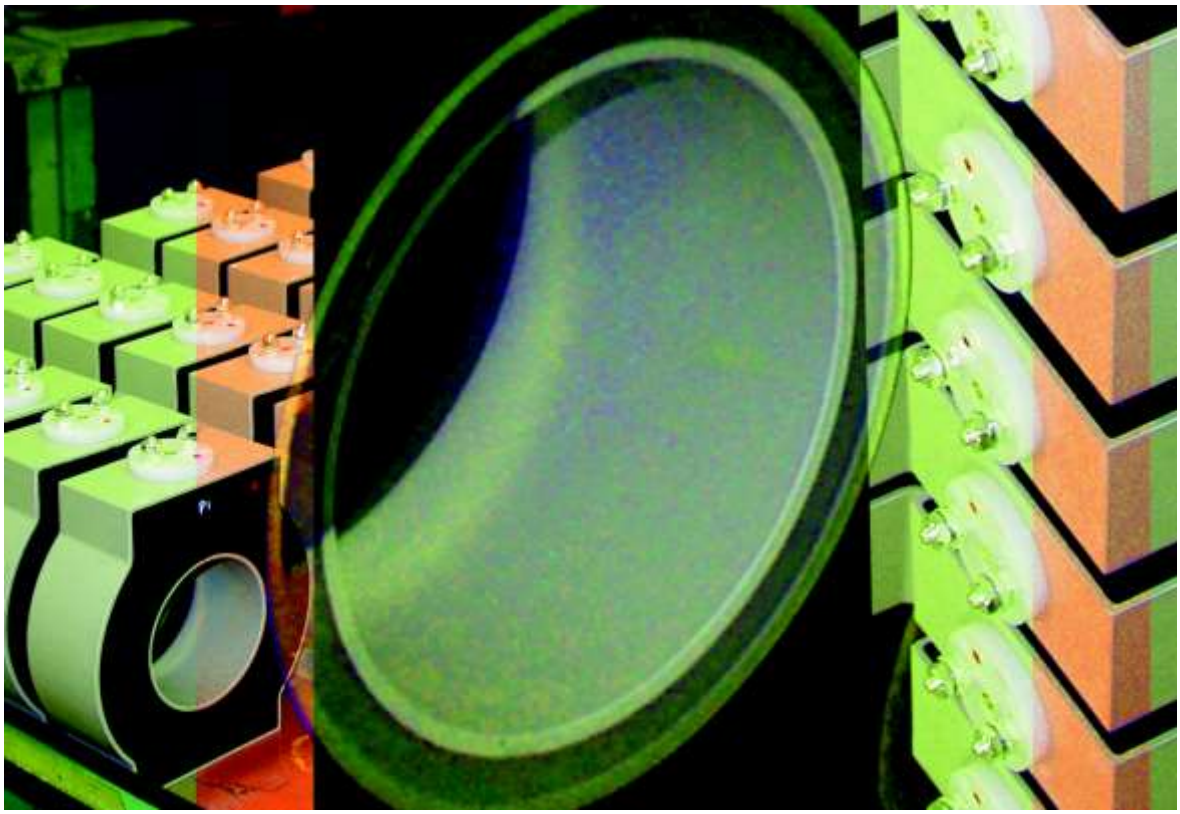
Section A Measure

Current Transformers



A1 Current Transformers

WF Energy Controls is Australia's leading manufacturer of all types of current transformers for measurement, metering, protection, summation and interposing. An extensive range of CTs is available ex-stock and, with over 3000 current transformers designs, WF Energy Controls can manufacture Current Transformers for most applications.

For the Australian market, the Australian Standard is AS 60044.1: Instrument Transformers – Part 1: Current Transformers, for all current transformers.

WF Energy Controls current transformers are manufactured in our factory at Sydney, NSW using high quality materials and processes. All raw materials are subject to incoming batch inspection and assembled according to quality processes developed over many years to ensure defect free products.

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Every transformer manufactured is tested according to its class. For metering CTs, accuracy is paramount. To ensure each and every metering CT complies with class requirements they are tested in our laboratory, and issued with a certificate of compliance. Our laboratory is certified to AS ISO/IEC 17025 – 2005 and accredited by the National Association of Testing Authorities (NATA).

