

LOUTH TRANSFORMER COMPANY LIMITED

ISSUE 23



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TRANSFORMER MANUFACTURERS AND COIL WINDERS 1VA to 100KVA



COMPANY PROFILE



Louth Transformer Co. Ltd. was founded in 1976 by the present Managing Director Mr. Kevin Mead who has over 50 years in the industry. A very low turnover of loyal diligent staff gives a wealth of experience in many areas ensuring a very smoothly run company.

The company operates from a modern purpose built factory on a 1.25 acre site situated on a large industrial estate in the pleasant Lincolnshire Wolds market town of Louth.

Computerised winding machines and extensive modern facilities enable us to manufacture transformers from 1.0VA to 100KVA, utilising copper winding wire from 0.04mm in diameter to sectional wire in excess of 100 sq. mm. We manufacture and hold in stock the following types of transformers.

- Printed Circuit Mounted
- Clamp and Frame types
- Control panel Transformers
- Auto Transformers
- Audio Transformers
- Low Profile Types
- Transformer Rectifier Units
- Single Phase Transformers
- Three Phase Transformers
- Site Isolating Types



COMPANY PROFILE



In addition to our vast range of 430 types held in stock, in quantity, for immediate delivery, we are also able to manufacture to customer specification in the same power range, usually for delivery in one week, or sometimes less if required.

We pride ourselves on giving immediate telephone quotations, technical assistance, and after sales help that we know, by the comments from our customers, is very much appreciated and appears to be quite unique to Louth Transformers.

We genuinely believe in, and put into practice, the importance of quality, service and efficiency, hoping that customers will remain with us for many of their future transformer needs. A large stockholding of materials makes it possible for fast turnaround of orders.

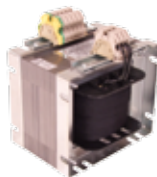
We have a huge database of customers involving many varied industries and professions, also having an active export department despatching to many countries. Louth Transformer Company believes that it has the capabilities to meet your transformer needs.



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ENVIRONMENTAL POLICY

Louth Transformer Company Ltd. accepts our responsibility for the harmful effects our operations have on both the local and global environment, and is committed to reducing them. Louth Transformer Company will comply with, and aims to exceed all relevant environmental legislation through a process of continual review and improvement. Louth Transformer Company has enlisted the support of our staff in order to achieve our environmental goals.

OFFICE

A large majority of company correspondence is conducted electronically via email, therefore reducing the environmental impact of postage and paper waste.

PRODUCTION

Due thought is to be given at the design stage of our products to ensure that the minimum amounts of materials are employed to do the job properly. Wastage and reject matter during production is kept to the lowest level possible, all unavoidable scrap metals to be collected by a suitable licensed scrap dealer.

DESPATCH

The despatch department tries wherever possible to recycle all incoming packaging, for example; padded envelopes, loose-fill, cardboard cartons, and pallets.

SALES

A positive decision has been taken not to use a company sales representative continually driving around the country, but to use other forms of advertising such as the internet. Our company catalogue has been produced in A5 size to save paper when printed.

MAINTENANCE

The use of water based paints wherever possible. All paper products to be derived from sustainable sources, garden waste to be composted.

GENERAL

All machines, equipment, and lighting to be switched off when not in use. Heating thermostat set to most efficient levels. In order to comply with the revised waste framework directive, we have implemented a dry mixed recycling scheme from an Environment Agency accredited provider.



RoHS / RoHS2 & RoHS3

EU Directives 2002/95/EC, 2011/65/EU & 2015/863/EU

The RoHS Directives stand for the “restriction of the use of certain hazardous substances in electrical and electronic equipment”. These directives ban the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of certain hazardous substances. The RoHS Directive, EU Directive 2002/95/EC, which came into effect from the 1st of July 2006 in Europe & further revised with the RoHS 2 Directive 2011/65/EU, and RoHS 3 Directive 2015/863/EU, mandates that electrical and electronic products, (EEE) traded within the EU market place shall contain restrictive levels of the following substances:

- Lead (Pb)
- Cadmium (Cd)
- Mercury (Hg)
- Hexavalent Chromium (Cr6+)
- Polybrominated Biphenyl (PBB)
- Polybrominated Diphenyl Ethers (PBDE)
- Bis(2-ethylhexyl) phthalate (BBP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP)

This directive, which aims to protect human health and the environment and mirrors the WEEE directive, applies to electrical and electronic equipment that is dependent on electric or electromagnetic fields in order to work properly. It also applies to some equipment used for the generation, transfer and measurement of such currents and fields designed for use with a voltage rating not exceeding 1,000 Volts for alternating current (AC) and 1,500 Volts for direct current (DC).

The RoHS/WEEE directives do not call for a total elimination of these substances. They mandate that all compliant products or materials that cannot be mechanically disjoined must not contain any of the restricted substances above the maximum concentration levels.

Louth Transformer Company attempts to design around the problem by using materials that comply with the RoHS/ RoHS 2 directives. We ensure this by seeking datasheets & written confirmation from our suppliers, that the restricted substances are not contained in any of our raw materials above the specified levels.



WEEE DIRECTIVE

EU Directive 2012/19/EU

The Waste Electrical and Electronic Equipment Directive (WEEE) aims to minimise the impacts of Electrical and Electronic Equipment on the environment during their life time and when they become waste.

The directive applies to a huge spectrum of products. It encourages and sets criteria for the collection, treatment, recycling and recovery of WEEE. It makes producers responsible for financing most of these activities. The company fully supports the WEEE directive.

The WEEE directive divides equipment into the following categories:

CATEGORY 1 & 10 - Large household appliances – cookers, fridges, freezers, washing machines, microwaves, electric heaters and cooking appliances.

CATEGORY 3 & 4 - TVs, radios, faxes, printers, computers, HI-FI's, video cameras, laptops, telephones, mobiles, calculators.

CATEGORY 2, 6, 7 & 9 - Small household appliances – vacuum cleaners, irons, toasters, clocks, watches, scales, coffee machines, fryers, electrical tools, toys, leisure equipment, thermostats and smoke detectors.

CATEGORY 5 – Fluorescent tubes, sodium lamps and bulbs.

It can be seen from the above that Louth Transformer Company has no responsibilities in regards to the WEEE directive, however we fully support the recycling of electrical items and always ensure that any unavoidable waste produced is disposed of via suitable, licenced waste processing companies and is recycled to the maximum extent possible.



REACH DIRECTIVE

Regulation (EC) No 1907/2006

The European REACH directive, (Registration Evaluation Authorisation and restriction of Chemicals) came into force on the 1st of June 2007. This directive covers all SVHC (Substances of Very High Concern) chemicals, whether manufactured, imported, used as intermediates or placed on the market, either on their own, in preparations or in articles, unless covered by one of the exemptions provided for in the REACH regulation.

REACH Objectives:

- To protect human health and the environment from the usage of hazardous chemicals.
- To make the manufacturers and importers, who place SVHC chemicals on the market understand and manage the risks associated with their use.
- To allow the unrestricted movement of substances within the EU.
- To encourage competitiveness and innovation within the EU chemicals industry.

Louth Transformer Company Limited, do not use or import any SVHC substances in to the EU at a level of 1 tonne or more per annum, and therefore are exempt from REACH registration.

CONFLICT MINERAL POLICY

Louth Transformer Company is aware of the legislation in the United States of America regarding what is termed “Conflict Minerals” and although the law relates at this time to only the USA, we have sought confirmation from our suppliers that none of their materials contain any minerals from The Democratic Republic of Congo (DRC), or the adjoining countries of Angola, Burundi, The Central African Republic, Rwanda, Sudan, Tanzania, Uganda, and Zambia, which all have concerns regarding revenues obtained from the mining and transport of certain minerals.

Some mines are controlled by armed groups and may involve human rights abuses, forced child labour, and violence. Sales of these “Conflict Minerals” offer financial support to these organisations.

The Conflict Minerals specified are:

- Columbite-Tantalite (coltan) refined into Tantalum (Ta)
- Cassiterite refined into Tin (sn)
- Wolframite refined into Tungsten (w)
- Gold (Au)

We can confirm that Louth Transformer Company do not purchase any products containing Conflict Minerals for the manufacture of our transformers. We do not routinely audit our supplier’s declarations, but do periodically request the latest statement. We will continue to work with our supplier base to help to ensure that only products containing “Conflict Free” minerals are supplied to our company.





ANTI-BRIBERY & CORRUPTION

This policy applies to directors, officers and employees, including temporary employees of Louth Transformer Company Limited.

Bribery can be defined as the giving or receiving of something of value to influence a business transaction.

Corruption is an abuse of a position of trust in order to gain an undue advantage.

Improper Performance is where the person receiving the 'bribe' fails to act in good faith or impartially.

Purpose Statement

Louth Transformer Company is committed to corporate conduct which is based on acting professionally, fairly and with integrity. The company has zero tolerance to any form of Bribery or Corruption. It is a criminal offence for anyone to 'offer to accept a financial or any other kind of advantage with the intent to induce the improper performance of a business function.

Responsibilities

All colleagues are expected to act with integrity and obey all laws and regulations that apply to their work.

Improper influence may take many forms. Cash, gifts, meals, travel, entertainment, loans, charitable contributions, political contributions or offers of employment may all be used inappropriately in attempts to influence business decisions or government action.

Colleagues must ensure they do not give or receive anything of value which influences a business transaction, use any other means to improperly influence the decisions of clients, potential clients or government officials, or abuse a position of trust in order to gain an undue advantage.

Penalties

Under the Bribery Act 2010 individuals can receive up to 10 years imprisonment, an unlimited fine and director disqualification. Businesses may receive unlimited fines.

EMC STATEMENT

With regard to both the EMC (89/336EEC) & Low Voltage (73/23/EEC) Directives it is Louth Transformer Company's considered opinion and experience that a transformer is an inert, benign electrical apparatus, consisting of a core and windings that will not generate conducted Electromagnetic Interference (EMI). Although there are radiated emissions, these are only at the electrical supply frequency, and are screened by the transformer's earthed metal housing if applicable.

It must however be noted that any conducted Electromagnetic Interference (EMI) already present on the electrical supply to a transformer may pass through it to the load, similarly any load generated interference may pass back through the transformer on to the supply. This interference will not be amplified by the transformer and will, in most cases be attenuated due to the inclusion of an earthed, copper, inter-winding screen, if fitted.



PRINTED CIRCUIT MOUNTED

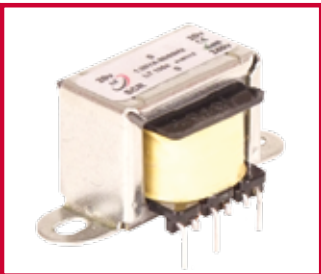


Sub Miniature PCB - 1.2VA

The smallest PCB transformer that we manufacture, 25 x 25mm x 20mm high. Continuously rated at 1.2VA depending on specification. Six pins are available for connections.

PRINTED CIRCUIT MOUNTED

PRINTED CIRCUIT MOUNTED



Sub Miniature PCB - 1.2VA

As above but with a 'U' clamp fitted in this position for added security. Weight including 'U' clamp is less than 60gms. Although not the cheapest design they may be useful if space is at a premium.

PRINTED CIRCUIT MOUNTED

PRINTED CIRCUIT MOUNTED



Small PCB 1.2 - 3.0VA

A more popular low power transformer with a plan area of 30 x 25mm and a height up to 32mm above board for designs up to 3.0VA depending upon specification.

PRINTED CIRCUIT MOUNTED

PRINTED CIRCUIT MOUNTED



Small Encapsulated PCB 1.2 - 3.0VA

The above transformer can be encapsulated into a small potting box to give improved mechanical and electrical protection. Other sizes are available

PRINTED CIRCUIT MOUNTED

PRINTED CIRCUIT MOUNTED



Printed Circuit Mounted

A comprehensive range of popular printed circuit mounted transformers ranging up to 130VA, usually on a double section fully shrouded bobbin with possible pin positions ranging from five positions per row up to eight.

PRINTED CIRCUIT MOUNTED

PRINTED CIRCUIT MOUNTED



PCB With Threaded Mounting Pillars

As above but with four threaded corner mounting pillars for added security for the heavier transformers or where the item may be subject to mechanical stress. This photo shows a red flame retardant bobbin to UL94V-0 standards.

PRINTED CIRCUIT MOUNTED

PRINTED CIRCUIT MOUNTED



Low Profile Printed Circuit Mounted

A range of popular types, or available as bespoke designs to customer's requirements, used where height is at a premium. Available with full approvals.

PRINTED CIRCUIT MOUNTED

PRINTED CIRCUIT MOUNTED



Three Phase Miniature PCB

A range of small three phase PCB transformers available both open or encapsulated. This particular photo depicts a 415V/24V 10VA delta star example with a plan area of 60 x 50mm and a height above board of only 26mm.

PRINTED CIRCUIT MOUNTED

CLAMP / FRAME TRANSFORMERS



U Clamp Sub Miniature

The smallest transformer that we manufacture, base area 44 x 25mm x 20mm high including clamp. Fixing centres 35mm.

CLAMP / FRAME TRANSFORMERS

CLAMP / FRAME TRANSFORMERS



U Clamp & Solder Tags

The very popular style of two hole "U" clamp fixing together with solder tag connections. Available on sizes up to 100VA depending on specification.

CLAMP / FRAME TRANSFORMERS

CLAMP / FRAME TRANSFORMERS



U Clamp & Screw Terminals

As above but screw terminals can be mounted on top of the transformer. Terminal block can incorporate a fuse depending on specification.

CLAMP / FRAME TRANSFORMERS

CLAMP / FRAME TRANSFORMERS



U Clamp & Fly Leads

Similar in style to the solder tag version, but of course having flying lead connections. All leads are tri-rated as standard Any length or colours can be specified.

CLAMP / FRAME TRANSFORMERS

CLAMP / FRAME TRANSFORMERS



U Clamp & Terminal Shrouds

Some solder tag transformers can be fitted with protective terminal shrouds. Terminal shrouds can also be supplied separately. These are only available for some sizes.

CLAMP / FRAME TRANSFORMERS

CLAMP / FRAME TRANSFORMERS



Frame & Solder Tags

The larger transformers require a more substantial method of fixing, so end frames are fitted which give four hole fixing and the transformers can be mounted 'normally' or 'upright'.

CLAMP / FRAME TRANSFORMERS

CLAMP / FRAME TRANSFORMERS



Frame & Fly Leads

Similar in style to the solder tag version, but of course having flying lead connections. All leads are tri-rated as standard. Any length or colours can be specified.

CLAMP / FRAME TRANSFORMERS

CLAMP / FRAME TRANSFORMERS



Solder Tags & Fly Leads

Similar in style to the above but incorporating a combination of flying leads and solder tag connections.

CLAMP / FRAME TRANSFORMERS



Screw Terminals

Open, single or three phase with T35 DIN rail mounted screw terminals with current carrying capacity up to 125A and a voltage rating up to 1.0kV. High quality leaf spring screw terminals are also available.



Studs

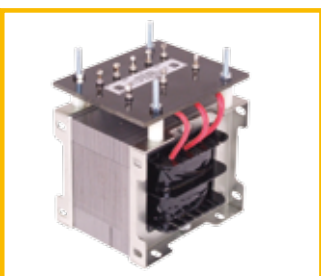
Non rotating nickel plated brass studs from M4 to M12 are available to give secure connections. Please remember it is recommended to check all high current connections periodically to avoid joint overheating.



Fuses

Fuses and neutral links can be fitted to the top terminal panel where space & specification allows.

Thermal fuses or cut-outs can be fitted to most styles if required.



Turret Tags

Not so popular nowadays but still available is this method of solder joint connection. Useful for high density connections.



Cut Cores & Screw Terminals

A cut core transformer uses a different style of core material instead of the usual interleaved flat lamination. Here the steel core is wound similar to a coil of tape then cut in half to allow assembly. The cut faces are then surface ground flat.



Cut Cores & Fly Leads

Similar to the above. Connections can be by any combination of the previous styles, in this case fly leads. As above the cut cores are constructed from grain orientated, low loss electrical steel.



Wall / Floor Case Mounted

A full range of indoor IP23 steel vented wall cases are offered for power ratings from 30VA to 6.0KVA depending on specification. The standard case has two 20mm entry/exit holes.



Floor Case Mounted

For the larger transformers an IP23 vented steel floor case is offered with a gland plate at either end for easy gland drilling. An IP65 outdoor version is also available.

AUTO TRANSFORMERS



Shells & Fly Leads

Mounted upright with bright zinc plated steel shells encasing the windings. This is a popular style sometimes found on amplifier chassis to give a neat finish.

AUTO TRANSFORMERS

AUTO TRANSFORMERS



Shells & Screw Terminals

Style as above which can be supplied with either fly leads or terminal block connections.

AUTO TRANSFORMERS

AUTO TRANSFORMERS



Cased 240 - 110v

These portable step down auto transformers suitable for indoor use only, come with a mains lead, mains switch and cut-out, with the output via 1 or 2 USA domestic 3 pin sockets depending on specification.

AUTO TRANSFORMERS

AUTO TRANSFORMERS



Encapsulated Auto Transformer

A class II, lead to lead, fully encapsulated and waterproof style of transformer with fixing feet, ideal for harsh environments.

AUTO TRANSFORMERS

TRANSFORMER RECTIFIER UNITS



Three Phase DC Output

For easy installation a three phase transformer is offered with a six diode silicon bridge rectifier already attached and wired for an un-smoothed d.c. output. Output currents up to 250A depending on specification.

TRANSFORMER RECTIFIER UNITS

TRANSFORMER RECTIFIER UNITS

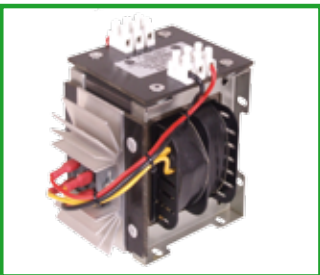


U Clamp & Rectifier

For the smaller items where a heat sink is not required a silicon bridge rectifier can be attached to the transformer solder tags for a quick & easy installation.

TRANSFORMER RECTIFIER UNITS

TRANSFORMER RECTIFIER UNITS



Screw Terminals & Rectifier

Larger single phase d.c. output transformers can be supplied with a suitable heat sink already attached for an un-smoothed d.c. supply.

TRANSFORMER RECTIFIER UNITS

TRANSFORMER RECTIFIER UNITS



12 / 24Vdc Cased

Low power un-smoothed d.c. supplies can be mounted in small steel cases. The item shown is for the hold in magnet on a fire door closer.

TRANSFORMER RECTIFIER UNITS

SINGLE & THREE PHASE



Open Single Phase

A twin coil single or two phase transformer taller than usual but with a smaller footprint. 30VA to 30KVA

SINGLE & THREE PHASE

SINGLE & THREE PHASE



Open Three Phase

A range from 100VA to 50KVA with fly lead, terminal block or non-rotating nickel plated brass stud connections. A typical winding configuration could be delta/star, vector group Dyn11.

SINGLE & THREE PHASE

SINGLE & THREE PHASE



DIN Rail Mounted

A range of single & two phase, DIN rail mounted class II safety isolating transformers, featuring a smart grey RAL 7035 plastic enclosure with screw terminals to IP21. Suitable for T35mm rail fixing, enabling quick & easy installation.

SINGLE & THREE PHASE

SINGLE & THREE PHASE



Site Distribution Transformer

A range of continuously rated, single and three phase, double wound transformers, designed to supply power for tools and lighting on construction sites through BS 60309 sockets. Enclosures are ruggedly constructed to IP44 for use outdoors.

SINGLE & THREE PHASE

TOROIDALS



TOROIDALS



TOROIDALS



TOROIDALS



TOROIDALS



TOROIDALS



TOROIDALS



TOROIDALS



Toroidal With Fly Leads

We do not offer a standard range but are able to quote for specials made to order. With power ratings up to 2.0KVA.



Toroidal With Mounting Feet

To enable two hole mounting, we are able to offer toroidal transformers with 'L' shaped brackets incorporated into the design.



Toroidal With Encapsulated Centre

For extra mounting strength the centre of the toroidal can be filled with resin & a centre hole drilled for a strong bolt down option, thus relieving the pressure of the steel washer on the windings if over tightened.



Fully Encapsulated Toroidal

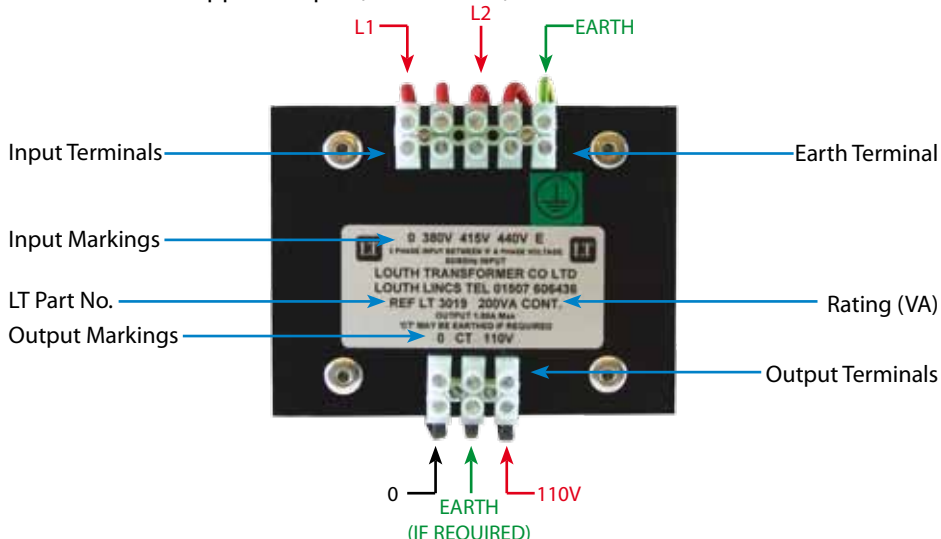
A limited range can be encapsulated into a purpose made circular potting box with fly lead connections and centre mounting hole.



INSTALLATION INFORMATION

EXAMPLE

415V Input, 2 Phase 2 Wire & Earth
110V Centre Tapped Output (55V - 0 - 55V)



For connection to a three phase supply, two phases should be used. Connect one phase (L1) to the '0' terminal, and the other (L2) to the supply voltage terminal.

For the safe installation and operation of a transformer, the following points should be considered:

1. The earth connection should always be used, where provided.
2. The transformer should only be used for the purpose for which it was designed.
3. All wires should be stripped to the correct length and fastened securely into the terminal blocks.
4. Adequate ventilation should be provided as transformers will get warm during normal operation.
5. Terminals should be inspected periodically for tightness (especially high current terminals).

TRANSFORMERS ARE ELECTRICAL DEVICES AND AS SUCH SHOULD ONLY BE INSTALLED BY QUALIFIED PERSONNEL

All transformers on the following pages have been fully designed and tested to BS 3535, EN 60742, VDE 0050 and 0051 where appropriate. Voltages stated are at full load. Maximum temperature rise of 55°C with suitable ventilation.

Whereas every effort has been made to ensure the details contained within this catalogue are correct, no responsibility or liability is taken for any errors or omissions. It is the customer's responsibility to ensure that all products used are suitable for the application concerned. We reserve the right to make changes to specifications without prior notice. All weights and dimensions quoted are intended as a guide only and may be subject to change. As part of continuous product improvement, some stock items now feature DIN rail mounted screw terminals in place of standard leaf spring terminals or non-rotating studs.



EX - STOCK TRANSFORMERS



Listed on the next 27 pages are 430 popular types, normally held in stock, in quantity, available for next day delivery. If your required type is not listed we are able to manufacture to customer specification, for delivery in one week, or sometimes less if required.

