

# DATA HANDBOOK

Variable mains transformers  
Annular fixed transformers

B | 0 | 0 | K | P | C | 1 | 0 | 1 | 9 | 8 | 9

Philips Components



**PHILIPS**



# VARIABLE MAINS TRANSFORMERS ANNULAR FIXED TRANSFORMERS

	<i>page</i>
<b>Introduction</b> . . . . .	5
<b>Selection guide</b> . . . . .	9
<b>Auto-transformers</b>	
Operational notes. . . . .	15
Device specifications. . . . .	23
<b>Variable mains transformers with separate windings</b> . . . . .	127
<b>Accessories</b>	
Ganging and motor drive . . . . .	145
AC stabilizer module . . . . .	167
Control knobs . . . . .	173
Carbon brushes . . . . .	175
<b>Annular fixed transformers</b> . . . . .	183





## **INTRODUCTION**



## INTRODUCTION

### Applications

The main applications are:

- electric motor speed control
  - fan speed control in ventilating systems
  - pottery wheel speed control
  - machinery motor speed control
- light dimmer control for buildings and platforms
- galvanizing equipment
  - cathodic protection for ships
  - electrolytic plating installations
- arc and CO<sub>2</sub> welding equipment
- spark erosion and pyrography devices
- medical equipment
- radar
- flash testers
- vibration equipment in shaker conveyors
- battery charging equipment
- electric heating installations
  - high frequency furnaces
  - plastics sealing equipment
- educational power supplies in school laboratories
- voltage stabilizing devices
- television repair shop test and measuring equipment
- computerized process control equipment

### TYPES

These variable transformers have a nominal output current range from 0.5 to 32 A. Most are auto-transformers, although a number of transformers with separate windings are also 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; it also 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 **panel model** or **laboratory model**. The regular 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.

# VARIABLE MAINS TRANSFORMERS

## 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

→ Most transformers meet the safety requirements laid down in SEV1003; the relevant types have SEV approval, which is indicated on the transformer and in the relevant data sheet.

## SELECTION GUIDE



SELECTION GUIDE

The transformers identified in the tables below are listed in order of their nominal input voltages, and then for each voltage group, 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			page
	nom. A	max. A		nom. A	max. A			panel model	bench model	lab. model	
→ 220	3		0-262				E7.1	00008		00007	137
	3		0-262				E7.1			00017	137
	3		0-16				E2.1	00009			129
	3		0-16				E2.1	00013			129
	6		0-30				E5.2	00011			133
	6		0-30				E5.2	00012			133

**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			page
	nom. A	max. A		nom. A	max. A			panel model	bench model	lab. model	
32	7	8	0-32				E1.1	90033			27
42	2.5	3	0-42				E1.1	90032			27
	4	4.8	0-42				E2	90031			33
60	1.2	1.32	0-60				E1	00007			23
	3.15	3.7	0-60				E1.1	10007			27
110	0.6	0.7	0-110				E1	00107			23
	1.4	1.7	0-110				E1.1	10107			27
	10		0-130				E6	90034			73
115	1.2	1.4	0-130	1.32	1.54	0-115	E2	01607			33
	1.4	1.7	0-115				E2	11607			33
127	2.5	3	0-150	2.75	3.25	0-127	E3.1	22307			41
	5	6	0-150	5.5	6.5	0-127	E4	23307			49
	10	12.6	0-150	11	13	0-127	E6.1	04307			79
220	0.5	0.6	0-220				E1.1	10407			27
	0.7	0.83	0-240	0.77	0.91	0-220	E2	01407			33
	0.83	1	0-220				E2	11407			33
	0.83	1	0-220				E2	90037			33
	1	1.25	0-260	1.1	1.3	0-220	E3.1	22407	22411		41
	1.2	1.4	0-260	1.32	1.56	0-220	E3	08407			37
	1.4	1.7	0-220				E3	18407			37

\* 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.

# VARIABLE MAINS TRANSFORMERS

## Selection guide

**Table 2** Auto-transformers (continued)

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			page
	nom. A	max. A		nom. A	max. A			panel model	bench model	lab. model	
220	2	2.4	0-260	2.2	2.6	0-220	E4	03407			49
	2.5	3	0-220				E4	13407			49
	2.5	3	90-220				E4	90022			49
	2.5	3	100-220				E4	90035			49
	2.5	3	0-220				E4	90036			49
	2.5	3	0-260	2.75	3.25	0-220	E4	23407	23411		49
	2.5	3	0-260	2.75	3.25	0-220	E4.1	90038			57
	2.5	3	0-260	2.75	3.25	0-220	E4	90053			49
	2.5	3	0-260	2.75	3.25	0-220	E4.1	90054			57
	4	4.8	90-220				E5	90023			65
	4	4.8	0-220				E5	90024			65
	4.5	5	0-253	5	5.85	0-220	E6	90028			73
	4.5	6	32-220				E6	90029			73
	5	6	0-220				E6	90027			73
	5	6.3	0-260	5.5	6.5	0-220	E6.1	04407	04411	04415	79
	8	11	0-260				E7		25411		93
	8.5	9	0-260				E7.2			25415	101
	8.5	11.2	0-260	9.3	11.5	0-220	E7	05407	05411	05415	93
	10	12	0-220				E7	15407			93
	12	15	0-260	13.2	15.6	0-220	E8	06407			113
12	14.4	0-220				E7.4	90066			109	
15	18	0-220				E8	16407			113	
18	21.5	0-220				E8.1	90067			117	
23	30	0-260	25.3	30	0-220	E10	07407	07411		121	
240	0.5	0.55	120-0 120-240				E1	00407			23
	0.5	0.55	120-0 120-240				E1	90004			23
	0.5	0.55	0-120 240-120				E1	90011			23
	1	1.25	0-270	1	1.25	0-240	E3.1	22507	22511		41
	1.7	2	0-240				E3.2	90055			45
	2	2.4	0-260	2	2.4	0-240	E4	03507			49
	2.5	3	0-270	2.5	3.2	0-240	E4	23507			49
	2.5	3	0-270	2.5	3.2	0-240	E4.1		23511		57
	2.9	3.4	0-240				E4.2	90056			61
	3.5	4.2	0-240				E5.2	90057			69
	4.5	5	0-276	4.5	5	0-240	E6	90028			73
	4.5	5	0-262	4.5	5	0-240	E6	90052			73
	4.5	5.4	0-240				E5.2	90058			69
	5	6.3	0-270	5	6.3	0-240	E6.1	04507	04511		79
	6.3	7.5	0-240				E6.2	90059			85
	7	8.4	0-240				E6.3	90061			89
	8.5	11.2	0-270	8.5	11.2	0-240	E7	05507	05511		93
	11	13.2	0-240				E7.3	90062			105
	12	15	0-260	12	15	0-240	E8	06507			113
	15	18	0-240				E7.4	90063			109
20	24	0-240				E10	90064			121	
23	30	0-260	23	30	0-240	E10	07507	07511		121	
26	31.3	0-240				E10	90065			121	
32	36	0-240				E10	17507			121	
380	4	4.8	0-380				E7	90069			93
	6	7.2	0-380				E8	90071			113
	8	9.6	0-380				E8.1	90072			117
	12	14.4	0-380				E10	90073			121

\* See note on preceding page.



CONVERSION LIST

Conversion of catalogue number to transformer size code.

catalogue number	transformer size code	page	catalogue number	transformer size code	page
2422 529 00007	E7.1	137	2422 530 13407	E4	49
00008	E7.1	137	15407	E7	93
00009	E2.1	129	16407	E8	113
00011	E5.2	133	17507	E10	121
			18407	E3	37
00012	E5.2	133			
00013	E2.1	129	22307	E3.1	41
00017	E7.1	137	22407	E3.1	41
			22411	E3.1	41
2422 530 00007	E1	23	22507	E3.1	41
00107	E1	23	22511	E3.1	41
00407	E1	23			
01407	E2	33	23307	E4	49
01607	E2	33	23407	E4	49
			23411	E4	49
03407	E4	49	23507	E4	49
03507	E4	49	23511	E4.1	57
04307	E6.1	79			
04407	E6.1	79	25411	E7	93
04411	E6.1	79	25415	E7.2	101
			90004	E1	23
04415	E6.1	79	90011	E1	23
04507	E6.1	79	90022	E4	49
04511	E6.1	79			
05407	E7	93	90023	E5	65
05411	E7	93	90024	E5	65
			90027	E6	73
05415	E7	93	90028	E6	73
05507	E7	93	90029	E6	73
05511	E7	93			
06407	E8	113	90031	E2	33
06507	E8	113	90032	E1.1	27
			90033	E1.1	27
07407	E10	121	90034	E6	73
07411	E10	121	90035	E4	49
07507	E10	121			
07511	E10	121	90036	E4	49
08407	E3	37	90037	E2	33
10007	E1.1	27			
10107	E1.1	27			
10407	E1.1	27			
11407	E2	33			
11607	E2	33			

CONVERSION LIST (continued)

catalogue number	transformer size code	page
2422 530 90038	E4.1	57
90052	E6	73
90053	E4	49
90054	E4	49
90055	E3.2	45
90056	E4.2	61
90057	E5.2	69
90058	E5.2	69
90059	E6.2	85
90061	E6.3	89
90062	E7.3	105
90063	E7.4	109
90064	E10	121
90065	E10	121
90066	E7.4	109
90067	E8.1	117
90069	E7	93
90071	E8	113
90072	E8.1	117
90073	E10	121

## **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 windings. In 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 ( $\Delta T$ ) of the brush track contact may not exceed 70 K or 90 K (see the relevant data sheet).

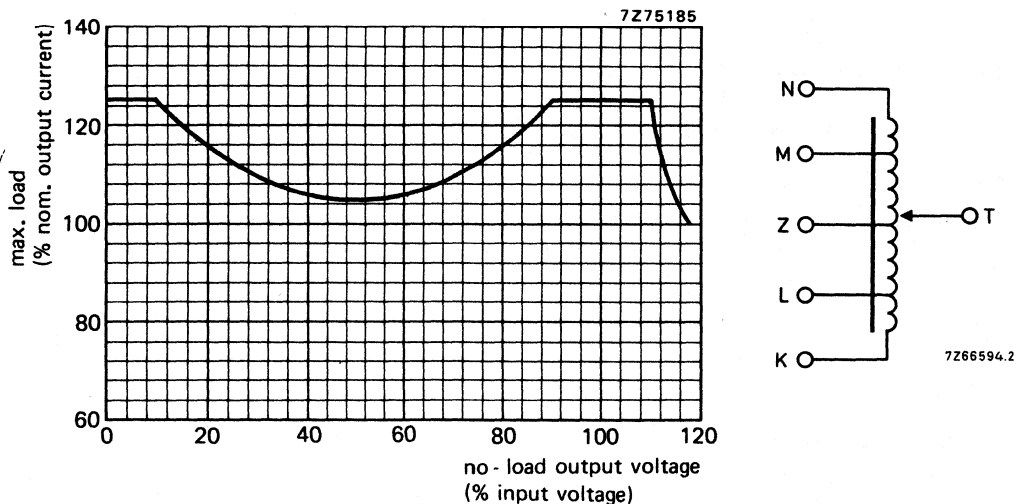


Fig. 1 Maximum load as a function of the output voltage; input voltage M to K or L to N.

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

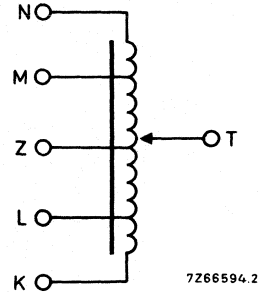
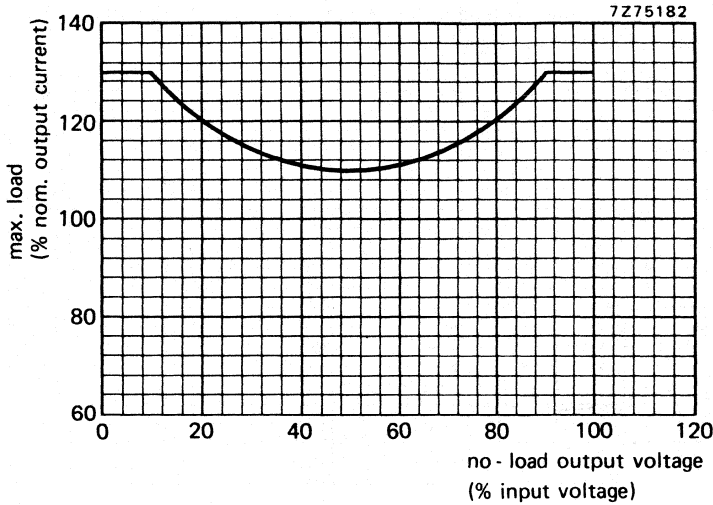


Fig. 2 Maximum load as a function of the output voltage; input voltage N to K.

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

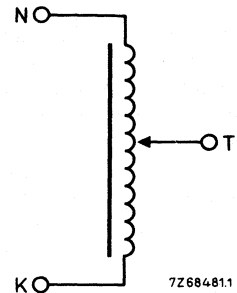
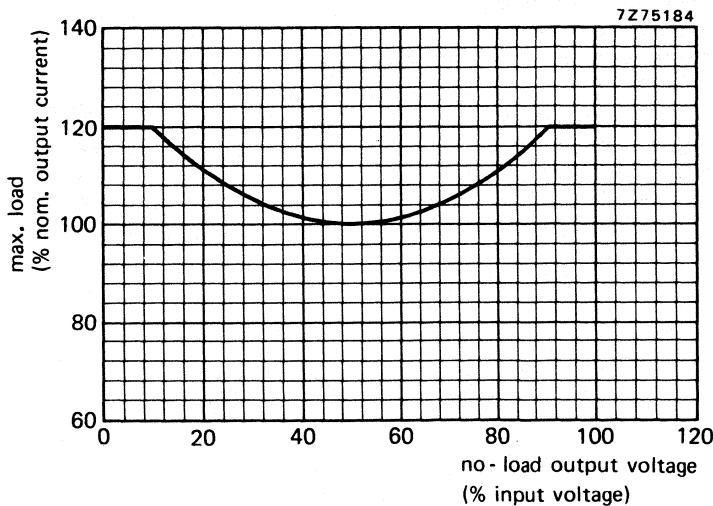


Fig. 3 Maximum load as a function of the output voltage; input voltage N to K.

**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.

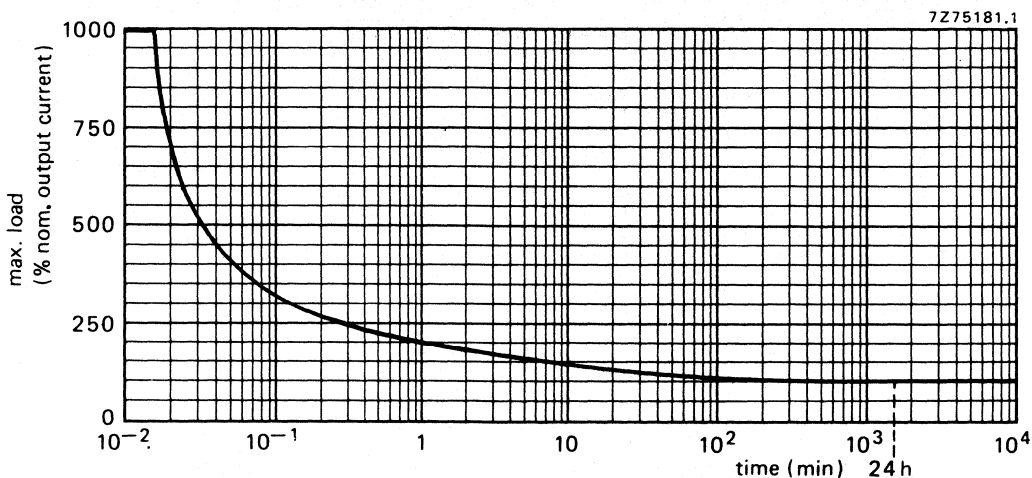


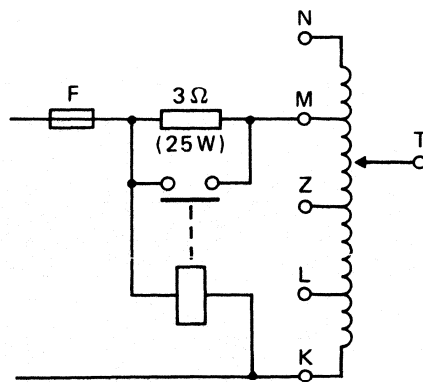
Fig. 4 Maximum non-repetitive overload as a function of time.

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).

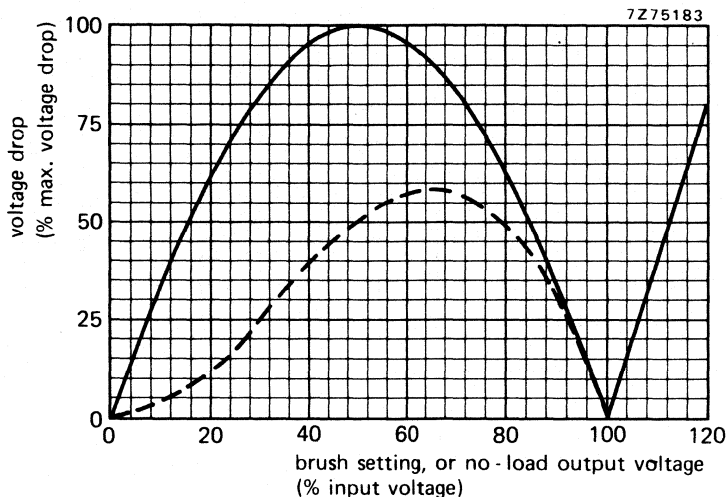


Fig. 6 Voltage drop as a function of brush setting.

### 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.

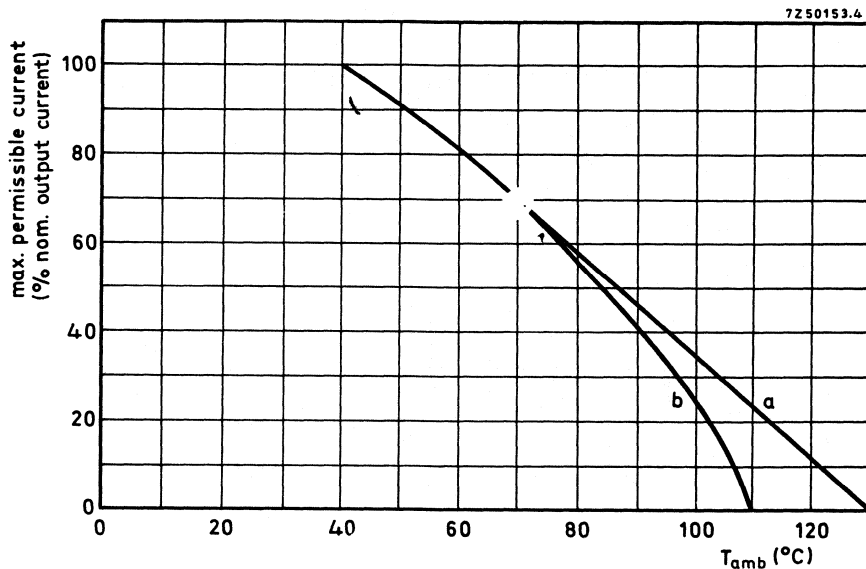


Fig. 7 Maximum permissible output current as a function of temperature.  
 Curve a applies to transformers for which the maximum permissible temperature rise at any point is 90 K.  
 Curve b applies to transformers for which the maximum permissible temperature rise at any point is 70 K.



**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  $\geq 4$  mm.

**Creepage path**

The creepage path between live and non-live parts is  $\geq 5$  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 <sup>2</sup> (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
- AC 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

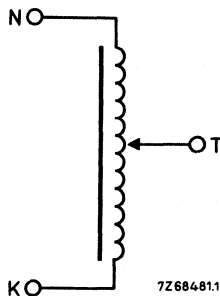


Fig. 1 Circuit diagram of transformers  
2422 530 00007 and 2422 530 00107.

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 <sup>^</sup>	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.

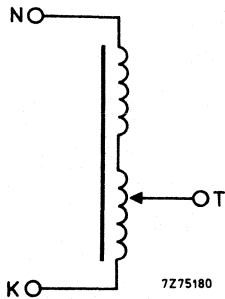


Fig. 2 Circuit diagram of transformer 2422 530 00407.

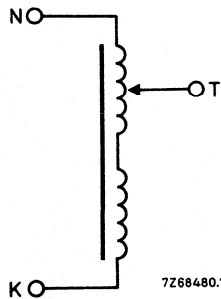


Fig. 3 Circuit diagram of transformer 2422 530 90011.

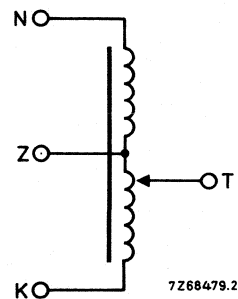


Fig. 4 Circuit diagram of transformer 2422 530 90004.

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

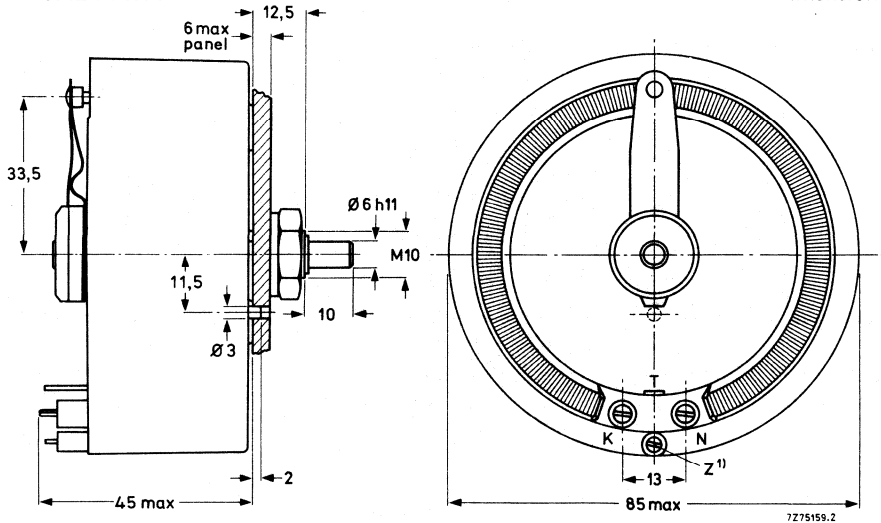


Fig. 5.

<sup>1)</sup>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.

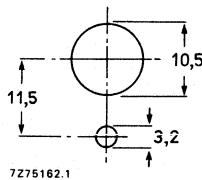


Fig. 6.

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

Transformer 90033 has a metal spindle which protrudes at both sides; its side-to-side position is adjustable. The other transformers have spindles of glass-fibre-filled plastic material. No maintenance is required for either type under normal conditions.

Screw terminals are provided for connecting the leads.

\* Approved by SEV.

# TRANSFORMERS SIZE CODE E1.1

## ELECTRICAL DATA

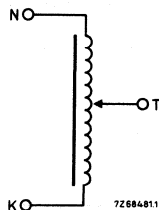


Fig. 1 Circuit diagram.

catalogue number	2422 530 . . . . .		
	10407	10107	90032
Input voltage N to K (note 1)	220 V + 10%	110 V + 10%	42 V + 10%
Output voltage, no load, T to K (note 2)	0 (+3) to 220 (-3) V	0 (+3) to 110 (-3) V	0 (+1) to 42 (-1) V
Voltage drop at nominal output current (note 3)	≤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 (note 4)	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 (note 5)	max. 70 K		

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side.
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See "Operational notes" paragraph "Derating for higher ambient temperatures".

catalogue number	2422 530 . . . . .	
	10007	90033
Input voltage N to K (note 1)	60 V + 10%	32 V + 10%
Output voltage, no load, T to K (note 2)	0 (+2) to 60 (-2) V	0 (+1) to 32 (-1) V
Voltage drop at nominal output current (note 3)	2,5 V	3 V
Nominal output current over the whole control range	3,15 A	7 A
Maximum output current (note 4)	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 (note 5)	max. 70 K	max. 90 K

Notes: see preceding page.

MECHANICAL DATA

Dimensions in mm

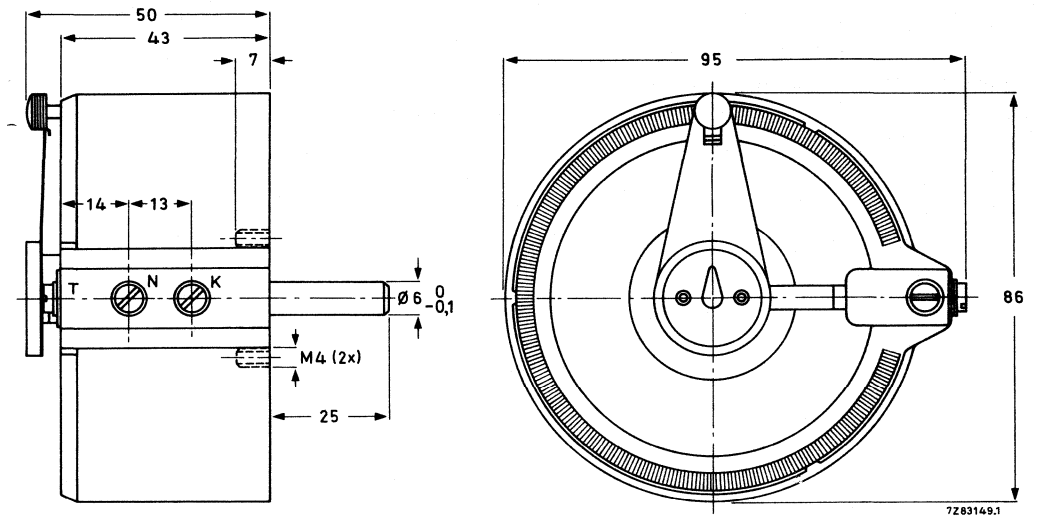


Fig.2 Transformers 2422 530 10007, 2422 530 10107, 2422 530 10407 and 2422 530 90032.

