SIEMENS

Ferrites

Soft-Magnetic Material

Data Book 1986/87

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(in numerical order)

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Ordering Code

In this data book – in line with Siemens' in-house regulations – the part numbers (ordering codes) which have so far been used unabbreviated (15 digits) have been replaced by an abbreviated form. Both forms may be used during a transition period. Some examples are given below:

Unabbreviated form	Abbreviated form
B65651-N0063-A001	B65651-N63-A1
B65652-B0000-T001	B65652-B-T1
B65659-E0001-X023	B65659-E1-X23
B65652-A5000-X000	B65652-A5000

We regard it as unnecessary to introduce the complex rules for our ordering code system to our customers and therefore ask them to use the ordering codes as quoted in the data books or data sheets when placing an order.
As for us, we will, of course, understand both forms.

Ordering code system

Example of the ordering code for an RM 5 core set, made of ferrite (SIFERRIT®) material N 48, 250 nH A_L value, ±3% tolerance of A_L value, type B 65805 (see page 277).

Ordering code: B65805–N250–A 48

- B65805: Type
- N: Revision status
- 250: A_L value in nH
- A: Tolerance of A_L value (A ≙ ±3%)
- 48: Code for ferrite material N 48

For special components, an uncoded inquiry is requested. The appropriate ordering code will be allocated.

Improvements and technical advance are expressed by changing the code letter for the revision status. It is reserved to deliver the components with a revision status later than that ordered.

Tolerance code letters

The tolerances of the A_L values are coded by letters in the third block of the ordering code similar to the recommendations in IEC publication 62/1968.

Code letter	Tolerance of A_L value	Code letter	Tolerance of A_L value
A	± 3%	Q	+30/−10%
G	± 2%	R	+30/−20%
J	± 5%	U	+80/−0%
K	± 10%	X	filling letter only
L	± 15%	Y	+40/−30%
M	± 20%	–	–

The tolerance values available are included in the individual ordering codes.
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Definitions, Standards, Quality

Definitions

SI units

In the present data book, SI units were introduced in accordance with the performance specifications of the Law for Units in Testing Procedures, dated 26th July, 1970. The main relations between these units and those used in previous editions of this data book are summarized in the following:

	Previous units
Magnetic flux density (magnetic induction)	
1 T (Tesla) = 1 Vs/m^2 = 10^{-4} Vs/cm^2	= 10^4 G
Decimal multiples or parts of this unit are permissible, e.g. mT (Millitesla), 1 mT = 10 x 10^{-8} Vs/cm^2	= 10 G
Magnetic field strength, magnetization	
1 A/m = 10^{-2} A/cm	= 1.257 x 10^{-2} Oe
Decimal multiples or parts can be used here, too e.g. 1 kA/m = 10^3 A/m = 10 A/cm	= 12.57 Oe
Density of energy	
1 J/m^3 = 1 T · 1 A/m = 1 mT · 1 kA/m	= 125.7 GOe
A decimal multiple of this unit is 1 kJ/m^3 = 1 mJ/cm^3	= 1.257 x 10^5 GOe
Magnetic flux	
1 Wb (Weber) = 1 Vs = 1 Tm^2	= 10^8 Gcm^2 = 10^8 M
A decimal part of this unit is the milliweber (mWb) 1 mWb = 10^{-3} Wb	= 10^5 M

Magnetic field constant (induction constant)

$$\mu_0 = 1.257 \times 10^{-6} \frac{T}{A/m} = 1.257 \times 10^{-6} \frac{Vs}{Am} = 1.257 \times 10^{-8} \frac{Vs}{Acm} = 1 \frac{G}{Oe}$$

From the stated decimal multiples and parts, it follows for μ_0:

$$\mu_0 = 1.257 \frac{mT}{kA/m} = 1.257 \times 10^{-6} \frac{H}{m}$$

Resistance (to tension and compression)	
1 Newton/square millimeter (N/mm^2)	= 0.102 kp/mm^2
10 N/mm^2 correspond to	approx. 1 kp/mm^2

Thermal conductivity

$$1 \frac{J}{mm \cdot s \cdot K} = \frac{W}{mm \cdot K} \qquad = 2.39 \frac{cal}{cm \cdot s \cdot {}^\circ C}$$

Definitions

Symbols	Meaning	Unit
V	Voltage, rms value of sinusoidal voltage	V
$\hat{V}$	Peak value of the voltage	V
J	Polarization	Vs/m^2
B	RMS value of magnetic flux density 10^{-4} Vs/m^2 =(1 G) = 0.1 mT	Vs/m^2
$\hat{B}$	Peak value of magnetic flux density	Vs/m^2
B_-	Direct field flux density	Vs/m^2
B_s	Peak value of saturation flux density	Vs/m^2
I	Current, rms value of sinusoidal current	A
I_-	Direct current	A
$\hat{I}$	Peak value of current	A
H	Magnetic field strength	A/m
$\hat{H}$	Peak value of magnetic field strength	A/m
H_-	DC field strength	A/m
μ_r	(Rel.) permeability, permeability number	A/m
μ_0	Magnetic field constant $\mu_0 = 1.257 \times 10^{-6}$ H/m	Vs/Am
μ_i	(Rel.) initial permeability	
μ_e	(Rel.) effective permeability	
μ_a	(Rel.) amplitude permeability	
μ_{rev}	(Rel.) reversible permeability	
μ_{app}	(Rel.) apparent permeability	
μ_{tot}	(Rel.) total permeability derived from the static magnetization curve	
$\overline{\mu}$	(Rel.) complex permeability	
μ'_s	(Rel.) real (inductance) component of $\overline{\mu}$	expressed in series terms
μ''_s	(Rel.) imaginary loss component of $\overline{\mu}$	
μ'_p	(Rel.) real (inductance) component of $\overline{\mu}$	expressed in parallel terms
μ''_p	(Rel.) imaginary loss component of $\overline{\mu}$	
μ_p	(Rel.) pulse permeability	
L	Self-inductance	H = Vs/A; nH = 10^{-9} H
L_0	Inductance of a coil without core	H
L_s	Series inductance	H
L_{rev}	Reversible inductance	H
A_L	Inductance factor; $A_L = L/N^2$	nH
N	Number of turns	
$\tan \delta$	Loss factor	
$\tan \delta_L$	Loss factor of the coil	
$\tan \delta_r$	(Residual) loss factor at $H \rightarrow 0$	
$\tan \delta_e$	Effective loss factor	
$\tan \delta_h$	Hysteresis loss factor	
$\tan \delta/\mu_i$	Relative loss factor of the material at $H \rightarrow 0$	
Q	Quality factor ($Q = \omega L/R_s = 1/\tan \delta_L$)	
P_v	Relative power loss	mW/g
ω	Angular frequency; $\omega = 2 \pi f$	s^{-1}
f	Frequency	s^{-1}, Hz

Definitions

Symbols	Meaning	Unit
h	Hysteresis coefficient of the material	cm/MA = 10^{-6} cm/A
h/μ_i^2	Relative hysteresis coefficient	cm/MA = 10^{-6} cm/A
η_B	Hysteresis material constant (in accordance with IEC)	
	$\eta_B = \frac{1}{2\pi \cdot \sqrt{2} \cdot \mu_0} \frac{h}{\mu_i^2}$; $h/\mu_i^2 = 2\pi \cdot \sqrt{2} \cdot \mu_0 \cdot \eta_B$	1/mT
η_i	Hysteresis core constant	$A^{-1}\ H^{-1/2}$
k_u	Voltage distortion factor	
α	Temperature coefficient (previously "*TC*")	1/°C; 1/K
α/μ_i	Relative temperature coefficient of the material (previously TC/μ_i, α_F in accordance with IEC)	1/°C; 1/K
α_e	Temperature coefficient of effective permeability	$\alpha_e = \alpha \frac{\mu_e}{\mu_i}$
t	Time	s, h
T	Temperature	°C
d	Disaccommodation coefficient	
DF	Relative disaccommodation coefficient $DF = d/\mu_i$	
$\Sigma l/A$	Core factor (magnetic characteristics)	mm^{-1}
$\Sigma l/A^2$	Core factor (magnetic characteristics)	mm^{-3}
l_e	Effective length (magnetic characteristics)	mm
A_e	Effective area (magnetic characteristics)	mm^2
V_e	Effective volume (magnetic characteristics)	mm^3
R	Resistance	Ω
R_h	Hysteresis loss resistance of a core	Ω
R_v	Effective loss resistance of a coil	Ω
R_s	Series loss resistance of a core	Ω
R_p	Parallel loss resistance of a core	Ω
R_r	Residual or after-effect loss resistance of a core	Ω
R_{Cu}	Winding resistance (f = O)	Ω
τ_{Cu}	DC current time constant $\tau_{Cu} = L/R_{Cu} = A_L/A_R$	s
f_{Cu}	Copper factor	
ρ	Resistivity	Ω mm; Ω m
A_R	Resistance factor, $A_R = R_{Cu}/N^2$	μΩ = 10^{-6}
l_N	Average length of turn	mm
A_N	Winding cross section	mm^2
ε_r	Rel. dielectric constant	
λ_s	Magnetostriction at saturation magnetization	
s	Total air gap	mm
Z	Complex impedance	Ω
t_d	Pulse duration	s
ΔB	Flux density deviation	mT
S	Current density	A/mm^2

Definitions

1 Permeability

The magnetic flux density (induction) inside an inductor with a ferrite core is composed of the magnetic flux density of the vacuum $\mu_0 H$ and the magnetic polarization J of the ferrite:

$$B = \mu_0 H + J$$

μ_0 = magnetic field constant.

Here, the so-called relative permeability or magnetic constant μ is introduced, defining:

$$B = \mu_r \mu_0 H \text{ or } \mu_r = \frac{1}{\mu_0} \cdot \frac{B}{H}$$

See also definitions in IEC publications 125, 205, 218, 219, 367.

1.1 Initial permeability μ_i

The initial permeability is defined as the ratio of the variation of flux density ΔB to that of the field strength ΔH in very weak ac fields ($\Delta H \rightarrow 0$), measured with a magnetically closed core (toroid). A measuring flux density of less than 0.25 mT is recommended.

$$\mu_i = \frac{1}{\mu_0} \cdot \frac{\Delta B}{\Delta H} \; (\Delta H \rightarrow 0).$$

1.2 Effective permeability μ_e, dimensional parameters, calculation of the air gap.

If an air gap is introduced in a magnetically closed core, e.g. a toroid or pot core, the permeability is lower than that of the same core without air gap. This smaller permeability is due to the higher reluctance of the air gap, and is called effective permeability. Its value depends not only on the core material but also on the shape and dimensions of the core.

$$\mu_e = \frac{1}{\mu_0} \cdot \frac{L}{N^2} \sum \frac{l}{A}$$

$\sum \frac{l}{A}$ and $\sum \frac{l}{A^2}$ are the core factors, the method of summation being specified in IEC publications 205, 205 A, and 205 B. By means of these factors the effective dimensions can be calculated as follows:

effective magnetic length $\quad l_e = (\sum \frac{l}{A})^2 / \sum \frac{l}{A^2}$

effective magnetic area $\quad A_e = l_e / \sum \frac{l}{A}$

effective magnetic volume $\quad V_e = l_e \cdot A_e$

The magnetic data is indicated on the pages of the individual core versions.

From these parameters the inductance, for example, can be calculated:

$$L = \mu_0 \mu_e N^2 \,/\, \sum \frac{l}{A}$$

or in the case of ungapped toroids,

$$L = \frac{1}{2\pi} \mu_i \mu_0 N^2 h \ln \frac{d_a}{d_i}$$

(where d_a and d_i are the outer and inner diameter and h is the height of the toroid).

By way of approximation, for $s \ll l_e$

$$\mu_e = \frac{\mu_i}{1 + \frac{s}{l_e}\mu_i}$$

1.3 Apparent permeability μ_{app}

This is defined as the relationship between the inductance L of the inductor with a magnetic core and the inductance L_0 of the same inductor without core, so that

$$\mu_{app} = \frac{L}{L_o}.$$

This definition is preferably used with cylindrical, tubular and screw cores where, because of the substantial stray inductances, a clear identification either of initial or effective permeability is not possible.

The apparent permeability μ_{app} of a given core material is a function of the core shape, the position of the winding with respect to the core, and of the coil data. A simple comparison of the apparent permeabilities of cores made of different materials is therefore only possible if these conditions are identical.

The apparent permeability μ_{app} is, in general, lower than the effective permeability μ_e.

1.4 Reversible permeability μ_{rev}

When a ferrite core is magnetized with a dc field H_- upon which a weak ac field $H_\sim$ is superimposed, the ac field produces a small lancet-shaped hysteresis loop which changes to a straight line as the ac field is reduced. The slope of this line is called "reversible permeability".

$$\mu_{rev} = \frac{1}{\mu_0} \lim \left[\frac{\Delta B}{\Delta H}\right] H_- \qquad \Delta H \rightarrow 0$$

The reversible permeability μ_{rev} is a function of the dc magnetic bias.
It usually reaches its maximum value when the dc field strength H_- is zero. In the case of toroids it is identical with the initial permeability μ_i.

It is not possible to determine from toroidial core data what effect the dc magnetic bias has on other core shapes. For this reason, the magnetic bias curves are given separately for specific core shapes.

For stability reasons, a dc bias should be avoided with high Q filter coils if possible, or its effect should at least be sufficiently reduced by an air gap (see para. 9, disaccommodation).

1.5 Complex permeability $\overline{\mu}$

With the (relative) complex permeability $\overline{\mu}$, the impedance $\overline{Z}$ of an inductor with ferrite core can be described on the basis of the law of induction as follows:
$\overline{Z} = j\omega\overline{\mu}\,L_0$, where L_0 is the inductance of the inductor without the core[1].

$$L_0 = \mu_0 \frac{N^2 A_e}{l_e}$$

On the other hand, an inductor with a ferrite core can be represented in an equivalent circuit by a lossless self-inductance L_s connected in series with a loss resistance R_s which is attributable only to the ferrite core material. The impedance $\overline{Z}$ can therefore be given by:
$\overline{Z} = j\omega L_s + R_s$
By equating, one obtains the complex permeability:

$$\overline{\mu} = \frac{L_s}{L_0} - j\frac{R_s}{\omega L_0}.$$

The real part:

$$\mu'_s = \frac{L_s}{L_0} = \frac{L_s\, l_e}{\mu_0 N^2 A_e}$$

represents the inductive permeability, and the imaginary part:

$$\mu''_s = \frac{R_s}{\omega L_0} = \frac{R_s\, l_e}{\omega \mu_0 N^2 A_e}$$

the resistive permeability determining the core losses.

