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Data handbook



Electronic
components
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Components and
materials

Book C8

1986

Variable mains transformers

Annular fixed transformers

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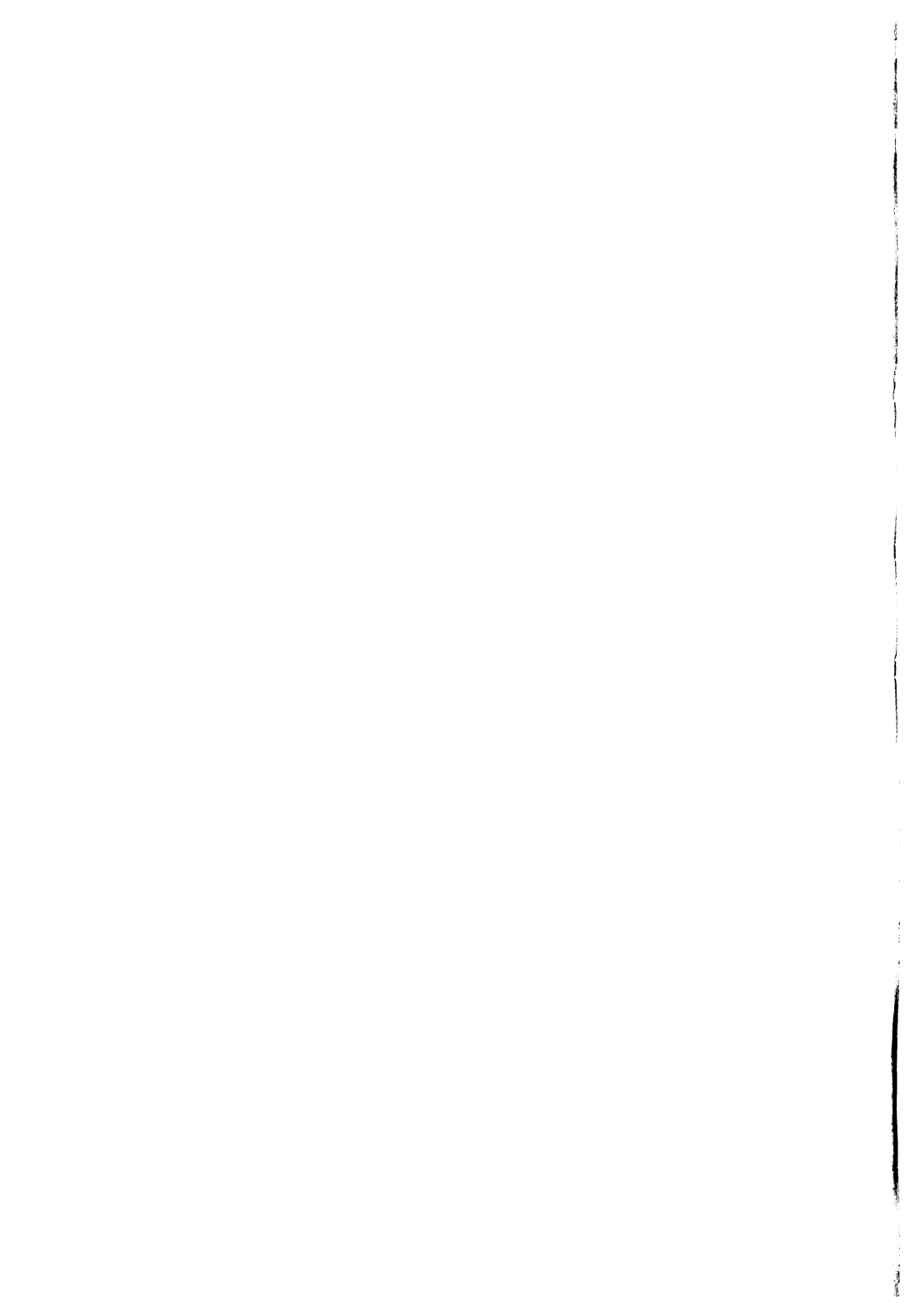
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VARIABLE MAINS TRANSFORMERS

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DATA HANDBOOK SYSTEM

Our Data Handbook System comprises more than 60 books with specifications on electronic components, subassemblies and materials. It is made up of four series of handbooks:

ELECTRON TUBES	BLUE
SEMICONDUCTORS	RED
INTEGRATED CIRCUITS	PURPLE
COMPONENTS AND MATERIALS	GREEN

The contents of each series are listed on pages iv to viii.

The data handbooks contain all pertinent data available at the time of publication, and each is revised and reissued periodically.

When ratings or specifications differ from those published in the preceding edition they are indicated with arrows in the page margin. Where application information is given it is advisory and does not form part of the product specification.

Condensed data on the preferred products of Philips Electronic Components and Materials Division is given in our Preferred Type Range catalogue (issued annually).

Information on current Data Handbooks and on how to obtain a subscription for future issues is available from any of the Organizations listed on the back cover.

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ELECTRON TUBES (BLUE SERIES)

The blue series of data handbooks comprises:

- T1** Tubes for r.f. heating
- T2a** Transmitting tubes for communications, glass types
- T2b** Transmitting tubes for communications, ceramic types
- T3** Klystrons
- T4** Magnetrons for microwave heating
- T5** Cathode-ray tubes
Instrument tubes, monitor and display tubes, C.R. tubes for special applications
- T6** Geiger-Müller tubes
- T8** Colour display systems
Colour TV picture tubes, colour data graphic display tube assemblies, deflection units
- T9** Photo and electron multipliers
- T10** Plumbicon camera tubes and accessories
- T11** Microwave semiconductors and components
- T12** Vidicon and Newvicon camera tubes
- T13** Image intensifiers and infrared detectors
- T15** Dry reed switches
- T16** Monochrome tubes and deflection units
Black and white TV picture tubes, monochrome data graphic display tubes, deflection units

SEMICONDUCTORS (RED SERIES)

The red series of data handbooks comprises:

- S1 Diodes**
Small-signal silicon diodes, voltage regulator diodes ($< 1,5 W$), voltage reference diodes, tuner diodes, rectifier diodes
- S2a Power diodes**
- S2b Thyristors and triacs**
- S3 Small-signal transistors**
- S4a Low-frequency power transistors and hybrid modules**
- S4b High-voltage and switching power transistors**
- S5 Field-effect transistors**
- S6 R.F. power transistors and modules**
- S7 Surface mounted semiconductors**
- S8 Devices for optoelectronics**
Photosensitive diodes and transistors, light-emitting diodes, displays, photocouplers, infrared sensitive devices, photoconductive devices.
- S9 Power MOS transistors**
- S10 Wideband transistors and wideband hybrid IC modules**
- S11 Microwave transistors**
- S12 Surface acoustic wave devices**
- S13 Semiconductor sensors**

INTEGRATED CIRCUITS (PURPLE SERIES)

The purple series of data handbooks comprises:

EXISTING SERIES

Superseded by:

IC1	Bipolar ICs for radio and audio equipment	IC01N
IC2	Bipolar ICs for video equipment	IC02Na and IC02Nb
IC3	ICs for digital systems in radio, audio and video equipment	IC01N, IC02Na and IC02Nb
IC4	Digital integrated circuits CMOS HE4000B family	
IC5	Digital integrated circuits – ECL ECL10 000 (GX family), ECL100 000 (HX family), dedicated designs	IC08N
IC6	Professional analogue integrated circuits	
IC7	Signetics bipolar memories	
IC8	Signetics analogue circuits	IC11N
IC9	Signetics TTL logic	IC09N and IC15N
IC10	Signetics Integrated Fuse Logic (IFL)	IC13N
IC11	Microprocessors, microcomputers and peripheral circuitry	IC14N

NEW SERIES

IC01N	Radio, audio and associated systems Bipolar, MOS	(published 1985)
IC02Na	Video and associated systems Bipolar, MOS Types MAB8031AH to TDA1524A	(published 1985)
IC02Nb	Video and associated systems Bipolar, MOS Types TDA2501 to TEA1002	(published 1985)
IC03N	Integrated circuits for telephony	(published 1985)
IC04N	HE4000B logic family CMOS	
IC05N	HE4000B logic family – uncased ICs CMOS	(published 1984)
IC06N	High-speed CMOS; PC54/74HC/HCT/HCU Logic family	(published 1985)
Supplement to IC06N	High-speed CMOS; PC74HC/HCT/HCU Logic family	(published 1985)
IC07N	High-speed CMOS; PC54/74HC/HCT/HCU – uncased ICs Logic family	
IC08N	ECL 10K and 100K logic families	(published 1984)
IC09N	TTL logic series	(published 1984)
IC10N	Memories MOS, TTL, ECL	
IC11N	Linear LSI	(published 1985)
IC12N	Semi-custom gate arrays & cell libraries ISL, ECL, CMOS	
IC13N	Semi-custom Integrated Fuse Logic	(published 1985)
IC14N	Microprocessors, microcontrollers & peripherals Bipolar, MOS	(published 1985)
IC15N	FAST TTL logic series	(published 1984)

Note

Books available in the new series are shown with their date of publication.

COMPONENTS AND MATERIALS (GREEN SERIES)

The green series of data handbooks comprises:

- C1 Programmable controller modules**
PLC modules, PC20 modules
- C2 Television tuners, coaxial aerial input assemblies, surface acoustic wave filters**
- C3 Loudspeakers**
- C4 Ferroxcube potcores, square cores and cross cores**
- C5 Ferroxcube for power, audio/video and accelerators**
- C6 Synchronous motors and gearboxes**
- C7 Variable capacitors**
- C8 Variable mains transformers**
- C9 Piezoelectric quartz devices**
- C10 Connectors**
- C11 Varistors, thermistors and sensors**
- C12 Potentiometers, encoders and switches**
- C13 Fixed resistors**
- C14 Electrolytic and solid capacitors**
- C15 Ceramic capacitors**
- C16 Permanent magnet materials**
- C17 Stepping motors and associated electronics**
- C18 Direct current motors**
- C19 Piezoelectric ceramics**
- C20 Wire-wound components for TVs and monitors**
- C21* Assemblies for industrial use**
HNIL FZ/30 series, NORbits 60-, 61-, 90-series, input devices
- C22 Film capacitors**

* To be issued shortly.

**INTRODUCTION
SELECTION GUIDE**

INTRODUCTION

Applications

The main applications are:

- distortion-free voltage control for measuring equipment and voltage stabilizers;
- power control for electric heating, heat sealing of plastics;
- current control for galvanizing plants;
- lighting control;
- ventilation control in farm buildings and greenhouses;
- motor speed control.

TYPES

These variable transformers have a nominal output current range from 0,5 to 23 A. Most are auto-transformers; transformers with separate windings for 3 A output current are available.

All auto-transformers are available as **panel model** and some also as **bench model** or **laboratory model**.

A **panel model** is a transformer of which the live parts are not protected.

A **bench model** is a transformer in a protective housing and has a knob and dial.

A **laboratory model** is a bench model with a handle, an input cable with plug and a fused outlet socket. ←

The transformers with separate windings are available as a **panel model** or a **laboratory model**. The laboratory model has a handle, overload protection, a voltmeter for indicating the output voltage, a cable with plug for input connection, and an outlet socket.

Features

- continuous voltage control;
- small size and high efficiency by using high quality core material;
- very low stray losses by using toroidal coil and specially treated track with low and stable contact resistance between brush and track resulting in low losses at the most critical place; under normal conditions, the brush track needs no maintenance;
- corrosion proof;
- long life carbon brushes and smooth contact surface;
- simple replacement of carbon brushes;
- adjustable side-to-side spindle position;
- low winding resistance;
- high overload capability;
- simple coupling in parallel or three-phase combinations;
- remote-controlled motor drive available for coupled and individual transformers.

All transformers meet the safety requirements laid down in SEV1003; the relevant types (output current ≤ 10 A) have SEV approval, which is indicated on the transformer and in the relevant data sheet.

SELECTION GUIDE

In the tables below the transformers are listed in order of their nominal input voltages, and for each input voltage in order of their output currents.

Detailed specifications are in the data sheets, which are in two sections (with tabbed dividers): auto-transformers and transformers with separate windings. The data sheets are listed according to transformer size code. (The size code is introduced to simplify division of the transformers into groups.)

Conversion of catalogue number to transformer size code is given in the list following Table 2.

Table 1 Transformers with separate windings

1 input voltage nom. V	2 3 output current		4 output voltage no-load V	5* 6* output current		7* output voltage no-load V	8 trans- former size code	9 10 11 catalogue number 2422 529			12 page
	nom. A	max. A		nom. A	max. A			panel model	bench model	lab. model	
220	3		0-262				E7.1	00008		00007	87
	3		0-262				E7.1			00017	87
	3		0-16				E2.1	00009			83

Table 2 Auto-transformers

1 input voltage nom. V	2 3 output current		4 output voltage no-load V	5* 6* output current		7* output voltage no-load V	8 trans- former size code	9 10 11 catalogue number 2422 530			12 page
	nom. A	max. A		nom. A	max. A			panel model	bench model	lab. model	
32	7	8	0-32				E1.1	90033			21
42	2,5	3	0-42				E1.1	90032			21
	4	4,8	0-42				E2	90031			27
60	1,2	1,32	0-60				E1	00007			17
	3,15	3,7	0-60				E1.1	10007			21
110	0,6	0,7	0-110				E1	00107			17
	1,4	1,7	0-110				E1.1	10107			21
	10		0-130				E6	90034			53
115	1,2	1,4	0-130	1,32	1,54	0-115	E2	01607			27
	1,4	1,7	0-115				E2	11607			27
127	2,5	3	0-150	2,75	3,25	0-127	E3.1	22307			35
	5	6	0-150	5,5	6,5	0-127	E4	23307			39
	10	12,6	0-150	11	13	0-127	E6.1	04307			57

* The data given in the 5th, 6th and 7th columns hold for overwound transformers (transformers with a maximum output voltage higher than the input voltage) with the input voltage applied across the complete winding.

Table 2 Auto-transformers (continued)

1 input voltage nom. V	3 output current		4 output voltage no-load V	5* 6* output current		7* output voltage no-load V	8 trans- former size code	9 10 11 catalogue number 2422 530			12 page	
	nom. A	max. A		nom. A	max. A			panel model	bench model	lab. model		
220	0,5	0,6	0-220	0,77	0,91	0-220	E1.1	10407				21
	0,7	0,83	0-240				E2	01407				27
	0,83	1	0-220	1,1	1,3	0-220	E2	11407	22411			27
	0,83	1	0-220				E2	90037				27
	1	1,25	0-260	1,32	1,56	0-220	E3.1	22407	22411			35
	1,2	1,4	0-260				E3	08407				31
	1,4	1,7	0-220	2,2	2,6	0-220	E3	18407				31
	2	2,4	0-260				E4	03407				39
	2,5	3	0-220	2,75	3,25	0-220	E4	13407	23411			39
	2,5	3	90-220				E4	90022				39
	2,5	3	0-220	2,75	3,25	0-220	E4	90036	23411			39
	2,5	3	0-260				E4	23407				39
	2,5	3	0-260	2,75	3,25	0-220	E4.1	90038				45
	4	4,8	90-220				E5	90023				49
	4	4,8	0-220	5	5,85	0-220	E5	90024				49
	4,5	5	0-253				E6	90028				53
	5	6	0-220	5,5	6,5	0-220	E6	90027	04411	04415	04415	53
	5	6,3	0-260				E6.1	04407				57
	8,5	11,2	0-260	9,3	11,5	0-220	E7	05407	05411	05415	25415	63
	8,5	11,2	0-260				E7.2					69
	10	12	0-220	13,2	15,6	0-220	E7	15407				63
	12	15	0-260				E8	06407				73
	15	18	0-220	25,3	30	0-220	E8	16407	07411			73
23	30	0-260	E10				07407	77				
32	36	0-240				E10	17507				77	
240	0,5	0,55	120- 0				E1	00407				17
			120-240				E1	90004				17
			120-240									
			0-120	1	1,25	0-240	E1	90011	22511			17
	0,5	0,55	240-120				E3.1	22507				35
	1	1,25	0-270	2	2,4	0-240	E4	03507	23507			39
	2	2,4	0-260				E4	23507				39
	2,5	3	0-270	2,5	3,2	0-240	E4		23511			39
	2,5	3	0-270				E4.1					45
	4,5	5	0-276	4,5	5	0-240	E6	90028				53
	5	6,3	0-270				E6.1	04507				57
8,5	11,2	0-270	8,5	11,2	0-240	E7	05507	04511	05511		63	
12	15	0-260				E8	06507				73	
23	30	0-260	23	30	0-240	E10	07507	07511			77	

* See note on preceding page.

VARIABLE MAINS TRANSFORMERS

→ CONVERSION LIST

Conversion of catalogue number to transformer size code.

catalogue number	transformer size code	page
2422 529 00007	E7.1	87
00008	E7.1	87
00009	E2.1	83
00017	E7.1	87
2422 530 00007	E1	17
00107	E1	17
00407	E1	17
01407	E2	27
01607	E2	27
03407	E4	39
03507	E4	39
04307	E6.1	57
04407	E6.1	57
04411	E6.1	57
04415	E6.1	57
04507	E6.1	57
04511	E6.1	57
05407	E7	63
05411	E7	63
05415	E7	63
05507	E7	63
05511	E7	63
06407	E8	73
06507	E8	73
07407	E10	77
07411	E10	77
07507	E10	77
07511	E10	77
08407	E3	31
10007	E1.1	21
10107	E1.1	21
10407	E1.1	21
11407	E2	27
11607	E2	27

catalogue number	transformer size code	page
2422 530 13407	E4	39
15407	E7	63
16407	E8	73
17507	E10	77
18407	E3	31
22307	E3.1	35
22407	E3.1	35
22411	E3.1	35
22507	E3.1	35
22511	E3.1	35
23307	E4	39
23407	E4	39
23411	E4	39
23507	E4	39
23511	E4.1	45
25415	E7.2	69
90004	E1	17
90011	E1	17
90022	E4	39
90023	E5	49
90024	E5	49
90027	E6	53
90028	E6	53
90031	E2	27
90032	E1.1	21
90033	E1.1	21
90034	E6	53
90036	E4	39
90037	E2	27
90038	E4.1	45

AUTO-TRANSFORMERS

OPERATIONAL NOTES

Note: Deviations from the following are given in the data sheets.

General

An auto-transformer is a variable mains transformer with a continuously variable secondary voltage. The common winding which serves as both primary and secondary winding is usually a single layer, wound on an annular core. A carbon brush, serving as the movable secondary tap, is made to contact the partly bared winding. The primary winding may be provided with one or more fixed taps.

Input voltage

The input voltage is connected to all or part of the primary winding of the transformer. In the data sheets the two input terminals for a stated input voltage are indicated. The **second letter** indicates the common input and output terminal. Unless otherwise stated the input/output terminals indicated are given so that a clockwise rotation of the spindle results in an increasing output voltage when the transformer is viewed from the mounting side (base).

The nominal input voltage may continuously be exceeded by 10%. ←

Output voltage

The output voltage (at no load) cannot always be set at exactly the same value as the input voltage as the carbon brush contact point with the slider against the end stop does not always coincide with the beginning or the end of the winding.

Terminals

The input terminals are denoted N, K, L or M; Z is a mid-tap. The output voltage is taken from T (carbon brush) and one of the other terminals.

Nominal output current

This is the current which the transformer may continuously supply under the most unfavourable brush position and ambient temperature.

Continuous overload (Maximum output current)

In an auto-transformer the distribution of the currents, and consequently the copper losses and heat generation in the windings, depends on the brush position. The nominal continuous current is defined by the most unfavourable brush position and the cooling capacity of the transformer. Starting from that cooling capacity it is obvious that the output current may be adapted to the brush position. Measurements have shown that a certain overload is permissible within 10% from the primary tapplings. In the graphs, Fig. 1, Fig. 2 and Fig. 3, the maximum load current is plotted as a function of the no-load output voltage which corresponds with the brush position. For the values of input voltage, nominal output current and maximum output current see under "Electrical data" in the data sheets.

If any doubt arises as to the cooling, do not overload the transformer. Overloads up to 70% can be tolerated if the transformer, and especially the brush track contact, is artificially cooled or immersed in oil. Since this depends greatly on given circumstances, the only hard-and-fast directive is that the temperature rise (ΔT) of the brush track contact may not exceed 70 °C or 90 °C (see the relevant data sheet).

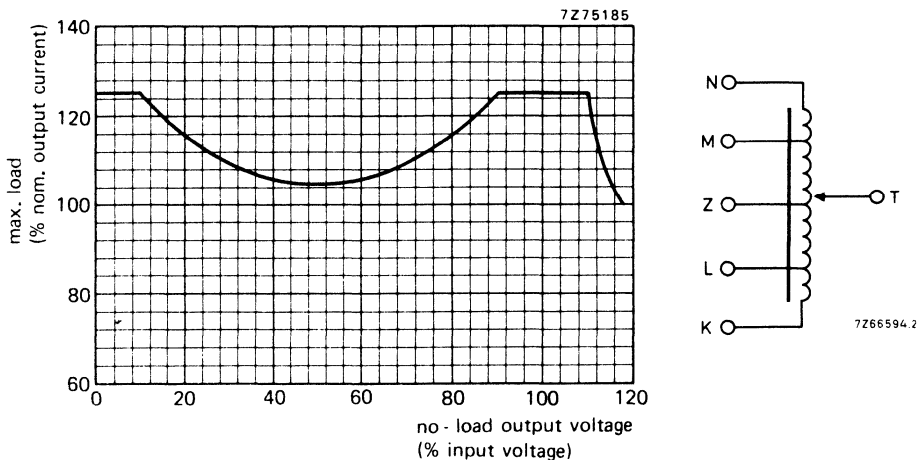


Fig. 1 Maximum load as a function of the output voltage; input voltage M to K or L to N.

When the ends of the winding are used as input terminals, an even higher load is permitted.

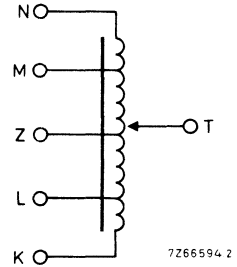
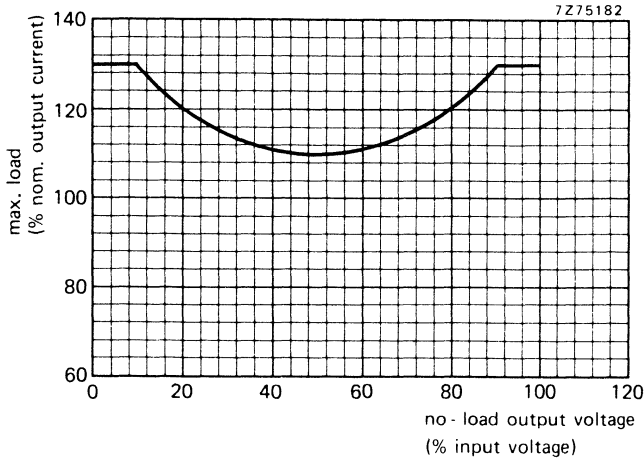


Fig. 2 Maximum load as a function of the output voltage; input voltage N to K.

For a transformer without taps the maximum load as a function of the output voltage is given in Fig. 3.

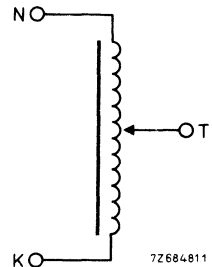
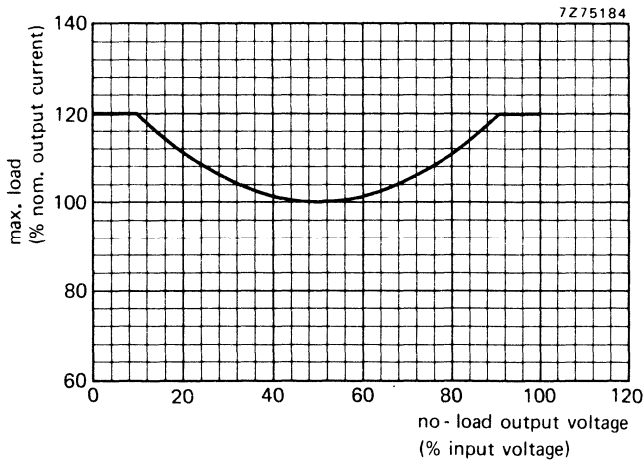


Fig. 3 Maximum load as a function of the output voltage; input voltage N to K.