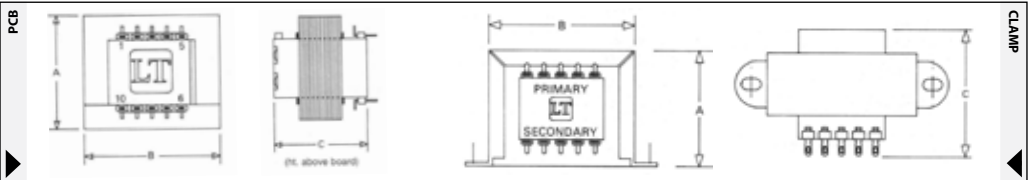


EURO RANGE

3.0VA TO 12VA
EX-STOCK

230V INPUT ONLY
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)
	3 PCB	0/230V	5V 5V 6V 6V 9V 9V 12V 12V 15V 15V 20V 20V 24V 24V	1474 1475 1476 1477 1478 1479 1480	32	39	31	127
			5 + 5 PINS					
	6 PCB	0/230V	5V 5V 6V 6V 9V 9V 12V 12V 15V 15V 20V 20V 24V 24V	1481 1482 1483 1484 1485 1486 1487	35	42	37	167
			6 + 6 PINS					
	6 CLAMP	0/230V	5V 5V 6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	1410 1411 1412 1413 1414 1415 1416 1417	37	46	39	187
			TERMINAL SHROUDS AVAILABLE					
	12 PCB	0/230V	5V 5V 6V 6V 9V 9V 12V 12V 15V 15V 20V 20V 24V 24V	1488 1489 1490 1491 1492 1493 1494	45	54	44	343
			6 + 6 PINS					





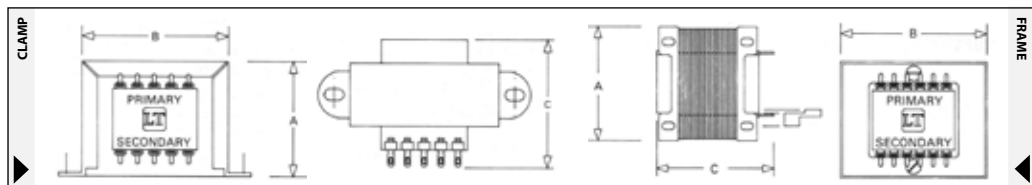
EURO RANGE

20VA TO 100VA
EX-STOCK

230V INPUT ONLY
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)	
	12 CLAMP	0/230V	5V 5V 6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	1418 1419 1420 1421 1422 1423 1424 1425	49	60	51	433	
			TERMINAL SHROUDS AVAILABLE						
	20 CLAMP	0/230V	5V 5V 6V 6V 6.3V 6.3V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	1426 1427 1428 1429 1430 1431 1432 1433 1434	49	60	57	565	
			5 + 5 PINS						
	50 CLAMP	0/230V	6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	1435 1436 1437 1438 1439 1440 1441	65	79	63	1004	
			6 + 6 PINS						
	75 FRAME	0/230V	6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 24V 24V 50V 50V	1442 1443 1444 1445 1446 1447 1448	77	79	73	1430	
			TERMINAL SHROUDS AVAILABLE						

EX-STOCK



ALL 100% RoHS COMPLIANT

DATA FOR GUIDANCE ONLY. SEE PAGE 18 FOR FURTHER INFORMATION

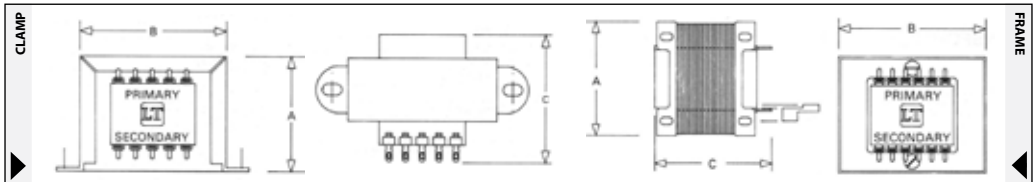


EURO RANGE

100VA TO 200VA
EX-STOCK

230V INPUT ONLY
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (kg)
	100 FRAME	0/230V	6V 6V	1449	75	89	58	1.47
			9V 9V	1450				
			12V 12V	1451				
			15V 15V	1452				
			18V 18V	1453				
			20V 20V	1454				
			24V 24V	1455				
			30V 30V	1456				
			50V 30V	1457				
	TERMINAL SHROUDS AVAILABLE							
	150 FRAME	0/230V	6V 6V	1458	83	99	64	2.26
			9V 9V	1459				
			12V 12V	1460				
			15V 15V	1461				
			18V 18V	1462				
			24V 24V	1463				
			50V 50V	1464				
								
	200 FRAME	0/230V	6V 6V	1465	83	99	74	2.74
			9V 9V	1466				
			12V 12V	1467				
			15V 15V	1468				
			18V 18V	1469				
			20V 20V	1470				
			24V 24V	1471				
			30V 30V	1472				
			50V 50V	1473				
								





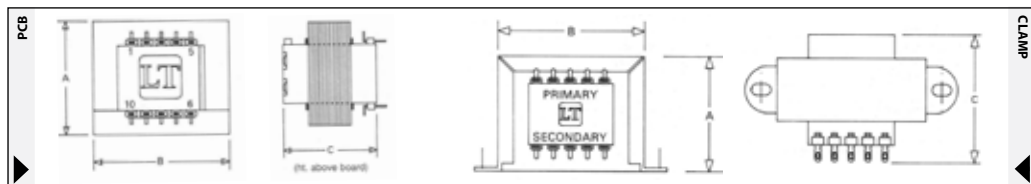
EURO RANGE

3.0VA TO 12VA
EX-STOCK

230V OR 115V INPUT
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)	
	3 PCB	0/115V 0/115V	6V 6V	10001	35	42	37	127	
			9V 9V	10002					
			12V 12V	10003					
			15V 15V	10004					
			24V 24V	10005					
	5 + 5 PINS								
	6 PCB	0/115V 0/115V	6V 6V	10006	35	42	37	166	
			9V 9V	10007					
			12V 12V	10008					
			15V 15V	10009					
			24V 24V	10010					
	6 + 6 PINS								
	6 CLAMP	0/115V 0/115V	6V 6V	10011	45	54	46	185	
			9V 9V	10012					
			12V 12V	10013					
			15V 15V	10014					
			24V 24V	10015					
	TERMINAL SHROUDS AVAILABLE								
	12 PCB	0/115V 0/115V	6V 6V	10016	45	54	46	348	
			9V 9V	10017					
			12V 12V	10018					
			15V 15V	10019					
			24V 24V	10020					
	TERMINAL SHROUDS AVAILABLE								
	12 CLAMP	0/115V 0/115V	6V 6V	10021	49	61	51	437	
			9V 9V	10022					
			12V 12V	10023					
			15V 15V	10024					
			24V 24V	10025					
	7 + 7 PINS								

EX-STOCK



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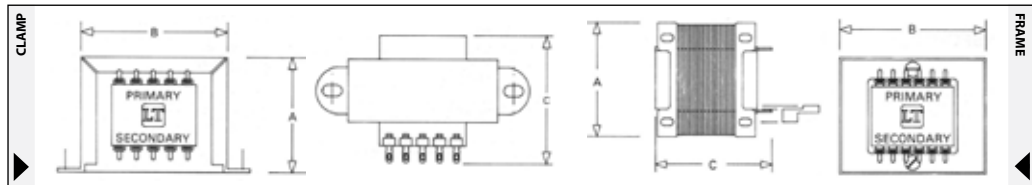


EURO RANGE

12VA TO 100VA
EX-STOCK

230V OR 115V INPUT
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)
	20 CLAMP	0/115V 0/115V	6V 6V	10026	49	61	57	561
			9V 9V	10027				
			12V 12V	10028				
			15V 15V	10029				
			24V 24V	10030				
	TERMINAL SHROUDS AVAILABLE							
	30 CLAMP	0/115V 0/115V	6V 6V	10031	57	70	56	700
			9V 9V	10032				
			12V 12V	10033				
			15V 15V	10034				
			24V 24V	10035				
	TERMINAL SHROUDS AVAILABLE							
	50 CLAMP	0/115V 0/115V	6V 6V	10036	66	79	62	1002
			9V 9V	10037				
			12V 12V	10038				
			15V 15V	10039				
			24V 24V	10040				
	TERMINAL SHROUDS AVAILABLE							
	75 FRAME	0/115V 0/115V	6V 6V	10041	67	80	76	1430
			9V 9V	10042				
			12V 12V	10043				
			15V 15V	10044				
			24V 24V	10045				
	TERMINAL SHROUDS AVAILABLE							
	100 FRAME	0/115V 0/115V	6V 6V	10046	75	99	69	1470
			9V 9V	10047				
			12V 12V	10048				
			15V 15V	10049				
			24V 24V	10050				
	TERMINAL SHROUDS AVAILABLE							





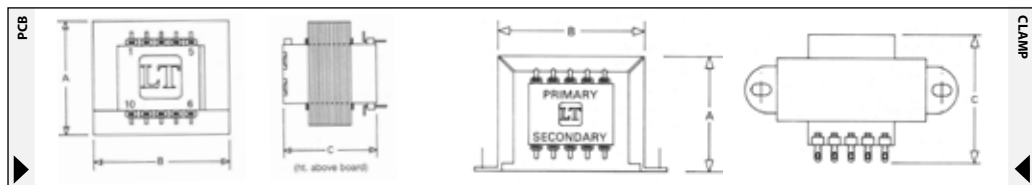
LOW VOLTAGE RANGE

1.2VA TO 6.0VA
EX-STOCK

240V OR 120V INPUT
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)	
	1.2	0/240V (ONLY)	3V - 0 - 3V 12V - 0 - 12V 20V - 0 - 20V 24V - 0 - 24V	1352 1353 1354 1355	24 +PINS	27	26	52	
	SUB - MINIATURE								
	1.2	0/240V (ONLY)	4.5V - 0 - 4.5V 6V - 0 - 6V 12V - 0 - 12V 15V - 0 - 15V 20V - 0 - 20V	1370 1371 1372 1373 1374	28	33	35	88	
	ENCAPSULATED								
	3 PCB	0/120V 0/120V	4.5V 4.5V 6V 6V 9V 9V 12V 12V 15V 15V 20V 20V 24V 24V	7000 1301 3800 1302 1303 1304 7006	35	39	33	127	
	5 + 5 PINS								
	6 PCB	0/120V 0/120V	6V 6V 9V 9V 12V 12V 15V 15V 20V 20V	1305 1306 1307 1308 1309	35	39	37	166	
	6 + 6 PINS								
	6 CLAMP	0/120V 0/120V	4.5V 4.5V 6V 6V 9V 9V 12V 12V 15V 15V 20V 20V	1310 1311 1312 1313 1314 1315	38	46	39	185	
	TERMINAL SHROUDS AVAILABLE								

EX-STOCK



ALL 100% RoHS COMPLIANT

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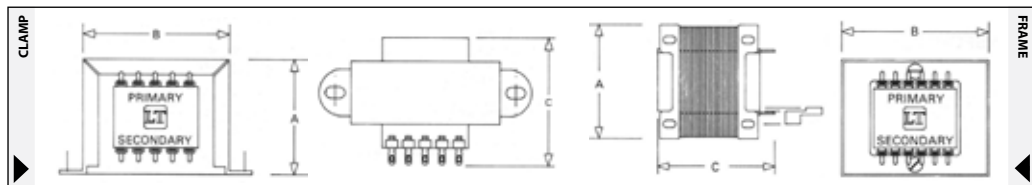


LOW VOLTAGE RANGE

12VA TO 100VA
EX-STOCK

240V OR 120V INPUT
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)
	12 PCB	0/120V 0/120V	4.5V 4.5V 6V 6V 9V 9V 12V 12V 15V 15V 20V 20V	1316 1317 1318 1319 1320 1321	48	57	50	386
			5 + 5 PINS					
	12 CLAMP	0/120V 0/120V	4.5V 4.5V 6V 6V 9V 9V 12V 12V 15V 15V 20V 20V	1322 1323 1324 1325 1326 1327	51	62	50	441
			TERMINAL SHROUDS AVAILABLE					
	20 CLAMP	0/120V 0/120V	4.5V 4.5V 6V 6V 9V 9V 12V 12V 15V 15V 17.5V 17.5V 20V 20V	1328 1329 1330 1331 1332 1333 1334	59	69	57	647
			TERMINAL SHROUDS AVAILABLE					
	50 CLAMP	0/120V 0/120V	4.5V 4.5V 6V 6V 9V 9V 12V 12V 15V 15V 20V 20V	1335 1336 1337 1338 1339 1340	66	81	64	1050
			TERMINAL SHROUDS AVAILABLE					



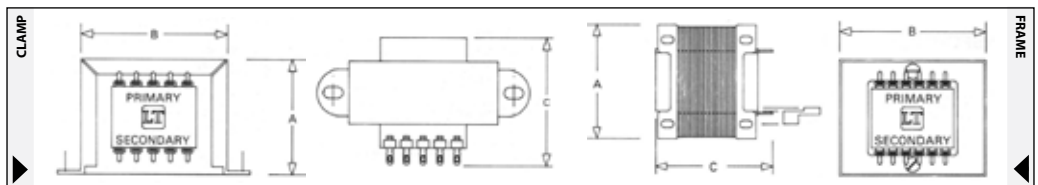


LOW VOLTAGE RANGE

20VA TO 240VA
EX-STOCK

240V OR 120V INPUT
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)	EX-STOCK	
	100 FRAME	0/120V 0/120V	6V 6V 9V 9V 12V 12V 15V 15V 20V 20V 50V 50V	1341 1342 1343 1344 1345 1346	76	90	70	1470		
			TERMINAL SHROUDS AVAILABLE							
	20 CLAMP	0/120V 0/120V	6V 9V 12V 18V 24V	1347 1348 1349 1350 1351	50	62	50	440		
			TERMINAL SHROUDS AVAILABLE							
	3.5	4k-15kΩ	3 - 15Ω	1360	42	51	49	265		
	2	RATIO 1:1 3Ω	RATIO 1:1 3Ω	1361	38	46	39	185		
	30	100V LINE	4 - 8 - 16Ω	1362	65	79	63	995		
	240 FRAME	0/120V 0/120V	TAPPED 0/4.5/6/9/12 18/20/24V 10 AMPS	1363	140	99	122	5100		
			SCREW TERMINALS							



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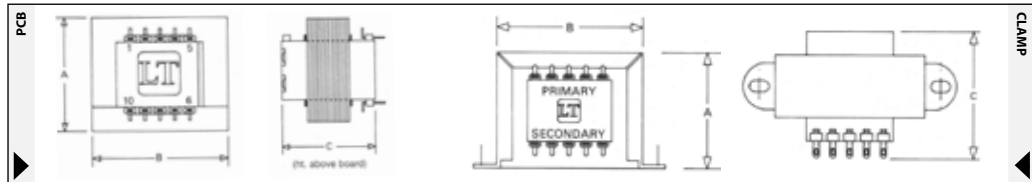


LOW VOLTAGE RANGE

6.0VA
EX-STOCK

240V OR 220V OR 110V INPUT
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)
	6 PCB	0/110V	4.5V 4.5V 6V 6V 9V 9V 10V @ 0.6A 12V 12V 15V 15V 20V 20V 24V 24V	7007 7008 7009 7010 7011 7012 7013 7014	36	43	33	168
		0/110/ 130V						
	5 + 5 PINS							
	12 PCB	0/110V	4.5V 4.5V 6V 6V 9V 9V 10V @ 1.2A 12V 12V 15V 15V 20V 20V 24V 24V	7015 7016 7017 7018 7019 7020 7021 7022	48	51	60	400
		0/110/ 130V						
	5 + 5 PINS							
	6 CLAMP	0/110V	4.5V 4.5V 6V 6V 9V 9V 10V @ 0.6A 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	7028 7029 7030 7031 7032 7033 7034 7035 7036	66	79	62	189
		0/110/ 130V						
	TERMINAL SHROUDS AVAILABLE							





LOW VOLTAGE RANGE

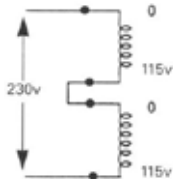
12VA TO 20VA
EX-STOCK

240V OR 220V OR 110V INPUT
50/60Hz

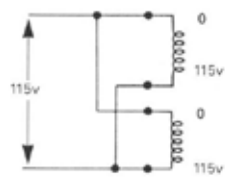
	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)	EX-STOCK
	12 CLAMP	0/110V 0/110/ 130V	4.5V 4.5V 6V 6V 9V 9V 10V @ 1.2A 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	7037 7038 7039 7040 7041 7042 7043 7044 7045	48	50	51	435	
TERMINAL SHROUDS AVAILABLE									
	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)	EX-STOCK
	20 CLAMP	0/110V 0/110/ 130V	4.5V 4.5V 6V 6V 9V 9V 10V @ 1.2A 12V 12V 15V 15V 18V @ 1.1A 20V 20V 24V 24V	7046 7047 7048 7049 7050 7051 7052 7053 7054	57	70	56	693	
TERMINAL SHROUDS AVAILABLE									

TRANSFORMER CONNECTIONS

SERIES
INPUT

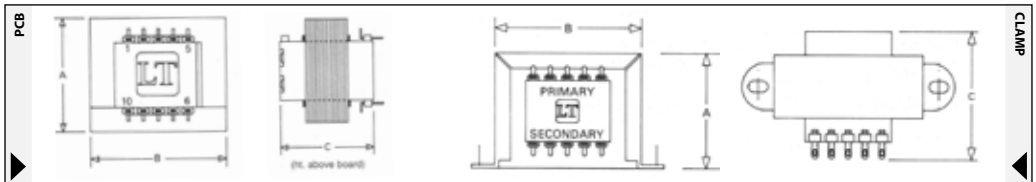


PARALLEL
INPUT



TRANSFORMER CONNECTIONS - SINGLE PHASE TYPES

Transformers with 2 primary windings are usually meant to be connected in either series or parallel depending on the supply voltage being used. For example, a common primary found would be 0-120v, 0-120v, for 240v operation the windings must be connected in series, for 120v the windings must be connected in parallel. Never be tempted to use only one primary, as this could seriously affect the operation of the transformer and could cause overheating.



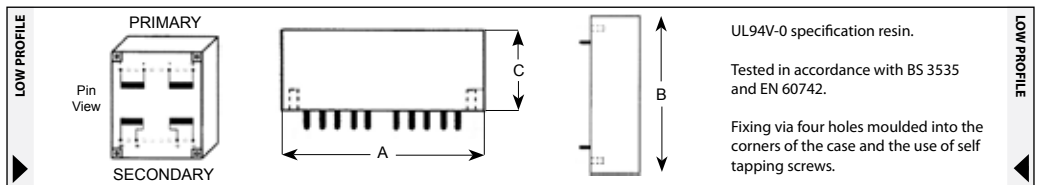


LOW PROFILE RANGE

2.0VA TO 6.0VA
EX-STOCK

240V OR 120V INPUT
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)
	2 PCB	0/120V 0/120V	6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	7073 7074 7075 7076 7077 7078 7079	44	53	17	122
	4 PCB	0/120V 0/120V	6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	7080 7081 7082 7083 7084 7085 7086	44	53	17	122
	6 PCB	0/120V 0/120V	6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	7087 7088 7089 7090 7091 7092 7093	44	53	17	122



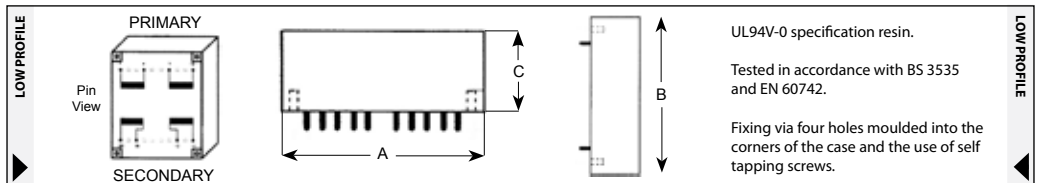


LOW PROFILE RANGE

2.0VA TO 6.0VA
EX-STOCK

240V OR 120V INPUT
50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (gms)	EX-STOCK
	10 PCB	0/120V 0/120V	6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	7094 7095 7096 7097 7098 7099 7100	58	69	17	303	
	18 PCB	0/120V 0/120V	6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	7101 7102 7103 7104 7105 7106 7107	58	69	28	390	
	24 PCB	0/120V 0/120V	9V 9V 15V 15V 18V 18V	1375 1376 1377	58	69	28	470	
	30 PCB	0/120V 0/120V	6V 6V 9V 9V 12V 12V 15V 15V 18V 18V 20V 20V 24V 24V	7108 7109 7110 7111 7112 7113 7114	58	69	31	552	





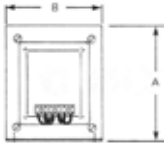
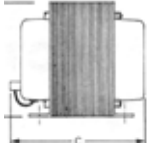
AUTO RANGE

50VA TO 1000VA
EX-STOCK

240V OR 115V INPUT
50/60Hz

	VA	TAPPED	REF	A (mm)	B (mm)	C (mm)	Wt (kg)
	50 SHELLS	0/115/240V	1364	67	56	61	0.74
		0.5MTR 3 CORE CABLE					
	150 SHELLS	0/115/200/220/240V	1365	85	72	78	1.48
		SCREW TERMINALS					
	250 SHELLS	0/115/200/220/240V	1366	95	79	95	2.42
		SCREW TERMINALS					
	500 SHELLS	0/115/200/220/240V	1367	114	95	98	3.62
		SCREW TERMINALS					
	1000 SHELLS	0/100/110/150/200/ 220/240/250V	1368	133	111	170	8.78
		SCREW TERMINALS					

PLEASE NOTE: AUTO TRANSFORMERS DO NOT PROVIDE INPUT - OUTPUT ISOLATION

AUTO RANGE			FIXING CENTRES		FIXING CENTRES		AUTO RANGE
			VA	WIDTH x DEPTH	VA	WIDTH x DEPTH	
			50	45 x 40	500	80 x 70	
			150	60 x 55			
			250	65 x 60	1000	95 x 100	

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CONTROL PANEL RANGE

50VA TO 200VA
EX-STOCK

50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (kg)	CASE
	50	0/380/415/440V	0/CT24V 0/CT/48V 0/CT/110V 0/240V	3001 3011 3017 3041	67	60	100	1.12	P1
	50	0/220/240V	0/CT/24V 0/CT48V 0/CT/110V	3006 3014 3029	67	60	100	1.12	P1
	100	0/380/415/440V	0/CT24V 0/CT/48V 0/CT/110V 0/240V	3002 3012 3018 3042	83	100		2.10	P1
	100	0/220/240V	0/CT/24V 0/CT48V 0/CT/110V	3007 3015 3030	83	100		2.10	P1
	200	0/380/415/440V	0/CT24V 0/CT/48V 0/CT/110V 0/240V	3003 3013 3019 3059	100	95	143	3.50	P2
	200	0/220/240V	0/CT/24V 0/CT48V 0/CT/110V	3008 3016 3031	100	95	143	3.50	P2

Class 1, double wound safety isolating transformers all wound on double section bobbins. Insulation meets requirements of BS 415, BS 3535 (EN 60742) and parts 1 and 3 of VDE 0550. Centre tap is available for earthing if required on 110V types.

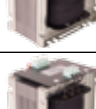
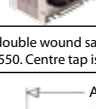
CONTROL PANEL	FIXING CENTRES		CONTROL PANEL
	VA	WIDTH x DEPTH	
	50	54 x 42	
	100	64 x 48	
	200	64 x 56	



CONTROL PANEL RANGE

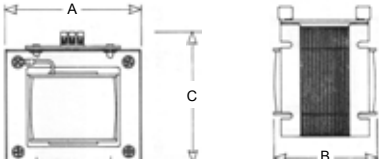
300VA TO 750VA
EX-STOCK

50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (kg)	CASE
	300	0/380/415/440V	0/CT/24V 0/CT/110V 0/240V	3004 3020 3043	100	105	145	4.50	P3 
	300	0/220/240V	0/CT/24V 0/CT/110V	3009 3032	100	105	145	4.50	P3 
	400	0/380/415/440V	0/CT/110V 0/240V	3021 3060	137	128	140	7.50	P3 
	400	0/220/240V	0/CT/110V	3033	137	128	140	7.50	P3 
	500	0/380/415/440V	0/CT/24V 0/CT/110V 0/240V	3005 3022 3044	137	150	142	8.70	P3 
	500	0/220/240V	0/CT/24V 0/CT/110V	3010 3034	137	150	142	8.70	P3 
	750	0/380/415/440V	0/CT/110V 0/240V	3023 3047	167	135	166	11.70	P3 
	750	0/220/240V	0/CT/110V	3035	167	135	166	11.70	P3 

Class 1, double wound safety isolating transformers with earthed, interwinding copper screen. Insulation meets requirements of BS 415, BS 3535 (EN 60742) and parts 1 and 3 of VDE 0550. Centre tap is available for earthing if required on 110V types.

CONTROL PANEL	FIXING CENTRES		CONTROL PANEL
	VA	WIDTH x DEPTH	
	300	64 x 69	
	400	89 x 84	
	500	89 x 98	
	750	89 x 93	



ALL 100% RoHS COMPLIANT

DATA FOR GUIDANCE ONLY. SEE PAGE 18 FOR FURTHER INFORMATION



CONTROL PANEL RANGE
1000VA TO 2000VA
EX-STOCK

50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (kg)	CASE
	1000	0/380/415/440V	0/CT/110V 0/240V	3024 3045	167	150	166	13.20	P4
	1000	0/220/240V	0/CT/110V	3036	167	150	166	13.20	P4
	1250	0/380/415/440V	0/CT/110V 0/240V	3025 3064	167	160	166	15.20	P4
	1250	0/220/240V	0/CT/110V	3037	167	160	166	15.20	P4
	1500	0/380/415/440V	0/CT/110V 0/240V	3026 3046	214	152	210	20.50	P5
	1500	0/220/240V	0/CT/110V	3038	214	152	210	20.50	P5
	2000	0/380/415/440V	0/CT/110V 0/240V	3027 3048	214	165	210	24.00	P5
	2000	0/220/240V	0/CT/110V	3039	214	165	210	24.00	P5

EX-STOCK

Class 1, double wound safety isolating transformers with earthed, interwinding copper screen. Insulation meets requirements of BS 415, BS 3535 (EN 60742) and parts 1 and 3 of VDE 0550. Centre tap is available for earthing if required on 110V types.

CONTROL PANEL	FIXING CENTRES		CONTROL PANEL
	VA	WIDTH x DEPTH	
	1000	90 x 106	
	1250	90 x 119	
		115 x 119	
		115 x 124	



CONTROL PANEL RANGE

2500VA TO 5000VA

EX-STOCK

50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (kg)	CASE
	2500	0/380/415/440V	0/CT/110V 0/240V	3028 3049	214	180	210	28.50	P5 
	2500	0/220/240V	0/CT/110V	3040	214	180	210	28.50	P5 
	3000	0/380/415/440V	0/CT/110V 0/240V	3050 3051	232	190	240	32.00	P5 
	3000	0/220/240V	0/CT/110V	3052	232	190	240	32.00	P5 
	3500	0/380/415/440V	0/CT/110V 0/240V	3053 3054	232	210	240	41.00	P6 
	3500	0/220/240V	0/CT/110V	3055	232	210	240	41.00	P6 
	5000	0/380/415/440V	0/CT/110V 0/240V	3056 3057	285	220	310	50.00	P6 
	5000	0/220/240V	0/CT/110V	3058	285	220	310	50.00	P6 

Class 1, double wound safety isolating transformers with earthed, interwinding copper screen. Insulation meets requirements of BS 415, BS 3535 (EN 60742) and parts 1 and 3 of VDE 0550. Centre tap is available for earthing if required on 110V types.