Metering Current Transformers

Metering current transformers fall into two categories – the popular extended range type and the traditional multi-ratio type. WF Energy Controls manufactures both types to order ranging from 200A to 3000A. Extended range current transformers are accurate to nominally twice their nameplate current – i.e. a 200A CT is accurate to 400A. This allows load growth without the need to replace the CT with one of a higher rating – or in the case of multi-ratio types, change taps, thus saving shutdown time and money.

WF Energy Controls is the industry leader in class accuracy metering types used in commercial and industrial metering applications throughout Australia. We manufacture to meet the requirements of the Electricity Distribution Businesses throughout Australia.

Given our high standard of manufacture and testing, WF Energy Controls has been appointed by the National Association of Testing Authorities (NATA), Australia as a verifying authority for metering current transformers.

Quality, accuracy and verification ensures that our metering current transformers are approved by the Australian Energy Market Operator (AEMO) for use in the National Electricity Market (NEM). Retailers throughout Australia can be confident that they are meeting the Rules when they choose WF Energy Controls metering current transformers to install in the contestable marketplace.

Protection Current Transformers

Protection CTs are manufactured for use in such applications as Earth Fault, Inverse Time Over Current, Definite Time Over Current, Distance Measuring, Biased Differential and Feeder Pilot Wire Protection schemes. Class P, PL and PX are manufactured dependant on the degree of accuracy required.

Summation & Interposing Current Transformers

Manufactured to AS60044.1 these 0.72kV 50/60Hz summation CTs are designed to accommodate identical feeder CT inputs, however special designs are available for non-identical feeders and/or multiple – up to 30 feeder inputs.

Interposing CTs are wound primary CTs used to isolate an instrument or relay from a main CT secondary, or to enable an instrument or relay of different current rating to that of the main CT secondary to be used – eg 5A CT secondary to 1A instrument input.

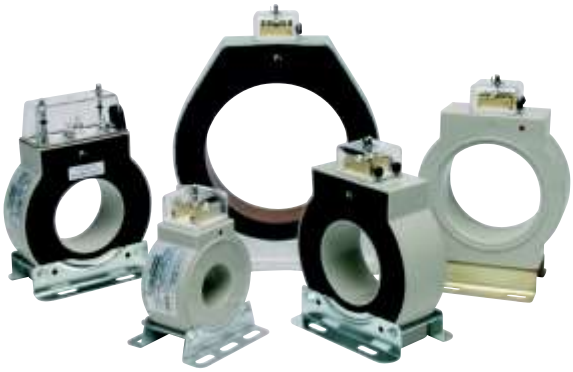
Measurement Current Transformers

A complete range of our series 27 measurement CTs are manufactured at our Sydney factory. Manufactured to AS60044.1, with hole diameters from 32mm to 112mm and ratings from 20A to 3000A to suit most applications, these CTs represent good value for many applications from panel metering to energy management input. They can be mounted using the feet provided or complete with busbar kits, they can be busbar mounted.

Complimenting this series WF Energy Controls has a a series 25 range of epoxy encapsulated measurement CTs for challenging environmental conditions, and a series 29 range of Split Core CTs ideal for existing installations where downtime or cost does not permit dismantling bars or cables to fit conventional CTs.

Metering – extended range

Series 24



Designed to AS600441 and manufactured industry standards, these extended range current transformers have been designed to match the load range capacity of long range kWh meters. Extended range CTs provide accuracy of measurement to 2 times their rated current in compliance with their class requirements.