[1] L_0 = inductance that would be measured if the core had uniform permeability, the flux distribution remaining unaltered (in the case of toroids).

The loss factor of the core is then:

$$\tan\delta = \frac{\mu''_s}{\mu'_s} = \frac{R_s}{\omega\, L_s}$$

In certain cases it is useful to employ the parallel equivalent circuit:
From

$$\bar{Z} = \frac{1}{1\,/\,R_p + 1\,/\,j\omega L_p}$$

the real part is found to be:

$$\mu'_p = \frac{L_p}{L_0} = \frac{L_p\, l_e}{\mu_0\, N^2\, A_e}$$

and the imaginary part:

$$\mu''_p = \frac{R_p}{\omega\, L_0} = \frac{R_p\, l_e}{\omega\; \mu_0 N^2\; A_e} \quad \text{and}$$

$$\tan\delta = \frac{\mu'_p}{\mu''_p} = \frac{\omega\;\, L_p}{R_p}$$

The relations between series and parallel terms are given by:

$$\mu'_p = \mu'_s\;\,(1 + \tan^2\delta) \text{ and}$$

$$\mu''_p = \mu''_s\;\,(1 + 1/\tan^2\delta,$$

Due to the influence of the hysteresis losses (see 6.5), R_s, R_p, and tan δ depend on the measuring field strength, but since the value for a negligibly low field strength is normally given, the loss factor includes only the remanence losses (also called the residual losses, see 6.1), so that:

$$\tan\delta = \tan\delta_r.$$

The variation of μ'_s and μ''_s of Siemens ferrite materials with frequency was measured at flux densities < 0.1 mT. For ferrite materials with higher permeability, low resistivity, and high dielectric constant, the shape of the curve largely depends on the dimensions of the core sample because eddy currents are allowed to be built up over the full core cross section (volume resonance).
An example of this is shown on page 47 covering measurements at three toroids of different heights made of a manganese zinc ferrite.
For these reasons, cores with smaller magnetic area can be used at higher frequencies.

2 Inductance factor A_L

It has been found useful to employ the magnetic conductance (permeance) in the calculation of the inductance or the number of turns of coils and this is called "inductance factor A_L" or "A_L value". The A_L value is the inductance L per unit turn

$$A_L = \frac{L}{N^2}; \qquad A_L = \frac{\mu_e \cdot \mu_0}{\Sigma\, l/A}$$ (for measuring conditions see below).

The A_L value is conveniently expressed in nH $= 10^{-9}$ H. Accordingly, the inductance L of a coil is obtained in nH from the given A_L values and the number of turns.

Occasionally, the so-called turns factor c (also designated K or α) is used for determining the number of turns in accordance with the formula

$$N = c\sqrt{L}$$

where L is expressed in mH. When c is expressed in $1/\sqrt{\text{mH}}$ and the A_L value in nH, the conversion factor from A_L to c is

$$c = \frac{10^3}{\sqrt{A_L}}.$$

Gapped ferrite pot cores are ground to specific A_L values; air gap dimensions are typical values. The A_L and μ_e values given in the data sheets apply to standard coils with defined winding data, at frequencies up to 10 kHz, a flux density of $\hat{B} \leq 1$ mT and without glueing and sealing. The measuring pressure should correspond to the holding force of the mounting assemblies indicated on page 88. Care should be taken that a good centering of both pot core halves and clean surfaces are ensured.

3 Resistance factor A_R

The resistance factor A_R or A_R value, is the dc resistance R_{Cu} per unit turn, analogous to the A_L value:

$$A_R = \frac{R_{Cu}}{N^2}$$

When the A_R value and the number of turns N are given, the dc resistance R_{Cu} is equal to $A_R\, N^2$. From the winding data etc. the A_R value can be determined:

$$A_R = \frac{\rho\, l_N}{f_{Cu}\, A_N}$$

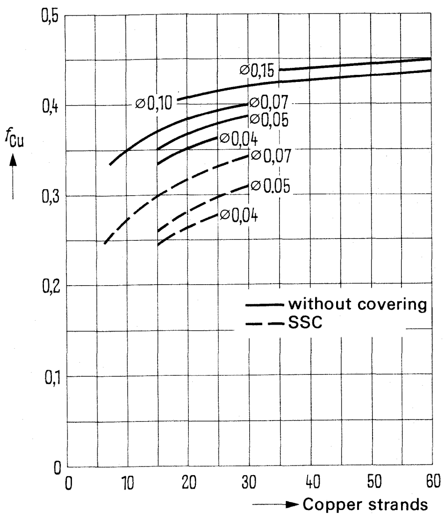
where
ρ is the resistivity (for copper: 17.2 μΩ mm), l_N the mean length of turn in mm, A_N the cross section of winding space in mm^2, f_{Cu} the copper factor. If these units are used in the equation, the A_R value is obtained in μΩ = 10^{-6} Ω.

For coil formers, A_R values are stated in addition to A_N and l_N. They are based on a copper factor of f_{Cu} = 0.5. This permits the A_R value to be calculated for any copper factor f_{Cu} according to the formula

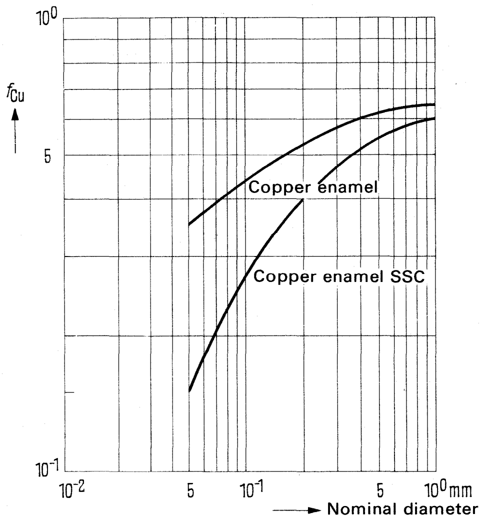
$$A_{R\,(f_{Cu})} = A_{R\,(0.5)} \frac{0.5}{f_{Cu}}$$

The following diagrams show the copper factor of wires and litz wires versus their nominal diameters in mm and the number of strands:

Copper factor f_{Cu} for litz wires



Copper factor f_{Cu} for wires



The cross section of the useful winding space, as given in the data for each coil, is smaller than that calculated from the dimensions of the drawing. It is an empirical value which takes into account that the winding space is not fully utilized because the wire ends are brought out and the top layer is incompletely wound.

4 Time constant

The time constant τ is defined as the ratio of the inductance L to the loss resistance R

$\tau = L/R.$

At low frequencies coil losses are essentially caused by the dc resistance R_{Cu}, the dc time constant being

$\tau_{Cu} = L/R_{Cu}.$

According to paragraphs 2 and 3, the dc time constant can simply be obtained from the equation

$\tau_{Cu} = A_L/A_R.$

5 Magnetization curves

5.1 Static (steady field) magnetization curves

The static magnetization curves shown on pages 54 to 60 were measured at room temperature by the ballistic galvanometer method. Curves are also shown at a temperature of 100 °C/212 °F for those materials which are frequently used at higher flux densities.

The relative total permeability $\mu_{tot} = \dfrac{B_-}{\mu_0 H_-}$ was determined from the curve of normal magnetization (new curve).

5.2 Dynamic (alternating field) magnetization curves

The graphs on page 61 show the dynamic magnetization curves of the ferrite materials K 1, M 33, and N 22 at various frequencies. The amplitude permeability can be determined from the relationship $\mu_a = \dfrac{\hat{B}}{\mu_0 \hat{H}}$ in which $\hat{B}$ and $\hat{H}$ are the peak values of effective flux density or effective field strength respectively.

When designing power transformers, for example, it is often necessary to calculate the peak values of magnetic field strength and magnetic flux density:

$$\hat{H} = \frac{I \cdot N\sqrt{2}}{l_e} \text{ and } \hat{B} = \frac{\sqrt{2}V}{\omega N A_e} \quad \left[\frac{\mathrm{V_s}}{\mathrm{m^2}} \text{ or T}\right] \qquad \text{if } V \text{ in V, } \omega \text{ in Hz, } A_e \text{ in m}^2$$

$$\text{and } \hat{B} = \frac{\sqrt{2}\, V \times 10^9}{\omega N A_e} = \frac{0.225 \times V \times 10^9}{f \cdot N \cdot A_e} \quad [\mathrm{mT}] \qquad \text{if } A_e \text{ in mm}^2.$$

$$\hat{B} = \frac{0.25 \cdot \hat{V} \cdot 10^9}{f \cdot N \cdot A_e} \text{ [mT]}$$

applies to square-wave voltages when A_e is given in mm^2.

5.3 Coercive force H_c and remanence B_r

When a hysteresis loop is drawn in the usual manner with flux density B as the ordinate and field strength H as the abscissa, H_c is the field strength at which the loop cuts the axis of the abscissa. The point where the hysteresis loop intersects the ordinate is called the remanence B_r.

5.4 Saturation flux density B_s

This is the value reached by the flux density $\hat{B}$ at high field strength. The flux densities shown on pages 42 and 43 (material survey) are already close to the saturation point. They were measured at a field strength of 3000 A/m. Values obtained otherwise are marked accordingly.

6 Core losses

In ferrite materials, the core loss resistance R_s (see para. 1.5) with weak magnetic fields (up to about 2 A/m) is essentially caused by the residual loss resistance R_r and the hysteresis loss resistance R_h. Eddy currents are only of secondary importance because of the low conductivity, especially at low frequencies.

6.1 Relative loss factor

In a gapped core, the material loss factor tan δ of the core is reduced by the factor μ_e/μ_i. The table of the material characteristics (pages 42 and 43) and the graph (page 45) give the loss factor as relative value μ_i: tan δ/μ_i.
The effective loss factor for a gapped core is therefore:

$$\tan \delta_e = \frac{\tan \delta}{\mu_i} \mu_e$$

The residual loss resistance R_r is given by

$$R_r = \omega L \tan \delta_e$$

6.2 Optimum frequency range

The relative loss factor tan δ/μ_i is plotted against the frequency for ferrite materials on page 45. These curves provide a quick reference for the selection of ferrite materials for high Q inductors. The curves of μ'_s and μ''_s of the complex permeability $\overline{\mu}$ on pages 46 to 47 are generally more suitable for designing broadband transformers and attenuators.

6.3 Upper frequency limit f_{max}

The upper frequency limit is that frequency at which the loss factor curve has not yet begun to rise too steeply. This is approximately the case when the Q factor of the toroid is about 50 or when tan δ is about 0.02. The Q factor below the limit frequency or for gapped cores is much higher.

6.4 Lower frequency limit f_{min}

The lower frequency limit is that frequency at which a change to the material with the next higher permeability is recommended because of its lower losses.

6.5 Hysteresis loss resistance R_h, hysteresis material constant η_B, and hysteresis core constant η_i

If the loss resistance of an inductor with a ferrite core is measured at different flux density levels, it is found to increase with flux density as a result of hysteresis. Since this hysteresis loss resistance R_h can increase to differing extents in different flux density ranges and at different frequencies, measurement should be carried out at $\hat{B}$ = 1.5 and 3 mT ($\Delta\hat{B}$ = 1.5 mT) and at f = 10 kHz for μ_i values greater than 500, complying with an IEC recommendation.

If the inductance bridge can only adjust current and not voltage, a flux density of 3 mT can be obtained for a ferrite material with μ_i = 2000 and an effective field strength of 0.85 A/m as follows:

$$\hat{B} = \mu_i \, \mu_0 \, \hat{H} = 2000 \times 1.257 \times 10^{-6} \times 0.85 \times \sqrt{2} = 3 \; [\mathrm{mT}]$$

The hysteresis material constant η_B characterizing the hysteresis losses, is independent of the influence of the air gap, unlike the previously used hysteresis coefficient h/μ_i^2:

$$\eta_B = \frac{\Delta \tan \delta_h}{\mu_e \, \Delta\hat{B}} = \frac{\Delta R_h}{\omega \, L \, \mu_e \, \Delta\hat{B}}$$

The hysteresis loss factor of an inductor can be reduced at constant flux density by an (additional) air gap according to

$$\Delta \tan \delta_h = \frac{\Delta R_h}{\omega \, L} = \eta_B \, \Delta\hat{B} \, \mu_e.$$

The material survey on page 42 shows the hysteresies material constants measured with toroids R 10, 10 mm in diameter, at 10 kHz and at the flux density interval $\Delta\hat{B}$ specified above.

The magnetic characteristics indicated in this survey apply to the Rayleigh range[1]. The permissible range of modulation increases with decreasing initial permeability. Since often the specifications of inductors do include current, inductance, and frequency but disregard field strength and flux density, a hysteresis core constant η_i is defined in accordance with IEC publication 125:

[1] Rayleigh range = range of linear dependence between flux density and field strength.

$$\eta_i = \frac{\tan \delta_h}{\hat{I} \cdot \sqrt{L}} = \frac{R_h}{\hat{I}\, L^{3/2}\, \omega}$$

The relationship between both constants being

$$\eta_i = \eta_B \sqrt{\frac{\mu_0\, \mu_e^3}{V_e}}$$

η_i establishes a relationship between core size, effective permeability, and hysteresis.

The previously used hysteresis coefficient h/μ_i^2 is still often applied. Conversion is done according to the following equations:

$$\frac{h}{\mu_i^2} = 2\pi \cdot \sqrt{2} \cdot \mu_0 \cdot \eta_B; \qquad \eta_B = \frac{1}{2\pi \cdot \sqrt{2} \cdot \mu_0} \cdot \frac{h}{\mu_i^2}$$

which can be simplified to:

$$\eta_B = 0.896 \times \frac{h}{\mu_i^2} \left[\frac{1}{\mathrm{mT}}\right]$$

Example with $h/\mu_i^2 = 0.8 \times 10^{-6}$ [cm/A]: $\eta_B = 0.896 \times 0.8 \times 10^{-6} = 0.71 \times 10^{-6} \left[\frac{1}{\mathrm{mT}}\right]$

$$\eta_i = \frac{1}{2\pi \cdot \sqrt{2}} \cdot \frac{h}{\mu_i^2} \cdot \sqrt{\frac{\mu_e^3}{\mu_0 \cdot V_e}}$$

For further information refer to IEC publications 205 and 401.