CONTROL PANEL	FIXING CENTRES		CONTROL PANEL
	VA	WIDTH x DEPTH	
	2500	115 x 134	
	3000	114 x 136	
	3500	114 x 147	
	5000	165 x 155	

ALL 100% RoHS COMPLIANT

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CONTROL PANEL RANGE

7500VA TO 10000VA

EX-STOCK

50/60Hz

	VA	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (kg)	CASE	EX-STOCK
	7500	0/380/415/440V	0/CT/110V 0/240V	3070 3071	360	260	390	85.00	T3 	
	7500	0/220/240V	0/CT/110V	3072	360	260	390	85.00	T3 	
	10000	0/380/415/440V	0/CT/110V 0/240V	3061 3062	360	280	390	95.00	T3 	
	10000	0/220/240V	0/CT/110V	3063	360	280	390	95.00	T3 	

STEEL CASES AVAILABLE



WALL OR FLOOR MOUNTED

Up to 5.0KVA

IP23 Rated
20mm hole for cable entry
See page 86 for details

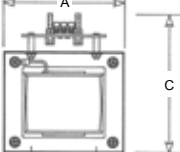
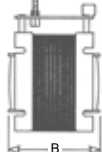


FLOOR MOUNTED

Over 5.0KVA

IP23 Rated
Gland plates for cable entry
See page 88 for details

Class 1, double wound safety isolating transformers with earthed, interwinding copper screen. Insulation meets requirements of BS 415, BS 3535 (EN 60742) and parts 1 and 3 of VDE 0550. Centre tap is available for earthing if required on 110V types.

CONTROL PANEL	FIXING CENTRES		CONTROL PANEL
	VA	WIDTH x DEPTH	
	7500	185 x 165	
	10000	185 x 190	

ALL 100% RoHS COMPLIANT

DATA FOR GUIDANCE ONLY. SEE PAGE 18 FOR FURTHER INFORMATION

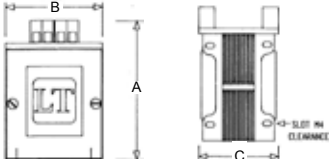


12V 25V 50V RANGE

50VA TO 1000VA
EX-STOCK

240V INPUT
50/60Hz

	VA	STYLE	VOLTS X AMPS	REF	A (mm)	B (mm)	C (mm)	Wt (kg)	CASE
	50	A	12V @ 4A	4056	98	67	58	1.05	P1 
	100	A	12V @ 8A	3225	120	84	71	2.02	P1 
	150	A	12V @ 12A	4057	120	84	76	2.23	P1 
	200	A	12V @ 16A	4058	144	98	97	2.50	P2 
	250	A	12V @ 21A	4059	125	118	95	4.00	P2 
	300	A	12V @ 25A	3226	134	137	117	4.97	P3 
	500	B	12V @ 41A	3227	172	134	137	8.76	P3 
	750	B	12V @ 62A	3228	193	172	126	11.36	P4 
	1000	B	12V @ 83A	3229	193	172	144	13.15	P4 

12V 25V 50V RANGE		FIXING CENTRES - STYLE A		FIXING CENTRES - STYLE A		12V 25V 50V RANGE
		VA	WIDTH x DEPTH	VA	WIDTH x DEPTH	
		50	55 x 45	250	65 x 60	
		100	65 x 50	300	110 x 60	
		150	65 x 55	500	115 x 95	
		200	65 x 55	750	90 x 95	



12V 25V 50V RANGE
300VA TO 1000VA
EX-STOCK

240V INPUT
50/60Hz

	VA	STYLE	VOLTS X AMPS	REF	A (mm)	B (mm)	C (mm)	Wt (kg)	CASE
	300	A	25V @ 12A	3230	134	137	100	4.88	P3 
	500	A	25V @ 20A	3231	134	137	140	8.46	P3 
	750	A	25V @ 30A	3232	170	172	126	11.02	P4 
	1000	B	25V @ 40A	3233	198	172	144	12.87	P4 

EX-STOCK

STYLE A



STYLE A

Both input and output via high quality leaf spring screw terminals.

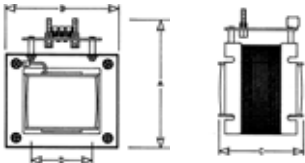
STYLE B



STYLE B

Input via high quality leaf spring screw terminals. Output via non-rotating nickel plated brass studs.

12V 25V 50V RANGE



FIXING CENTRES - STYLE B

VA	WIDTH x DEPTH
500	120 x 100
750	100 x 80
1000	120 x 105

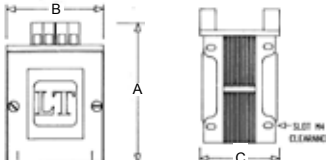
12V 25V 50V RANGE



12V 25V 50V RANGE
300VA TO 2000VA
EX-STOCK

240V INPUT
50/60Hz

	VA	STYLE	VOLTS X AMPS	REF	A (mm)	B (mm)	C (mm)	Wt (kg)	CASE
	300	A	50V @ 6A	3234	134	137	117	5.01	P3 
	500	A	50V @ 10A	3235	138	137	139	8.59	P3 
	750	A	50V @ 15A	3236	170	172	126	10.73	P4 
	1000	A	50V @ 20A	3237	176	172	144	13.22	P4 
	1500	A	50V @ 30A	3238	225	211	172	19.94	P5 
	2000	B	50V @ 40A	3239	232	211	172	23.16	P5 

12V 25V 50V RANGE		FIXING CENTRES - STYLE A		FIXING CENTRES - STYLE B		12V 25V 50V RANGE
		VA	WIDTH x DEPTH	VA	WIDTH x DEPTH	
		500	115 x 95	750	120 x 100	
		750	90 x 95	1000	120 x 100	
		1000	120 x 110			
		1500	160 x 110	2000	160 x 120	



3 PHASE STEP DOWN AUTO RANGE

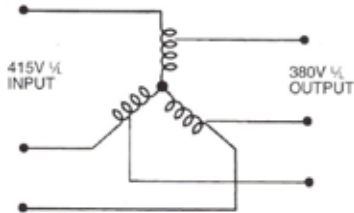
2.5KVA TO 50KVA
EX-STOCK

415V INPUT
50/60Hz

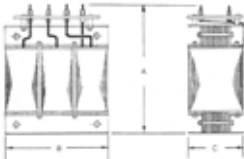
	KVA	STYLE	INPUT	OUTPUT	REF	A (mm)	B (mm)	C (mm)	Wt (kg)	CASE	EX-STOCK
	2.5	A	415V 3 PHASE STAR 50/60Hz	380V 3 PHASE STAR 50/60Hz	5200	150	150	110	5.45	P3 	EX-STOCK
	6	A			5201	180	180	130	9.50	P4 	
	10	B			5202	250	240	140	16.30	P5 	
	20	B			5203	250	240	200	26.0	P6 	
	35	B			5204	330	290	170	32.00	P7 	
	50	B			5205	320	300	180	50.00	P7 	

A range of three phase star connected auto transformers, suitable for stepping down three phase 415V to three phase 380V. Line to line. Neutral point also available.

These transformers are especially useful for supplying imported machinery from European countries whose supply differs from that of the UK.



PLEASE NOTE: AUTO TRANSFORMERS DO NOT PROVIDE INPUT - OUTPUT ISOLATION

3 PHASE AUTO RANGE		FIXING CENTRES		FIXING CENTRES		3 PHASE AUTO RANGE
		KVA	WIDTH x DEPTH	KVA	WIDTH x DEPTH	
		2.5	80 x 70	20	160 x 113	
		6	130 x 83	35	211 x 85	
		10	170 x 80	50	211 x 105	



CASED AUTO RANGE

100VA TO 2000VA
EX-STOCK

240V INPUT
50/60Hz



110V



240V

FOR OPERATION OF AMERICAN EQUIPMENT ON UK MAINS SUPPLY

Mounted in an epoxy coated high gloss, black, IP23 case, with cut-out, mains switch & indicator. Input via 3 core mains lead fitted with rewirable UK domestic 13A, 3 pin plug, output via American 15A, 3 pin socket. 2 pin flat bladed American plugs also fit these sockets.



· INPUT: 240V UK 13A PLUG

· OUTPUT: 110V AMERICAN 15A SOCKET

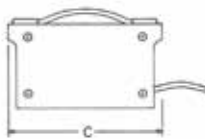
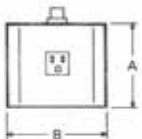
· CONTINUOUSLY RATED

VA	REF	OUTLETS	HEIGHT A (mm)	WIDTH B (mm)	LENGTH C (mm)	WEIGHT (kg)
100	636	1	88	113	147	2.00
300	644	1	88	113	147	3.00
500	536	1	103	122	166	4.50
1000	537	1	119	142	185	7.00
1500	561	2	145	171	226	10.50
2000	538	2	145	171	226	11.50

PLEASE NOTE: AUTO TRANSFORMERS DO NOT PROVIDE INPUT - OUTPUT ISOLATION

100VA & 300VA DO NOT HAVE CARRY HANDLES

CASED AUTO RANGE



CASED AUTO RANGE



CASED AUTO RANGE

500VA TO 2000VA
EX-STOCK

110V INPUT
50/60Hz



240V



110V

EX-STOCK

FOR OPERATION OF AMERICAN EQUIPMENT ON UK MAINS SUPPLY

Mounted in an epoxy coated high gloss, black, IP23 case, with cut-out, mains switch & indicator. Input via 3 core mains lead fitted with rewirable American 15A, 3 pin plug, output via UK domestic 13A, 3 pin socket.



• INPUT: 110V AMERICAN 15A PLUG

• OUTPUT: 240V UK 13A SOCKET

• CONTINUOUSLY RATED

VA	REF	OUTLETS	HEIGHT A (mm)	WIDTH B (mm)	LENGTH C (mm)	WEIGHT (kg)
500	1400	1	103	122	166	4.50
1000	1401	1	119	142	185	7.00
2000	1402	1	145	171	226	16.00

PLEASE NOTE: AUTO TRANSFORMERS DO NOT PROVIDE INPUT - OUTPUT ISOLATION





PORTABLE TOOL TRANSFORMERS

1000VA TO 2000VA
EX-STOCK

240V INPUT
50/60Hz

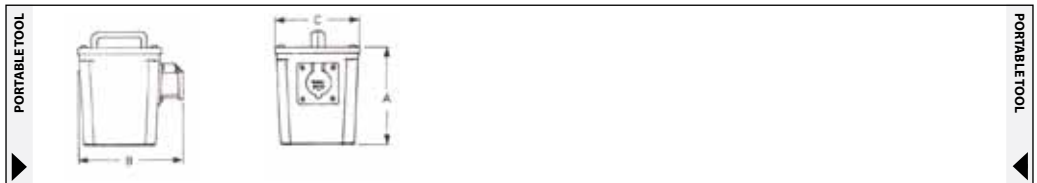
A range of Class1, double wound safety isolating transformers. Mounted in tough, moulded, glass fibre IP44 enclosure with integral carry handle. Input via 2 metres of 3 core flexible cable, easily replaceable should damage occur. Manually resettable cut-out fitted to input. Secondary centre tap and sockets bonded to earth. Suitable for 50/60Hz operation. Designed and tested to BS 3535, EN 60742, VDE 0050 and 0051. Standard 3 pin output sockets to BS EN 60309 (Formerly BS 4343).



· INPUT: 0/240V UK 13A PLUG · OUTPUT: 0/CTE/110V BS 60309 SOCKETS · PLUGS CAN BE SUPPLIED SEPARATELY

VA TOOL	REF	INPUT	OUTPUT	SOCKETS	HEIGHT A (mm)	WIDTH B (mm)	LENGTH C (mm)	WEIGHT (kg)
1000	LTP/1	0/240V	0/CTE/110V	1 X 16A	215	220	170	11.00
1500	LTP/2	0/240V	0/CTE/110V	1 X 16A	260	255	195	17.00
2000	LTP/3	0/240V	0/CTE/110V	1 X 32A OR 2 X 16A	260	255	295	20.00
3000	LTP/5	0/240V	0/CTE/110V	2 X 16A	260	255	295	18.00

PLEASE NOTE: TOOL RATINGS SHOWN ARE FOR 5 MINUTES ON 15 MINUTES OFF DUTY CYCLE, IN ACCORDANCE WITH EN 61558.
FOR CONTINUOUS RATINGS DIVIDE TOOL RATINGS BY 2.





SITE DISTRIBUTION TRANSFORMERS

5KVA TO 10KVA
EX-STOCK

240V OR 415V INPUT
50/60Hz

A range of continuously rated, double wound safety isolating transformers, designed to supply power for tools & lighting on construction sites. All enclosures are ruggedly constructed to IP44 and fitted with skids to enable use outdoors. Protection is via switched input & double pole MCB's fitted to the output. Designed and tested to BS 3535, EN 60742, VDE 0050 and 0051. Standard 3 pin output sockets to BS EN 60309 (Formerly BS 4343).

EX-STOCK



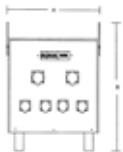
· INPUT: 240V SINGLE PHASE & 415V THREE PHASE

· OUTPUT: 110V BS 60309 SOCKETS

· OUTDOOR IP44

KVA CONT.	REF	INPUT	OUTPUT	SOCKETS	WIDTH A (mm)	HEIGHT B (mm)	LENGTH C (mm)	WEIGHT (kg)
5	2000	240V 1 PH	110V	INPUT ISOLATOR 4 X 16A MCB PROTECTED	460	660	460	65.00
10	3000	240V 1 PH	110V	INPUT ISOLATOR 4 X 16A MCB PROTECTED	460	660	460	85.00
10	4500	415V 3PH	110V	INPUT ISOLATOR 4 X 16A & 2 X 32A MCB PROTECTED	580	660	600	75.00

SITE DISTRIBUTION TX



SITE DISTRIBUTION TX



SECTION A



**PRINTED CIRCUIT MOUNTED
TRANSFORMERS (MADE TO ORDER)**



PRINTED CIRCUIT MOUNTED

1.2VA - 3.0VA

(MADE TO ORDER)

Notes

1. Select transformer required, i.e. Primary A, Secondary 7 etc.
2. VA rating is the product of secondary voltage and secondary full load current.
3. All output voltages specified are at full load.
4. All primaries suitable for 50/60Hz operation.
5. Standard types designed for full rating at 40°C ambient temperature.
6. Transformers require adequate ventilation. De-rate for confined spaces.

Notes for printed circuit mounted transformers

1. Pin layouts indicated are when viewed from transformer pin face.
2. Any pin layout can be accommodated.
3. Fine winding wires skeined to tags for extra strength.
4. Flash test 4.0KV r.m.s. Temperature range -10°C to +50°C
5. Thermal fuse protection to BS 3535 can be fitted on request.

Any other voltage/tapping available. Please enquire.

All terminal pins are plated to a lead free standard.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.



PRIMARY INPUT		Using Pin No's.
A	0 - 110V	1 - 5
B	0 - 115V	1 - 5
C	0 - 120V	1 - 5
D	0 - 127V	1 - 5
E	0 - 110V 0 - 110V	1 - 2 - 4 - 5
F	0 - 115V 0 - 115V	1 - 2 - 4 - 5
G	0 - 120V 0 - 120V	1 - 2 - 4 - 5
H	0 - 220V	1 - 5
I	0 - 230V	1 - 5
J	0 - 240V	1 - 5
K	0 - 380V	1 - 5
L	0 - 415V	1 - 5
M	0 - 440V	1 - 5
N		
O		
P		
Q		
R		
S		
T	To your specification	

PRIMARY INPUT		Using Pin No's.
1	0 - 3V	7 - 9
2	0 - 6V	7 - 9
3	0 - 9V	7 - 9
4	0 - 12V	7 - 9
5	0 - 15V	7 - 9
6	0 - 20V	7 - 9
7	0 - 24V	7 - 9
8	0 - 30V	7 - 9
9	3V - 0 - 3V	6 - 8 - 10
10	6V - 0 - 6V	6 - 8 - 10
11	9V - 0 - 9V	6 - 8 - 10
12	12V - 0 - 12V	6 - 8 - 10
13	15V - 0 - 15V	6 - 8 - 10
14	20V - 0 - 20V	6 - 8 - 10
15	30V - 0 - 30V	6 - 8 - 10
16	0 - 6V 0 - 6V	6 - 7 - 9 - 10
17	0 - 9V 0 - 9V	6 - 7 - 9 - 10
18	0 - 12V 0 - 12V	6 - 7 - 9 - 10
19	0 - 15V 0 - 15V	6 - 7 - 9 - 10
20	0 - 20V 0 - 20V	6 - 7 - 9 - 10



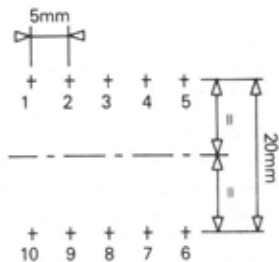
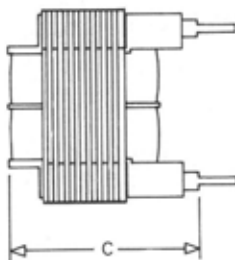
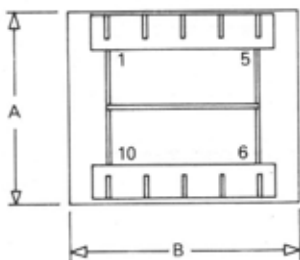


PRINTED CIRCUIT MOUNTED

1.2VA - 3.0VA
(MADE TO ORDER)

PCB MOUNTED TRANSFORMERS

1.2VA - 1.8VA



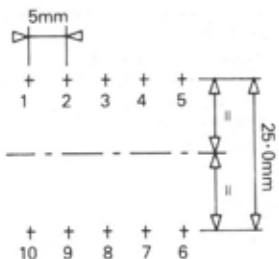
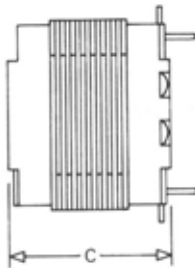
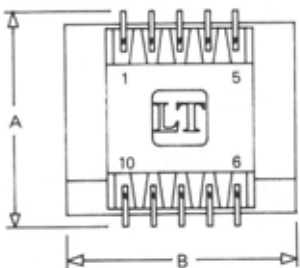
Copper Side

PCB MOUNTED TRANSFORMERS

SECTION A

PCB MOUNTED TRANSFORMERS

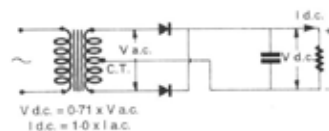
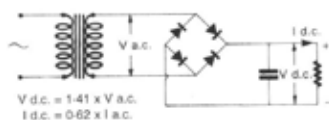
3.0VA



Copper Side

PCB MOUNTED TRANSFORMERS

VA	REG % APPROX	PLAN AREA		C (mm)	WEIGHT (gms)
		A (mm)	B (mm)		
1.2				25	65
1.5	35	25	30	27	70
1.8				29	75
3.0	21	35	38	30	120





PRINTED CIRCUIT MOUNTED

6.0VA - 8.0VA

(MADE TO ORDER)

Notes

1. Select transformer required, i.e. Primary A, Secondary 7 etc.
2. VA rating is the product of secondary voltage and secondary full load current.
3. All output voltages specified are at full load.
4. All primaries suitable for 50/60Hz operation.
5. Standard types designed for full rating at 40°C ambient temperature.
6. Transformers require adequate ventilation. De-rate for confined spaces.

Notes for printed circuit mounted transformers

1. Pin layouts indicated are when viewed from transformer pin face.
2. Any pin layout can be accommodated.
3. Fine winding wires skeined to tags for extra strength.
4. Flash test 4.0KV r.m.s. Temperature range -10°C to +50°C
5. Thermal fuse protection to BS 3535 can be fitted on request.

Any other voltage/tapping available. Please enquire.

All terminal pins are plated to a lead free standard.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.



PRIMARY INPUT		Using Pin No's.	
		6.0VA	8.0VA
A	0 - 110V	1 - 5	1 - 6
B	0 - 115V	1 - 5	1 - 6
C	0 - 120V	1 - 5	1 - 6
D	0 - 127V	1 - 5	1 - 6
E	0 - 110V 0 - 110V	1 - 2 - 4 - 5	1 - 3 - 4 - 6
F	0 - 115V 0 - 115V	1 - 2 - 4 - 5	1 - 3 - 4 - 6
G	0 - 120V 0 - 120V	1 - 2 - 4 - 5	1 - 3 - 4 - 6
H	0 - 220V	1 - 5	1 - 6
I	0 - 230V	1 - 5	1 - 6
J	0 - 240V	1 - 5	1 - 6
K	0 - 380V	1 - 5	1 - 6
L	0 - 415V	1 - 5	1 - 6
M	0 - 440V	1 - 5	1 - 6
N			
O			
P			
Q			
R			
S			
T	To your specification		

PRIMARY INPUT		Using Pin No's.	
		6.0VA	8.0VA
1	0 - 3V	7 - 9	8 - 11
2	0 - 6V	7 - 9	8 - 11
3	0 - 9V	7 - 9	8 - 11
4	0 - 12V	7 - 9	8 - 11
5	0 - 15V	7 - 9	8 - 11
6	0 - 20V	7 - 9	8 - 11
7	0 - 24V	7 - 9	8 - 11
8	0 - 30V	7 - 9	8 - 11
9	3V - 0 - 3V	6 - 8 - 10	8 - 10 - 12
10	6V - 0 - 6V	6 - 8 - 10	8 - 10 - 12
11	9V - 0 - 9V	6 - 8 - 10	8 - 10 - 12
12	12V - 0 - 12V	6 - 8 - 10	8 - 10 - 12
13	15V - 0 - 15V	6 - 8 - 10	8 - 10 - 12
14	20V - 0 - 20V	6 - 8 - 10	8 - 10 - 12
15	30V - 0 - 30V	6 - 8 - 10	8 - 10 - 12
16	0 - 6V 0 - 6V	6 - 7 - 9 - 10	7 - 9 - 10 - 12
17	0 - 9V 0 - 9V	6 - 7 - 9 - 10	7 - 9 - 10 - 12
18	0 - 12V 0 - 12V	6 - 7 - 9 - 10	7 - 9 - 10 - 12
19	0 - 15V 0 - 15V	6 - 7 - 9 - 10	7 - 9 - 10 - 12
20	0 - 20V 0 - 20V	6 - 7 - 9 - 10	7 - 9 - 10 - 12



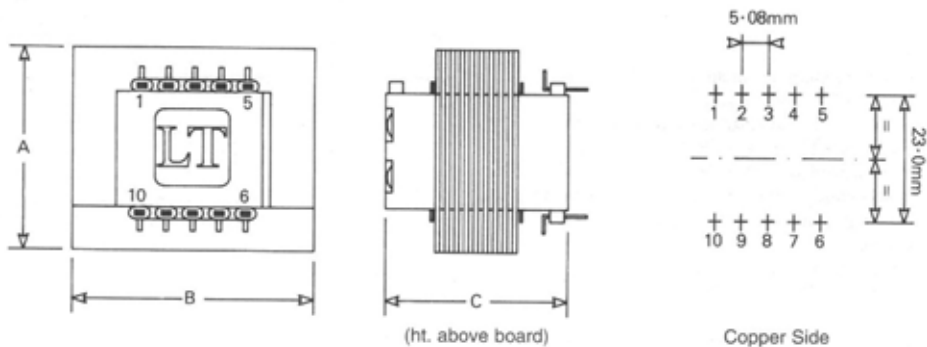
PRINTED CIRCUIT MOUNTED

6.0VA - 8.0VA

(MADE TO ORDER)

PCB MOUNTED TRANSFORMERS

6.0VA

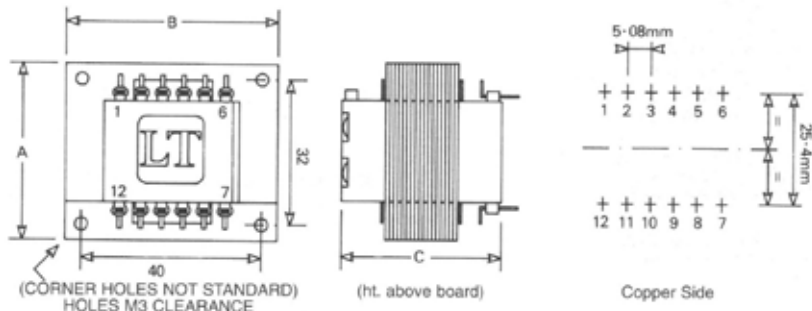


PCB MOUNTED TRANSFORMERS

SECTION A

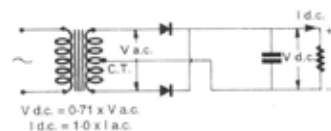
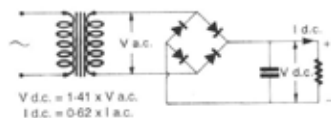
PCB MOUNTED TRANSFORMERS

8.0VA



PCB MOUNTED TRANSFORMERS

VA	REG % APPROX	PLAN AREA		C (mm)	WEIGHT (gms)
		A (mm)	B (mm)		
6.0	25	36	43	35	165
8.0	23	40	48	37	215





PRINTED CIRCUIT MOUNTED

12.0VA - 18.0VA
(MADE TO ORDER)

Notes

1. Select transformer required, i.e. Primary A, Secondary 7 etc.
2. VA rating is the product of secondary voltage and secondary full load current.
3. All output voltages specified are at full load.
4. All primaries suitable for 50/60Hz operation.
5. Standard types designed for full rating at 40°C ambient temperature.
6. Transformers require adequate ventilation. De-rate for confined spaces.

Notes for printed circuit mounted transformers

1. Pin layouts indicated are when viewed from transformer pin face.
2. Any pin layout can be accommodated.
3. Fine winding wires skeined to tags for extra strength.
4. Flash test 4.0KV r.m.s. Temperature range -10°C to +50°C
5. Thermal fuse protection to BS 3535 can be fitted on request.

Any other voltage/tapping available. Please enquire.

All terminal pins are plated to a lead free standard.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.