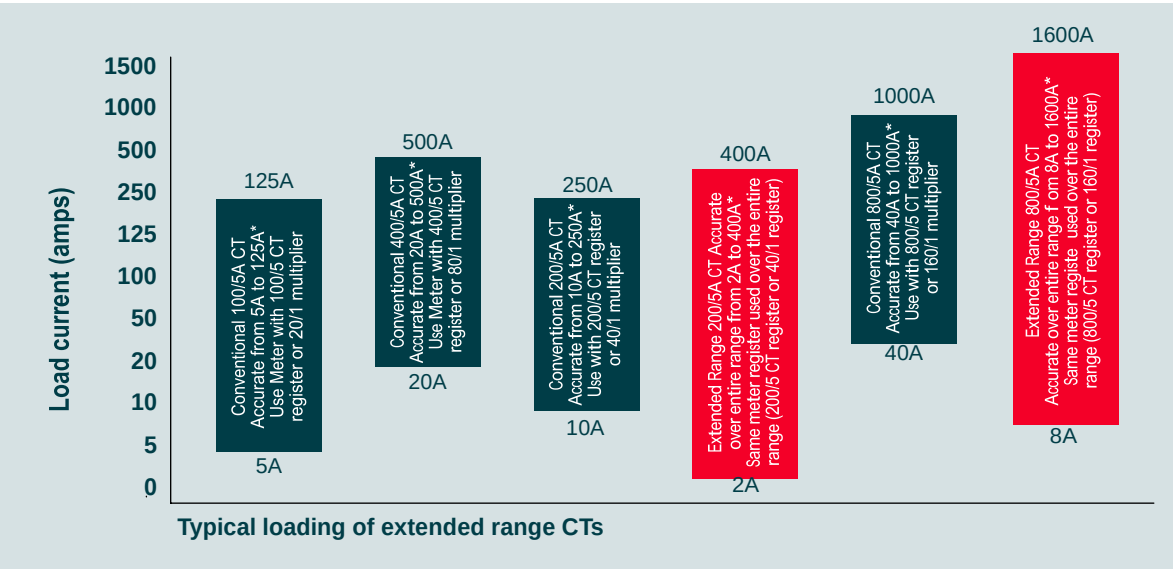
Class accuracy to 0.5S is assured through our testing and certification of each CT that passes through our NATA accredited laboratory.

Extended range CTs have proved effective over many years, providing accuracy over a wide range where multitap CTs (which require ratio change on load increase) were traditionally used.

Material & Construction

Encapsulation	Epoxy Resin
Outer Case	Fibreglass filled Epoxy Resin or PVC
Terminal Cover	Clear Polycarbonate
Sealing Screws	Brass, Nickel plated
Terminals	6mm Brass, Silver plated with silver plated nuts and stainless steel spring washers, or brass tunnel type
Mounting Brackets	Anodised Aluminium or Zinc plated steel

A graphical comparison, showing ranges of accuracy of:
a) Conventional CTs, and
b) WF Energy Controls Extended Range CTs



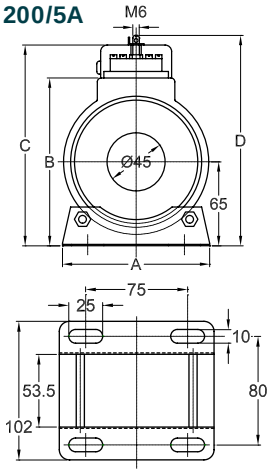
Typical loading of extended range CTs

* The word 'accurate' is used in the above diagram to denote:
"Accurate within the limits of currrent and phase error specified by the Australian Standards for current transformers"

Metering – extended range

Series 24

200/5A



Form	Catalogue	Ratio	Terminal Arrangement	Output Burden (VA)	Range of Loading from	Range of Loading to
AS60044.1 Class 0.5S - Compensated						
S45	240S45CL05S/5	200/5	Tunnel Terminals	5	2A	400A
S45	240S45CL05S/ST	200/5	Stud Terminals	5	2A	400A
AS60044.1 Class 0.5S - Non-compensated						
S45NC	240S45CL05S/NC	200/5	Tunnel Terminals	5	2A	400A
S45NC	240S45CL05S/NCST	200/5	Stud Terminals	5	2A	400A

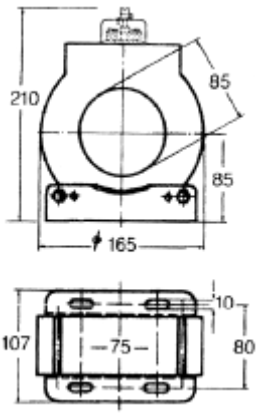
Form	Dimensions			
	A	B	C	D
S45C	114	130	155.5	163
S45NC	129	138	160	1 65.1

Note: For Stud Terminals

Form	Dimensions			
	A	B	C	D
S45C	114	130	160	169
S45NC	129	138	163.5	177

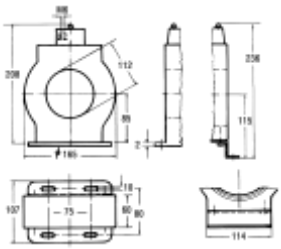
Note: For Tunnel Terminal

800/5A



Form	Catalogue	Ratio	Terminal Arrangement	Output Burden (VA)	Range of Loading from	Range of Loading to
AS60044.1 Class 0.5S						
T	240T85CL05S/ST	800/5	Stud Terminals	15	8A	1600A
T	240T85CL05S/5	800/5	Tunnel Terminal	15	8A	1600A