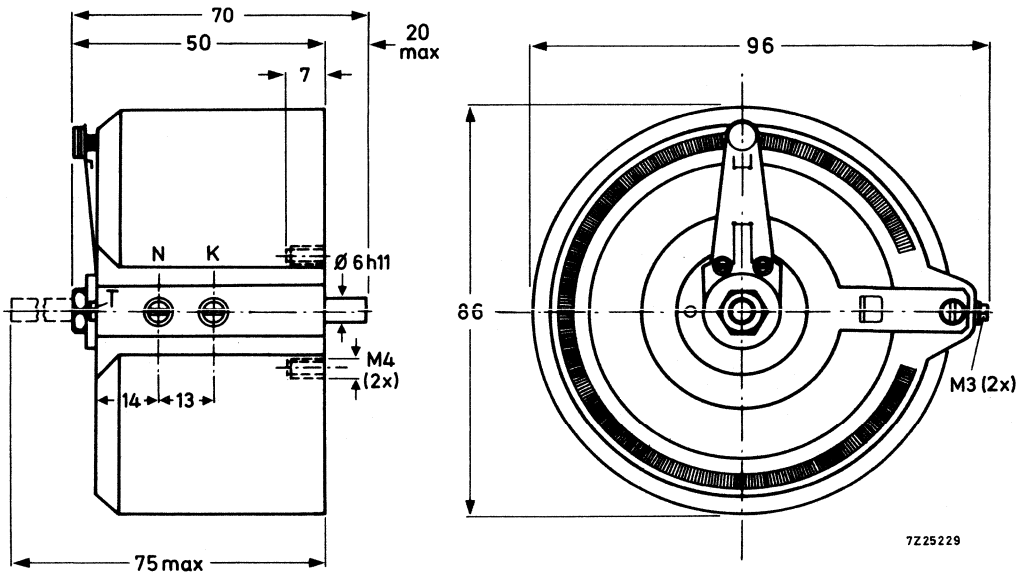


Fig.3 Transformer 2422 530 90033.

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

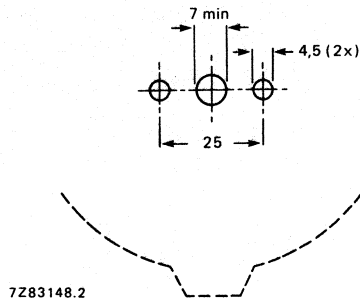


Fig.4 Mounting hole pattern.

### 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 027 78720 (service number 5322 362 44015) 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

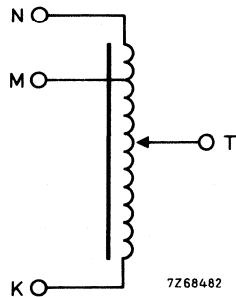


Fig. 1 Circuit diagram of transformers  
2422 530 01407 and 2422 530 01607.

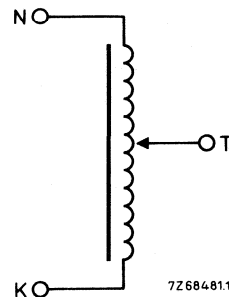


Fig. 2 Circuit diagram of transformers  
2422 530 11407, 2422 530 11607,  
2422 530 90031 and 2422 530 90037.

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 <sup>^</sup>	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 <sup>^^</sup>	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".

<sup>^</sup> See also data in the 5th, 6th and 7th column of the table on pages 4 and 5.

<sup>^^</sup> 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 ( $\pm 2$ ) V	0 (+2) to 115 ( $-2$ ) V
Voltage drop at nominal output current*	$\leq 7$ V	$\leq 6$ V
Nominal output current over the whole control range	1,2 A	1,4 A
Maximum output current**	1,4 A <sup>^</sup>	1,7 A
Voltage per turn of winding	0,211 V	0,186 V
Losses, no load	$\leq 4$ W	$\leq 4$ W
Permissible temperature rise at any point <sup>^^</sup>	max. 70 °C	

Notes: see preceding page.

## MECHANICAL DATA

Dimensions in mm

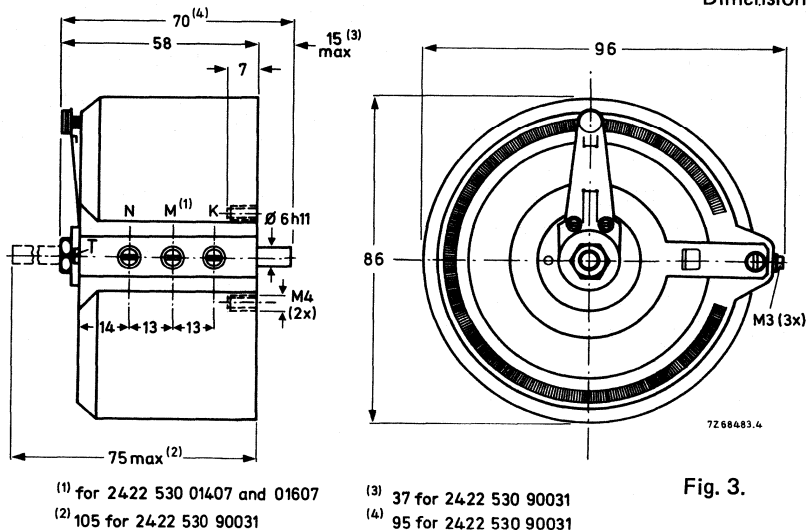


Fig. 3.

Degree of protection (IEC 144)

Mass

Operating torque

Permissible end stop torque

IP00

1250 g

0,05 to 0,1 Nm

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.

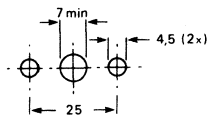


Fig. 4.

### 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.

# TRANSFORMERS SIZE CODE E3

## ELECTRICAL DATA

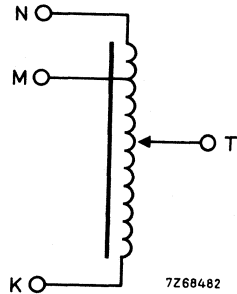


Fig. 1 Circuit diagram of transformer  
2422 530 08407.

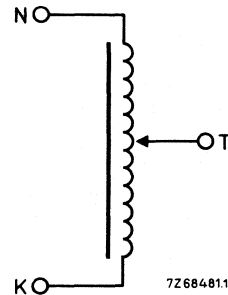


Fig. 2 Circuit diagram of transformer  
2422 530 18407.

catalogue number	2422 530 . . . . .	
	08407	18407
Input voltage M to K*	220 V + 10%	
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 <sup>▲</sup>	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 <sup>▲▲</sup>	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

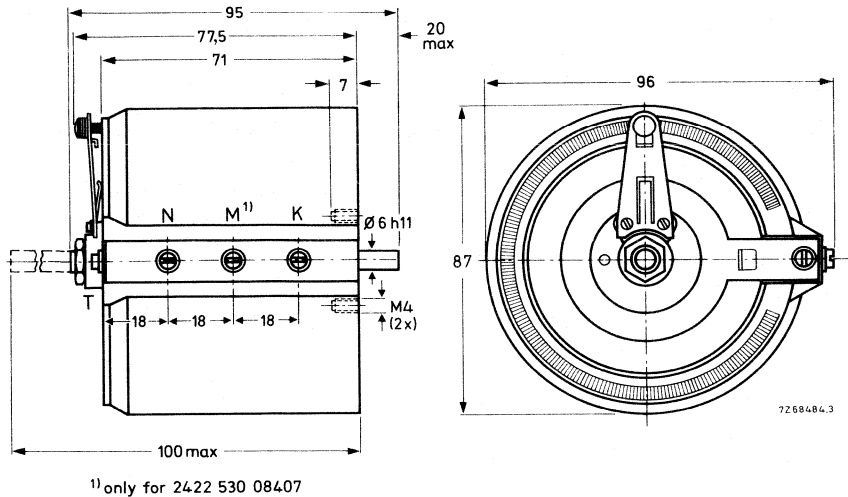


Fig. 3.

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.

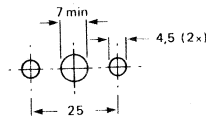


Fig. 4.

**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	<b>1</b>	0 to 260	<b>22407*</b>	<b>22411*</b>
240/270	<b>1</b>	0 to 270	<b>22507*</b>	<b>22511</b>
127/150	<b>2,5</b>	0 to 150	<b>22307*</b>	

### 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

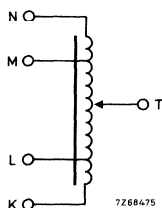


Fig. 1 Circuit diagram of panel model transformers 2422 530 22407, 2422 530 22507 and 2422 530 22307; KL = NM.

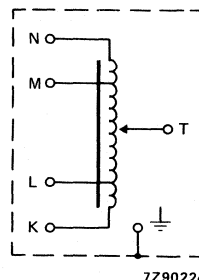


Fig. 2 Circuit diagram of bench model transformers 2422 530 22411 and 2422 530 22511; KL = NM.

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

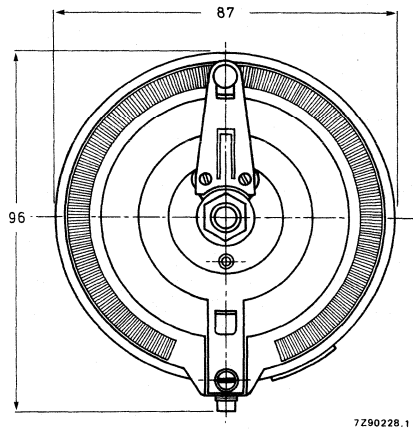
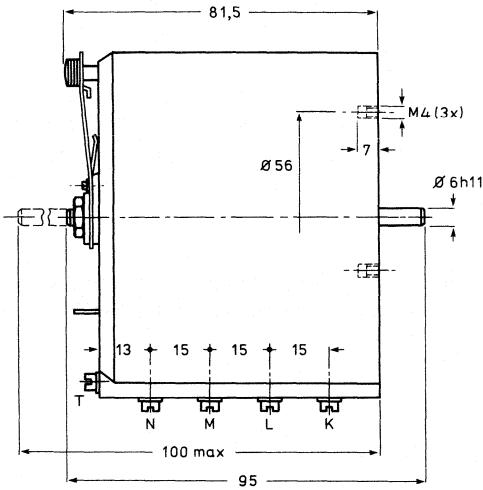
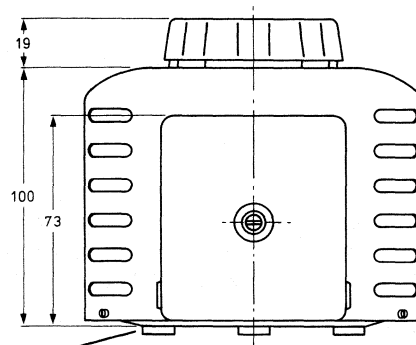


Fig. 3 Panel model transformer.



The pads protrude approximately 3 mm.

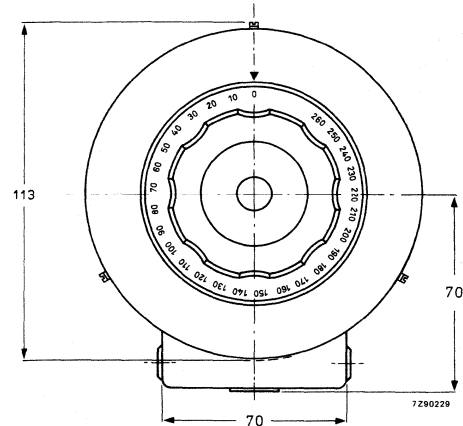


Fig. 4 Bench model transformer.

# 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.

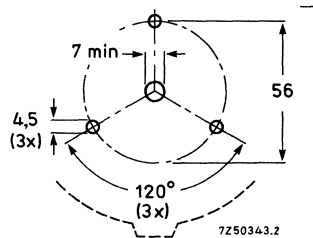


Fig. 5.

## 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 TRANSFORMER

- Moulded type; size code E3.2
- To be read in conjunction with Operational Notes

### QUICK REFERENCE DATA

input voltage V	output voltage A	output voltage V	catalogue number
240	1,7	0 to 240	2422 530 90055

### APPLICATION

This panel model transformer has been designed for industrial use e.g. cinemas studios, power plants, etc.

### DESCRIPTION

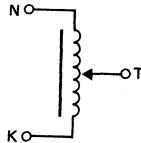
The transformer is moulded in reinforced polyester resin. The construction is rugged and professional. The transformer does not require maintenance normal conditions.

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.

# TRANSFORMERS SIZE CODE E3.2

## ELECTRICAL DATA



7268481.1

Fig. 1 Circuit diagram.

catalogue number	2422 530 90055
Input voltage N to K (note 1)	240 V + 10%
Output voltage, no load, T to K (note 2)	0 (+3) to 240 (-3) V
Voltage drop at nominal output current (note 3)	≤ 17 V
Nominal output current over the whole control range	1,7 A
Maximum output current (note 4)	2 A (note 5)
Voltage per turn of winding	0,39 V
Losses, no load	≤ 6,5 W
Permissible temperature rise at any point (note 6)	max. 90 K

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

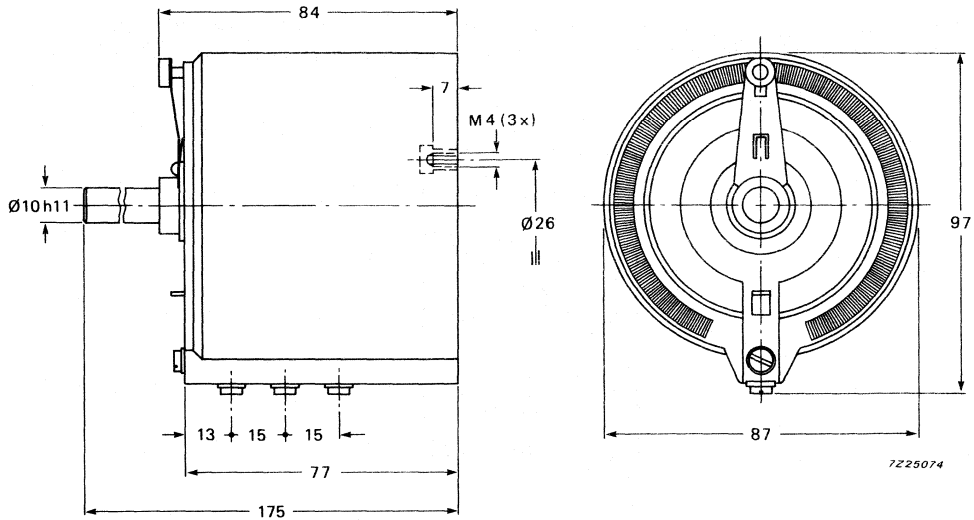


Fig. 2 Transformer 2422 530 90055.

Degree of protection (IEC 144)

IP00

Mass

approx. 1,9 kg

Operating torque

0,05 to 0,15 Nm

Permissible end stop torque

max. 1 Nm

## TRANSFORMERS SIZE CODE E3.2

### Mounting

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

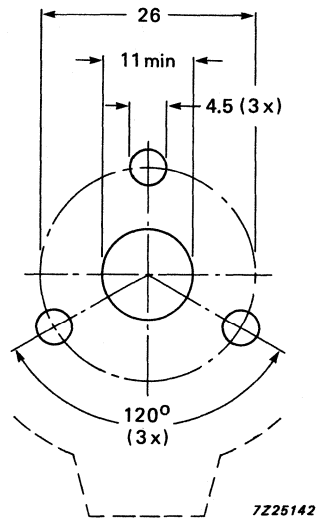


Fig. 3 Mounting hole pattern.

### Carbon brushes

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

### ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- motor drive module.

See section "Accessories"; use size code E3.2 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	2,5	100 to 220	90035	
220	2,5	0 to 260	90053	
220	2,5	0 to 260	90054	
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

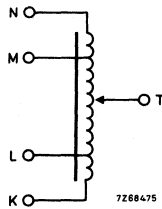


Fig. 1 Circuit diagram of panel model transformers  
2422 530 03407, 2422 530 03507,  
2422 530 23407, 2422 530 23507  
and 2422 530 23307; KL = NM.

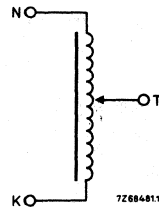


Fig. 2 Circuit diagram of panel model transformers  
2422 530 13407 and  
2422 530 90035.

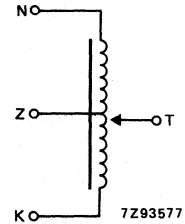


Fig. 3 Circuit diagram of panel model transformer  
2422 530 90036;  
Z = centre tap.

catalogue number panel model	2422 530 . . . . .			
	03407	03507	13407 90036	90022
Input voltage M to K (note 1)	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 (note 2)	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 (note 3)	≤ 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 (note 4)	2,4 A (note 5)	2,4 A (note 5)	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 (note 6)	max. 70 K			

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 of the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".



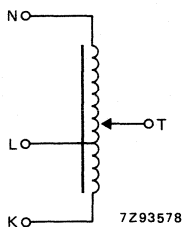


Fig. 4 Circuit diagram of panel model transformer 2422 530 90022.

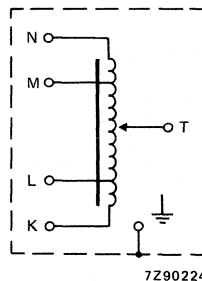


Fig. 5 Circuit diagram of bench model transformer 2422 530 23411; KL = NM.

catalogue number	2422 530 . . . . .			
	23407	23507	23307	90035
panel model				
bench model	23411			
Input voltage M to K (note 1)	220 V + 10%	240 V + 6%	127 V + 10%	
Input voltage N to K	260 V + 10%	270 V + 6%	150 V + 10%	220 V + 10%
Output voltage, no load, T to K (note 2)	0 (+3) to 260 (±3) V	0 (+3) to 270 (±3) V	0 (+2) to 150 (±2) V	100 (±3) to 220 (-3) V
Voltage drop at nominal output current (note 3)	≤ 8 V	≤ 8,5 V	≤ 3,5 V	≤ 7 V
Nominal output current over the whole control range	2,5 A	2,5 A	5 A	2,5 A
Maximum output current (note 4)	3 A (note 5)	3 A (note 5)	6 A (note 5)	3 A
Voltage per turn of winding	0,488 V	0,504 V	0,485 V	0,478 V
Losses, no load	≤ 8 W	≤ 9 W	≤ 6 W	≤ 8 W
Permissible temperature rise at any point (note 6)	max. 90 K	max. 90 K	max. 90 K	max. 70 K

**Notes to Electrical Data**

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 of the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

# TRANSFORMERS SIZE CODE E4

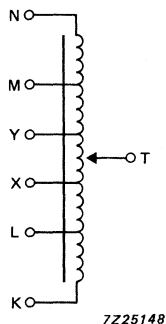


Fig. 6 Circuit diagram of panel model transformer 2422 530 90053.

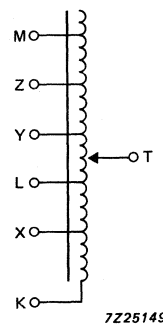


Fig. 7 Circuit diagram of panel model transformer 2422 530 90054.

catalogue number panel model	2422 530 . . . . .	
	90053	90054
Input voltage M to K (note 1)	220 V + 10%	220 V + 10%
Input voltage N to K	260 V + 10%	
Output voltage, no load, T to N (note 2)	0 (+3) to 260 (±3) V	0 (+3) to 260 (±3) V
Output voltage, no load, L to K	40 (±3) V	40 (±3) V
X to K	48 (±3) V	20 (±3) V
Y to K	110 (±3) V	110 (±3) V
Z to K		130 (±3) V
N to K	260 (±3) V	
Voltage drop at nominal output current (note 3)	≤ 7 V	≤ 7 V
Nominal output current over the whole control range	2,5 A	2,5 A
Maximum output current (note 4)	3 A (note 5)	3 A (note 5)
Voltage per turn of winding	0,488 V	0,602 V
Losses, no load	8 W	8 W
Permissible temperature rise at any point (note 6)	max. 90 K	max. 70 K

## Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

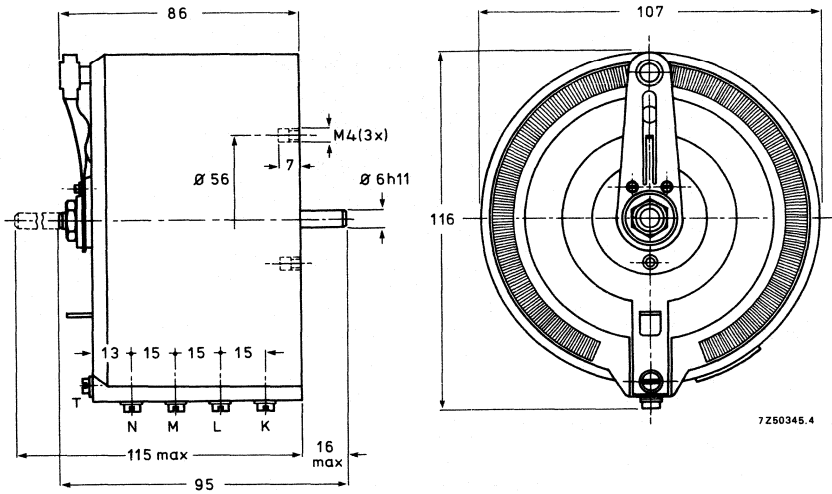
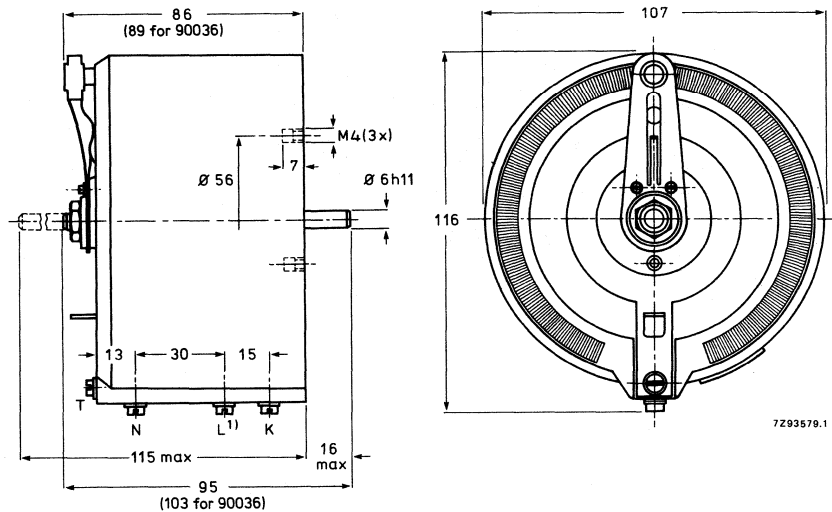


Fig. 8 Panel model transformers 2422 530 03407, 2422 530 03507, 2422 530 23407, 2422 530 23507 and 2422 530 23307.



1) Not for transformers 2422 530 13407 or 2422 530 90035; for transformer 2422 530 90036 this terminal is marked Z.

Fig. 9 Panel model transformers 2422 530 13407, 2422 530 90022, 2422 530 90035 and 90036.

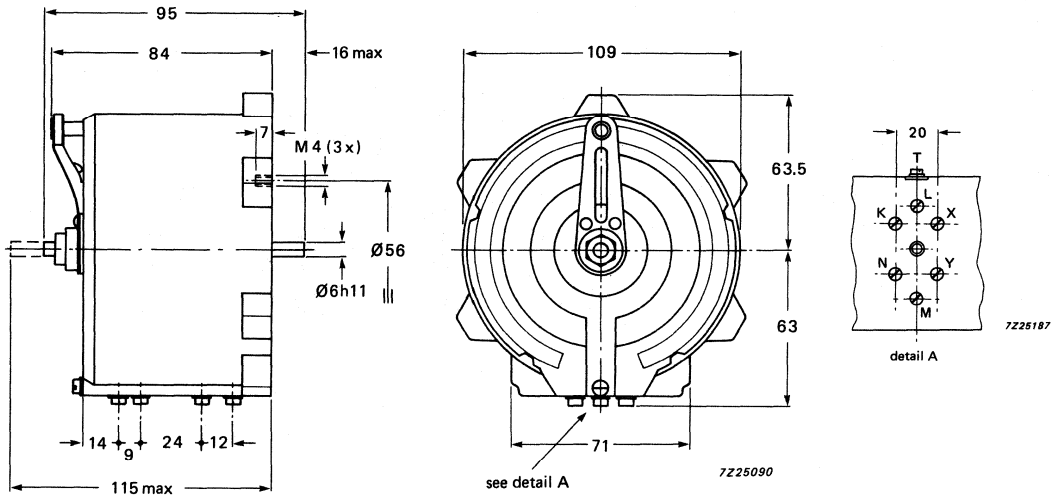


Fig. 10 Panel model transformer 2422 530 90053.

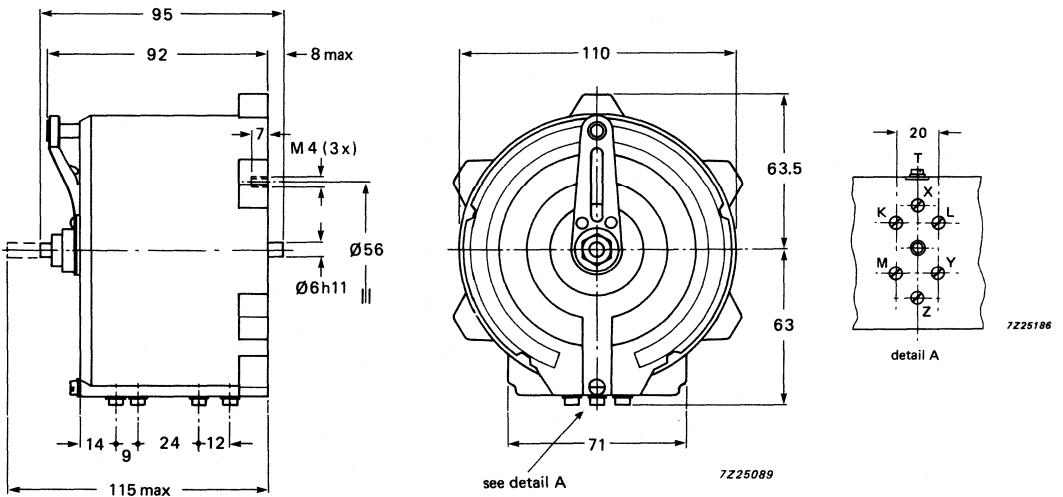
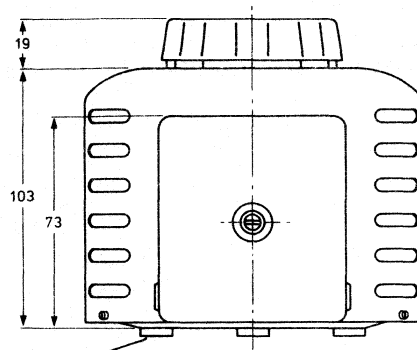


Fig. 11 Panel model transformer 2422 530 90054.



The pads protrude approximately 3 mm.

