accuracy power and accuracy class	According to type (.../5 A or .../1 A)
Use	Inner
Casing	Self extinguishing (UL94V0)
Terminal box for the secondary	Lockable
Dimensions and weight	According to type
Standards	IEC 44-1, UNE 21 088-1, UL 94, VDE 0414

CODE TABLE

A	TP-23	TP-58	TP-88	TP-812	TP-816
100/5	M70111				
150/5	M70112				
200/5	M70113				
250/5	M70114	M70121	M70131		
300/5	M70115	M70122	M70132		
400/5	M70116	M70123	M70133		
500/5		M70124	M70134	M70141	
600/5		M70125	M70135	M70142	
750/5		M70126	M70136	M70143	
800/5		M70127	M70137	M70144	
1 000/5		M70128	M70138	M70145	M70151
1 200/5				M70146	
1 250/5				M70147	
1 500/5				M70148	M70152
2 000/5					M70153
2 500/5					M70154
3 000/5					M70155
4 000/5					M70156
5 000/5					M70157


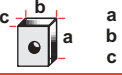
ACCESSORIES




Certificate

TET114 (TP58)
TET144 (TP88,812)

TM 45 , TA 210 , TW 25 , TW 25M

									
Type	TM 45	TA 210	TW 25						
Inner Ø	Primary winding -	Primary winding -	Bushing bar 25						
	85	104.5	85						
	52,5	75	70						
	70	134	70						
Mounting									
A \ V-A	Class			Class			Class		
	0,5	1	3	0,5	1	3	0,5	1	3
5/5	2,5	5	7	15	20	30			
10/5	2,5	5	7	15	20	30			
15/5	2,5	5	7	15	20	30			
20/5	2,5	5	7	15	20	30			
25/5	2,5	5	7	15	20	30			
30/5	2,5	5	7	15	20	30			
40/5	2,5	5	7	15	20	30			
100/5							-	1,5	3
125/5							-	2	4
150/5							-	3	5
200/5							3	5	8
250/5							4	9	11
300/5							6	11	13

Measurement transformers

			
Type	TW 25 M*		
Inner Ø	Bushing bar 25		
a	85		
b	70		
c	70		
Mounting			
A \ V-A	Class		
	0,5	1	3
100/5	-	1,5	3
125/5	-	2	4
150/5	-	3	5
200/5	3	5	8
250/5	4	9	11
300/5	6	11	13

* MULTI-RATIO TRANSFORMER:

Groups 6 currents into one single transformer, selecting a ratio according to the secondary terminal connection.

FEATURES

	TM 45	TA 210	TW 25	TW 25 M
Frequency	50...60 Hz			
Isolating voltage	3 kV			
Short-circuit thermal current, I_{th}	60 I_n			
Dynamic current, I_{dyn}	2,5 I_{th}			
Higher voltage for the material	0,72 kV			
Thermal class	A (105 °C)			
Encapsulated in self-extinguishing plastic	VO			
Safety factor	< 5			
Sealed secondary terminals	Yes			
Standards	IEC 44-1, UNE 21 088-1, UL 94, VDE 0414			

CODE TABLE

A	TM 45	TA 210	TW 25	TW 25 M
5/5	M70601	M70541		
10/5	M70602	M70542		
15/5	M70603	M70543		
20/5	M70604	M70544		
25/5	M70605	M70545		
30/5	M70606	M70546		
40/5	M70607	M70547		
50/5	M70608	M70548		
60/5		M70549		
75/5		M7054A		
100/5		M7054B	M70611	M70621
125/5		M7054C	M70612	
150/5		M7054D	M70613	
200/5		M7054E	M70614	
250/5		M7054F	M70615	
300/5		M7054G	M70616	
400/5		M7054H		