1500/5A



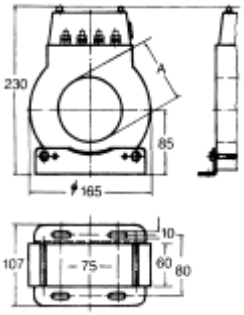
Form	Catalogue	Ratio	Terminal Arrangement	Output Burden (VA)	Range of Loading from	Range of Loading to
AS60044.1 Class 0.5S						
W	24W112CL05S/ST	1500/5	Stud Terminal	15	15A	3000A
W	24W112CL05S/5	1500/5	Tunnel Terminal	15	15A	3000A

Options

Low or High Brackets

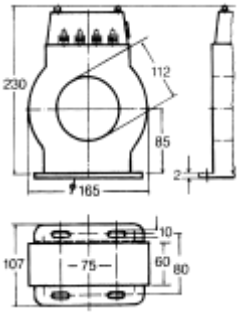
Metering – multi-ratio

Series 24



Form	Catalogue	Ratio	Class	Output Burden (VA)	Mtg.
AS60044.1 Class 0.5					
B70	240B70CL05S/5	400/800/1200/5	0.5	15/15/15	Std.
B85	240B85CL05S/5	400/800/1200/5	0.5	10/15/15	Std.

ØA	Form	Dia.
	A	60mm
	B70	70mm
	B85	85mm



Form	Catalogue	Ratio	Class	Output Burden (VA)	Mtg.
AS60044.1 Class 0.5					
C	24C112CL05S/L	1000/2000/3000/5	0.5	15/15/15	Low Brkt.
C	24C112123H/5	1000/2000/3000/5	0.5	15/15/15	High Brkt.

Test Terminal Blocks offer easy access for testing of KwH Meters, relays and other instruments without disconnecting the load. The Test Blocks form an integral part of the metering solution. For 3 phase, 4 wire application these units are complete with both current and voltage terminals. A transparent polycarbonate cover is provided. Dimensional drawings and wiring diagrams are available.

Catalogue	Description
CT-TB	CT Test Block
CT-TB-ZLINK	CT Test Block with Z links

The fuse assembly is used to protect transformers and distribution systems. . A transparent polycarbonate cover is provided. Dimensional drawings and wiring diagrams are available.

Catalogue	Description
FA-TB	Fuse Assembly

Protection

Series 26

WF Energy Controls manufactures all forms of Protection current transformers at its factory in Sydney, Australia, to the Australian/IEC standard AS60044.1. To assist you with selection we have provided the following overview of 'class' types.

Class P

Class P current transformers are intended for general protection schemes where transient stability is of no importance. The relay manufacturers usually specify the current transformer requirements and these recommendations must be followed when designing a protection system.

Relays that can be used with class P current transformers are Induction disc type, Earth fault protection, Inverse time/over current, and Definite time over current. These types of relay are generally not sensitive to several cycles of distorted current, which could occur under transient fault current conditions, and the effect on the relay response time is negligible.

Typical Designation: 10P60F20 to AS1675-1986

Where: 10 = Rated composite error at accuracy limit current, in percent

- P = Class
- 60 = Rated secondary reference voltage
- F = Letter 'F' for factor
- 20 = Rated accuracy limit factor

Typical Designation: 10P20 15VA to AS60044.1

Where: 10 = Rated composite error at accuracy limit current, in percent

- P = Class
- 20 = Rated accuracy limit factor
- 15 = Rated burden in VA

Class PL or PX

Class PL or PX current transformers are used for more accurate applications, such as distance measuring protection schemes, biased differential and feeder pilot wire protection schemes and other protective cases where performance must be certain under transient conditions.

High impedance differential protection schemes do not always require a class PL or PX current transformer as the secondary excitation current and secondary resistance can be specified.

In those protection schemes where transient performance of the current transformer is important the specified knee-point is transient factor times the knee-point required by the steady state fault current (TF= transient factor = X/R of the system).