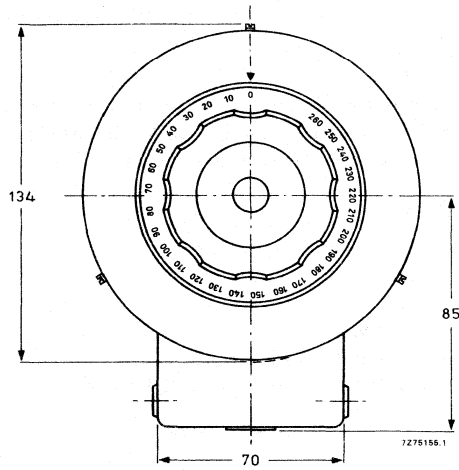


Fig. 12 Bench model transformer.

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

# TRANSFORMERS SIZE CODE E4

## 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. 13.

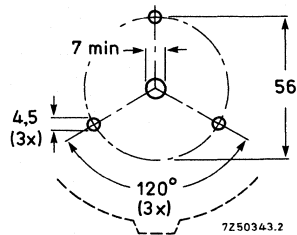


Fig. 13 Mounting hole pattern.

## 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.
- AC stabilizer module - 220 V only.

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

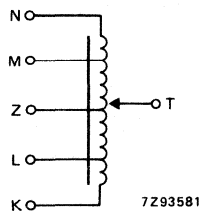


Fig. 1 Circuit diagram of panel model transformer  
2422 530 90038; KL = NM,  
Z = centre tap.

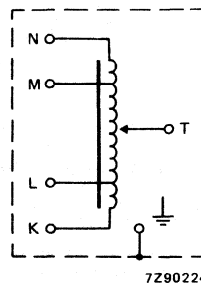


Fig. 2 Circuit diagram of bench model transformer  
2422 530 23511; KL = NM.

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

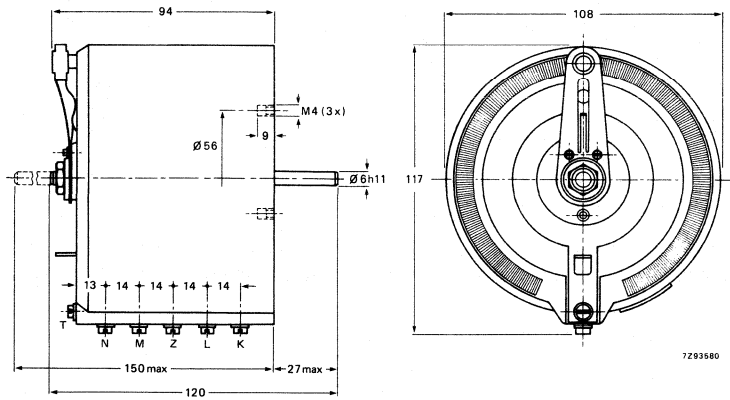


Fig. 3 Panel model transformer.

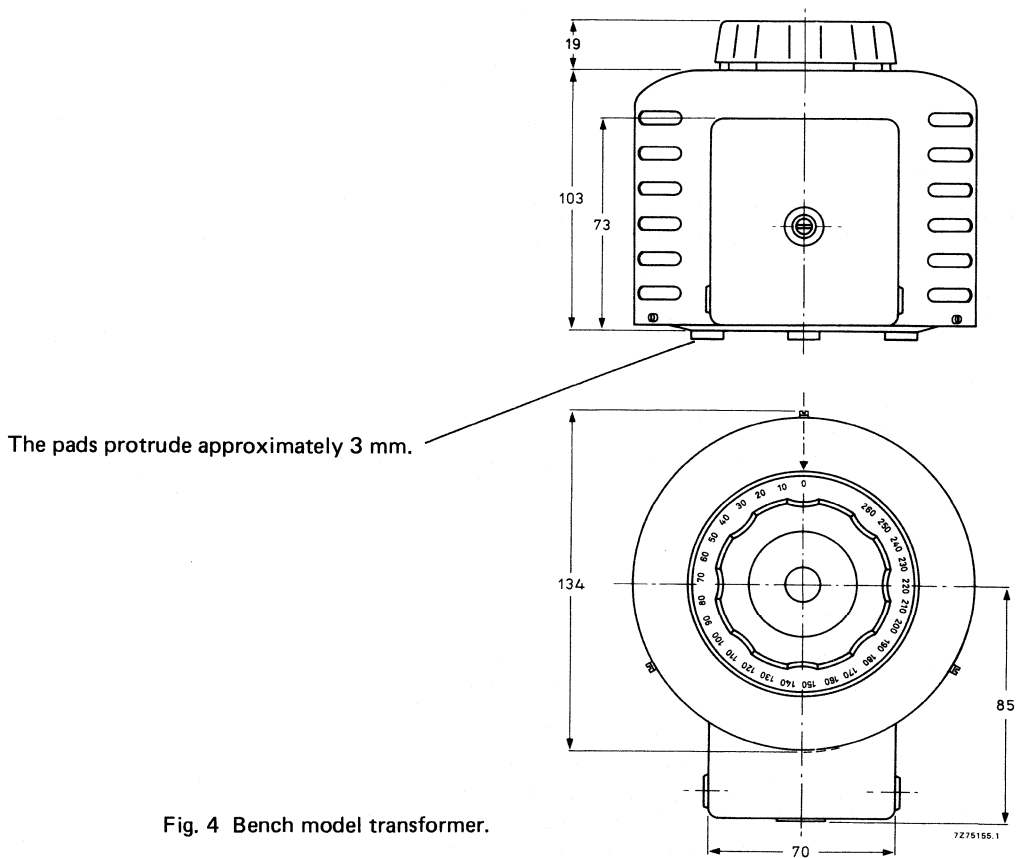


Fig. 4 Bench model transformer.

# 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.

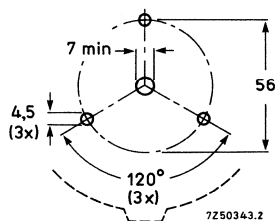


Fig. 5.

## 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 TRANSFORMER

- Moulded types; size code E4.2
- To be read in conjunction with Operational Notes

### QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number
240	2,9	0 to 240	2422 530 90056

### APPLICATION

This panel model transformer has been designed for industrial use e.g. cinemas, studios, power plants, etc.

### DESCRIPTION

The transformer is partly moulded in reinforced polyester resin. The construction is rugged and professional. The transformer does not require maintenance under normal conditions.

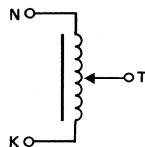
The spindle protrudes at both sides; its side-to-side position is adjustable.

The spindle can be easily replaced by one of another length.

Screw terminals are provided for connecting the leads.

# TRANSFORMERS SIZE CODE E4.2

## ELECTRICAL DATA



7268481.1

Fig. 1 Circuit diagram.

catalogue number	2422 530 90056
Input voltage N to K (note 1)	240 V + 10%
Output voltage, no load, T to K (note 2)	0 (+3) to 240 (-3) V
Voltage drop at nominal output current (note 3)	≤ 8,5 V
Nominal output current over the whole control range	2,9 A
Maximum output current (note 4)	3,4 A (note 5)
Voltage per turn of winding	0,522 V
Losses, no load	≤ 10 W
Permissible temperature rise at any point (note 6)	max. 90 K

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

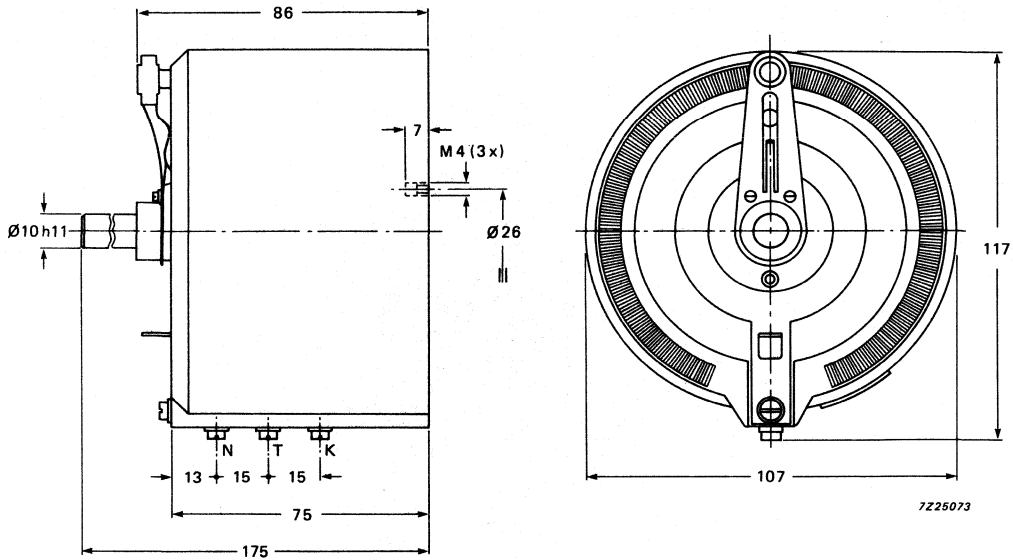


Fig. 2 Transformer 2422 530 90056.

Degree of protection (IEC 144)

Mass

Operating torque

Permissible end stop torque

IP00

approx. 3,1 kg

0,05 to 0,2 Nm

max. 1 Nm

# TRANSFORMERS SIZE CODE E4.2

## Mounting

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

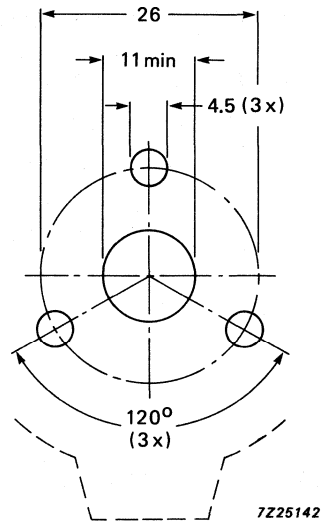


Fig. 3 Mounting hole pattern.

## 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.

See section "Accessories"; use size code E4.2 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.

# TRANSFORMERS SIZE CODE E5

## ELECTRICAL DATA

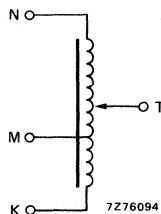


Fig. 1 Circuit diagram.

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

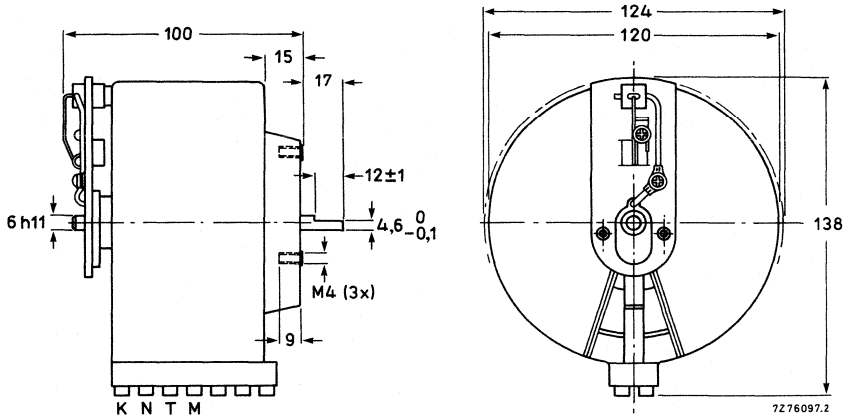


Fig. 2.

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

approx. 160°

2422 530 90023

approx. 320°

2422 530 90024

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.

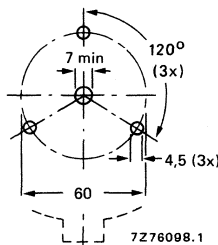


Fig. 3.

Carbon brushes

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



**VARIABLE MAINS TRANSFORMER**

- Moulded types; size code E5.2
- 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	3,5	0 to 240	90057
240	4,5	0 to 240	90058

**APPLICATION**

These panel 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.

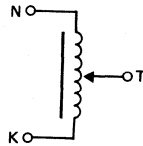
The spindle protrudes at both sides; its side-to-side position is adjustable.

The spindle can be easily replaced by one of another length.

Screw terminals are provided for connecting the leads.

# TRANSFORMERS SIZE CODE E5.2

## ELECTRICAL DATA



7268481.1

Fig. 1 Circuit diagram.

Catalogue number	2422 530 . . . . .	
	90057	90058
Input voltage N to K (note 1)	240 V + 6%	240 V + 6%
Output voltage, no load, T to K (note 2)	0 (+3) to 240 (-3) V	0 (+3) to 240 (-3) V
Voltage drop at nominal output current (note 3)	≤ 4 V	≤ 5 V
Nominal output current over the whole control range	3,5 A	4,5 A
Maximum output current (note 4)	4,2 A (note 5)	5,4 A (note 5)
Voltage per turn of winding	0,67 V	0,67 V
Losses, no load	≤ 10 W	≤ 10 W
Permissible temperature rise at any point (note 6)	max. 70 K	max. 90 K

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

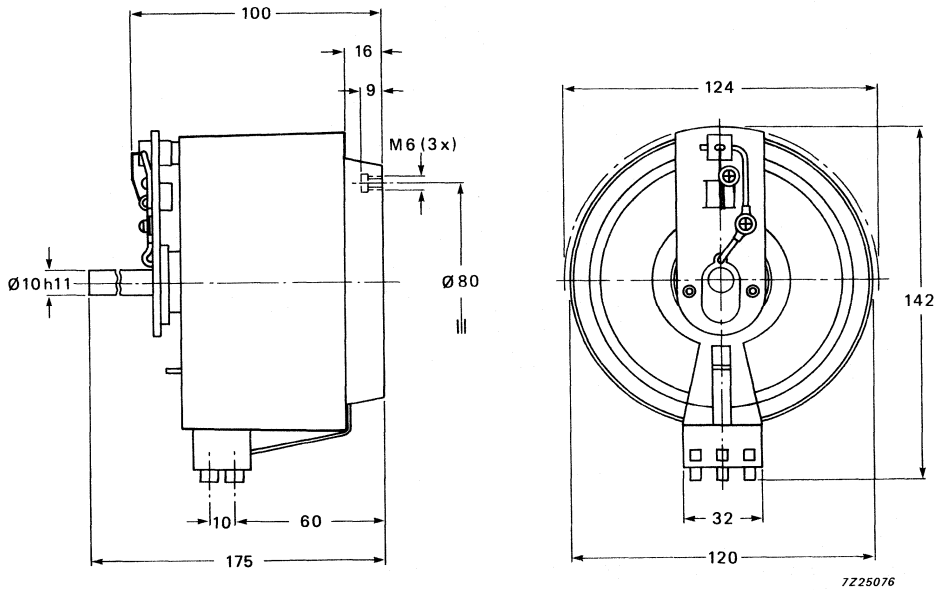


Fig. 2 Transformers 2422 530 90057/90058.

Degree of protection (IEC 144)

IP00

Mass

approx. 4,3 kg

Operating torque

0,05 to 0,2 Nm

Permissible end stop torque

max. 1 Nm

# TRANSFORMERS SIZE CODE E5.2

## Mounting

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

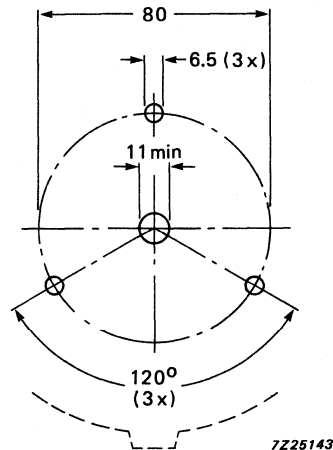


Fig. 3 Mounting hole pattern.

## Carbon brushes

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

## ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- motor drive module.

See section "Accessories"; use size code E5.2 when selecting.  
Further information on request.

**VARIABLE MAINS TRANSFORMER**

- 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	4,5	32 to 220	90029
240	4,5	0 to 262	90052
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 with the impregnated winding unprotected. The mounting hole pattern is such that 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

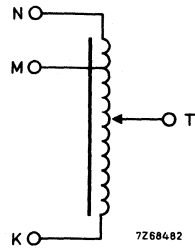


Fig. 1 Circuit diagram of transformer 2422 530 90028.

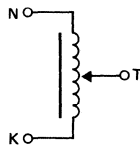


Fig. 2 Circuit diagram of transformers 2422 530 90027 and 2422 530 90029.

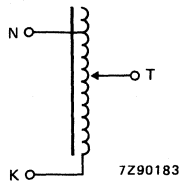


Fig. 3 Circuit diagram of transformer 2422 530 90034.

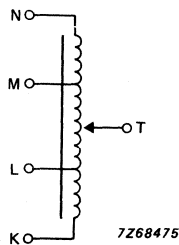


Fig. 4 Circuit diagram of transformer 2422 530 90052.



catalogue number	2422 530 . . . . .		2422 530 . . . . .	
	90028	90027 90029	90034	90052
Input voltage M to K (note 1)	220 V + 15%			240 V
Output voltage, no load, T to K (note 2)	0 (+3) to 253 (±3) V			
Input voltage M to K	240 V + 6%			240 V + 10%
Output voltage, no load, T to K (note 2)	0 (+3,3) to 276 (±3,3) V			0 (+3) to 262 (-3) V
Input voltage N to K	276 V + 6%	220 V + 10%	110 V + 10%	262 V + 10%
Output voltage, no load, T to K (note 2)	0 (+3,3) to 276 (-3,3) V	*0 (+3) to 220 (-3) V	0 (+2) to 130 (±2) V	0 (+3) to 262 (-3) V
Voltage drop at nominal output current (note 3)	≤6 V	≤6 V	≤2,5 V	≤6 V
Nominal output current over the whole control range	4,5 A	**5 A	10 A	4,5 A
Maximum output current (note 4)	5 A (note 5)	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	0,558 V
Losses, no load	≤4 W		≤5 W	≤8 W
Permissible temperature rise at any point (note 6)	max. 70 K		max. 90 K	max. 70 K

**Notes to Electrical Data**

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

\* 32 (± 3) to 220 (-3) V for 2422 530 90029.

\*\* 4,5 A for 2422 530 90029.

# TRANSFORMERS SIZE CODE E6

## MECHANICAL DATA

Dimensions in mm

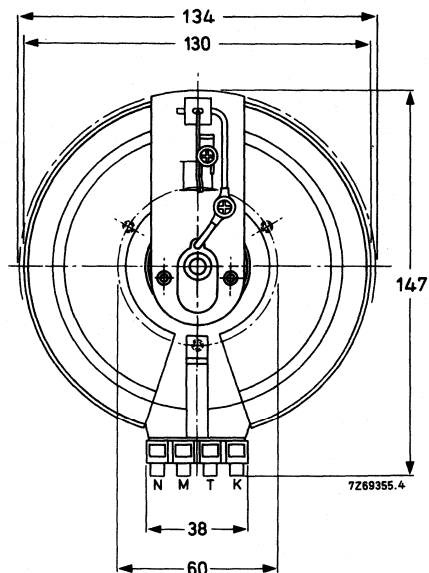
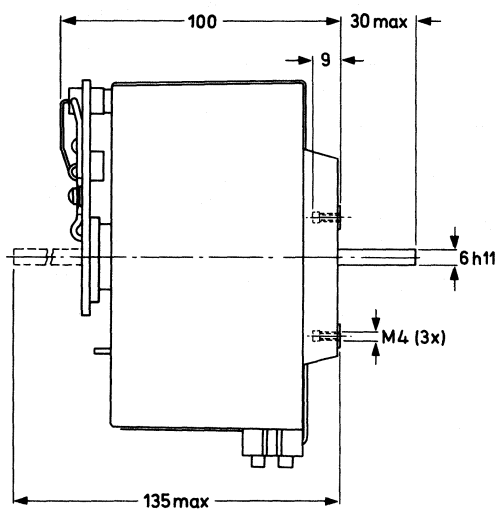


Fig. 5 Transformers 2422 530 90027 and 2422 530 90028.

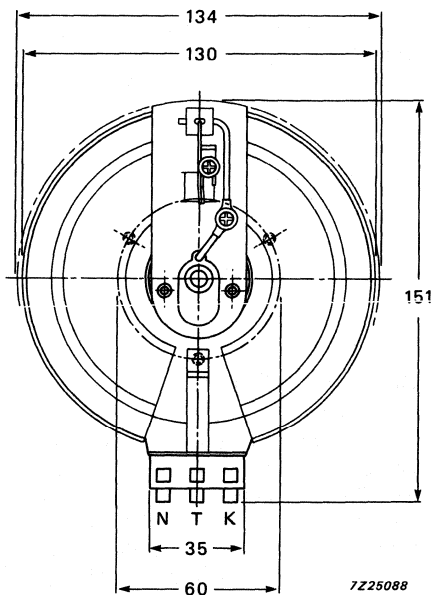
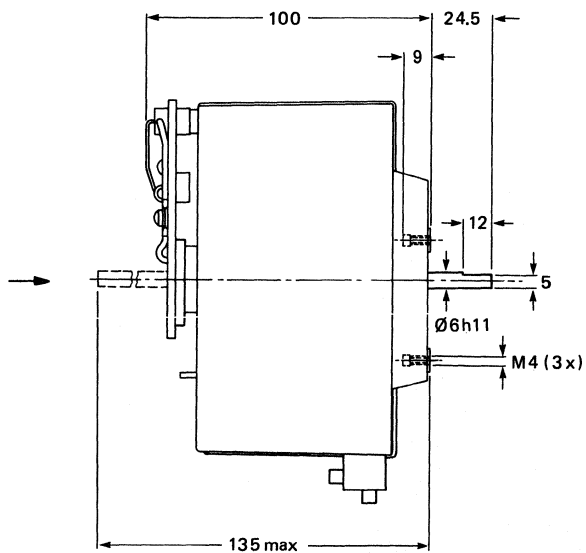


Fig. 6 Transformer 2422 530 90029.

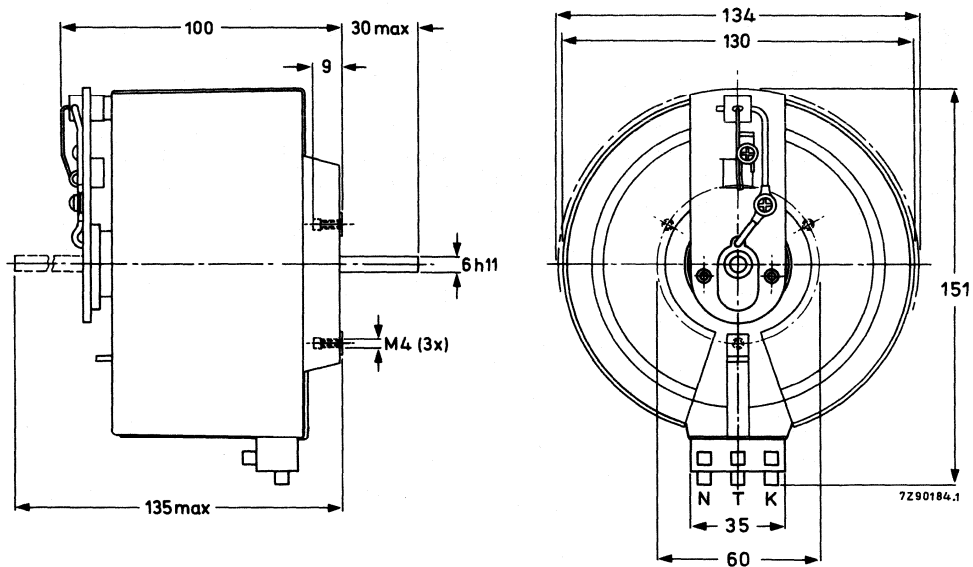


Fig. 7 Transformer 2422 530 90034.

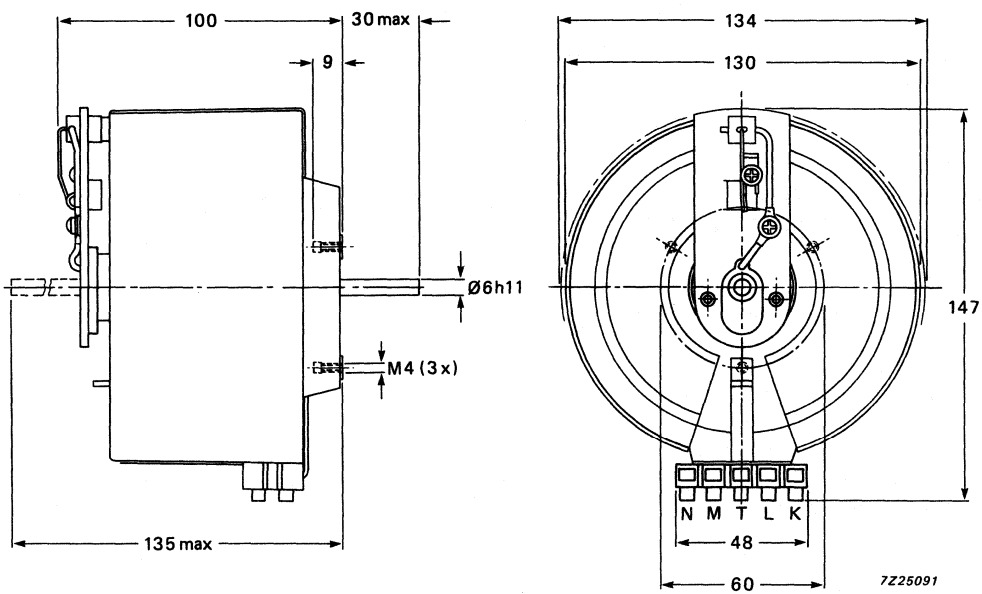


Fig. 8 Transformer 2322 530 90052.

# TRANSFORMERS SIZE CODE E6

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 three screws M4 (maximum length = panel thickness + 9 mm). The mounting hole pattern is in accordance with DIN 42595 and is shown in Fig. 9.

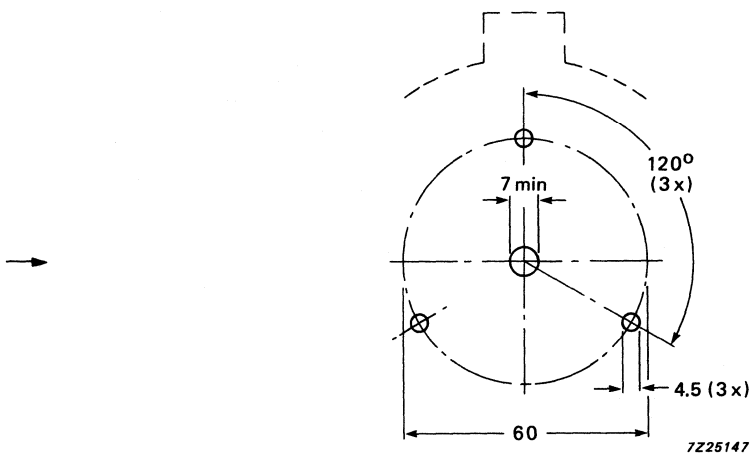


Fig. 9 Mounting hole pattern.