PRIMARY INPUT		Using Pin No's.	
		12.0VA	18.0VA
A	0 - 110V	1 - 6	1 - 5
B	0 - 115V	1 - 6	1 - 5
C	0 - 120V	1 - 6	1 - 5
D	0 - 127V	1 - 6	1 - 5
E	0 - 110V 0 - 110V	1 - 3 - 4 - 6	1 - 2 - 4 - 5
F	0 - 115V 0 - 115V	1 - 3 - 4 - 6	1 - 2 - 4 - 5
G	0 - 120V 0 - 120V	1 - 3 - 4 - 6	1 - 2 - 4 - 5
H	0 - 220V	1 - 6	1 - 5
I	0 - 230V	1 - 6	1 - 5
J	0 - 240V	1 - 6	1 - 5
K	0 - 380V	1 - 6	1 - 5
L	0 - 415V	1 - 6	1 - 5
M	0 - 440V	1 - 6	1 - 5
N	0 - 550V	1 - 6	1 - 5
O	0 - 600V (Max.)	1 - 6	1 - 5
P			
Q			
R			
S			
T	To your specification		

PRIMARY INPUT		Using Pin No's.	
		12.0VA	18.0VA
1	0 - 3V	8 - 11	7 - 9
2	0 - 6V	8 - 11	7 - 9
3	0 - 9V	8 - 11	7 - 9
4	0 - 12V	8 - 11	7 - 9
5	0 - 15V	8 - 11	7 - 9
6	0 - 20V	8 - 11	7 - 9
7	0 - 24V	8 - 11	7 - 9
8	0 - 30V	8 - 11	7 - 9
9	4.5V - 0 - 4.5V	8 - 10 - 12	6 - 8 - 10
10	6V - 0 - 6V	8 - 10 - 12	6 - 8 - 10
11	9V - 0 - 9V	8 - 10 - 12	6 - 8 - 10
12	12V - 0 - 12V	8 - 10 - 12	6 - 8 - 10
13	15V - 0 - 15V	8 - 10 - 12	6 - 8 - 10
14	20V - 0 - 20V	8 - 10 - 12	6 - 8 - 10
15	30V - 0 - 30V	8 - 10 - 12	6 - 8 - 10
16	0 - 6V 0 - 6V	7 - 9 - 10 - 12	6 - 7 - 9 - 10
17	0 - 9V 0 - 9V	7 - 9 - 10 - 12	6 - 7 - 9 - 10
18	0 - 12V 0 - 12V	7 - 9 - 10 - 12	6 - 7 - 9 - 10
19	0 - 15V 0 - 15V	7 - 9 - 10 - 12	6 - 7 - 9 - 10
20	0 - 20V 0 - 20V	7 - 9 - 10 - 12	6 - 7 - 9 - 10

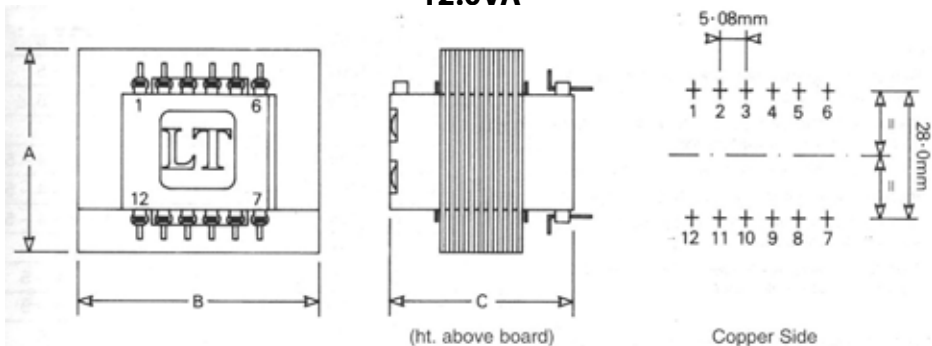


PRINTED CIRCUIT MOUNTED

12.0VA - 18.0VA
(MADE TO ORDER)

PCB MOUNTED TRANSFORMERS

12.0VA

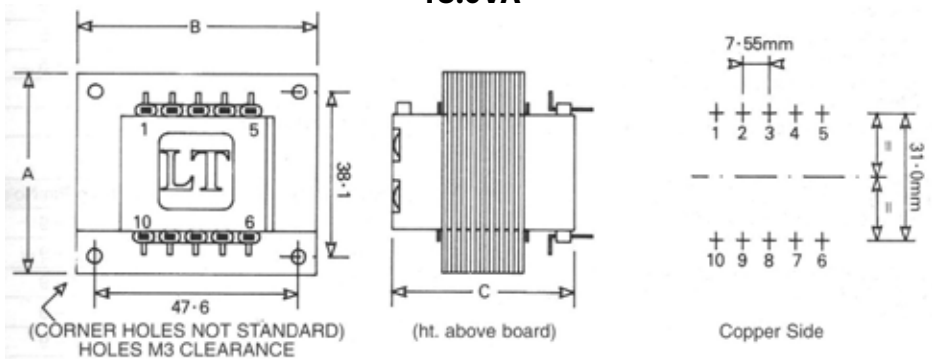


PCB MOUNTED TRANSFORMERS

SECTION A

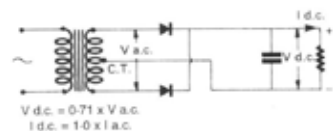
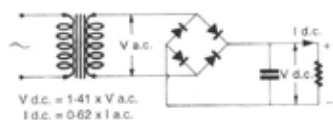
PCB MOUNTED TRANSFORMERS

18.0VA



PCB MOUNTED TRANSFORMERS

VA	REG % APPROX	PLAN AREA		C (mm)	WEIGHT (gms)
		A (mm)	B (mm)		
12.0	20	44	52	42	300
18.0	18	48	57	46	400





PRINTED CIRCUIT MOUNTED

22.0VA - 30.0VA
(MADE TO ORDER)

Notes

1. Select transformer required, i.e. Primary A, Secondary 7 etc.
2. VA rating is the product of secondary voltage and secondary full load current.
3. All output voltages specified are at full load.
4. All primaries suitable for 50/60Hz operation.
5. Standard types designed for full rating at 40°C ambient temperature.
6. Transformers require adequate ventilation. De-rate for confined spaces.

Notes for printed circuit mounted transformers

1. Pin layouts indicated are when viewed from transformer pin face.
2. Any pin layout can be accommodated.
3. Fine winding wires skeined to tags for extra strength.
4. Flash test 4.0KV r.m.s. Temperature range -10°C to +50°C
5. Thermal fuse protection to BS 3535 can be fitted on request.

Any other voltage/tapping available. Please enquire.

All terminal pins are plated to a lead free standard.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.



PRIMARY INPUT		Using Pin No's.
A	0 - 110V	1 - 5
B	0 - 115V	1 - 5
C	0 - 120V	1 - 5
D	0 - 127V	1 - 5
E		
F	0 - 110V 0 - 110V	1 - 2 - 4 - 5
G	0 - 115V 0 - 115V	1 - 2 - 4 - 5
H	0 - 120V 0 - 120V	1 - 2 - 4 - 5
I		
J	0 - 110V - 240V	1 - 4 - 5
K	0 - 220V - 240V	1 - 4 - 5
L	0 - 220V	1 - 5
M	0 - 230V	1 - 5
N	0 - 240V	1 - 5
O	0 - 380V	1 - 5
P	0 - 415V	1 - 5
Q	0 - 440V	1 - 5
R	0 - 550V	1 - 5
S	0 - 600V (Max.)	1 - 5
T	To your specification	

PRIMARY INPUT		Using Pin No's.
1	0 - 6V	7 - 9
2	0 - 9V	7 - 9
3	0 - 10V	7 - 9
4	0 - 12V	7 - 9
5	0 - 18V	7 - 9
6	0 - 24V	7 - 9
7	0 - 30V	7 - 9
8	0 - 48V	7 - 9
9	0 - 60V	7 - 9
10	6V - 0 - 6V	6 - 8 - 10
11	9V - 0 - 9V	6 - 8 - 10
12	12V - 0 - 12V	6 - 8 - 10
13	15V - 0 - 15V	6 - 8 - 10
14	20V - 0 - 20V	6 - 8 - 10
15	30V - 0 - 30V	6 - 8 - 10
16	0 - 6V 0 - 6V	6 - 7 - 9 - 10
17	0 - 9V 0 - 9V	6 - 7 - 9 - 10
18	0 - 12V 0 - 12V	6 - 7 - 9 - 10
19	0 - 15V 0 - 15V	6 - 7 - 9 - 10
20	0 - 20V 0 - 20V	6 - 7 - 9 - 10

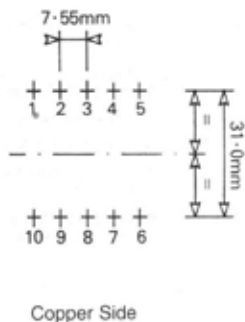
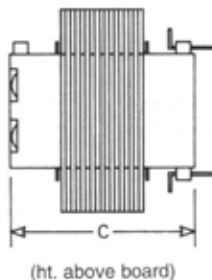
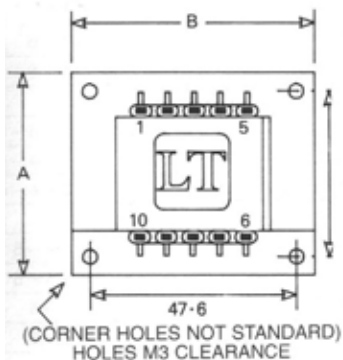


PRINTED CIRCUIT MOUNTED

22.0VA - 30.0VA
(MADE TO ORDER)

PCB MOUNTED TRANSFORMERS

22.0VA

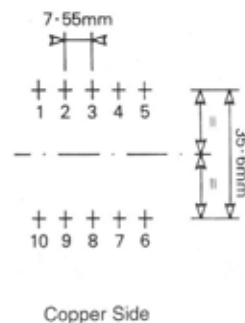
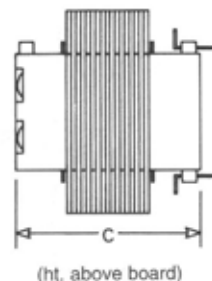
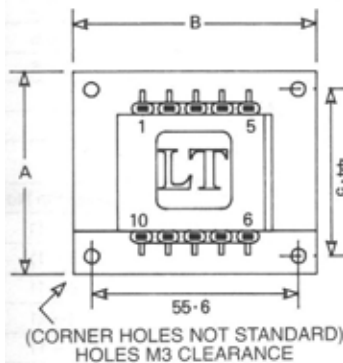


PCB MOUNTED TRANSFORMERS

SECTION A

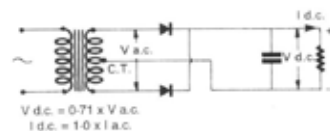
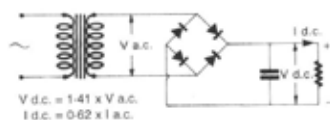
PCB MOUNTED TRANSFORMERS

30.0VA



PCB MOUNTED TRANSFORMERS

VA	REG % APPROX	PLAN AREA		C (mm)	WEIGHT (gms)
		A (mm)	B (mm)		
22.0	15	48	58	52	450
30.0	11	56	67	50	770





PRINTED CIRCUIT MOUNTED

50.0VA - 65.0VA
(MADE TO ORDER)

Notes

1. Select transformer required, i.e. Primary A, Secondary 7 etc.
2. VA rating is the product of secondary voltage and secondary full load current.
3. All output voltages specified are at full load.
4. All primaries suitable for 50/60Hz operation.
5. Standard types designed for full rating at 40°C ambient temperature.
6. Transformers require adequate ventilation. De-rate for confined spaces.

Notes for printed circuit mounted transformers

1. Pin layouts indicated are when viewed from transformer pin face.
2. Any pin layout can be accommodated.
3. Fine winding wires skeined to tags for extra strength.
4. Flash test 4.0KV r.m.s. Temperature range -10°C to +50°C
5. Thermal fuse protection to BS 3535 can be fitted on request.

Any other voltage/tapping available. Please enquire.

All terminal pins are plated to a lead free standard.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.



PRIMARY INPUT		Using Pin No's.
A	0 - 110V	1 - 5
B	0 - 115V	1 - 5
C	0 - 120V	1 - 5
D	0 - 127V	1 - 5
E		
F	0 - 110V 0 - 110V	1 - 2 - 4 - 5
G	0 - 115V 0 - 115V	1 - 2 - 4 - 5
H	0 - 120V 0 - 120V	1 - 2 - 4 - 5
I		
J	0 - 110V - 240V	1 - 4 - 5
K	0 - 220V - 240V	1 - 4 - 5
L	0 - 220V	1 - 5
M	0 - 230V	1 - 5
N	0 - 240V	1 - 5
O	0 - 380V	1 - 5
P	0 - 415V	1 - 5
Q	0 - 440V	1 - 5
R	0 - 550V	1 - 5
S	0 - 600V (Max.)	1 - 5
T	To your specification	

PRIMARY INPUT		Using Pin No's.
1	0 - 9V	8 - 11
2	0 - 12V	8 - 11
3	0 - 15V	8 - 11
4	0 - 24V	8 - 11
5	0 - 48V	8 - 11
6	6V - 0 - 6V	8 - 10 - 12
7	9V - 0 - 9V	8 - 10 - 12
8	12V - 0 - 12V	8 - 10 - 12
9	15V - 0 - 15V	8 - 10 - 12
10	20V - 0 - 20V	8 - 10 - 12
11	24V - 0 - 24V	8 - 10 - 12
12	30V - 0 - 30V	8 - 10 - 12
13	0 - 6V 0 - 6V	7 - 9 - 10 - 12
14	0 - 9V 0 - 9V	7 - 9 - 10 - 12
15	0 - 12V 0 - 12V	7 - 9 - 10 - 12
16	0 - 15V 0 - 15V	7 - 9 - 10 - 12
17	0 - 18V 0 - 18V	7 - 9 - 10 - 12
18	0 - 20V 0 - 20V	7 - 9 - 10 - 12
19	0 - 24V 0 - 24V	7 - 9 - 10 - 12
20	0 - 30V 0 - 30V	7 - 9 - 10 - 12

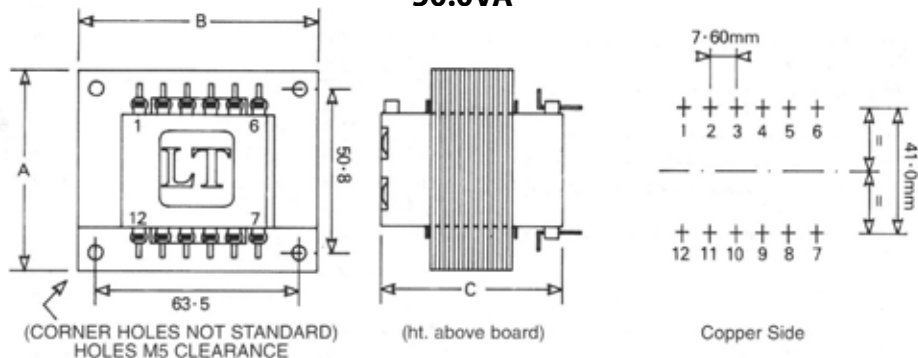


PRINTED CIRCUIT MOUNTED

50.0VA - 65.0VA
(MADE TO ORDER)

PCB MOUNTED TRANSFORMERS

50.0VA

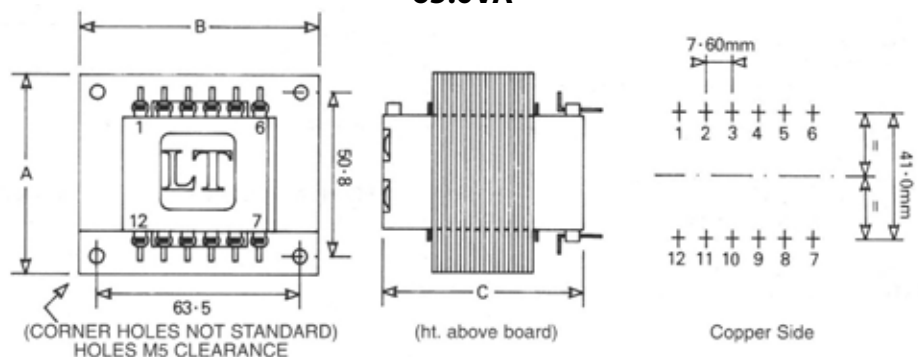


PCB MOUNTED TRANSFORMERS

A NO. 1 SECTION

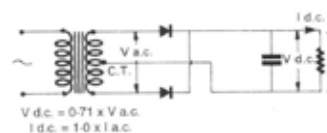
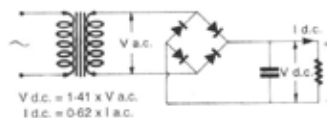
PCB MOUNTED TRANSFORMERS

65.0VA



PCB MOUNTED TRANSFORMERS

VA	REG % APPROX	PLAN AREA		C (mm)	WEIGHT (gms)
		A (mm)	B (mm)		
50.0	10	64	77	59	1000
65.0	9	64	77	63	1200





PRINTED CIRCUIT MOUNTED

75.0VA - 100.0VA
(MADE TO ORDER)

Notes

1. Select transformer required, i.e. Primary A, Secondary 7 etc.
2. VA rating is the product of secondary voltage and secondary full load current.
3. All output voltages specified are at full load.
4. All primaries suitable for 50/60Hz operation.
5. Standard types designed for full rating at 40°C ambient temperature.
6. Transformers require adequate ventilation. De-rate for confined spaces.

Notes for printed circuit mounted transformers

1. Pin layouts indicated are when viewed from transformer pin face.
2. Any pin layout can be accommodated.
3. Fine winding wires skeined to tags for extra strength.
4. Flash test 4.0KV r.m.s. Temperature range -10°C to +50°C
5. Thermal fuse protection to BS 3535 can be fitted on request.

Any other voltage/tapping available. Please enquire.

All terminal pins are plated to a lead free standard.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.



PRIMARY INPUT		Using Pin No's.
A	0 - 110V	1 - 5
B	0 - 115V	1 - 5
C	0 - 120V	1 - 5
D	0 - 127V	1 - 5
E		
F	0 - 110V 0 - 110V	1 - 2 - 4 - 5
G	0 - 115V 0 - 115V	1 - 2 - 4 - 5
H	0 - 120V 0 - 120V	1 - 2 - 4 - 5
I		
J	0 - 110V - 240V	1 - 4 - 5
K	0 - 220V - 240V	1 - 4 - 5
L	0 - 220V	1 - 5
M	0 - 230V	1 - 5
N	0 - 240V	1 - 5
O	0 - 380V	1 - 5
P	0 - 415V	1 - 5
Q	0 - 440V	1 - 5
R	0 - 550V	1 - 5
S	0 - 600V (Max.)	1 - 5
T	To your specification	

PRIMARY INPUT		Using Pin No's.
1	0 - 9V	8 - 11
2	0 - 12V	8 - 11
3	0 - 15V	8 - 11
4	0 - 24V	8 - 11
5	0 - 48V	8 - 11
6	6V - 0 - 6V	8 - 10 - 12
7	9V - 0 - 9V	8 - 10 - 12
8	12V - 0 - 12V	8 - 10 - 12
9	15V - 0 - 15V	8 - 10 - 12
10	20V - 0 - 20V	8 - 10 - 12
11	24V - 0 - 24V	8 - 10 - 12
12	30V - 0 - 30V	8 - 10 - 12
13	0 - 6V 0 - 6V	7 - 9 - 10 - 12
14	0 - 9V 0 - 9V	7 - 9 - 10 - 12
15	0 - 12V 0 - 12V	7 - 9 - 10 - 12
16	0 - 15V 0 - 15V	7 - 9 - 10 - 12
17	0 - 18V 0 - 18V	7 - 9 - 10 - 12
18	0 - 20V 0 - 20V	7 - 9 - 10 - 12
19	0 - 24V 0 - 24V	7 - 9 - 10 - 12
20	0 - 30V 0 - 30V	7 - 9 - 10 - 12



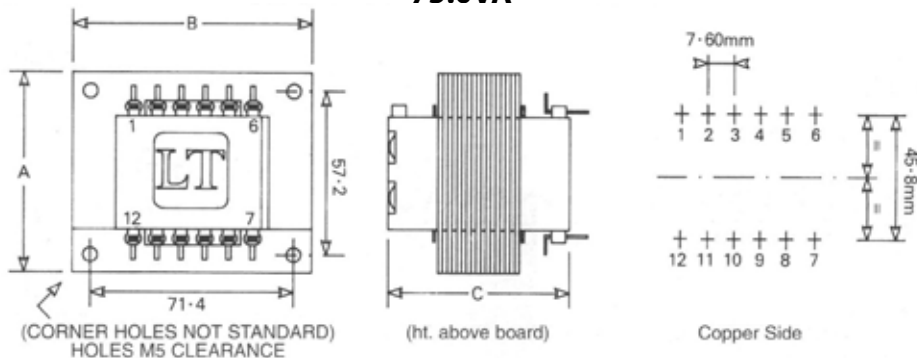


PRINTED CIRCUIT MOUNTED

75.0VA - 100.0VA
(MADE TO ORDER)

PCB MOUNTED TRANSFORMERS

75.0VA

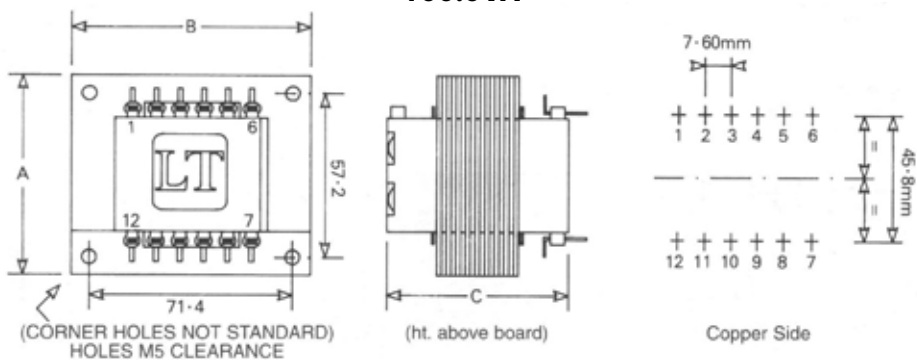


PCB MOUNTED TRANSFORMERS

SECTION A

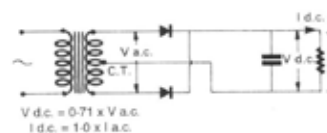
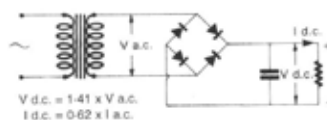
PCB MOUNTED TRANSFORMERS

100.0VA



PCB MOUNTED TRANSFORMERS

VA	REG % APPROX	PLAN AREA		C (mm)	WEIGHT (gms)
		A (mm)	B (mm)		
75.0	8	73	86	63	1400
100.0*	8	73	86	63	1400



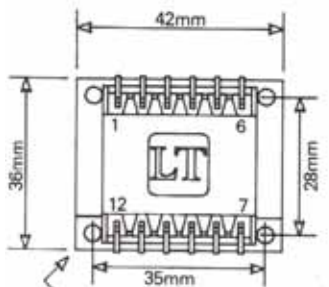
* USING HIGH GRADE CORE MATERIAL

196-196

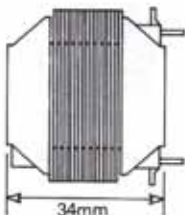


PRINTED CIRCUIT MOUNTED ALTERNATIVE PCB SIZES - METRIC BOBBINS (MADE TO ORDER)

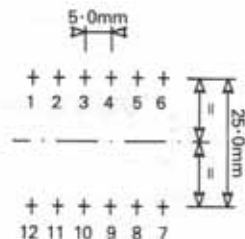
6.0VA



(CORNER HOLES NOT STANDARD)
HOLES M3 CLEARANCE

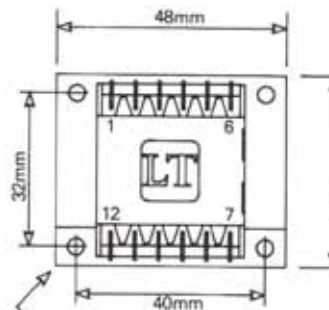


(ht. above board)

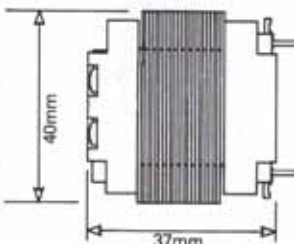


Copper Side

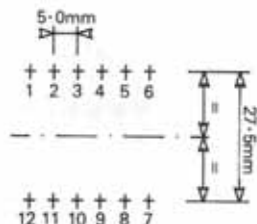
8.0VA



(CORNER HOLES NOT STANDARD)
HOLES M3 CLEARANCE



(ht. above board)



Copper Side

BOBBIN

Double Section. Fully Shrouded. 30% Glass Filled Nylon. Melt Temperature 260°C. Meets Basic Requirements of VDE. IEC. BS 415 and CEE 15 Relating to Creepage Distances. Insulation Requirements. Class B (130°C)

WIRE

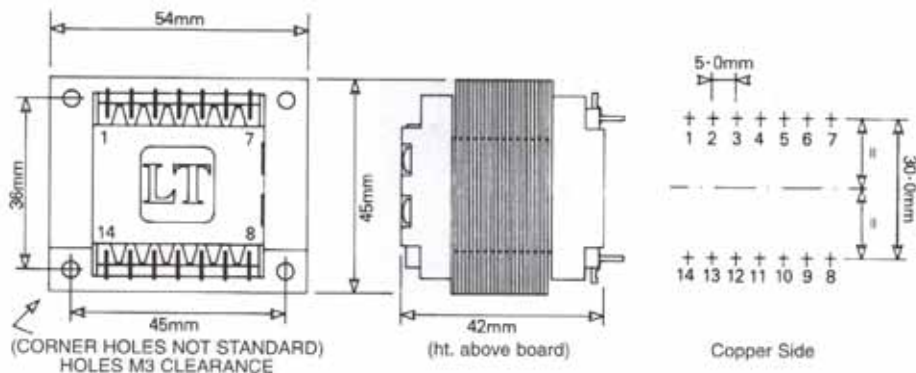
Solderable Grade 1. Modified Polyurethane Synthetic Enamel to BS 6811. IEC 317-4 DIN 46416-BL.2(v) Class B (130°C). 99.9% Copper