Designation: 0.025PL800R5 to AS1675-1986, or 0.025PX800R5 to AS60044.1-2007

Where: 0.025 = Maximum secondary exciting current in amperes at the rated knee-point voltage

- 10P20 15VA to AS600441-2003
- PL or PX = Class
- 800 = Rated knee-point voltage
- R = Letter 'R' for resistance
- 5 = Maximum secondary winding resistance at 75°C or at maximum service temperature, whichever is greater.

General Specification

Insulation Voltage: 0.72kV – epoxy encapsulated. Ratios: Single and multi-ratios 50/5A to 3000/5A. 1A Secondaries available.

Window diameters: 35mm to 203mm.

Delivery Lead Times: 4 weeks, however if you have a standard repetitive requirement, based on a specific relay manufacturers specification, WF Energy Controls will maintain stocks for you.

Form	Window Diameter
35PT	35
60PT	60
70PT	70
85PT	85
112PT	112

All our CTs are manufactured to the highest standards under our AS/NZS ISO 9001:2008 certification and tested in our NATA Accredited Laboratory which operates in accordance with our certification to AS ISO/IEC 17025 - 2005

Technical Support: please call our office and ask for technical advice.

Summation & interposing

Series 28

Manufactured in Australia to AS600441, these 0.72kV, 50/60Hz Summation CTs are designed to accommodate identical feeder CT inputs. Special designs are available for non-identical feeder CTs and/or multiple feeder inputs – up to 30 inputs. Form NS are measurement class whilst Form NT are metering class current transformers.

Interposing CTs are wound primary CTs used to isolate an instrument or relay from a main CT secondary, or to enable an instrument or relay of different current rating to that of the main CT secondary to be used – eg 5A CT secondary to 1A instrument input.

Measurement Class

Form	Catalogue	Ratio	Class	Output Burden (VA)
Summation				
N-1	W-3441	5 + 5/5	1.0	5
N-1	W-3442	5 + 5/5	1.0	15
N-1	W-3443	1 + 1/1	1.0	5
N-1	W-3444	1 + 1/1	1.0	15
Interposing				
N-1	W-3450	1/1	1.0	5
N-1	W-3451	1/1	1.0	15
N-1	W-3452	5/5	1.0	5
N-1	W-3453	5/5	1.0	15
N-1	W-3454	5/1	1.0	5
N-1	W-3455	5/1	1.0	15
N-1	W-3456	1/5	1.0	5
N-1	W-3457	1/5	1.0	15

Metering Class

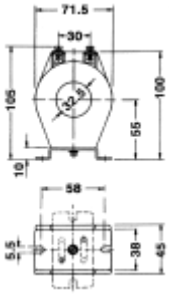
Form	Catalogue	Ratio	Class	Output Burden (VA)
Summation				
N-3	W-3445	5 + 5/5	0.5	5
N-3	W-3440	5 + 5/5	0.5	15
N-3	W-3446	5 + 5 + 5/5	0.5	5
N-3	W-3447	5 + 5 + 5/5	0.5	15
N-3	W-3448	1 + 1/1	0.5	5
N-3	W-3449	1 + 1/1	0.5	15
Interposing				
N-3	W-3458	1/1	0.5	5
N-3	W-3459	1/1	0.5	15
N-3	W-3460	5/5	0.5	5
N-3	W-3461	5/5	0.5	15
N-3	W-3462	5/1	0.5	5
N-3	W-3463	5/1	0.5	15
N-3	W-3464	1/5	0.5	5
N-3	W-3465	1/5	0.5	15

Measurement – through hole

Series 27

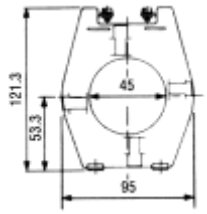
A range of general measurement current transformers, manufactured by WF Energy Controls in Australia, they conform to the class performance requirements of AS600441. With 6 window sizes, current ranges from 20A to 3000A, and with both foot and busbar mounting kits they meet all applications for either bar or cable mounting in switchboards of all types. All popular sizes are stocked. 1A secondary outputs are available on request.