ACCESSORIES

Certificate



TI-420 , TP-420 , TCM-420 , TCB-420

Current transformers WITH 4 ... 20 mA OUTPUT

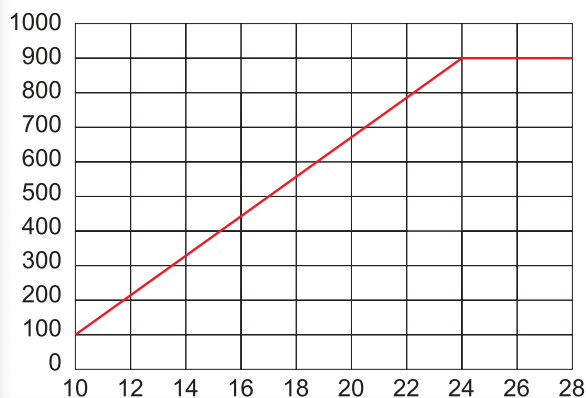
Type	TI-420			TP-420					TCM-420		TCB-420		
	35	70	105	23	58	88	812	816	25	35	35	70	105
Inner Ø	35	70	105	20 x 30	50 x 80	80 x 80	80 x 120	80 x 160	25	35	35	70	105
	79	110	146	110	145	145	185	245	87	87	79	110	146
	100	130	170	89	114	144	144	184	70	105	166	196	236
	33	33	33	58	50	50	50	70	70	70	33	33	33
Mounting													
A	TI-420			TP-420					TCM-420		TCB-420		
	35	70	105	23	58	88	812	816	25	35	35	70	105
2,5	M70811								M71041			M71011	
5	M70812			M70211					M71042			M71012	
10	M70813			M70212					M71043	M71051	M71013		
20	M70814			M70213					M71044	M71052	M71014		
50	M70815			M70214					M71045	M71053	M71015		
100	M70816	M70821		M70215	M70221	M70231			M71046	M71054	M71016	M71021	
200				M70216					M71047	M71055			
250	M70817	M70822	M70831	M70217	M70222	M70232	M70241				M71017	M71022	M71031
300										M71056			
500		M70823	M70832	M70218	M70223	M70233	M70242	M70251				M71023	M71032
750		M70824	M70833		M70224	M70234	M70243	M70252				M71024	M71033
1 000			M70834			M70235	M70244	M70253					M71034
1 500			M70835			M70236	M70245	M70254					M71035
2 000								M70255					
3 000								M70256					
4 000								M70257					

FEATURES

	TI-420	TP-420	TCM-420	TCB-420
Operating Conditions				
Class interval	0 °C / +50 °C			
Operating temperature	-10 °C / +50 °C			
Higher voltage for the material (U_m)	0,72 kV c.a.			

	TI-420	TP-420	TCM-420	TCB-420
Measurement circuit				
Primary current	According to type			
Response in lineal frequency	50...60 Hz			
Secondary current	4...20 mA d.c.			
Accuracy (between 5...110 % I_n)	$\pm 1,5 I_n$ reading			
Overloads (at ambient temperature)	$1,5 I_n$ permanently			
Standards	IEC 44-1, UNE 21 088-1, IEC 664, VDE0110, VDE0414, UL 94, IEC 1010-1, EN 61010-1			

MAXIMUM LOAD RESISTANCE






ACCESSORIES

FA-420
M79911



TC 420 / TC 020

Current transformers WITH BUILT IN CONVERTER

						
Type	TC 420			TC 020		
	TC 5 420	TC 6 420	TC 8 420	TC 5 020A	TC 6 020A	TC 8 020A
Inner Ø	20	28	44	20	28	44
BAR mm	25 x 5	40 x 10	60 x 12	25 x 5	40 x 10	60 x 12
	b	70	80,5	102	70	80,5
	a	58	64	84,5	58	64
	b	32	44	50	32	44
	c					
Mounting						
A	TC 420			TC 020		
	TC 5 420	TC 6 420	TC 8 420	TC 5 020A	TC 6 020A	TC 8 020A
5	M72112			M72012		
10	M72113			M72013		
20	M72114			M72014		
50		M72131			M72031	
100		M72132			M72032	
200		M72134			M72034	
300		M72136			M72036	
500			M72151			M72051
1 000			M72152			M72052
1 500			M72153			M72053