Transient overloads

High transient overloads can be permitted due to the construction of the brush track and of the brush gear. The curve (Fig. 4) gives the relation between maximum permissible load and time. It is based on the maximum permissible temperature of the brush and on the unfavourable brush position. Therefore, after transient overload, additional cooling of the transformer is not required.

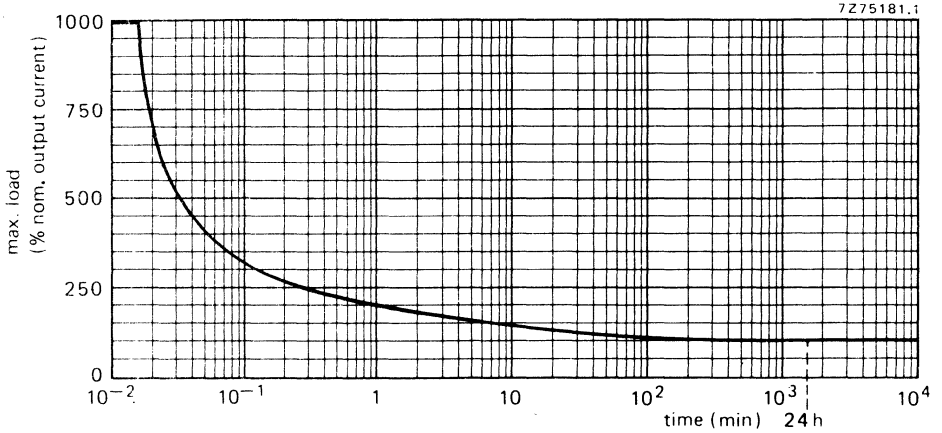


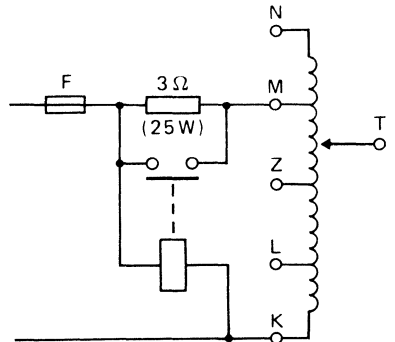
Fig. 4 Maximum non-repetitive overload as a function of time.

To avoid damage to the brush and the track the absolute limit for instantaneous loads is 1000%.

Overload protection and inrush current

As a result of the variable transformation ratio, fuses or other safety devices in the primary circuit cannot provide adequate overload protection in the secondary circuit. It is, therefore always necessary to provide secondary circuit protection

Attention should be paid to the high inrush currents (up to 20 times the nominal current) when providing protection for the primary circuit. As these currents last for a few cycles only, the transformer will not be damaged, but the primary current safety devices may be operated. Safety devices with slow-to-operate characteristics should be used, or measures should be taken to limit the inrush current, e.g. a resistor switched in series with the transformer during the switching delay of a relay (see Fig. 5).



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Fig. 5.

Voltage per turn of winding

The smallest step of voltage regulation (finest resolution) is that which occurs as the carbon brush "moves" from one turn of the winding to the next.

Voltage drop

Due to copper and brush-losses the output voltage will drop in proportion to the output current. The curves (Fig. 6) show the voltage drop as a percentage of the maximum voltage drop given in the data sheets as a function of brush setting. The upper curve applies to a constant current load (nominal output current). The lower curve applies to a constant impedance load (current approximately proportional to the voltage, increasing to maximum current at nominal input voltage).

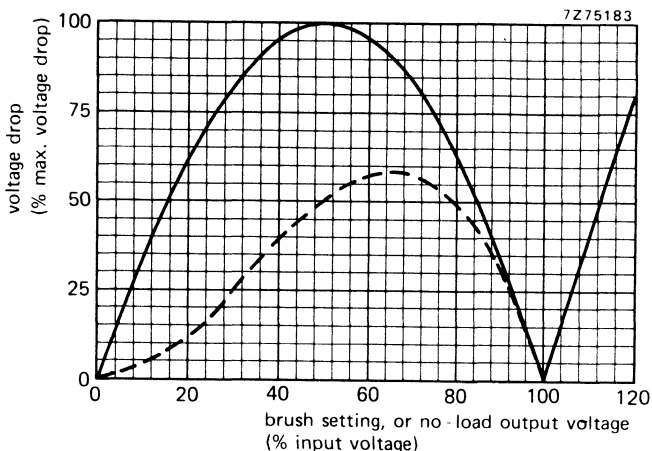


Fig. 6 Voltage drop as a function of brush setting.

Losses, no load

The core material has a practically constant specific no-load loss for frequencies of 50 to 400 Hz. The values given in the data sheets, refer to a mains frequency of 50 Hz. For lower frequencies the mains voltage must be decreased proportionally to avoid saturation of the core, and hence excessive core losses. Theoretically, the mains voltage can be increased for higher frequencies. However, the brush losses, being related to the voltage per turn of winding, would cause overheating of the brush contact point. For this reason it is not advisable to increase the input voltage.

Ambient temperature range

The data refer to an ambient temperature range of -15 to $+40$ °C. See also following paragraph.

Derating for higher ambient temperatures

The nominal data refer to a maximum ambient temperature of 40 °C. For higher temperatures the current must be derated in conformity with the curves of the figure below. These curves are also based on the most unfavourable brush position and should be combined with figures of preceding pages for different conditions.

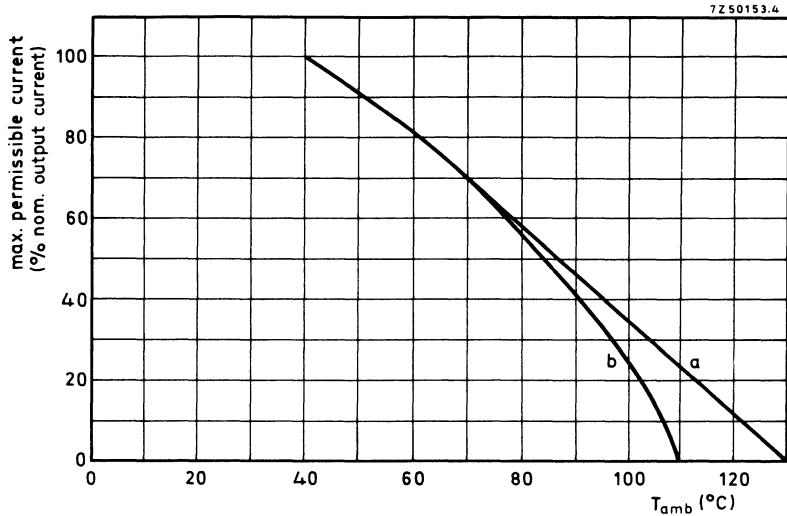


Fig. 7 Maximum permissible output current as a function of temperature.
Curve a applies to transformers for which the maximum permissible temperature rise at any point is 90 °C.
Curve b applies to transformers for which the maximum permissible temperature rise at any point is 70 °C.

Frequency range

The transformers may be used at frequencies between 50 and 400 Hz. See also "Losses, no load".

Insulation resistance

The insulation resistance between live and non-live parts after the damp heat test (IEC 68-2-3, test Ca, 21 days) is $> 5 \text{ M}\Omega$.

Test voltage

All transformers are tested for 1 min at 2000 V, 50 Hz between live and non-live parts.

Air gap

The air gap between live and non-live parts is ≥ 4 mm.

Leakage path

The leakage path between live and non-live parts is ≥ 5 mm.

Earthing the output circuit

If it is necessary to earth the output circuit, an isolating transformer must be connected between the mains and the variable transformer, so as to prevent short-circuits.

Angle of rotation

The total angle of rotation is $\approx 320^\circ$.

Life

The **guaranteed life** of the carbon brushes, if used within the ratings, is 100 000 two-way turns, however, the **life expectancy** is well beyond 250 000 two-way turns.

Parallel connection

For parallel connection of two or more transformers, chokes should be connected between the secondary windings to prevent high interchange currents caused by small differences in ganging. See section "Accessories".

Environmental tests

The transformers are designed to meet the following tests:

Damp heat test	IEC 68-2-3, test Ca, 21 days
Temperature cycling	IEC 68-2-14, test Na, $-10/+85$ °C, 1 cycle
Shock test	IEC 68-2-27, test Ea Acceleration, peak, 294 m/s ² (30g) Pulse duration: 6 ms
Vibration test	IEC 68-2-6, test Fc, Procedure B4 10-55-10 Hz, 1 oct./min, amplitude 0,35 mm, 3 x 2 h

Climatic category

The climatic category of the transformers is 15/040/21, according to IEC 68-1.

Accessories

The following accessories are available:

- control knobs
- ganging units
- motor drive modules
- chokes for parallel connection of transformers
- a.c. stabilizer module.

See section "Accessories".

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E1
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530
240	0,5	120 to 0 or 120 to 240	00407*
120 or 240	0,25/0,5	120 to 0 or 120 to 240	90004*
240	0,5	0 to 120 or 240 to 120	90011*
110	0,6	0 to 110	00107*
60	1,2	0 to 60	00007*

APPLICATION

These panel model transformers will find their main application in those cases where inefficient load potentiometers or adjustable series resistors are used. They can also successfully replace tapped transformers in some types of inductive voltage control.

DESCRIPTION

The transformers are moulded in reinforced polyester resin. The construction is rugged and professional; the winding is protected by the moulding. The mounting is simple by means of a nut on a threaded bushing.

The transformers do not require maintenance under normal conditions.

Soldering tags are provided for connecting the leads.

The coils of the 240 V types are wound in two layers. The outer layer forms the brush track, so that the brush sweeps half the total winding.

* Approved by SEV.

TRANSFORMERS SIZE CODE E1

ELECTRICAL DATA

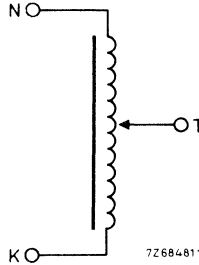


Fig. 1 Circuit diagram of transformers
2422 530 00007 and 2422 530 00107.

catalogue number	2422 530	
	00007	00107
Input voltage K to N*	60 V + 10%	110 V + 10%
Output voltage, no load, T to N**	0 (+2) to 60 (-2) V	0 (+3) to 110 (-3) V
Voltage drop at nominal output current*	≤ 6 V	≤ 10 V
Nominal output current over the whole control range	1,2 A	0,6 A
Maximum output current**	1,32 A	0,7 A
Voltage per turn of winding	0,122 V	0,12 V
Losses, no load	≤ 1,1 W	≤ 1,8 W
Permissible temperature rise at any point*	max. 70 °C	

* Second letter denotes the common input/output terminal.

→ ** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side.

• See "Operational notes" paragraph "Voltage drop".

• See "Operational notes" paragraph "Continuous overload".

▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

▲▲ 0,25 A/0,28 A for input connection between terminals Z and N.

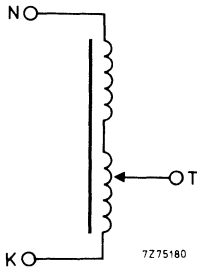


Fig. 2 Circuit diagram of transformer 2422 530 00407.

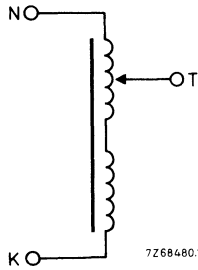


Fig. 3 Circuit diagram of transformer 2422 530 90011.

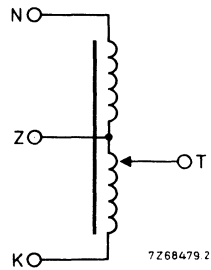


Fig. 4 Circuit diagram of transformer 2422 530 90004.

catalogue number	2422 530		
	00407	90011	90004
Input voltage N to K*	240 V + 10%	240 V + 10%	240 V + 10%
Output voltage, no load, T to K**	120 (±2) to 0 (+3) V	240 (-3) to 120 (±2) V	120 (±2) to 0 (+3) V
Input voltage K to N	240 V + 10%	240 V + 10%	240 V + 10%
Output voltage, no load, T to N**	120 (±2) to 240 (-3) V	0 (+3) to 120 (±2) V	120 (±2) to 240 (-3) V
Input voltage Z to N			120 V + 10%
Output voltage, no load, T to N**			120 (±2) to 240 (-3) V
Input voltage Z to K			120 V + 10%
Output voltage, no load, T to K**			120 (±2) to 0 (+3) V
Voltage drop at nominal output current*	≤ 20 V	≤ 20 V	≤ 20 V
Nominal output current over the whole control range	0,5 A	0,5 A	0,5 A (0,25 A**)
Maximum output current**	0,55 A	0,55 A	0,55 A (0,28 A**)
Voltage per turn of winding	0,133 V		
Losses, no load	≤ 1,8 W		
Permissible temperature rise at any point*	max. 70 °C		

Notes: see preceding page.

MECHANICAL DATA

Dimensions in mm

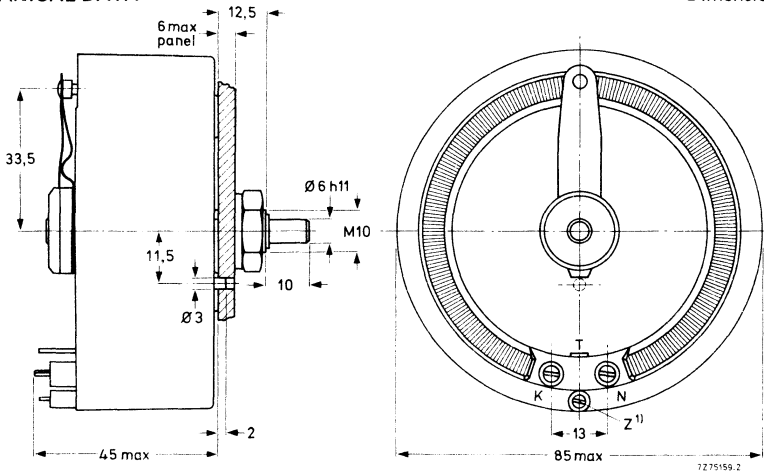


Fig. 5.

¹⁾ only for 2422 530 90004

Degree of protection (IEC 144)

IP00

Mass

approx. 700 g

Operating torque

0,03 to 0,07 Nm

Permissible end stop torque

max. 1 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis (maximum thickness 6 mm) by means of the nut on the threaded bushing. The mounting hole pattern is given in Fig. 6.

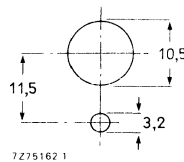


Fig. 6.

Carbon brushes

Spare carbon brushes, already mounted in the contact arm, can be supplied under catalogue number 4322 027 78660 (or service number 5322 362 40038).

ACCESSORIES

For these transformers a control knob with dial is available; see section "Accessories". Further information on request.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E1.1
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage	output current	output voltage	catalogue number
220 V	0,5 A	0 to 220 V	2422 530 10407*
110 V	1,4 A	0 to 110 V	2422 530 10107*
42 V	2,5 A	0 to 42 V	2422 530 90032*
60 V	3,15 A	0 to 60 V	2422 530 10007*
32 V	7 A	0 to 32 V	2422 530 90033

APPLICATION

These panel model transformers will find their main application in those cases where load potentiometers or adjustable series resistors are used. They can also successfully replace tapped transformers in some types of inductive voltage control.

DESCRIPTION

The transformers are moulded in reinforced polyester resin. The construction is rugged and professional; the winding is protected by the moulding. The mounting hole pattern is simple, the support area is relatively wide and therefore the transformer can be mounted on thin chassis or panels.

The transformers have spindles of glass-fibre-filled plastic material. They do not require maintenance under normal conditions.

Screw terminals or Faston terminals (transformers 2422 530 90033) are provided for connecting the leads.

* Approved by SEV.

ELECTRICAL DATA

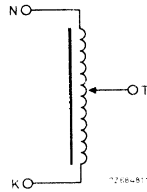


Fig. 1 Circuit diagram.

catalogue number	2422 530		
	10407	10107	90032
Input voltage N to K*	220 V + 10%	110 V + 10%	42 V + 10%
Output voltage, no load, T to K**	0 (+3) to 220 (-3) V	0 (+3) to 110 (-3) V	0 (+1) to 42 (-1) V
Voltage drop at nominal output current●	≤ 15 V	≤ 6 V	≤ 2,6 V
Nominal output current over the whole control range	0,5 A	1,4 A	2,5 A
Maximum output current●●	0,6 A	1,7 A	3 A
Voltage per turn of winding	0,2 V	0,2 V	0,16 V
Losses, no-load	≤ 3 W	≤ 3 W	≤ 3 W
Permissible temperature rise at any point▲	max. 70 °C		

* Second letter denotes the common input/output terminal.

→ ** The output voltage increases for clockwise rotation when the transformer is viewed from the mounting side.

● See "Operational notes" paragraph "Voltage drop".

●● See "Operational notes" paragraph "Continuous overload".

▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

catalogue number	2422 530	
	10007	90033
Input voltage N to K*	60 V + 10%	32 V + 10%
Output voltage, no load, T to K**	0 (+2) to 60 (-2) V	0 (+1) to 32 (-1) V
Voltage drop at nominal output current●	2,5 V	3 V
Nominal output current over the whole control range	3,15 A	7 A
Maximum output current●●	3,7 A	8 A
Voltage per turn of winding	0,203 V	0,128 V
Losses, no-load	≤ 3 W	≤ 4 W
Permissible temperature rise at any point▲	max. 70 °C	max. 90 °C

Notes: see preceding page.

MECHANICAL DATA

Dimensions in mm

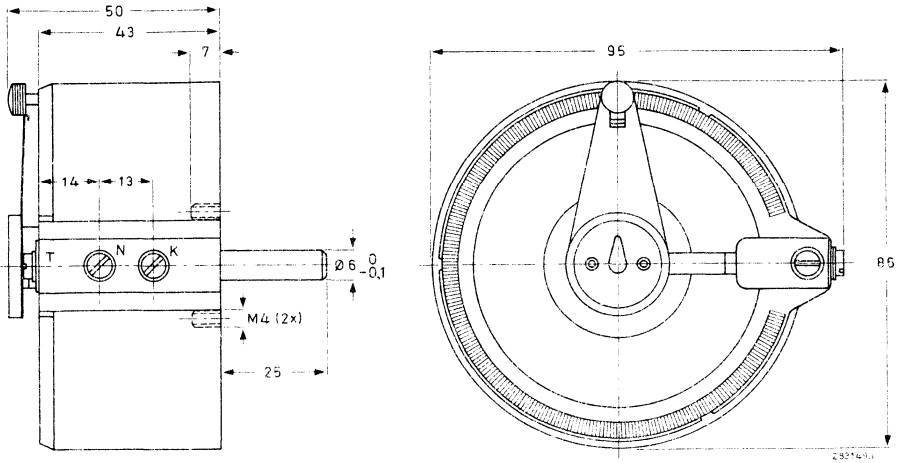


Fig. 2 Transformers 2422 530 10007, 2422 530 10107, 2422 530 10407 and 2422 530 90032.

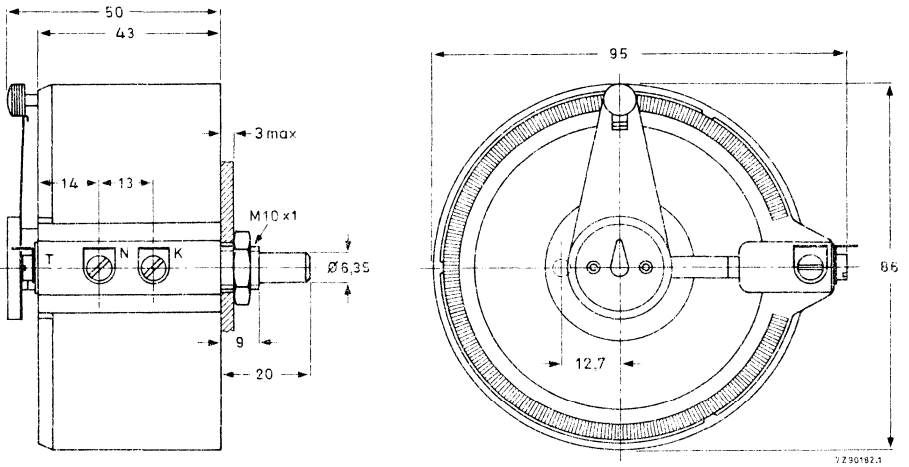


Fig. 3 Transformer 2422 530 90033.

Degree of protection (IEC 144)	IP00
Mass	1000 g
Operating torque	0,05 to 0,1 Nm
Permissible end stop torque	max. 1 Nm

Mounting

The transformers can be mounted on a panel or a chassis in any position. Transformer 2422 530 90033 can be secured with the hexagonal nut, which is supplied; see Fig. 4 for the required mounting holes. The other types of transformer can be fitted with 2 screws M4 (maximum length = panel thickness + 7 mm); see Fig. 5 for the mounting hole pattern.

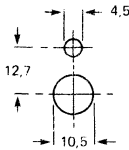
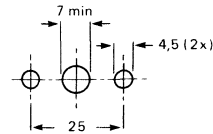


Fig. 4 Mounting hole pattern for transformer 2422 530 90033.



7283148.2

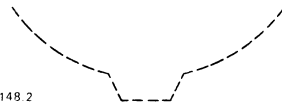


Fig. 5 Mounting hole pattern for transformers 2422 530 10007, 2422 530 10107, 2422 530 10407.

Carbon brushes

A subassembly consisting of a spindle, a contact arm with carbon brushes, and a locking washer can be supplied under:
 catalogue number 4322 028 04980 (service number 5322 362 44025) for transformers 2422 530 10107 and 2422 530 10407;
 catalogue number 4322 028 05710 (service number 5322 362 44027) for transformers 2422 530 10007 and 2422 530 90032;
 catalogue number 4322 028 07090 (service number 5322 362 40185) for transformer 2422 530 90033.

ACCESSORIES

For these transformers a control knob with dial is available*; see section "Accessories".
 Further information on request.

* Not for transformers 2422 530 90033.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E2
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530
220/240	0,7	0 to 240	01407*
220	0,83	0 to 220	11407*
220	0,83	0 to 220	90037 ←
115/130	1,2	0 to 130	01607*
115	1,4	0 to 115	11607*
42	4	0 to 42	90031*

APPLICATION

These panel model transformers will find their main application in those cases where inefficient load potentiometers or adjustable series resistors are used. They can also successfully replace tapped transformers in some types of inductive voltage control.

DESCRIPTION

The transformers are moulded in reinforced polyester resin. The construction is rugged and professional; the winding is protected by the moulding. The mounting hole pattern is simple, the support area is relatively wide and therefore the transformers can be mounted on thin chassis or panels.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can be easily replaced by one of another length.

The transformers do not require maintenance under normal conditions.

Screw terminals or Faston terminals (transformer 2422 530 90037) are provided for connecting the leads. ←

* Approved by SEV.

TRANSFORMERS SIZE CODE E2

ELECTRICAL DATA

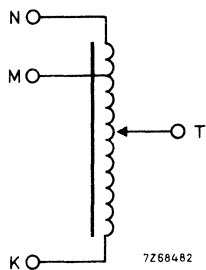


Fig. 1 Circuit diagram of transformers 2422 530 01407 and 2422 530 01607.

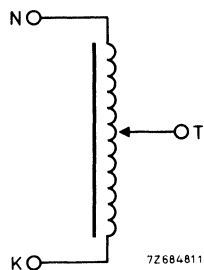


Fig. 2 Circuit diagram of transformers 2422 530 11407, 2422 530 11607, 2422 530 90031 and 2422 530 90037.

→ catalogue number	2422 530		
	01407	11407; 90037	90031
Input voltage M to K*	220 V + 10%		
Input voltage N to K	240 V + 10%	220 V + 10%	42 V + 10%
Output voltage, no load, T to K**	0 (+3) to 240 (± 3 V)	0 (+3) to 220 (-3) V	0 (+1) to 42 (-1) V
Voltage drop at nominal output current*	≤ 16 V	≤ 13 V	≤ 2 V
Nominal output current over the whole control range	0,7 A	0,83 A	4 A
Maximum output current**	0,83 A [▲]	1 A	4,8 A
Voltage per turn of winding	0,242 V	0,23 V	0,206 V
Losses, no-load	≤ 4 W	≤ 4 W	≤ 2 W
Permissible temperature rise at any point ^{▲▲}	max. 70 °C		

* Second letter denotes the common input/output terminal.

→ ** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side.

• See "Operational notes" paragraph "Voltage drop".

•• See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on pages 4 and 5.

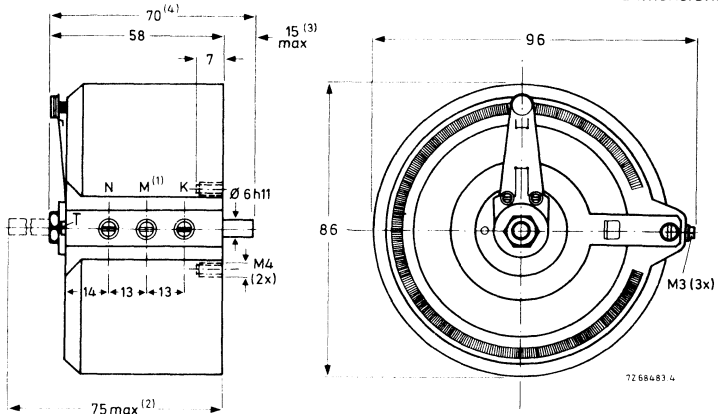
▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

catalogue number	2422 530	
	01607	11607
Input voltage M to K*	115 V + 10%	
Input voltage N to K	130 V + 10%	115 V + 10%
Output voltage, no load, T to K**	0 (+2) to 130 (± 2) V	0 (+2) to 115 (-2) V
Voltage drop at nominal output current*	≤ 7 V	≤ 6 V
Nominal output current over the whole control range	1,2 A	1,4 A
Maximum output current**	1,4 A [^]	1,7 A
Voltage per turn of winding	0,211 V	0,186 V
Losses, no load	≤ 4 W	≤ 4 W
Permissible temperature rise at any point ^{^^}	max. 70 °C	

Notes: see preceding page.

MECHANICAL DATA

Dimensions in mm



(1) for 2422 530 01407 and 01607
(2) 105 for 2422 530 90031

(3) 37 for 2422 530 90031
(4) 95 for 2422 530 90031

Fig. 3.

Degree of protection (IEC 144)

IP00

Mass

1250 g

Operating torque

0,05 to 0,1 Nm

Permissible end stop torque

max. 1 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis with 2 screws M4 (maximum length = panel thickness + 7 mm). The mounting hole pattern is given in Fig. 4.

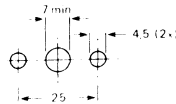


Fig. 4.

7268484.1

Carbon brushes

Spare carbon brushes, already mounted in the contact arm, can be supplied under catalogue number 4322 026 16310 (or service number 5322 362 40054). For transformer 2422 530 90031 the catalogue number of the spare carbon brush is 4322 027 78720 (or service number 5322 362 44015).

ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- motor drive modules
- a.c. stabilizer module.

See section "Accessories"; use size code E2 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E3
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530
220/260	1,2	0 to 260	08407*
220	1,4	0 to 220	18407*

APPLICATION

These panel model transformers are used as power or voltage controls in mass produced apparatus , such as air heaters, ventilator controls, etc.

DESCRIPTION

The transformers are moulded in reinforced polyester resin. The construction is rugged and professional; the winding is protected by the moulding. The mounting hole pattern is simple, the support area is relatively wide and therefore the transformers can be mounted on thin chassis or panels.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can be easily replaced by one of another length.

The transformers do not require maintenance under normal conditions.

Screw terminals are provided for connecting the leads.

* Approved by SEV.

ELECTRICAL DATA

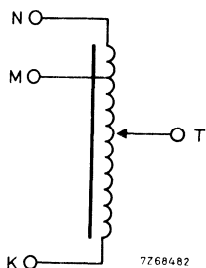


Fig. 1 Circuit diagram of transformer 2422 530 08407.

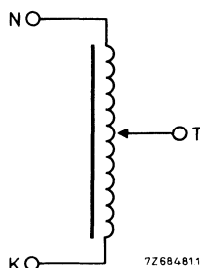


Fig. 2 Circuit diagram of transformer 2422 530 18407.

catalogue number	2422 530	
	08407	18407
Input voltage M to K*	220 V + 10%	220 V + 10%
Input voltage N to K	260 V + 10%	220 V + 10%
Output voltage, no load, T to K**	0 (+3) to 260 (± 3) V	0 (+3) to 220 (-3) V
Voltage drop at nominal output current*	≤ 13 V	≤ 14 V
Nominal output current over the whole control range	1,2 A	1,4 A
Maximum output current**	1,4 A [▲]	1,7 A
Voltage per turn of winding	0,36 V	0,36 V
Losses, no load	≤ 6 W	≤ 5 W
Permissible temperature rise at any point ^{▲▲}	max. 70 °C	

* Second letter denotes the common input/output terminal.

→ ** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side.

• See "Operational notes" paragraph "Voltage drop".

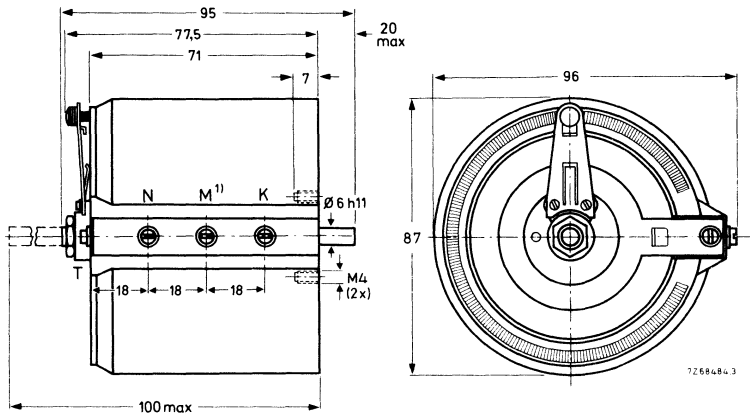
•• See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on page 5.

▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm



¹⁾ only for 2422 530 08407

Fig. 3.

Degree of protection (IEC144)

IP00

Mass

approx. 1800 g

Operating torque

0,05 to 0,10 Nm

Permissible end stop torque

1 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis with 2 screws M4 (maximum length = panel thickness + 7 mm). The mounting hole pattern is given in Fig. 4.

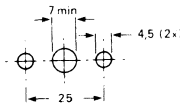
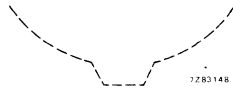


Fig. 4.



Carbon brushes

Spare carbon brushes, already mounted in the contact arm, can be supplied under catalogue number 4322 026 16310 (or service number 5322 362 40054).

ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- motor drive module
- a.c. stabilizer module.

See section "Accessories"; use size code E3 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E3.1
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530	
			panel model	bench model
220/260	1	0 to 260	22407*	22411*
240/270	1	0 to 270	22507*	22511
127/150	2,5	0 to 150	22307*	

APPLICATION

These panel model and bench model transformers are for use in industrial and professional equipment.

DESCRIPTION

The annular core with a single layer of insulated copper wire is moulded in reinforced polyester resin. The construction is rugged and professional; the mounting hole pattern is simple, the support area is relatively wide and therefore the transformers can be mounted on thin chassis or panels.

The bench models can also be panel mounted.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can easily be replaced by one of another length.

The transformers do not require maintenance under normal conditions.

Screw terminals are provided for connecting the leads.

* Approved by SEV.



TRANSFORMERS SIZE CODE E3.1

ELECTRICAL DATA

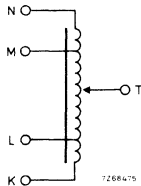


Fig. 1 Circuit diagram of panel model transformers 2422 530 22407, 2422 530 22507 and 2422 530 22307; K L = NM.

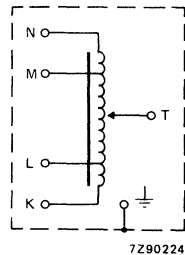


Fig. 2 Circuit diagram of bench model transformers 2422 530 22411 and 2422 530 22511; K L = NM.

catalogue number	2422 530		
	22407 22411	22507 22511	22307
panel model			
bench model			
Input voltage M to K*	220 V + 10%	240 V + 6%	127 V + 10%
Input voltage N to K	260 V + 10%	270 V + 6%	150 V + 10%
Output voltage, no load, T to K**	0 (+ 3) to 260 (± 3) V	0 (+ 3) to 270 (± 3) V	0 (+ 2) to 150 (± 2) V
Voltage drop at nominal output current●	≤ 10 V	≤ 11 V	≤ 5 V
Nominal output current over the whole control range	1 A	1 A	2,5 A
Maximum output current●●	1,25 A▲	1,25 A▲	3 A▲
Voltage per turn of winding	0,36 V	0,37 V	0,36 V
Losses, no load	≤ 6 W	≤ 7 W	≤ 6 W
Permissible temperature rise at any point▲▲	max. 70 °C		max. 90 °C

* Second letter denotes the common input/output terminal.

→ ** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).

● See "Operational notes" paragraph "Voltage drop".

●● See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on pages 4 and 5.

▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

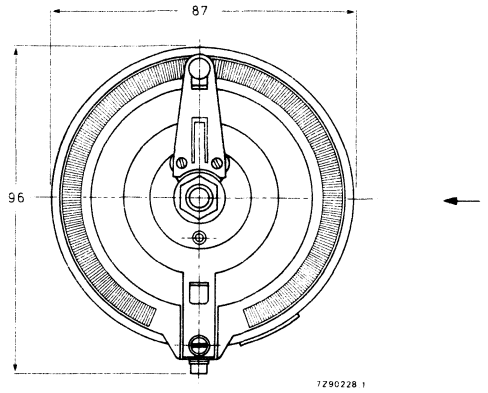
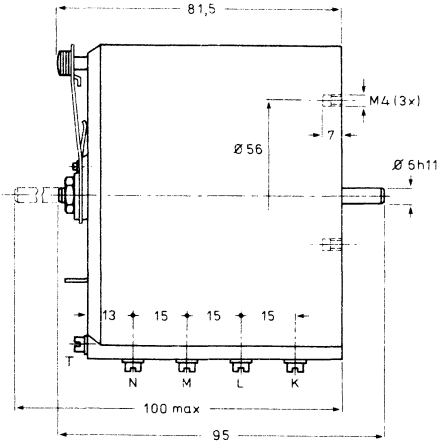
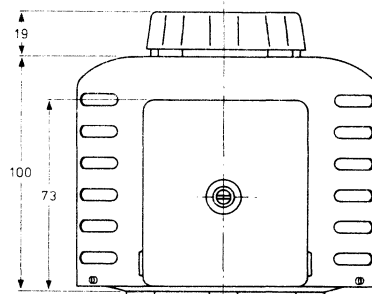


Fig. 3 Panel model transformer.



The pads protrude approximately 3 mm.

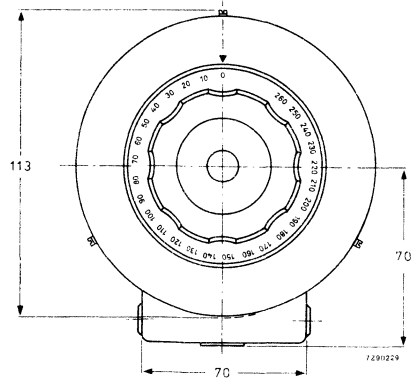


Fig. 4 Bench model transformer.

TRANSFORMERS SIZE CODE E3.1

Degree of protection (IEC 144)

panel model
bench model

IP00
IP20

Mass

panel model
bench model

approx. 1,8 kg
approx. 2,1 kg

Operating torque

0,05 to 0,1 Nm

Permissible end stop torque

max. 1 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis with 3 screws M4 (maximum length = panel thickness + 7 mm). The mounting hole pattern is given in Fig. 5.

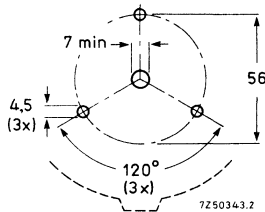


Fig. 5.

Carbon brushes

Spare carbon brushes, already mounted in the contact arm, can be supplied under catalogue number 4322 026 16310 (or service number 5322 362 40054). For transformer 2422 530 22307 the catalogue number of spare carbon brushes is 4322 028 07660 (or service number 5322 362 40187).

ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- motor drive module
- a.c. stabilizer module.

See section "Accessories"; use size code E3.1 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E4
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530	
			panel model	bench model
220/260	2	0 to 260	03407*	23411*
240/260	2	0 to 260	03507*	
220	2,5	0 to 220	13407*	
220	2,5	0 to 220	90022	
220	2,5	0 to 220	90036	
220/260	2,5	0 to 260	23407*	
240/270	2,5	0 to 270	23507*	
127/150	5	0 to 150	23307*	

APPLICATION

These panel model and bench model transformers are for use in industrial and professional equipment.

DESCRIPTION

The annular core with a single layer of insulated copper wire is moulded in reinforced polyester resin. The construction is rugged and professional; the mounting hole pattern is simple, the support area is relatively wide and therefore the transformers can be mounted on thin chassis or panels.

The bench models can also be panel mounted.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can easily be replaced by one of another length.

The transformers do not require maintenance under normal conditions.

Screw terminals are provided for connecting the leads.

* Approved by SEV.

TRANSFORMERS SIZE CODE E4

ELECTRICAL DATA

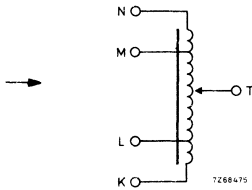


Fig. 1 Circuit diagram of panel model transformers 2422 530 03407, 2422 530 03507, 2422 530 23407, 2422 530 23507 and 2422 530 23307; KL = NM.

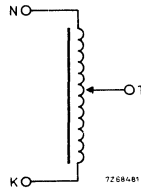


Fig. 2 Circuit diagram of panel model transformer 2422 530 13407.

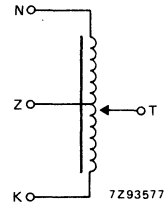


Fig. 3 Circuit diagram of panel model transformer 2422 530 90036; Z = centre tap.

catalogue number → panel model →	2422 530			
	03407	03507	13407 90036	90022
Input voltage M to K*	220 V + 10%	240 V + 10%		
Input voltage N to K	260 V + 10%	260 V + 10%	220 V + 10%	220 V + 10%
Output voltage, no load, T to K**	0 (+3) to 260 (± 3) V	0 (+3) to 260 (± 3) V	0 (+3) to 220 (-3) V	(90 ± 3) to 220 (-3) V
Output voltage, no load, L to K				80 (± 3) V
Voltage drop at nominal output current●	≤ 7 V	≤ 7 V	≤ 7 V	≤ 7 V
Nominal output current over the whole control range	2 A	2 A	2,5 A	2,5 A
Maximum output current●●	2,4 A▲	2,4 A▲	3 A	3 A
Voltage per turn of winding	0,488 V	0,488 V	0,478 V	0,478 V
Losses, no load	≤ 8 W			
Permissible temperature rise at any point▲▲	max. 70 °C			

* Second letter denotes the common input/output terminal.

→ ** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).

● See "Operational notes" paragraph "Voltage drop".

●● See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on page 5.

▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

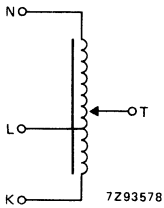


Fig. 4 Circuit diagram of panel model transformer 2422 530 90022.

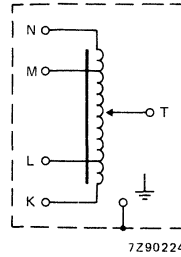


Fig. 5 Circuit diagram of bench model transformer 2422 530 23411; KL = NM.

catalogue number	2422 530		
	23407	23507	23307
panel model	23411		
bench model			
Input voltage M to K*	220 V + 10%	240 V + 6%	127 V + 10%
Input voltage N to K	260 V + 10%	270 V + 6%	150 V + 10%
Output voltage, no load, T to K**	0 (+ 3) to 260 (± 3) V	0 (+ 3) to 270 (± 3) V	0 (+ 2) to 150 (± 2) V
Voltage drop at nominal output current*	≤ 8 V	≤ 8,5 V	≤ 3,5 V
Nominal output current over the whole control range	2,5 A	2,5 A	5 A
Maximum output current**	3 A [▲]	3 A [▲]	6 A [▲]
Voltage per turn of winding	0,488 V	0,504 V	0,485 V
Losses, no load	≤ 8 W	≤ 9 W	≤ 6 W
Permissible temperature rise at any point ^{▲▲}	max. 90 °C		

* Second letter denotes the common input/output terminal.

** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).

● See "Operational notes" paragraph "Voltage drop".

●● See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on pages 4 and 5.

▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

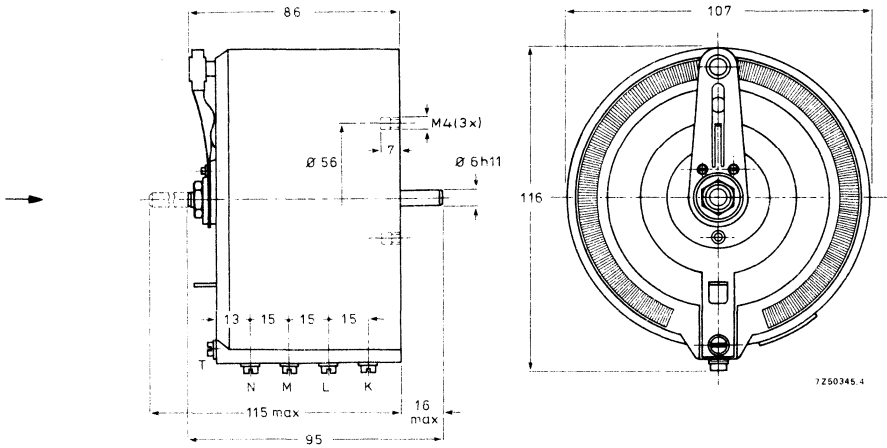


Fig. 6 Panel model transformers 2422 530 03407, 2422 530 03507, 2422 530 23407, 2422 530 23507 and 2422 530 23307.

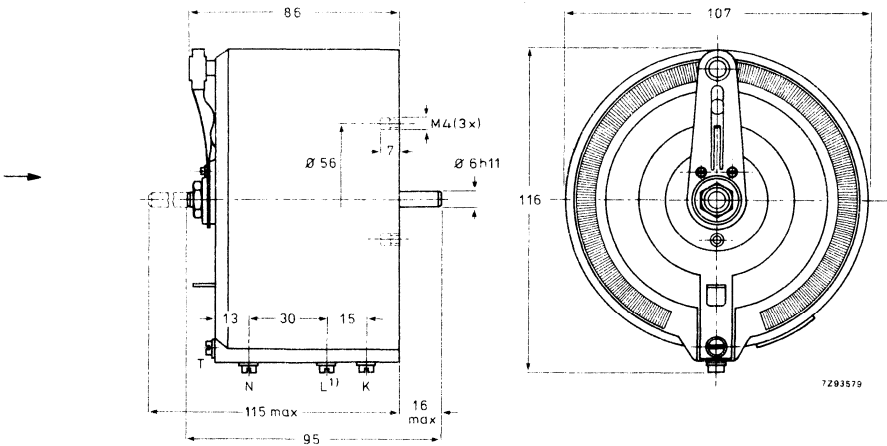
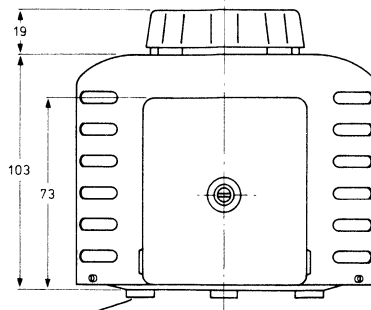


Fig. 7 Panel model transformers 2422 530 13407, 2422 530 90022 and 2422 530 90036.

1) Not for transformer 2422 530 13407; for transformer 2422 530 90036 this terminal is marked Z.



The pads protrude approximately 3 mm.

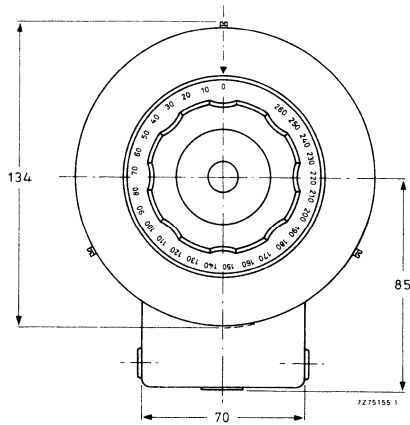


Fig. 8 Bench model transformer.

Degree of protection (IEC 144)

panel model
bench model

IP00
IP20

Mass

panel model
bench model

approx. 3,1 kg
approx. 3,3 kg

Operating torque

0,05 to 0,15 Nm

Permissible end stop torque

max. 1 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis with 3 screws M4 (maximum length = panel thickness + 7 mm). The mounting hole pattern is given in Fig. 9.

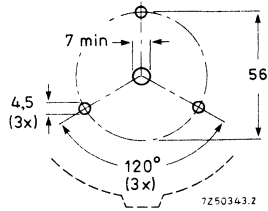


Fig. 9.

Carbon brushes

Spare carbon brushes, already mounted in the contact arm, can be supplied under catalogue number 4322 026 65540 (or service number 5322 362 40079). For transformer 2422 530 23307 the catalogue number of spare carbon brushes is 4322 028 07670 (or service number 5322 362 40188).

ACCESSORIES

The following accessories are available:

- control knobs.
- ganging units.
- motor drive module.
- a.c. stabilizer module.

See section "Accessories"; use size code E4 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E4.1
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530	
			panel model	bench model
220/260 240/270	2,5 2,5	0 to 260 0 to 270	90038*	23511*

APPLICATION

These panel model and bench model transformers are for use in industrial and professional equipment.

DESCRIPTION

The annular core with a single layer of insulated copper wire is moulded in reinforced polyester resin. The construction is rugged and professional; the mounting hole pattern is simple, the support area is relatively wide and therefore the transformers can be mounted on thin chassis or panels.

The bench model can also be panel mounted.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can easily be replaced by one of another length.

The transformers do not require maintenance under normal conditions.

Screw terminals are provided for connecting the leads.

* Approved by SEV.

TRANSFORMERS SIZE CODE E4.1

ELECTRICAL DATA

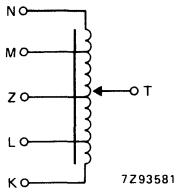


Fig. 1 Circuit diagram of panel model transformer
2422 530 90038; KL = NM,
Z = centre tap.

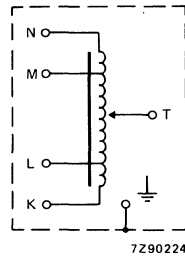


Fig. 2 Circuit diagram of bench model transformer
2422 530 23511; KL = NM.

catalogue number	2422 530	
	90038	23511
panel model		
bench model		
Input voltage M to K*	220 V + 10%	240 V + 10%
Input voltage N to K	260 V + 10%	270 V + 10%
Output voltage, no load, T to K**	0 (+3) to 260 (± 3) V	0 (+3) to 270 (± 3) V
Voltage drop at nominal output current●	≤ 8 V	≤ 8,5 V
Nominal output current over the whole control range	2,5 A	2,5 A
Maximum output current●●	3 A▲	3 A▲
Voltage per turn of winding	0,602	0,625
Losses, no load	≤ 8 W	≤ 9 W
Permissible temperature rise at any point▲▲	max. 70 °C	max. 70 °C

* Second letter denotes the common input/output terminal.

** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).

● See "Operational notes" paragraph "Voltage drop".

●● See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on pages 4 and 5.

▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

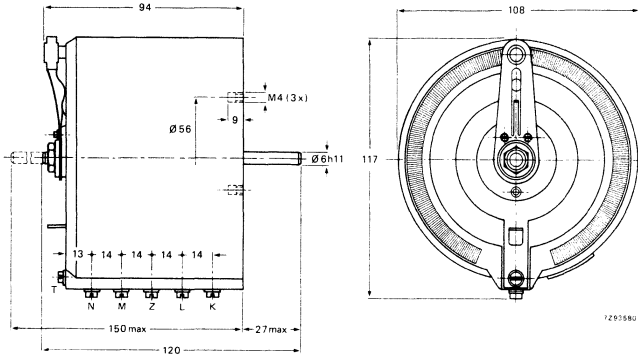


Fig. 3 Panel model transformer.

The pads protrude approximately 3 mm.