The distortion factor k is proportional to the hysteresis loss factor $\tan \delta_h$ (in the Rayleigh range).

If the current is sinusoidal the voltage distortion factor k_u approximates $\frac{3}{5} \tan \delta_h$.

6.6 Power loss P_v at higher flux densities

The power loss P_v of ferrite materials which are useful at higher flux density levels versus frequency is shown on page 113, with flux density levels given as parameters (measured with toroids R 16). The total losses versus temperature are indicated on page 112 for materials N 27, N 41, N 47 and N 67, which are particularly suitable for power transformers.

7 Q factor and loss factor $\tan \delta_L$ of inductors

The ratio of the reactance to the total resistance of an inductor is called the Q factor:

$$Q = \frac{\omega L}{R_v} = \frac{1}{\tan \delta_L} = \frac{\text{reactance}}{\text{total real resistance}}$$

where

R_v = resistance in series with inductance L,

$\tan \delta_L$ = loss factor of complete inductor.

The measuring technique determines only inaccurately the loss components – losses per core and losses per winding – especially for gapped pot cores. Examples are therefore given showing the Q factor versus frequency.

The so-called ISO Q curves were determined for some core types from these Q factor versus frequency curves.

8 Influence of temperature

8.1 Curie temperature

This is the temperature at which ferrites practically lose their magnetic properties. With ferrite materials, this transition occurs fairly abruptly. The phenomenon is reversible, i.e. when cooled to a point below Curie temperature the material becomes magnetic again. See pages 42 and 43 for the Curie temperature of the materials.

8.2 Temperature dependance of initial permeability μ_i and relative loss factor $\tan \delta/\mu_i$

The curves for both values versus temperature are shown on pages 48 and 49. In the range +5 °C (+41 °F) to +55 °C (+131 °F) variation of the loss factor with temperature is of minor significance as in most cases the variation of the copper resistance has the greater effect on the Q factor of inductors.

8.3 Temperature coefficient α of permeability

The temperature coefficient of the initial permeability is defined as follows:

$$\alpha = \frac{\mu_{i2} - \mu_{i1}}{\mu_{i1}} \cdot \frac{1}{T_2 - T_1}$$

μ_{i1} = initial permeability at temperature T_1 (20 °C to 25 °C/68 °F to 77 °F)

μ_{i2} = permeability value at temperature T_2

In a magnetic circuit with an air gap and the effective permeability μ_e, the temperature coefficient of the material is reduced by the factor μ_e/μ_i. Hence, the formula for gapped cores is

$$\alpha_e = \alpha \frac{\mu_e}{\mu_i} = \frac{\mu_{i2} - \mu_{i1}}{\mu_{i1}} \cdot \frac{1}{T_2 - T_1} \cdot \frac{\mu_e}{\mu_i}$$

The magnitude α/μ_i is the "relative temperature coefficient" α_F. It is indicated in the material survey (page 42 and 43) throughout the range between +55 °C/131 °F and −25 °C/−13 °F. The effective permeability μ_e, necessary for calculating the temperature coefficient of the core, is mentioned under special core data. The diagrams on pages 52 and 53 also show data for an extended temperature range.

There, the relative inductance change between two temperatures can be determined with the help of the permeability factor $(\mu_i - \mu_{i1}) / \mu_i \cdot \mu_{i1}$ according to:

$$\frac{\Delta L}{L} = \frac{\mu_i - \mu_{i1}}{\mu_i \cdot \mu_{i1}} \cdot \mu_e = \frac{\alpha}{\mu_i} \cdot \mu_e \cdot (T - T_1) = \alpha_F \cdot \mu_e (T - T_1)$$

Moreover, α/μ_i values are also given for some temperatures in accordance with the IEC recommendations. It should be taken into account that the temperature coefficient of the complete inductor may largely differ from that of the core, since various parameters such as winding design, assembly (support pressure, glueing), leakage flux etc. also determine the temperature coefficient of the complete inductor.

As far as pot cores are concerned, the α/μ_i values (data on pages 52 and 53) are referred to measurements with standard inductors at frequencies up to 50 kHz, a flux density $\hat{B}$ of less than and equal to 1 mT, and a measuring pressure which corresponds to the support forces indicated on page 88.

For further information refer to the book by Kampczyk/Röss on "Ferrite cores", published by Siemens-Verlag.

9 Disaccommodation

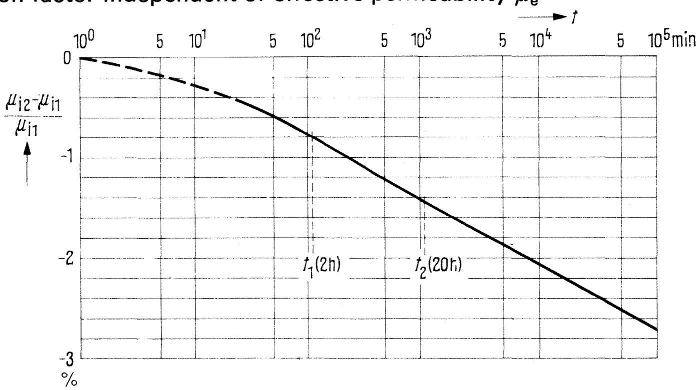
Disaccomodation is the variation of permeability with time under constant operating conditions, especially at constant temperature. Tests over a period of a few years have shown that a few hours after production the permeability of a ferrite core decreases almost linearly, if time t is plotted logarithmically. Therefore, characteristics have been introduced:

the disaccomodation coefficient

$$d = \frac{\mu_{i1} - \mu_{i2}}{\mu_{i1} \cdot \log \frac{t_2}{t_1}} \qquad \begin{array}{l} \mu_{i1} = \text{permeability at time } t_1 \\ \mu_{i2} = \text{permeability at time } t_2 \end{array} \quad (t_2 > t_1),$$

and the disaccomodation factor independent of effective permeability μ_e

$$DF = \frac{d}{\mu_{i1}}$$



Hence it follows from the indicated measuring points at t_1 and t_2: d = 0.6% and at $\mu_e = \mu_{i1}$ = 2000; $DF = 3 \times 10^{-6}$.

Magnetic, thermal, or mechanical stress can, once more, cause a decrease in permeability with time. The data in the material survey (page 42 and 43) is referred to a thermal stress of at least 170 °C/338 °F and is measured at times t_1 = 2 hours and t_2 = 20 hours after the test. Experience has shown that the value obtained by this method is almost identical with the long-term value desired.

After a magnetic shock (value of demagnetization in an alternating field) shorter periods of time t_1 and t_2 can be selected than after thermal stress. After periods below 2 hours, generally, lower values for the disaccommodation are obtained than at periods longer than two hours.

An air gap reduces every inductance variation by the factor μ_e/μ_i. It can be said that

$$\frac{L_1 - L_2}{L_1} = DF \cdot \mu_e \cdot \log \frac{t_2}{t_1}$$

Example:

For a pot core 22 dia x 13 of material K 1 with an effective permeability of μ_e = 15.9 (A_L value = 40 nH) and a disaccommodation factor $DF < 35 \times 10^{-6}$ which has been placed in operation at a time t_1 = 5 weeks (after production) and which should function at least until time t_2 = 10 years (appr. 500 weeks) a max. inductance variation $\Delta L/L$ of

$< 35 \times 10^{-6} \times 15.9 \times \log \frac{500}{5}$, i.e. $< 0.11\,\%$ can be expected.

10 Resistivity

The material survey (page 42 and 43) also provides information on the resistivity ρ, measured at room temperature, low current density (< 0.01 mA/mm^2), and with Indium-Gallium junctions. Higher values are normally obtained using some other types of juncton, for example highly conductive silver.

The effect of frequency on resistivity with material N 48 is shown in the following table:

f	kHz	10	100	500
ρ	Ωm	1,0	0,95	0,65

The effect of frequency on resistivity with highly resistive ferrite materials, e.g. K 1, is negligible.

11 Dielectric constant

Highly conductive ferrite materials exhibit a high relative dielectric constant (ε_r) at low frequencies which is based on a layer effect of the fine grain structure. At high frequencies, all ferrite materials approach the dielectric constant of the crystalline ferrite material (ε approx. 10 to 20). Ferrite materials with a low conductivity already display these characteristics at lower frequencies, as is shown in the following table:

Ferrite material	Resistivity	Dielectric constant ε at				
	Ωm approx.	10 kHz approx.	100 kHz approx.	1 MHz approx.	100 MHz approx.	300 MHz approx.
K 1	10^5	30	15	12	11	11
N48	1	140×10^3	50×10^3	30×10^3		

12 Magnetostriction

Linear magnetostriction is defined as the relative change in the length of a magnetic core under the influence of a magnetic field. The greatest relative variation in length $\lambda = \Delta l / l$ occurs at saturation magnetization. The values of the saturation magnetostriction (λ_s) of ferrite materials are given in the following table (negative values denote contraction).

Ferrite material	K 12	K 1	N48
λ_s in 10^{-6}	−21	−18	−1,5

Magnetostrictive effects in ferrite power transformers can produce audible whistling similar to that in laminated iron cores, particularly when gapped U or pot cores are used. Satisfactory mounting of the parts is therefore absolutely necessary.

Standards

Siemens ferrite parts are manufactured to a large extent in accordance with the requirements laid down in the DIN standard and IEC recommendations. The relevant standards are specified in the summaries preceding each type series and in the individual data sheets. It would take up too much space here to enumerate all ferrite standards but the following are mentioned because of their general significance:

DIN 41280 (1983)	Soft-magnetic ferrite cores: Material properties
DIN 41290 (1972)	Soft-magnetic ferrite cores: Calculation of the effective parameters
IEC 367-1 (1962)	Cores for inductors and transformers for telecommunications Part 1: Measuring methods
IEC 205 (1966) IEC 205A (1968) IEC 205 B (1974)	Calculation of the effective parameters of magnetic piece parts.

Whereas the DIN and IEC standards predominantly define the dimensions and designations of the core types, the European quality assessment system of the CECC and the harmonized DIN-CECC standards define methods of measurement and quality levels. Since 1982 the so-called IEC Q-system has been worked out in the IEC; this is a quality assessment system analogous to the CECC but applied worldwide. CECC and IEC Q have the same structure.

A basis specification is followed by the generic specification and sectional specification. The core types are described in the detail specifications with the blank detail specifications containing all the specific provisions.

The IEC quality standards are characterized by a double number. There is only partial agreement between IEC and CECC quality stipulations. IEC 367-1 mentioned above is used chiefly as a basic specification.

The following list shows the correlation between the IEC-Q standard "Cores for inductors and transformers for telecommunications" with the CECC and DIN-CECC:

Generic specification	IEC 723-1/QC 250000	CECC 25000	DIN 45970 part 10
Sectional specification	IEC 723-2/QC 250100	CECC 25100	DIN 45970 part 11
Blank detail specification	IEC 723-2-1/QC 250101	CECC 25100	DIN 45970 part 11
Sectional specification	IEC 723-3/QC 250200	CECC 25200	DIN 45970 part 12
Blank detail specification	IEC 723-3-1/QC 250201	CECC 25200	DIN 45970 part 12
Sectional specification	(in preparation)	CECC 25300	DIN 45970 part 13
Blank detail specification	(in preparation)	CECC 25300	DIN 45970 part 13
		CECC 25400	DIN 45970 part 14

Quality Specifications
(Delivery Quality, Sampling Inspection, AQL Values)

1 Delivery quality
This term designates the conformity with the agreed data at the time of delivery.

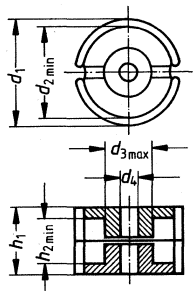
2 Sampling inspection
The customer may carry out incoming inspections which are subject to standardized sampling inspection plans specifying the acceptance or rejection of a delivery lot in conjunction with the fixed AQL (acceptable quality level) values. Siemens, as component manufacturer, uses the same system for the final inspection on the basis of the test and failure criteria explained in para. 3. The scope and maximum permissible number of defects of a sampling inspection are specified in DIN 40080 (identical with MIL STD 105D and IEC 410), single sampling inspection plan for normal inspection level II. The sampling instructions are such that a delivery lot will be accepted with a high degree of probability (>90%), if the percentage of defective components does not exceed the specified AQL value. Generally, the average defect percentage of our component deliveries lies clearly below the AQL value due to appropriate AQL tests in the supplying factories.

3 Classification of defects
A component is considered defective if it does not comply with the specifications stated in the data sheets or an agreed delivery contract. A distinction is made between major defects and minor defects. The total failures defined for passive components (e.g. capacitors, resistors) are not applicable to ferrites, since ferrites are not complete components but shaped electromagnetic parts.

<u>Major and minor defects of mechanical properties are:</u>

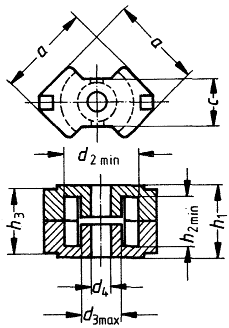
a) Pot cores

Major defects:	Minor defects:
h_1	
h_{2min}	h_{2max}
d_1	
d_{2min}	d_{2max}
d_{3max}	d_{3min}
d_4	



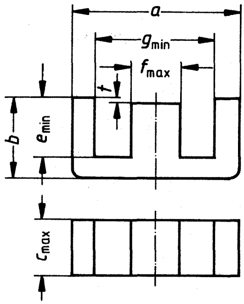
b) RM cores

Major defects:	Minor defects:
h_1	
h_{2min}	h_{2max}
h_3	
d_{2min}	d_{2max}
d_{3max}	d_{3min}
d_4	
a	
c	



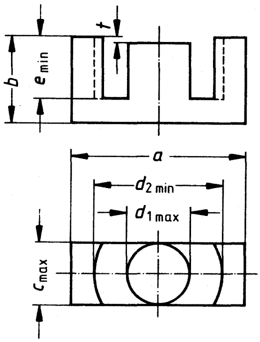
c) E cores

Major defects:	Minor defects:
b	
e_{min}	e_{max}
a	
g_{min}	g_{max}
f_{max}	f_{min}
c_{max}	c_{min}
t	



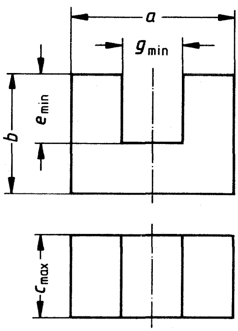
d) ETD cores

Major defects:	Minor defects:
b	
e_{min}	e_{max}
a	
d_{1max}	d_{1min}
d_{2min}	d_{2max}
c_{max}	
t	



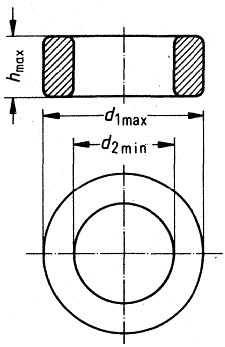
e) U cores

Major defects:	Minor defects:
b	
e_{min}	e_{max}
a	
g_{min}	g_{max}
c_{max}	c_{min}



f) Toroidal cores

Major defects:	Minor defects:
h_{max}	h_{min}
d_{1max}	d_{1min}
d_{2min}	d_{2max}



The major defects (primary dimensions) are checked with gauges. The gauges used have the dimensions specified in DIN 7151, on the basis of the manufacturing tolerance and allowance for wear in DIN 7151, ISO tolerance series 8.