FEATURES

	TC 420	TC 020
Frequency	50...60 Hz	
Assigned insulating voltage	3 kV	
Short-circuit thermal current, I_{th}	60 I_n	
Dynamic current, I_{dyn}	2,5 I_{th}	
Higher voltage for the material	0,72 kV	
Thermal class	B (130 °C)	
Encapsulated in self-extinguishing plastic	VO	
Safety factor	< 5	
Sealed secondary terminals	Si	
Response time	< 300ms	
Accuracy class	± 1,5%	
Standards	IEC 44-1, B5 2627	

ACCESSORIES



DIN rail



Terminals cover

SHUNTS



CIRCUTOR has a wide range of Shunts up to 15 000 A for continuous current measurement in voltage drops of standard 60 mV (also 50, 100, 150, 200, 300, 600 mV, on request) which comply with the main industrial standards.

Type		SH	Type		SH	Type		SHP	SHB
Ratio	A		Ratio	A		Ratio	A		
30 A / 60 mV	30	M71231	1 000 A / 60 mV	1 000	M7123G	1 A / 60 mV	1		M71221
40 A / 60 mV	40	M71232	1 200 A / 60 mV	1 200	M7123H	1,5 A / 60 mV	1,5		M71222
50 A / 60 mV	50	M71233	1 500 A / 60 mV	1 500	M7123J	2,5 A / 60 mV	2,5		M71223
60 A / 60 mV	60	M71234	2 000 A / 60 mV	2 000	M7123K	4 A / 60 mV	4		M71224
80 A / 60 mV	80	M71235	2 500 A / 60 mV	2 500	M7123L	5 A / 60 mV	5		M71225
100 A / 60 mV	100	M71236	3 000 A / 60 mV	3 000	M7123M	6 A / 60 mV	6		M71226
150 A / 60 mV	150	M71237	4 000 A / 60 mV	4 000	M7123N	10 A / 60 mV	10		M71227
200 A / 60 mV	200	M71238	5 000 A / 60 mV	5 000	M7123P	15 A / 60 mV	15		M71228
250 A / 60 mV	250	M71239	6 000 A / 60 mV	6 000	M7123Q	25 A / 60 mV	25		M71229
300 A / 60 mV	300	M7123A	7 500 A / 60 mV	7 500	M7123R	30 A / 60 mV	30	M71211	M7122A
400 A / 60 mV	400	M7123B	8 000 A / 60 mV	8 000	M7123S	40 A / 60 mV	40	M71212	M7122B
500 A / 60 mV	500	M7123C	10 000 A / 60 mV	10 000	M7123T	50 A / 60 mV	50	M71213	M7122C
600 A / 60 mV	600	M7123D	12 500 A / 60 mV	12 500	M7123U	60 A / 60 mV	60	M71214	M7122D
750 A / 60 mV	750	M7123E	15 000 A / 60 mV	15 000	M7123V	75 A / 60 mV	75	M71215	
800 A / 60 mV	800	M7123F				80 A / 60 mV	80		M7122E
						100 A / 60 mV	100	M71216	M7122F
						150 A / 60 mV	150	M71217	

TSR



Having to add currents in different lines to get a common measurement is frequent in electrical installations. Adding current transformers offer an easy solution to this problem; they have different $I_n / 5 A$ inputs and one single 5 A output which is equal to the sum of these inputs (see Fig. 2)

The output current on the adding transformer is obtained from the following calculation:

$$I_{\text{OUTPUT}} = \frac{I_1 + I_2 + \dots + I_n}{n}$$

where n is the number of inputs on the totaliser and I_1, I_2, \dots, I_n are the currents for each input.

So that they can add currents from several transformers and the output is proportional to the same, it is necessary that the transformer ratio is the same. On request, adding transformers may be supplied for inputs which do not have the same ratio.