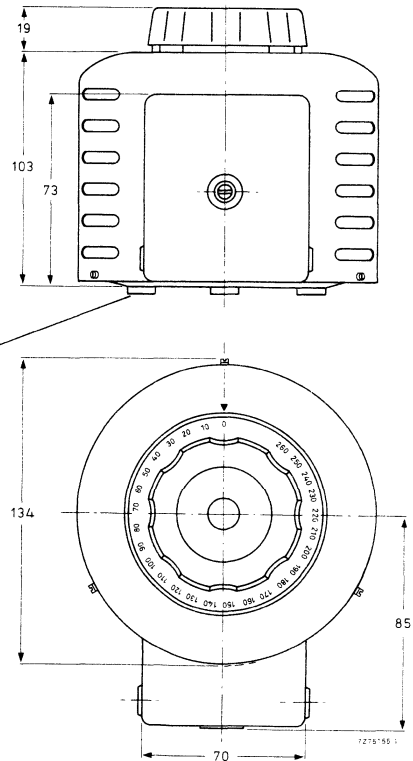


Fig. 4 Bench model transformer.

TRANSFORMERS SIZE CODE E4.1

Degree of protection (IEC 144)

panel model
bench model

IP00
IP20

Mass

panel model
bench model

approx. 3,5 kg
approx. 3,7 kg

Operating torque

0,05 to 0,15 Nm

Permissible end stop torque

max. 1 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis with 3 screws M4 (maximum length = panel thickness + 7 mm). The mounting hole pattern is given in Fig. 5.

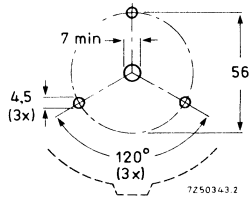


Fig. 5.

Carbon brushes

Spare carbon brushes, already mounted in the contact arm, can be supplied under catalogue number 4322 026 65540 (or service number 5322 362 40079).

ACCESSORIES

The following accessories are available:

- control knobs.
- ganging units.
- motor drive module.
- a.c. stabilizer module.

See section "Accessories"; use size code E4.1 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E5
- Utility version
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530
220	4	90 to 220	90023*
220	4	0 to 220	90024*

APPLICATION

These panel model transformers are designed to be built in laboratory, industrial and professional equipment.

DESCRIPTION

The transformers are partly moulded in reinforced polyester resin. The construction is simple but rugged; the impregnated winding is unprotected. The mounting hole pattern is simple, the support area is relatively wide and therefore the transformers can be mounted on thin chassis or panels.

The transformers do not require maintenance under normal conditions.

Screw terminals are provided for connecting the leads.

* Approved by SEV.

ELECTRICAL DATA

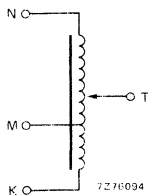


Fig. 1 Circuit diagram.

catalogue number	2422 530	
	90023	90024
Input voltage N to K*	220 V + 10%	220 V + 10%
→ Output voltage, no load, T to K**	90 (±3) to 220 (-3) V	0 (+3) to 220 (-3) V
Output voltage, no load, M to K	80 (±3) V	80 (±3) V
Voltage drop at nominal output current*	≤ 8,1 V	
Nominal output current over the whole control range	4 A	
Maximum output current**	4,8 A	
Voltage per turn of winding	0,61 V	
Losses, no load	≤ 6,5 W	
Permissible temperature rise at any point [^]	max. 70 °C	

* Second letter denotes the common input/output terminal.

→ ** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side.

• See "Operational notes" paragraph "Voltage drop".

** See "Operational notes" paragraph "Continuous overload".

[^] See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

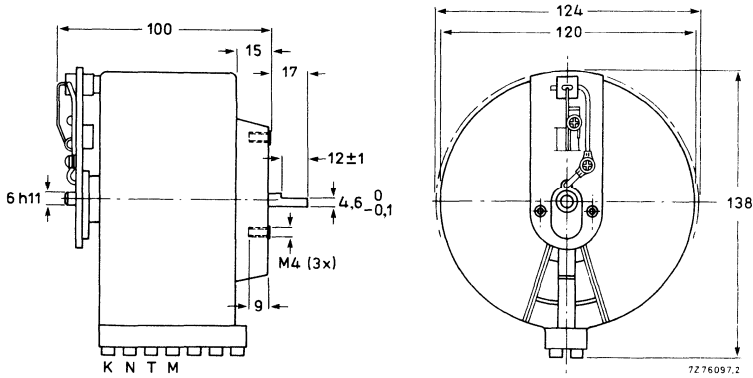


Fig. 2.

Degree of protection (IEC 144)

IP00

Mass

approx. 4030 g

Operating torque

0,05 to 0,15 Nm

Permissible end stop torque

max. 1 Nm

Total angle of rotation

2422 530 90023

approx. 160°

2422 530 90024

approx. 320°

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis with 3 screws M4 (maximum length = panel thickness +9 mm). The mounting hole pattern is shown in Fig. 3.

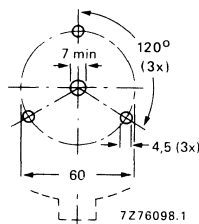


Fig. 3.

Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 027 75750 (service number 5322 362 44012).

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E6
- Utility version
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530
220/240/276	4,5	0 to 253 or 0 to 276	90028*
220	5	0 to 220	90027*
110	10	0 to 130	90034

APPLICATION

These panel model transformers are for use in industrial and professional equipment.

DESCRIPTION

The transformers are partly moulded in reinforced polyester resin. The construction is simple but rugged; the impregnated winding is unprotected. The mounting hole pattern is simple, the support area is relatively wide and therefore the transformers can be mounted on thin chassis or panels.

The transformers do not require maintenance under normal conditions.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can be easily replaced by one of another length.

Screw terminals or Faston terminals (transformer 2422 530 90034) are provided for connecting the leads.

* Approved by SEV.

TRANSFORMERS SIZE CODE E6

ELECTRICAL DATA

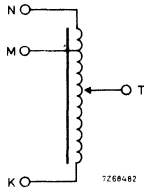


Fig. 1 Circuit diagram of transformer 2422 530 90028.

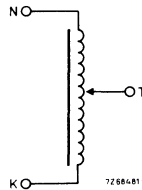


Fig. 2 Circuit diagram of transformer 2422 530 90027.

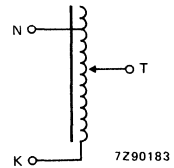


Fig. 3 Circuit diagram of transformer 2422 530 90034.

catalogue number	2422 530		
	90028	90027	90034
Input voltage M to K*	220 V + 15%		
Output voltage, no load, T to K**	0 (+ 3) to 253 (± 3) V		
Input voltage M to K	240 V + 6%		
Output voltage, no load, T to K**	0 (+ 3,3) to 276 (± 3,3) V		
Input voltage N to K	276 V + 6%	220 V + 10%	110 V + 10%
Output voltage, no load, T to K**	0 (+ 3,3) to 276 (-3,3) V	0 (+ 3) to 220 (-3) V	0 (+ 2) to 130 (± 2) V
Voltage drop at nominal output current ●	≤ 6 V	≤ 6 V	≤ 2,5 V
Nominal output current over the whole control range	4,5 A	5 A	10 A
Maximum output current ●●	5 A▲	6 A	
Voltage per turn of winding			
input 220 V	0,56 V	0,543 V	
input 240 V	0,61 V		
input 110 V			0,524 V
Losses, no load	≤ 8 W		≤ 5 W
Permissible temperature rise at any point▲▲	max. 70 °C		max. 90 °C

* Second letter denotes the common input/output terminal.

→ ** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side.

● See "Operational notes" paragraph "Voltage drop".

●● See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on pages 4 and 5.

▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

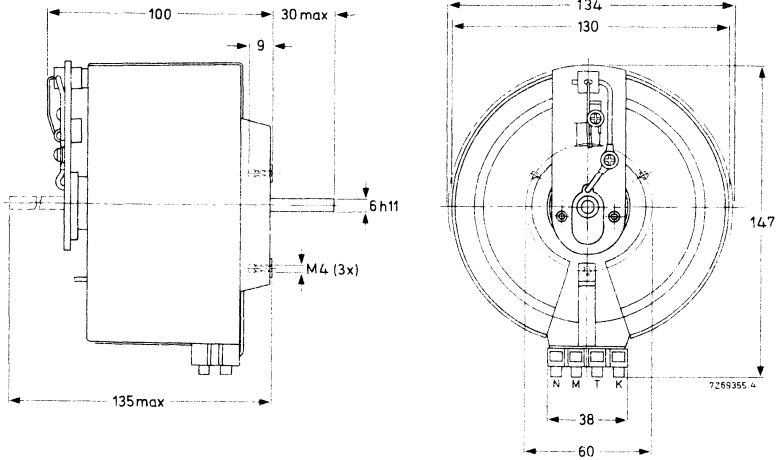


Fig. 4 Transformers 2422 530 90027 and 2422 530 90028.

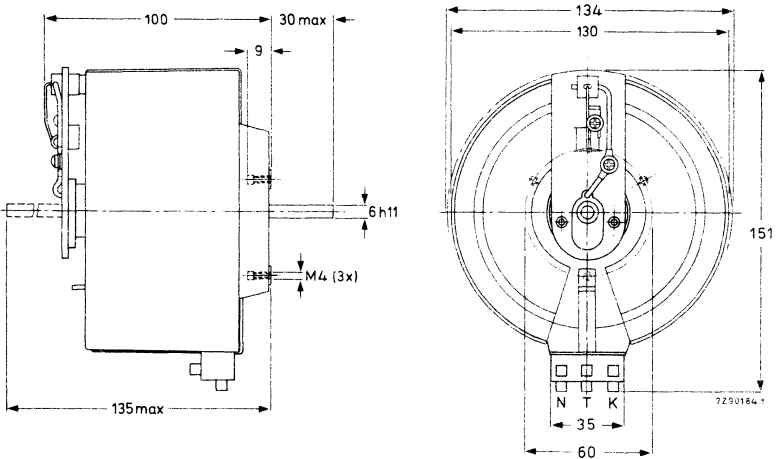


Fig. 5 Transformer 2422 530 90034.

Degree of protection (IEC 144)

IP00

Mass

approx. 4,5 kg

Operating torque

0,05 to 0,15 Nm

Permissible end stop torque

max. 2 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or chassis with 3 screws M4 (maximum length = panel thickness + 9 mm). The mounting hole pattern is in accordance with DIN 42595 and shown in Fig. 6.

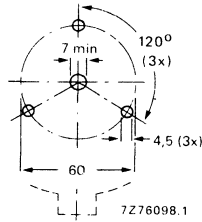


Fig. 6.

Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 027 75750 (or service number 5322 362 44012).

ACCESSORIES

The following accessories are available;

- control knobs
- ganging knobs
- chokes for parallel connection
- motor drive module
- a.c. stabilizer module.

See section "Accessories"; use size code E6 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E6.1
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530		
			bench model	panel model	lab model
127/150	10	0 to 150		04307 *	
220/260	5	0 to 260	04411 *	04407 *	
240/270	5	0 to 270	04511 *	04507 *	
220	5	0 to 260			04415

APPLICATION

These panel model, bench model and laboratory model transformers are designed for use in laboratories and in industrial and professional applications.

DESCRIPTION

The annular core with a single layer of insulated copper wire is moulded in a reinforced polyester resin bottom part. The construction is rugged and professional; the transformers need no maintenance under normal conditions.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can be easily replaced by one of another length.

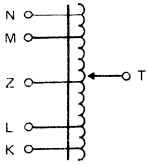
Screw terminals are provided for connecting the leads, except for the laboratory model. The bench models can also be used for panel mounting. The laboratory model is a bench model with a handle, a 3-core cable (including earth) with plug for input connection, an outlet socket, and a fuse.

Both plug and socket have a side-contact earth connection.

* Approved by SEV.

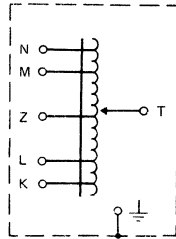
TRANSFORMERS SIZE CODE E6.1

ELECTRICAL DATA



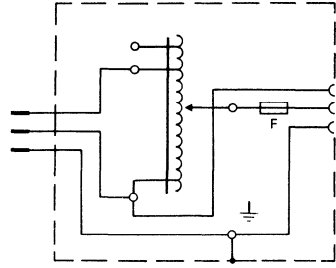
7Z66594.3

Fig. 1 Circuit diagram of panel model, KL = NM; Z = centre tap.



7Z68474.3

Fig. 2 Circuit diagram of bench model, KL = NM; Z = centre tap.



7Z75186.3

Fig. 3 Circuit diagram of laboratory model; F = 5 A.

catalogue number, bench model panel model laboratory model	2422 530			
	04307	04411 04407	04511 04507	04415
Input voltage L to N*	127 V + 10%	220 V + 10%	240 V + 10%	220 V + 10%
Input voltage K to N	150 V + 10%	260 V + 10%	270 V + 10%	
Input voltage				
Output voltage, no load, T to N**	0 to 150 ± 2 V	0 to 260 ± 3 V	0 to 270 ± 3 V	0 to 260 ± 3 V
Output voltage				
Voltage drop at nominal output current*	≤ 5 V	≤ 6 V	≤ 6 V	≤ 6 V
Nominal output current	10 A	5 A	5 A	5 A
Maximum output current**	12,6 A [▲]	6,3 A [▲]	6,3 A [▲]	6,3 A
Voltage per turn of winding	0,65 V	0,63 V	0,66 V	0,63 V.
Losses, no load	≤ 10,5 W	≤ 9 W	≤ 10,5 W	≤ 9 W
Permissible temperature rise at any point ^{▲▲}	max. 90 °C			

* Second letter denotes the common input/output terminal.

→ ** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).

• See "Operational notes" paragraph "Voltage drop"

•• See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on pages 4 and 5.

▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

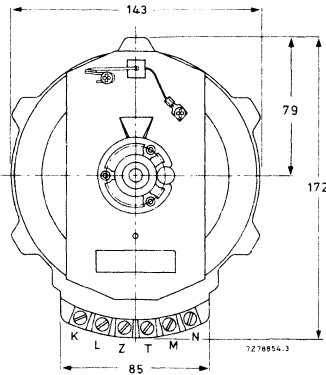
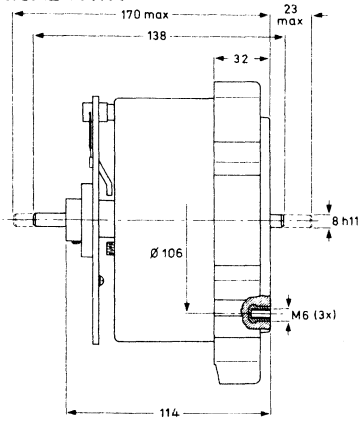
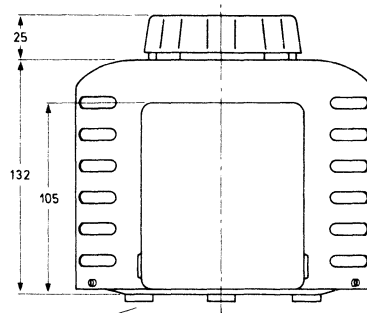


Fig. 4 Panel model.



The pads protrude approximately 4 mm.

Fig. 5 Bench model.

TRANSFORMERS
SIZE CODE E6.1

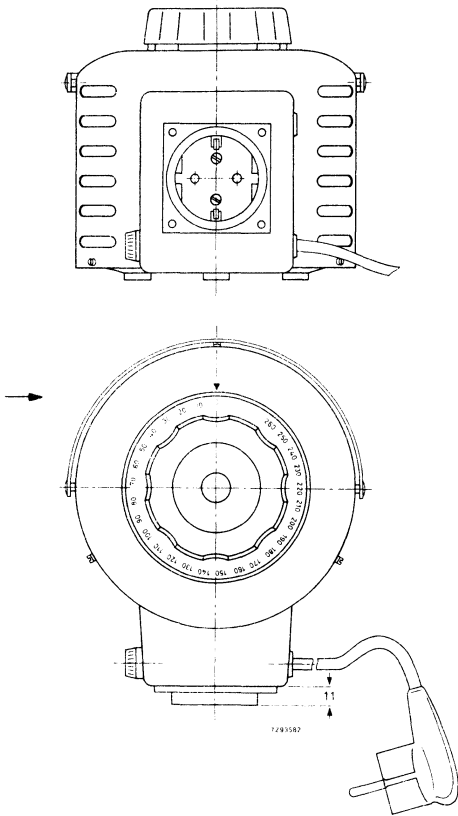


Fig. 6 Laboratory model; dimensions are identical with those in Fig. 5, except as shown.

Degree of protection	
panel model	IP00
bench model	IP20
Mass	
panel model	approx. 6 kg
bench model	approx. 6,6 kg
laboratory model	approx. 6,9 kg
Operating torque	0,15 to 0,25 Nm
Permissible end stop torque	max. 4 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis by means of 3 screws M6 (maximum length = panel thickness + 10 mm). The mounting hole pattern is shown in Fig. 7.

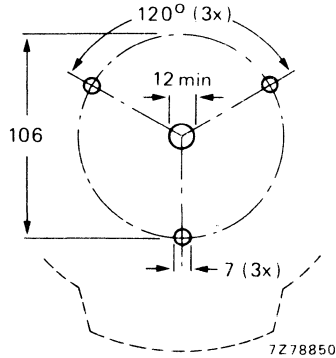


Fig. 7.

Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 027 75160 (service number 5322 362 40044). For complete replacement transformer 2422 530 04307 needs two brushes.

ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- chokes for parallel connection
- motor drive module
- a.c. stabilizer module.

See section "Accessories"; use transformer size code E6.1 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E7
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage A	output current A	output voltage V	catalogue number 2422 530		
			bench model	panel model	lab. model
220	10	0 to 220		15407 *	
220/260	8,5	0 to 260	05411	05407 *	
240/270	8,5	0 to 270	05511	05507 *	
220	8,5	0 to 260			05415

APPLICATION

These panel mounting, bench model and laboratory model transformers are designed for use in laboratories and in industrial and professional equipment.

DESCRIPTION

The annular core with a single layer of insulated copper wire is moulded in a reinforced polyester resin bottom part. The construction is rugged and professional; the transformers need no maintenance under normal conditions.

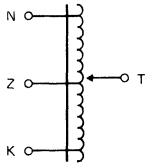
The construction permits an adjustment down to exactly 0 V.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can be easily replaced by one of another length.

Screw terminals are provided for connecting the leads, except for the laboratory model. The bench models can also be used for panel mounting. The laboratory model is a bench model with a handle, a 3-core cable (including earth) with plug for input connection, an outlet socket, and a fuse. Both plug and socket have a side-contact earth connection.

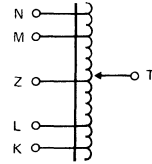
* Approved by SEV.

ELECTRICAL DATA



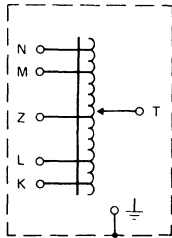
7Z74005.2

Fig. 1 Circuit diagram of panel model 2422 530 15407; Z = centre tap.



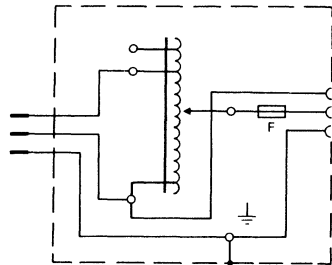
7Z66594.3

Fig. 2 Circuit diagram of panel models 2422 530 05407 and 2422 530 05507. KL = NM; Z = centre tap.



7Z68474.3

Fig. 3 Circuit diagram of bench model. KL = NM; Z = centre tap.



7Z75186.3

Fig. 4 Circuit diagram of laboratory model; F = 8 A.

catalogue number	2422 530			
	15407	05411 05407	05511 05507	05415
bench model				
panel model				
laboratory model				
Input voltage L to N*		220 V + 10%	240 V + 10%	
Input voltage K to N	220 V + 10%	260 V + 10%	270 V + 10%	
Input voltage				220 V + 10 %
Output voltage, no load, T to N**	0 to 220 ± 3 V	0 to 260 ± 3 V	0 to 270 ± 3 V	
Output voltage, no load				0 to 260 ± 3 V
Voltage drop at nominal output current*	≤ 4 V	≤ 6 V	≤ 6 V	≤ 6 V
Nominal output current over the whole control range	10 A	8,5 A	8,5 A	8,5 A
Maximum output current**	12 A [▲]	11,2 A [▲]	11,2 A [▲]	11,2 A
Voltage per turn of winding	0,81 V	0,81 V	0,85 V	0,81 V
Losses, no load	≤ 16 W	≤ 16 W	≤ 17,5 W	≤ 16 W
Permissible temperature rise at any point ^{▲▲}	max. 90 °C			

* Second letter denotes the common input/output terminal.

** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side. (base). ←

• See "Operational notes" paragraph "Voltage drop".

•• See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on page 5.

▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

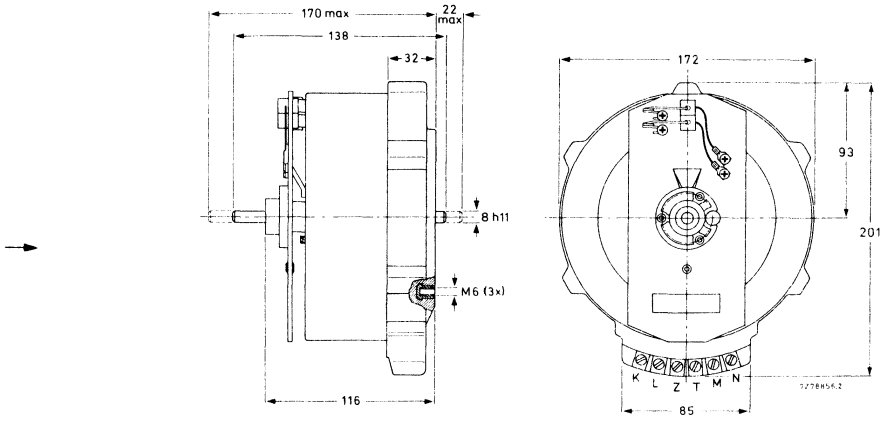
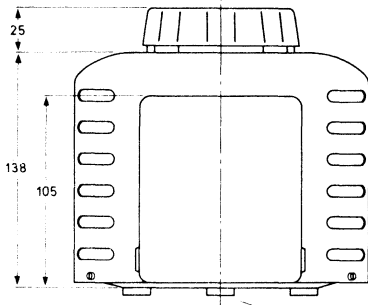


Fig. 5 Panel model.



The pads protrude approximately 4 mm.

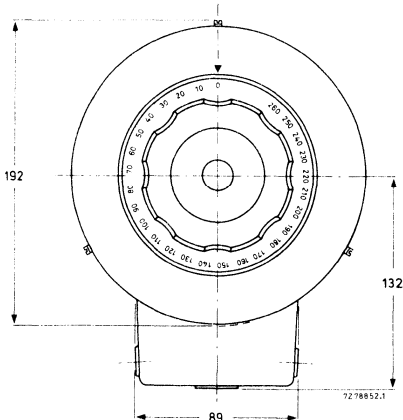


Fig. 6 Bench model.

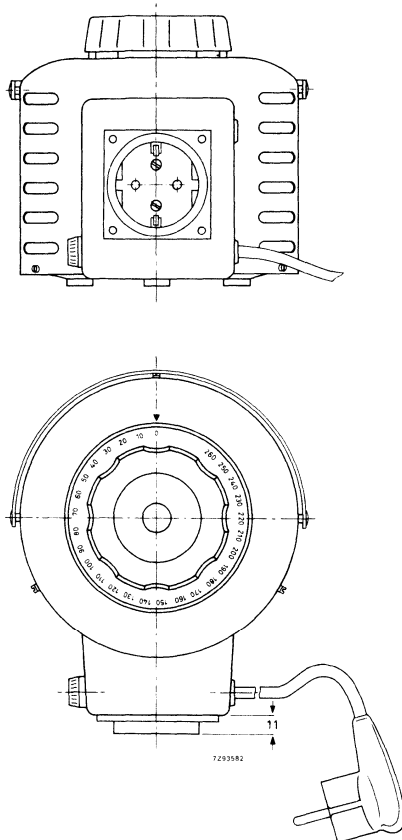


Fig. 7 Laboratory model; dimensions are identical with those in Fig. 6, except as shown.