## 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 units
- chokes for parallel connection
- motor drive module
- AC stabilizer module – 220 V only.

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.

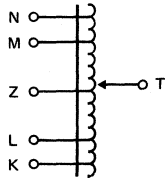
The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can be easily replaced by one of another length.

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.

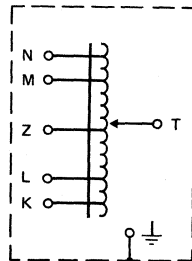
# TRANSFORMERS SIZE CODE E6.1

## ELECTRICAL DATA



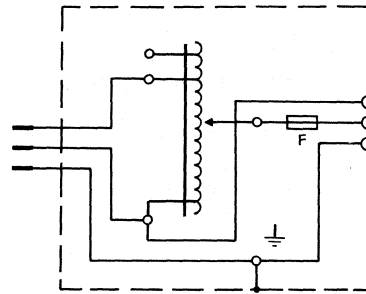
7Z66594.3

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	
Output voltage				0 to 260 ± 3 V
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 <sup>^</sup>	6,3 A <sup>^</sup>	6,3 A <sup>^</sup>	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 <sup>^ ^</sup>	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".

<sup>^</sup> See also data in the 5th, 6th and 7th column of the table on pages 4 and 5.

<sup>^ ^</sup> See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

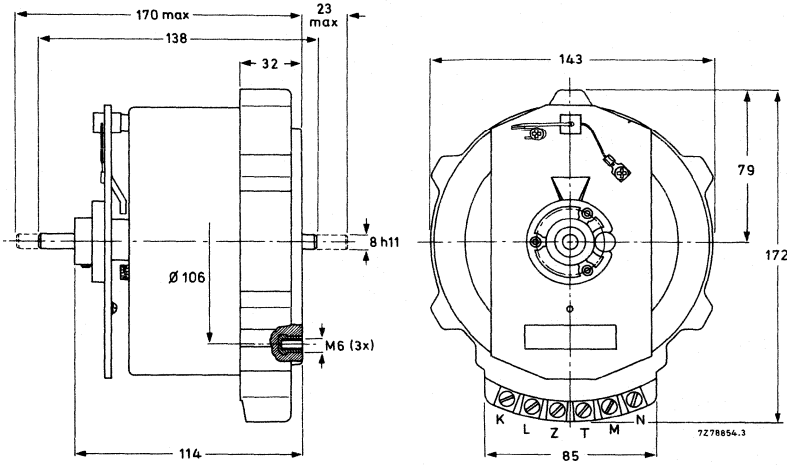
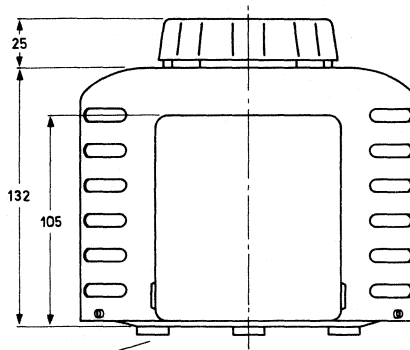


Fig. 4 Panel model.



The pads protrude approximately 4 mm.

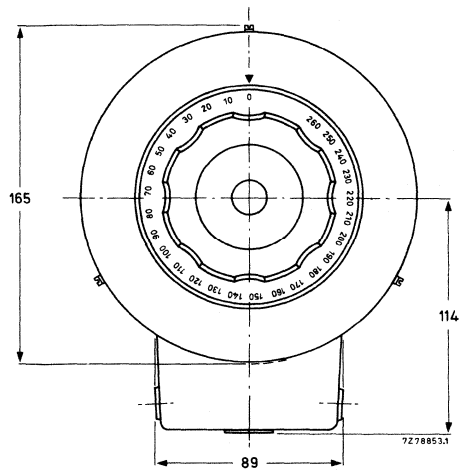
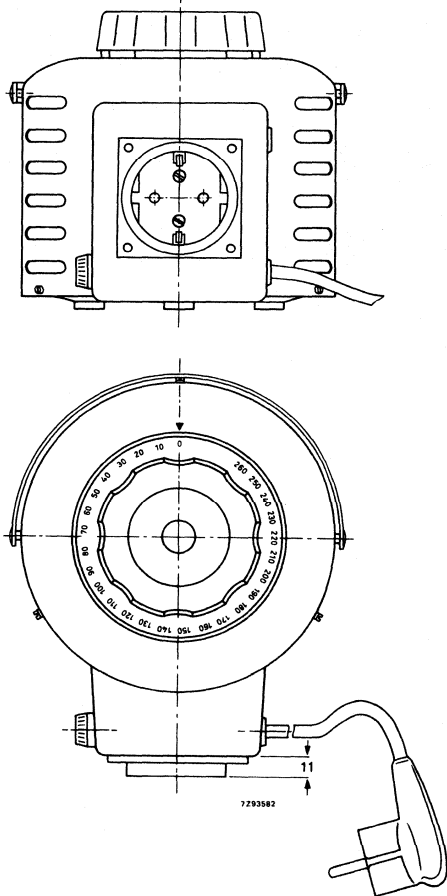


Fig. 5 Bench model.

**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  
bench model

IP00  
IP20

**Mass**

panel model  
bench model  
laboratory model

approx. 6 kg  
approx. 6,6 kg  
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.

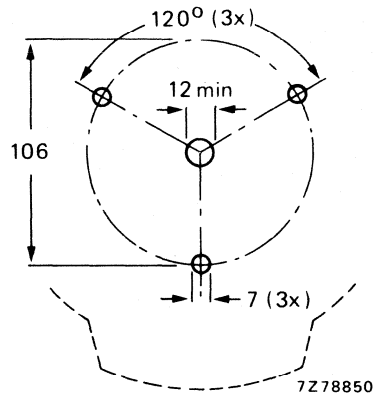


Fig. 7.

**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 TRANSFORMER**

- Moulded types; size code E6.2
- To be read in conjunction with Operational Notes

**QUICK REFERENCE DATA**

input voltage V	output current A	output voltage V	catalogue number
240	6,3	0 to 240	2422 530 90059*

**APPLICATION**

This panel model transformer has been designed for industrial use e.g. cinemas, studios, power plants, etc.

**DESCRIPTION**

The transformer is partly moulded in reinforced polyester resin. The construction is rugged and professional. The transformer does 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.

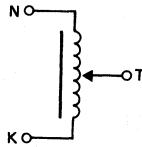
The spindle can be easily replaced by one of another length.

Screw terminals are provided for connecting the leads.

\* SEV approval applied for.

# TRANSFORMERS SIZE CODE E6.2

## ELECTRICAL DATA



7Z68481.1

Fig. 1 Circuit diagram.

catalogue number	2422 530 90059
Input voltage N to K (note 1)	240 V + 10%
Output voltage, no load, T to K (note 2)	0 (+3) to 240 (-3) V
Voltage drop at nominal output current (note 3)	≤ 6 V
Nominal output current over the whole control range	6,3 A
Maximum output current (note 4)	7,5 A (note 5)
Voltage per turn of winding	0,59 V
Losses, no load	≤ 9 W
Permissible temperature rise at any point (note 6)	max. 90 K

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

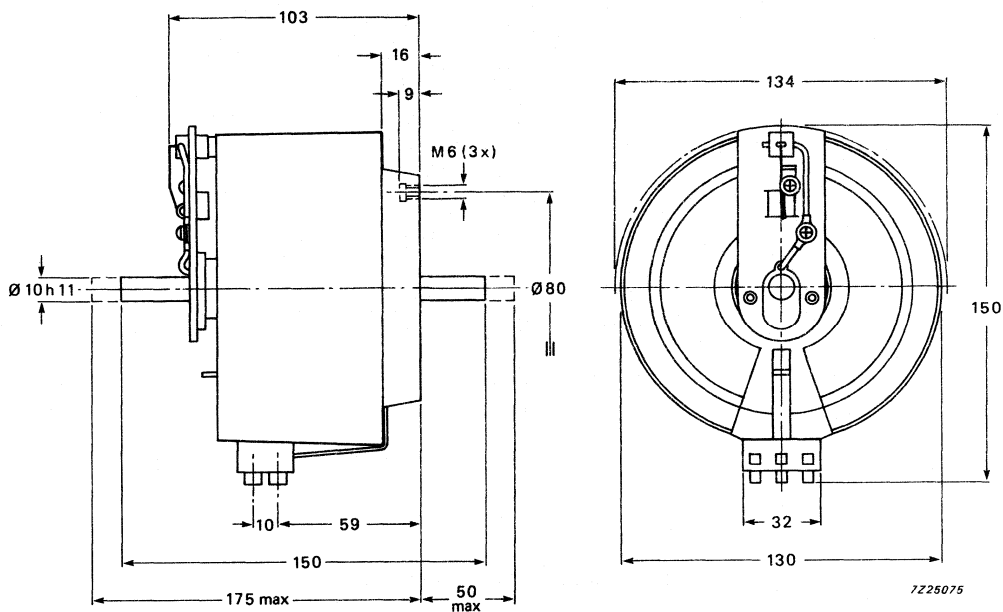


Fig. 2 Transformer 2422 530 90059.

Degree of protection (IEC 144)  
Mass  
Operating torque  
Permissible end stop torque

IP00  
approx. 4,8 kg  
0,05 to 0,2 Nm  
max. 1 Nm

## Mounting

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

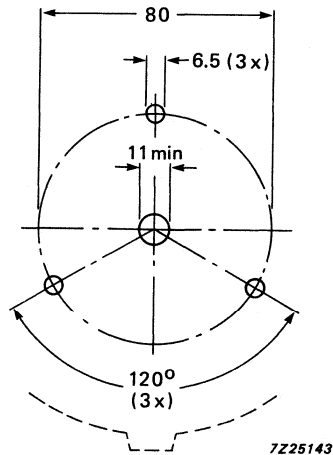


Fig. 3 Mounting hole pattern.

## Carbon brushes

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

## ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- motor drive module.

See section "Accessories"; use size code E6.2 when selecting.  
Further information available on request.

## VARIABLE MAINS TRANSFORMER

- Moulded types; size code E6.3
- To be read in conjunction with Operational Notes.

### QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number
240	7	0 to 240	2422 530 90061

### APPLICATION

This panel model transformer has been designed for industrial use e.g. cinemas, studios, power plants, etc.

### DESCRIPTION

The transformer is partly moulded in reinforced polyester resin. The construction is rugged and professional. The transformer does not require maintenance under normal conditions.

The construction permits an adjustment down to exactly 0 V.

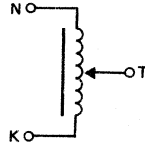
The spindle protrudes at both sides; its side-to-side position is adjustable.

The spindle can be easily replaced by one of another length.

Screw terminals are provided for connecting the leads.

# TRANSFORMERS SIZE CODE E6.3

## ELECTRICAL DATA



7Z68481.1

Fig. 1 Circuit diagram.

catalogue number	2422 530 90061
Input voltage N to K (note 1)	240 V + 10%
Output voltage, no load, T to K (note 2)	0 (+3) to 240 (-3) V
Voltage drop at nominal output current (note 3)	≤5 V
Nominal output current over the whole control range	7 A
Maximum output current (note 4)	8,4 A (note 5)
Voltage per turn of winding	0,67 V
Losses, no load	≤10 W
Permissible temperature rise at any point (note 6)	max. 90 K

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".



MECHANICAL DATA

Dimensions in mm

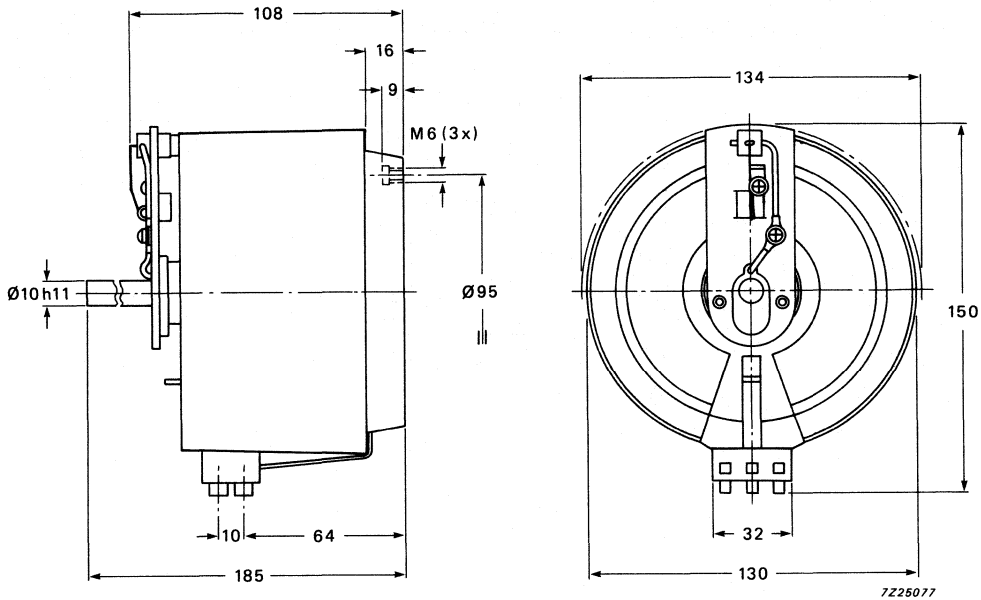


Fig. 2 Transformer 2422 530 90061.

Degree of protection (IEC 144)  
Mass  
Operating torque  
Permissible end stop torque

IP00  
approx. 5,3 kg  
0,05 to 0,2 Nm  
max. 1 Nm

# TRANSFORMERS SIZE CODE E6.3

## Mounting

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

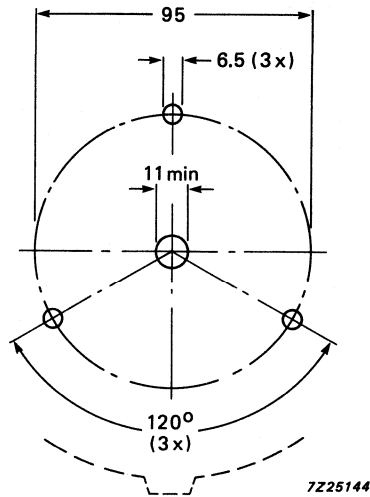


Fig. 3 Mounting hole pattern.

## Carbon brushes

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

## ACCESSORIES

The following accessories are available:

- control knobs
  - ganging units
  - motor drive module
- } Minor modification required for this option – details available

See section "Accessories"; use size code E6.3 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*	05415 ← ←
220/260	8,5	0 to 260	05411	05407*	
240/270	8,5	0 to 270	05511	05507*	
220	8,5	0 to 260			
220/260	8	0 to 260	25411*		
380	4	0 to 380		90069*	

**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.

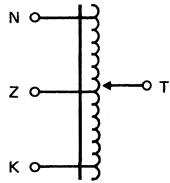
The spindle protrudes at both sides; its side-to-side position is adjustable. The spindle can be easily replaced by one of another length.

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.

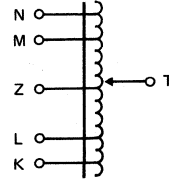
# TRANSFORMERS SIZE CODE E7

## ELECTRICAL DATA



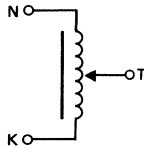
7Z74005.2

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



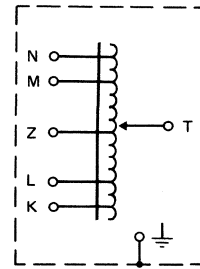
7Z66594.3

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



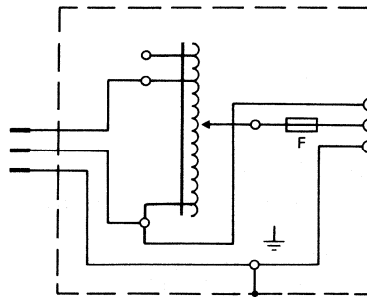
7Z68481.1

Fig. 3 Circuit diagram of panel model 2422 530 90069.



7Z68474.3

Fig. 4 Circuit diagram of bench model. KL = NM; Z = centre tap.



7Z75186.3

Fig. 5 Circuit diagram of laboratory model; F = 8 A.

catalogue number	2422 530 . . . . .		
bench model		05411, 25411	05511
panel model	15407	05407	05507
laboratory model			
Input voltage L to N (note 1)		220 V + 10%	240 V + 10%
Input voltage K to N	220 V + 10%	260 V + 10%	270 V + 10%
Input voltage			
Output voltage, no load, T to N (note 2)	0 to 220 ± 3 V	0 to 260 ± 3 V	0 to 270 ± 3 V
Output voltage, no load			
Voltage drop at nominal output current (note 3)	≤ 4 V	≤ 6 V	≤ 6 V
Nominal output current over the whole control range	10 A	*8,5 A	8,5 A
Maximum output current (note 4)	12 A (note 5)	11,2 A (note 5)	11,2 A (note 5)
Voltage per turn of winding	0,81 V	0,81 V	0,85 V
Losses, no load	≤ 16 W	≤ 16 W	≤ 17,5 W
Permissible temperature rise at any point (note 6)	max. 90 K		

**Notes to Electrical Data**

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

\*8 A for 2422 530 25411

# TRANSFORMERS SIZE CODE E7

catalogue number	2422 530 . . . . .	
bench model		
→ panel model		90069
laboratory model	05415	
Input voltage L to N (note 1)		
Input voltage K to N		380 V + 10%
Input voltage	220 V + 10%	
Output voltage, no load, T to N (note 2)		0 (+ 3) to 380 (– 3) V
Output voltage, no load	0 to 260 ± 3 V	
Voltage drop at nominal output current (note 3)	≤ 6 V	≤ 6 V
Nominal output current over the whole control range	8,5 A	4 A
Maximum output current (note 4)	11,2 A (note 5)	4,8 A
Voltage per turn of winding	0,85 V	0,85 V
Losses, no load	≤ 17,5 W	≤ 17,5 W
Permissible temperature rise at any point (note 6)	max. 90 K	max. 90 K

## Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

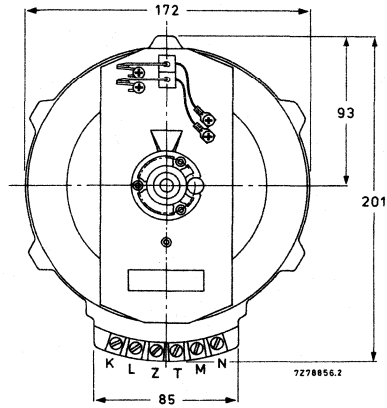
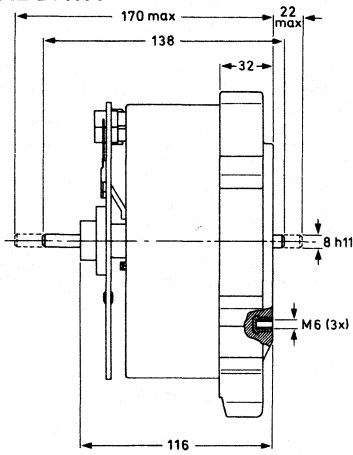
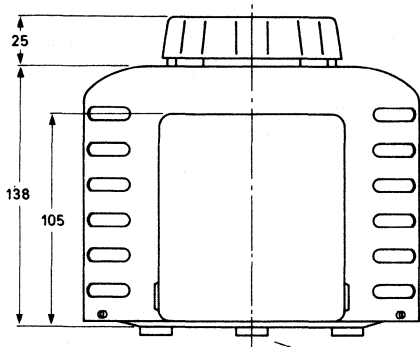


Fig. 6 Panel model.



The pads protrude approximately 4 mm.

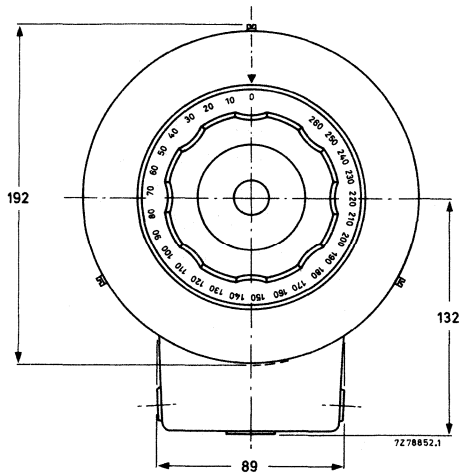


Fig. 7 Bench model.

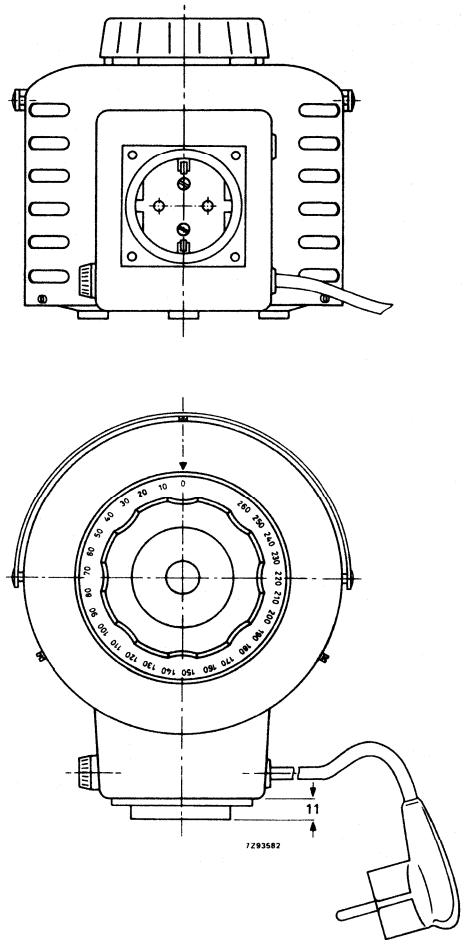


Fig. 8 Laboratory model; dimensions are identical with those in Fig. 7, except as shown.

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. 9.

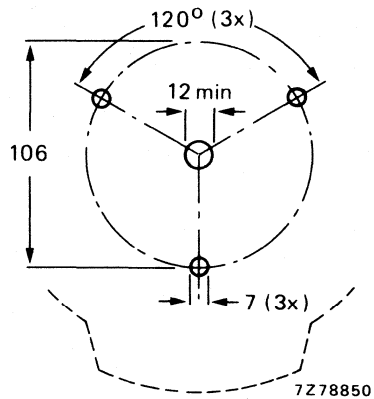


Fig. 9 Mounting hole pattern.

**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
- AC stabilizer module – 220 V only.

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.

# TRANSFORMERS SIZE CODE E7.2

## ELECTRICAL DATA

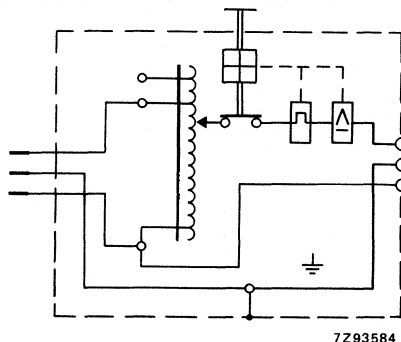


Fig. 1 Circuit diagram.

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

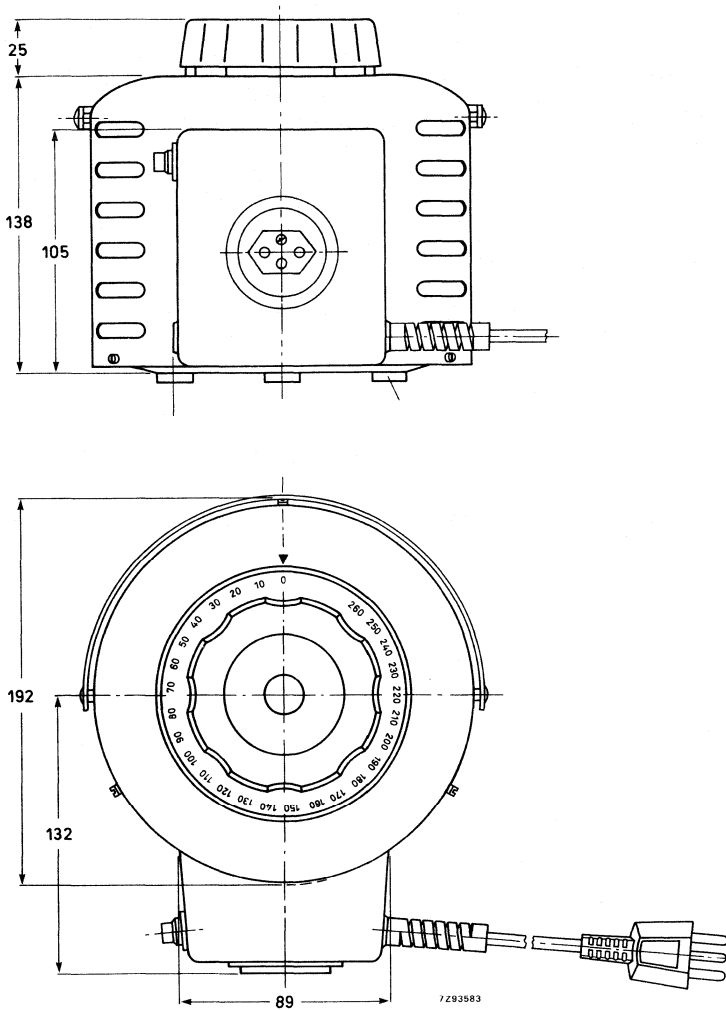


Fig. 2.

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 TRANSFORMER

- Moulded types; size code E7.3
- To be read in conjunction with Operational Notes

### QUICK REFERENCE DATA

input voltage V	output current A	output voltage V	catalogue number
240	11	0 to 240	2422 530 90062

### APPLICATION

This panel model transformer has been designed for industrial use e.g. cinemas, studios, power plants, etc.

### DESCRIPTION

The transformer is partly moulded in reinforced polyester resin. The construction is rugged and professional. The transformer does not require maintenance under normal conditions.

The construction permits an adjustment down to exactly 0 V.

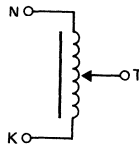
The spindle protrudes at both sides; its side-to-side position is adjustable.

The spindle can be easily replaced by one of another length.

Screw terminals are provided for connecting the leads.