VARNISH

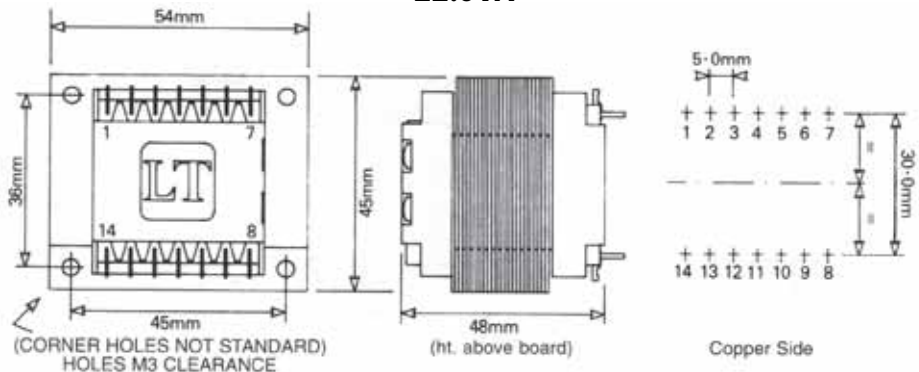
Isophthalic Alkyd flexible. Air Dried. Class F (155°C) to BS 5629. IEC 85

PRINTED CIRCUIT MOUNTED **ALTERNATIVE PCB SIZES - METRIC BOBBINS** **(MADE TO ORDER)**

18.0VA



22.0VA



BOBBIN

Double Section. Fully Shrouded. 30% Glass Filled Nylon. Melt Temperature 260°C. Meets Basic Requirements of VDE. IEC. BS 415 and CEE 15 Relating to Creepage Distances. Insulation Requirements. Class B (130°C)

WIRE

Solderable Grade 1. Modified Polyurethane Synthetic Enamel to BS 6811. IEC 317-4 DIN 46416-BL.2(v) Class B (130°C). 99.9% Copper

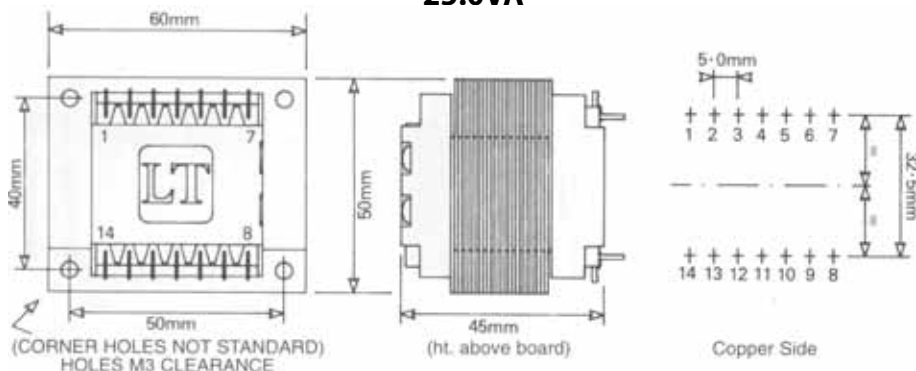
VARNISH

Isophthalic Alkyd flexible. Air Dried. Class F (155°C) to BS 5629. IEC 85

PRINTED CIRCUIT MOUNTED ALTERNATIVE PCB SIZES - METRIC BOBBINS (MADE TO ORDER)

PCB MOUNTED TRANSFORMERS

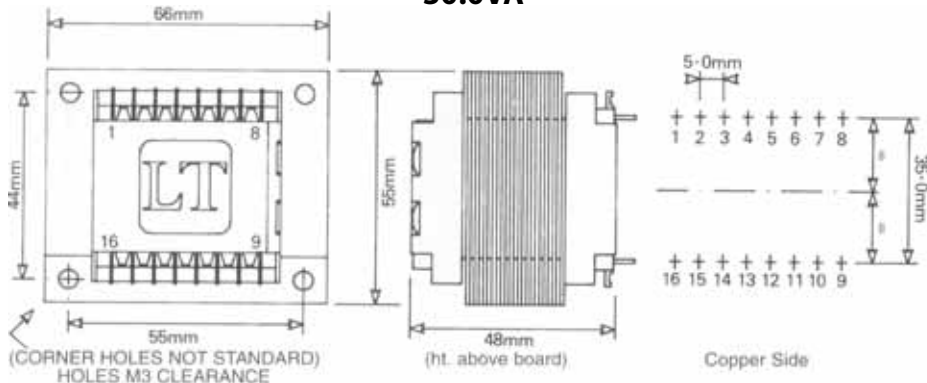
25.0VA



PCB MOUNTED TRANSFORMERS

PCB MOUNTED TRANSFORMERS

30.0VA



PCB MOUNTED TRANSFORMERS

BOBBIN

Double Section. Fully Shrouded. 30% Glass Filled Nylon. Melt Temperature 260°C. Meets Basic Requirements of VDE. IEC. BS 415 and CEE 15 Relating to Creepage Distances. Insulation Requirements. Class B (130°C)

WIRE

Solderable Grade 1. Modified Polyurethane Synthetic Enamel to BS 6811. IEC 317-4 DIN 46416-BL.2(v) Class B (130°C). 99.9% Copper

VARNISH

Isophthalic Alkyd flexible. Air Dried. Class F (155°C) to BS 5629. IEC 85



SECTION B



**CLAMP / FRAME TRANSFORMERS
(MADE TO ORDER)**



U CLAMP TRANSFORMERS (MADE TO ORDER)

Notes

1. Select transformer required, i.e. Primary A, Secondary 7 etc.
2. VA rating is the product of secondary voltage and secondary full load current.
3. All output voltages specified are at full load.
4. All primaries suitable for 50/60Hz operation.
5. Standard types designed for full rating at 40°C ambient temperature.
6. Transformers require adequate ventilation. De-rate for confined spaces.
7. Flash test 4.0KV r.m.s. Temperature range -10°C to +50°C

Any other voltage/tapping available. Please enquire.

U Clamp Transformers are normally supplied with input tags at top & output tags at bottom.

All terminal pins are plated to a lead free standard.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.

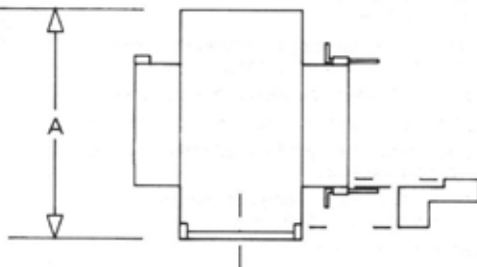
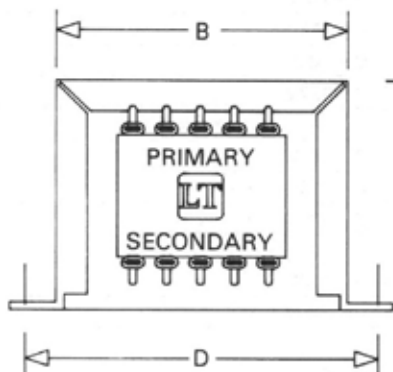


PRIMARY INPUT	
A	0 - 110V
B	0 - 115V
C	0 - 120V
D	0 - 127V
E	
F	0 - 110V 0 - 110V
G	0 - 115V 0 - 115V
H	0 - 120V 0 - 120V
I	
J	0 - 110V - 240V
K	0 - 220V - 240V
L	0 - 220V
M	0 - 230V
N	0 - 240V
O	0 - 380V
P	0 - 415V
Q	0 - 440V
R	0 - 550V
S	0 - 600V (Max.)
T	To your specification

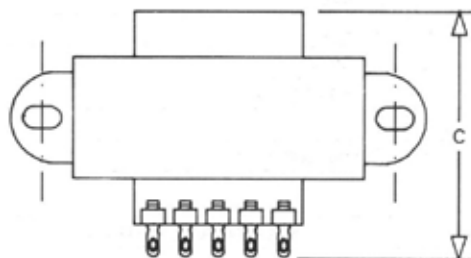
PRIMARY INPUT	
1	0 - 9V
2	0 - 12V
3	0 - 15V
4	0 - 24V
5	0 - 48V
6	6V - 0 - 6V
7	9V - 0 - 9V
8	12V - 0 - 12V
9	15V - 0 - 15V
10	20V - 0 - 20V
11	24V - 0 - 24V
12	30V - 0 - 30V
13	0 - 6V 0 - 6V
14	0 - 9V 0 - 9V
15	0 - 12V 0 - 12V
16	0 - 15V 0 - 15V
17	0 - 18V 0 - 18V
18	0 - 20V 0 - 20V
19	0 - 24V 0 - 24V
20	0 - 30V 0 - 30V



U CLAMP TRANSFORMERS (MADE TO ORDER)



Terminal shrouds available for some sizes. Please enquire.



A range of open type transformers with double section. Glass filled nylon bobbins. To BS 3535, BS 415 and CEE 15.
Solder tag terminations.

VA at 50Hz	REG % APPROX	HEIGHT A (mm)	LENGTH B (mm)	WIDTH C (mm)	FIXING CTRS D (mm)	WEIGHT (kg)
6	25.0	37	45	38	53	0.18
8	23.0	42	50	42	61	0.24
12	20.0	45	55	45	69	0.34
18	18.0	49	59	50	73	0.43
22	15.0	49	59	55	73	0.54
30	11.0	57	69	56	83	0.70
35	10.0	57	69	66	83	0.95
50	10.0	65	78	63	92	1.00
60	9.0	65	78	69	92	1.20
70	9.0	65	78	75	92	1.38
75	8.0	73	88	70	102	1.50
100*	10.0	73	88	70	102	1.50

* USING HIGH GRADE CORE MATERIAL



FRAME TRANSFORMERS (MADE TO ORDER)

Notes

1. Select transformer required, i.e. Primary A, Secondary 7 etc.
2. VA rating is the product of secondary voltage and secondary full load current.
3. All output voltages specified are at full load.
4. All primaries suitable for 50/60Hz operation.
5. Standard types designed for full rating at 40°C ambient temperature.
6. Transformers require adequate ventilation. De-rate for confined spaces.
7. Flash test 4.0KV r.m.s. Temperature range -10°C to +50°C

Any other voltage/tapping available. Please enquire.

Frame Transformers are normally supplied with input tags at top & output tags at bottom.

All terminal pins are plated to a lead free standard.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.



PRIMARY INPUT	
A	0 - 110V
B	0 - 115V
C	0 - 120V
D	0 - 127V
E	
F	0 - 110V 0 - 110V
G	0 - 115V 0 - 115V
H	0 - 120V 0 - 120V
I	
J	0 - 110V - 240V
K	0 - 220V - 240V
L	0 - 220V
M	0 - 230V
N	0 - 240V
O	0 - 380V
P	0 - 415V
Q	0 - 440V
R	0 - 550V
S	0 - 600V (Max.)
T	To your specification

PRIMARY INPUT	
1	0 - 9V
2	0 - 12V
3	0 - 15V
4	0 - 24V
5	0 - 48V
6	6V - 0 - 6V
7	9V - 0 - 9V
8	12V - 0 - 12V
9	15V - 0 - 15V
10	20V - 0 - 20V
11	24V - 0 - 24V
12	30V - 0 - 30V
13	0 - 6V 0 - 6V
14	0 - 9V 0 - 9V
15	0 - 12V 0 - 12V
16	0 - 15V 0 - 15V
17	0 - 18V 0 - 18V
18	0 - 20V 0 - 20V
19	0 - 24V 0 - 24V
20	0 - 30V 0 - 30V



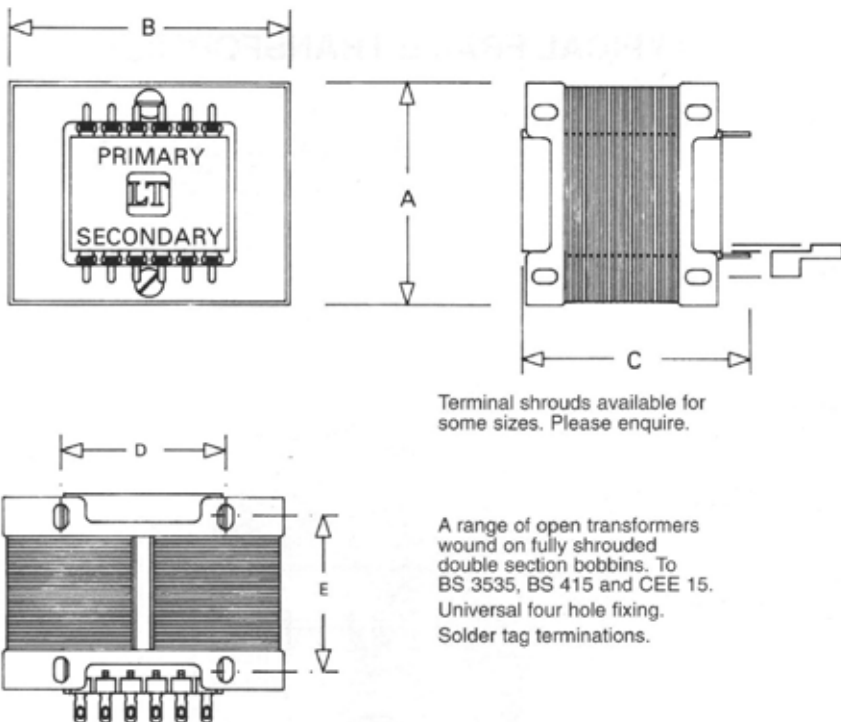
FRAME TRANSFORMERS

(MADE TO ORDER)

FRAME TRANSFORMERS

FRAME TRANSFORMERS

SECTION B



VA at 50Hz	REG % APPROX	HEIGHT A (mm)	LENGTH B (mm)	WIDTH C (mm)	FIXING CENTRES		WEIGHT (kg)
					D (mm)	E (mm)	
30	11.0	58	70	56	44	35	0.80
35	10.0	58	70	59	44	39	0.90
45	10.0	58	70	66	44	46	0.95
50	10.0	67	79	63	53	41	1.00
60	9.0	67	79	69	53	48	1.20
70	9.0	74	79	75	53	54	1.38
75	8.0	74	89	70	57	45	1.40
100*	8.0	74	89	70	57	45	1.40
125	7.0	83	98	76	63	48	2.20
150	7.0	83	98	90	63	62	2.50
200*	7.0	83	98	90	63	62	2.80

* USING HIGH GRADE CORE MATERIAL



FRAME TRANSFORMERS

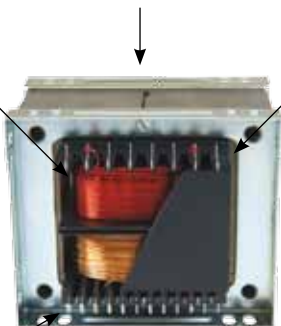
TYPICAL CONSTRUCTION

(MADE TO ORDER)

Winding wire.
Solderable Grade 1.
To BS 6811.
Class B
(130°C) Minimum

Steel, Zinc Plated.
4 Hole Fixing
Universal Mounting
End Frames

Strong Double
Section, Glass
Filled Nylon Bobbin.
Fully Shrouded



Solder Tag
Terminations
RoHS Compliant

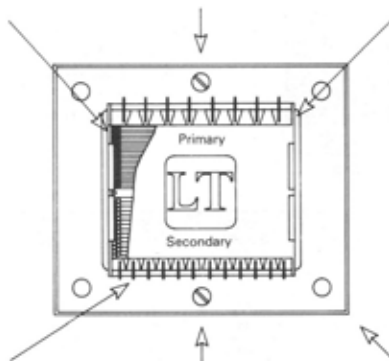
2 or 4 Clamping
Bolts Dependent
Upon Size

Varnish to BS 5629
IEC 85 Class F
(155°C)

Winding Wire.
Solderable Grade 1.
To BS 6811, Class B
(130°C) Minimum

Steel, Zinc Plated.
4 Hole Fixing
Universal Mounting
End Frames.

Strong, Double
Section, Glass
Filled Nylon
Bobbin, Fully
Shrouded



Solder Tag.
Terminations,
Plated to BS 2011.
For Improved
Solderability

2 or 4 Clamping
Bolts Dependent
Upon Size.

Varnish to BS 5629.
IEC 85, Class F
(155°C).



SECTION C



**CONTROL PANEL TRANSFORMERS
(MADE TO ORDER)**



OPEN TYPE CONTROL PANEL TRANSFORMERS (MADE TO ORDER)

Notes

1. Select transformer required, i.e. Primary A, Secondary 7 etc.
2. VA rating is the product of secondary voltage and secondary full load current.
3. All output voltages specified are at full load.
4. All primaries suitable for 50/60Hz operation.
5. Standard types designed for full rating at 40°C ambient temperature.
6. Transformers require adequate ventilation. De-rate for confined spaces.
7. Flash test 4.0KV r.m.s. Temperature range -10°C to +50°C

Any other voltage/tapping available. Please enquire.

May be either indoor or outdoor cased if required.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.



PRIMARY INPUT	
A	0 - 110V
B	0 - 120V
C	0 - 127V
D	0 - 240V
E	0 - 380V
F	0 - 415V
G	0 - 420V
H	0 - 440V
I	0 - 220V - 240V
J	0 - 200V - 220V - 240V
K	0 - 380V - 415V
L	0 - 415 - 440V
M	0 - 380V - 415V - 440V
N	0 - 415V - 440V
O	10V - 0 - 220V - 240V
P	20V - 0 - 380V - 420V
Q	0 - 115V - 240V - 415V
R	0 - 120V 0 - 120V
S	25V - 10V - 0 - 380V - 415V
T	To your specification

PRIMARY INPUT	
1	0 - 12V
2	0 - 24V
3	0 - 30V
4	0 - 50V
5	24V - 024V
6	0 - 110V
7	0 - 240V
8	0 - 220 - 240V
9	0 - 380V
10	0 - 415V
11	0 - 415V - 440V
12	0 - 380V - 415V
13	0 - 600V
14	0 - 630V
15	0 - CT - 110V
16	0 - 24V - 110V
17	0 - 24V - 110V - 240V
18	0 - CT - 110V 0 - CT - 110V
19	0 - 220V 0 - 220V
20	To your specification

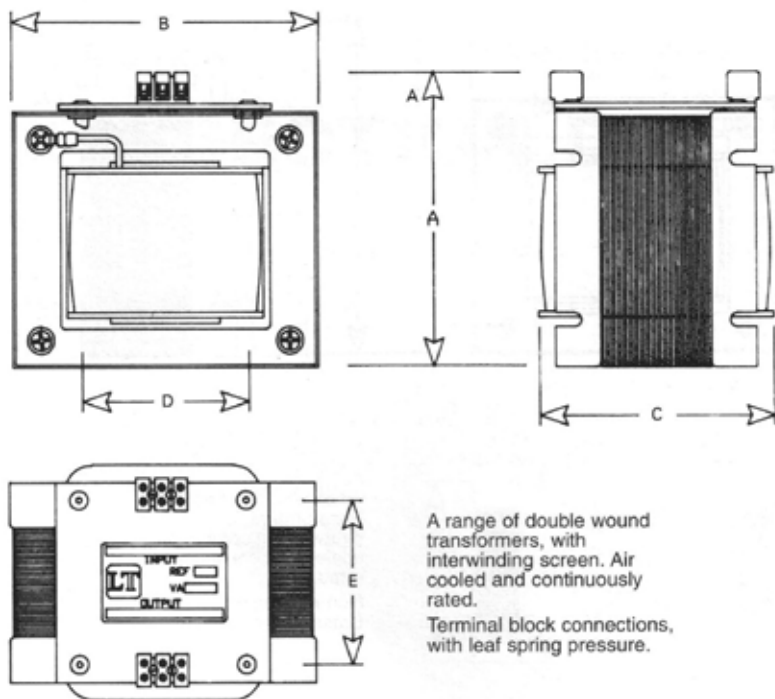


OPEN TYPE CONTROL PANEL TRANSFORMERS (MADE TO ORDER)

CONTROL PANEL TRANSFORMERS - SCREW TERMINALS

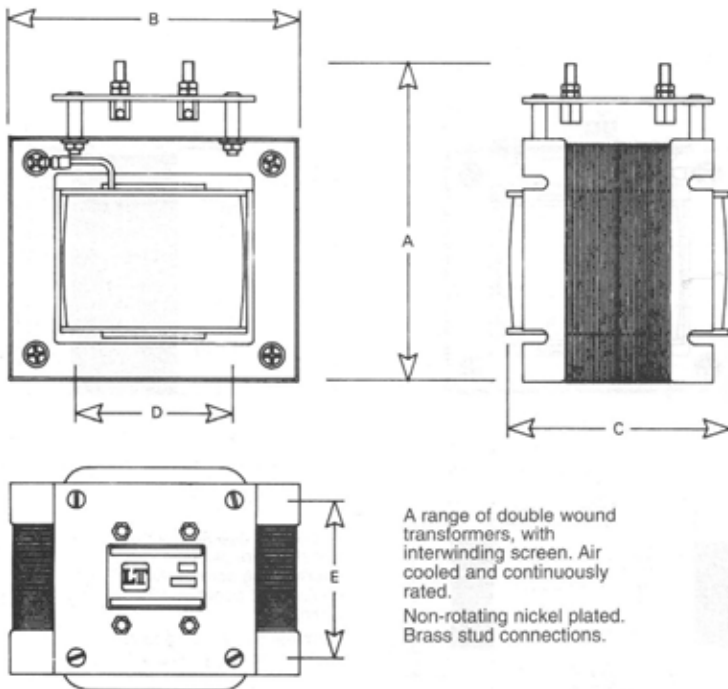
CONTROL PANEL TRANSFORMERS - SCREW TERMINALS

SECTION C



VA at 50Hz	INRUSH VA 0.8pf 95%V	REG % APPROX	HEIGHT A (mm)	LENGTH B (mm)	WIDTH C (mm)	FIXING CENTRES		WEIGHT (kg)
						D (mm)	E (mm)	
100	160	8.0	105	99	70	63	48	2.4
200	370	6.0	125	117	92	63	53	4.2
300	450	6.0	137	137	117	89	71	5.9
500	1400	6.0	137	137	151	89	109	8.0
750	1800	5.5	168	167	147	89	104	13.0
1000	2300	5.0	168	167	160	89	116	15.6
1500	3200	4.0	215	216	152	14	107	21.0
2000	4100	3.5	215	216	178	114	132	26.0
2500	4600	3.5	235	232	178	114	124	29.0
3000	5800	3.5	235	232	190	114	136	32.0
3500	7800	3.0	235	232	202	114	149	41.0
4000	9600	2.5	235	232	215	114	162	49.0
4500	12000	2.0	235	232	238	114	175	56.0
5000	16000	2.0	290	285	240	165	175	64.0
6000	19000	2.0	310	285	260	165	180	74.0

OPEN TYPE CONTROL PANEL TRANSFORMERS (MADE TO ORDER)



VA at 50Hz	INRUSH VA 0.8pf 95%V	REG % APPROX	HEIGHT A (mm)	LENGTH B (mm)	WIDTH C (mm)	FIXING CENTRES		WEIGHT (kg)
						D (mm)	E (mm)	
200	370	6.0	150	150	115	64	69	4.3
300	450	6.0	185	185	117	89	71	6.0
500	1400	6.0	185	185	151	89	109	8.1
600	1680	5.5	220	220	135	89	92	11.4
750	1800	5.5	220	220	147	89	104	13.1
1000	2300	5.0	220	220	160	89	116	15.7
1250	2700	4.5	250	250	139	114	95	18.0
1500	3200	4.0	250	250	152	114	107	21.1
1750	3600	3.3	250	250	165	114	119	23.2
2000	4100	3.5	250	250	178	114	132	26.1
2500	4600	3.5	270	270	178	114	124	29.1
3000	5800	3.2	270	270	190	114	136	32.2
3500	7800	3.0	270	270	202	114	149	41.2
4000	9600	2.5	270	270	225	114	162	49.0
5000	16000	2.0	320	320	240	165	175	64.0
6000	19000	2.0	320	320	262	165	200	74.0



SECTION D



**AUTO TRANSFORMERS
(MADE TO ORDER)**

AUTO TRANSFORMERS

(MADE TO ORDER)

An auto transformer has a single tapped winding with a direct electrical connection between the input and output, therefore cannot provide isolation.

Auto transformers usually have size & cost advantages over double wound transformers where input - output isolation is not required, however these advantages are reduced with wider input - output differences.

The following information is a guide of the styles available, however a wide range of styles are available dependent upon specific requirements.

May be step up or step down.

May be single, two or three phase.

Physical size dependent upon final specification.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.