Measurement CT – 20A to 500A – 32mm hole



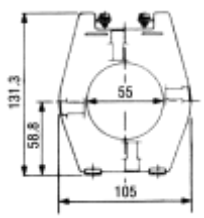
Form Y	Catalogue	Ratio	Inserted Primary Turns	Output Burden (VA) at Class Index 0.5	1	3
32Y	27032Y0020/5	20/5	6			2.5
32Y	27032Y0040/5	40/5	3			2.5
32Y	27032Y0060/5	60/5	2			2.5
32Y	27032Y0100/5	100/5	1			2.5
32Y	27032Y0150/5	150/5	1		2.5	5.0
32Y	27032Y0200/5	200/5	1	1.25	5.0	7.5
32Y	27032Y0250/5	250/5	1	1.25	7.5	10.0
32Y	27032Y0300/5	300/5	1	5.0	10.0	15.0
32Y	27032Y0400/5	400/5	1	10.0	15.0	20.0
32Y	27032Y0500/5	500/5	1	15.0	20.0	25.0

Measurement CT – 20A to 600A – 45mm hole



Form U	Catalogue	Ratio	Inserted Primary Turns	Output Burden (VA) at Class Index 0.5	1	3
45U	27045U0020/5	20/5	6			1.25
45U	27045U0040/5	40/5	3			1.25
45U	27045U0060/5	60/5	2			1.25
45U	27045U0100/5	100/5	1			1.25
45U	27045U0150/5	150/5	1		1.25	3.75
45U	27045U0200/5	200/5	1		2.5	7.5
45U	27045U0250/5	250/5	1		5.0	7.5
45U	27045U0300/5	300/5	1	2.5	7.5	10.0
45U	27045U0400/5	400/5	1	5.0	10.0	15.0
45U	27045U0500/5	500/5	1	10.0	15.0	20.0
45U	27045U0600/5	600/5	1	15.0	20.0	25.0

Measurement CT – 300A to 1000A – 55mm hole

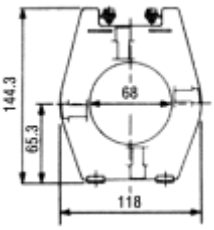


Form U	Catalogue	Ratio	Output Burden (VA) at Class Index 0.2	0.5	1	3
55U	27055U0300/5	300/5		1.25	5.0	10.0
55U	27055U0400/5	400/5		3.75	10.0	15.0
55U	27055U0500/5	500/5		5.0	15.0	20.0
55U	27055U0600/5	600/5	1.25	10.0	20.0	
55U	27055U0750/5	750/5	2.5	15.0	25.0	
55U	27055U0800/5	800/5	2.5	20.0	30.0	
55U	27055U1000/5	1000/5	10.0	30.0	40.0	

Measurement – through hole

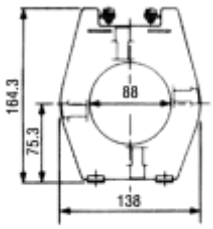
Series 27

Measurement CT – 500A to 1200A – 68mm hole



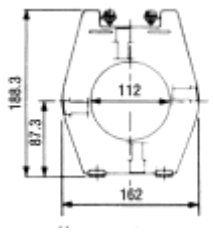
Form U	Catalogue	Ratio	Output Burden (VA) at Class Index 0.2	0.5	1	3
68U	27068U0500/5	500/5		3.75	10.0	15.0
68U	27068U0600/5	600/5		5.0	15.0	20.0
68U	27068U0750/5	750/5		10.0	20.0	25.0
68U	27068U0800/5	800/5	2.5	12.5	25.0	
68U	27068U1000/5	1000/5	5.0	25.0	35.0	
68U	27068U1200/5	1200/5	7.5	35.0	40.0	

Measurement CT – 500A to 1600A – 88mm hole



Form U	Catalogue	Ratio	Output Burden (VA) at Class Index 0.2	0.5	1	3
88U	27088U0500/5	500/5		2.5	7.5	15.0
88U	27088U0750/5	750/5		7.5	20.0	25.0
88U	27088U0800/5	800/5		7.5	25.0	25.0
88U	27088U1000/5	1000/5	7.5	25.0	25.0	
88U	27088U1200/5	1200/5	3.75	25.0	40.0	
88U	27088U1500/5	1500/5	5.0	40.0	50.0	
88U	27088U1600/5	1600/5	7.5	45.0	50.0	