Thus the gauge tolerance for the dia 14 x 8 pot core with an outside diameter of 14.2 mm is 31 µm, i.e. parts with an outside diameter of 14.23 mm are still evaluated as "good".

Reference should be made to IEC publication 424 for assessment of cracks and spalling.

Major and minor defects of electrical properties are:

a) Pot cores and RM cores

Major defects:	Minor defects:
A_L value	$\tan\delta/\mu_i$
	η_B
	α/μ_i
	DF

The test for minor defects is application-oriented.

b) E, ETD and U cores

For these cores testing of major and minor defects is customer-oriented.
Unification has not been successfully achieved so far.

c) Toroidal cores

Major defects:
A_L value
Testing of the minor defects is customer-oriented.

4 AQL values

Individual AQL for major defects (electrical and mechanical)	1.0
Individual AQL for minor defects (electrical and mechanical)	4.0

5 CECC quality assessment

Some pot cores and RM cores made of N48 material can be supplied in accordance with the "European CECC quality assessment system". In accordance with this the cores are tested and documented in conformity with the following testing schedule.

Testing schedule for CECC quality assessment

Group	Test	AQL
A (lotwise)	visual inspection dimensions primary dimensions secondary inductance factor	1,5% 1% 4% 1%
B (lotwise)	loss factor or quality hysteresis temperature coefficient disaccommodation	4% 4% 4% 4%
C (periodical)	compressive load	15 sets 1 defect every 6 months

The following types of cores can be supplied with CECC quality assessment (sectional specification DIN 45970, part 11 or CECC 25100):

Type specification	Core type	A_L value (nH ±%)	Ordering code
DIN 45970 part 1112	RM 5	160 ± 3% 200 ± 3% 250 ± 3% >1250	B65805–C160–A B65805–C200–A B65805–C250–A B65805–C–R48
DIN 45970 part 1113	RM 6	200 ± 3% 250 ± 3% 315 ± 3% 400 ± 3% >1600	B65807–C200–A B65807–C250–A B65807–C315–A B65807–C400–A B65807–C–R48
DIN 45970 part 1114	RM 8	250 ± 3% 315 ± 3% 400 ± 3% 630 ± 3% 2000	B65811–D250–A B65811–D315–A B65811–D400–A B65811–D630–A48 B65811–D–R48
DIN 45970 part 1116	Pot Ø 14 x 8	100 ± 3% 160 ± 3% 250 ± 3% 315 ± 3% >1600	B65541–K100–A B65541–K160–A B65541–K250–A B65541–K315–A B65541–K–R48
DIN 45970 part 1117	Pot Ø 18 x 11	160 ± 3% 250 ± 3% 315 ± 3% 400 ± 3% 2200	B65651–K160–A B65651–K250–A B65651–K315–A B65651–K400–A B65651–K–R48
DIN 45970 part 1118	Pot Ø 22 x 13	250 ± 3% 315 ± 3% 400 ± 3% 630 ± 3% 2800	B65661–L250–A B65661–L315–A B65661–L400–A B65661–L630–A B65661–L–R48

Ferrite Materials

1 General material data

The ferrites used are magnetic ceramic oxides. They consist of mixed crystals which are compounds of Fe III oxide Fe_2O_3 with one or more oxides of bivalent metals such as FeO, NiO, ZnO, MnO, CuO, BaO, CoO. They have a much higher resistivity than metallic materials; the resistivity is 10^0 to 10^5 Ωm compared with 10^{-7} to 10^{-6} Ωm for metallic materials. Contrary to metallic cores, most ferrites have negligible eddy current losses in an alternating magnetic field.

Siemens ferrite cores are well-known under the trademark SIFFERIT®.

1.1 General technical data

Tensile strength	approx. 20 N/mm²
Resistance to compression	approx. 100 N/mm²
Vickers hardness HV_{15}	approx. 8000 N/mm²
Modulus of elasticity	approx. 150000 N/mm²
Heat conductivity	approx. 4 ... 7 · 10^{-3} J/mm · s · K
Linear expansion coefficient	approx. 7 ... 10 · 10^{-6}/K
Specific heat	approx. 0.7 J/g · K

1.2 Resistance to moisture

Ferrites are moisture, water and also sea-water-resistant, but can be corroded by several acids in high concentrations.

1.3 Resistance to radiation

Ferrite materials can be exposed without significant variation ($\Delta L/L \leq 1\%$ for ungapped cores) to the following radiation:

gamma quanta	10^9 rad
quick neutrons	2 x 10^{20} neutrons/m²
thermal neutrons	2 x 10^{22} neutrons/m²

1.4 Shrinkage due to the sintering process

The burning or sintering process produces a considerable shrinkage of the molded body, linearly by 15% and 40% by volume. For this reason, often a slight distortion must be accepted, when the cores are not worked after the burning and sintering process. The dimensional tolerances of unworked parts are ±2 to ±3%.

2 Application survey

Application	Frequency range (MHz)	Flux density low[1]	high
High Q inductors in resonant circuits and filters	... 0,1	x	
	0,2 ... 1,6	x	
	1,5 ... 12	x	
	6 ... 30	x	
	... 100	x	
High Q inductors in resonant circuits and filters (open)	0,2 ... 1,6	x	
	1,5 ... 12	x	
	10 ... 300	x	
Transformers with flat permeability characteristic	... 0,3	x	
Broadband transformers (e.g. antenna transformers for MW, SW, VHF, TV) and pulse transformers for EDP	... 3[2]	x	
	... 5[2]	x	
	... 10	x	
	... 250	x	
	... 400	x	
Power transformers, chokes (e.g. for switched-mode power supplies pulse transformers, TV line transformers transducers ignition coils etc.)	... 0,1		x
	... 1		x
Attenuators	... 500	x	x
Proximity switches	... 1	x	
	.. 2	x	

[1] Low flux density up to approx. 10 mT (Rayleigh range).
[2] Upper frequency limit also depends on core dimensions (in pot core filters also on gap).
[3] Upon request

Ferrite material	Type
N 48	Pot, RM, gapped TT cores
M 33	
K 1	
K 12	
U 17	
M 33	Screw cores
K 1	
U 17	
N 48, N 30, T 35, T 38	Pot, RM, X, Q, EP, E cores
N 30	Pot cores Double-aperture cores
N 30, T 35, T 38	Toroids, EP cores
N 48	Pot cores E cores
M 33	Pot, RM cores
K 1, K 12	Pot cores Double-aperture cores
U 17	Double-aperture cores
N 27, N 41, N 67	U cores, toroids, TT cores Pot, PM, RM cores E, EC, ER, ETD, CC cores
N 47	RM cores
N 22	Shielding beads
N 22	Pot cores
M 33	

3 Material characteristics

The values for ferrite materials were measured with toroids R10 and are, unless otherwise stated, related to room temperature

		Standard					
Preferred application		Resonant circuit inductors			Broadband transformers		
Material		K 1	M 33	N 48	N 26	N 30	T 35
Color code		violet	white	–	–	–	–
Initial permeability μ_i		80 ±20%	750[1] ±20%	2000 ±20%	2300 ±20%	4300 ±20%	6000 ±20%
Optimum frequency range f_{min}	MHz	1,5	0,2	0,001	–	–	–
Optimum frequency range f_{max}	MHz	12	1,0	0,1	–	–	–
Relative dissipation factor $\tan \delta/\mu_i$ f_{min}	10^{-6}	<40	<12	<0,5	–	–	–
Relative dissipation factor $\tan \delta/\mu_i$ f_{max}	10^{-6}	<100	<20	<2,5	< 5[4]	–	–
Curie temperature	°C	>400	>200	>150	>150	>130	>130
Coercivity	A/m	500	100	20	20	13	6
Flux density $\hat{B}$ at $\hat{H}$ = 3000 A/m	mT	360	450	390	390	380	380
DC resistivity ρ	Ω m	10^5	5	3	2	0,5	0,2
Hysteresis material constant η_B	10^{-6}/mT	<36	<1,8	<0,4	<1,5	<1,1	<1,4
Relative temperature coefficient α/μ_i for 20 to 55 °C/68 to 131 °F	10^{-6}/K	2...6	0,5...2,3	0,4...1,0	0...1,5	–	–
for 20 to 5 °C/68 to 41 °F	10^{-6}/K	1...5	0,5...2,5	0,4...1,0	0...2	–	–
for 20 to −25 °C/68 to −13 °F	10^{-6}/K	1...5	0,5...3,0	0,4...1,5	–	–	–
Mean value of α/μ_i for +20 to +55°C/+68 to 131°F	10^{-6}/K	4	1,6	0,7	–	1	0,7
Disaccommodation factor *DF* at +60 °C/140 °F	10^{-6}	<35	<12	<4	–	–	–
at +20 °C/ 68 °F	10^{-6}	20	8	2	–	–	–
Density	kg/m³	4400	4500	4700	4700	4800	4900
Core shapes		Pot RM threaded toroids double-aperture	Pot RM threaded toroids	Pot RM X TT Q EP	RM, EP pot Q, X cube	RM, EP pot Q, X, TT E toroids double-aperture	

[1] μ_i = 600 ±20% applies to screw cores.
[2] Upon request
[3] Perminvarferrite; irreversible changes in quality and permeability occur with strong fields in the core (about > 1500 A/m).
[4] At 100 kHz

materials					Special materials			
	Power transformers				Resonant circuit inductors Transformers, chokes			Proximity switches and small parts
T 38	N 47	N 27	N 67	N 41	U 60[2)]	U 17[3)]	K 12	N 22
–	–	–	–	–	pink	grey	yellow	red
10000 ± 30%	1400 ± 20%	2000 ± 20%	2300 ± 25%	3000 ± 20%	8 ± 20%	10 ± 20%	26 ± 25%	1900 ± 25%
– –	– 1,0	– 0,15	– 0,3	– 0,15	100 1000	10 220	3 40	0,001 0,2
– –	– –	– –	– –	– –	< 2000 –	< 100 < 1700	< 150 < 600	< 2 < 20
> 130	> 200	> 220	> 200	> 220	> 350	> 550	> 450	> 145
4	35	20	18	20	1000	1500	1200	30
380	430	510	505	510	110	–	145	390
0,1	4	3	4	2	10^5	10^5	10^5	1
< 1,4	< 0,8	< 1,5	< 1,4	< 1,4	–	< 27	< 45	< 1,4
– – –	– – –	– – –	– – –	– – –	– – –	– – –	3 ...14 –0,5...12 –1 ...12	0,6...1,6 0,6...1,8 0,7...2,3
0,5	1	3	4	4	150	40	10	0,9
– –	– –	– –	– –	– –	– –	– –	< 50 –	< 7 4
4900	4700	4800	4800	4800	4000	4300	4300	4700
RM, EP pot Q toroids	RM toroids	Pot RM, TT PM, CC E, U toroids welding rods	ETD, RM (upon request)	Pot RM	only upon request	Double- aperture threaded pot	Pot	Proximity switch shielding beads

Data for power applications are given in chapter "Cores for power transmission."

3.1 Measuring conditions

The values for ferrite materials, given in the preceding table, were measured with toroids R 10 (10 mm in diameter) and are, unless otherwise stated, related to room temperature (23 ± 3) °C/(73 ± 5.4) °F.

Due to reasons of functional efficiency, this data does not generally apply to products of deviating shape and size. Product-referred values are to be found on the corresponding data sheets.

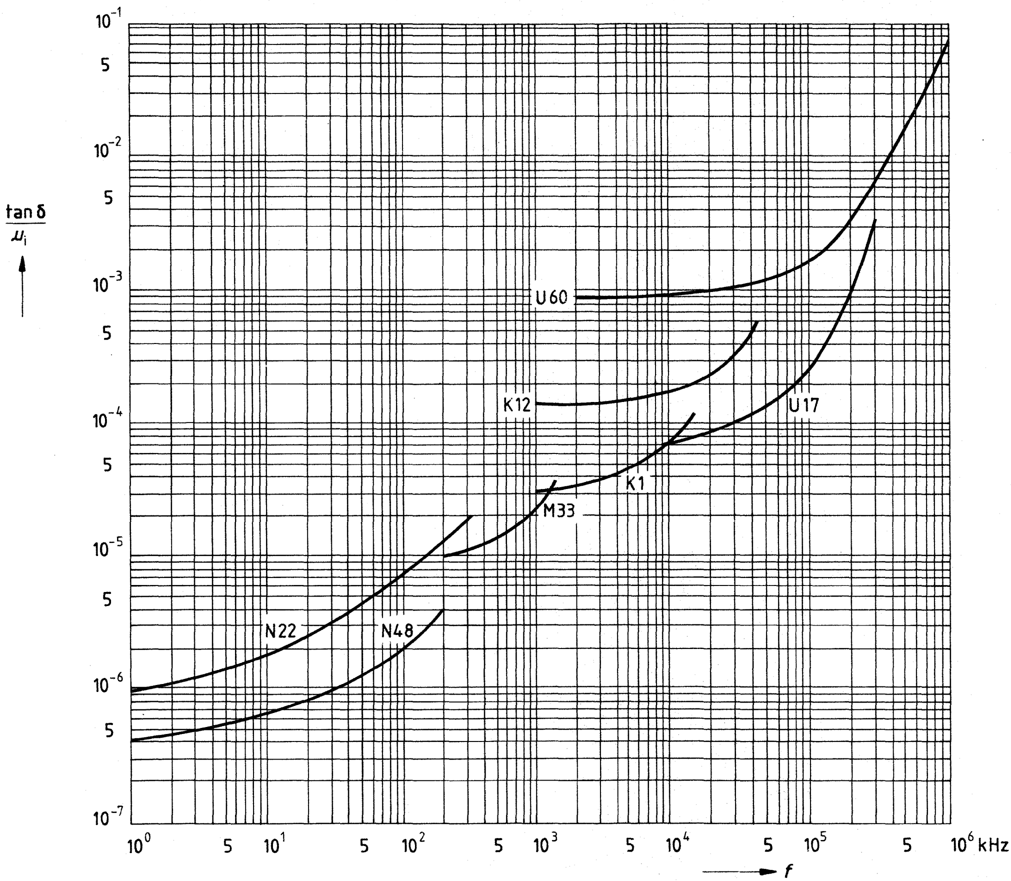
The specifications in the material table are subject to the following measuring conditions:

		Frequency f	Flux density $\hat{B}$ mT	Other conditions
Initial permeability	μ_i	≤10 kHz	≤0,1	
Relative loss factor	$\frac{\tan\delta}{\mu_i}$	see table	≤0,1	
Curie temperature	T_c	≤10 kHz	≤0,1	
Peak value of the flux density (≈ saturation flux density $\hat{B}_s$)	B	static		3000 A/m
DC resistivity	ρ			< 10 A/m²
Hysteresis material constant	η_B	$\mu_i \geq 500$: 10 kHz	1,5 and 3	
		$\mu_i < 500$: 100 kHz	0,3 and 1,2	
Relative temperature coefficient	α/μ_i	≤50 kHz	≤0,1	for temperature refer to table
Disaccommodation factor	DF	≤10 kHz	≤0,1	for temperature refer to table

For explanation of the terms refer to para. "Definitions".