# TRANSFORMERS SIZE CODE E7.3

## ELECTRICAL DATA



7Z68481.1

Fig. 1 Circuit diagram.

catalogue number	2422 530 90062
Input voltage N to K (note 1)	240 V + 10%
Output voltage, no load, T to K (note 2)	0 (+3) to 240 (±3) V
Voltage drop at nominal output current (note 3)	≤ 5 V
Nominal output current over the whole control range	11 A
Maximum output current (note 4)	13,2 A (note 5)
Voltage per turn of winding	0,9 V
Losses, no load	≤ 18 W
Permissible temperature rise at any point (note 6)	max. 90 K

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".



## MECHANICAL DATA

Dimensions in mm

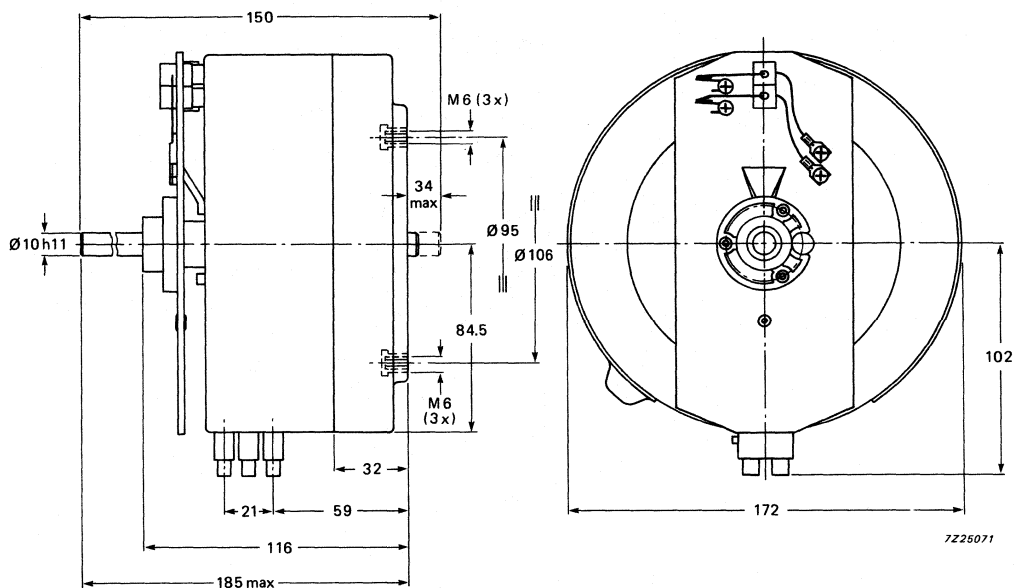


Fig. 2 Transformer 2422 530 90062.

Degree of protection (IEC 144)

IP00

Mass

approx. 8,8 kg

Operating torque

0,2 to 0,3 Nm

Permissible end stop torque

max. 4 Nm

# TRANSFORMERS SIZE CODE E7.3

## Mounting

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

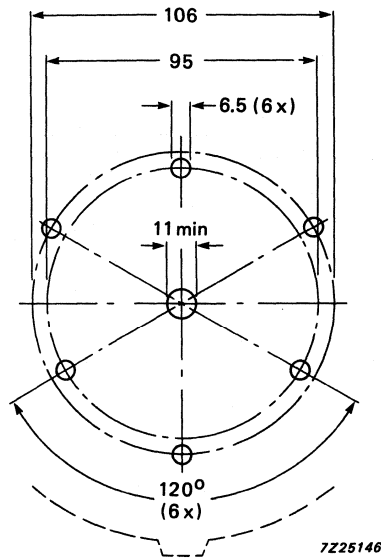


Fig. 3 Mounting hole pattern.

## Carbon brushes

Spare carbon brushes can be supplied under catalogue number 4322 027 75160 (service number 5322 362 40044).

For complete replacement the transformer needs two brushes.

## ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- motor drive module.

See section "Accessories"; use size code E7.3 when selecting.

Further information on request.

**VARIABLE MAINS TRANSFORMER**

- Moulded types; size code E7.4
- 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	12	0 to 220	90066
240	15	0 to 240	90063

**APPLICATION**

These panel 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.

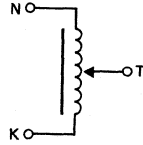
The spindle protrudes at both sides; its side-to-side position is adjustable.

The spindle can be easily replaced by one of another length.

Screw terminals are provided for connecting the leads.

# TRANSFORMERS SIZE CODE E7.4

## ELECTRICAL DATA



7268481.1

Fig. 1 Circuit diagram

catalogue number	2422 530 . . . . .	
	90066	90063
Input voltage K to N (note 1)	220 V + 10%	240 V + 6%
Output voltage, no load, T to N (note 2)	0 (+3) to 220 (-3) V	0 (+3) to 240 (-3) V
Voltage drop at nominal output current (note 3)	≤3 V	≤4 V
Nominal output current over the whole control range	12 A	15 A
Maximum output current (note 4)	14,4 A (note 5)	18 A
Voltage per turn of winding	1,105 V	1,19 V
Losses, no load	≤16 W	≤22 W
Permissible temperature rise at any point (note 6)	max. 70 K	max. 90 K

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

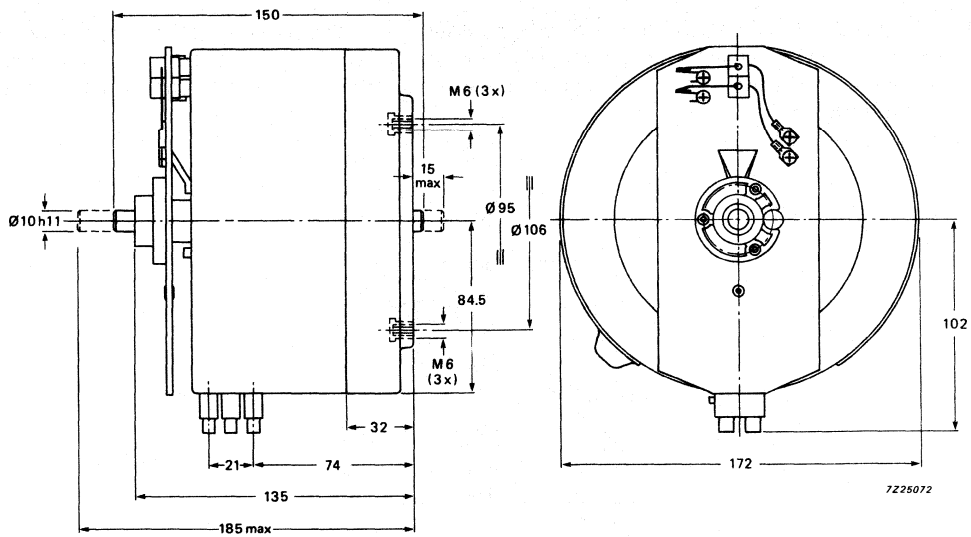


Fig. 2 Transformers 2422 530 90066/90063.

Degree of protection (IEC 144)

IP00

Mass

approx. 11,5 kg

Operating torque

0,2 to 0,3 Nm

Permissible end stop torque

max. 4 Nm

# TRANSFORMERS SIZE CODE E7.4

## Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis with three screws M6 (maximum length = panel thickness + 11 mm). The mounting hole pattern is given in Fig. 3. Fitting by means of either the three holes on the outer circle or by the three holes on the inner circle provides adequate support.

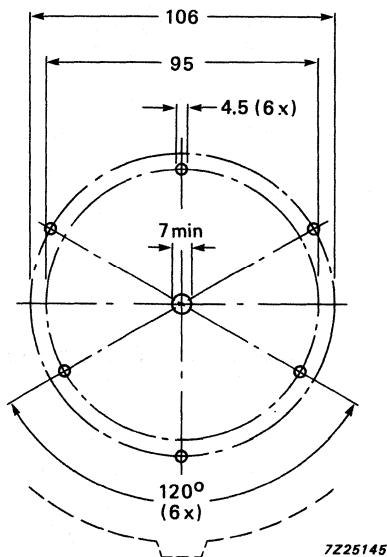


Fig. 3 Mounting hole pattern.

## 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
- AC stabilizer module (for 2422 530 90066 only).

See section "Accessories"; use size code E7.4 when selecting.

Further information on request.

**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 . . . . .
380	6	0 to 380	90071*
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 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.

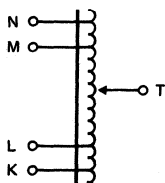
The transformers do not require maintenance under normal conditions.

Screw terminals are provided for connecting the leads.

\* SEV approval applied for.

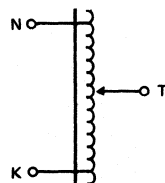
# TRANSFORMERS SIZE CODE E8

## ELECTRICAL DATA



7Z90226

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



7Z90227

Fig. 2 Circuit diagram of transformers  
2422 530 16407 and 2422 530 90071.

→ catalogue number	2422 530 . . . .			
	06407	06507	16407	90071
Input voltage L to N (note 1)	220 V + 10%	240 V + 10%		
Input voltage K to N	260 V + 10%	260 V + 10%	220 V + 10%	380 V + 10%
Output voltage, no load, T to N (note 2)	0 to 260 (±3) V	0 to 260 (±3) V	0 to 220 (±3) V	0 to 380 (±0) V
Voltage drop at nominal output current (note 3)	≤6 V	≤6 V	≤4,5 V	≤6 V
Nominal output current over the whole control range	12 A	12 A	15 A	6 A
Maximum output current (note 4)	15 A (note 5)	15 A (note 5)	18 A	7,2 A
Voltage per turn of winding	0,75 V	0,75 V	0,75 V	0,73 V
Losses, no load	≤19,5 W			
Permissible temperature rise at any point (note 6)	max. 90 K			

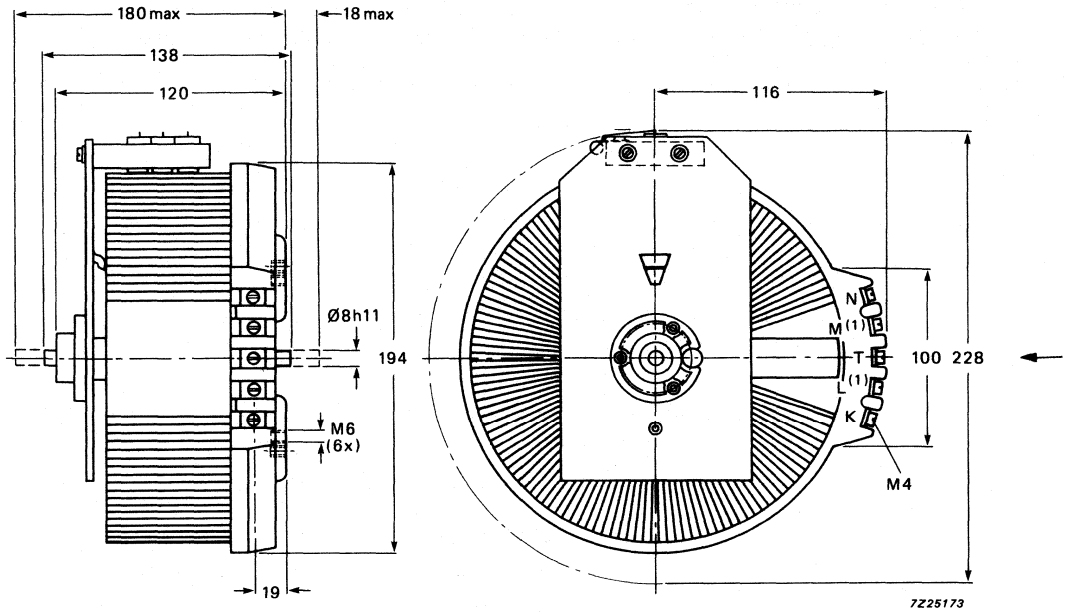
### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side.
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".



MECHANICAL DATA

Dimensions in mm



(1) only for 2422 530 06407  
and 2422 530 06507

Fig. 3 Mechanical dimensions.

Degree of protection (IEC 144)  
Mass  
Operating torque  
Permissible end stop torque

IP00  
approx. 10 kg  
0,25 to 0,5 NM  
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.

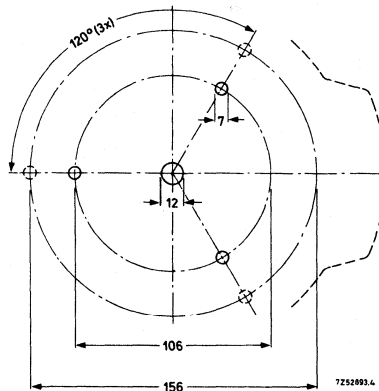


Fig. 4 Mounting hole pattern.

### 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
- AC stabilizer module —220 V only.

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

**VARIABLE MAINS TRANSFORMER**

- Moulded types; size code E8.1
- To be read in conjunction with Operational Notes.

**QUICK REFERENCE DATA**

input voltage V	output current A	output voltage V	catalogue number 2422 530 . . . . .
380	8	0 to 380	90072*
220	18	0 to 220	90067*

**APPLICATION**

These panel 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.

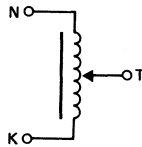
The spindle protrudes at both sides; its side-to-side position is adjustable.

The spindle can be easily replaced by one of another length.

Screw terminals are provided for connecting the leads.

\* SEV approval applied for.

## ELECTRICAL DATA



7Z68481.1

Fig. 1 Circuit diagram.

catalogue number	2422 530 . . . . .	
	90072	90067
Input voltage K to N (note 1)	380 V + 10%	220 V + 10%
Output voltage, no load, T to N (note 2)	0 (+3) to 380 (±3) V	0 (+3) to 220 (±3) V
Voltage drop at nominal output current (note 3)	≤6 V	≤4 V
Nominal output current over the whole control range	8 A	18 A
Maximum output current (note 4)	9,6 A (note 5)	21,5 A (note 5)
Voltage per turn of winding	0,9 V	0,88 V
Losses, no load	≤23,5 W	≤22 W
Permissible temperature rise at any point (note 6)	max. 90 K	

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

MECHANICAL DATA

Dimensions in mm

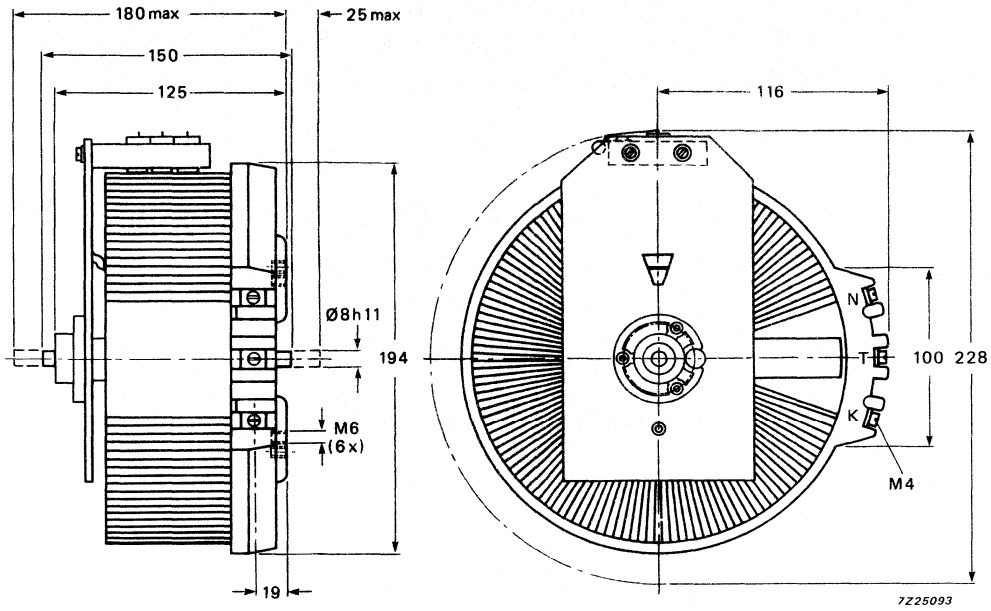


Fig. 2 Transformers 2422 530 90067 and 2422 530 90072.

Degree of protection (IEC 144)

IP00

Mass

approx. 11,7 kg

Operating torque

0,25 to 0,5 Nm

Permissible end stop torque

max. 4 Nm

# TRANSFORMERS SIZE CODE E8.1

## Mounting

The transformer can be mounted in any position. It can be fitted to a panel or a chassis with three screws M6 (maximum length = panel thickness + 11 mm). The mounting hole pattern is given in Fig. 3. Fitting by means of either the three holes on the outer circle or by the three holes on the inner circle provides adequate support.

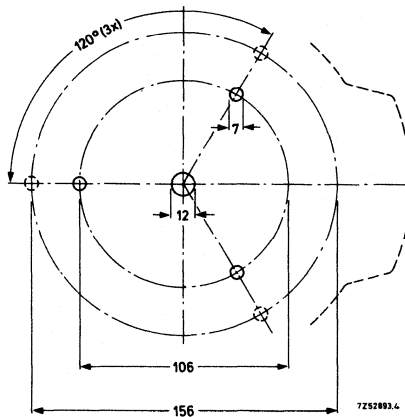


Fig. 3 Mounting hole pattern.

## 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 the following numbers of brushes:

- 2422 530 90072 – three brushes
- 2422 530 90067 – four brushes.

## ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- motor drive module
- AC stabilizer module – 220 V only.

See section "Accessories"; use size code E8.1 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
380	12	0 to 380		90073*
240	20	0 to 240		90064*
220/260	23	0 to 260	07411*	07407*
240/260	23	0 to 260	07511*	07507*
240	26	0 to 240		90065*
220/240	32	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.

\* SEV approval applied for.

# TRANSFORMERS SIZE CODE E10

## ELECTRICAL DATA

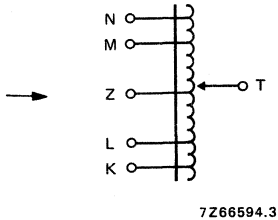


Fig. 1 Circuit diagram of panel models  
2422 530 07407 and  
2422 530 07507  
KL = NM  
Z = centre tap.

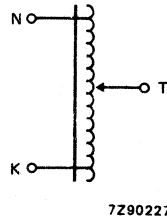


Fig. 2 Circuit diagram of panel models  
2422 530 90064  
2422 530 90065  
2422 530 90073  
2422 530 17507

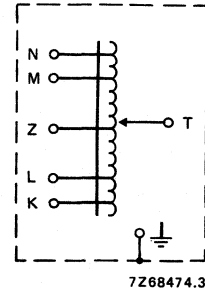


Fig. 3 Circuit diagram of bench models  
KL = NM  
Z = centre tap.

catalogue number	2422 530 . . . . .		
	07411 07407	07511 07507	17507
Input voltage L to N (note 1)	220 V + 10%	240 V + 10%	
Input voltage K to N	260 V + 10%		
Output voltage, no load, T to N (note 2)	0 to 260 (± 3) V		220 V + 15%    240 V + 6%
Voltage drop at nominal output current (note 3)	≤ 6 V		0 to 220 (-3) V    0 to 240 (-3) V
Nominal output current over the whole control range	23 A		≤ 6 V
Maximum output current (note 4)	30 A (note 5)		32 A
Voltage per turn of winding	0,9 V		36 A (note 5)
Losses, no load	≤ 40 W		0,89 V    0,97 V
Permissible temperature rise at any point (note 6)	max. 90 K		≤ 40 W
			max. 90 K

### Notes to Electrical Data

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".



catalogue number	2422 530 . . . . .		
	90073	90064	90065 ←
Input voltage K to N (note 1)	380 V + 10%	240 V + 10%	240 V + 10%
Output voltage, no load, T to N (note 2)	0 (+ 3) to 380 (± 3) V	0 (+ 3) to 240 (± 3) V	0 (+ 3) to 240 (± 3) V
Voltage drop at nominal output current (note 3)	≤ 6 V	≤ 6 V	≤ 5 V
Nominal output current over the whole control range	12 A	20 A	26 A
Maximum output current (note 4)	14,4 A (note 5)	24 A (note 5)	31,3 A (note 5)
Voltage per turn of winding	0,85 V	0,83 V	0,97 V
Losses, no load	≤ 40 W	≤ 40 W	≤ 40 W
Permissible temperature rise at any point (note 6)	max. 90 K	max. 70 K	max. 70 K

**Notes to Electrical Data**

1. Second letter denotes the common input/output terminal.
2. The output voltage is stated for clockwise rotation when the transformer is viewed from the mounting side (base).
3. See "Operational notes" paragraph "Voltage drop".
4. See "Operational notes" paragraph "Continuous overload".
5. See also data in the 5th, 6th and 7th column of Table 2 in the selection guide.
6. See "Operational notes" paragraph "Derating for higher ambient temperatures".

## MECHANICAL DATA

Dimensions in mm

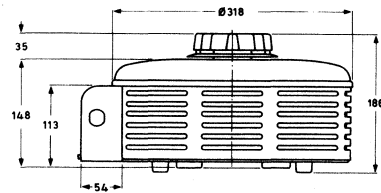
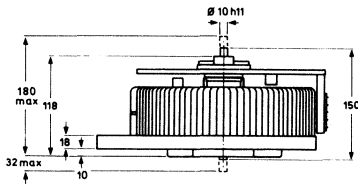
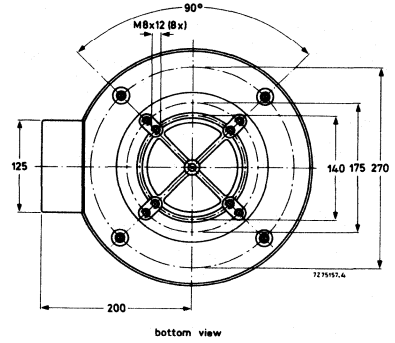
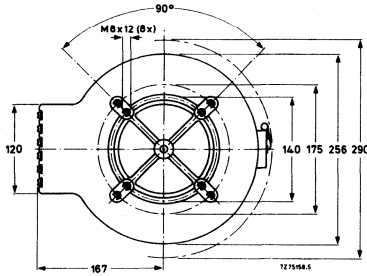


Fig. 4 Panel models.

Fig. 5 Bench models.

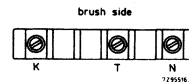
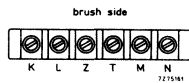


Fig. 6 Connection strip of transformers 2422 530 07407, 2422 530 07411, 2422 530 07507 and 2422 530 07511.

Fig. 7 Connection strip of transformers 2422 530 17507, 2422 530 90064, 2422 530 90065 and 2422 530 90073.

	bench model	panel model
Degree of protection (IEC 144)	IP20	IP00
Mass	approx. 19,8 kg	approx. 17,9 kg
Operating torque	1 to 1,5 Nm	
Permissible end stop torque	max. 5 Nm	

### Mounting

The transformer can be mounted in any position. Either model, panel or bench type, may be fitted to a panel or chassis with four screws M8 (maximum length = panel thickness + 12 mm). The mounting hole pattern is shown in Fig. 8. Remove pads of bench model before mounting. Fitting by means of either the four holes on the outer circle or the four holes on the inner circle provides sufficient security.

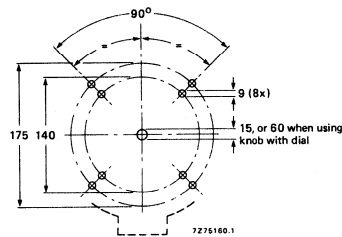


Fig. 8 Mounting hole pattern.

### 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 five brushes.

### ACCESSORIES

The following accessories are available:

- control knobs
- ganging units
- chokes for parallel connection
- motor drive module
- AC stabilizer module – 220 V only

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
220	3	0 to 16	2422 529 00013 ←

### 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.

# TRANSFORMERS SIZE CODE E2.1

## ELECTRICAL DATA

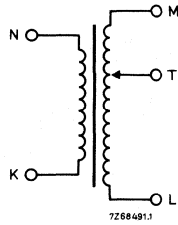


Fig. 1 Circuit diagram of transformer 2422 529 00009.

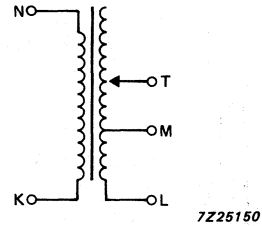


Fig. 2 Circuit diagram of transformer 2422 529 00013.

catalogue number	2422 529 . . . . .	
	00009	00013
Input voltage N to K	220 V + 10%	
Output voltage, no load L to T (note 1)	0 to 21 V	
→ Output voltage, no load L to M		12 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 (note 2) after damp heat test (IEC 68-2, test Ca, 21 days)	≤ 5 MΩ	
Test voltage (note 2) for 1 min	3500 V, 50 Hz	
Air gap (note 2)	≤ 4 mm	
Leakage path (note 2)	≤ 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	

### Notes to Electrical Data

1. Clockwise rotation of the spindle results in an increasing output voltage when the transformer is viewed from the mounting side.
2. Between windings and between live and non-live parts.



MECHANICAL DATA

Dimensions in mm

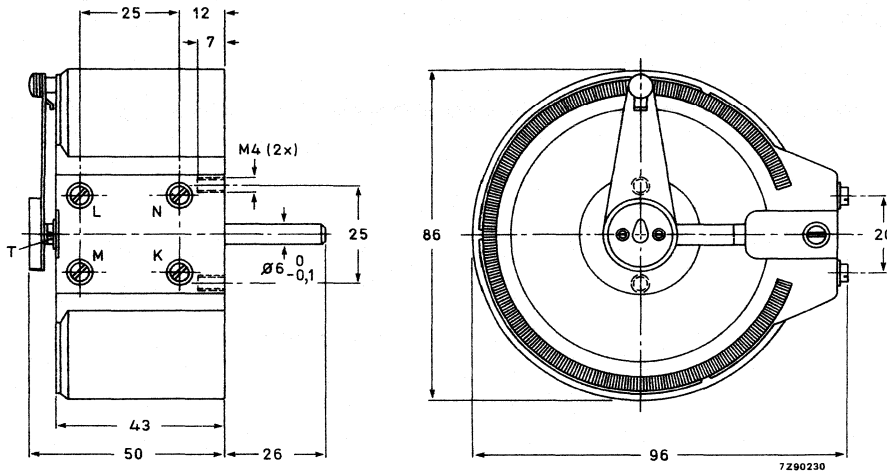


Fig. 3 Transformers 2422 529 00009 and 2422 529 00013.

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. 4.