Degree of protection (IEC 144)

panel model
bench model

IP00
IP20

Mass

panel model
bench model
laboratory model

approx. 8,8 kg
approx. 9,6 kg
approx. 9,85 kg

Operating torque

0,2 to 0,3 Nm

Permissible end stop torque

max. 4 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or chassis by means of 3 screws M6 (maximum length = panel thickness + 11 mm). The mounting hole pattern is shown in Fig. 8.

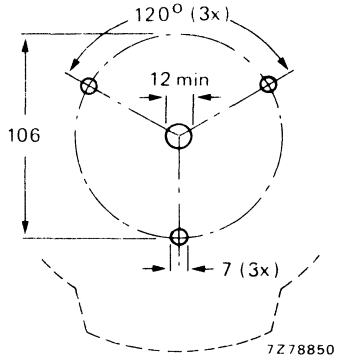


Fig. 8.

Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 027 75160 (service number 5322 362 40044). For complete replacement the transformers need two brushes.

ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- chokes for parallel connection
- motor drive module
- a.c. stabilizer module.

See section "Accessories"; use transformer size code E7 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMER

- Moulded types; size code E7.2
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number
220	8,5	0 to 260	2422 530 25415*

APPLICATION

This variable transformer is for use in laboratories.

DESCRIPTION

The annular core with a single layer of insulated copper wire is moulded in a reinforced polyester resin bottom part. The construction is rugged and professional; the transformer needs no maintenance under normal conditions.

The construction permits an adjustment down to exactly 0 V.

The transformer has a handle, a 3-core cable (including earth) with plug for input connection, an outlet socket according to SEV, and a thermal and magnetic cut-out in the output circuit. Both plug and socket have an earth connection.

* SEV approval applied for.

ELECTRICAL DATA

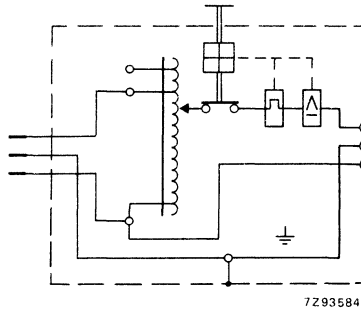


Fig. 1 Circuit diagram.

catalogue number	2422 530 25415
Input voltage	220 V + 10%
Output voltage, no load	0 to 260 ± 3 V
Voltage drop at nominal output current●	≤ 6 V
Nominal output current over the whole control range	8,5 A
Maximum output current●●	9 A▲
Voltage per turn of winding	0,978 V
Losses, no load	≤ 16 W
Permissible temperature rise at any point▲▲	max. 90 °C

- See "Operational notes" paragraph "Voltage drop".
- See "Operational notes" paragraph "Continuous overload".
- ▲ See also data in the 5th, 6th and 7th column of the table on page 5.
- ▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

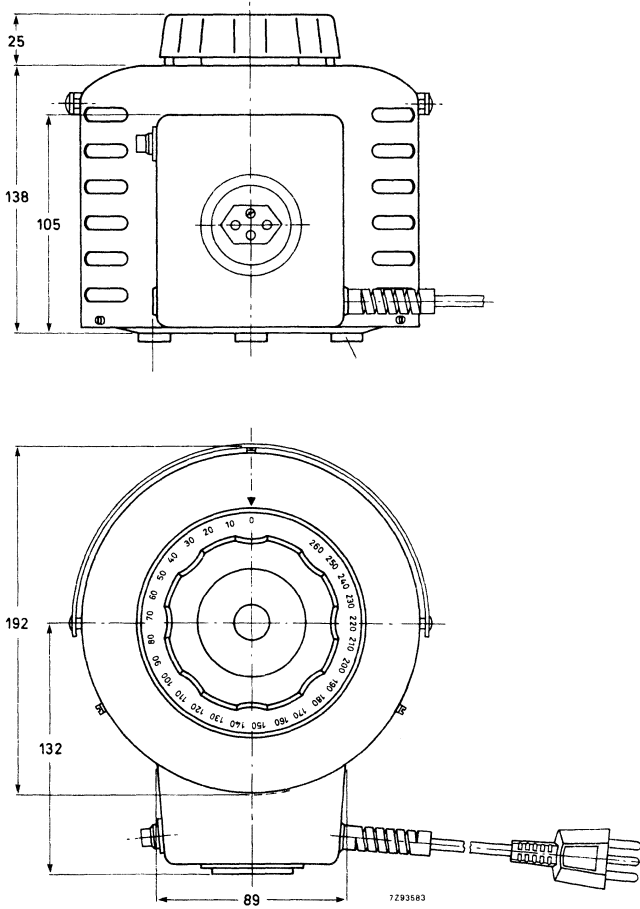


Fig. 2.

Degree of protection (IEC 144)

IP20

Mass

approx. 10,5 kg

Operating torque

0,2 to 0,3 Nm

Permissible end stop torque

max. 4 Nm

Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 027 75160 (service number 5322 362 40044). For complete replacement the transformers need two brushes.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E8
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530
220/260	12	0 to 260	06407
240/260	12	0 to 260	06507
220	15	0 to 220	16407

APPLICATION

These panel model transformers have been developed to meet the demand for larger power requirements e.g. power plants, studios, cinemas, etc.

DESCRIPTION

The annular core with a single layer of insulated copper wire is moulded in a reinforced polyester resin bottom part. The construction is rugged and professional. The contact surface is on the cylindrical outside and it has a special metal finish to ensure permanently perfect contact and to prevent any oxidation by overheating.

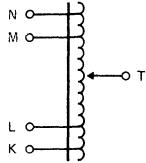
The construction permits an adjustment down to exactly 0 V.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can easily be replaced by one of another length.

The transformers do not require maintenance under normal conditions.

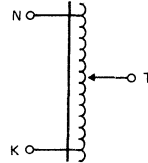
Screw terminals are provided for connecting the leads.

ELECTRICAL DATA



7Z90226

Fig. 1 Circuit diagram of transformers
2422 530 06407 and 2422 530 06507;
KL = NM.



7Z90227

Fig. 2 Circuit diagram of transformer
2422 530 16407.

catalogue number	2422 530		
	06407	06507	16407
Input voltage L to N*	220 V + 10%	240 V + 10%	
Input voltage K to N	260 V + 10%	260 V + 10%	220 V + 10%
Output voltage, no load, T to N**	0 to 260 (± 3) V	0 to 260 (± 3) V	0 to 220 (± 3) V
Voltage drop at nominal output current*	≤ 6 V	≤ 6 V	≤ 4,5 V
Nominal output current over the whole control range	12 A	12 A	15 A
Maximum output current**	15 A [^]	15 A [^]	18 A
Voltage per turn of winding	0,75 V	0,75 V	0,75 V
Losses, no load	≤ 19,5 W		
Permissible temperature rise at any point ^{^^}	max. 90 °C		

* Second letter denotes the common input/output terminal.

→ ** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side.

• See "Operational notes" paragraph "Voltage drop".

•• See "Operational notes" paragraph "Continuous overload".

[^] See also data in the 5th, 6th and 7th column of the table on page 5.

^{^^} See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

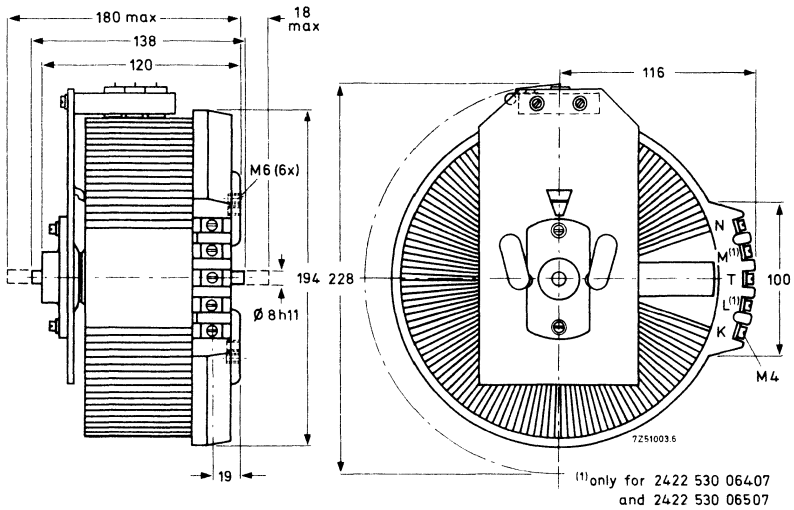


Fig. 3.

Degree of protection (IEC 144)

IP00

Mass

approx. 10 kg

Operating torque

0,25 to 0,5 Nm

Permissible end stop torque

max. 4 Nm

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or chassis with 3 screws M6 (maximum length = panel thickness + 10 mm). The mounting hole pattern is given in Fig. 4. Three holes on the outer circle or on the inner circle are sufficient for mounting.

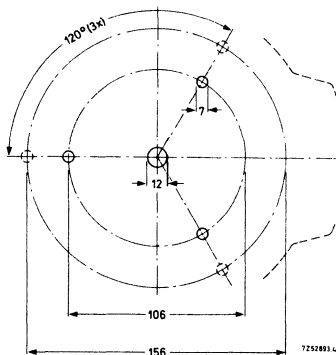


Fig. 4.

TRANSFORMERS SIZE CODE E8

Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 028 01800 (service number 5322 362 44016). For complete replacement the transformers need 3 brushes.

ACCESSORIES

- control knobs
- ganging units
- chokes for parallel connection
- motor drive module
- a.c. stabilizer module.

See section "Accessories"; use size code E8 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMERS

- Moulded types; size code E10
- To be read in conjunction with Operational Notes

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 530	
			bench model	panel model
220/260	23 A	0 to 260	07411	07407
240/260	23 A	0 to 260	07511	07507
220/240	32 A	0 to 220/240		17507



APPLICATION

These panel model and bench model transformers have been designed for industrial use e.g. cinemas, studios, power plants, etc.

DESCRIPTION

The transformers are partly moulded in reinforced polyester resin. The construction is rugged and professional. The transformers do not require maintenance under normal conditions.

The construction permits an adjustment down to exactly 0 V.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can be easily replaced by one of another length.

Screw terminals are provided for connecting the leads.

TRANSFORMERS SIZE CODE E10

ELECTRICAL DATA

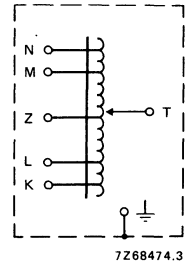
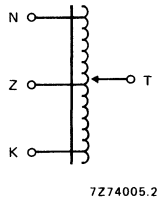
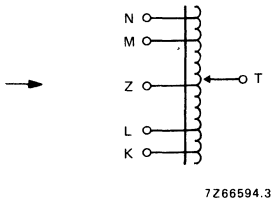


Fig. 1 Circuit diagram of panel models 2422 530 07407 and 2422 530 07507; KL = NM, Z = centre tap.

Fig. 2 Circuit diagram of panel model 2422 530 17507; Z = centre tap.

Fig. 3 Circuit diagram of bench models; KL = NM, Z = centre tap.

catalogue number	2422 530		
	07411	07511	17507
bench model			
panel model	07407	07507	
Input voltage L to N*	220 V + 10%	240 V + 10%	
Input voltage K to N	260 V + 10%		220 V + 15% | 240 V + 6%
Output voltage, no load, T to N**	0 to 260 (± 3) V		0 to 220 (-3) V | 0 to 240 (-3) V
Voltage drop at nominal output current●	≤ 6 V		≤ 6 V
Nominal output current over the whole control range	23 A		32 A
Maximum output current●●	30 A▲		36 A▲
Voltage per turn of winding	0,9 V		0,89 V | 0,9 V
Losses, no load	≤ 40 W		≤ 40 W
Permissible temperature rise at any point▲▲	max. 90 °C		max. 90 °C

* Second letter denotes the common input/output terminal.

** The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).

● See "Operational notes" paragraph "Voltage drop".

●● See "Operational notes" paragraph "Continuous overload".

▲ See also data in the 5th, 6th and 7th column of the table on page 5.

▲▲ See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

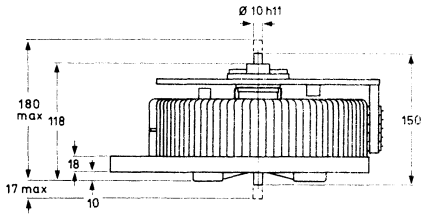
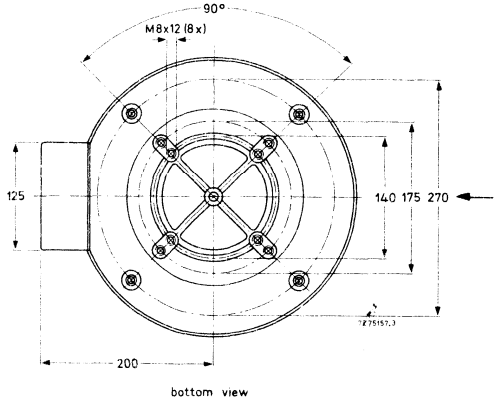
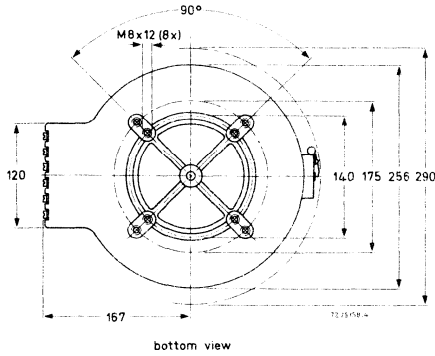


Fig. 4 Panel model.

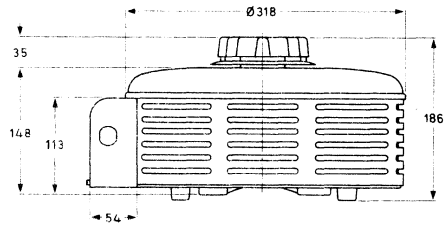


Fig. 5 Bench model.

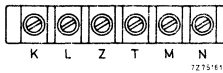


Fig. 6 Connection strip of transformers 2422 530 07407, 2422 530 07411, 2422 530 07507 and 2422 530 07511.

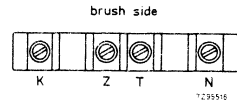


Fig. 7 Connection strip of transformer 2422 530 17507.

Degree of protection (IEC 144)

Mass

Operating torque

Permissible end stop torque

bench model	panel model
IP20	IP00
approx. 19,8 kg	approx. 17,9 kg
	1 to 1,5 Nm
	max. 5 Nm

Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 028 01800 (service number 5322 362 44016). For complete replacement the transformers need 5 brushes.

Mounting

The transformer can be mounted in any position. Both panel and bench models can be fitted to a panel or chassis with 4 screws M8 (maximum length = panel thickness +12 mm). The mounting hole pattern is shown in Fig. 8. Remove pads of bench model before mounting.

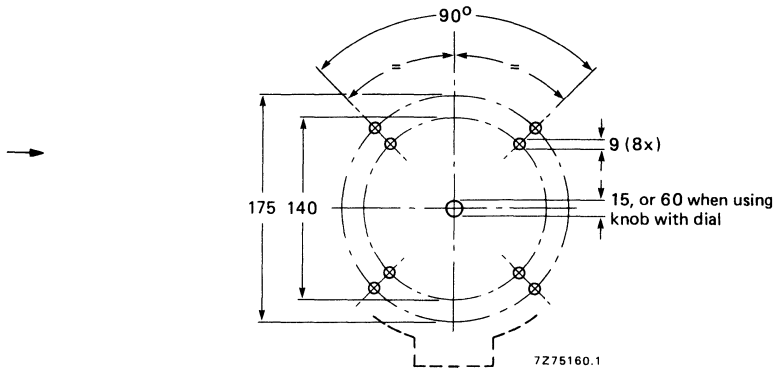


Fig. 8.

ACCESSORIES

- control knobs
- ganging units
- chokes for parallel connection
- motor drive module
- a.c. stabilizer module.

See section "Accessories"; use size code E10 when selecting. Further information on request.

VARIABLE MAINS TRANSFORMERS
WITH SEPARATE WINDINGS

VARIABLE MAINS TRANSFORMER

- With separate windings; size code E2.1
- Moulded type

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number
220	3	0 to 16	2422 529 00009

APPLICATION

This variable transformer is used for low-voltage supply.

DESCRIPTION

The annular core with two separated layers of insulated copper wire is moulded in reinforced polyester resin. The construction is simple but rugged; the transformer needs no maintenance under normal conditions.

The contact surface is on the top of the coil. The angle of rotation is 320° ; end stops prevent the brush from overrunning the contact track.

The transformer has a spindle of glass-fibre-filled plastic material.

Screw terminals are provided for connecting the leads.

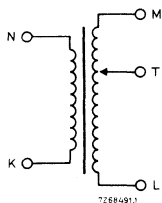


Fig. 1 Circuit diagram.

Input voltage N to K	220 V + 10%
Output voltage, no load L to T*	0 to 21 V
Voltage drop at nominal output current	≤ 5 V
Nominal output current over the whole control range	3 A
Short term overload current	3,5 A
Voltage per turn of winding	0,101 V
Losses, no load	≤ 3 W
Frequency range	50 to 400 Hz
Insulation resistance** after damp heat test (IEC 68-2, test Ca, 21 days)	> 5 MΩ
Test voltage** for 1 min	3500 V, 50 Hz
Air gap**	≥ 4 mm
Leakage path**	≥ 5 mm
Ambient temperature range	-10 to + 40 °C
Climatic category, IEC 68-1	10/040/21
Maximum temperature rise at any point	70 °C

* Clockwise rotation of the spindle results in an increasing output voltage when the transformer is viewed from the mounting side.

** Between windings and between live and non-live parts.

MECHANICAL DATA

Dimensions in mm

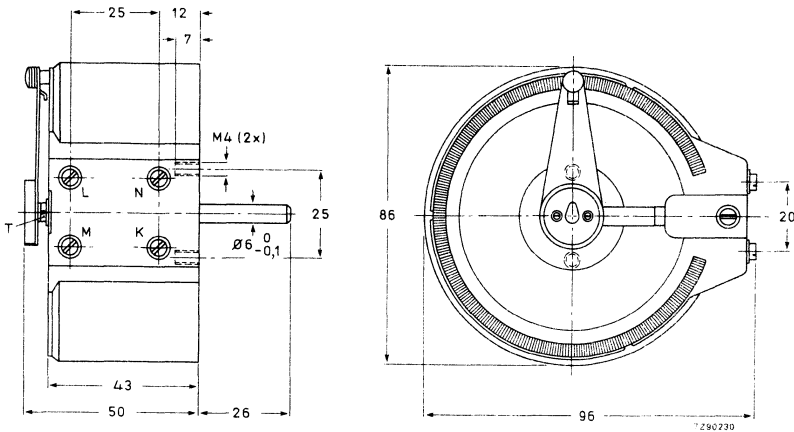


Fig. 2.

Degree of protection (IEC144)

IP00

Mass

approx. 0,85 kg

Operating torque

0,05 to 0,1 Nm

Permissible end stop torque

max. 1 Nm

Total angle of rotation

320°

Life of carbon brushes, guaranteed

> 100 000 complete rotations

Life of carbon brushes, expected

> 250 000 complete rotations

Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis by means of 2 screws M4 (maximum length = panel thickness + 7 mm). The mounting hole pattern is shown in Fig. 3.

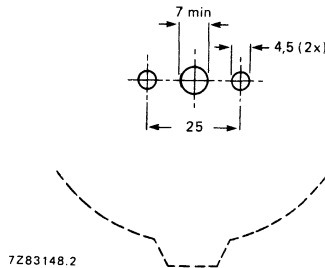


Fig. 3.

TRANSFORMERS SIZE CODE E2.1

Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 028 05710 (or service number 5322 362 44027).

ACCESSORIES

For this transformer a control knob with dial is available; see section "Accessories". Further information on request.

VARIABLE MAINS TRANSFORMERS

- With separate windings; size code E7.1
- Moulded types

QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number 2422 529	
			panel model	lab. model
220	3	0 to 262	00008*	00007**
				00017*

APPLICATION

These variable transformers find their main application as isolating transformers in radio and television repair shops, laboratories and in teaching institutes.

DESCRIPTION

The annular core with two separated layers of insulated copper wire is moulded in a reinforced polyester resin bottom part. The construction is rugged and professional; the transformers need no maintenance under normal conditions.

The contact surface is on the top of the coil. The angle of rotation is 320°; end stops prevent the two brushes, which operate in parallel, from overrunning the contact track.

The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can easily be replaced by one of another length.

The panel model is provided with screw terminals for connecting the leads.

The laboratory models are metal encased Class I (transformer 2422 529 00017) or Class II (transformer 2422 529 00007) transformers. They are short-circuit proof by means of a non-self-resetting thermal and magnetical cut-out, which opens the output circuit when the transformer is overloaded or short-circuited.

Transformer 2422 529 00007 has a plug according to CEE7 (pin diameter 4,8 mm; pin distance 19 mm), a socket outlet for accepting similar plugs, an insulated handle, and a voltmeter for indicating the output voltage.

Transformer 2422 529 00017 has a 3-core cable (including earth conductor) with plug (according to SEV) for input connection, a socket outlet, an insulated handle, and a voltmeter for indicating the output voltage. ←

* Approved by SEV.

** Approved by TÜV.

ELECTRICAL DATA

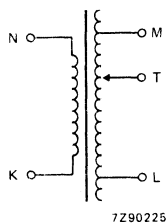


Fig. 1 Circuit diagram of panel models.

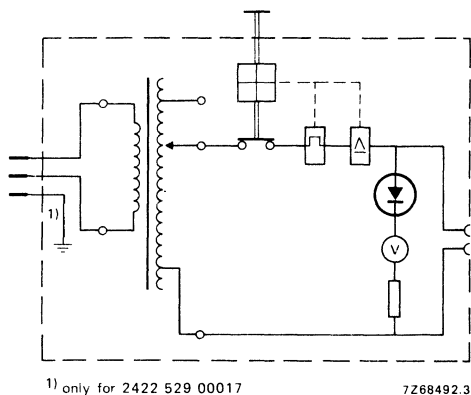


Fig. 2 Circuit diagram of laboratory models.

Input voltage N to K	220 V + 10%
Output voltage, no load L to T*	0 to ≥ 262 V
Voltage drop at nominal output current	≤ 12 V
Nominal output current over the whole control range	3 A
Short term overload current	5 A
Voltage per turn of winding	0,83 V
Losses, no load	≤ 11 W
Frequency range	50 to 400 Hz
Insulation resistance** after damp heat test (IEC 68-2, test Ca, 21 days)	> 5 M Ω
Test voltage** for 1 min	5000 V, 50 Hz
Air gap**	≥ 4 mm
Leakage path**	≥ 5 mm
Ambient temperature range	-10 to +40 °C
Climatic category, IEC 68-1	10/040/21
Maximum temperature rise at any point	70 °C

→ * Clockwise rotation of the spindle results in an increasing output voltage when the transformer is viewed from the mounting side (base).

→ ** Between primary and secondary windings and between live and non-live parts, except for transformer 2422 529 00017, for which the test voltage between live and non-live parts is 2000 V, 50 Hz.

Environmental tests

The transformers are designed to meet the following tests:

Damp heat test	IEC 68-2-3, test Ca, 21 days
Temperature cycling	IEC 68-2-14, test Na, $-10/+85$ °C, 1 cycle
Shock test	IEC 68-2-27, test Ea Acceleration, peak, 294 m/s^2 (30g) Pulse duration: 6 ms
Vibration test	IEC 68-2-6, test Fc, Procedure B4 10-55-10 Hz, 1 oct./min, amplitude 0,35 mm, 3 x 2 h

MECHANICAL DATA

Dimensions in mm

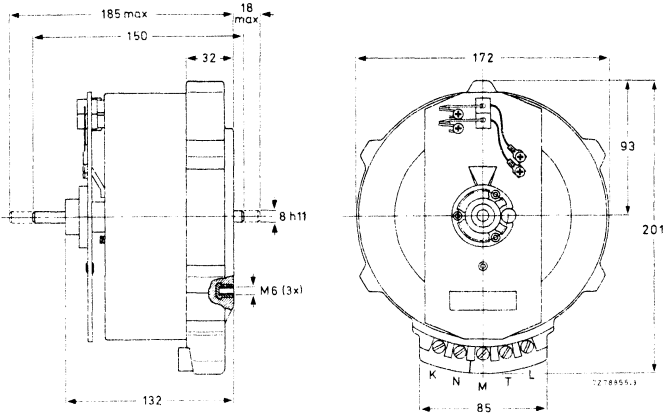


Fig. 3 Panel model.