4 Specific material data

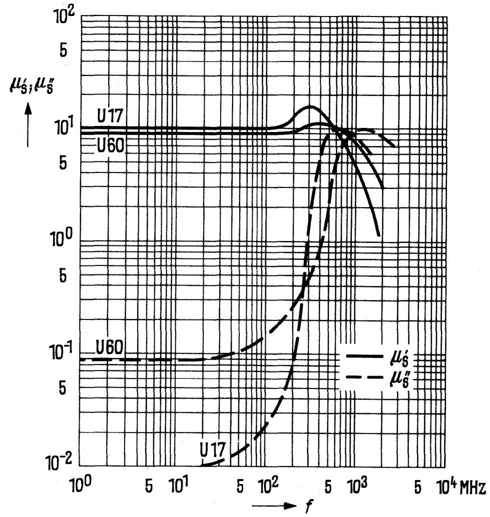
Relative loss factor versus frequency



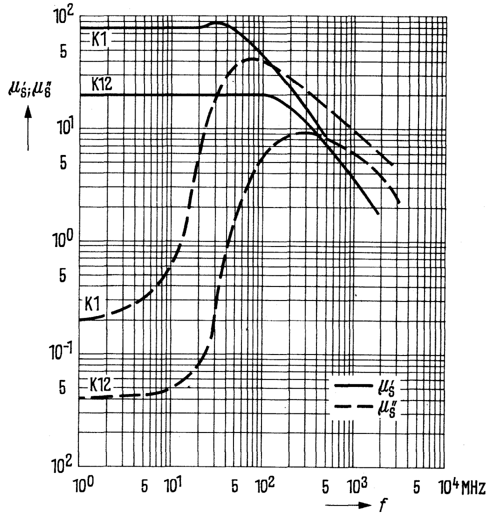
Measured with toroids R 10.
Measuring flux density $\hat{B} \leq 0.1$ mT.

Complex permeability versus frequency

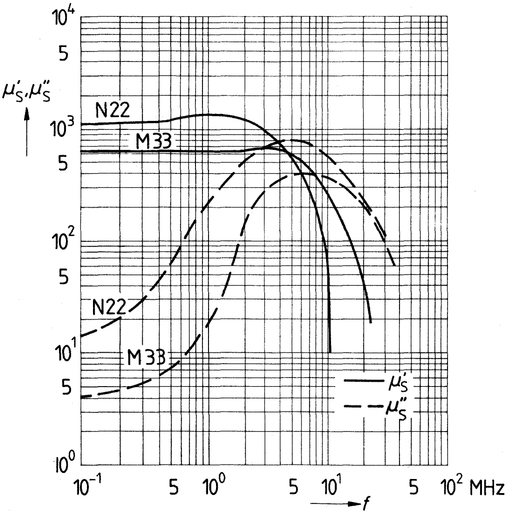
U 17, U 60



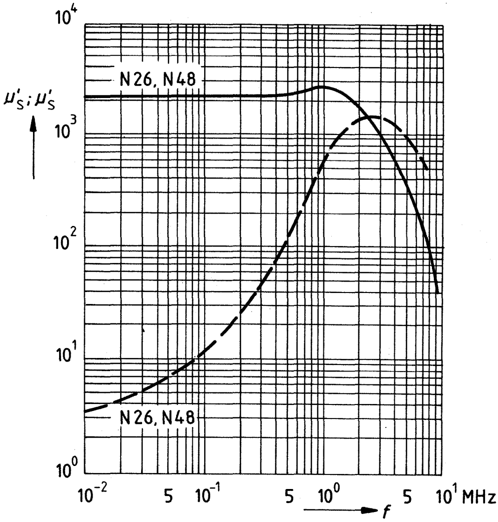
K 12, K 1



M 33, N 22



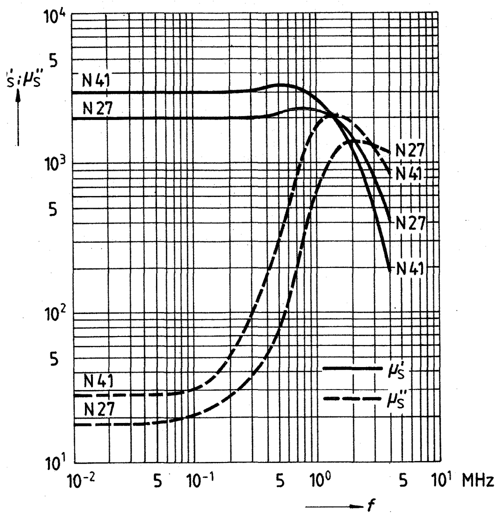
N 26, N 48



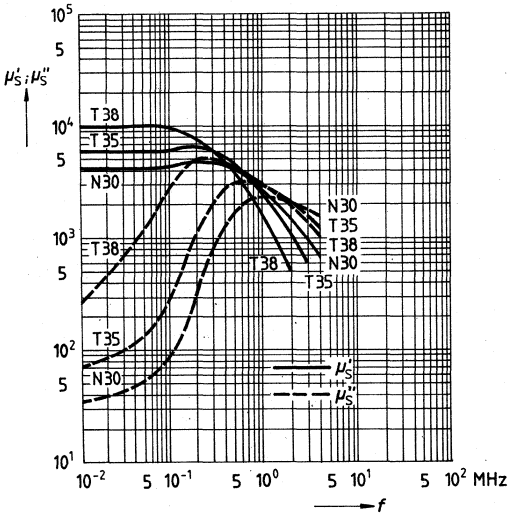
Measured with toroids R 10. Measuring flux density $\hat{B} \leq 0.1$ mT.

Complex permeability versus frequency

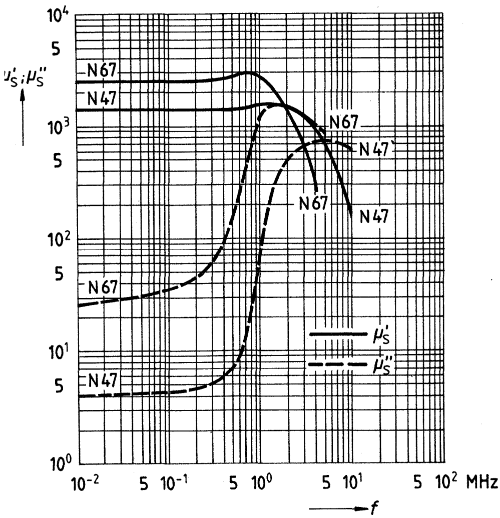
N 27, N 41



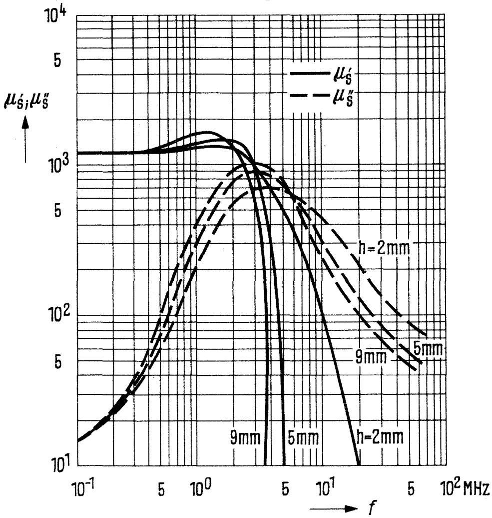
N 30, T 35, T 38



N 47, N 67



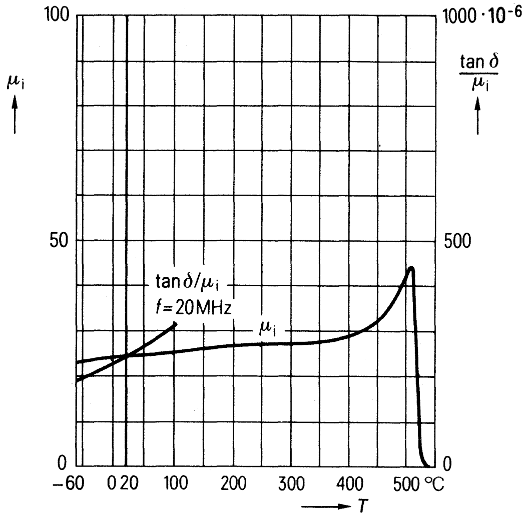
Influence of the core size on the frequency characteristic of the complex permeability, measured with a toroidal core of manganese zinc ferrite Parameter: Core height h.



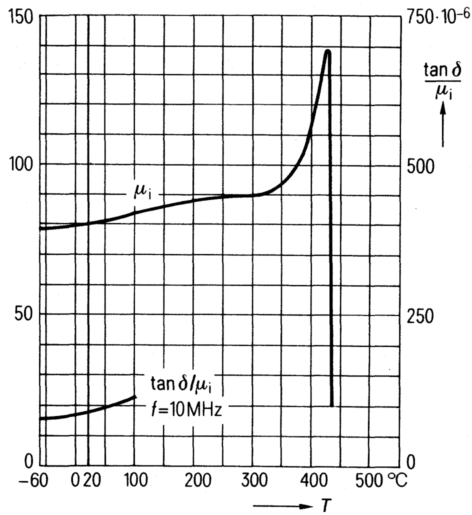
Measured with toroids R 10. Measuring flux density $\hat{B} \leq 0.1$ mT.

Initial permeability and relative loss factor versus temperature

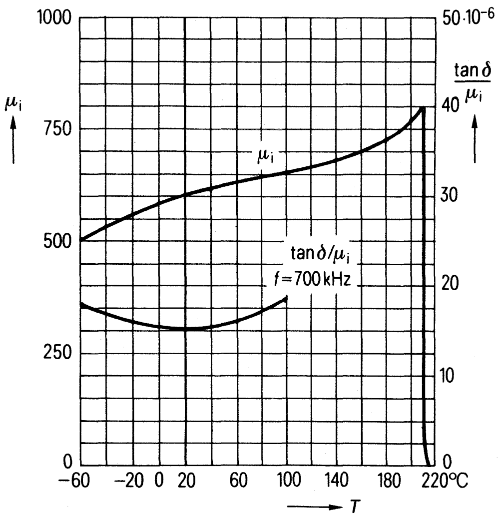
K 12



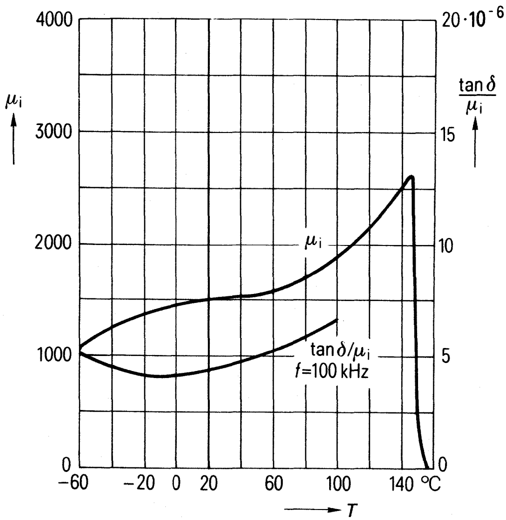
K 1



M 33



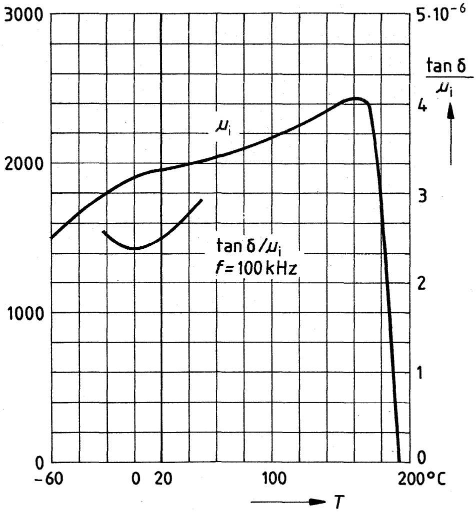
N 22



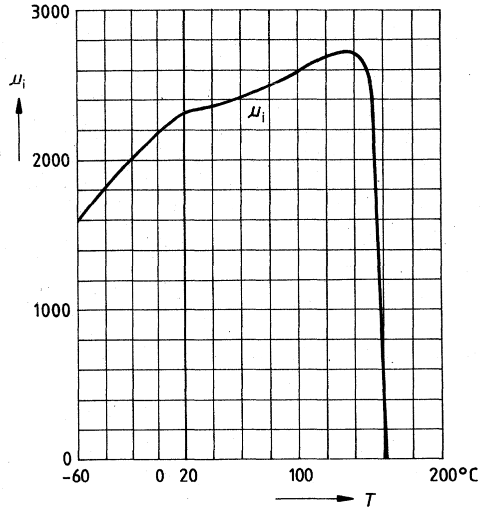
Measuring flux density $\hat{B} \leq 0.1$ mT.