Number of inputs	Power and accuracy	Type	Code
2 x 5 A	15 V·A / Class 0,5	TSR-2	M70701
3 x 5 A	15 V·A / Class 0,5	TSR-3	M70702
4 x 5 A	15 V·A / Class 0,5	TSR-4	M70703
5 x 5 A	15 V·A / Class 0,5	TSR-5	M70704



ACCESSORIES

TERMINAL COVER



Accessory to seal the terminals on the TC type transformer secondary

Code: M79951

PA-TC / WG



Accessory to assemble the TC5, TC5.2, T6, TC6.2 transformer on a DIN rail

Code: P19921

FA-420



The FA-420 module is a 15 V d.c. power source, supplying a 230 V a.c. system.

Code: M79911

TET 114 / TET 144



TP bad weather protector

For TP 58 -

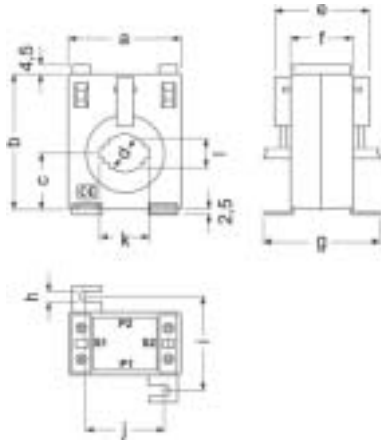
TET 114 Code: M79972

For TP 88 and TP 812 -

TET 144 Code: M79973

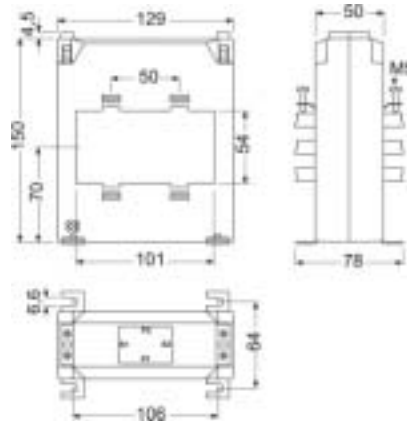
DIMENSIONS

TC 5 / TC 5.2 / TC 6.2 / TC 6 / TC 8 / TC 10 / TCH 5 / TCH 5.2 / TCH 6.2 / TCH 6 / TCH 8 / TCH 10

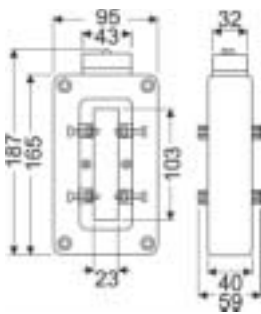


sizes in mm	TC 5 TCH 5	TC 5.2 TCH 5.2	TC 6.2 TCH 6.2	TC 6 TCH 6	TC 8 TCH 8	TC 10 TCH 10
a	58	58	64	64	84,5	108
b	70	70	80,5	80,5	102	130
c	29	29	34	34	46	61
d	20,3	22	26	28,5	44	63
e	45	45	60,5	66,5	69	---
f	32	32	44	44	50	50
g	59	59	71	71,2	78	78
h	5,6	5,6	5,6	5,6	6,6	6,6
i	48	48	60	60	64	64
j	39	39	46	46	62	86
k	25,6	30,6	20,6	40,6	60,6	80,6
l	15,6	15,6	30,6	25,2	30,6	50,8