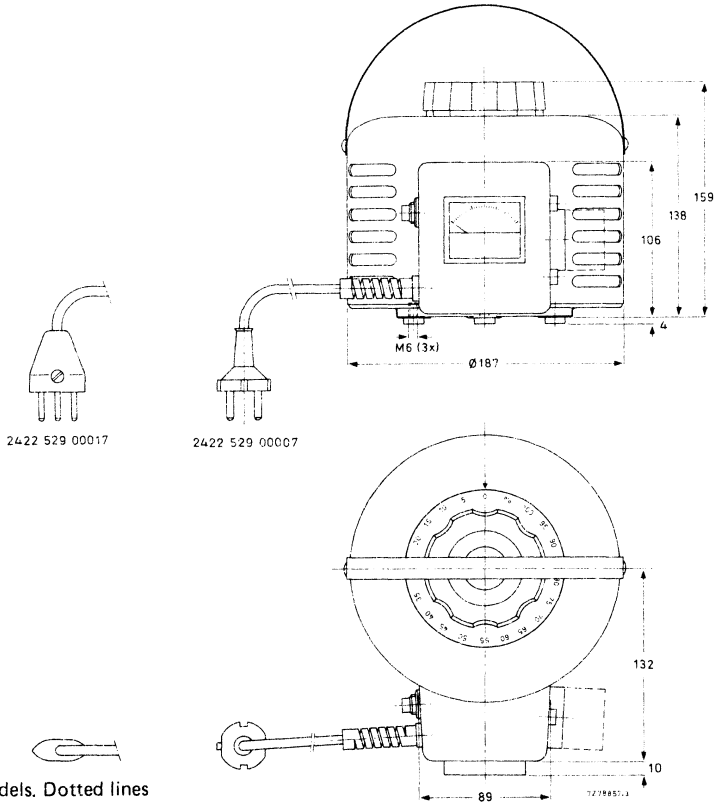


Fig. 4 Laboratory models. Dotted lines apply to transformer 2422 529 00017.

Degree of protection (IEC 144)	
panel model	IP00
laboratory models	IP20
Mass	
panel model	approx. 9 kg
laboratory models	approx. 10,2 kg
Operating torque	0,15 to 0,3 Nm
Permissible end stop torque	max. 4 Nm
Total angle of rotation	320°
Life of carbon brushes, guaranteed	> 100 000 complete rotations
Life of carbon brushes, expected	> 250 000 complete rotations

Mounting

The transformers can be mounted in any position. They can be fitted to a panel or a chassis by means of 3 screws M6 (maximum length = panel thickness + 10 mm). The mounting hole pattern is shown in Fig. 5.

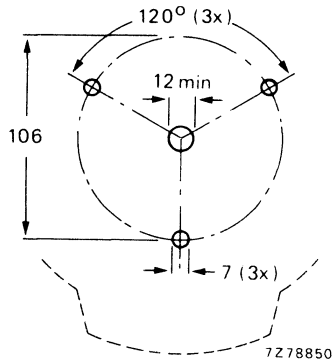


Fig. 5.

Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 027 75160 (or service number 5322 362 40044). For complete replacement the transformers need two brushes.

ACCESSORIES

The following accessories are available:

- control knobs;
- ganging units;
- chokes for parallel connection;
- motor drive module.

See section "Accessories"; use size code E7.1 when selecting. Further information on request.

ACCESSORIES

	page
Ganging and motor drive	95
A.C. stabilizer module	117
Control knobs	123
Carbon brushes	125

GANGING AND MOTOR DRIVE

INTRODUCTION

Variable mains transformers can be electrically connected in parallel or in series. To ensure correct current distribution **chokes** are supplied, which should be inserted between the output terminals of transformers connected in parallel.

For mechanical ganging of two or three variable transformers **ganging units** must be used, which are supplied in an assembly kit.

Most transformers, either ganged or individual, can be provided with a remote-controlled **motor drive**. Motor drive kits and base plate assemblies are supplied for this purpose.

Instructions for assembling come with all kits.

For ordering the required parts, and for details of the assembly kits, see paragraph "Ordering", page 112.

ELECTRICAL COUPLING

Parallel connection

Two or three variable mains transformers can be connected in parallel for the supply of higher single-phase secondary currents.

Chokes must be used to prevent high interchange currents between the parallel-connected circuits.

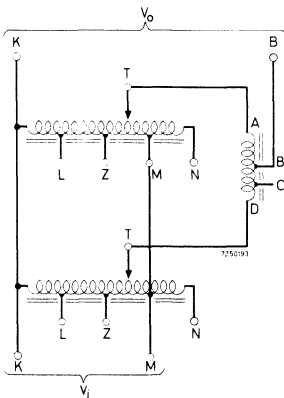


Fig. 1 Two transformers connected in parallel; choke AD inserted.

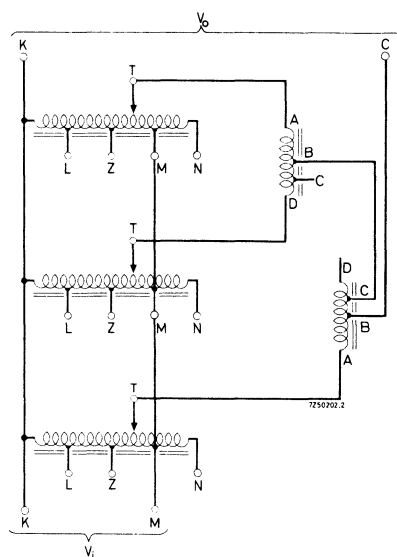


Fig. 2 Three transformers connected in parallel; chokes AD inserted.

Series connection

Two variable mains transformers can be connected in series for connection of high input voltages (max. 520 V).

The two brushes move simultaneously toward, or away from, the line terminals of the transformers, which means that the load is "floating".

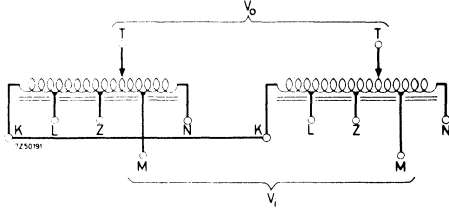


Fig. 3 Two transformers connected in series.

Three-phase connection

Three transformers in star circuit

To control three-phase voltages, three transformers can be connected in star.

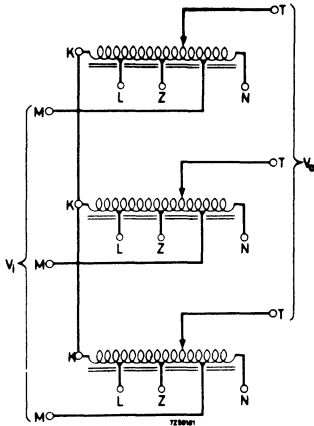


Fig. 4 Three transformers connected in star circuit.

Two transformers in open delta circuit

Voltage control of the three-phase mains can also be obtained by using two variable transformers, connected in "open delta". The circuit applies to 127/220 V mains for transformers with 220 V input. This circuit provides full control without phase shift.

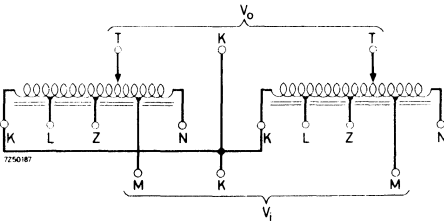


Fig. 5 Two transformers connected in open delta circuit.

Chokes

For parallel connection of two or three transformers, chokes must be inserted between the output terminals to prevent high interchange currents caused by differences in coupling. The permissible output voltage difference between the coupled transformers is ≤ 2 V.

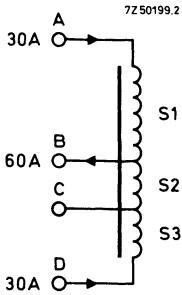


Fig. 6a Circuit diagram of choke
2422 532 00017; 2 x 30A parallel;
S1: S2: S3 = 2 : 1 : 1.

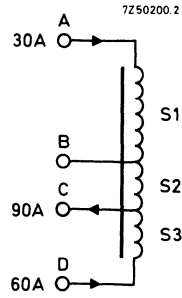


Fig. 6b Circuit diagram of choke
2422 532 00017; 30A + 60A parallel;
S1: S2: S3 = 2 : 1 : 1.

MECHANICAL GANGING

Dimensions in mm

Transformers with size code E2, E3, E3.1, E4 and E4.1

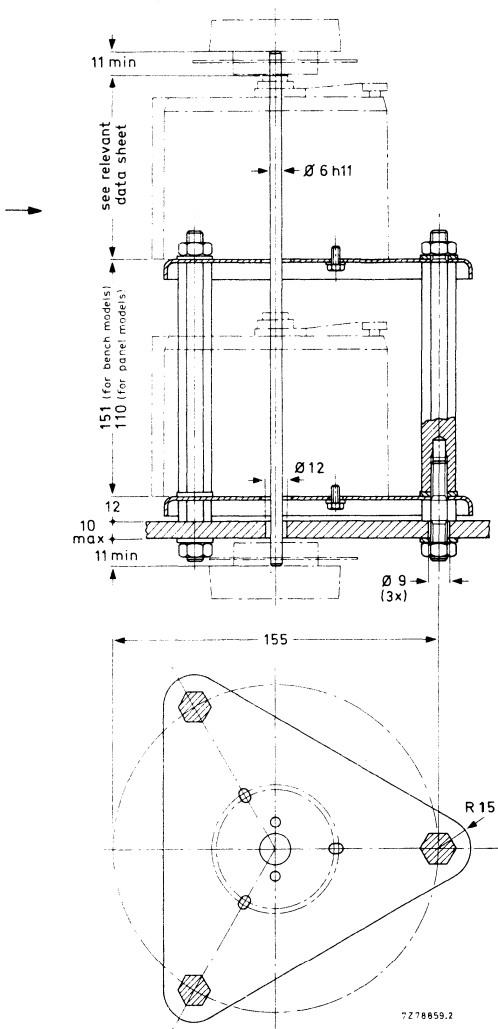


Fig. 7 Two ganged transformers.

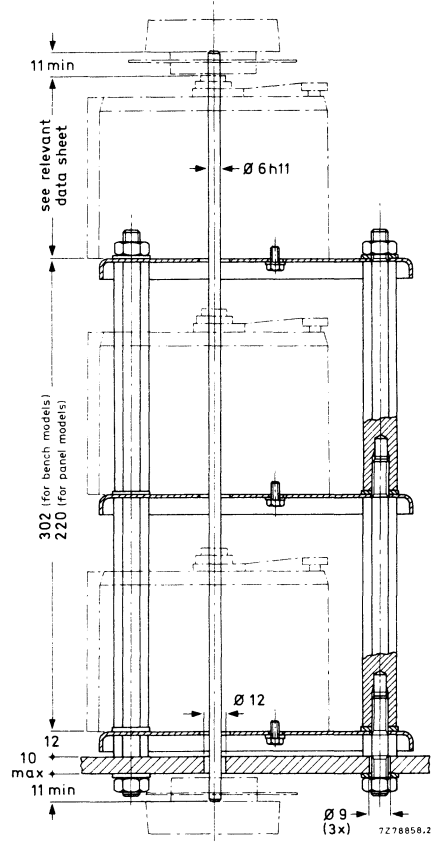


Fig. 8 Three ganged transformers.

Transformers with size code E6, E6.1, E7 and E7.1

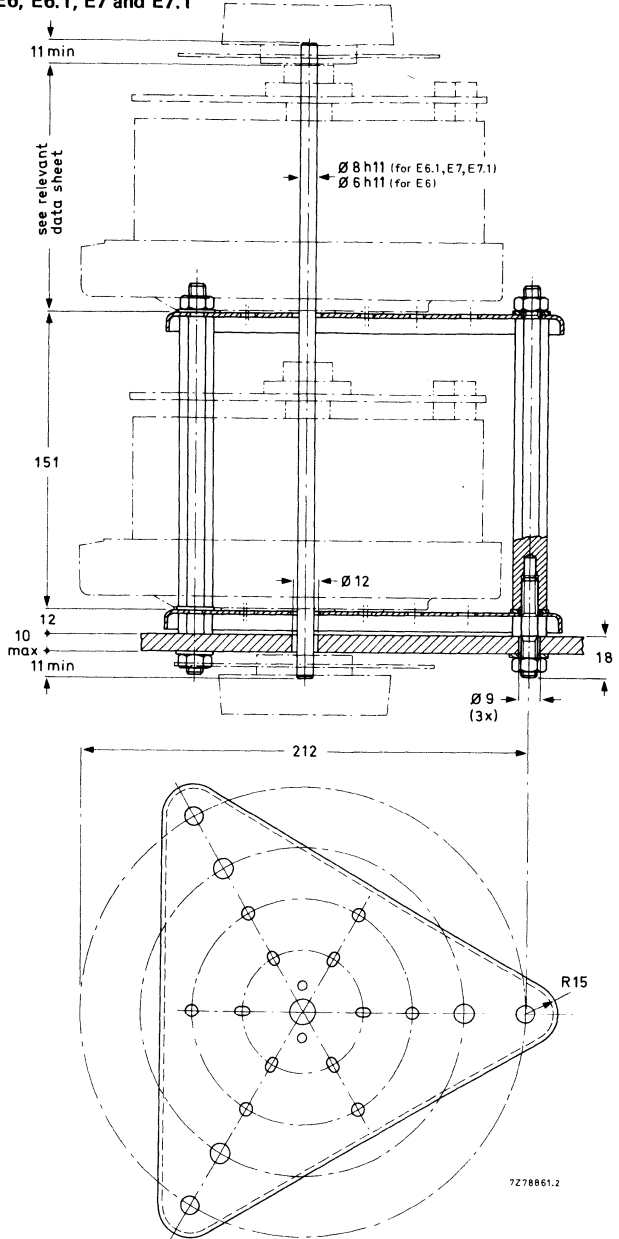


Fig. 9 Two ganged transformers.

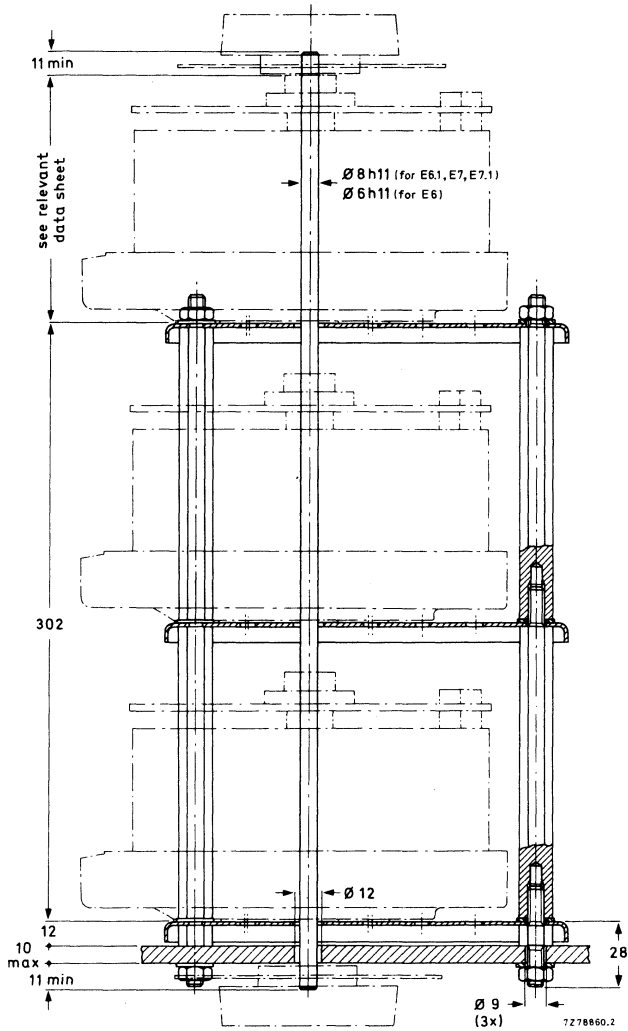


Fig. 10 Three ganged transformers.

Transformers with size code E8

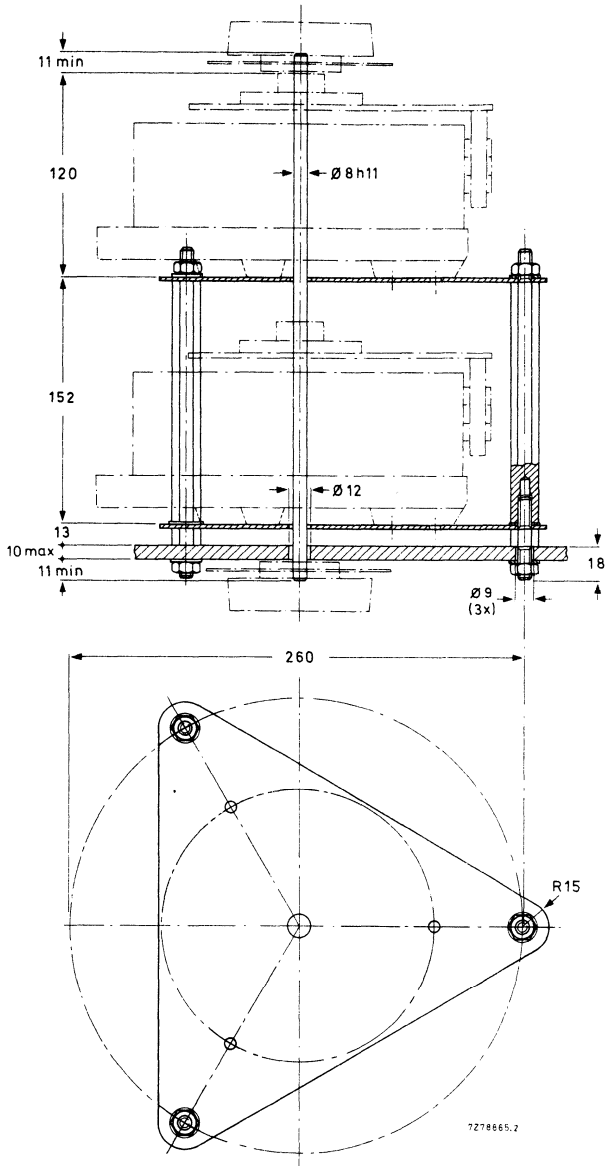


Fig. 11 Two ganged transformers.

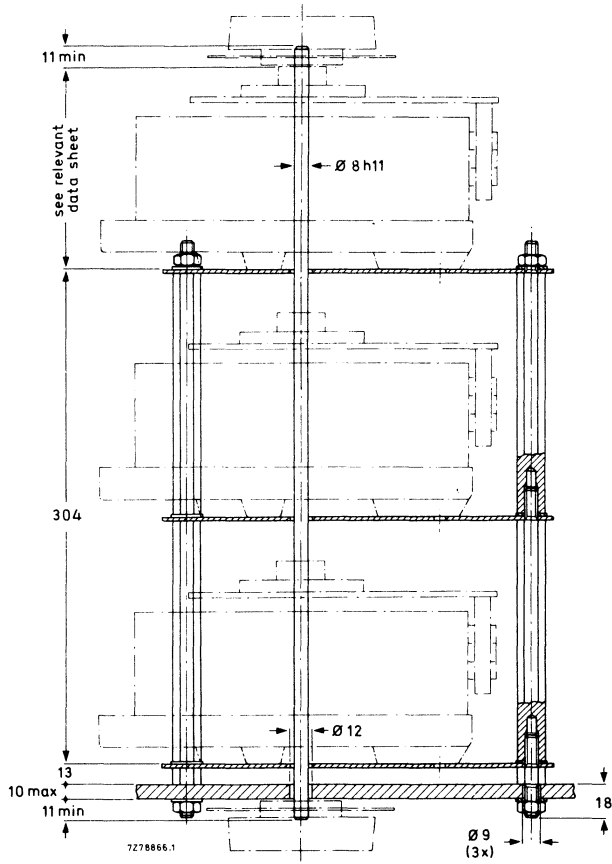


Fig. 12 Three ganged transformers.

Transformers with size code E10

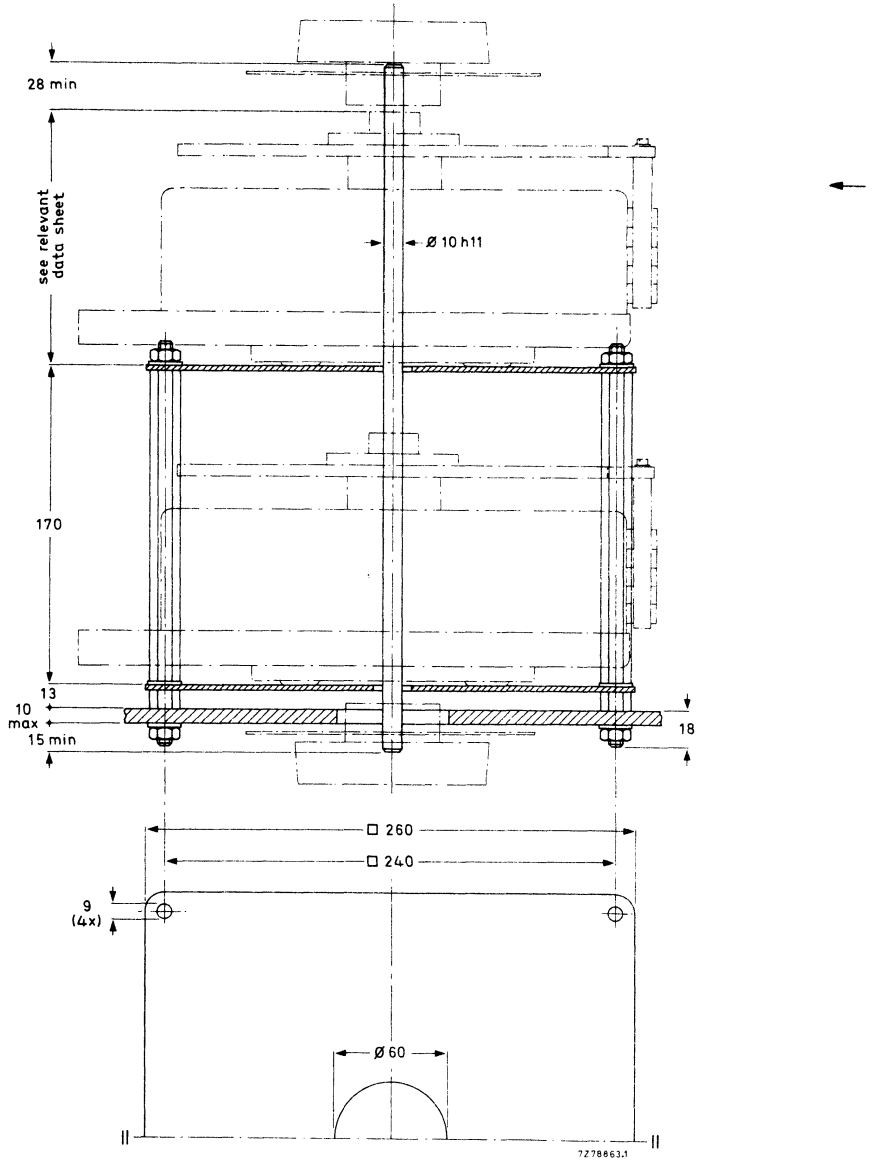


Fig. 13 Two ganged transformers.