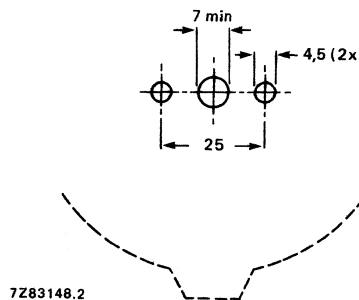


Fig. 4 Mounting hole pattern.

## 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 TRANSFORMER**

- With separate windings; size code E5.2
- Moulded type

**QUICK REFERENCE DATA**

input voltage V	output current A	output voltage V	catalogue number 2422 529 . . . . .
220	6	0 to 30	00011
220	6	0 to 30	00012

**APPLICATION**

These variable transformers are used for low-voltage supplies.

**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 top of the coil. The angle of rotation is 320°. End stops prevent the brush from overrunning the contact track.

# TRANSFORMERS SIZE CODE E5.2

## ELECTRICAL DATA

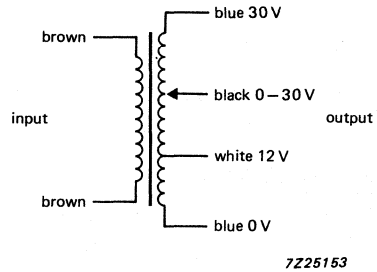
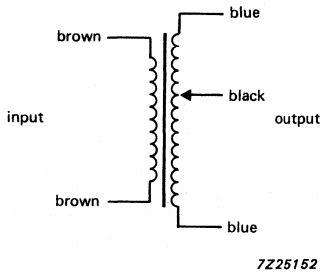


Fig. 1 Circuit diagram of transformer  
2422 529 00011.

Fig. 2 Circuit diagram of transformer  
2422 529 00012.

catalogue number	2422 529 . . . . .	
	00011	00012
Input voltage N to K2	220 V + 10%	
Output voltage, no load*	0 to 30 V	
Tap voltage	12 V	
Voltage drop at nominal output current	≤ 3,5 V	
Nominal output current over the whole control range	6 A	
Short term overload current	7 A	
Voltage per turn of winding	0,285 V	
Losses, no load	≤ 5 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 minute	3500 V, 50 Hz	
Air gap**	≥ 4 mm	
Leakage gap**	≥ 5 mm	
Ambient temperature range	-10 to +40 °C	
Climatic category, IEC 68-1	10/040/21	
Maximum temperature rise at any point	70 K	

\* 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

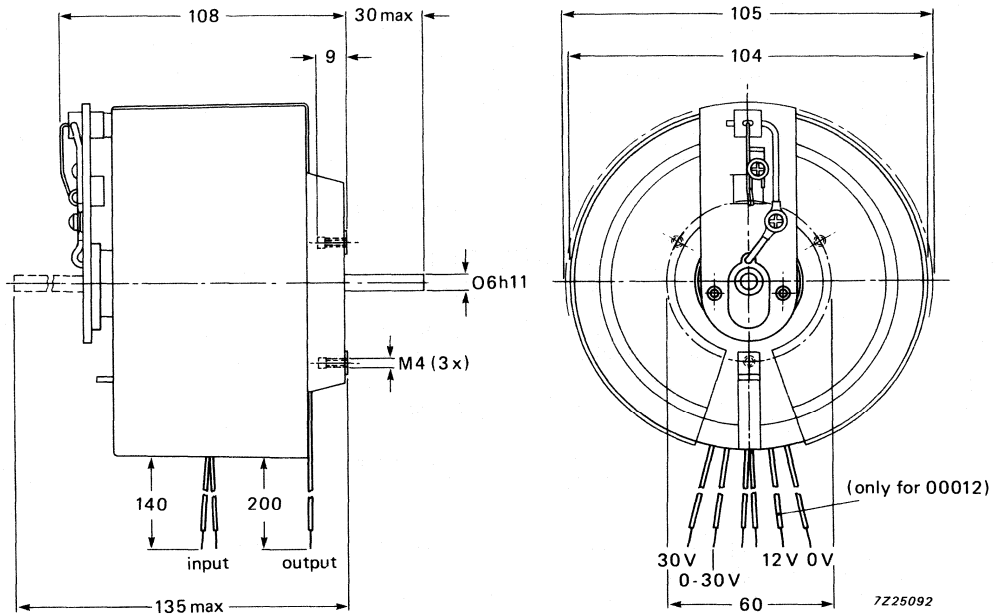


Fig. 3 Transformers 2422 529 00011/00012.

Degree of protection (IEC 144)

IP00

Mass

approx. 2,5 kg

Operating torque

0,05 to 0,15 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 with three screws M4 (maximum length = panel thickness + 9 mm). The mounting hole pattern is given in Fig. 4.

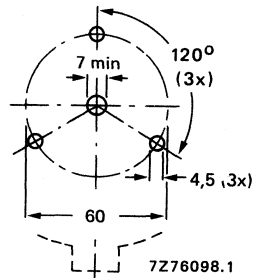


Fig. 4 Mounting hole pattern.

**Carbon brushes**

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

**ACCESSORIES**

For this transformer a control knob with dial is available; see section "Accessories". Further information available 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 . . . . .	
220	3	0 to 262	panel model	lab. model
			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.

# TRANSFORMERS SIZE CODE E7.1

## ELECTRICAL DATA

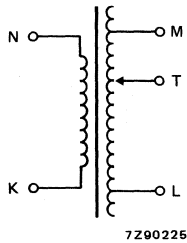


Fig. 1 Circuit diagram of panel models.

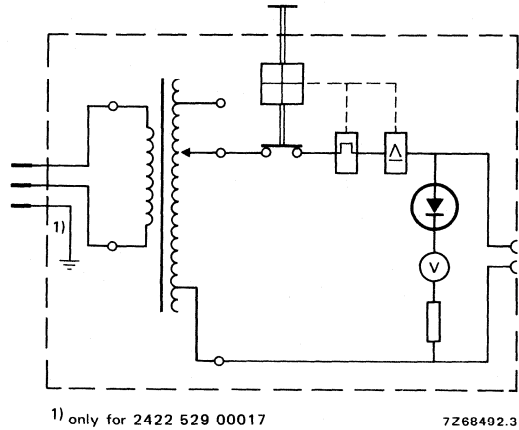


Fig. 2 Circuit diagram of laboratory models.

Input voltage N to K	220 V + 10%
Output voltage, no load L to T*	0 to $\geq 262$ V
Voltage drop at nominal output current	$\leq 12$ 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	$\leq 11$ W
Frequency range	50 to 400 Hz
Insulation resistance** after damp heat test (IEC 68-2, test Ca, 21 days)	$> 5$ M $\Omega$
Test voltage** for 1 min	5000 V, 50 Hz
Air gap**	$\geq 4$ mm
Leakage path**	$\geq 5$ 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, $294 \text{ m/s}^2$ (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

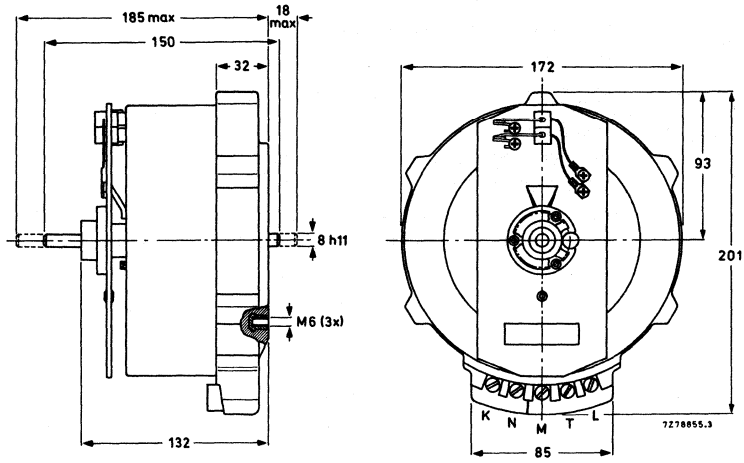


Fig. 3 Panel model.

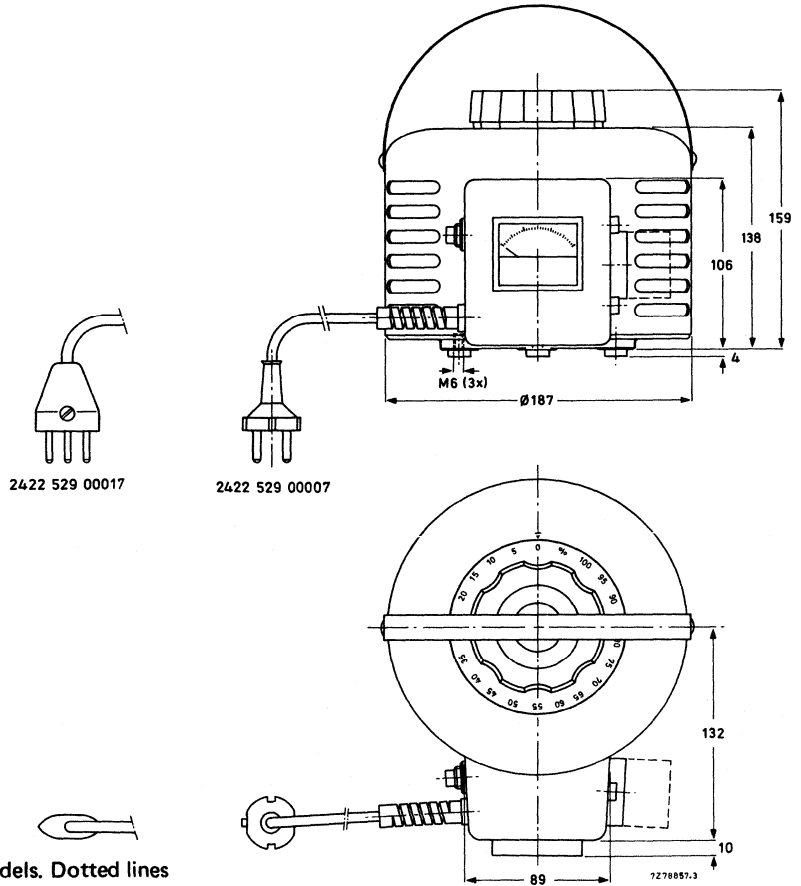


Fig. 4 Laboratory models. Dotted lines apply to transformer 2422 529 00017.

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.

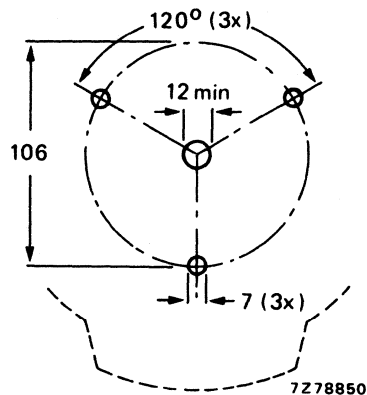


Fig. 5.

### 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	145
AC stabilizer module	167
Control knobs	173
Carbon brushes	175



## 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.

Ganged and/or motor driven transformers will be supplied to specification. Kits for assembly by the user are also available. ←

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.

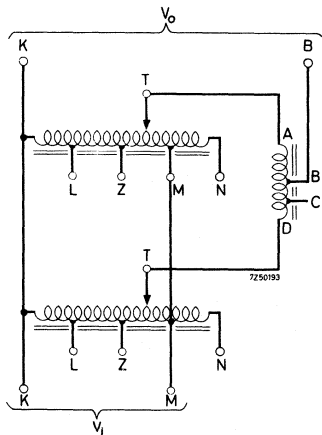


Fig.1 Two transformers connected in parallel; choke AD inserted.

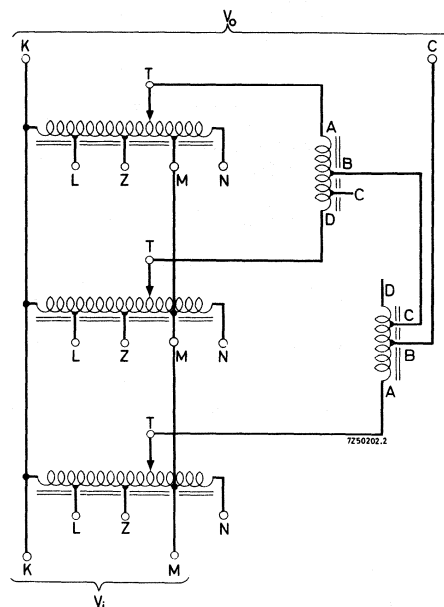


Fig. 2 Three transformers connected in parallel; chokes AD inserted.

## Series connection

- Two variable mains transformers can be connected in series for connection of high input voltages to a maximum of 760 V, dependent on national restrictions relating to creepage path and air gap distances. The two brushes move simultaneously toward, or away from, the line terminals of the transformers, which means that the load is "floating".

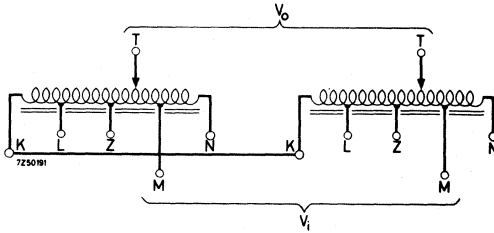


Fig. 3 Two transformers connected in series.

## Three-phase connection

### Three transformers in star circuit

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

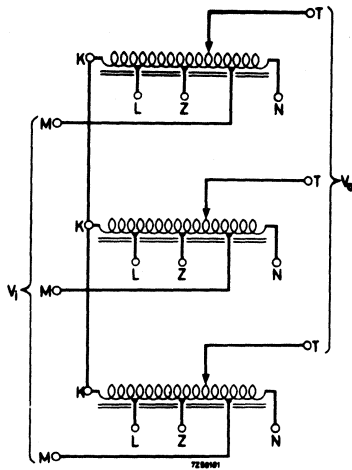


Fig. 4 Three transformers connected in star circuit.

### 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 and to 220/380 V mains for transformers with 380 V input. This circuit provides full control without phase shift.

This circuit provides full control without phase shift.

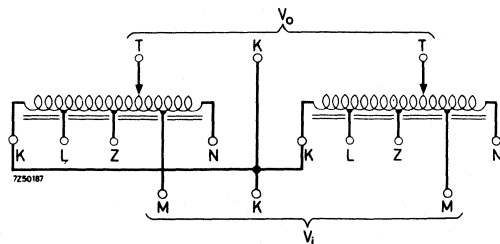


Fig. 5 Two transformers connected in open delta circuit.



**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  $\leq 2$  V.

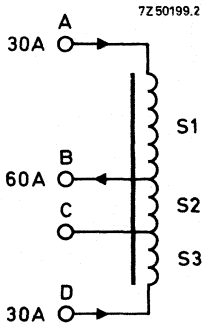


Fig. 6a Circuit diagram of choke  
2422 532 00017; 2 x 30A parallel;  
S1: S2: S3 = 2 : 1 : 1.

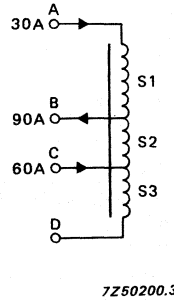


Fig. 6b Circuit diagram of choke  
2422 532 00017; 30A + 60A parallel;  
S1: S2: S3 = 2 : 1 : 1.

MECHANICAL GANGING

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

Dimensions in mm

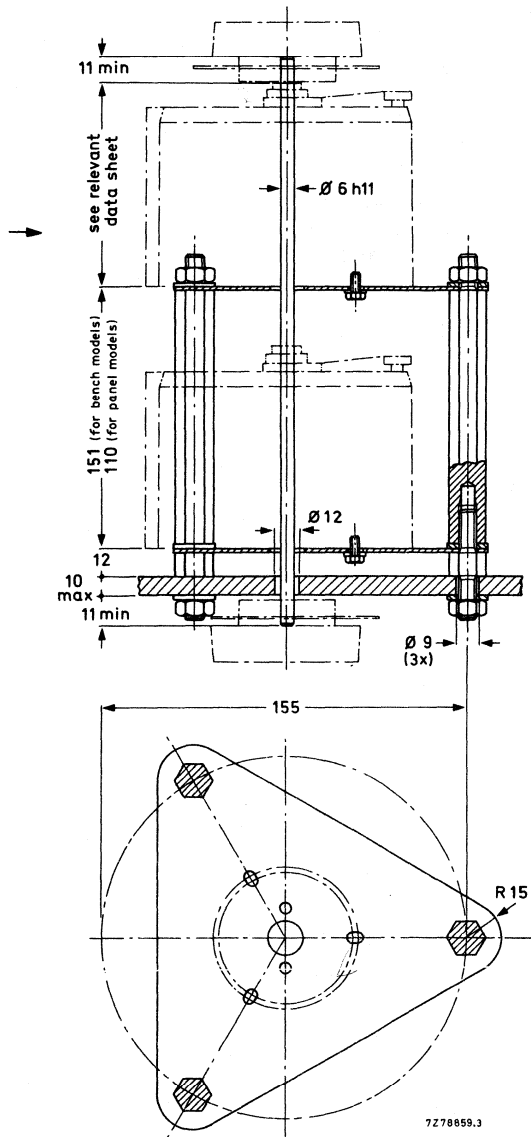


Fig. 7 Two ganged transformers.

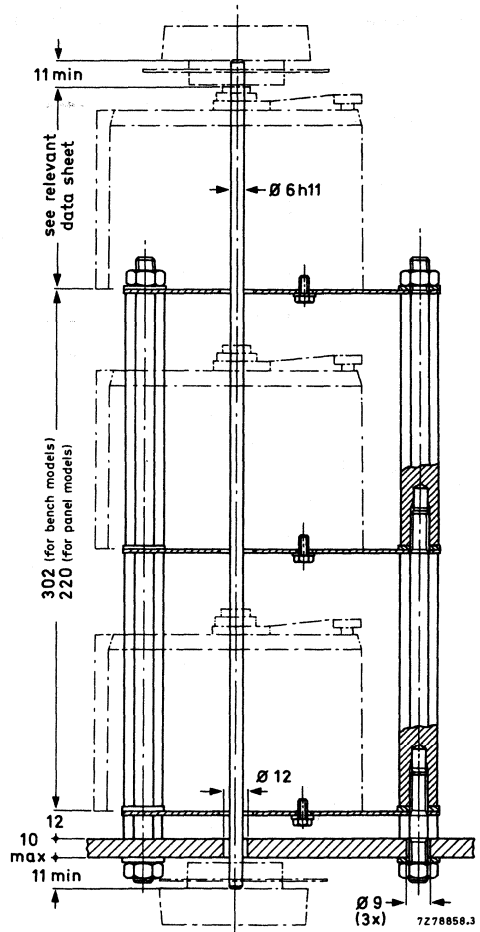
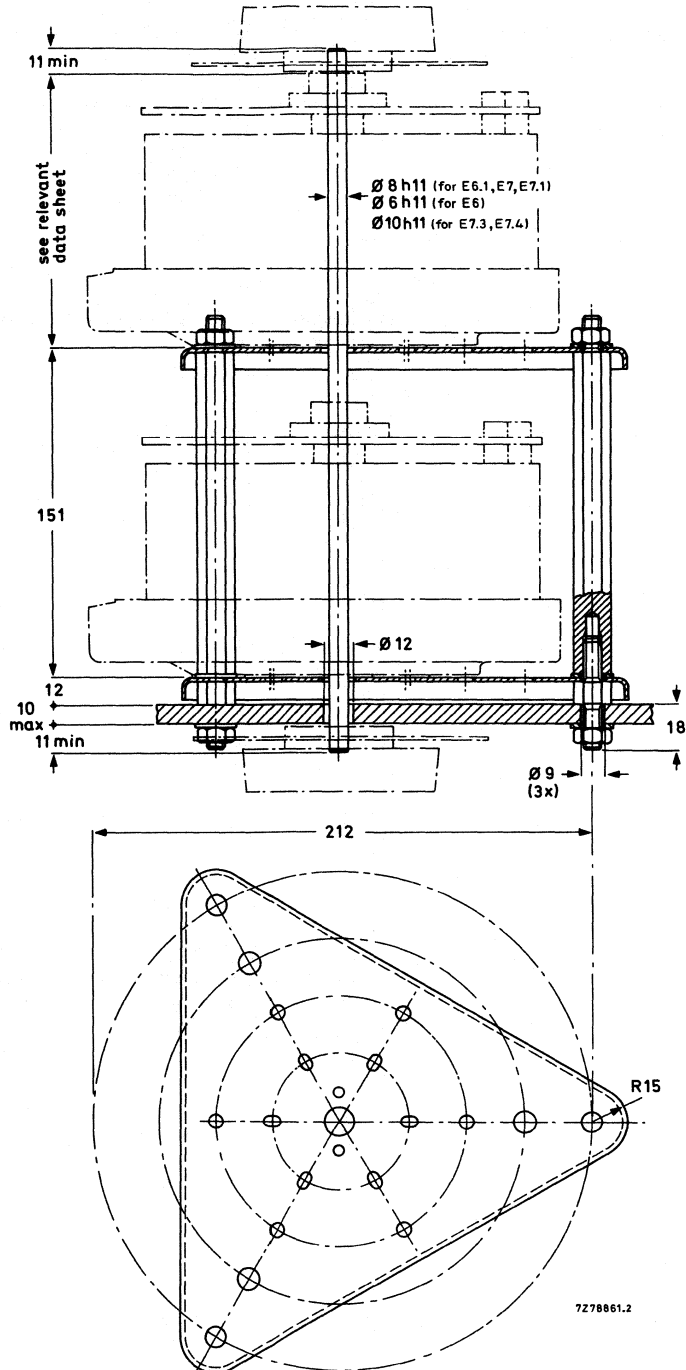


Fig. 8 Three ganged transformers.

Transformers with size code E6, E6.1, E7, E7.1, E7.3 and E7.4.



7278861.2

Fig. 9.  
Two ganged transformers

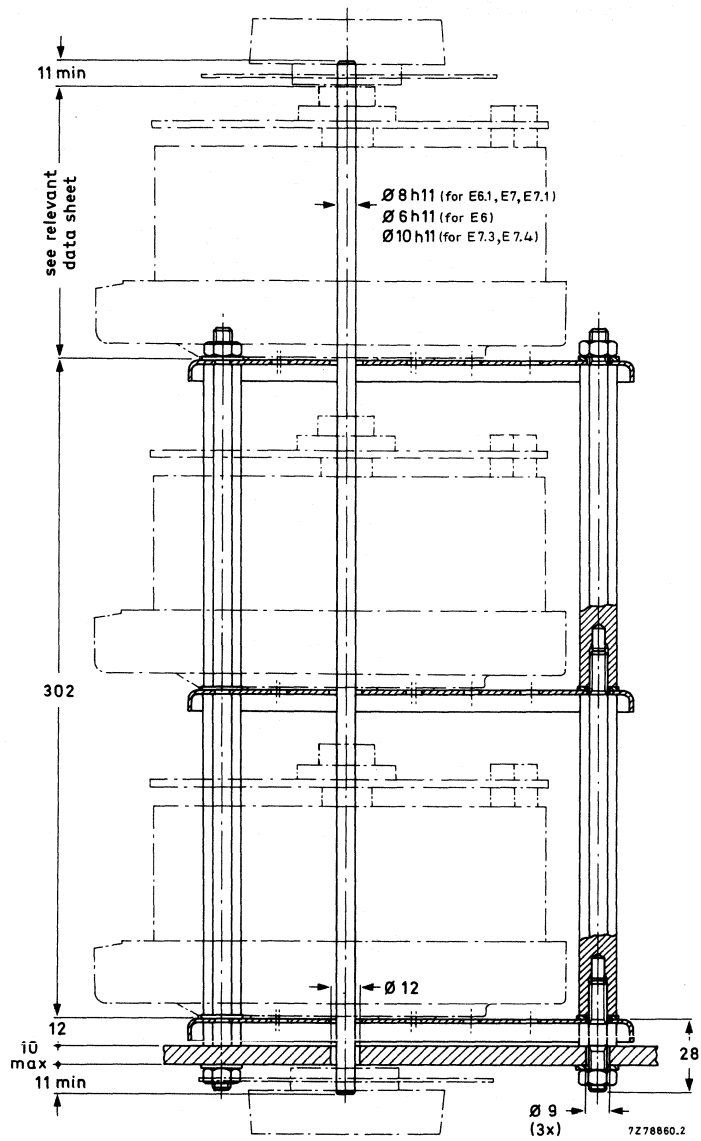


Fig. 10 Three ganged transformers.

Transformers with size code E8 and E8.1

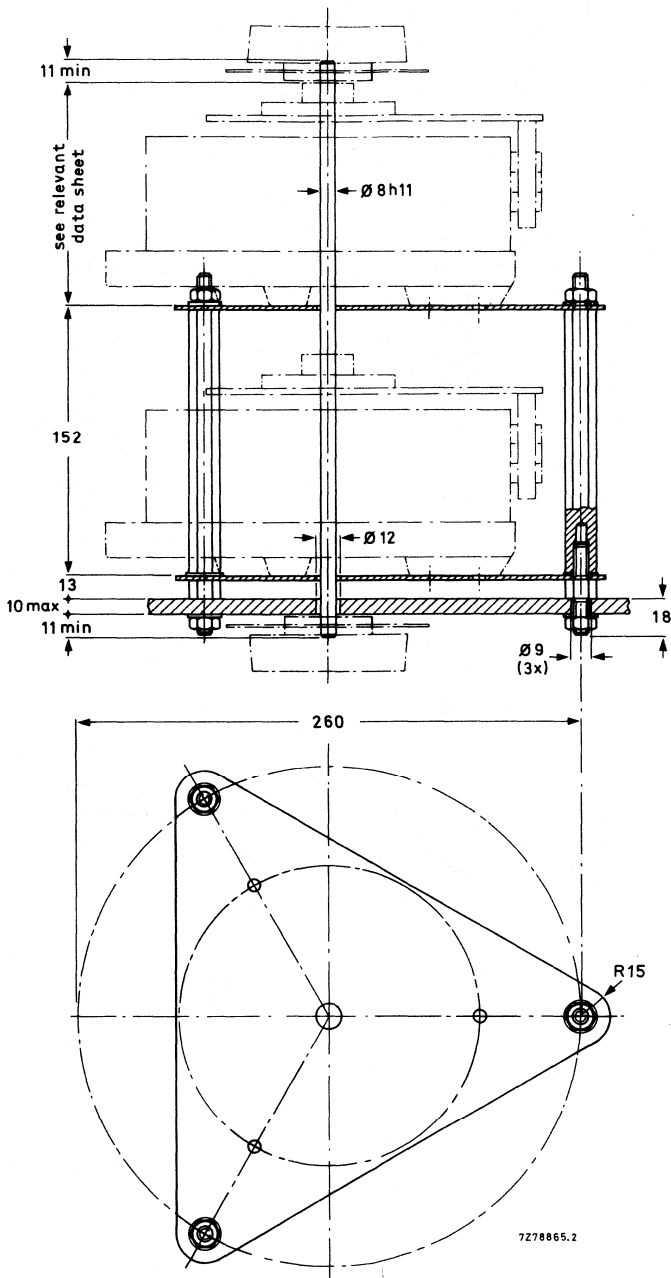


Fig. 11 Two ganged transformers.