Measurement CT – 800A to 3000A – 112mm hole

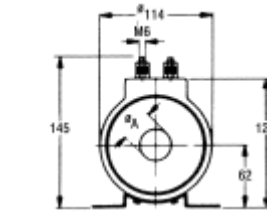


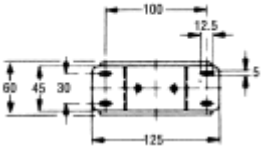
Form U	Catalogue	Ratio	Output Burden (VA) at Class Index 0.2	0.5	1	3
112U	27112U0800/5	800/5		5.0	15.0	25.0
112U	27112U1000/5	1000/5		10.0	30.0	40.0
112U	27112U1200/5	1200/5	2.5	20.0	40.0	
112U	27112U1500/5	1500/5	5.0	30.0	40.0	
112U	27112U1600/5	1600/5	5.0	35.0	50.0	
112U	27112U2000/5	2000/5	15.0	50.0	75.0	
112U	27112U2400/5	2400/5	20.0	60.0	75.0	
112U	27112U2500/5	2500/5	25.0	80.0	80.0	
112U	27112U3000/5	3000/5	40.0	75.0	75.0	

Measurement – through hole, epoxy encapsulated Series 25

Manufactured by WF Energy Controls in Australia, these high quality epoxy encapsulated general measurement current transformers are used where the environment calls for both accuracy and longevity. Conforming to the class performance requirements of AS60044.1, they are available in 5 window sizes covering current ranges from 40A to 3000A. Foot mounting brackets are provided as standard, busbar mounting kits are optional. 1A secondary outputs are available on request.

Measurement CT – 40A to 1200A

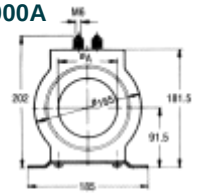


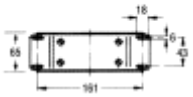


ØA	Form	Dia.
	20S	20mm
	32S	32mm
	60S	60mm

Form S	Catalogue	Ratio	Output Burden (VA) at Class Index 0.2	0.5	1	3
20S	25020S0050/5	50/5				2.5
32S	25032S0060/5	60/5				3.75
32S	25032S0075/5	75/5			1.25	3.75
32S	25032S0080/5	80/5			1.25	5.0
32S	25032S0100/5	100/5			2.5	7.5
32S	25032S0150/5	150/5		2.5	5.0	25.0
32S	25032S0200/5	200/5		3.75	10.0	17.5
32S	25032S0300/5	300/5			3.75	10.0
32S	25032S0400/5	400/5		5.0	15.0	30.0
60S	25060S0100/5	100/5				3.75
60S	25060S0150/5	150/5			1.25	5.0
60S	25060S0200/5	200/5			3.75	10.0
60S	25060S0250/5	250/5		1.25	5.0	20.0
60S	25060S0300/5	300/5		3.75	7.5	25.0
60S	25060S0400/5	400/5		5.0	10.0	30.0
60S	25060S0500/5	500/5		3.75	10.0	20.0
60S	25060S0600/5	600/5		5.0	15.0	25.0
60S	25060S0750/5	750/5	1.25	10.0	25.0	25.0
60S	25060S0800/5	800/5	2.5	10.0	25.0	25.0
60S	25060S1000/5	1000/5	2.5	20.0	40.0	40.0
60S	25060S1200/5	1200/5	5.0	30.0	40.0	50.0

Measurement CT – 300A to 3000A





ØA	Form	Dia.
	85T	85mm
	112T	112mm

Form T	Catalogue	Ratio	Output Burden (VA) at Class Index 0.2	0.5	1	3
85T	25085T0300/5	300/5		2.5	5.0	20.0
85T	25085T0400/5	400/5		2.5	10.0	40.0
85T	25085T0500/5	500/5	1.25	5.0	15.0	50.0
85T	25085T0600/5	600/5	2.5	10.0	30.0	60.0
85T	25085T0750/5	750/5	3.75	15.0	50.0	75.0
85T	25085T0800/5	800/5	3.75	20.0	60.0	75.0
85T	25085T1000/5	1000/5	7.5	30.0	75.0	75.0
112T	25112T1200/5	1200/5	5.0	30.0	75.0	75.0
112T	25112T1500/5	1500/5	10.0	50.0	75.0	75.0
112T	25112T1600/5	1600/5	10.0	60.0	75.0	75.0
112T	25112T2000/5	2000/5	25.0	75.0	75.0	
112T	25112T2400/5	2400/5	40.0	75.0	75.0	
112T	25112T2500/5	2500/5	50.0	75.0	75.0	
112T	25112T3000/5	3000/5	75.0	75.0	75.0	