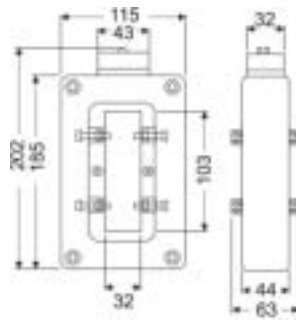
TC 12 / TCH 12



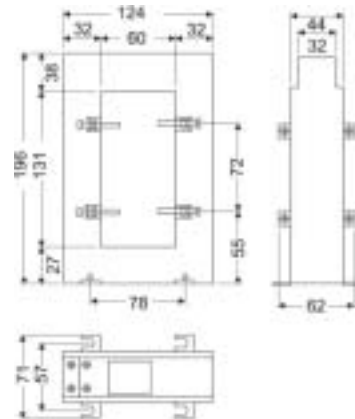
TA 400



TA 500

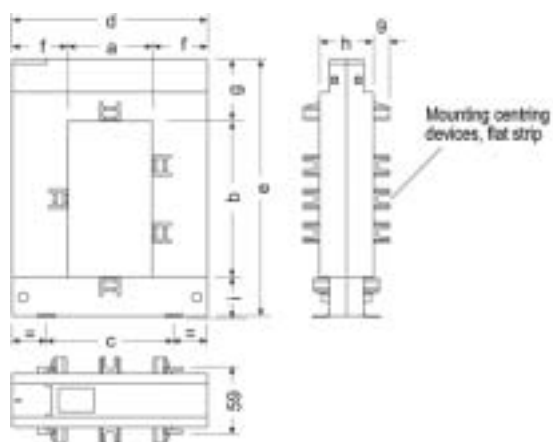


TA 600





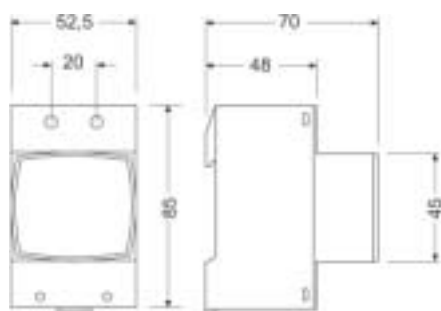
TP 23 / TP 58 / TP 88 / TP 812 / TP 816



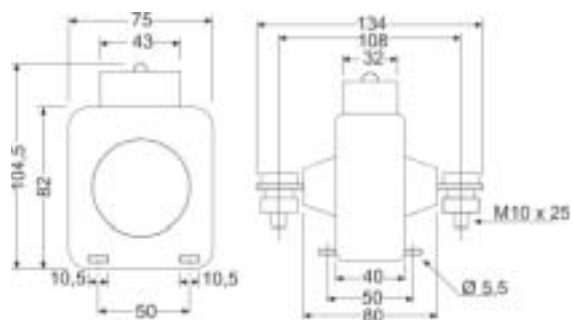
sizes in mm	TP-23	TP-58	TP-88	TP-812	TP-816
a	20	50	80	80	80
b	30	80	80	120	160
c	51	78	108	108	120
d	89	114	144	144	184
e	110	145	145	185	245
f	34	32	32	32	52
g	47	32	32	32	47
h	40	32	32	32	52
i	32	32	32	32	38