Initial permeability and relative loss factor versus temperature

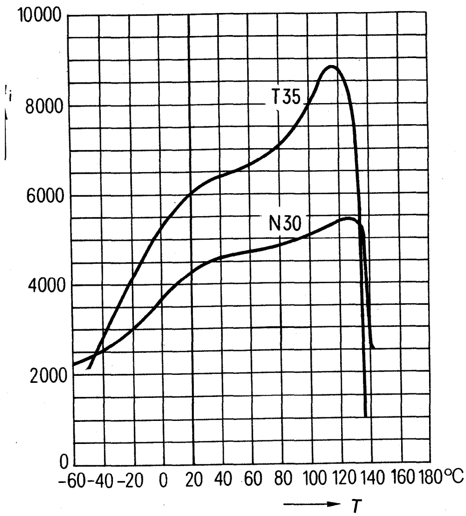
N 48



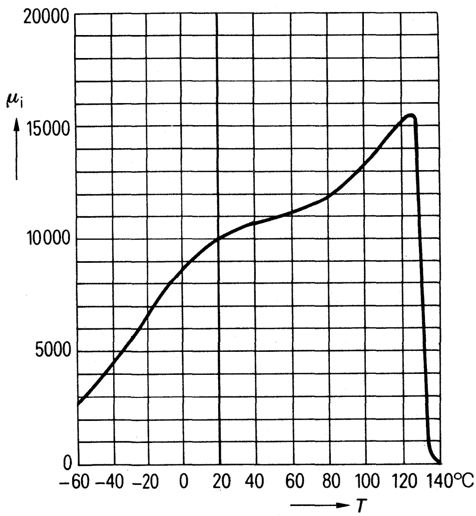
N 26



N 30, T 35



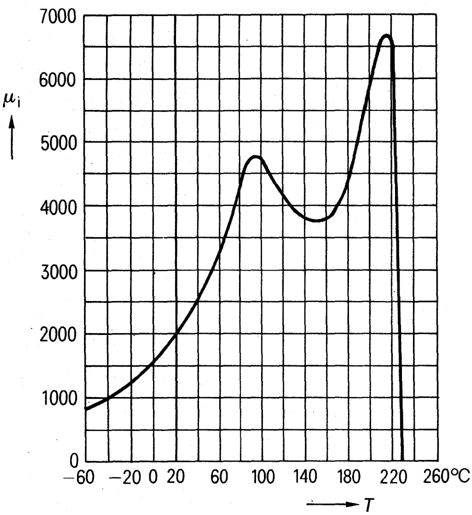
T 38



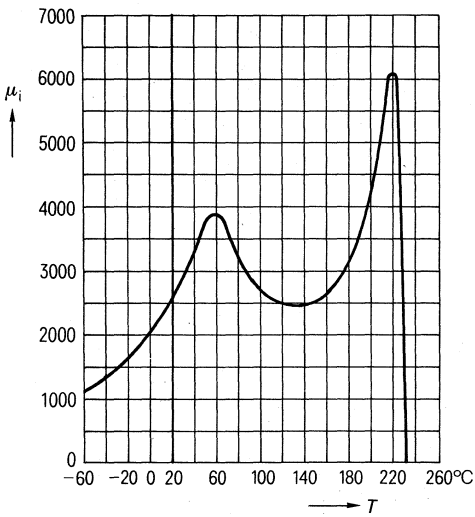
Measuring flux density $\hat{B} \leq 0.1$ mT.

Initial permeability versus temperature

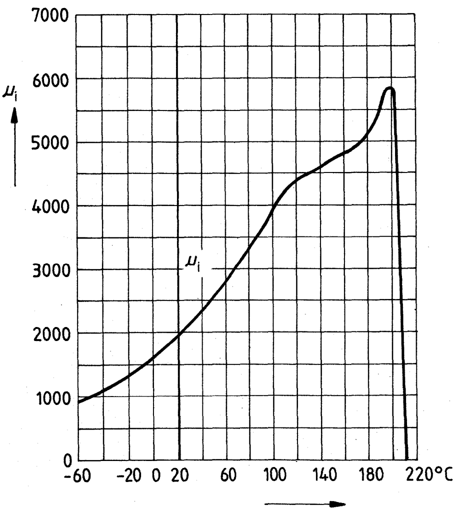
N 27



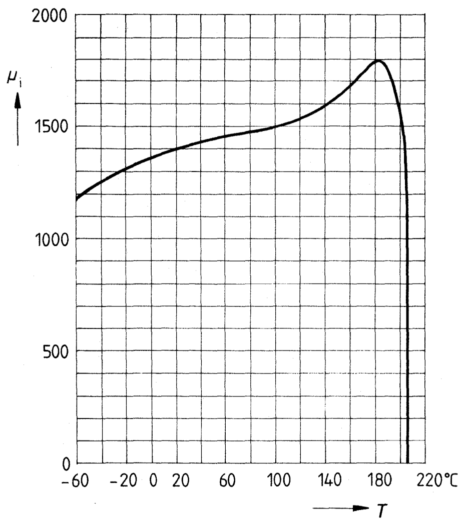
N 41



N 67

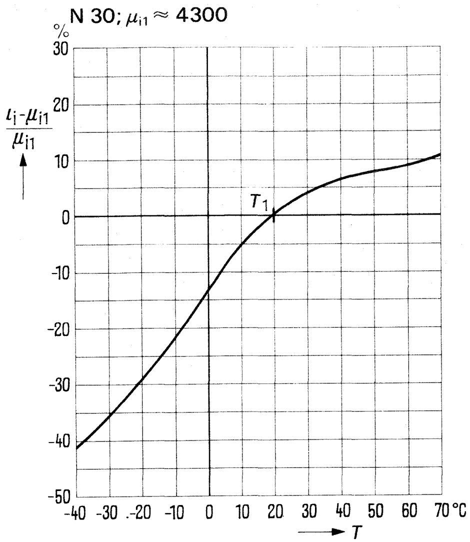


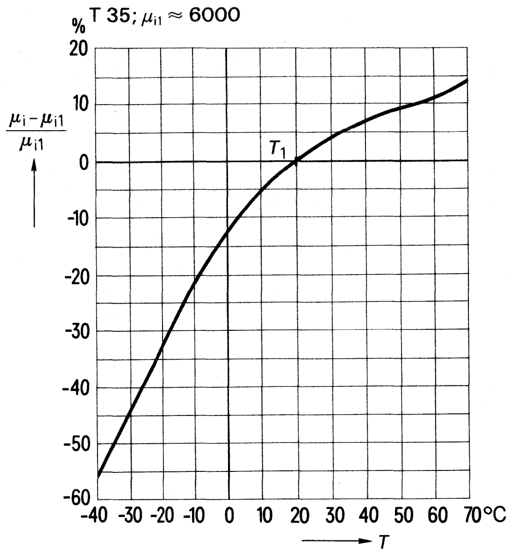
N 47

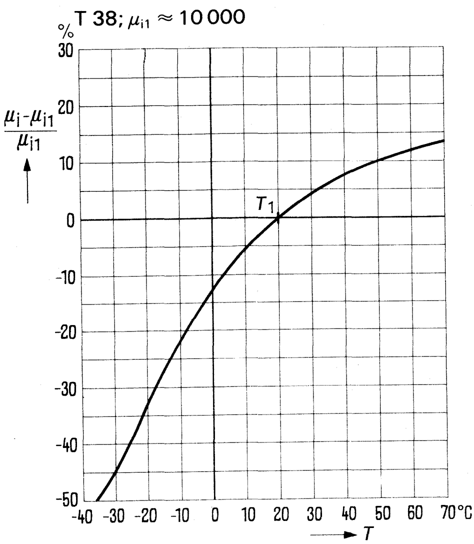


Measuring flux density $\hat{B} \leq 0.1$ mT.

Variation of initial permeability versus temperature







Measuring flux density $\hat{B} \leq 0.1$ mT.

Permeability factor versus temperature

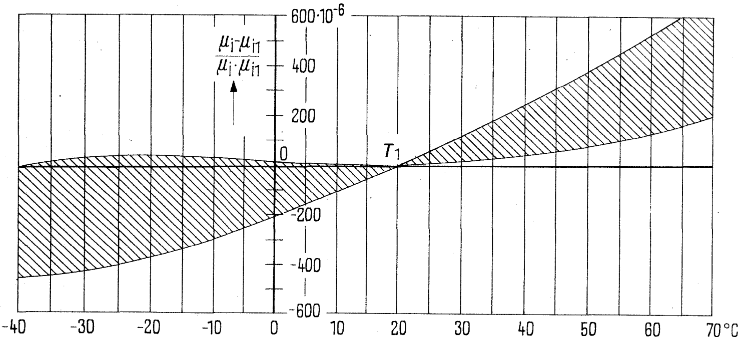
$$\frac{\alpha}{\mu_i} = \frac{\mu_i - \mu_{i1}}{\mu_i \cdot \mu_{i1}} \cdot \frac{1}{(T - T_1)}$$

μ_i at temperature T

μ_{i1} at temperature T_1

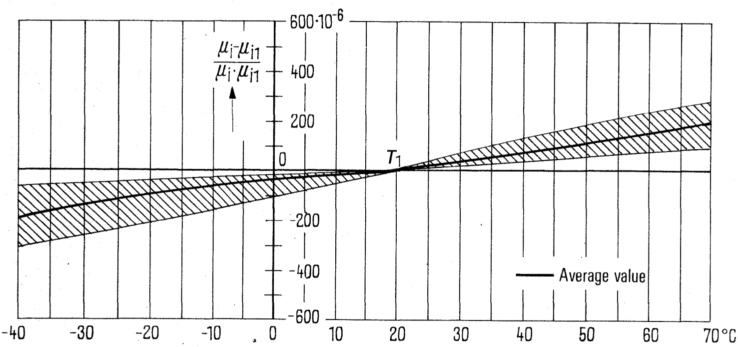
$$\frac{\Delta L}{L}[\%] = \frac{\alpha}{\mu_i}[10^{-6}/\mathrm{K}] \cdot (T - T_1)\,[\mathrm{K}] \cdot \mu_e \cdot 100$$

$$\frac{\Delta L}{L}[\%] = \frac{\mu_i - \mu_{i1}}{\mu_i \cdot \mu_{i1}}\,\mu_e \cdot 100$$



K 12 ($\mu_{i1} \approx 24$)

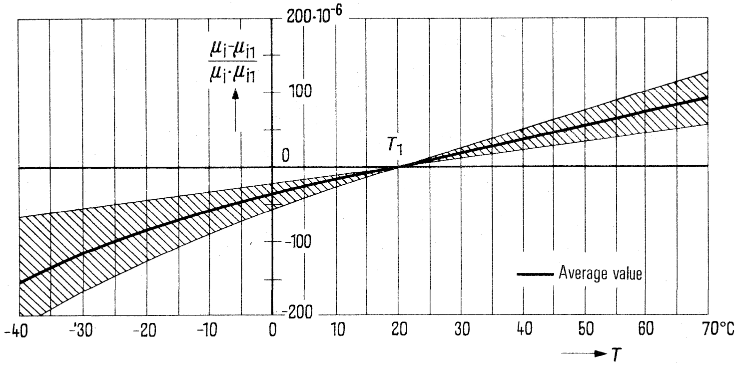
T °C	α/μ_i 10^{-6}/K
20... 55	3 ...14
20... 5	−0,5...12
20...−25	−1 ...12



K 1 ($\mu_{i1} \approx 80$)

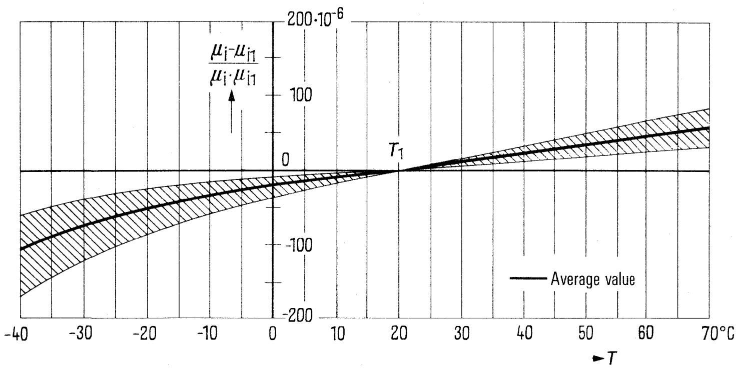
T °C	α/μ_i 10^{-6}/K
20... 55	2...4 ...6
20... 5	1...3 ...5
20...−25	1...3 ...5

Permeability factor versus temperature



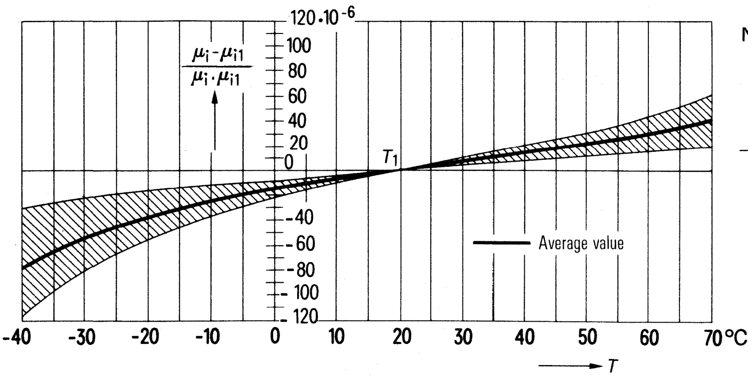
M 33 ($\mu_{i1} \approx$

T °C	α/μ_i 10^{-6}/K
20... 55	0,5...1,6...2,3
20... 5	0,5...1,8...2,5
20...−25	0,5...2,0...3,0



N 22 ($\mu_{i1} \approx$

T °C	α/μ_i 10^{-6}/K
20... 55	0,6...0,9...1,6
20... 5	0,6...1,0...1,8
20...−25	0,7...1,4...2,3



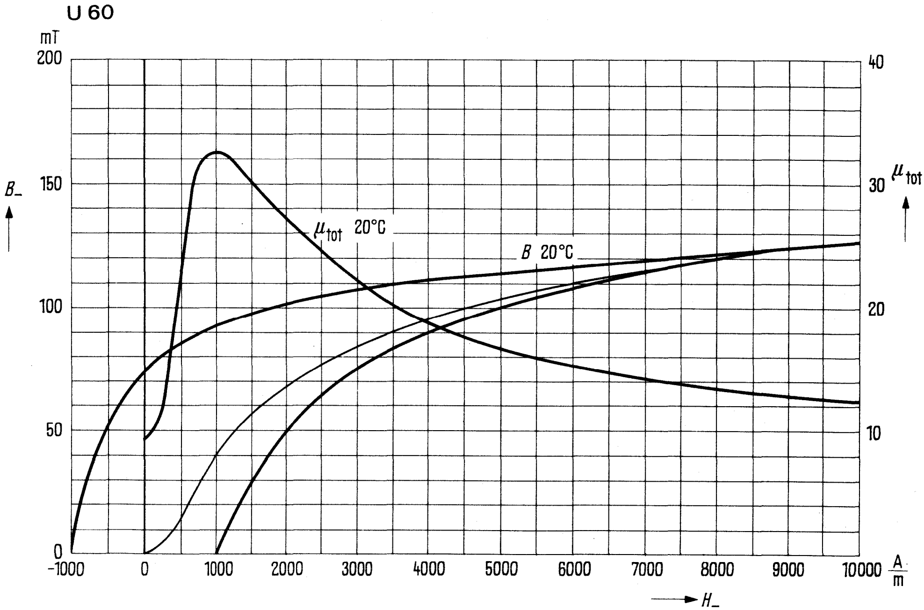
N 48 ($\mu_{i1} \approx 2000$)

T °C	α/μ_i 10^{-6}/K
20... 55	0,4...0,7...1,0[1]
20... 5	0,4...0,7...1,0[1]
20...−25	0,4...0,9...1,5
20...−40	0,6...1,25...2,0

[1] For pot cores greater than 22 mm dia and RM cores greater than RM 8, the α/μ_i value may deviate by up to 1.2×10^{-6}/K.