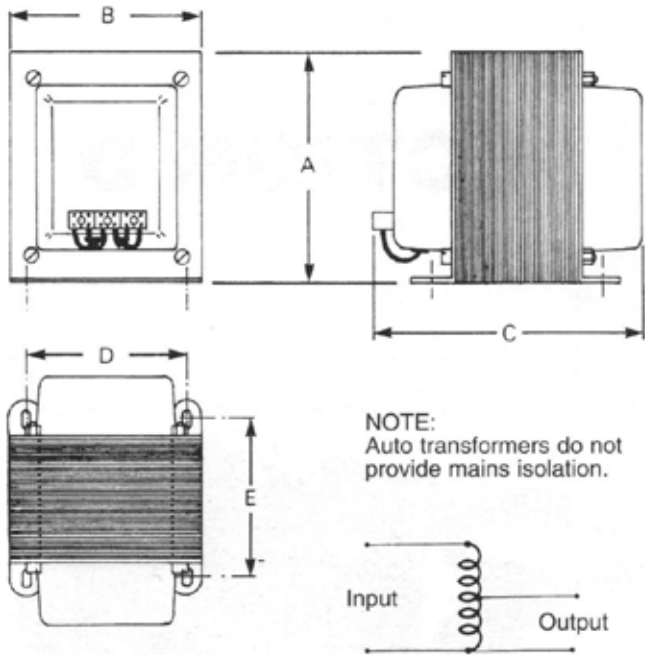


ENCLOSED AUTO TRANSFORMERS

(MADE TO ORDER)

ENCLOSED AUTO TRANSFORMERS

ENCLOSED AUTO TRANSFORMERS



SECTION D

DATA BELOW FOR GUIDANCE ONLY. ACTUAL SIZES DEPENDENT UPON FINAL SPECIFICATION

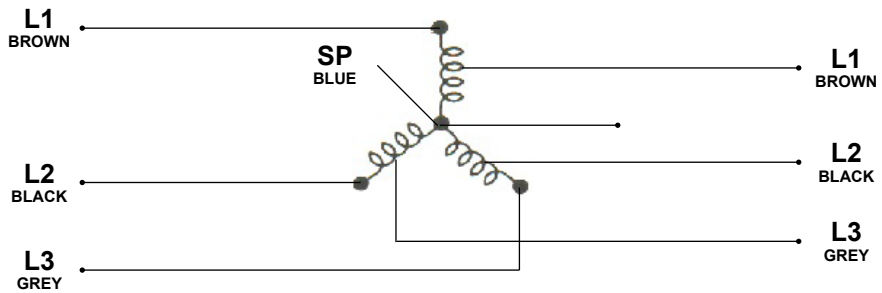
VA at 50Hz	REG % APPROX	HEIGHT A (mm)	LENGTH B (mm)	WIDTH C (mm)	FIXING CENTRES		WEIGHT (kg)
					D (mm)	E (mm)	
50	10.0	69	56	70	45	39	0.90
100	10.0	78	64	80	48	46	1.10
150	9.0	88	72	90	57	51	1.45
200	8.0	97	80	100	63	48	2.50
250	8.0	97	80	107	63	55	2.80
300	7.0	97	80	120	63	67	3.00
400	6.0	116	96	123	79	76	4.30
500	6.0	116	96	135	79	88	5.20
600	5.0	135	112	150	92	89	6.50
800	5.0	135	112	163	92	101	7.20
1000	5.0	135	112	176	92	114	8.00
1200	4.0	135	112	190	92	127	9.30

PLEASE NOTE: AUTO TRANSFORMERS DO NOT PROVIDE INPUT - OUTPUT ISOLATION

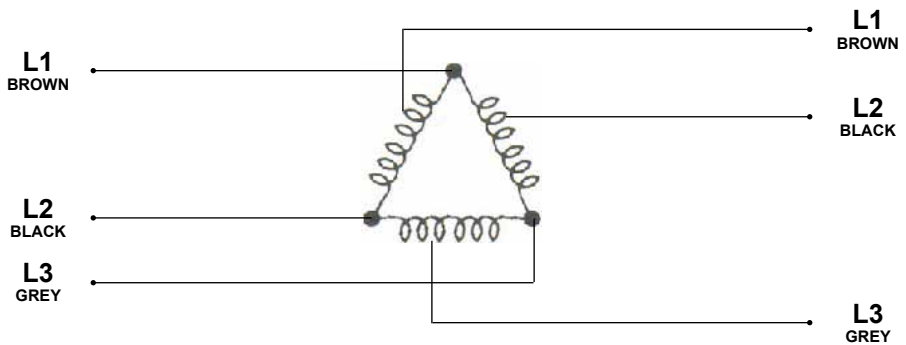
THREE PHASE AUTO TRANSFORMERS (MADE TO ORDER)

Below are detailed circuit diagrams of two common methods of connecting three phase auto transformers in a step down star or delta configuration. Step up may also be done.

THREE PHASE STEP DOWN STAR



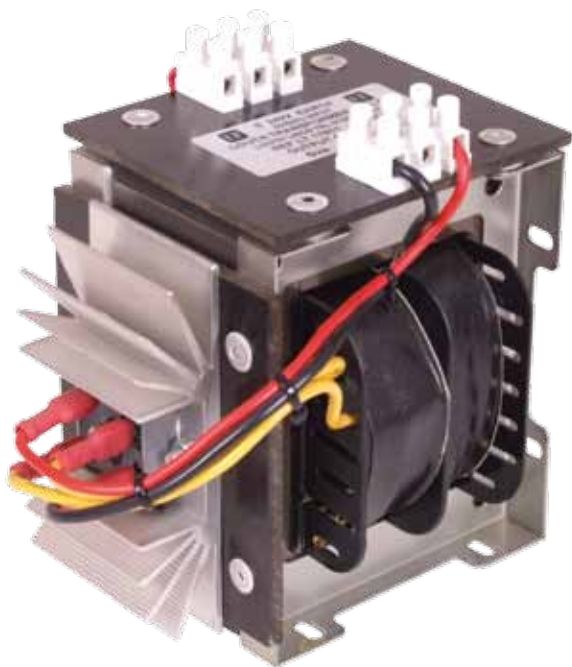
THREE PHASE STEP DOWN DELTA



PLEASE NOTE: AUTO TRANSFORMERS DO NOT PROVIDE INPUT - OUTPUT ISOLATION



SECTION E

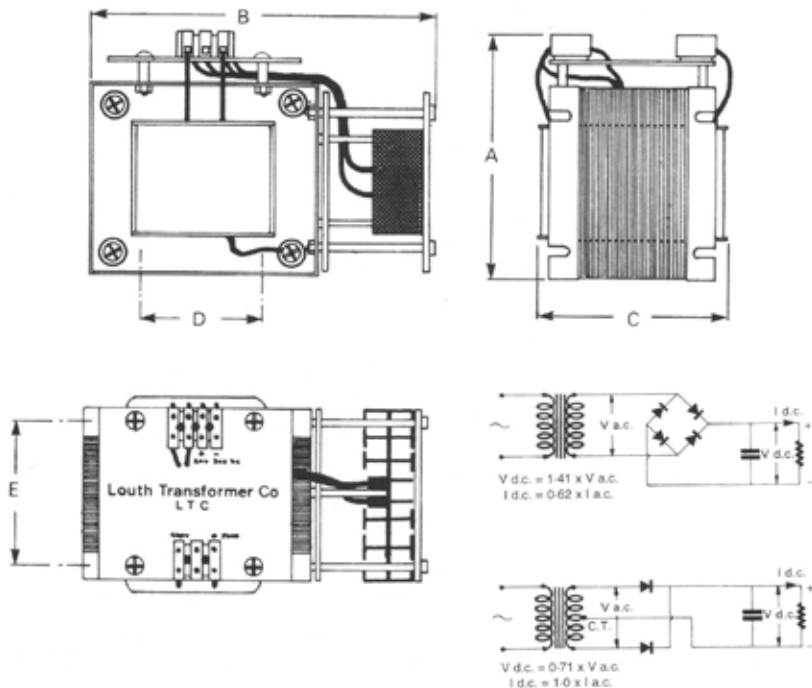


**TRANSFORMER RECTIFIER UNITS
(MADE TO ORDER)**

TRANSFORMER RECTIFIER UNITS (MADE TO ORDER)

TRANSFORMER RECTIFIER UNITS

TRANSFORMER RECTIFIER UNITS



Single, two and three phase transformer rectifier assemblies can be designed and manufactured to suit most requirements. Base plates are also available.

May be either indoor or outdoor cased if required.

Physical size dependent upon final specification.

Flash tested at 4.0KV r.m.s.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.





SECTION F



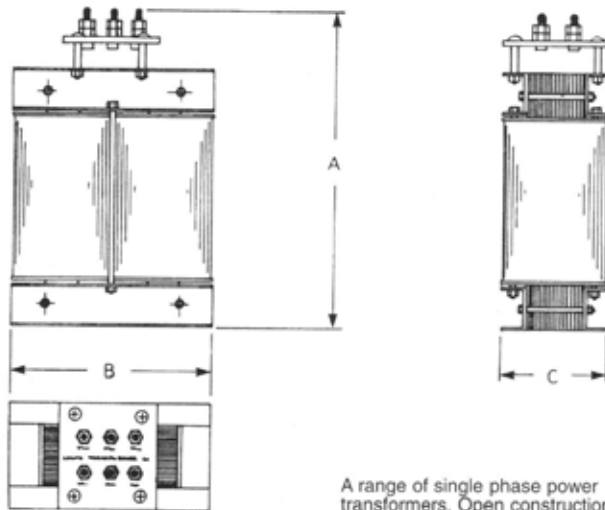
**SINGLE & THREE PHASE TRANSFORMERS
(MADE TO ORDER)**

OPEN TYPE SINGLE PHASE TRANSFORMERS

(MADE TO ORDER)

OPEN TYPE SINGLE PHASE TRANSFORMERS

OPEN TYPE SINGLE PHASE TRANSFORMERS



A range of single phase power transformers. Open construction steel floor mounted enclosures available. Dimensions are approximate.

Single phase power transformers can be designed and manufactured to suit most requirements.

May be either indoor or outdoor cased if required.

Physical size dependent upon final specification.

Flash tested at 4.0KV r.m.s.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.

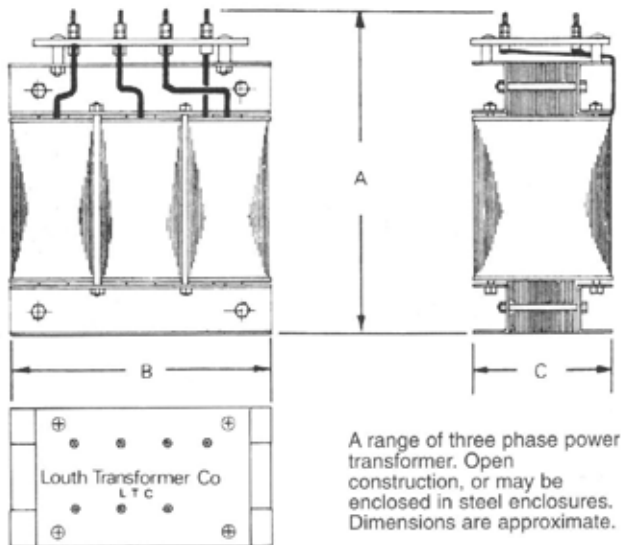


OPEN TYPE THREE PHASE TRANSFORMERS

(MADE TO ORDER)

OPEN TYPE THREE PHASE TRANSFORMERS

OPEN TYPE THREE PHASE TRANSFORMERS



SECTION F

Three phase power transformers can be designed and manufactured to suit most requirements.

May be either indoor or outdoor cased if required.

Physical size dependent upon final specification.

Flash tested at 4.0KV r.m.s.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.



THREE PHASE TRANSFORMERS

TYPICAL CONSTRUCTION

(MADE TO ORDER)

Winding wire.
Solderable Grade 1.
To BS 6811.
Class B
(130°C) Minimum

Top Panel. Fully labeled
with studs or terminal
blocks for ease of
connection

Strong, Glass
filled nylon, or
interlocking bobbin.
dependent upon
size

Steel Zinc Plated
mounting brackets with
4 or 6 bolts dependent
upon size

Varnish to BS 5629
IEC 85 Class F
(155°C)

Earthed Inter-winding
copper screen

Winding wire.
Solderable Grade 1.
To BS 6811. Class B
(130°C) Minimum

Top Panel. Fully labeled
with studs or terminal
blocks for ease of
connection

Strong, Glass
filled nylon, or
interlocking bobbin.
dependent upon
size

Steel Zinc Plated
mounting brackets with
4 or 6 bolts dependent
upon size

Varnish to BS 5629
IEC 85 Class F
(155°C)

Earthed Inter-winding
copper screen



SECTION G



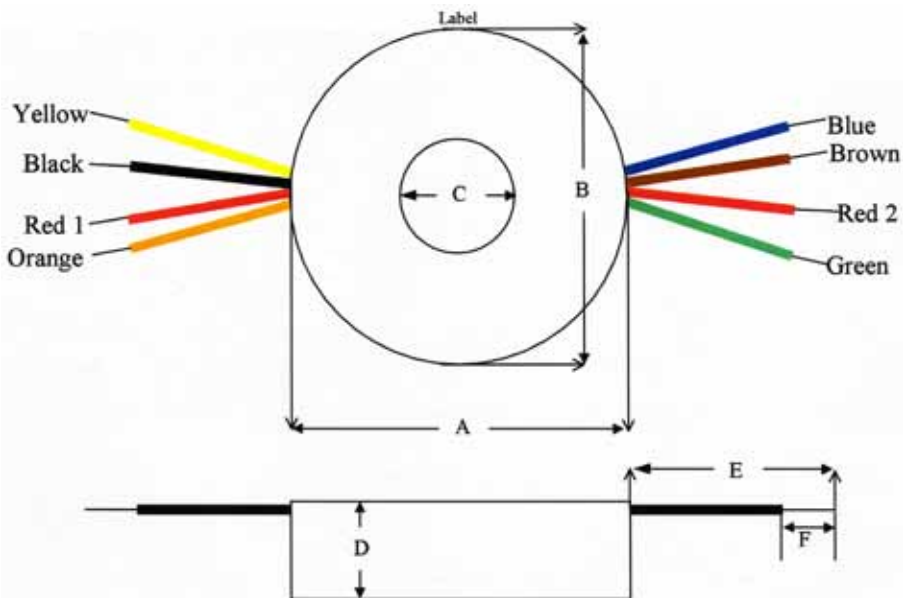
**TOROIDAL TRANSFORMERS
(MADE TO ORDER)**

TOROIDAL TRANSFORMERS

(MADE TO ORDER)

TOROIDAL TRANSFORMERS

TOROIDAL TRANSFORMERS



Toroidal transformers can be designed and manufactured to suit most requirements. Can be finished in either Mylar, cotton, or black acetate wrap with a UL94V-0 resin potted centre if required. Thermal fuses can be fitted to windings if required.

Physical size dependent upon final specification.

Flash tested at 4.0KV r.m.s.

All transformers fully RoHS compliant.

All tested in accordance with BS 3535 and EN 60742.





SECTION H



TRANSFORMER ENCLOSURES

TRANSFORMER ENCLOSURES

'P' RANGE INDOOR

P RANGE INDOOR ENCLOSURES

A range of wall or floor mounted, IP23 steel transformer cases. Finished in a matt black, epoxy / polyester powder paint. Cable entry is via two 20mm conduit holes on either side of the case.

CASE PAINT PROCESS

1. Degrease.
2. Iron Phosphate Pre-Treatment.
3. Single Coat Epoxy/Polyester Paint.

Laboratory Tested 600 Hours Hot Salt Spray.

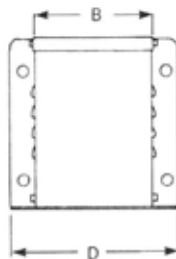
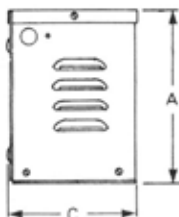
TEST METHOD

1. Chip an area of paint away 15mm in diameter.
2. Subject the area to 600 hours hot salt spray.
3. The area under test will of course rust, but there must be no creepage under the paint.



<http://enclosures.louthtx.com>

Scan QR code to download full datasheets from our website.



REF	VA SIZE APPROX.	A (mm)	B (mm)	C (mm)	OVERALL (mm)	WEIGHT (kg)
P00	---	135	120	130	200	1.10
P1	150	135	120	190	200	1.30
P2	200	160	160	225	220	1.90
P3	500	200	185	245	275	2.60
P4	1000	265	220	270	340	3.60
P5	4000	290	250	350	350	5.50
P6	4500	315	315	455	390	8.10
P7	6000 (Max.)	370	340	480	445	10.00

FULL DATASHEETS AVAILABLE ON REQUEST - PLEASE CONTACT US

P RANGE INDOOR ENCLOSURES

TRANSFORMER ENCLOSURES

'S' RANGE INDOOR

P RANGE INDOOR ENCLOSURES

A range of floor mounted, IP23 steel transformer cases, suitable for single phase transformers. Finished in a matt black, epoxy / polyester powder paint. Cable entry is via two gland plates on either side of the case.

CASE PAINT PROCESS

1. Degrease.
2. Iron Phosphate Pre-Treatment.
3. Single Coat Epoxy/Polyester Paint.

Laboratory Tested 600 Hours Hot Salt Spray.

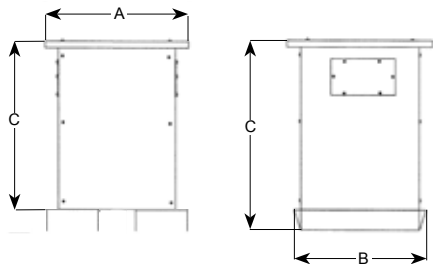
TEST METHOD

1. Chip an area of paint away 15mm in diameter.
2. Subject the area to 600 hours hot salt spray.
3. The area under test will of course rust, but there must be no creepage under the paint.



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REF	A (mm)	B (mm)	C (mm)	WEIGHT (kg)
S1	380	450	630	18.00
S2	450	560	730	25.00
S3	550	550	830	30.00

FULL DATASHEETS AVAILABLE ON REQUEST - PLEASE CONTACT US

P RANGE INDOOR ENCLOSURES

SECTION H

TRANSFORMER ENCLOSURES

'T' RANGE INDOOR

T RANGE INDOOR ENCLOSURES

A range of floor mounted, IP23 steel transformer cases, suitable for three phase transformers. Finished in a hammer grey, epoxy / polyester powder paint. Cable entry is via two gland plates on either side of the case.

CASE PAINT PROCESS

1. Degrease.
2. Iron Phosphate Pre-Treatment.
3. Single Coat Epoxy/Polyester Paint.

Laboratory Tested 600 Hours Hot Salt Spray.

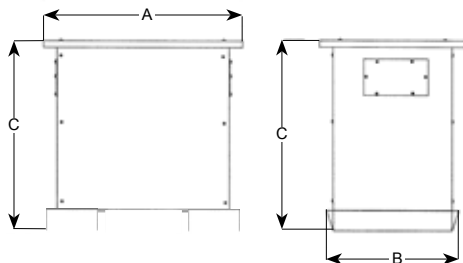
TEST METHOD

1. Chip an area of paint away 15mm in diameter.
2. Subject the area to 600 hours hot salt spray.
3. The area under test will of course rust, but there must be no creepage under the paint.



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T RANGE INDOOR ENCLOSURES

REF	A (mm)	B (mm)	C (mm)	WEIGHT (kg)
T1	AVAILABLE TO ORDER			
T2	420	300	460	10.50
T3	520	450	570	21.00
T4	630	495	670	26.00
T5	770	600	825	39.00
T6	855	700	780	43.00

FULL DATASHEETS AVAILABLE ON REQUEST - PLEASE CONTACT US

TRANSFORMER ENCLOSURES

'TK' RANGE OUTDOOR

TK RANGE OUTDOOR ENCLOSURES

A range of fully seam welded, floor mounted, IP65 steel transformer cases, suitable for three phase transformers. Finished in a hammer grey, pure polyester powder paint. Cable entry is via two gland plates on either side of the case.

CASE PAINT PROCESS

1. Degrease.
2. Iron Phosphate Pre-Treatment.
3. Single Coat Pure Polyester Paint.

Laboratory Tested 600 Hours Hot Salt Spray.

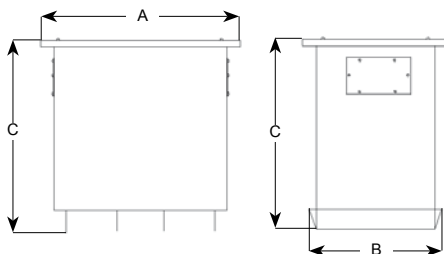
TEST METHOD

1. Chip an area of paint away 15mm in diameter.
2. Subject the area to 600 hours hot salt spray.
3. The area under test will of course rust, but there must be no creepage under the paint.



<http://enclosures.louthtx.com>

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TK RANGE OUTDOOR ENCLOSURES

REF	A (mm)	B (mm)	C (mm)	WEIGHT (kg)
TK1	AVAILABLE TO ORDER			
TK2	420	300	460	12.50
TK3	520	450	570	23.00
TK4	630	495	670	29.00
TK5	770	600	825	43.00
TK6	855	700	780	47.00

FULL DATASHEETS AVAILABLE ON REQUEST - PLEASE CONTACT US

TRANSFORMER ENCLOSURES

'R' WALL MOUNTED RANGE OUTDOOR

R WALL MOUNTED RANGE OUTDOOR ENCLOSURES

A range of fully seam welded, IP65 steel transformer cases, with wall mounting brackets. Finished in a hammer grey, pure polyester powder paint. Cable entry is via a 20mm conduit hole.

CASE PAINT PROCESS

1. Degrease.
2. Iron Phosphate Pre-Treatment.
3. Single Coat Pure Polyester Paint.

Laboratory Tested 600 Hours Hot Salt Spray.

TEST METHOD

1. Chip an area of paint away 15mm in diameter.
2. Subject the area to 600 hours hot salt spray.
3. The area under test will of course rust, but there must be no creepage under the paint.

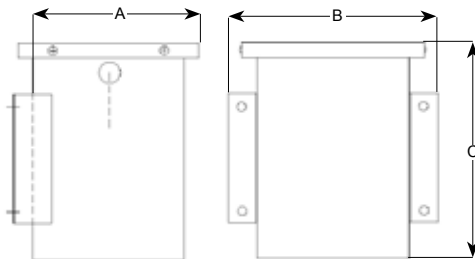


R WALL MOUNTED RANGE OUTDOOR ENCLOSURES



<http://enclosures.louthtx.com>

Scan QR code to download full datasheets from our website.



REF	A (mm)	B (mm)	C (mm)	WEIGHT (kg)
R1 / WALL	235	285	230	4.70
R2 / WALL	285	335	310	7.20
R3 / WALL	310	350	360	9.00
R4 / WALL	360	410	480	13.30
R5 / WALL	440	475	520	18.10

FULL DATASHEETS AVAILABLE ON REQUEST - PLEASE CONTACT US

TRANSFORMER ENCLOSURES

'R' PORTABLE RANGE OUTDOOR

R PORTABLE RANGE OUTDOOR ENCLOSURES

A range of fully seam welded, portable, IP65 steel transformer cases. Finished in a hammer grey, pure polyester powder paint. Cable entry is via a 20mm conduit hole.

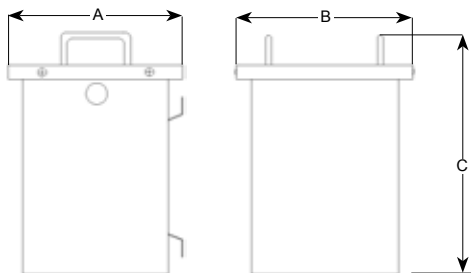
CASE PAINT PROCESS

1. Degrease.
2. Iron Phosphate Pre-Treatment.
3. Single Coat Pure Polyester Paint.

Laboratory Tested 600 Hours Hot Salt Spray.

TEST METHOD

1. Chip an area of paint away 15mm in diameter.
2. Subject the area to 600 hours hot salt spray.
3. The area under test will of course rust, but there must be no creepage under the paint.



<http://enclosures.louthtx.com>

Scan QR code to download full datasheets from our website.

REF	A (mm)	B (mm)	C (mm)	WEIGHT (kg)
R1 / PORTABLE	230	230	280	4.30
R2 / PORTABLE	280	280	370	6.70
R3 / PORTABLE	310	310	410	8.40
R4 / PORTABLE	355	355	540	12.40
R5 / PORTABLE	430	430	570	16.70

FULL DATASHEETS AVAILABLE ON REQUEST - PLEASE CONTACT US

TRANSFORMER ENCLOSURES

'R' FLOOR RANGE OUTDOOR

R FLOOR MOUNTED RANGE OUTDOOR ENCLOSURES

A range of fully seam welded, IP65 steel transformer cases, with floor mounting brackets. Finished in a hammer grey, pure polyester powder paint. Cable entry is via a 20mm conduit hole.

CASE PAINT PROCESS

1. Degrease.
2. Iron Phosphate Pre-Treatment.
3. Single Coat Pure Polyester Paint.

Laboratory Tested 600 Hours Hot Salt Spray.

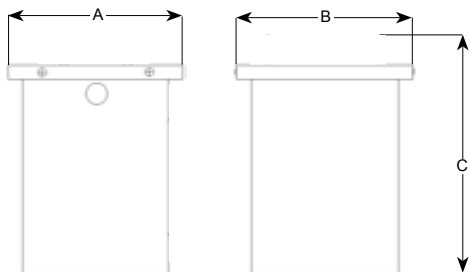
TEST METHOD

1. Chip an area of paint away 15mm in diameter.
2. Subject the area to 600 hours hot salt spray.
3. The area under test will of course rust, but there must be no creepage under the paint.



<http://enclosures.louthtx.com>

Scan QR code to download full datasheets from our website.



R FLOOR MOUNTED RANGE OUTDOOR ENCLOSURES

REF	A (mm)	B (mm)	C (mm)	WEIGHT (kg)
R1 / FLOOR	235	285	230	4.70
R2 / FLOOR	285	335	310	7.20
R3 / FLOOR	310	350	360	9.00
R4 / FLOOR	360	410	480	13.30
R5 / FLOOR	440	475	520	18.10

FULL DATASHEETS AVAILABLE ON REQUEST - PLEASE CONTACT US

TRANSFORMER ENCLOSURES

PORTABLE RANGE OUTDOOR

PORTABLE RANGE OUTDOOR ENCLOSURES

A range of IP65, non-hygroscopic, corrosion resistant, portable transformer cases. Manufactured from a moulded, glass reinforced resin compound, these cases are suitable for outdoor use, and are most commonly found on construction sites.

These cases are available in two types with either a single carry handle on smaller models (types A & B), or two carry handles on larger models (type C).

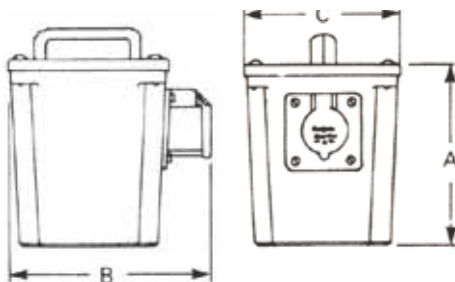
May be fitted with BS EN 60309 (formerly BS 4343) sockets, as indicated in the diagram if required.



PORTABLE RANGE OUTDOOR ENCLOSURES



<http://enclosures.louthtx.com>
Scan QR code to download full datasheets from our website.



SIZE / TYPE	VA SIZE APPROX.	A (mm)	B (mm)	C (mm)	WEIGHT (kg)
A	1250	220	168	169	1.20
B	2500	260	192	192	1.80
C	3000	280	280	267	4.20

SECTION H

FULL DATASHEETS AVAILABLE ON REQUEST - PLEASE CONTACT US

TRANSFORMER ENCLOSURES

IP RATINGS EXPLAINED

International Standard IEC 60529 uses IP ratings to classify the level of protection provided by electrical appliances to the ingress of solid objects, dust, accidental contact and water. The first digit indicates the level of protection provided against solid foreign objects while the second digit indicates the level of protection against water.