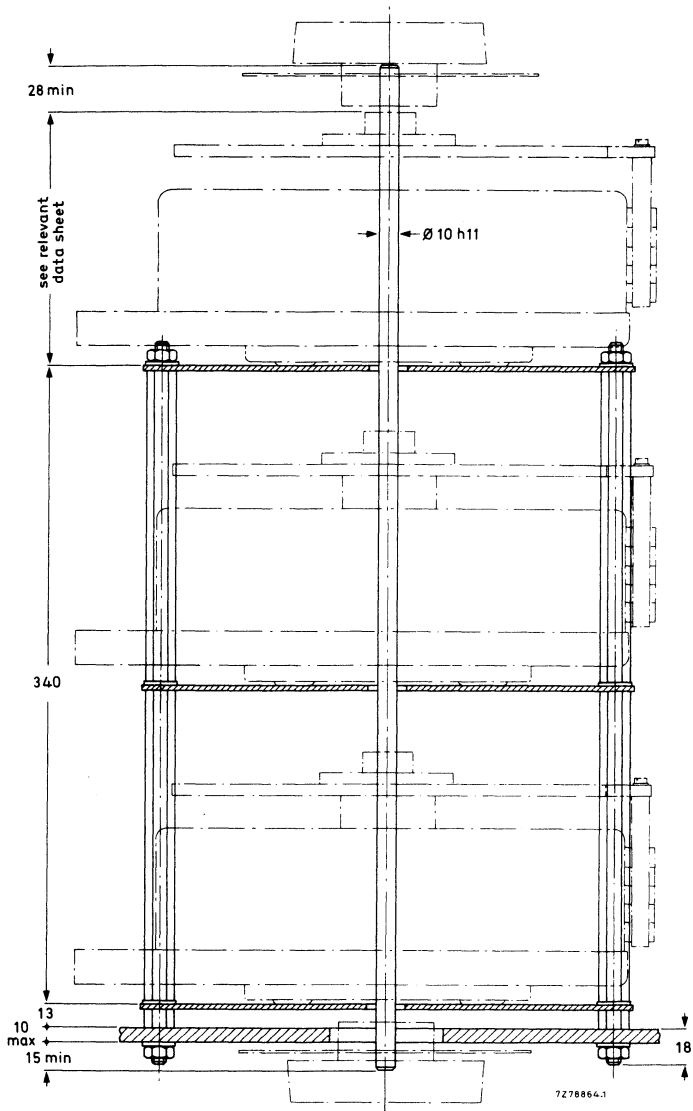


Fig. 14 Three ganged transformers.

MOTOR DRIVE for transformers with size code E2, E3, E3.1, E4, E4.1, E6, E6.1, E7 and E7.1

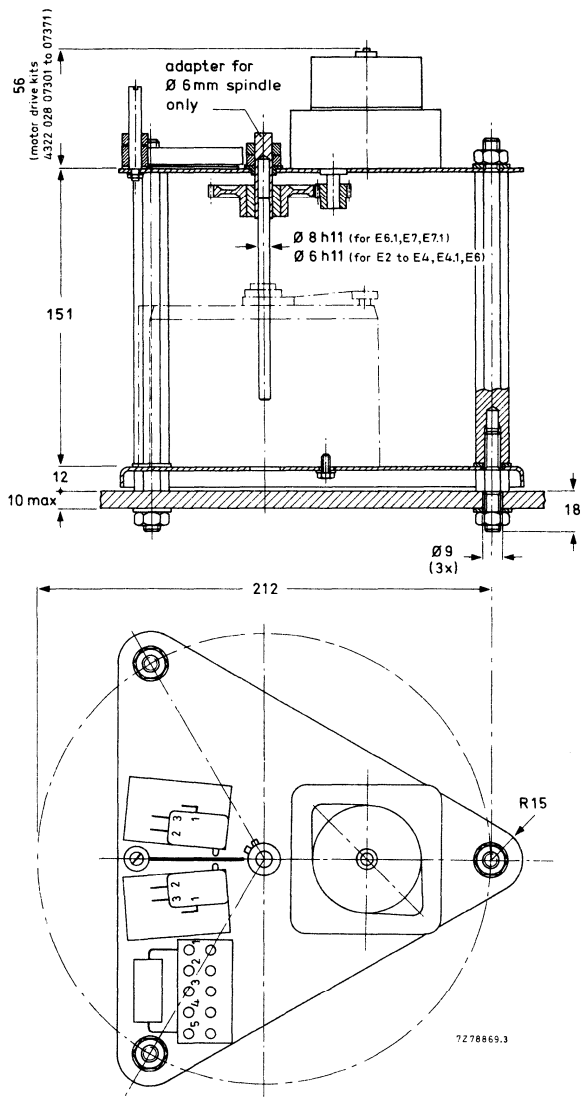


Fig. 15 Motor drive for one transformer.

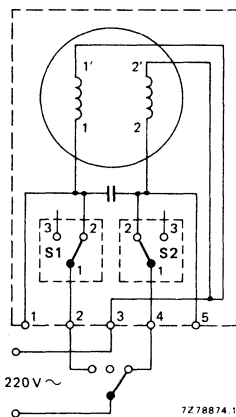


Fig. 16 Connection diagram for top-plate parts. Connection of motor terminals 1 and 2 may require interchanging (to terminals 5 and 1 respectively) for correct direction of rotation, depending on gearbox used. S1 and S2 are limit switches.

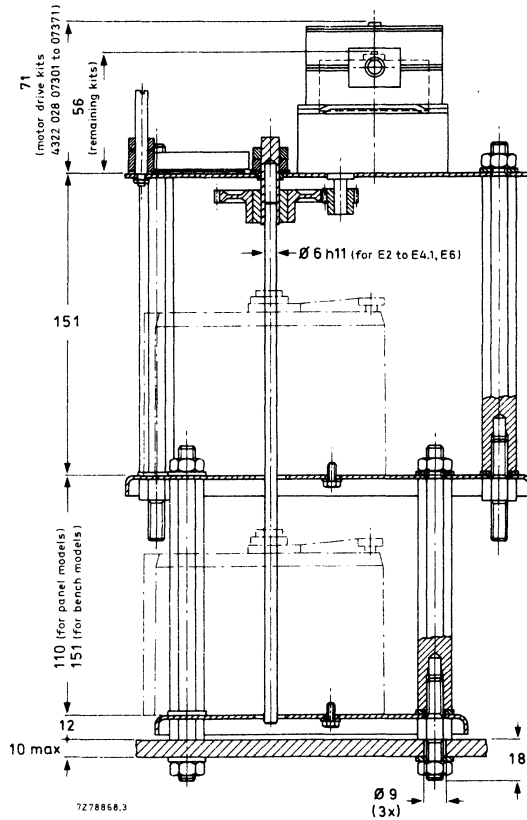


Fig. 17 Motor drive for two ganged transformers with size code E2, E3, E3.1, E4, E4.1.
For connections of top-plate parts, see Fig. 16.
For three ganged transformers, consult also Fig. 8.

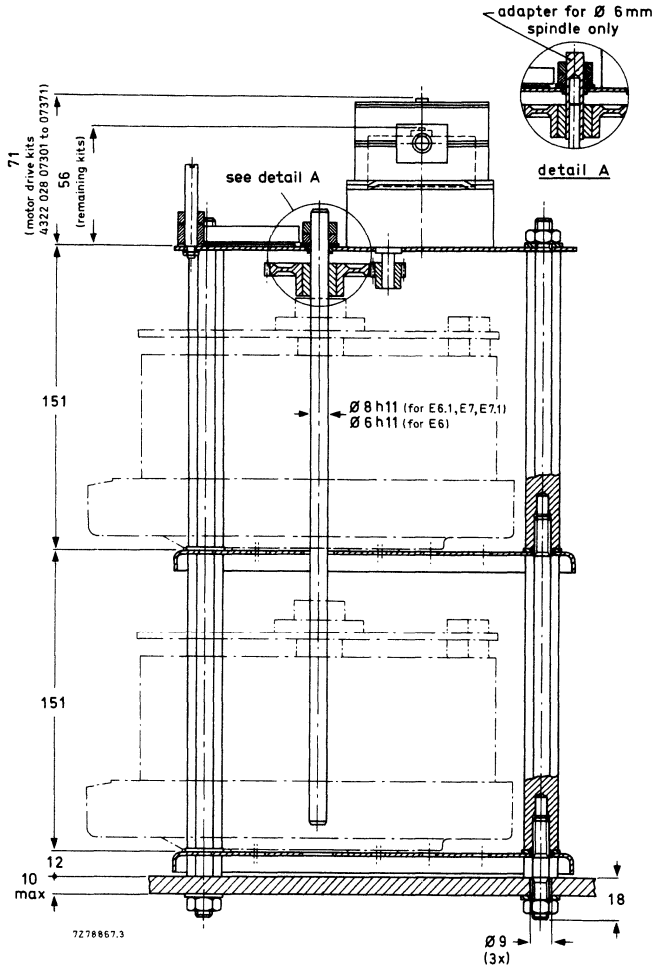


Fig. 18 Motor drive for two ganged transformers with size code E6, E6.1, E7 and E7.1.
For connections of top-plate parts, see Fig. 16.
For three ganged transformers, consult also Fig. 10.

Transformers with size code E8

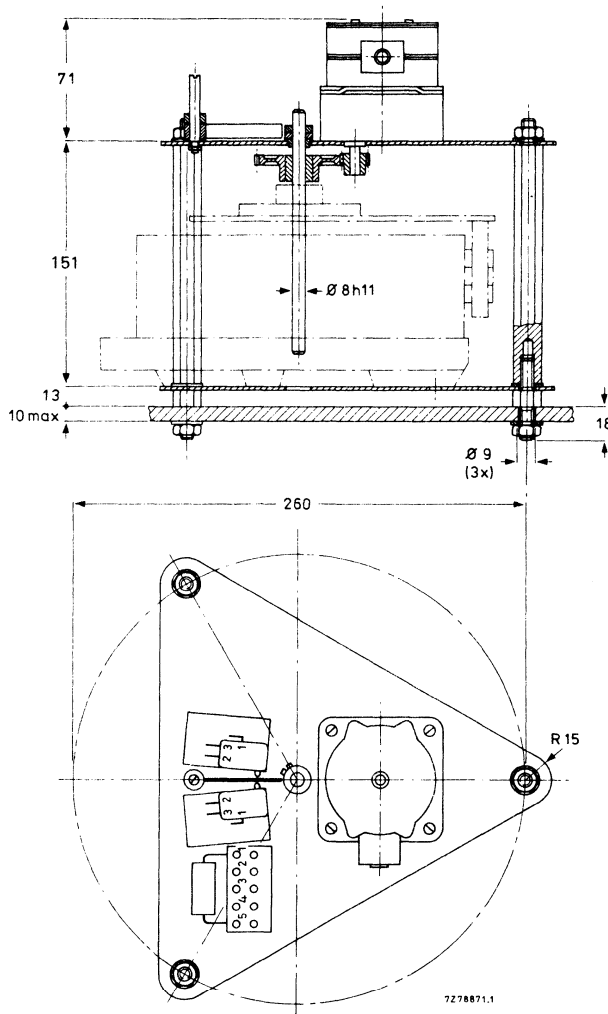


Fig. 19 Motor drive for one transformer.

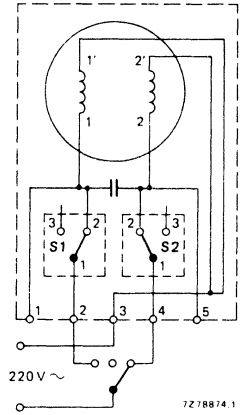


Fig. 20 Connection diagram for top-plate parts. Connection of motor terminals 1 and 2 may require interchanging (to terminals 5 and 1 respectively) for correct direction of rotation, depending on gearbox used. S1 and S2 are limit switches.

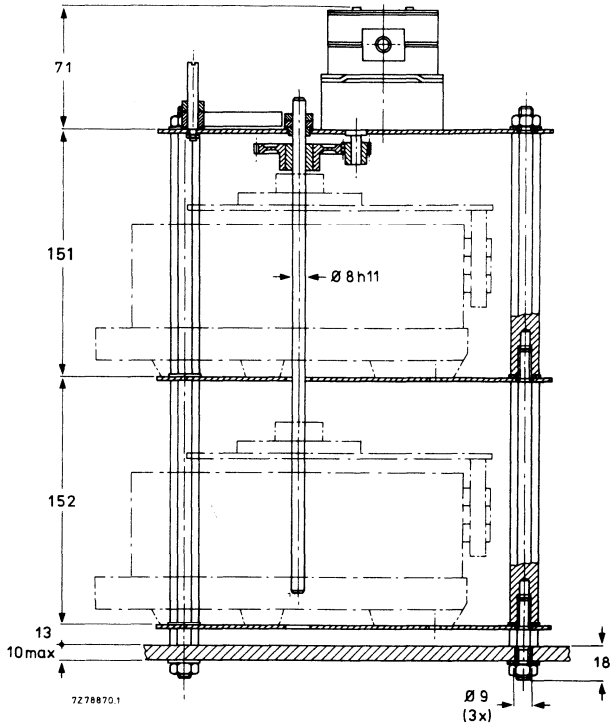


Fig. 21 Motor drive for two ganged transformers.
For connection of top-plate parts, see Fig. 20.
For three ganged transformers, consult also Fig. 12.

Transformers with size code E10

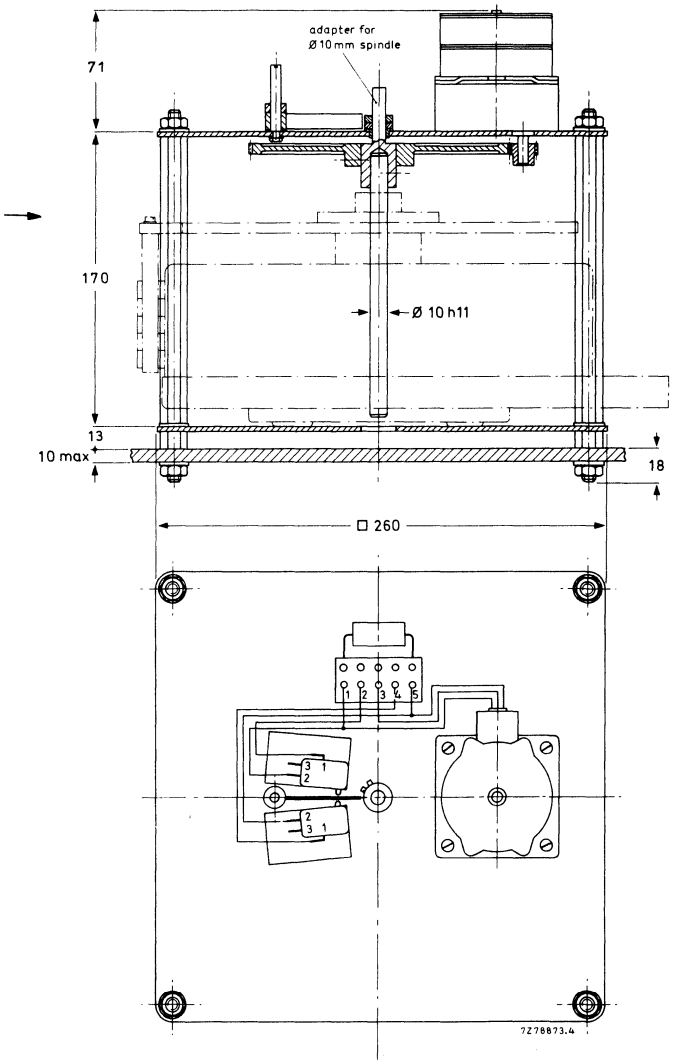


Fig. 22 Motor drive for one transformer.

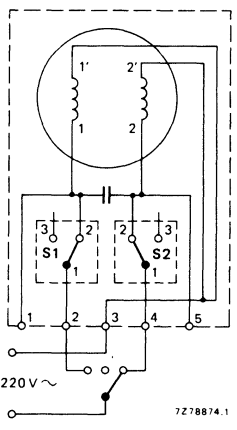


Fig. 23 Connection diagram for top-plate parts. Connection of motor terminals 1 and 2 may require interchanging (to terminals 5 and 1 respectively) for correct direction of rotation, depending on gearbox used. S1 and S2 are limit switches.

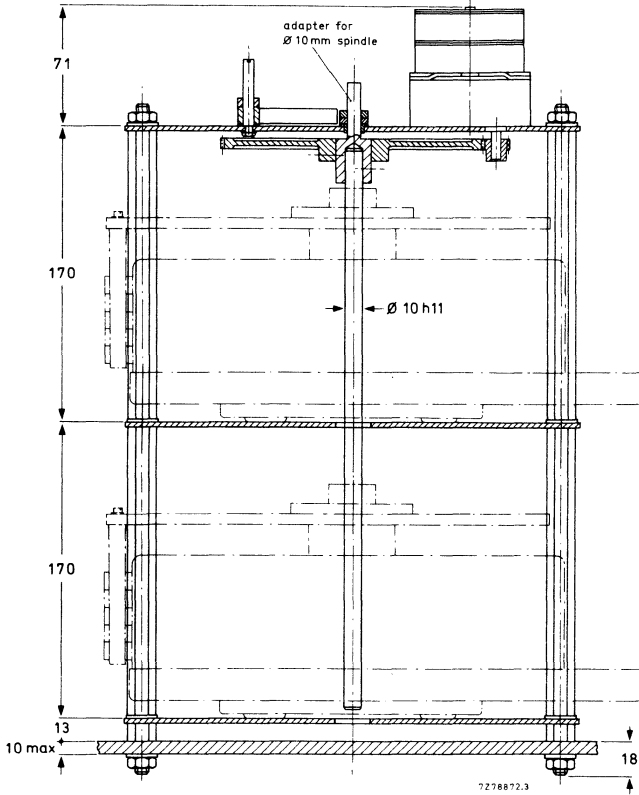


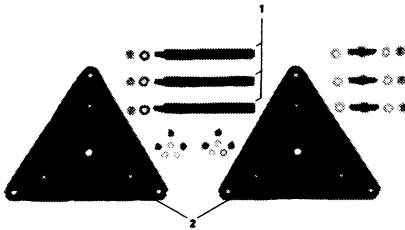
Fig. 24 Motor drive for two ganged transformers.
For connection of top-plate parts, see Fig. 23.
For three ganged transformers, consult also Fig. 14.

ORDERING

For correct ordering use the table on page 114 and pay attention to the following points.

- A) For **mechanical ganging** order ganging unit (Fig. 25) and spindle; see columns 4 and 5 of the table.
- B) For **motor drive of single transformers** order base plate assembly (Fig. 26) and motor drive kit (Fig. 27); see columns 6 and 7 of the table.
 For **motor drive of ganged transformers** order ganging unit (Fig. 25) spindle, base plate assembly (Fig. 26), if required, and motor drive kit (Fig. 27); see columns 4, 5, 6 and 7 of the table.
- C) For **electrical parallel connection** order also chokes (Fig. 28); see column 3 of the table.
- D) If the brushes of the transformer have to stop at intermediate positions, order the special switch set, catalogue number 2422 532 00032.

83060-05-03



830630-05-02

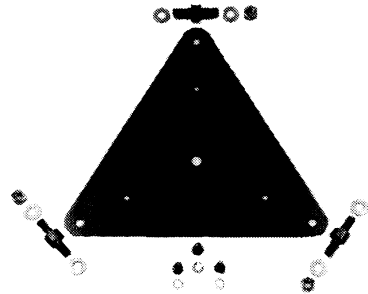


Fig. 25 Example of components of ganging unit;
 1 = distance rods;
 2 = coupling plates;
 components for attachment.

Fig. 26 Example of components of base plate assembly.

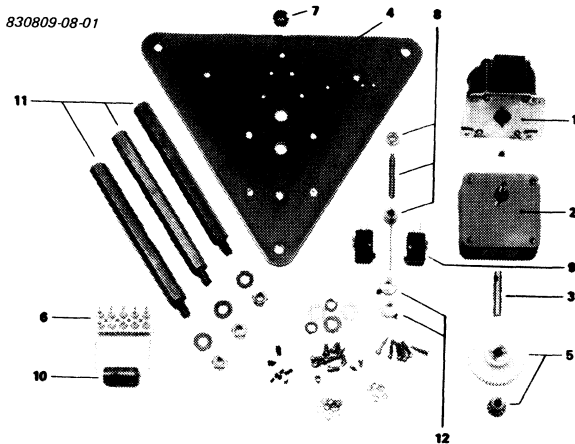


Fig. 27 Example of components of motor drive kit;

- 1 = synchronous motor, 220 V, 50 Hz;
 - 2 = gear box + pinion;
 - 3 = adapter for ϕ 6 mm or ϕ 10 mm spindles*
 - 4 = top plate;
 - 5 = gear + pinion;
 - 6 = contact block;
 - 7 = bushing;
 - 8 = vane + spindle + locking ring;
 - 9 = micro switches;
 - 10 = phasing capacitor;
 - 11 = distance rods;
 - 12 = actuating rings;
- components for attachment.

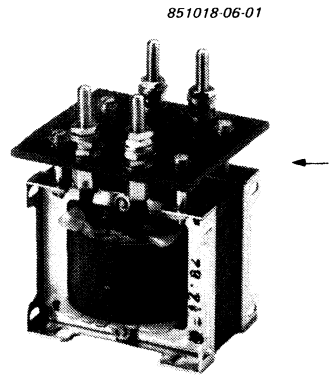


Fig. 28 Example of a choke.

* If required.

1	2	3	4		5	6	7												
			parallel connection	mechanical ganging			base plate assembly	motor drive											
				choke				ganging unit	spindle	motor drive kit 4322 028									
Transformer size code	number of transformers	2422 532	2422 532	4322	2422 532	rotation time (s/rev)* at 50 Hz													
		.....	.....	.....	.....	6.67	10	13.3	20	30	33.3	40	66.7	100	120	200	600	800	2400
E2	1	-	-	-	00073	07301	07311	07321			07331	07341	07351						
E3.1	2	**	00057	026 66750	00073	07381	07311	07321			07331	07341	07351		07361		07371		
E4	3	**	00053	026 66740	00073	07381	07391	07321			07331	07341	07351		07361		07371		
●E3.1	1	-	-	-	00073	07301	07311	07321			07331	07341	07351		07361		07371		
E4	2	**	00016	026 66750	00073	07381	07311	07321			07331	07341	07351		07361		07371		
E4.1	3	**	00005	026 66740	00073	07381	07391	07321			07331	07341	07351		07361		07371		
	1	-	-	-	00073	07301	07311	07321			07331	07341	07351		07361		07371		
E6	2	00017	00055	026 66750	-	07381	07391	07321			07331	07341	07351		07361		07371		
	3	2 x 00017	00056	026 66740	-	07381	07391	07401			07331	07341	07351		07361		07371		
E6.1	1	-	-	-	00073	07301	07311	07321			07331	07341	07351		07361		07371		
E7	2	00017	00055	026 08350	-	07381	07391	07321			07331	07341	07351		07361		07371		
E7.1	3	2 x 00017	00056	026 08360	-	07381	07391	07401			07411	07421	07351		07361		07371		
	1	-	-	-	00069	07431	07441	07451			07461	07471	07481		07491		07501		
E8	2	00017	00066	026 08350	-	07431	07441	07451			07461	07471	07481		07491		07501		
	3	2 x 00017	00067	026 08360	-	-	07441	07451			07461	07471	07481		07491		07501		
	1	-	-	-	00062	-	07511	07521			07531		07541		07551		07561		07581
E10	2	00017	00063	026 01850	-	-	07511	07521			07531		07541		07551		07561		07581
	3	2 x 00017	00064	026 01860	-	-	-	07521			07531		07541		07551		07561		07581

Note: Motor drive kits with motors for other supply voltages, and gear boxes with other rotation times can be supplied to special order.

- * The effective rotation angle of the variable mains transformers is 320°, so the actual rotation time between end stops is $\frac{320}{360}$ x listed rotation time.
- ** No standard chokes are available for transformer size codes E2, E3, E3.1, E4 and E4.1, since a single transformer of the standard range with larger size code, is a more economic proposition than ganging these smaller size transformers.
- ▲ Only panel models.
- Only bench models.

A.C. STABILIZER MODULE

2422 532 00071

QUICK REFERENCE DATA

Input voltage	220 V, + 10%, - 15%; 50/60 Hz
Stabilized output voltage	
transformers 220 V/0-220 V	5 to 100% of input voltage
transformers 220 V/0-260 V	5 to 115% of input voltage
Maximum stabilization accuracy	$\pm 0,5$ V
Ambient temperature range	-10 to + 45 °C

APPLICATION

This automatic stabilizer module can be used in combination with motor driven transformers for correction of voltage variations. Its main use will be in those applications where the speed of response is of secondary importance to waveform distortion, and where the price per kVA of controlled power must be kept low. Application areas are in test and research laboratories, service centres, and factories. The module can also be used as a voltage, light or temperature-sensitive control for power sources. It is not intended for transformers with separate windings.

DESCRIPTION

A complete a.c. stabilizer circuit consists of:

- one or more mains transformers;
- a transformer ganging unit, if two or three transformers are used;
- a motor drive with 220 V reversible synchronous motor, see "ganging and motor drive";
- the a.c. stabilizer module;
- a control potentiometer.