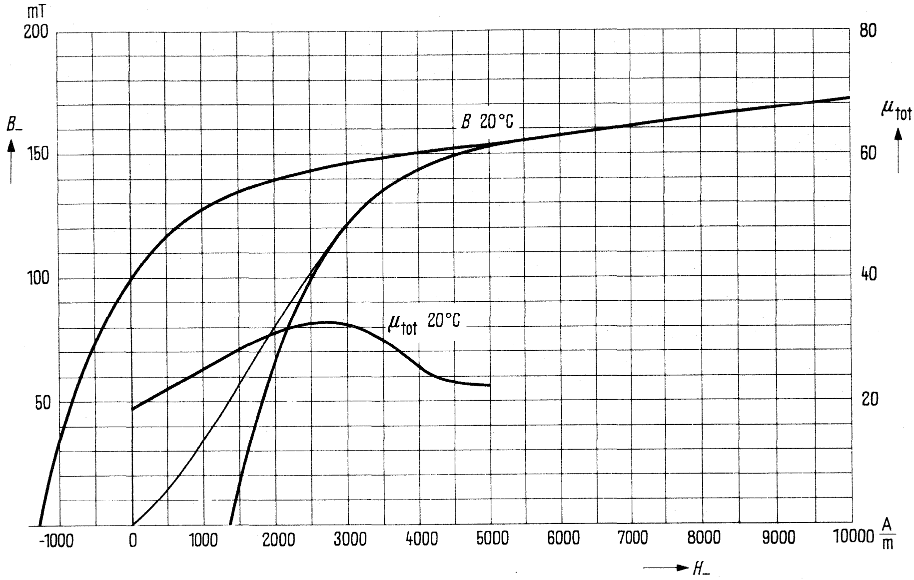
Static magnetization curves

The static magnetization curves were obtained by the ballistic galvanometer method.
The relative total permeability $\mu_{tot} = \frac{1}{\mu_0} \cdot \frac{B_{-}}{H_{-}}$ is taken from the curve of normal magnetization (new curve).