IP XX

LEVEL	PROTECTED AGAINST
0	No protection against contact & ingress of objects.
1	Any large surface of the body, such as the back of a hand.
2	Fingers or similar objects.
3	Tools, thick wires etc.
4	Most wires, screws etc.
5	Ingress of dust is not entirely prevented, however it must not enter in sufficient quantity to interfere with the operation of the equipment.
6	No ingress of dust.

LEVEL	PROTECTED AGAINST
0	-----
1	Dripping water (vertically falling drops) shall have no harmful effect.
2	Vertically dripping water shall have no harmful effects when the enclosure is tilted up to 15° from its normal position.
3	Water falling as a spray at any angle up to 60° from vertical shall have no harmful effect.
4	Water splashing against the enclosure from any direction shall have no harmful effect.
5	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect.
6	Water from heavy seas or projected in powerful jets shall not enter the enclosure in harmful quantity.
7	Ingress of water in harmful quantities shall not be possible when immersed in water up to 1m deep.
8	The equipment is suitable for continuous immersion in water under conditions specified by the manufacturer.



SECTION I



ECODESIGN INFORMATION

The EU Ecodesign directive 548/2014 requires all new transformers brought to the market after 1st July 2015 to comply with strict new requirements regarding losses in order to improve energy efficiency and reduce avoidable CO₂ emissions as part of the EU's 20-20-20 program, which by 2020 aims to achieve:

- 20% reduction in CO₂ emission levels compared to 1990.
- 20% of energy consumption coming from renewable energy sources.
- 20 increase in energy efficiency.

By 2020 it is hoped that energy savings of around 16TWh/year are achievable, as the Ecodesign Regulation removes the worst performing transformers from the market by:

- Reducing electrical losses in two phases in 2015 and 2021.
- Making indications of transformer performance more visible and clearly marked.
- Harmonising maximum loss levels across the EU.

All of our products are fully compliant with the Ecodesign regulation and losses are clearly marked on the product where applicable. We have also published on the following pages full information on losses for our range of ex-stock transformers.





ECODESIGN INFORMATION

CONTROL PANEL RANGE

REF	VA	Po (Watts)	Pk (Watts)	AN (Watts)	Cu (kg)	Fe (kg)	TEMP CLASS	EARTHING CLASS	INPUT TERMINALS	OUTPUT TERMINALS
3001	50	2	9	0	0.23	0.74	B, 130°C	1	BLOCKS	BLOCKS
3002	100	5	15	0	0.41	1.48	B, 130°C	1	BLOCKS	BLOCKS
3003	200	8	22	0	0.72	2.51	B, 130°C	1	BLOCKS	BLOCKS
3004	300	12	33	0	0.84	3.34	B, 130°C	1	BLOCKS	BLOCKS
3005	500	15	39	0	1.35	6.87	B, 130°C	1	BLOCKS	BLOCKS
3006	50	3	11	0	0.19	0.74	B, 130°C	1	BLOCKS	BLOCKS
3007	100	4	14	0	0.39	1.48	B, 130°C	1	BLOCKS	BLOCKS
3008	200	8	30	0	0.61	2.51	B, 130°C	1	BLOCKS	BLOCKS
3009	300	12	36	0	0.92	3.34	B, 130°C	1	BLOCKS	BLOCKS
3010	500	17	41	0	1.37	6.87	B, 130°C	1	BLOCKS	BLOCKS
3011	50	3	10	0	0.24	0.74	B, 130°C	1	BLOCKS	BLOCKS
3012	100	4	13	0	0.39	1.48	B, 130°C	1	BLOCKS	BLOCKS
3013	200	8	30	0	0.69	2.51	B, 130°C	1	BLOCKS	BLOCKS
3014	50	2	9	0	0.20	0.74	B, 130°C	1	BLOCKS	BLOCKS
3015	100	3	13	0	0.32	1.48	B, 130°C	1	BLOCKS	BLOCKS
3016	200	8	23	0	0.64	2.51	B, 130°C	1	BLOCKS	BLOCKS
3017	50	3	11	0	0.18	0.74	B, 130°C	1	BLOCKS	BLOCKS
3018	100	3	12	0	0.44	1.48	B, 130°C	1	BLOCKS	BLOCKS
3019	200	8	30	0	0.70	2.51	B, 130°C	1	BLOCKS	BLOCKS
3020	300	12	31	0	0.88	3.34	B, 130°C	1	BLOCKS	BLOCKS
3021	400	12	33	0	1.28	4.65	B, 130°C	1	BLOCKS	BLOCKS
3022	500	17	41	0	1.31	6.87	B, 130°C	1	BLOCKS	BLOCKS

Ecodesign Product Information:

Po - No load losses. (Watts).

Pk - Full load losses (Watts). Including Po at 100°C.

AN - Cooling system power (Watts).

Cu - Copper/wire weight (kg).

Fe - Iron/core weight (kg).

Earthing Class:

1 - Has provision for earthing.

2 - Has no provision for earthing.



ECODESIGN INFORMATION

CONTROL PANEL RANGE

REF	VA	Po (Watts)	Pk (Watts)	AN (Watts)	Cu (kg)	Fe (kg)	TEMP CLASS	EARTHING CLASS	INPUT TERMINALS	OUTPUT TERMINALS
3023	750	20	15	0	2.10	7.67	B, 130°C	1	BLOCKS	BLOCKS
3024	1000	24	66	0	2.30	10.23	B, 130°C	1	BLOCKS	BLOCKS
3025	1250	34	83	0	2.56	11.94	B, 130°C	1	BLOCKS	BLOCKS
3026	1500	32	86	0	3.97	14.35	B, 130°C	1	BLOCKS	BLOCKS
3027	2000	43	109	0	4.84	17.22	B, 130°C	1	BLOCKS	BLOCKS
3028	2500	40	149	0	4.86	20.09	B, 130°C	1	BLOCKS	BLOCKS
3029	50	3	11	0	0.20	0.74	B, 130°C	1	BLOCKS	BLOCKS
3030	100	4	12	0	0.41	1.48	B, 130°C	1	BLOCKS	BLOCKS
3031	200	8	23	0	0.63	2.51	B, 130°C	1	BLOCKS	BLOCKS
3032	300	9	32	0	0.81	3.34	B, 130°C	1	BLOCKS	BLOCKS
3033	400	12	33	0	1.38	4.65	B, 130°C	1	BLOCKS	BLOCKS
3034	500	15	37	0	1.44	6.87	B, 130°C	1	BLOCKS	BLOCKS
3035	750	20	53	0	1.85	7.67	B, 130°C	1	BLOCKS	BLOCKS
3036	1000	20	67	0	2.04	10.23	B, 130°C	1	BLOCKS	BLOCKS
3037	1250	25	123	0	2.68	11.94	B, 130°C	1	BLOCKS	BLOCKS
3038	1500	30	75	0	3.90	14.40	B, 130°C	1	BLOCKS	BLOCKS
3039	2000	40	117	0	4.00	17.20	B, 130°C	1	BLOCKS	BLOCKS
3040	2500	32	124	0	5.33	20.10	B, 130°C	1	BLOCKS	BLOCKS
3041	50	3	10	0	0.21	0.74	B, 130°C	1	BLOCKS	BLOCKS
3042	100	4	12	0	1.46	1.48	B, 130°C	1	BLOCKS	BLOCKS
3043	300	10	32	0	0.88	3.34	B, 130°C	1	BLOCKS	BLOCKS
3044	500	17	42	0	1.23	6.87	B, 130°C	1	BLOCKS	BLOCKS

Ecodesign Product Information:

Po - No load losses. (Watts). Including Po at 100°C.

Pk - Full load losses (Watts).

AN - Cooling system power (Watts).

Cu - Copper/wire weight (kg).

Fe - Iron/core weight (kg).

Earthing Class:

1 - Has provision for earthing.

2 - Has no provision for earthing.



ECODESIGN INFORMATION

CONTROL PANEL RANGE

REF	VA	Po (Watts)	Pk (Watts)	AN (Watts)	Cu (kg)	Fe (kg)	TEMP CLASS	EARTHING CLASS	INPUT TERMINALS	OUTPUT TERMINALS
3045	1000	25	64	0	2.46	10.23	B, 130°C	1	BLOCKS	BLOCKS
3046	1500	32	104	0	3.80	14.35	B, 130°C	1	BLOCKS	BLOCKS
3047	750	20	54	0	2.06	8.52	B, 130°C	1	BLOCKS	BLOCKS
3048	2000	45	107	0	5.14	17.22	B, 130°C	1	BLOCKS	BLOCKS
3049	2500	47	135	0	5.27	20.90	B, 130°C	1	BLOCKS	BLOCKS
3050	3000	41	136	0	6.76	24.15	B, 130°C	1	BLOCKS	BLOCKS
3051	3000	40	119	0	6.52	24.15	B, 130°C	1	BLOCKS	BLOCKS
3052	3000	55	153	0	6.10	24.15	B, 130°C	1	BLOCKS	BLOCKS
3053	3500	73	164	0	7.14	27.60	B, 130°C	1	BLOCKS	STUDS
3054	3500	70	168	0	6.92	27.60	B, 130°C	1	BLOCKS	BLOCKS
3055	3500	63	179	0	6.66	27.60	B, 130°C	1	BLOCKS	STUDS
3056	5000	80	193	0	10.31	37.04	B, 130°C	1	BLOCKS	STUDS
3057	5000	75	200	0	10.46	37.04	B, 130°C	1	BLOCKS	BLOCKS
3058	5000	80	235	0	9.86	37.60	B, 130°C	1	BLOCKS	STUDS
3059	200	6	23	0	0.89	2.51	B, 130°C	1	BLOCKS	BLOCKS
3060	400	12	32	0	1.26	4.65	B, 130°C	1	BLOCKS	BLOCKS
3061	10000	145	433	0	23.44	67.23	B, 130°C	1	BLOCKS	STUDS
3062	10000	74	284	0	20.06	67.23	B, 130°C	1	BLOCKS	STUDS
3063	10000	160	365	0	23.74	67.23	B, 130°C	1	BLOCKS	STUDS
3064	1250	31	80	0	2.56	11.94	B, 130°C	1	BLOCKS	BLOCKS
3070	7500	130	271	0	18.08	60.56	B, 130°C	1	BLOCKS	STUDS
3071	7500	105	364	0	19.18	59.76	B, 130°C	1	BLOCKS	STUDS
3072	7500	110	213	0	17.00	60.00	B, 130°C	1	BLOCKS	STUDS

Ecodesign Product Information:

Po - No load losses. (Watts).

Pk - Full load losses (Watts). Including Po at 100°C.

AN - Cooling system power (Watts).

Cu - Copper/wire weight (kg).

Fe - Iron/core weight (kg).

Earthing Class:

1 - Has provision for earthing.

2 - Has no provision for earthing.



ECODESIGN INFORMATION

12V 25V 50V RANGE

REF	VA	Po (Watts)	Pk (Watts)	AN (Watts)	Cu (kg)	Fe (kg)	TEMP CLASS	EARTHING CLASS	INPUT TERMINALS	OUTPUT TERMINALS
3225	100	5	14	0	0.37	1.48	B, 130°C	1	BLOCKS	BLOCKS
3226	300	12	40	0	1.12	3.34	B, 130°C	1	BLOCKS	BLOCKS
3227	500	17	39	0	1.31	6.87	B, 130°C	1	BLOCKS	STUDS
3228	750	25	71	0	2.36	8.52	B, 130°C	1	BLOCKS	STUDS
3229	1000	29	67	0	2.46	10.23	B, 130°C	1	BLOCKS	STUDS
3230	300	11	37	0	0.86	3.34	B, 130°C	1	BLOCKS	BLOCKS
3231	500	18	46	0	1.26	6.87	B, 130°C	1	BLOCKS	BLOCKS
3232	750	27	79	0	1.97	8.52	B, 130°C	1	BLOCKS	BLOCKS
3233	1000	20	100	0	2.46	10.23	B, 130°C	1	BLOCKS	STUDS
3234	300	8	28	0	1.08	3.34	B, 130°C	1	BLOCKS	BLOCKS
3235	500	19	42	0	1.23	6.87	B, 130°C	1	BLOCKS	BLOCKS
3236	750	20	57	0	1.96	8.52	B, 130°C	1	BLOCKS	BLOCKS
3237	1000	24	94	0	2.20	10.23	B, 130°C	1	BLOCKS	BLOCKS
3238	1500	24	103	0	4.36	14.35	B, 130°C	1	BLOCKS	BLOCKS
3239	2000	36	110	0	4.64	17.22	B, 130°C	1	BLOCKS	STUDS
4056	50	3	11	0	0.21	0.74	B, 130°C	1	BLOCKS	BLOCKS
4057	150	6	19	0	0.46	1.66	B, 130°C	1	BLOCKS	BLOCKS
4058	200	9	31	0	0.70	2.51	B, 130°C	1	BLOCKS	BLOCKS
4059	250	9	33	0	0.93	2.93	B, 130°C	1	BLOCKS	BLOCKS

Ecodesign Product Information:

Po - No load losses. (Watts).

Pk - Full load losses (Watts). Including Po at 100°C.

AN - Cooling system power (Watts).

Cu - Copper/wire weight (kg).

Fe - Iron/core weight (kg).

Earthing Class:

1 - Has provision for earthing.

2 - Has no provision for earthing.



SECTION J



USEFUL DATA



DATA

WHAT IS A TRANSFORMER?

WHAT IS A TRANSFORMER

Although a transformer is a relatively simple piece of electrical equipment, there are numerous factors which must be taken into account in the design and manufacture to ensure that it will give reliable service, perform the task intended and be safe in operation.

Whilst many of these considerations are left to the manufacturer, a transformer properly specified, designed, manufactured, and installed should give many years of reliable service.

As is commonly known, a transformer essentially consists of a magnetic core, upon which are wound two or more separate coils of insulated copper wire, suitably located in respect to one another and usually termed the primary and secondary respectively. The ratios of these windings in respect to the input voltage determine if it is a step up or step down transformer.

Individual laminations in iron cored transformers are given insulating coatings to develop adequate magnetic insulation between layers in the stacked core, to reduce inter-lamination eddy current losses to an acceptable level, which keeps the total watts loss of the stack to a minimum. C-cores and E-cores take advantage of their shape, and the excellent magnetic properties of silicon iron when rolled in the direction of the grain of the material. These cores can therefore be used at higher flux densities, thus giving higher efficiency, smaller size, or reduced weight, although usually at a higher cost than that of a conventionally constructed transformer.

Stamped laminations come in a variety of shapes and sizes, the most popular being 'E' and 'I' laminations. This shape gives excellent economy with acceptable losses per kilo of material being used for a given transformer design. There are several grades of this type of lamination available, which can be used to either reduce physical size or improve efficiency.

When a voltage is applied to the primary windings with the secondary open circuit a relatively small current will flow, which magnetizes the core and supplies the iron loss. This is called the no load current. The iron losses are constant whether the transformer is at no load or full load. The losses that vary with load are the copper losses. Maximum efficiency of a given transformer is usually, although not always obtained when the iron losses and copper losses are balanced. This should usually occur at full load.

When a load is connected to the secondary, increased current flows through the primary winding as well as the secondary and copper losses become more significant. The ability of the surface area of the transformer, in respect to the sum of the iron losses and copper losses determine the eventual temperature rise. Other losses are present such as stray eddy currents in core clamps, bolts, di-electric loss in insulation, etc. although these are normally of a smaller nature.

AN ANALOGY

A transformer could be considered as a 'gearbox' for voltage and current. The primary winding can be considered as the input shaft and the secondary winding as the output shaft. Current is equivalent to shaft speed and voltage to torque.

The ratio of the windings on the transformer are equivalent to the gear ratio. A step-up transformer acts as a reduction gear in which power is transferred from a small, rapidly rotating gear to a larger, slower gear, therefore increasing torque at the expense of speed. A transformer will do the same, transferring power from a primary coil with less turns to a secondary coil with more turns, therefore trading current for voltage. A step-down transformer works in the opposite direction. By transferring power from the large, slowly rotating gear to the smaller, faster gear, greater speed is obtained at the expense of torque. A transformer will do the same by transferring power from a primary coil with more turns to a secondary coil with fewer turns, therefore lowering the voltage but obtaining higher current.

AUTO TRANSFORMERS

An auto transformer has a single tapped winding with a direct electrical connection between the input and the output. When an AC voltage is applied to a section of the winding, a voltage is produced across another section of the same winding. For example, if the transformer has a tap at the centre of the winding and 230V is applied across the entire winding, 115V could be measured between one end and the tap. The transformer can also, at least in theory be reversed so if 115V is applied between one end and the tap, 230V could be measured across the entire winding, however losses mean that in practice, slightly less voltage will be obtained. Auto transformers are usually smaller, lighter and cheaper than the more commonly found isolating transformer which has two physically separated windings, giving high resistance between them, even though they are closely coupled magnetically.

LOSSES

An ideal transformer would have no losses and therefore would be 100% efficient. In practice however, energy is lost due to the resistance of the windings, (copper loss), and to magnetic effects in the core, (iron loss). Transformers in general are very efficient, large power transformers may have an efficiency as high as 99%. Small transformers, such as those used to power consumer electronics, may be less than 85% efficient.

STEEL CORES

Most transformers have cores made of thin laminations of silicon steel. As the steel core is also conductive, it has currents induced in it by the changing magnetic flux. Insulating the layers from one another helps to reduce eddy currents, and the insulation is used to prevent the laminations acting as a solid piece of steel. The thinner the laminations, the lower the eddy currents and the lower the losses, however very thin laminations are usually expensive. Most transformers use the traditional 'E' and 'I' shaped laminations, stacked alternately in order to reduce any air gap; however there are other types such as 'C' cores

'C' cores are made by winding silicon steel strips around a rectangular form. Once the required thickness has been achieved, it is removed and the laminations bonded together. It is then cut in half to form two 'C' cores. The faces are then smoothed to ensure that they fit together with the smallest possible gap, in order to reduce losses. The coil is placed over one half of the core, which is then assembled and tightly held together by a steel strap.

TOROIDAL CORES

Toroidal transformers are assembled on a ring shaped core, usually with a rectangular cross section, although a more expensive circular type is available. The core is constructed from strips of silicon steel wound in to a coil. The closed ring eliminates any air gaps which are present in 'E' 'I' laminated cores.

Toroidal transformers are usually more efficient, although more expensive, than laminated 'E' 'I' types of a similar power level, other advantages include less mechanical hum, making their usage superior in audio applications such as amplifiers, as well as size and weight being around half that of 'E' 'I' laminated transformers.

When fitting a toroidal transformer, it is important not to allow both ends of the mounting bolt to simultaneously come into contact with metalwork, as this would make a loop of conductive material flowing through the hole in the toroid, thus allowing a dangerously large current to flow through the bolt.

SHIELDING

Where minimum electrostatic coupling between the primary and secondary windings is required, an electrostatic shield can be placed between the primary and secondary, in order to reduce capacitance between them. The shield consists of a single layer of metal foil connected to earth, and insulated where it overlaps to prevent it acting as a shorted turn. Transformers may also be placed within an electrostatic enclosure to prevent interference with nearby electrostatic sensitive devices.

WINDINGS

The wire used in a transformer is usually solid copper magnet wire with an insulated coating, in order to electrically insulate adjacent turns in the coil from each other to ensure that current travels through the entire winding. Extra tape insulation is usually provided between winding layers in larger transformers.

Windings on both the primary and secondary coils may have taps to enable adjustment of the voltage ratio. A centre tapped transformer is often used in the output stage of an audio power amplifier in a push-pull type circuit. Tapped transformers are also used as amplifier components. Transformers can also be manufactured with multiple primary and secondary windings, to allow for multiple step-up and/or step-down ratios in the same device. A variable transformer can also be made by providing a moveable arm that sweeps along the length of the winding, making contact at any point along its length.

OPERATING AT DIFFERENT FREQUENCIES

By operating at higher frequencies, transformers can be physically more compact without reaching saturation, and a given core is able to transfer more power. However, other properties of the transformer, such as losses within the core and skin-effect, also increase with frequency. Generally, operation of a transformer at its designed voltage but at a higher frequency than intended will lead to reduced magnetising current. At a frequency lower than the designed value, with the rated voltage applied, the magnetising current may increase to an excessive level.

A transformer designed for 50Hz will work at 60Hz; however a transformer designed for 60Hz may be damaged if required to work at 50Hz.

SYMBOLS



Transformer with two windings and iron core.



Step-up or step-down transformer. The symbol shows which winding has more turns but does not show the exact ratio.



Transformer with three windings. The dots indicate the start of the winding.



Transformer with electrostatic screen, which prevents capacitive coupling between the windings.

DATA

WORLD WIDE VOLTAGES

COUNTRY	FREQUENCY	VOLTAGE	COUNTRY	FREQUENCY	VOLTAGE
 Afghanistan	50 & 60	220/380	 Bolivia	50 & 60	110/220/380
 Albania	50	230/400	 Bosnia & Herzegovina	50	230/400
 Algeria	50	127/220/380	 Botswana	50	220/380
 Andorra	50	230/400	 Brazil	50 & 60	127/220/380/440
 Angola	50	220/380	 Brunei	50	240/415
 Anguilla	60	120/208/240/415	 Bulgaria	50	220/380
 Antigua & Barbuda	50	230/400	 Burkina Faso	50	220/380
 Argentina	50	220/380/440	 Burundi	50	220/380
 Armenia	50	230/400	 Cambodia	50	120/208/220/380
 Aruba	60	120/220	 Cameroon	50	127/220/380/400
 Australia	50	240/415/440	 Canada	60	120/240
 Austria	50	220/380	 Canary Islands	50	127/220/380
 Azerbaijan	50	220/380	 Cayman Islands	60	120/240
 Azores	50	220/380	 Central African Republic	50	220/380
 Bahamas	60	120/208/240	 Chad	50	220/380
 Bahrain	50 & 60	110/220/230/400	 Channel Islands	50	230/415
 Bangladesh	50	230/400	 Chile	50	220/380
 Barbados	50	110/200/120/208	 China, Peoples Republic	50	220/380
 Belarus	50	220/380	 Colombia	60	110/220
 Belgium	50	128/220/380	 Congo, Democratic Republic	50	220/380
 Belize	60	110/240/440	 Congo, Peoples Republic	50	230/400
 Benin	50	220/380	 Costa Rica	60	120/240
 Bermuda	60	115/230/120/208	 Côte d'Ivoire	50	220/380
 Bhutan	50	230/400	 Croatia	50	230/400

COUNTRY	FREQUENCY	VOLTAGE	COUNTRY	FREQUENCY	VOLTAGE
 Cuba	60	110/190/220	 Greenland	50	220/380
 Cyprus	50	240/415	 Grenada	50	230/400
 Czech Republic	50	220/380	 Guadeloupe	50	220/380
 Denmark	50	220/380	 Guam	60	110/190
 Dominican Republic	60	110/220	 Guatemala	60	110/220/120/240
 East Timor (Timor-Leste)	50	220/380	 Guinea	50	220/380
 Ecuador	60	120/208/127/220	 Guyana	50 & 60	110/220
 Egypt	50	110/220/380	 Haiti	60	110/220/380
 El Salvador	60	115/230	 Honduras	60	110/220
 Eritrea	50	230/400	 Hong Kong	50	200/346
 Estonia	50	230/400	 Hungary	50	220/380
 Ethiopia	50	220/380	 Iceland	50	220/380
 Falkland Islands	50	240/415	 India	50	230/400
 Faeroe Islands	50	230/400	 Indonesia	50	127/220
 Fiji	50	240/415	 Iran	50	220/380
 Finland	50	220/380	 Iraq	50	220/380
 France	50	127/220/380	 Ireland, Republic of	50	220/380
 Gabon	50	220/380	 Isle of Man	50	230/415
 Gambia	50	230/400	 Israel	50	230/400
 Georgia	50	220/380	 Italy	50	127/220/380
 Germany	50	220/380	 Jamaica	50	110/220
 Ghana	50	220/400	 Japan	50 & 60	100/200
 Gibraltar	50	240/415	 Jordan	50	220/380
 Greece	50	220/380	 Kazakhstan	50	220/380

DATA

WORLD WIDE VOLTAGES

	FREQUENCY	VOLTAGE	COUNTRY	FREQUENCY	VOLTAGE
 Kenya	50	240/415	 Moldova	50	230/400
 Korea, North	50	220/380	 Monaco	50	127/220/380
 Korea, South	60	220/380	 Mongolia	50	230/400
 Kosovo	50	230/400	 Montenegro	50	230/400
 Kuwait	50	240/415	 Morocco	50	115/200/127/220/380
 Kyrgyzstan	50	220/380	 Mozambique	50	220/380
 Laos	50	230/380	 Myanmar (Burma)	50	120/208/220/380/440
 Latvia	50	230/400	 Namibia	50	220/380
 Lebanon	50	110/190/220/380	 Nauru	50	240/380
 Lesotho	50	220/380	 Nepal	50	230/330
 Liberia	60	120/208/240	 Netherlands	50	220/380
 Libya	50	127/220/230/400	 New Caledonia	50	220/380
 Liechtenstein	50	230/400	 New Zealand	50	230/400
 Lithuania	50	230/400	 Nicaragua	60	120/240
 Luxembourg	50	120/208/220/380	 Niger	50	220/380
 Macedonia	50	230/400	 Nigeria	50	230/415
 Madagascar	50	127/220/380	 Norway	50	230
 Malawi	50	230/400	 Oman	50	220/440
 Malaysia	50	240/415	 Pakistan	50	230/380/400
 Mali	50	220/380	 Panama	60	110/220/120/240
 Malta	50	240/415	 Papua New Guinea	50	240/415
 Mauritania	50	220	 Paraguay	50	240
 Mauritius	50	230/400	 Peru	60	110/220
 Mexico	60	127/220	 Philippines	60	110/220

COUNTRY	FREQUENCY	VOLTAGE	COUNTRY	FREQUENCY	VOLTAGE
 Poland	50	220/380	 Sweden	50	127/220/380
 Portugal	50	220/380	 Switzerland	50	220/380
 Puerto Rico	60	120/240	 Syria	50	115/200/220/380
 Qatar	50	240/415	 Tahiti	60	127/220
 Romania	50	220/380	 Taiwan	60	110/220
 Russia	50	127/220	 Tanzania	50	230/400
 Rwanda	50	220/380	 Thailand	50	220/380
 Saint Helena	50	230	 Togo, Republic of	50	127/220/380
 Saint Lucia	50	230/400	 Trinidad & Tobago	60	115/230/400
 Samoa	50	230/400	 Tunisia	50	230/400
 Saudi Arabia	50 & 60	127/220/380/400	 Turkey	50	220/380
 Senegal	50	110/220	 Uganda	50	240/415
 Serbia	50	230/400	 Ukraine	50	230/400
 Sierra Leone	50	220/440	 United Arab Emirates	50	230/400
 Singapore	50	230/400	 United Kingdom	50	230/415
 Slovakia	50	230/400	 United States of America	60	115/220/120/208
 Slovenia	50	230/400	 Uruguay	50	220
 Somalia	50	110/220/380/440	 Uzbekistan	50	220/380
 South Africa	50	220/380/400	 Venezuela	60	120/240
 Spain	50	127/220/380	 Vietnam	50	127/220/380
 Sri Lanka	50	230/400	 Virgin Islands (American)	60	120/240
 Sudan	50	240/415	 Yemen	50	230/400
 Suriname	60	110/220/115/230	 Zambia	50	220/380
 Swaziland	50	230/400	 Zimbabwe	50	220/380



DATA GLOSSARY

ALTERNATING CURRENT (AC)	Current that alternates regularly in direction, is periodic, and has an average value of zero.
AMBIENT TEMPERATURE	The normal surrounding temperature of the environment in which a transformer operates.
AUTO TRANSFORMER	A transformer used to step up or step down voltage. The primary and secondary windings share common turns and provide on isolation.
CORE	The ferrous centre part of a transformer or inductor, used to increase the strength of a magnetic field.
CORE SATURATION	A condition that occurs when an inductor or transformer has reached its maximum magnetic strength.
CURRENT TRANSFORMER (CT)	A transformer used in instrumentation to assist in measuring current. It utilizes the strength of the magnetic field around the conductor to form an induced current that can then be applied across a resistance to form a proportional voltage.
DELTA	A standard three phase connection with the ends of each phase winding connected in series to form a closed loop with each phase 120 electrical degrees from the other.
DELTA - DELTA	The connection between a delta source and a delta load.
DELTA - STAR	The connection between a delta source and a star load.
DUTY CYCLE	The percentage of time a transformer will be supplying the full rated power to the load. Percentage of time a unit is expected to perform at full rated power versus time spent in idle can significantly affect the physical size of the transformer.
EFFICIENCY	The efficiency of a transformer is the ratio of its power output to its total power input.