Note: All types have mounting centring devices except the TP-23

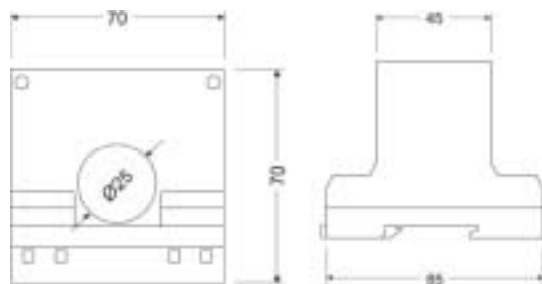
TM 45



TA 210

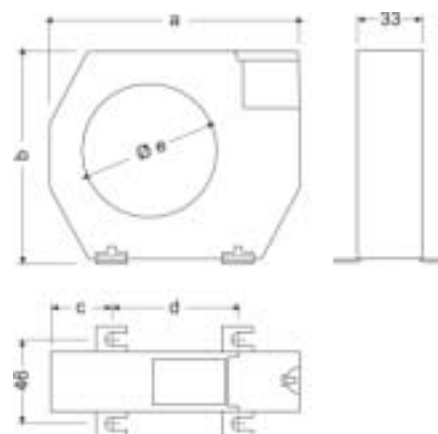


TW 25 / TW 25M

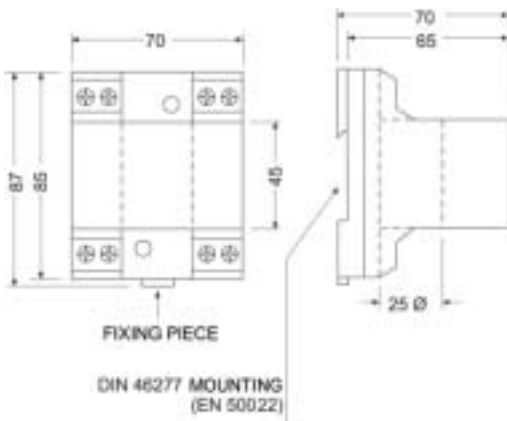


TI 420

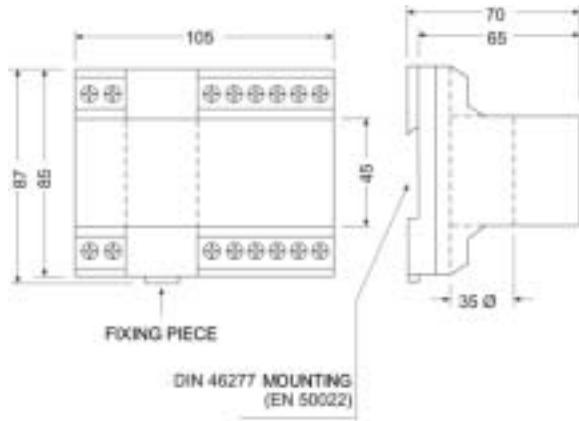
sizes in mm	TI-420-35	TI-420-70	TI-420-105
a	100	130	170
b	79	110	146
c	26	32	38
d	48,5	66	94
e	35	70	105



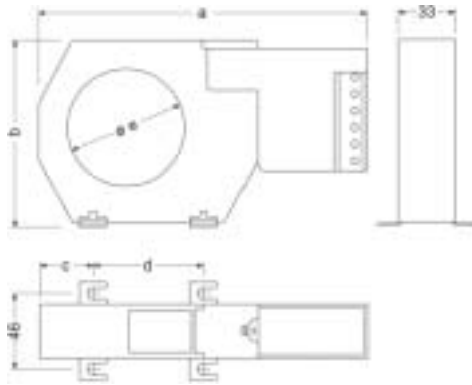
TCM-420-25



TCM-420-35

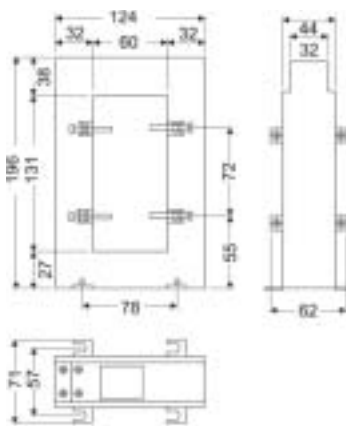


TCB-420

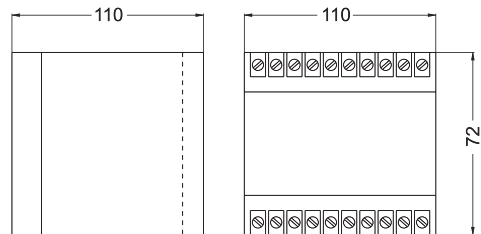


sizes in mm	TCB-420-35	TCB-420-70	TCB-420-105
a	166	196	236
b	79	110	146
c	26	32	38
d	48,5	66	94
e	35	70	105