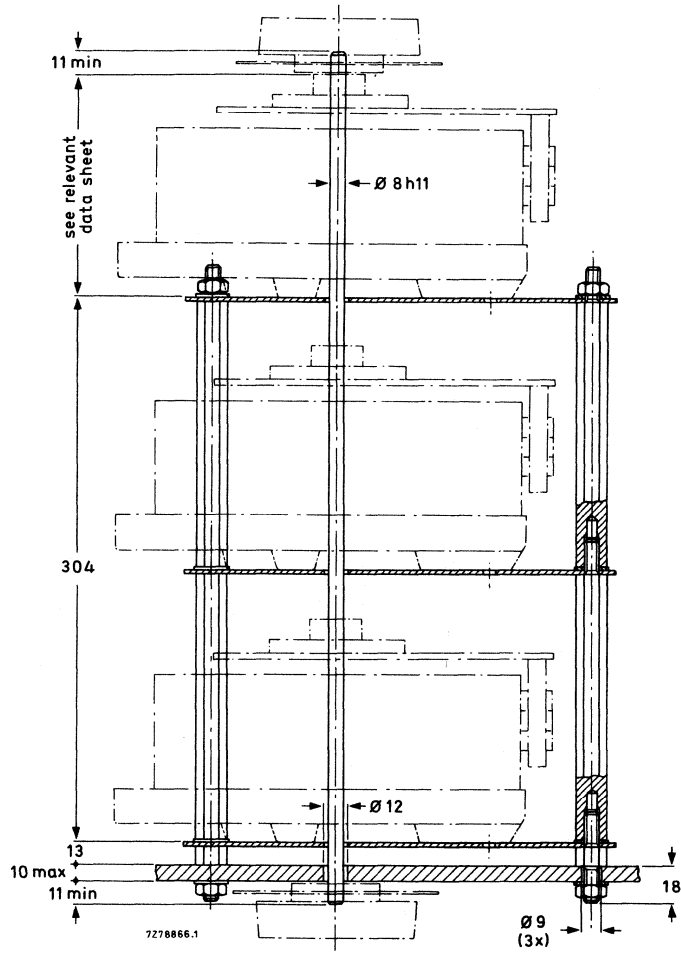


Fig. 12 Three ganged transformers.

Transformers with size code E10

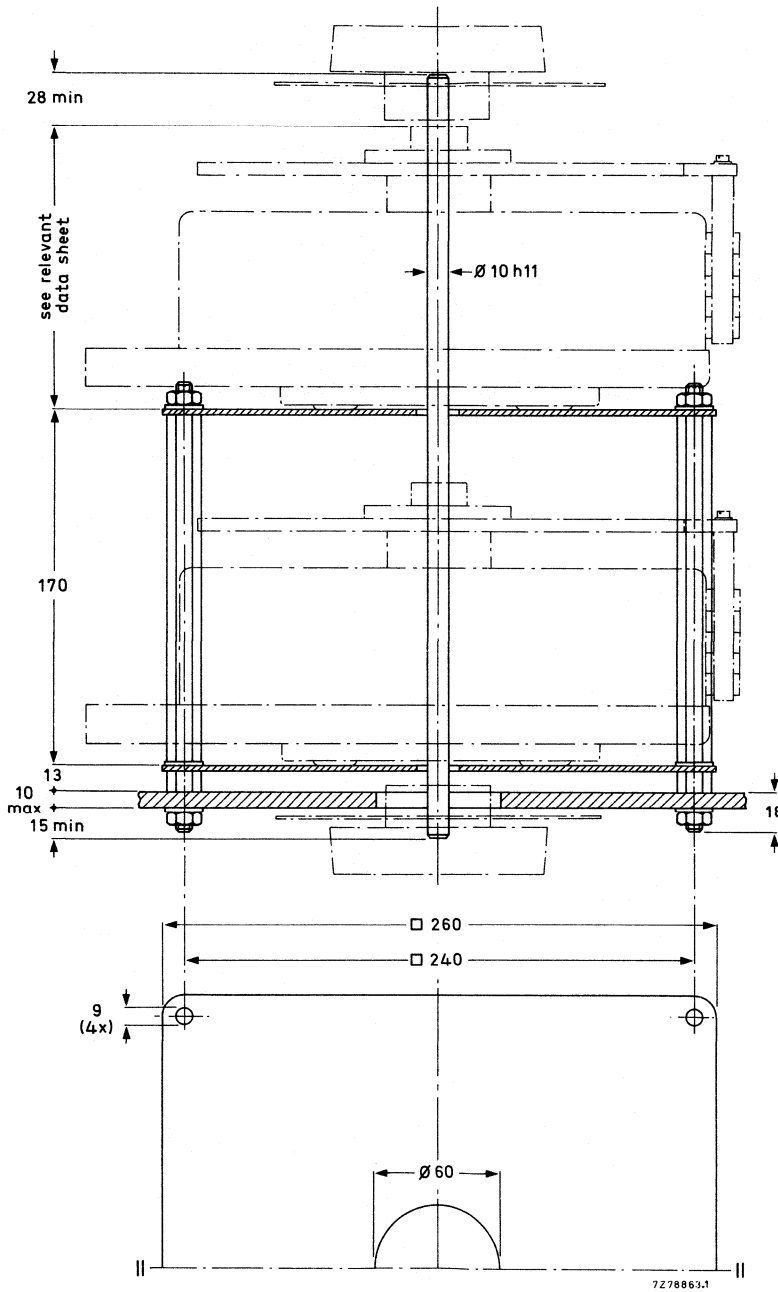


Fig. 13 Two ganged transformers.

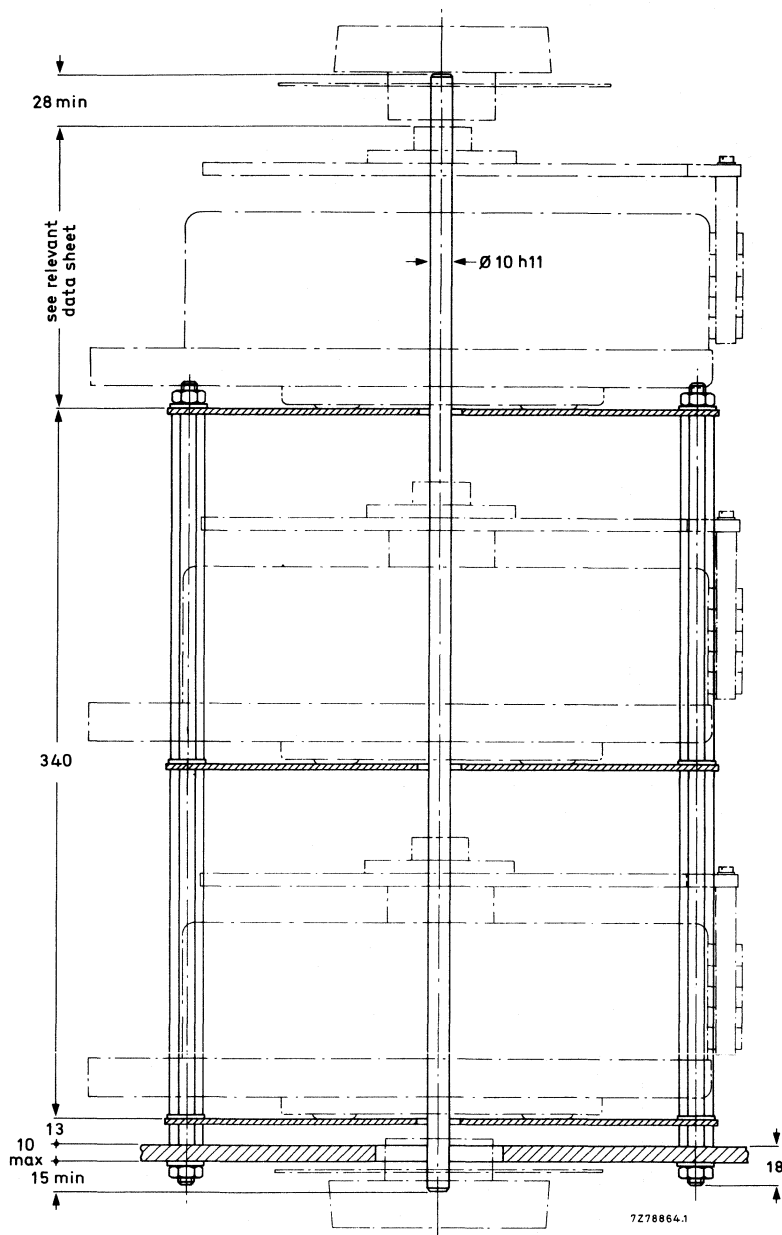


Fig. 14 Three ganged transformers.



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

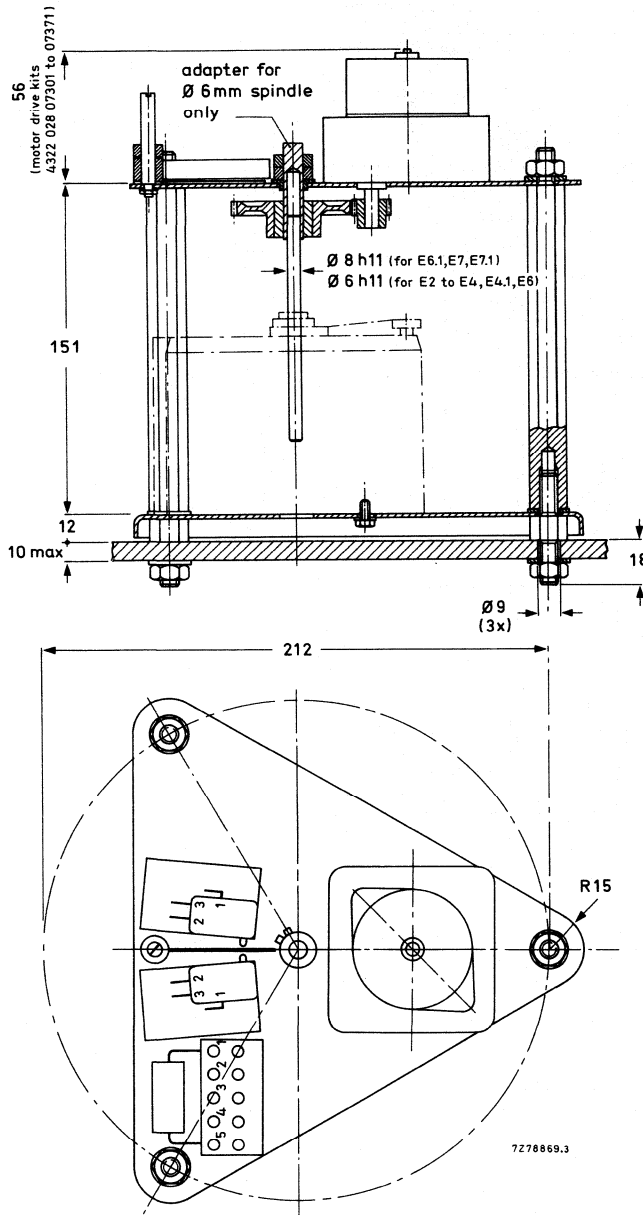


Fig. 15 Motor drive for one transformer.

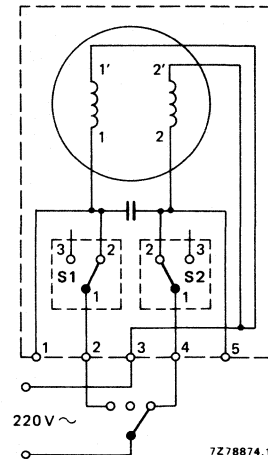


Fig. 16 Connection diagram for top-plate parts. Connection of motor terminals 1 and 2 may require interchanging (to terminals 5 and 1 respectively) for correct direction of rotation, depending on gearbox used. S1 and S2 are limit switches.

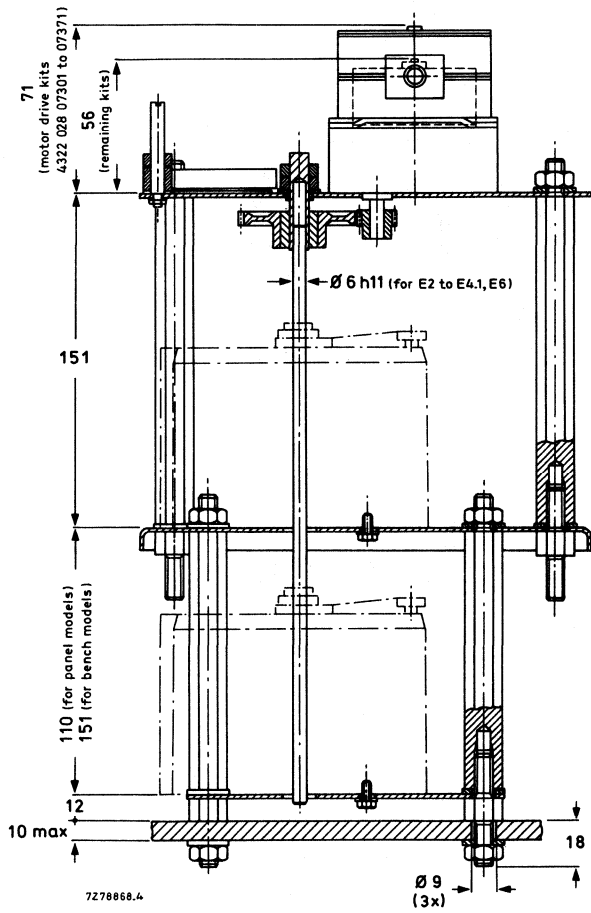


Fig. 17 Motor drive for two ganged transformers with size code E2, E3, E3.1, E4, E4.1.  
For connections of top-plate parts, see Fig. 16.  
For three ganged transformers, consult also Fig. 8.

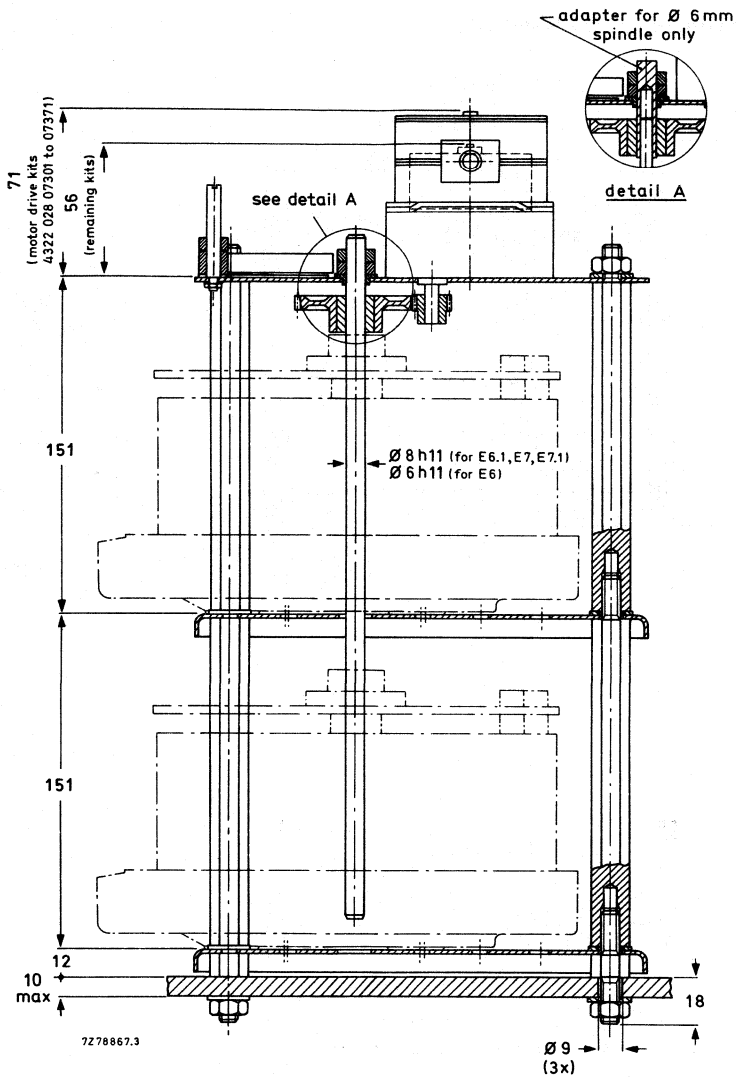


Fig. 18 Motor drive for two ganged transformers with size code E6, E6.1, E7 and E7.1.  
For connections of top-plate parts, see Fig. 16.  
For three ganged transformers, consult also Fig. 10.

## Transformers with size code E8 and E8.1

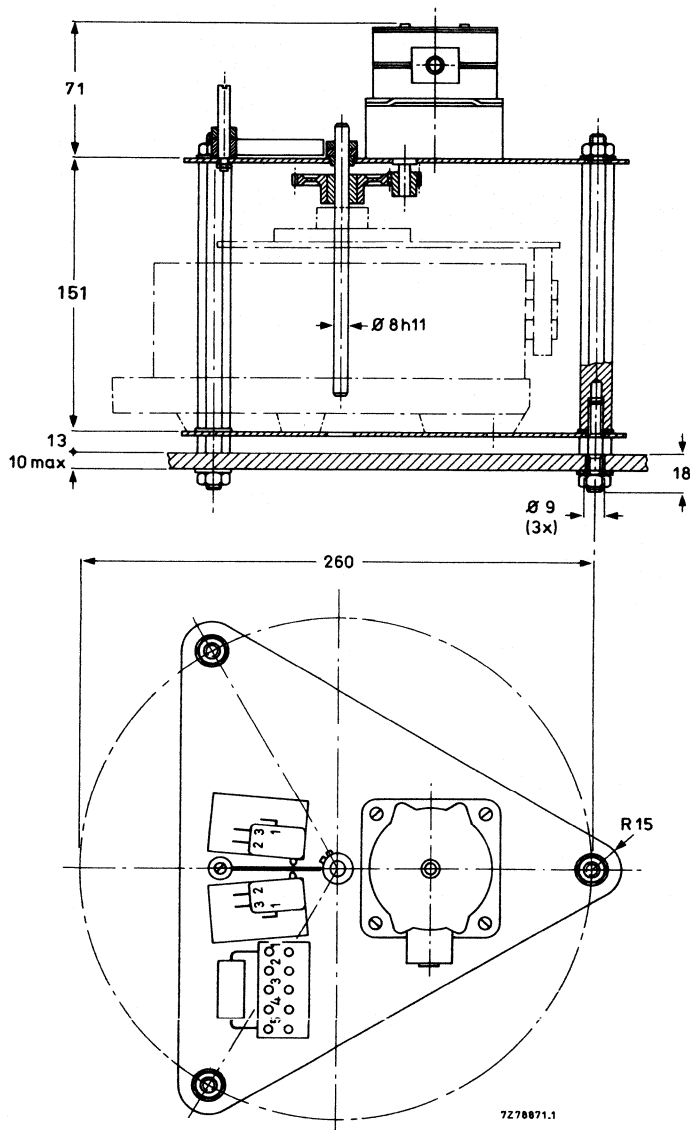


Fig. 19 Motor drive for one transformer.

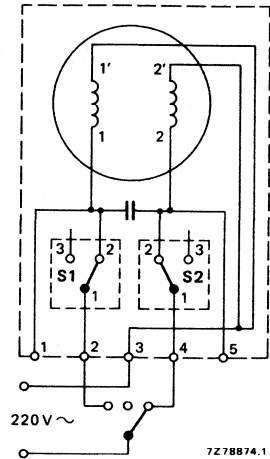


Fig. 20 Connection diagram for top-plate parts. Connection of motor terminals 1 and 2 may require interchanging (to terminals 5 and 1 respectively) for correct direction of rotation, depending on gearbox used. S1 and S2 are limit switches.

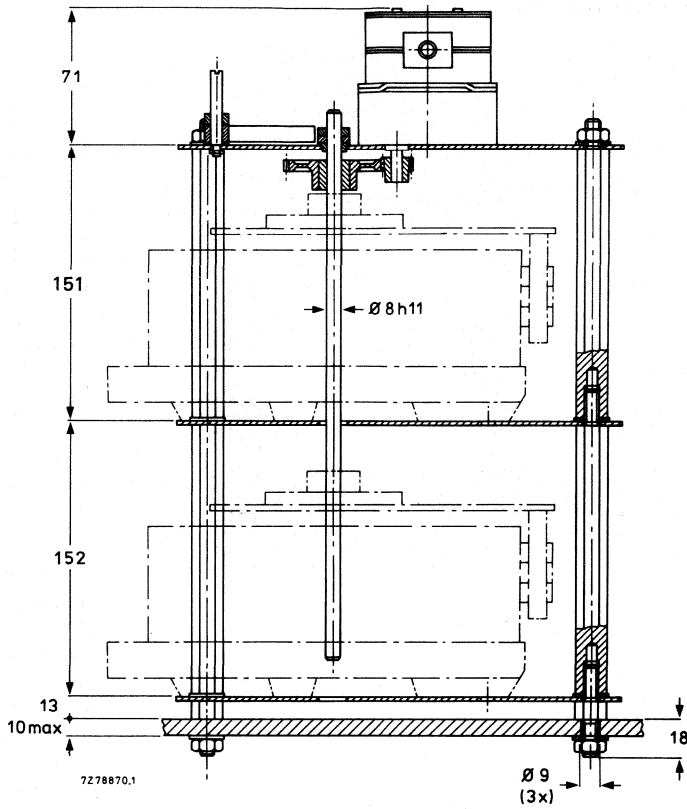


Fig. 21 Motor drive for two ganged transformers.  
 For connection of top-plate parts, see Fig. 20.  
 For three ganged transformers, consult also Fig. 12.

Transformers with size code E10

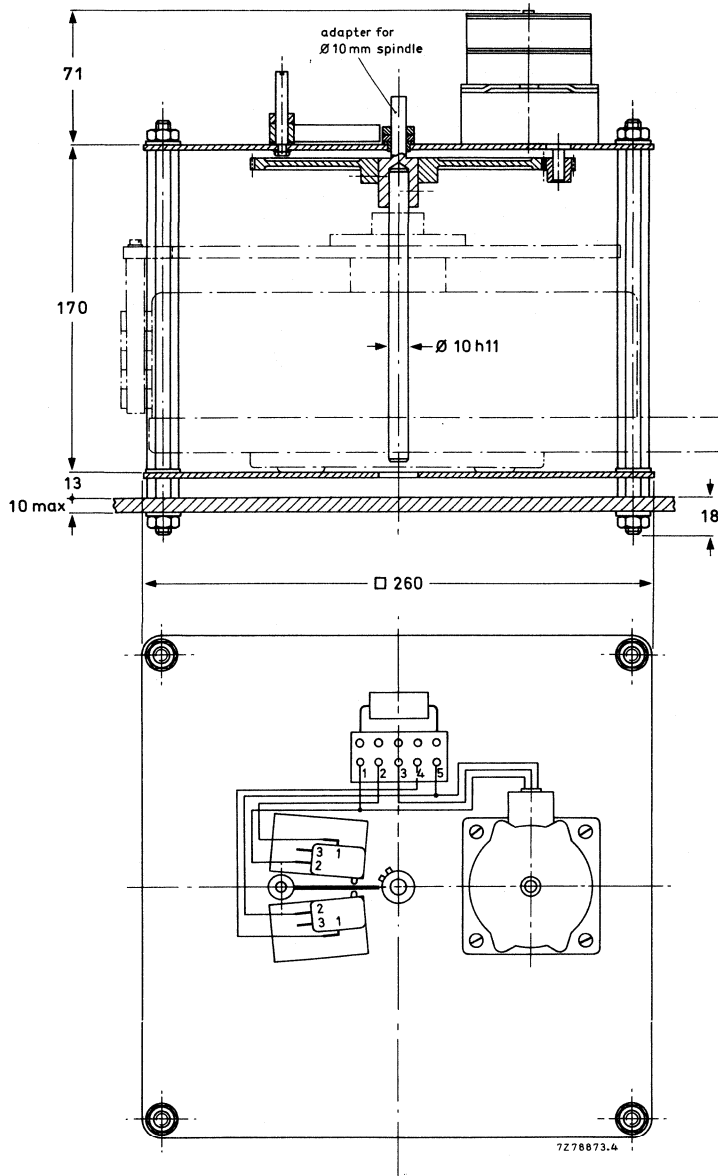


Fig. 22 Motor drive for one transformer.

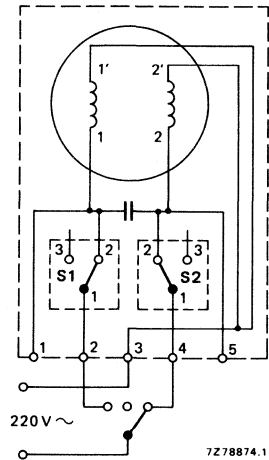


Fig. 23 Connection diagram for top-plate parts. Connection of motor terminals 1 and 2 may require interchanging (to terminals 5 and 1 respectively) for correct direction of rotation, depending on gearbox used. S1 and S2 are limit switches.