ENCAPSULATION	A process in which a transformer is completely sealed with epoxy or similar material. This process is usually used when a unit might encounter harsh environmental conditions.
EXCITING CURRENT	The current drawn by a transformer at nominal input voltage in its unloaded (open-circuit) condition.
FERRORESONANCE	Resonance resulting when the iron core of an inductive component of an LC circuit is saturated, increasing the inductive resistance with respect to the capacitance resistance.
FERRORESONANT TRANSFORMER	A voltage regulating transformer that depends on core saturation and output capacitance.
FILTER	A selective network of resistors, inductors or capacitors which offers comparatively little opposition to certain frequencies or direct current, whilst blocking or attenuating other frequencies.
FUSE	A protective device, gG types are used for resistive loads and aM types are used for inductive loads.
GRAIN	A term often used to describe the quality of the transformer core. It is also known as M6 material. A more expensive, low loss lamination. it can be used to reduce temperature or where space may be limited.
IMPEDANCE	Total opposition of a component or circuit to the flow of an alternating or varying current. (Symbol Z).
INDUCTANCE	The ability of a coil to store energy and oppose changes in current flowing through it. A function of the cross sectional area, number of turns, length of coil and core material. Measured in Henrys. (Symbol L).
INDUCTOR	A coiled conductor that opposes changes in current. Can be very similar in appearance to a transformer.
INRUSH CURRENT	A brief and momentary surge of current through the transformer, due to residual flux, experienced as the transformer is energised.

ISOLATING TRANSFORMER	A transformer with primary and secondary windings physically separated by design to permit magnetic coupling between isolated circuits whilst minimizing electrostatic coupling.
LINEAR LOAD	A load in which the relationship between current and voltage is directly proportional.
KW	Kilowatt, 1,000 watts.
KWH	Kilowatt hour, one kilowatt for one hour.
KVA	Kilovolt-ampere, or thousand volt-ampere. When multiplied by the power factor, will give kilowatts, or KW. Most transformers have their rating expressed in KVA
MAGNETIC SHIELDING	Conductive material placed around a transformer's coils to attenuate stray magnetic fields.
NATURAL CONVECTION	A method of temperature regulation in which the normal convection of ambient air surrounding the transformer will provide its only cooling.
NOMINAL VOLTAGE	The normal designed voltage level.
NON-LINEAR LOAD	A load in which the relationship between current and voltage is not directly proportional.
OHM'S LAW	The relationship between voltage, current and resistance. The current in an electrical circuit is directly proportional to the voltage and inversely proportional to the resistance.
OPEN FRAME	A method of transformer construction.

POWER FACTOR	(PF) A capacitive or inductive circuit condition that results in the applied current leading or lagging the applied voltage.
PRIMARY	The winding that is directly connected to the input supply. A transformer can have more than one primary winding, which can either be connected in series or parallel.
RATING	The addition of all transformer output windings. Normally measured in VA or KVA.
RECTIFIER	An electrical device used to change AC power into DC power.
REGULATION	Usually expressed as a percentage, between the difference of a winding's no-load to full-load. Normally between 0.75 and 1.0.
SECONDARY	The winding(s) supplying the output voltage to the load(s).
SHORT CIRCUIT	A low resistance connection, usually accidental, across part of a circuit, resulting in excessive current flow. Some small transformers can be designed as 'short circuit proof'. Whose windings will have a high impedance.
STEP-UP / STEP-DOWN TRANSFORMERS	A transformer can either step-up or step-down voltage. A step-up transformer is one in which the output voltage is greater than the input voltage. With a step-down transformer, the input voltage is greater than the output voltage.
TEMPERATURE RISE	The temperature increase above ambient when the transformer is under constant load conditions and no further temperature increase is noted.
TOROIDAL	A doughnut shaped transformer, featuring lower height and lower stray magnetic field.
WYE	Refers to a type of three phase transformer connection. Also known as a star connection.



DATA

AUTO TRANSFORMERS, PHYSICAL SIZES

Due to the characteristics of auto transformers their physical sizes can often give a saving in space. To determine the equivalent size of an auto transformer against that of a double wound transformer the following formula may be used as a guide. It should be remembered that other factors may alter the size, i.e. amperages, high winding voltages, etc.

$$\text{Voltage difference} \times \text{current at highest voltage} = \text{VA}$$

Voltage difference	=	The difference between the input volts and output volts
Highest voltage	=	The highest voltage tap should be selected (either input or output) and the current at that tap should be determined.

DATA REQUIRED FOR QUOTATION PURPOSES

To enable a manufacturer to quote for, or make transformers to specification certain information is required. Below is a list of essential points.

1)	Primary input tappings and frequency	i.e. 0/240V 50Hz
2)	Outputs required in volts and amps	i.e. 0/12V at 10A (120VA)
3)	Type of load	i.e. Resistive/inductive
4)	Physical style	i.e. Tags/Screw terminals/Cased
5)	Size limitations	

Please advise if particular attention should be given to:-

Regulation, duty cycle, ambient temperature, PCB Pin Positions, type of mounting, length of fly leads.

Remember transformers are normally rated in VA. Inductive loads produce power factors less than unity.

EFFICIENCY

Of a given transformer is given by the following formula:-

$$\frac{\text{Output in watts} \times 100}{\text{Output in watts} + \text{total losses in watts}}$$

Expressed as a percentage

The iron loss of a transformer remains constant regardless of load. The copper loss varies with the square of the load and is directly proportional to the load when expressed as a percentage.

RESISTANCE

The resistance of a copper winding increases at the rate of 0.4% per degree C rise in temperature.

SHORT CIRCUIT CURRENT

The short circuit current that a winding can deliver is given by the following formula.

$$ISC = IFL \times \frac{100}{V_z}$$

IFL = Designed winding current

V_z = Impedance voltage of that winding (%)

It must be remembered that the short circuit current derived from the above equation presumes the maintenance of the full line voltage under fault conditions. But in fact the line voltage is generally maintained for the first few cycles only after the first instant short circuit. Only larger systems being capable of supplying sufficient MVA will maintain the supply voltage behind the fault. Therefore, obviously as the supply voltage drops so will the value of the short circuit current.

MAINS TRANSFORMERS

- 1) All primaries suitable for 50/60Hz operation.
- 2) All secondary voltages stated are at maximum load.
Please indicate on your order if off load voltages are required.
- 3) Flash tested at 4.0KV r.m.s
- 4) All temperature limits within Cee 15 at 25°C ambient at full load.

REGULATION

Regulation is determined by the following formula:-

$$\frac{\text{Off load voltage} - \text{Full load voltage}}{\text{Off load voltage}}$$

EFFECT OF AMBIENT TEMPERATURE ON RATINGS

AVERAGE	PEAK	SUGGESTED RATING REDUCTION
30°C	35°C	NIL
35°C	45°C	6%
40°C	50°C	12%
45°C	55°C	20%

EFFECT OF WIDE RANGE OF PRIMARY TAPS ON PHYSICAL SIZE

0.....380V.....	550V	PLUS 18%
0.....110V.....	240V	PLUS 25%
0.....220V.....	440V	PLUS 25%
0.....110V.....220V.....	550V	PLUS 40%
0.....220V.....400V.....	550V	PLUS 30%

This table is a guide for tapped primary windings. It may not apply to Series/Parallel type windings.

EARTHING

Class 1 - Has provision for earthing.
Class - Has no provision for earthing.

INSULATION CLASS

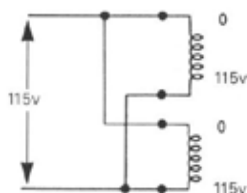
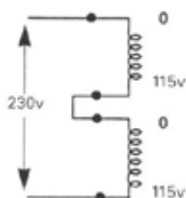
Y = 90°C	F = 155°C
A = 105°C	H = 180°C
E = 120°C	H+ = 200°C
B = 130°C	C = 220°C

IMPEDANCE VOLTAGE

The impedance voltage of a winding is the voltage required, with other windings short circuited, to produce in that winding under test the full load current that it was designed for. This figure is usually expressed as a percentage of the total winding voltage.

TRANSFORMER CONNECTIONS - Single Phase Types

Transformers with 2 primary windings are usually meant to be connected in either series or parallel, depending on the supply voltage being used for example, a common primary found would be 0 - 120v, 0 - 120v, for 240v operation the windings must be connected in series, for 120v the windings must be connected in parallel, never be tempted to use only one primary, as this could seriously affect the operation of the transformer and could cause overheating.

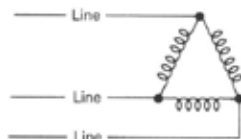


Secondaries may also be wired in series or parallel but only if their voltages are the same and have been designed for the purpose

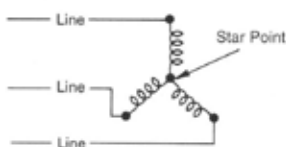
TRANSFORMER CONNECTIONS - Three Phase Types

Three phase transformer connections are more complex than single phase transformers, there are also many more different winding configurations. The most common two types being delta and star.

DELTA



STAR



Input and output windings can be either star or delta (or other) types. Depending upon customer requirements. In delta there are only three connections to be made. In star an extra terminal may be provided, called a star point or SP. If this winding is the output winding the star point may be used to supply a voltage $\sqrt{3}$ smaller than the line voltage.

- 1831** Michael Faraday experimented with Electromagnetic induction
- 1837** The first practical electric truck was constructed in Aberdeen. It was later to be used on the Edinburgh-Glasgow railway.
Developments of the Carbon Arc lamp.
- 1848** The national gallery in London was lit, lighthouse applications followed.
- 1871** Z.T. Gramme produced a dynamo, later adapted as the first commercial generator.
- 1878** A football match at Bramall Lane, Sheffield, was lit under carbon-arc electric light.
Swann demonstrated the first incandescent filament electric lamp.
- 1879** Electric arc furnace for melting iron and steel constructed by Siemens.
Edison began large scale manufacture of the filament lamp
- 1880** The first house in the UK, lit by electric lamps in Gateshead
- 1881** Godalming in Surrey lit by electric street lamps in place of gas.
The first public supply of electricity (water power).
- 1882** Holborn Viaduct power station generated 110V DC, powered by steam, supplied both private consumers and public lighting.
Sebastian Ferranti & Lord Kelvin pioneer early AC power technology including an early transformer.
Electric Lighting Act. Considered to be the start of the industry in the UK.
- 1884** Lucien Gaulard develops transformers and the power transmission system from Lanzo to Turino.
- 1885** George Westinghouse orders a Siemens alternator and a Gaulard & Gibbs transformer.
- 1886** William Stanley builds the worlds first full AC power system using step up & step down transformers.
- 1889** Electric tram service in Kent.
Mikhail Dolivo-Dobrovsky builds the first transformer and motor to work with his 3 phase AC system.
- 1890** Start of the underground tube system. The City and South London railway.
Ferranti designed a power station at Deptford. It generated AC, which was to become the norm.
- 1891** Electric tram service in Leeds.
- 1908** Electric vacuum cleaners in the USA.
- 1913** Neon lamps at a London cinema.
- 1917** Electric washing machines in the UK.
- 1918** Refrigerators in the USA.
- 1926** Electricity (supply) Act created a public corporation (the CEB) to link up selected Stations into a National Grid. 132kV was to be the primary transmission, with 66kV and 33kV as secondary transmissions.
The frequency of the AC was to be standardised to 50Hz.
- 1927** British standards for 2-pin sockets introduced.
- 1934** 3-pin sockets standardised (2A, 5A, 15A were chosen).
- 1938** National control based in London operated the grid system.
- 1947** The supply industry of England & Wales was nationalised, 240V adopted as the UK Standard supply

- 1950** Prototype storage heater developed.
- 1953** The Supergrid developed. A 275kV network superimposed on the existing grid system.
- 1956** The first large-scale nuclear station at Calder Hall, Cumberland. 4x23MW. Mainly a research station.
- 1957** Central Electricity Generating Board (CEGB) formed.
- 1960** Automatic washing machines available.
- 1962** The first commercial nuclear power stations in operation at Berkley, Glos. and Bradwell, Essex. 1963. 400kV transmission lines in use with the grid system.
- 1976** **Louth Transformer Company started trading.**
- 1980** A further seven nuclear power stations in commission. Another three under construction.
More domestic electricity used for refrigerators and freezers than used for lighting.
The floppy disk was introduced which could store 875kbs.
Long life, energy efficient light bulbs became available.
- 1981** International discussions on world-wide standard for plug and socket systems.
- 1983** James Dyson launches the first bagless vacuum cleaner in Japan.
- 1985** Optical fibre technologies first used to transmit 300,000 telephone conversations over a single fibre.
- 1986** Largest ever nuclear accident takes place at Chernobyl in the former Soviet Union.
Fuji introduces the disposable camera.
- 1989** Tim Berners-Lee invents the world wide web.
First commercial handheld GPs receiver becomes available.
- 1995** Pierre Omidyar launches eBay.
- 1996** The first power station to be run on chicken droppings built near Thetford, Norfolk.
First HDTV signal broadcast in the United States.
- 1997** WiFi becomes a world wide standard for wireless internet.
- 2000** Environmentally friendly transformer fluid from vegetable oils invented by T.V. Oommen.
- 2001** Apple launches the first iPod.
- 2002** iRobot corporation releases the first version of its Roomba vacuum cleaning robot.
- 2007** Apple introduced the first iPhone.
BBC launched the iPlayer.
Amazon launched its first Kindle eReader.
- 2008** The International Telecommunications Union (ITU) specified a set of requirements for 4G.
- 2014** Google begins testing driverless cars.
- 2015** The world's first commercial wave power station switched on in Australia.
- 2019** The UK extends its record for running without coal fired electricity.
First to one week, then two weeks, then 18 days.



DATA PROTECTIVE DEVICES

PROTECTION OF THE SUPPLY (INPUT)

When a transformer is energised, an initial surge current is produced. A protective device must not break under the initial surge current. The protection of the supply circuit must only take into account the risk of fault current as the protection against overload must be situated on the secondary circuit. Below is a list of appropriate protection based on primary voltage and VA rating.

VA	230v		415v	
	aM Fuse	Type C M.C.B.	aM Fuse	Type C M.C.B.
50	1	1	1	1
100	1	3	1	2
150	1	6	1	2
200	1	6	1	3
250	2	6	1	3
300	2	10	2	6
400	4	10	2	6
500	6	16	4	10
750	8	16	6	10
1000	10	20	6	16
1250	10	25	8	20
1500	10	32	10	20
2000	12	40	10	25
2500	16	40	10	32
3000	16	50	12	40
3500	20	50	16	40
4000	20	63	16	50
5000	25	80	20	63

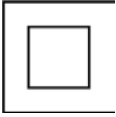
OVERLOAD PROTECTION (OUTPUT)

Clause 14 of BS 3535: Part 1: 1990 specifies that a transformer should not become unsafe in the event of a short-circuit or overload. The table below shows a suggested rating for a protective device based on secondary voltage and VA rating.

VA	Secondary Voltage			
	12v - 0 - 12v	24v - 0 - 24v	55v - 0 - 55v	240v
50	2	1	0.5	0.2
100	4	2	1	0.5
150	6	4	2	1
200	8	4	2	1
250	10	6	4	2
300	12	6	4	2
400	16	8	4	2
500	20	10	6	2
750		16	7	4
1000		20	10	4
1250			12	6
1500			16	6
2000			20	8
2500			25	10
3000			25	
3500			32	
4000			38	
5000			50	

SYMBOLS

Listed below are some of the more popular symbols found in documentation relating to transformers, some of which appear on our product labels. Please note we are unable to supply UL or CSA certified transformers, however we can supply transformers for submission to test houses by customers.

	Class 1 Has provision for earthing.		Double wound transformer.
	Class 2 Double insulated. Does not require and has no provision for earthing.		Short circuit proof transformer.
	Single phase A.C.		Non short circuit proof transformer
	Three phase A.C.		Auto Transformer.
	Three phase with neutral A.C.		Chassis or core.
	D.C.		Fuse.
	UL recognised component.		CSA certification marking.



DATA

WEIGHT PER AREA AND VOLUME

Pounds per square foot	x	4.8824	=	Kilogrammes per square metre
Kilogrammes pre square metre	x	0.20482	=	Pounds per square foot
Ounces per square foot	x	305.15	=	Grammes per square metre
Grammes per square metre	x	0.0032771	=	Ounces per square foot
Pounds per cubic foot	x	16.018	=	Kilogrammes per cubic metre
Kilogrammes per cubic metre	x	0.062428	=	Pounds per cubic foot
Pounds per cubic inch	x	27.680	=	Grammes per cubic centimetre
Grammes per cubic centimetre	x	0.036128	=	Pounds per cubic inch

LENGTH, AREA AND VOLUME

Cubic centimetres	x	0.061023	=	Cubic inches
Cubic inches	x	16.387	=	Cubic centimetres
Square centimetres	x	0.1550	=	Square inches
Square inches	x	6.4516	=	Square centimetres
Centimetres	x	0.3937	=	Inches
Inches	x	2.5400	=	Centimetres

MAGNETIC AND ELECTRICAL

Kilowatt-hours	x	3413.0	=	British thermal units
Kilowatt-hours	x	2.6553×10^6	=	Foot pounds
Kilowatts	x	1.3410	=	Horsepower
Horsepower	x	0.7457	=	Kilowatts
Watts per cubic inch	x	3.6169	=	Watts per pound for density 7.65 gms. per cc
Watts per pound	x	0.27638	=	Watts per cubic inch for density 7.65 gms. per cc
Watts per cubic inch	x	3.6662	=	Watts per pound for density 7.55 gms. per cc
Watts per pound	x	0.27277	=	Watts per cubic inch for density 7.55 gms. per cc
Watts per cubic inch	x	3.5702	=	Watts per pound for density 7.75 gms. per cc
Watts per pound	x	0.28009	=	Watts per cubic inch for density 7.75 gms. per cc
Watts per kilogramme	x	0.4536	=	Watts per pound
Watts per pound	x	2.2046	=	Watts per kilogramme
Webers per square metre	x	10	=	Kilogauss
Kilogauss	x	0.1	=	Webers per square metre
Amp. turns per cm.	x	2.5400	=	Amp. turns per inch
Amp. turns per inch	x	0.3937	=	Amp. turns per centimetre
Amp. turns per Cm.	x	1.2566	=	Oersteds (H)
Oersteds (H)	x	0.79577	=	Amp turns per centimetre
Amp. turns per inch	x	0.49474	=	Oersteds (H)
Oersteds (H)	x	2.0213	=	Amp. turns per inch
Lines per square inch	x	0.1550	=	Lines per square centimetre
Lines per sq. cm. (gausses) (B)	x	6.4516	=	Lines per square inch

WEIGHT

Metric tons	x	0.98421	=	Long tons
Long tons	x	1.0160	=	Metric tons
Metric tons	x	1.1023	=	Short tons
Short tons	x	0.90718	=	Metric tons
Short (nett) tons	x	2000.0	=	Pounds (Av.)
Long (gross) tons	x	2240.0	=	Pounds (Av.)
Short tons	x	1.120	=	Long tons
Metric tons	x	1000.0	=	Kilogrammes
Tons	x	1016.0	=	Kilogrammes
Ounces (Av.)	x	28.35	=	Grammes
Grammes	x	0.035274	=	Ounces (Av.)
Pounds (Av.)	x	0.45359	=	Kilogrammes
Kilogrammes	x	2.2046	=	Pounds (Av.)



TERMS AND CONDITIONS

GENERAL TERMS AND CONDITIONS

All descriptions, data and illustrations contained within this catalogue are intended to present a general idea of the products available and nothing contained in the catalogue shall form part of any contract between Louth Transformer Company Limited and the customer, and shall not be under liability for damage, loss or expense resulting from the giving of incorrect advice or information. We will endeavour to give the best advice but the customer should satisfy himself that the goods offered are fit for the purpose. All electrical ratings represent safe working limits. Dimensions are subject to commercial tolerances.

1. It is hereby agreed that the following conditions shall be deemed to be incorporated into all contracts entered into by Louth Transformer Company Limited with the customer named on this form ('The Customer').
2. In these conditions the term "The Goods" means any goods which are the subject of a contract between Louth Transformer Company Limited and the Customer.
3. The risk in any goods shall pass to the Customer on delivery thereof
4. **PASSING OF TITLE**
 - a) The ownership of the goods shall remain with Louth Transformer Company Limited, who reserve the right to dispose of the goods until payment in full for all of the goods has been received by it in accordance with the terms of these conditions or until such time as the Customer sells the goods to its own Customers by way of bona-fide sales at full market value.
 - b) If such payment is overdue in whole or in part Louth Transformer Company Limited may (without prejudice to any of its other rights) recover or resell the goods or any of them and may enter upon the Customer's premises by its servants or agents for that purpose
 - c) Such payments shall become due immediately upon the commencement of any act or proceeding in which the Customer's solvency is involved
 - d) If any of the goods is incorporated in or used as material for other goods before such payment the property in the whole or such other goods shall be and remain with Louth Transformer Company Limited until such payment has been made, or the other goods have been sold as aforesaid, and all the rights of Louth Transformer Company Limited hereunder in the goods shall extend to those other goods.
 - e) Until Louth Transformer Company Limited is paid in full for all of the goods the relationship of the Customer to Louth Transformer Company Limited shall be fiduciary in respect of the goods or other goods in which they are incorporated or used and if the same are sold by the Customer Louth Transformer Company Limited shall have the right to trace the proceeds thereof according to the principles in re Hallett's Estate (1880) 13 CH D 696, (1874-80) ALL ER REP 793. A like right for Louth Transformer Company Limited shall apply where the Customer uses the goods in any way so as to be entitled to payment from a third party.
5. **OVERDUE PAYMENTS AND CANCELLATION**
 - a) The price payable for the goods shall be net and payments shall be made on or before the last day of the month following the month of invoice date unless otherwise agreed in writing.
 - b) Louth Transformer Company Limited shall be entitled to suspend or cancel deliveries under any contract between the parties hereto if any payment is overdue.
 - c) For the purpose of this condition, time shall be of the essence of any contract governed by these conditions.
 - d) The Customer shall not be entitled to withhold or set-off payment for any goods delivered for any reason whatsoever.

CARRIAGE All prices quoted for goods are exclusive of carriage and VAT, unless otherwise stated in writing by Louth Transformer Company Limited

AMENDMENTS Call off orders are accepted on the condition that any amendment is notified to us in writing 4 weeks before change is to be effected. We reserve the right to despatch and invoice any goods to which time, expense or materials have been committed. We also reserve the right to stop manufacture of any order without penalty if the account is overdue for payment.

DELIVERY Louth Transformer Company Limited will endeavour to meet any requested or estimated despatch dates but cannot be held responsible for any reasonable delay. Any special, or fast delivery instructions will be subject to extra charge.

HEALTH AND SAFETY Customers should satisfy themselves that the goods delivered are to the specification ordered and fit for the purpose required. Transformers should be installed by qualified personnel.

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GOODS ORDERED IN ERROR Stock items may normally be returned if ordered in error or not wanted, providing the following conditions apply:

- a) Goods are returned within 30 days of invoice date.
- b) They are unused and in good condition.
- c) They are returned to us adequately packed at the Customer's expense.
- d) The Customer's original order number is quoted.

If the above procedure is adopted a handling charge of 20% will be deducted from the credit, together with the original outward carriage charge.

Items not normally held in stock, i.e. manufactured to specification, may not be returned unless agreed to in writing by Louth Transformer Company Limited.



LOUTH TRANSFORMER COMPANY LIMITED



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