TP 420

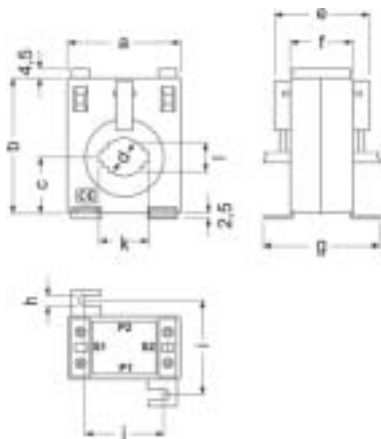


TSR





TC-020 / TC-420



sizes in mm	TC 5 TCH 5	TC 6 TCH 6	TC 8 TCH 8
a	58	64	84,5
b	70	80,5	102
c	29	34	46
d	20,3	28,5	44
e	45	66,5	69
f	32	44	50
g	59	71,2	78
h	5,6	5,6	6,6
i	48	60	64
j	39	46	62
k	25,6	40,6	60,6
l	15,6	25,2	30,6

SHP / SHB / SH

Voltage drop mV ₍₁₎	Scope A ₍₁₎	Fig.	a1	a2	b1	b2	b3	c1	c2	e	h	Weight kg	No. of current splices	Current splices			Voltage splices		
														Hexagonal screw DIN 933	Washer DIN 125	Nut DIN 934			
60	1-1, 5-2, 5-4-6-10-15-25	1	90	28	20	-	-	8	-	78	-	0,15	2 x 1	M5 x 12	5,3	-	2 M5 x 8 DIN 84 screws and 2 x 5,3 DIN 433 washers		
	30-40-60-100-150		100	33	20	-	-	8	-	80	-	0,13	2 x 1	M8 x 16	8,4	-			
	250	2	145	55	30	15	-	10	10	105	30	0,54	2 x 1	M12 x 40	13	M12			
	400-600				40	20						0,78	2 x 1	M16 x 45	17	M16			
	1 000				60	30	-	10	10	115	30	1,49	2 x 1	M20 x 50	21	M20			
	1 500				90	21	48	10	10	115	30	1,95	2 x 2	M16 x 45	17	M16			
2 500	120	30	60	10	10	115	30	3	2 x 2	M20 x 50	21	M20							
150	1-1, 5-2, 5-4-6-10-15-25	1	90	25	20	-	-	8	-	78	-	0,18	2 x 1	M5 x 12	5,3	-	2 M5 x 8 DIN 84 screws and 2 x 5,3 DIN 433 washers		
	40-60-100-150		225	33	25	-	-	8	-	205	-	1,14	2 x 1	M8 x 16	8,4	-			
	250	2	270	55	30	15	-	10	10	230	50	0,80	2 x 1	M12 x 40	13	M12			
	400-600				40	20						1,38	2 x 1	M16 x 45	17	M16			
	1 000				290	65	70	35	-	10	10	240	60	2,55	2 x 1	M20 x 50		21	M20

All shunts are supplied with connection cables, 1.5 m long and 1.5 mm Ø diameter.

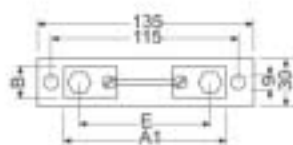
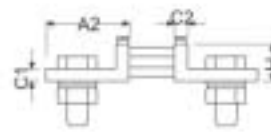
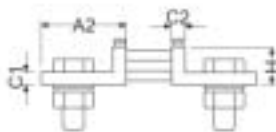
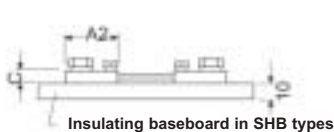


fig 1: from 1 to 150 A

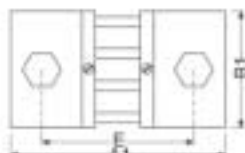


fig 2: from 200 to 1 000 A

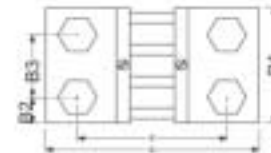


fig 3: from 1 500 to 2 500 A



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