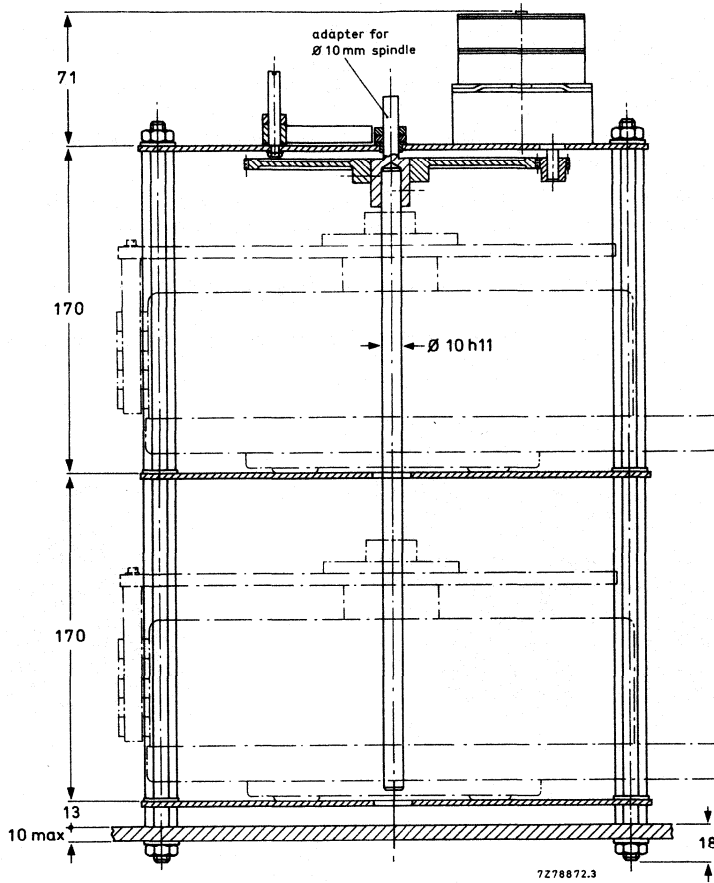


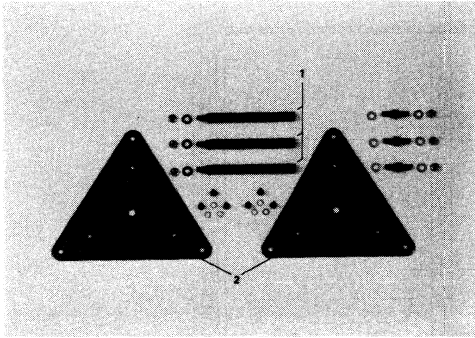
Fig. 24 Motor drive for two ganged transformers.  
 For connection of top-plate parts, see Fig. 23.  
 For three ganged transformers, consult also Fig. 14.

## ORDERING

For correct ordering use Table 1 paying particular attention to the following points.

- A) For **mechanical ganging** order ganging unit (Fig. 25) and spindle; see columns 4 and 5.
- B) For **motor drive of single transformers** order base plate assembly (Fig. 26) and motor drive kit (Fig. 27); see columns 6 and 7.  
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.
- C) For **electrical parallel connection** order also chokes (Fig. 28); see column 3.
- 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



1 = distance rods;  
2 = coupling plates;  
components for attachment.

Fig. 25 Example of components of ganging unit.

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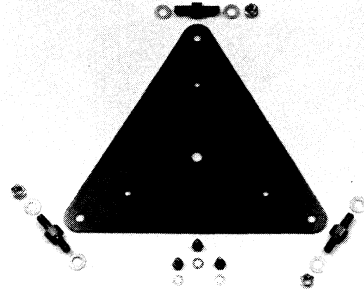
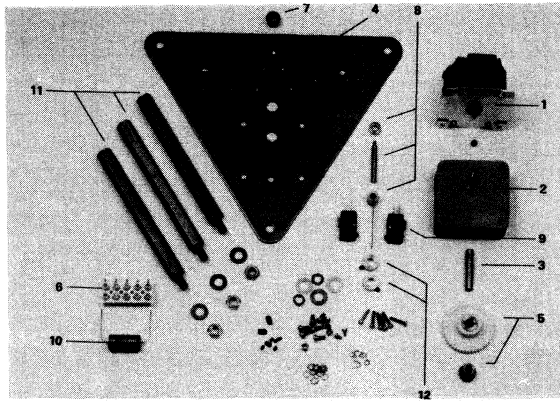


Fig. 26 Example of components of base plate assembly.



830809-08-01



- 1 = synchronous motor, 220 V, 50 Hz;
  - 2 = gear box + pinion;
  - 3 = adapter for  $\phi$  6 mm or  $\phi$  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. 27 Example of components of motor drive kit.

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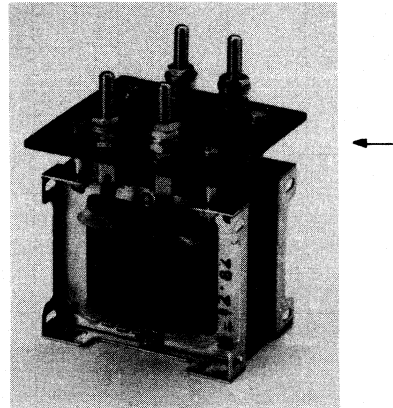


Fig. 28 Example of a choke.

\* If required.







## 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 AC 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 AC stabilizer module;
- a control potentiometer.

Figure 1 shows the block diagram of the stabilizer circuit. A stabilized power supply provides a DC 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.

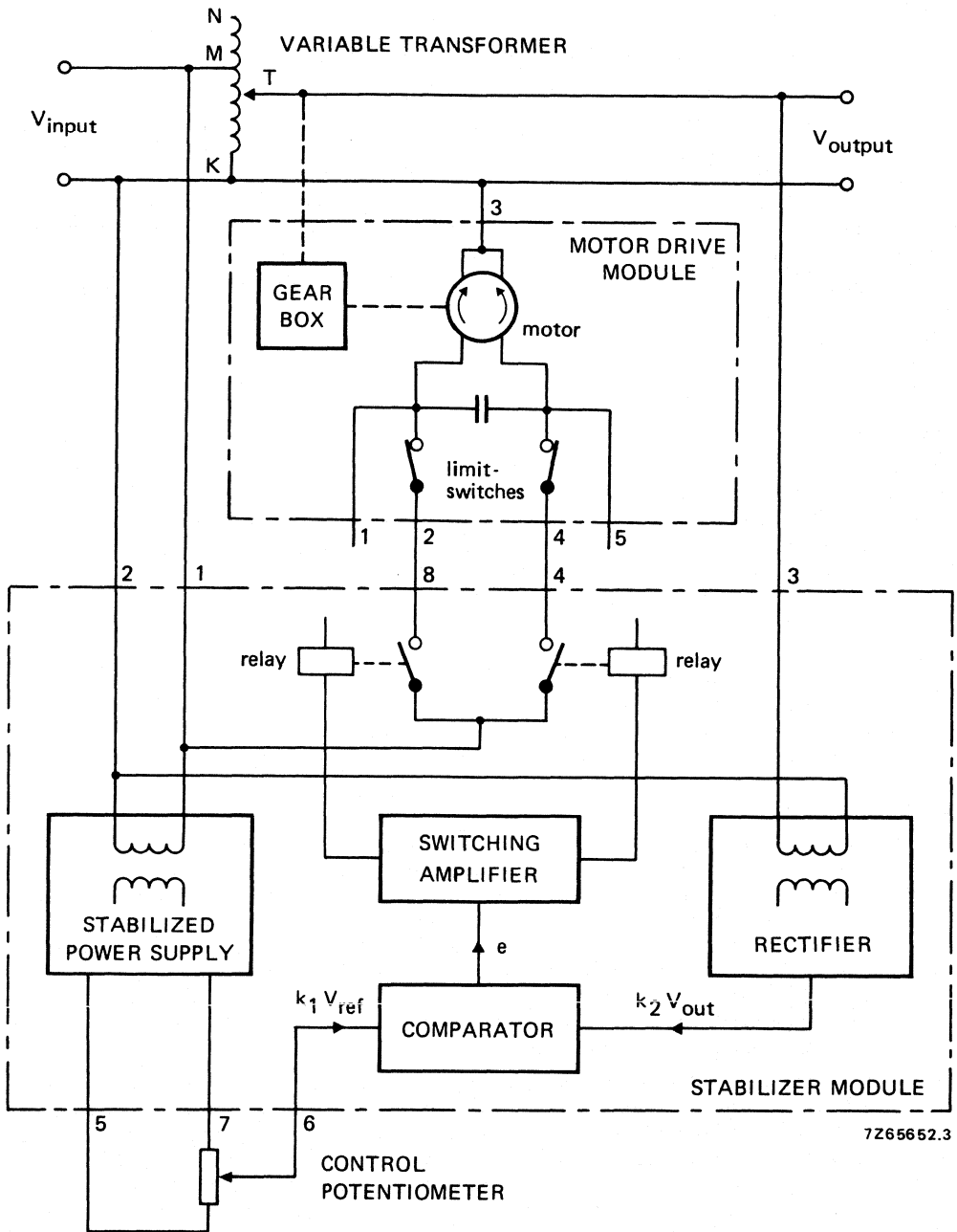


Fig. 1 Voltage stabilization: block diagram.

## MECHANICAL DATA

Dimensions in mm

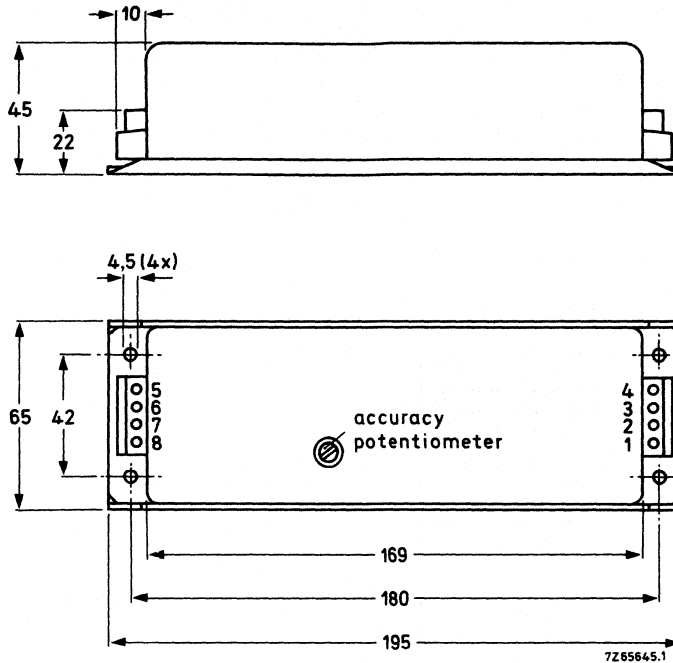


Fig. 2 AC stabilizer module.

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 (AC)
impedance	5 k $\Omega$
Terminals 2 and 4, and 2 and 8	
maximum switching capability of relays	250 V (AC), 1 A, $\cos \phi = 0,7$
Terminals 5(+), and 7(-)	
reference output voltage	+12 V (DC)
maximum load	5 mA
Terminals 6(+), and 7(-)	
reference input voltage	0 to +12 V (DC)
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

# ACCESSORIES

Accuracy

adjustable with accuracy potentiometer between  $\pm 0,5 \text{ V (AC)}$  or voltage per turn of winding, whichever is the higher\*, and  $\pm 2,5 \text{ V (AC)}$

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

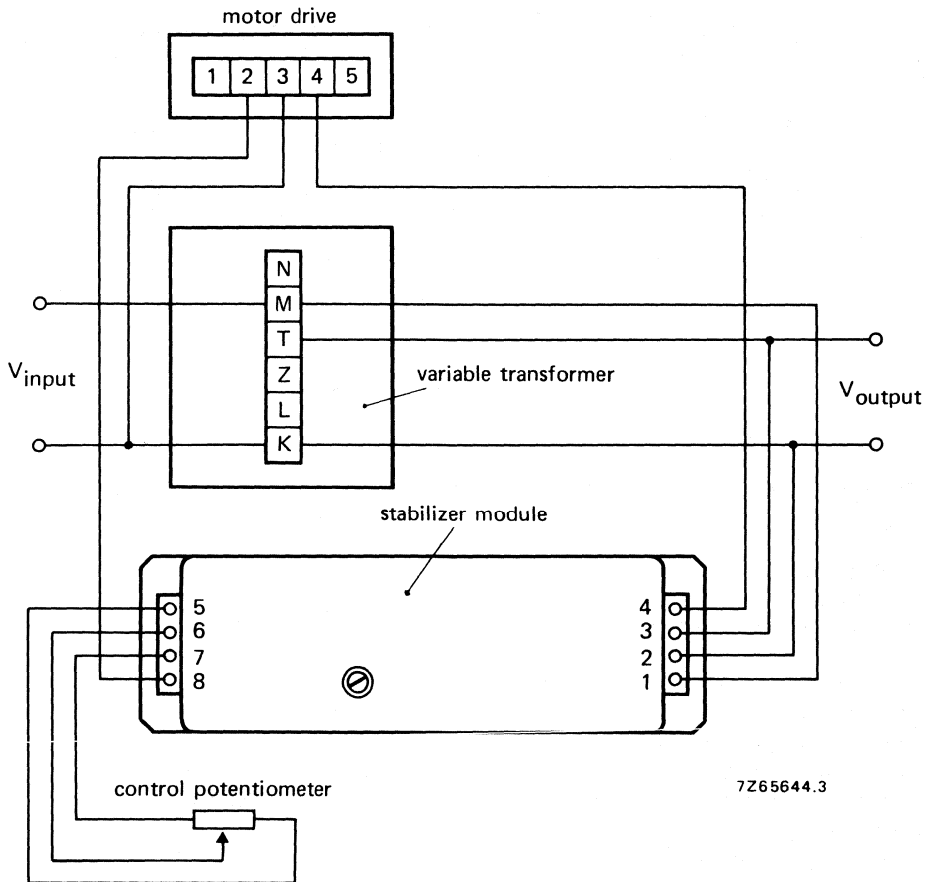


Fig. 3 AC stabilization: connections.

\* Valid for motor drive kits for rotation times  $\geq 10 \text{ s/rev}$ , see the Table of "ganging and motor drive".

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



**Notes**

Motor connections 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.

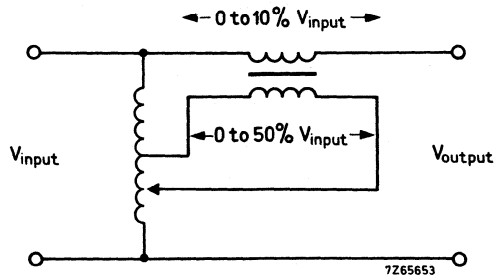


Fig. 4 Boost transformer.

**Programmed stabilization**

An external programmed voltage source can be injected into the stabilizer module. This can be done by connecting a control voltage ( $V_{\text{control}}$ ) 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 - 115 %	6	60	78	15	4	24	90044	
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, E8.1
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, E7.3, E3.2, E4.2, E5.2, E6.2, E6.3, E7.4

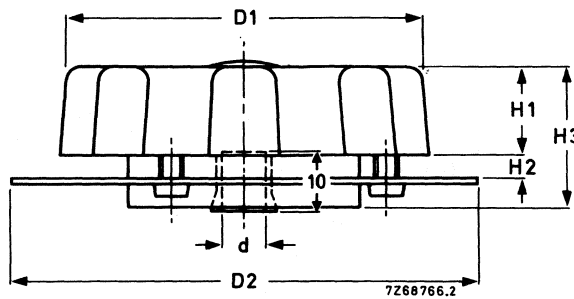


Fig. 1 Control knob with dial.

# ACCESSORIES

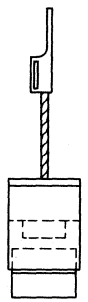
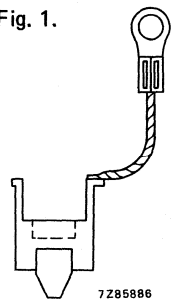


Fig. 1.



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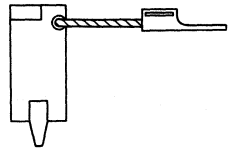
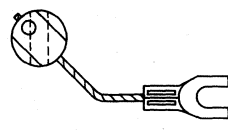


Fig. 2.



7Z85884

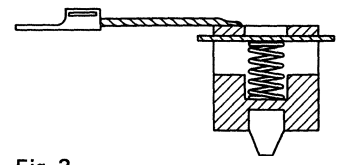
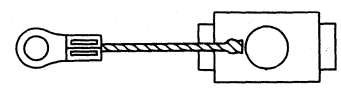


Fig. 3.



7Z85882

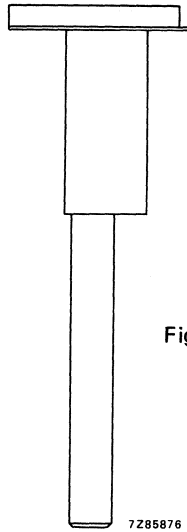


Fig. 4.

7Z85876

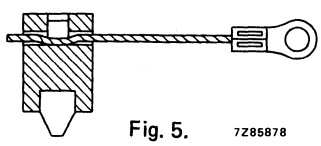


Fig. 5.

7Z85878

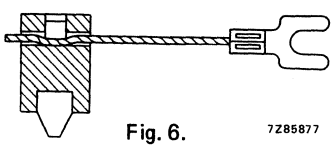
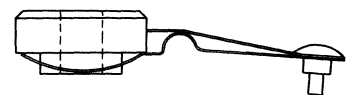


Fig. 6.

7Z85877



7Z85885

Fig. 7.



7Z85880

Fig. 8.

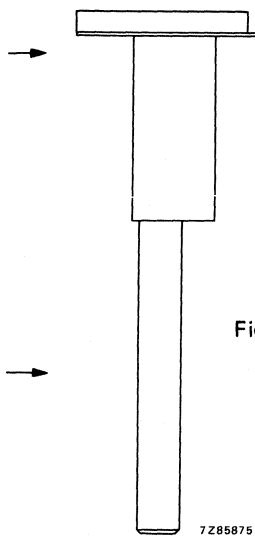


Fig. 9.

7Z85875

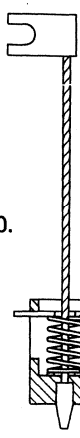
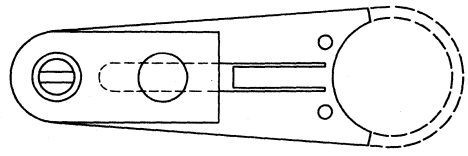


Fig. 10.

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7Z85879.1

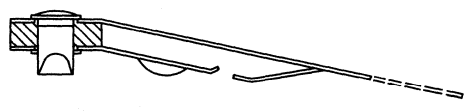
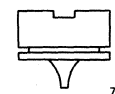


Fig. 11 (note 3).



7Z85881

Fig. 12.

## CARBON BRUSHES

Replacement carbon brushes are available for all variable transformers.

Table 1 shows all transformers of the present and previous ranges and their carbon brushes by quoting either the 12-digit Philips Components 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 that their Fig. numbers are the same.

Table 1 Carbon brush replacement guide

variable transformer	carbon brush		required number of brushes	Fig.
	Philips components 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
00011	027 75750	44012	1	6
00012	027 75750	44012	1	6
00013	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

# ACCESSORIES

Table 1 (continued)

variable transformer	carbon brush		required number of brushes	Fig.
	Philips components catalogue number	service number		
2422 530 02503	4322 026 19310	5322 362 40011	1	2
02506	02619310	40011	1	2
03301	026 19300		1	10
03302	026 19300		1	10
03306	026 19300		1	10
	027 75160	40044	1	6
03401	026 19300		1	10
	027 75160	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

Table 1 (continued)

variable transformer	carbon brush		required number of brushes	Fig.
	Philips components catalogue number	service number		
2422 530 04503	4322 026 19300		1	10
04506	026 19300		1	10
	027 75160	5322 362 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
05403	026 19300		2	10
05404	026 19300		2	10
	027 75160	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		3	1
	028 01800	44016	3	5
06507	{ see Note 1 at end of table		3	1
	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

# ACCESSORIES

Table 1 (continued)

variable transformer	carbon brush		required number of brushes	Fig.
	Philips components catalogue number	service number		
2422 530 07501	see Note 2 at end of table		5	3
07503			5	3
07506			5	3
07507	4322 028 01800	5322 362 44016	5	5
07511	028 01800	44016	5	5
08407	026 16310	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 028 01800		3	1
		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	027 78720	44015	1	9
90034	027 75750	44012	1	6
90035	026 65540	40079	1	11
90029	027 75750	44012	1	6
90035	026 65540	40079	1	11



Table 1 (continued)

variable transformer	carbon brush		required number of brushes	Fig.
	Philips components catalogue number	service number		
2422 530 90052	4322 027 75750	5322 362 44012	1	6
90053	026 65540	40079	1	11
90054	026 65540	40079	1	11
90055	026 16310	40054	1	8
90056	026 65540	40079	1	11
90057	027 75750	44012	1	6
90058	027 75750	44012	1	6
90059	027 75750	44012	1	6
90061	027 75750	44012	1	6
90062	027 75160	40044	2	6
90063	027 75160	40044	2	6
90064	028 01800	44016	5	5
90065	028 01800	44016	5	5
90066	027 75160	40044	2	6
90067	028 01800	44016	4	5
90069	027 75160	40044	2	6
90071	028 01800	44016	3	5
90072	028 01800	44016	3	5
90073	028 01800	44016	5	5
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
23507	026 65540	40079	1	11
23511	026 65540	40079	1	11

## Notes to Table 1

1. For these transformers a complete brush holder including three brushes is available under catalogue number 4322 028 09310.
2. For these transformers a complete brush holder including five brushes is available under catalogue number 4322 027 78620.
3. This new model supersedes the old style (dotted outline). It is fully compatible with previous transformer models to which the old style related.



## 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 $\Omega$

#### Test voltage

5000 V, 50 Hz

#### Leakage path

$\geq 6$  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

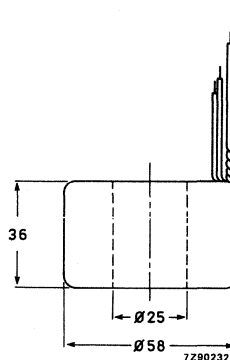
white/white  
red/white  
red/red

Colour of secondary connecting wires

black

### MECHANICAL DATA

Dimensions in mm



## DATA HANDBOOK SYSTEM

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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 six series of handbooks:

INTEGRATED CIRCUITS

DISCRETE SEMICONDUCTORS

DISPLAY COMPONENTS

PASSIVE COMPONENTS\*

PROFESSIONAL COMPONENTS\*\*

MATERIALS\*

The contents of each series are listed on pages iii 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 is given it is advisory and does not form part of the product specification.

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

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

Product specialists are at your service and enquiries will be answered promptly.

\* Will replace the Components and materials (green) series of handbooks.

\*\* Will replace the Electron tubes (blue) series of handbooks.



# INTEGRATED CIRCUITS

This series of handbooks comprises:

code	handbook title
IC01	<b>Radio, audio and associated systems</b> Bipolar, MOS
IC02a/b	<b>Video and associated systems</b> Bipolar, MOS
IC03	<b>ICs for Telecom</b> Bipolar, MOS Subscriber sets, Cordless Telephones
IC04	<b>HE4000B logic family</b> CMOS
IC05N	<b>HE4000B logic family – uncased ICs</b> CMOS
IC06	<b>High-speed CMOS; PC74HC/HCT/HCU</b> Logic family
IC07	<b>not yet issued</b>
IC08	<b>ECL 10K and 100K logic families</b>
IC09N	<b>TTL logic series</b>
IC10	<b>Memories</b> MOS, TTL, ECL
IC11	<b>Linear Products</b>
Supplement to IC11	<b>Linear Products</b>
IC12	<b>I<sup>2</sup>C-bus compatible ICs</b>
IC13	<b>Semi-custom</b> Programmable Logic Devices (PLD)
IC14	<b>Microcontroller and peripherals</b> Bipolar, MOS
IC15	<b>FAST TTL logic series</b>
IC16	<b>CMOS integrated circuits for clocks and watches</b>
IC17	<b>ICs for Telecom</b> Bipolar, MOS Radio pagers Mobile telephones ISDN
IC18	<b>Microprocessors and peripherals</b>
IC19	<b>Data communication products</b>

## DISCRETE SEMICONDUCTORS

This series of data handbooks comprises:

current code	new code	handbook title
S1	SC01*	<b>Diodes</b> High-voltage tripler units
S2a	SC02*	<b>Power diodes</b>
S2b	SC03*	<b>Thyristors and triacs</b>
S3	SC04*	<b>Small-signal transistors</b>
S4a	SC05*	<b>Low-frequency power transistors and hybrid modules</b>
S4b	SC06	<b>High-voltage and switching power transistors</b>
S5	SC07*	<b>Small-signal field-effect transistors</b>
S6	SC08*	<b>RF power transistors</b>
	SC09*	<b>RF power modules</b>
S7	SC10*	<b>Surface mounted semiconductors</b>
S8a	SC11*	<b>Light emitting diodes</b>
S8b	SC12*	<b>Optocouplers</b>
S9	SC13*	<b>PowerMOS transistors</b>
S10	SC14*	<b>Wideband transistors and wideband hybrid IC modules</b>
S11	SC15	<b>Microwave transistors</b>
S15**	SC16	<b>Laser diodes</b>
S13	SC17	<b>Semiconductor sensors</b>
S14	SC18*	<b>Liquid crystal displays and driver ICs for LEDs</b>

\* Not yet issued with the new code in this series of handbooks.

\*\* New handbook in this series; will be issued shortly.

## DISPLAY COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
T8	DC01	Colour display systems
T16	DC02*	Monochrome tubes and deflection units
C2	DC03*	Television tuners, coaxial aerial input assemblies
C3	DC04*	Loudspeakers
C20	DC05*	Wire-wound components for TVs and monitors

\* These handbooks are currently issued in another series; they are not yet issued in the Display Components series of handbooks.

## PASSIVE COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
C14	PA01	Electrolytic capacitors; solid and non-solid
C11	PA02*	Varistors, thermistors and sensors
C12	PA03*	Potentiometers, encoders and switches
C7	PA04*	Variable capacitors
C22	PA05*	Film capacitors
C15	PA06*	Ceramic capacitors
C9	PA07*	Piezoelectric quartz devices
C13	PA08*	Fixed resistors

\* Not yet issued with the new code in this series of handbooks.

## PROFESSIONAL COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
T1	*	Power tubes for RF heating and communications
T2a	*	Transmitting tubes for communications, glass types
T2b	*	Transmitting tubes for communications, ceramic types
T3	PC01**	High-power klystrons
T4	*	Magnetrons for microwave heating
T5	PC02**	Cathode-ray tubes
T6	PC03**	Geiger-Müller tubes
T9	PC04**	Photo and electron multipliers
T10	PC05**	Plumbicon camera tubes and accessories
T11	PC06**	Microwave diodes and sub-assemblies
T12	PC07**	Vidicon and Newvicon camera tubes and deflection units
T13	PC08**	Image intensifiers and infrared detectors
T15	PC09**	Dry reed switches
C8	PC10	Variable mains transformers; annular fixed transformers

\* These handbooks will not be reissued.

\*\* Not yet issued with the new code in this series of handbooks.

## MATERIALS

This series of data handbooks comprises:

current code	new code	handbook title
C4 } C5 }	MA01*	Soft Ferrites
C16	MA02**	Permanent magnet materials
C19	MA03**	Piezoelectric ceramics

\* Handbooks C4 and C5 will be reissued as one handbook having the new code MA01.

\*\* Not yet issued with the new code in this series of handbooks.



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T66

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