Figure 1 shows the block diagram of the stabilizer circuit. A stabilized power supply provides a d.c. reference voltage (V_{ref}), which is applied to the control potentiometer. This potentiometer reduces the reference voltage by a factor k_1 , thus the voltage k_1V_{ref} is applied to the comparator. The output voltage of the variable mains transformer is applied to the primary of a step-down transformer whose secondary output is rectified. The output of the rectifier, k_2V_{out} , is applied to the other comparator input. The comparator provides an output e to the switching amplifier when the difference between k_2V_{out} and k_1V_{ref} exceeds the value set by the accuracy potentiometer on the module. The output of the switching amplifier energizes the appropriate relay for driving the motor in the direction which corrects the voltage variation of the transformer.

The accuracy potentiometer (see Fig. 2) adjusts the stabilization accuracy between $\pm 0,5$ V and $\pm 2,5$ V; correct adjustment is necessary to prevent the system hunting. The system has a tendency to hunt because the rotor of a synchronous motor has permanent magnets and cannot stop between pole pairs, and also because the movement of the transformer brush from turn to turn causes a stepping voltage. Simultaneous occurrence of these conditions can exceed the accuracy potentiometer setting causing the stabilizer to hunt for the accurate transformer brush position, therefore the accuracy potentiometer would need re-adjustment. The phenomenon is dependent on control speed, i.e. the total gear ratio between motor and transformer drive spindle, thus a high control speed must be combined with a large voltage tolerance.

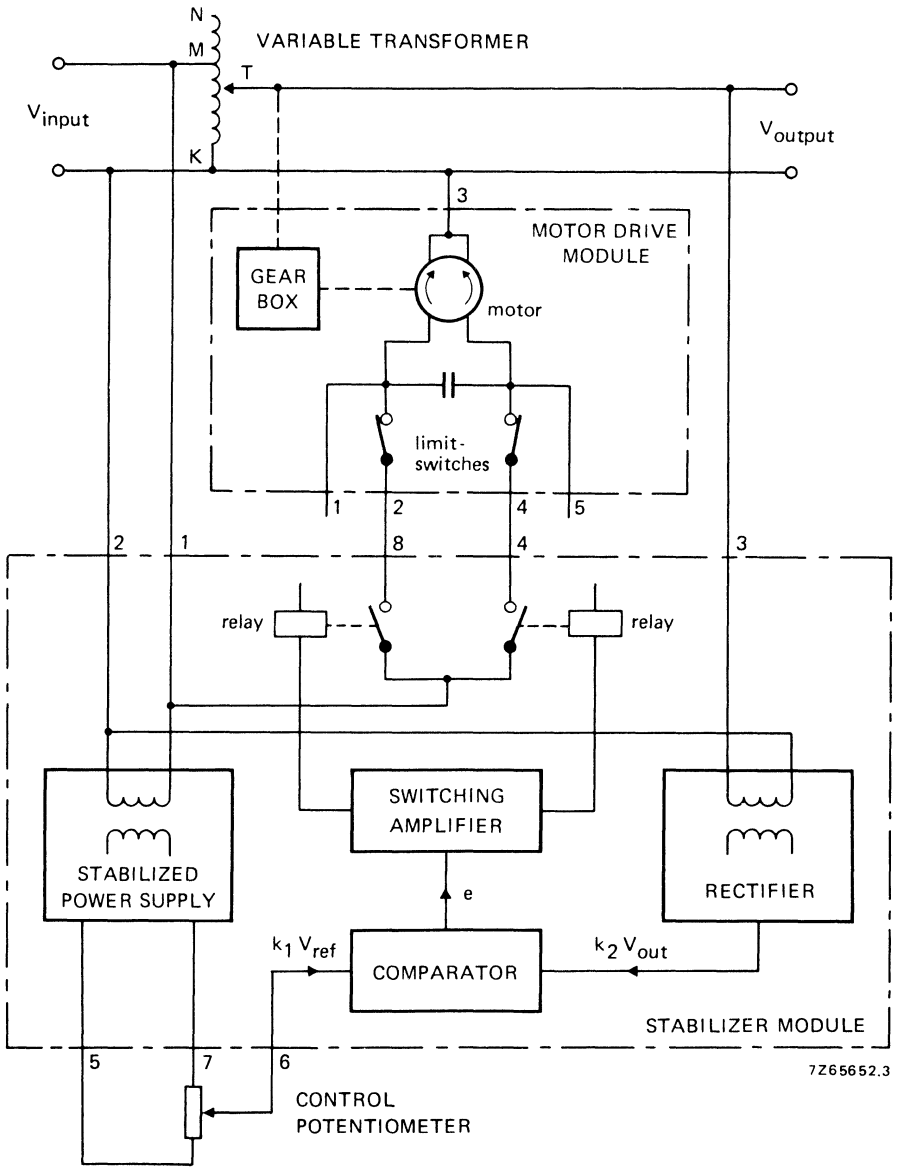


Fig. 1.

MECHANICAL DATA

Dimensions in mm

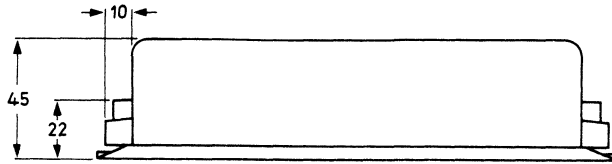
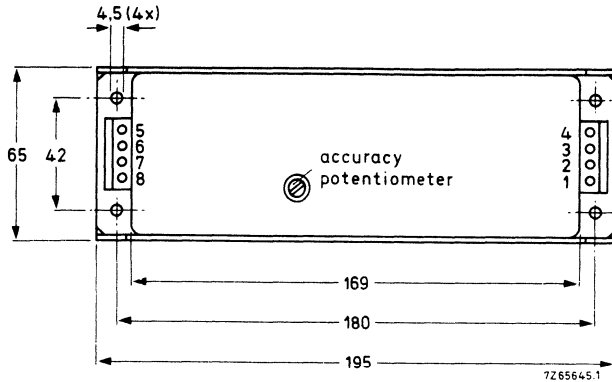


Fig. 2.



Mass: approx. 700 g
 Housing: lacquered metal
 Connections are made via two screw-terminal blocks.

ELECTRICAL DATA

Terminals 1 and 2	
input voltage	220 V, + 10%, - 15%; 50/60 Hz
power consumption, relays not operating	2,5 W
relays operating	3 W
Terminals 2 and 3	
voltage to be stabilized	0 to 260 V (a.c.)
impedance	5 kΩ
Terminals 2 and 4, and 2 and 8	
maximum switching capability of relays	250 V (a.c.), 1 A, cos φ = 0,7
Terminals 5(+) and 7(-)	
reference output voltage	+12 V (d.c.)
maximum load	5 mA
Terminals 6(+) and 7(-)	
reference input voltage	0 to +12 V (d.c.)
maximum current consumption	1 mA
Stabilized output voltage	
transformers 220 V/0-220 V	adjustable between 5 and 100% of input voltage
transformers 220 V/0-260 V	adjustable between 5 and 115% of input voltage

Accuracy

adjustable with accuracy potentiometer between $\pm 0,5$ V (a.c.) or voltage per turn of winding, whichever is the higher*, and $\pm 2,5$ V (a.c.)

Maximum control speed

→ transformers, size code E10
other transformers

14,5 V/s**
43 V/s**

Operating temperature range

-10 to +45 °C

Storage temperature range

-25 to +85 °C

Connections

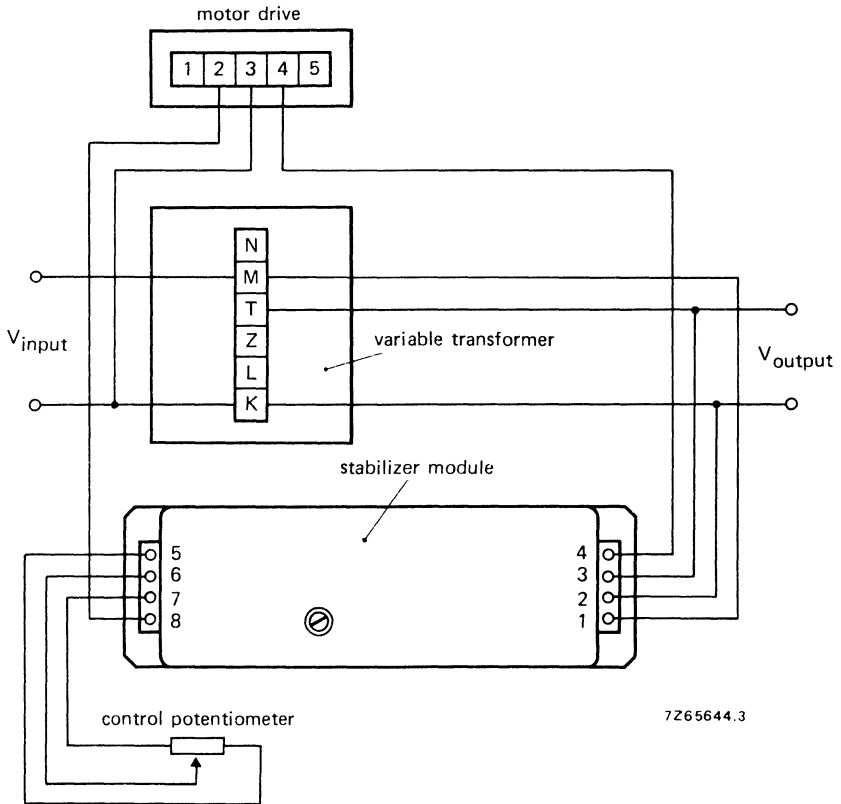


Fig. 3.

→ * Valid for motor drive kits for rotation times ≥ 10 s/rev, see the Table of "ganging and motor drive".

** Provided the motor and gearbox are selected from the Table of "ganging and motor drive".

Notes

Motorconnections to terminals 1 and 5 of the motor drive may require interchanging to produce correct direction of rotation (depends on gearbox used).

Recommended control potentiometer $5\text{ k}\Omega \pm 20\%$, 0,25 W.

If only stabilization or positioning at a lower voltage than the input voltage is required the phase can be connected to N instead of M.

APPLICATION INFORMATION**Heavy load application**

Greater output current that is stabilized against load and input voltage variations can be achieved by a boost transformer connected according to Fig. 4. The permissible load current is thus increased by the boost ratio factor. For example, with an input voltage of 220 V, an 8,5 A variable transformer can supply 0 to 110 V to a 5: 1 ratio boost transformer thus controlling 42,5 A over 22 V.

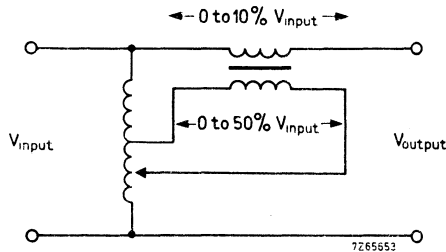


Fig. 4.

Programmed stabilization

An external programmed voltage source can be injected into the stabilizer module. This can be done by connecting a control voltage (V_{control}) of max. 12 V to terminals 6(+) and 7(-); terminal 5 is not used. Then stabilized output voltage is: $V_{\text{output}} = k \cdot V_{\text{control}}$, in which $k = 23 \pm 7\%$.

Temperature and illumination level control

Instead of a control potentiometer a combination of fixed resistors and NTC thermistors or LDRs can be used to control a temperature or illumination level respectively.

CONTROL KNOBS

These knobs with dials are for panel model transformers. They have a clamping collet enabling them to be locked in any position on the spindle. The range includes knobs with large diameter dials which allow transformer mounting screws to be concealed.

dial calibration	d mm	D1 mm	D2 mm	H1 mm	H2 mm	H3 mm	catalogue number	intended for transformer size code
0 - 260 V	6	60	78	15	4	24	2922 511 90043	E1, E1.1, E2, E2.1, E3, E3.1, E4, E4.1, E6 ←
0 - 270 V	6	60	78	15	4	24	90045	
0 - 100 %	6	60	78	15	4	24	90046	
0 - 100 %	8	80	106	19	4	28	2922 511 90052	E6.1, E7, E7.1, E8 ←
0 - 260 V	8	80	106	19	4	28	90054	
0 - 270 V	8	80	106	19	4	28	90055	
0 - 100 %	8	80	125	19	4	28	2922 511 90056	
0 - 260 V	8	80	125	19	4	28	90058	
0 - 270 V	8	80	125	19	4	28	90059	
0 - 260 V	10	100	155	22	5	44	2922 511 90071	E10

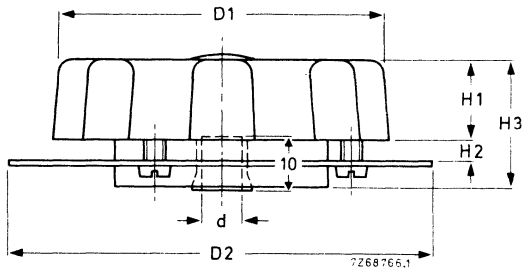


Fig. 1 Control knob with dial.

ACCESSORIES

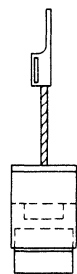
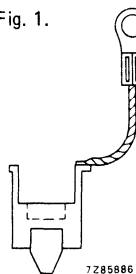


Fig. 1.



7285886

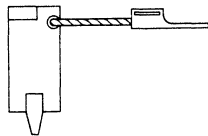


Fig. 2.

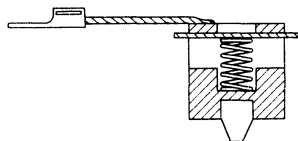
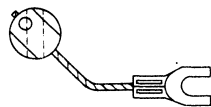
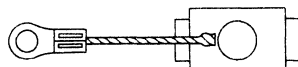


Fig. 3.



7285884



7285882

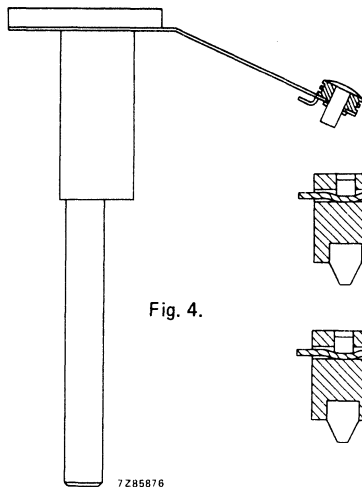


Fig. 4.

7285876

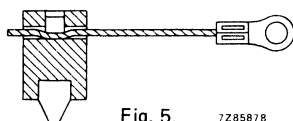


Fig. 5.

7285878

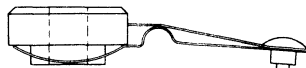


Fig. 7.

7285885

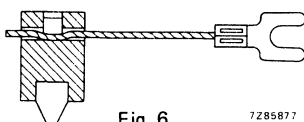


Fig. 6.

7285877



Fig. 8.

7285880

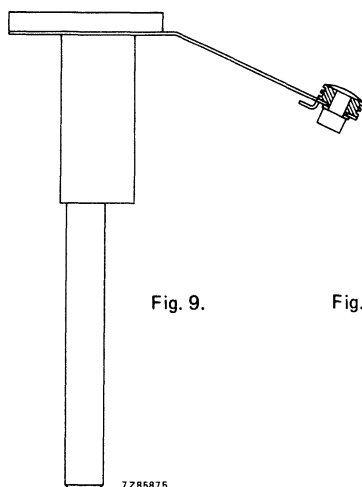


Fig. 9.

7285875

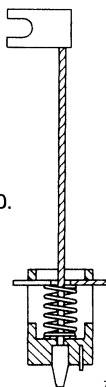


Fig. 10.

7285883

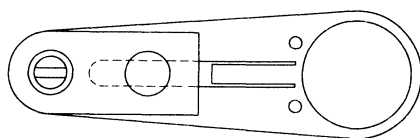


Fig. 11.

7285879



Fig. 12.

7285881

CARBON BRUSHES

Replacement carbon brushes are available for all variable transformers.

The table below shows all transformers of the present and previous ranges and their carbon brushes, and the number of brushes required for complete replacement. Order the spare carbon brushes by quoting either the 12-digit Elcoma catalogue number or service number; note that the 12-digit number applies to one brush. If brushes with different catalogue numbers are given for the same transformer, they are interchangeable provided their Fig. numbers are the same.

variable transformer	carbon brush		required number of brushes	Fig.
	Elcoma catalogue number	service number		
2422 529 00005	4322 027 75160	5322 362 40044	2	6
	027 55830	44003	2	1
	026 69320		2	1
00006	027 75160	40044	2	6
	027 55830	44003	2	1
	026 69320		2	1
00007	027 75160	40044	2	6
00008	027 75160	40044	2	6
00009	028 05710	44027	1	9
00017	027 75160	40044	2	6
2422 530 00007	027 78660	40038	1	7
00107	027 78660	40038	1	7
00407	027 78660	40038	1	7
01407	026 16310	40054	1	8
01607	026 16310	40054	1	8
02301	026 19310	40011	1	2
02306	026 19310	40011	1	2
02401	026 19310	40011	1	2
02402	026 19310	40011	1	2
02403	026 19310	40011	1	2
02405	026 19310	40011	1	2
02406	026 19310	40011	1	2
02501	026 19310	40011	1	2
02503	026 19310	40011	1	2
02506	026 19310	40011	1	2
03301	026 19300		1	10
03302	026 19300		1	10
03306	026 19300		1	10
	027 75160	40044	1	6

ACCESSORIES

variable transformer	carbon brush		required number of brushes	Fig.
	Elcoma catalogue number	service number		
2422 530 03401	4322 026 19300		1	10
	027 75160	5322 362 40044	1	6
03405	026 19300		1	10
	027 75160	40044	1	6
03406	026 19300		1	10
	027 75160	40044	1	6
03407	026 65540	40079	1	11
03501	026 19300		1	10
	027 75160	40044	1	6
03503	026 19300		1	10
03506	026 19300		1	10
	027 75160	40044	1	6
03507	027 65540	40079	1	11
04301	026 19300		2	10
04304	026 19300		2	10
04306	026 19300		2	10
	027 75160	40044	2	6
04307	027 75160	40044	2	6
04401	026 19300		1	10
	027 75160	40044	1	6
04402	026 19300		1	10
04404	026 19300		1	10
	027 75160	40044	1	6
04405	026 19300		1	10
	027 75160	40044	1	6
04406	026 19300		1	10
	027 75160	40044	1	6
04407	027 75160	40044	1	6
04411	027 75160	40044	1	6
04415	027 75160	40044	1	6
04501	026 19300		1	10
	027 75160	40044	1	6
04503	026 19300		1	10
04506	026 19300		1	10
	027 75160	40044	1	6
04507	027 75160	40044	1	6
04511	027 75160	40044	1	6
05401	026 19300		2	10
	027 75160	40044	2	6
05402	026 19300		2	10

variable transformer	carbon brush		required number of brushes	Fig.
	Elcoma catalogue number	service number		
2422 530 05403	4322 026 19300		2	10
05404	026 19300		2	10
	027 75160	5322 362 40044	2	6
05405	026 19300		2	10
	027 75160	40044	2	6
05406	026 19300		2	10
	027 75160	40044	2	6
05407	027 75160	40044	2	6
05411	027 75160	40044	2	6
05415	027 75160	40044	2	6
05501	026 19300		2	10
	027 75160	40044	2	6
05503	026 19300		2	10
05506	026 19300		2	10
	027 75160	40044	2	6
05507	027 75160	40044	2	6
05511	027 75160	40044	2	6
05515	027 75160	40044	2	6
06407	(see Note 1 at end of table 028 01800	44016	3	1 ←
06507	(see Note 1 at end of table 028 01800	44016	3	5
07401	(see Note 2		5	3
07402	(at the end		5	3
07403	(of the		5	3 ←
07406	(table		5	3
07407	028 01800	44016	5	5
07411	028 01800	44016	5	5
07501	(see Note 2		5	3
07503	(at the end		5	3 ←
07506	(of the		5	3
07507	(table		5	3
07507	028 01800	44016	5	5
07511	028 01800	44016	5	5

ACCESSORIES

variable transformer	carbon brush		required number of brushes	Fig.
	Elcoma catalogue number	service number		
2422 530 08407	4322 026 16310	5322 362 40054	1	8
10007	028 05710	44027	1	9
10107	028 04980	44025	1	4
10407	028 04980	44025	1	4
11407	026 16310	40054	1	8
11607	026 16310	40054	1	8
13407	026 65540	40079	1	11
14406	026 19300		1	10
15406	026 19300		2	10
	027 75160	40044	2	6
15407	027 75160	40044	2	6
→ 16407	see Note 1, next page		3	1
	028 01800	44016	3	5
18407	026 16310	40054	1	8
90004	027 78660	40038	1	7
90011	027 78660	40038	1	7
90012	027 78660	40038	1	7
90023	027 75750	44012	1	6
	028 01820	44017	1	12
90024	027 75750	44012	1	6
	028 01820	44017	1	12
90027	027 75750	44012	1	6
90028	027 75750	44012	1	6
90029	027 75750	44012	1	6
90031	027 78720	44015	1	8
90032	028 05710	44027	1	9
90033	028 07090	40185	1	9
90034	027 75750	44012	1	6
90035	026 65540	40079	1	11
22307	028 07660	40187	1	8
22407	026 16310	40054	1	8
22411	026 16310	40054	1	8
22507	026 16310	40054	1	8
22511	026 16310	40054	1	8
23307	028 07670	40188	1	11
23407	026 65540	40079	1	11
23411	026 65540	40079	1	11

variable transformer	carbon brush		required number of brushes	Fig.
	Elcoma catalogue number	service number		
2422 530 23507	4322 026 65540	5322 362 40079	1	11
23511	026 65540	40079	1	11

Notes

1. For these transformers a complete brush holder including 3 brushes is available under catalogue number 4322 028 09310.
2. For these transformers a complete brush holder including 5 brushes is available under catalogue number 4322 027 78620.

ANNULAR FIXED TRANSFORMERS

ANNULAR FIXED TRANSFORMERS

- With separate windings

QUICK REFERENCE DATA

input voltage V	frequency Hz	output power VA	output voltage V	catalogue number
240	50/60	15	6	4322 028 06340
225	50/60	15	6	4322 028 06200
120	60	15	6	4322 028 06400

APPLICATION

Due to such excellent properties of these annular fixed transformers as very low stray losses, ability to withstand high temperatures, small size and low mass, they are suitable for various kinds of applications. For example, they are used in halogen spotlights, where they withstand the high temperatures occurring in the lamp units.

DESCRIPTION

Two layers of insulated copper wire, which are separated by means of polyamide paper, are wound on an annular core.

The connecting wires are insulated with glass-fibre-filled silicon sleeves; the primary wires are double insulated.

The transformers comply with the insulation requirements for class II equipment; all insulation materials used apply to temperature class H (180 °C), according to IEC 85.

Other versions can be supplied to special order.

4322 028 06200
4322 028 06340
4322 028 06400

ELECTRICAL DATA

Input voltage

transformer 4322 028 06340
transformer 4322 028 06200
transformer 4322 028 06400

240 V + 10%, 50/60 Hz
225 V + 10%, 50/60 Hz
120 V + 10%, 60 Hz

Output voltage

no load
at output current = 2,5 A, copper temperature = 25 °C
at output current = 2,5 A, copper temperature = 140 °C

$6,7 \pm 0,2$ V
 $6,1 \pm 0,2$ V
 $5,9 \pm 0,2$ V

Output power

15 W

Losses, at output current = 2,5 A, copper temperature = 140 °C

< 3 W

Insulation resistance, after damp heat test,

IEC 68-2, test Ca, 21 days

> 5 M Ω

Test voltage

5000 V, 50 Hz

Leakage path

≥ 6 mm

Ambient temperature range

-10 to + 140 °C

Climatic category, IEC 68

10/140/21

Mass

380 g

Colour of primary connecting wires

transformer 4322 028 06340
transformer 4322 028 06200
transformer 4322 028 06400

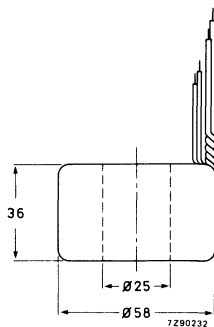
white/white
red/white
red/red

Colour of secondary connecting wires

black

MECHANICAL DATA

Dimensions in mm



Argentina: PHILIPS ARGENTINA S.A., Div. Elcoma, Vedia 3892, 1430 BUENOS AIRES, Tel. 541-7141/7242/7343/7444/7545.

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