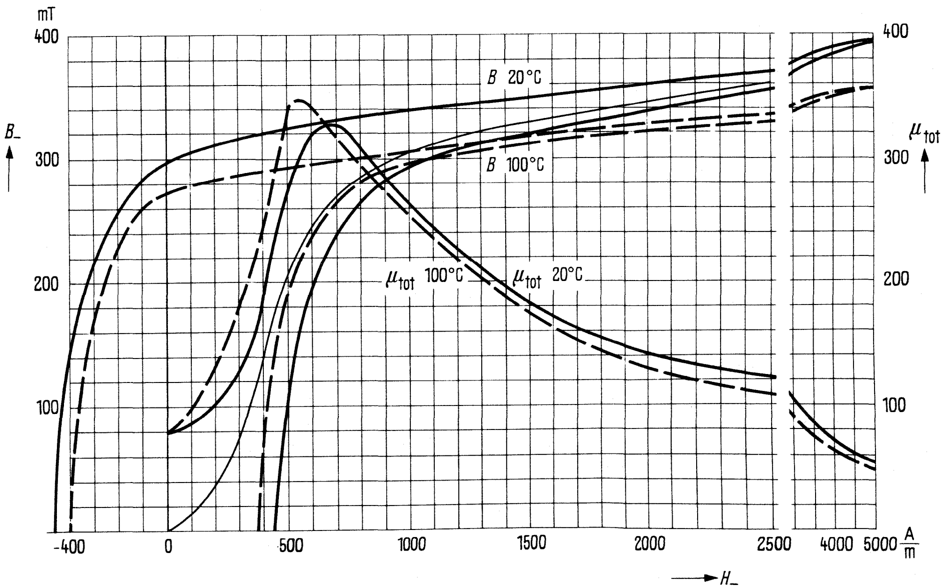


Static magnetization curves

K 12

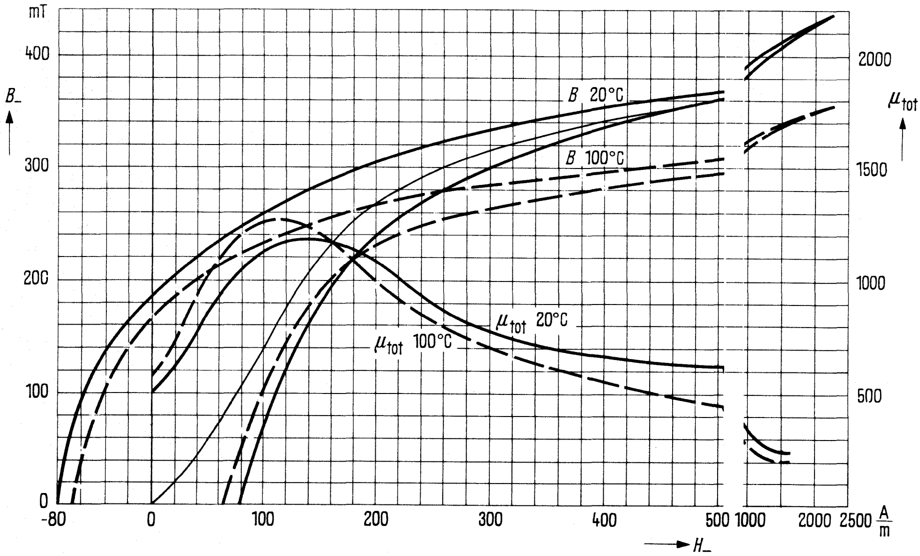


K 1



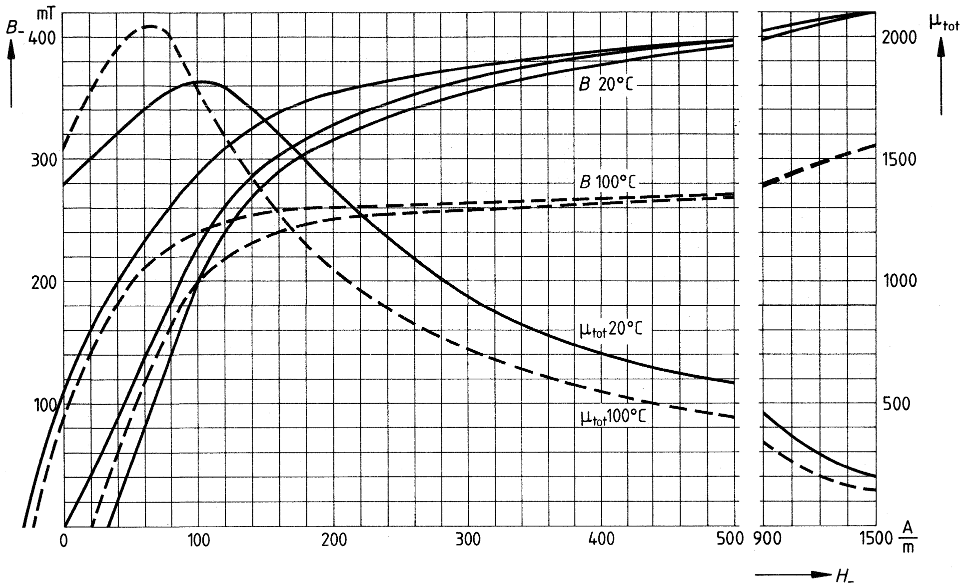
Static magnetization curves

M 33

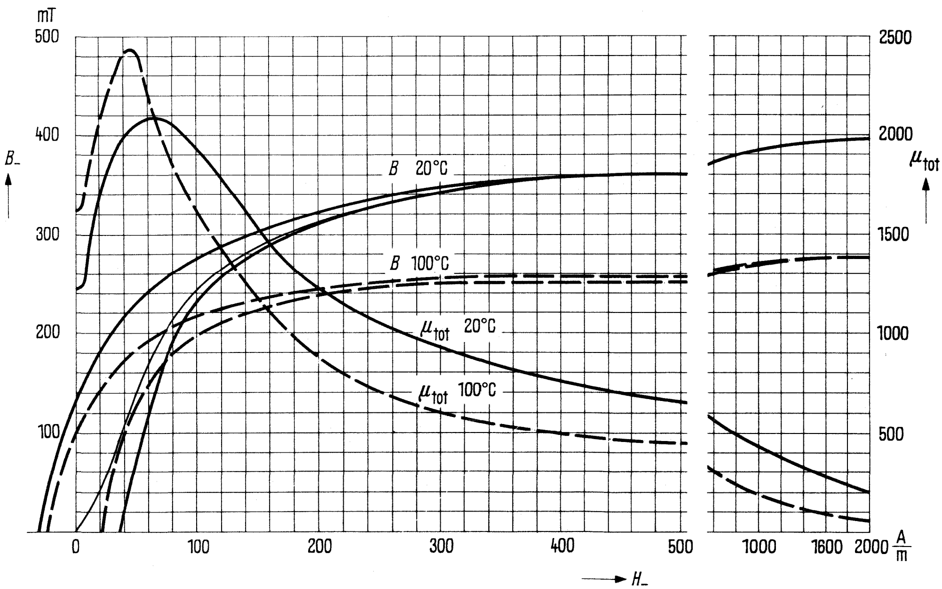


Static magnetization curves

N 47

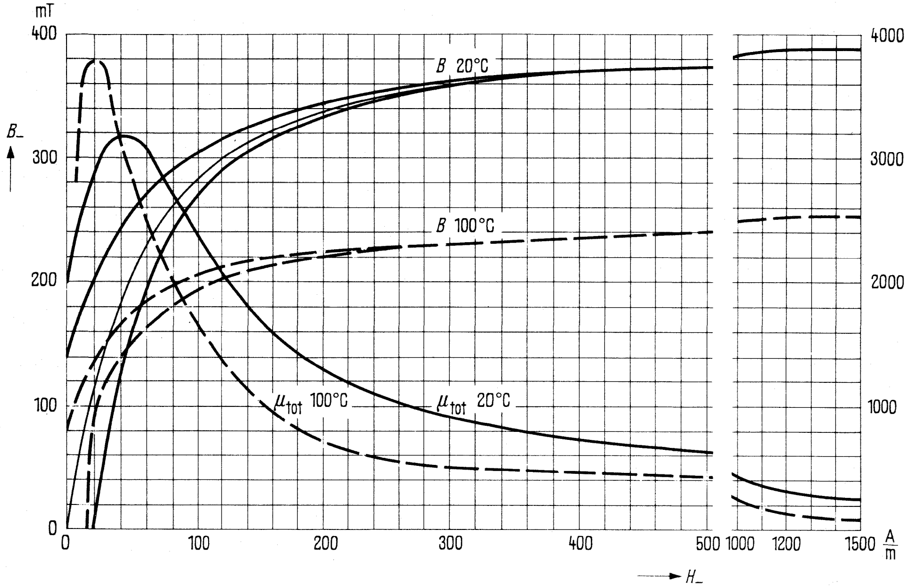


N 22

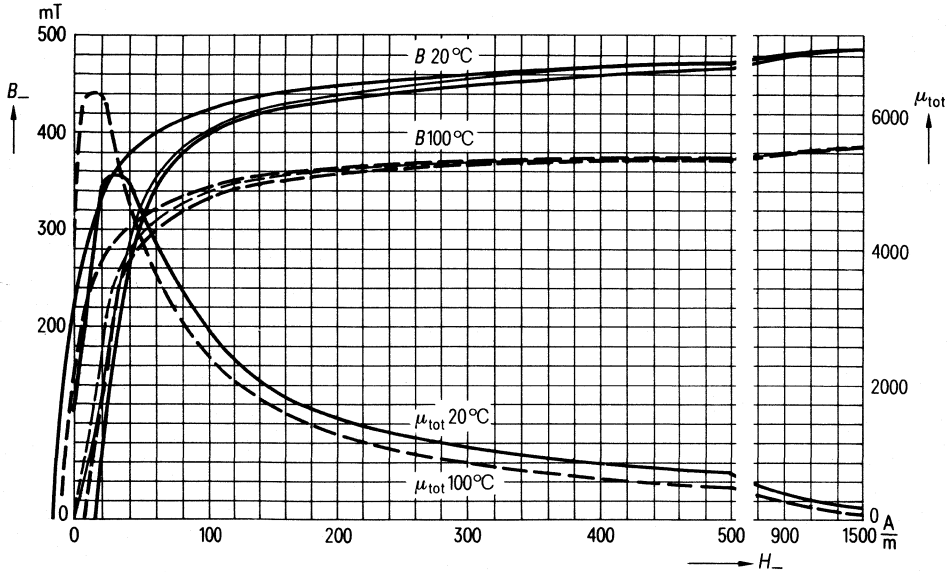


Static magnetization curves

N 48

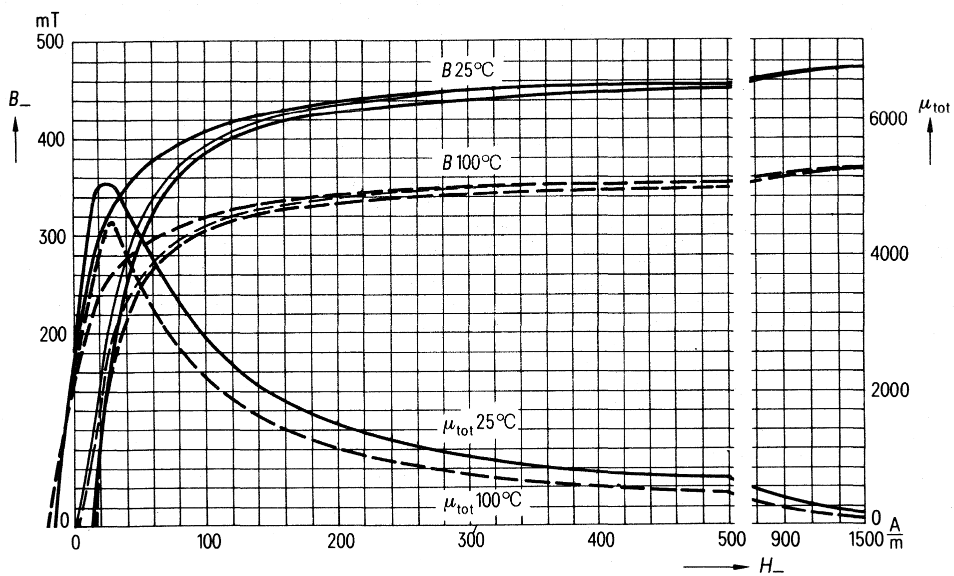


N 27

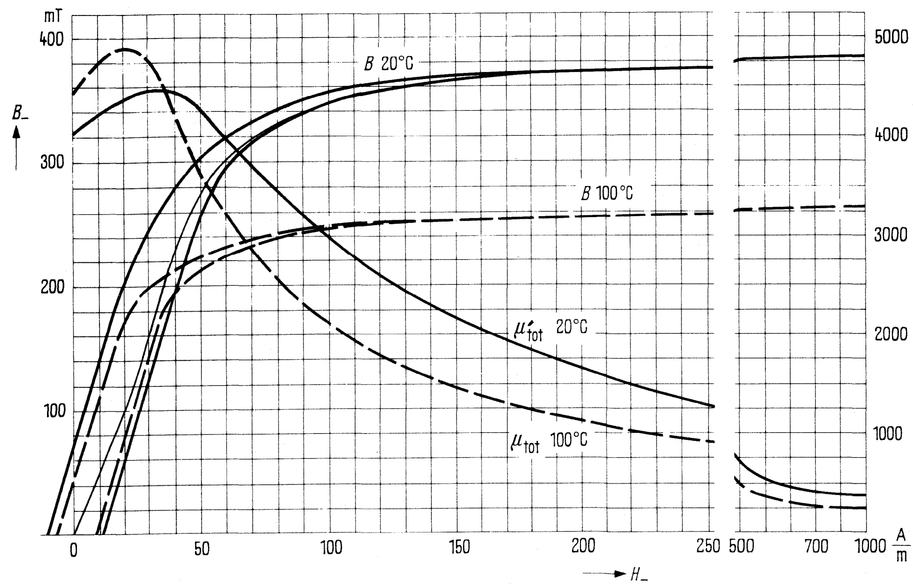


Static magnetization curves

N 41

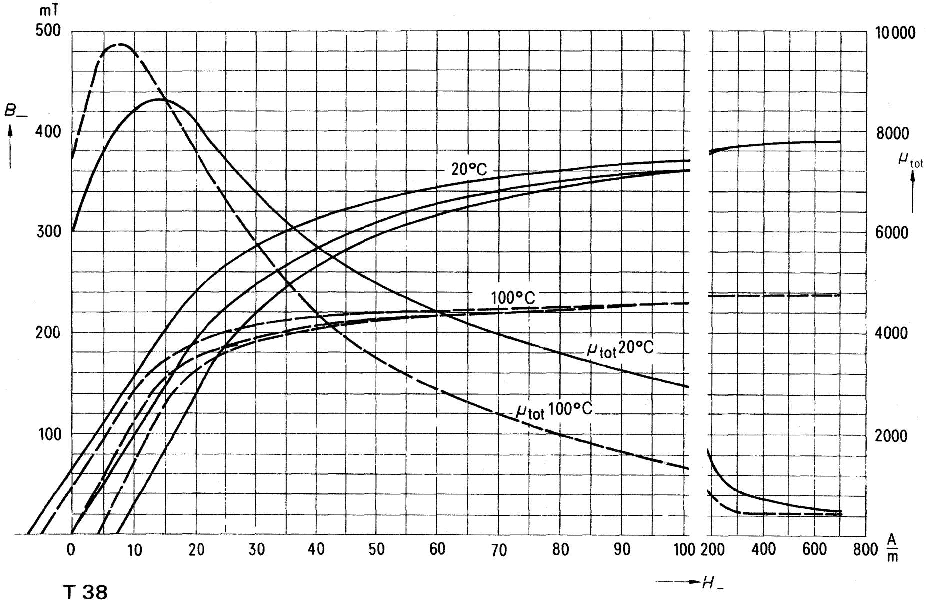


N 30

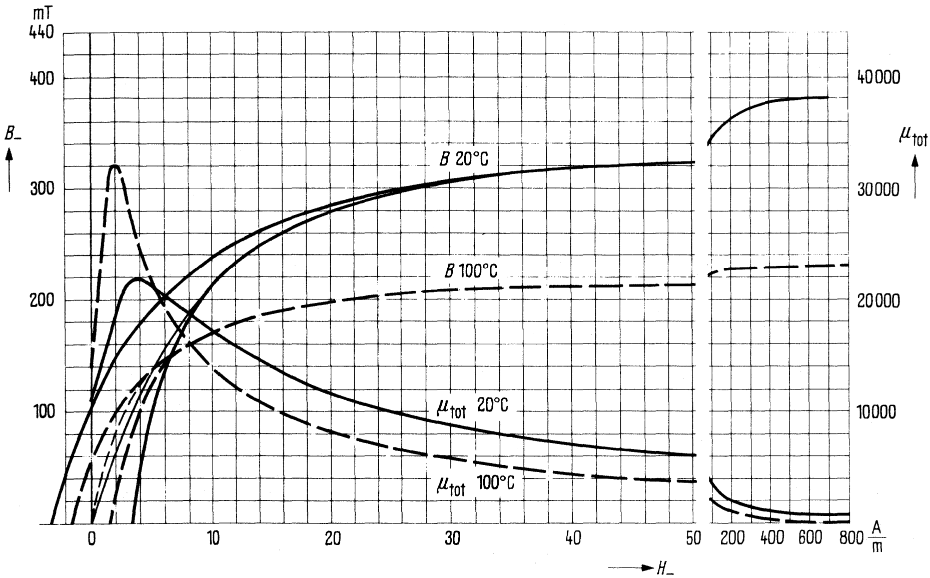


Static magnetization curves

T 35



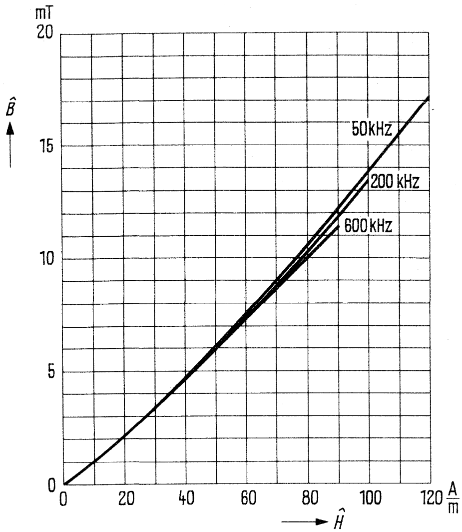
T 38



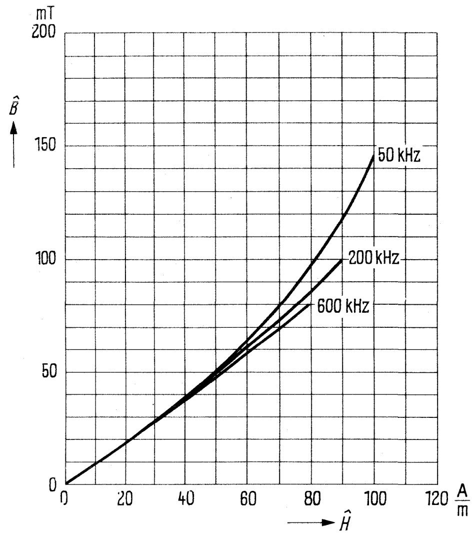
Ferrite Materials

Dynamic magnetization curves

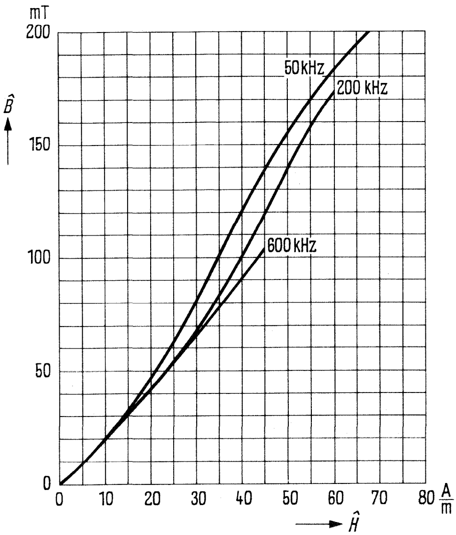
K 1



M 33



N 22



Inductor Design

1 Ungapped pot cores

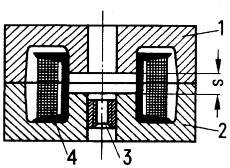
Even with the best grinding methods known today, a certain degree of roughness on ground surfaces cannot be avoided, so that the usual term "without air gap, (ungapped)" does not in fact imply no air gap at all. The A_L values quoted allow for a certain amount of roughness of the ground faces. The tolerance of the A_L value for the ungapped pot cores is +30 to −20% or +40 to −30%. Closer tolerances are not available for several reasons. The spreads in the A_L value of an ungapped pot core practically equal the spreads in toroids permeability, and the A_L value largely depends on the grinding quality of the matching surfaces. With increasing material permeability the influence of the inevitable residual air gap grows larger.

The spreads in the A_L value may also be increased by the mode of core assembly. Influences of mounting and glueing generally tend to diminish the A_L value. It is, therefore, particularly important for delivery to keep the minimum limit value, whereas exceeding the A_L value within moderate limits (about 20%), is of no importance. Considering these versatile influences, we have made it a rule to maintain the minimum limit in any case, whereas occasional exceeding the maximum limit will be tolerated.

2 Gapped pot cores

This type of core is used in high quality filter and resonant circuits. In case of small air gaps (max. 0.15 mm for round types or 0.22 mm for RM cores) the air gap can be ground into only one core half. Then, the half with the ground air gap has been stamped whereas the other half is blank. The gap reduces after-effect losses, temperature coefficient and disaccommodation factor by the ratio of the permeability of a gapped core to the permeability of the same core without air gap, and hysteresis losses by the square of this ratio. Furthermore, closer tolerances on the A_L value can be obtained.

The rated A_L values for cores with a ground air gap can be obtained from the appropriate sheets on pot cores. These also indicate the relative effective permeability μ_e used to approximately determine the loss and temperature coefficients etc. for the appropriate effective permeability (see page 42) from the toroidal core characteristics. In cores with a larger air gap the stray field immediately around the air gap causes additional eddy current losses in the copper winding. If the coil Q must meet stringent requirements, it is therefore advisable to wind several layers of polystyrene or nylon tape instead of wire in that part of the winding in the proximity of the air gap. For example in the section near the air gap of the center compartment of a three-compartment former, thus "padding" the winding.



Schematic drawing showing construction of a set of gapped (s) pot or RM cores comprising 2 core halves 1 and 2, threaded part 3 and padded winding 4.

3 Ferrite pot and RM cores with inserted threaded sleeves

Pot and RM cores are available with threaded sleeve fitted to the core. We have developed automatic machines of high reliability in adding adhesive and in positioning the threaded sleeve in the core.

The rigid fit of the threaded sleeve is checked regularly, at a climate of 40 °C/104 °F/ 93% humidity[1)] during four days and also by periodic examinations during 3 weeks. Bond strengths of 20 N for 2 mm center holes (e.g. for pot cores 11 x 7 or RM 5 cores) and >30 N for 3 mm center holes (e.g. pot cores 14 x 8, or RM 6 cores) are greatly exceeded, on an average of 100 N. The threaded sleeve is also properly centered and positioned to the proper depth (this helps maintain the specified adjustment range). Summing up, the controlled automated procedure guarantees higher reliability than manual glueing and its unavoidable inadequacies.

Owing to the porosity of the ferrite, bracing of the ferrite structure because of soaked-in, hardened adhesive cannot always be avoided. Hence, the relative temperature coefficient α/μ_e can be increased by approximately 0.2×10^{-6}/K.

The ordering codes for pot and RM cores with glued threaded sleeve (e.g. for RM 6: B65807–**N**...) are to be found on the pages dealing with the individual core types.

4 Inductance adjustment

Inductance curves, to be understood as typical values, are included in the data for RM and pot core adjusting devices. The indicated percentage change in inductance is referred to L (inductance without adjusting screw). Adjustment is done by bridging the air gap with a cylindrical or screw core, and is, therefore, only possible on gapped pot cores.

In order to avoid unstable conditions of inductance, Q etc. due to intermittent magnetic contact, the adjusting device should not come into direct contact with the wall of the center boss during the adjusting procedure. A suitable insulator is therefore provided for the adjustment systems of ferrite pot cores.

Although wide variations of inductance can be obtained with a large air gap, it should be remembered that the magnetic properties depend to a great extent on the size of the air gap. If the coils have to meet stringent Q and temperature coefficient requirements etc., it is advisable to use the smallest possible adjustment range.

These conditions can be met by suitably selecting the adjusting ferrite core material. Suitable plastic adjusting tools are included on the pages dealing with adjusting devices.

5 Marking of ferrite cores

5.1 Marking of pot core or RM core sets

As a general principle, only pot cores greater than 5.8 and RM cores greater than RM 3 are marked with material and A_L value, ungapped cores with 'o.L.'. In each case only one half of the set is stamped. When cores have an asymmetrical air gap, the half with the air gap is marked; cores with a glued-in threaded sleeve are marked on the half without the sleeve.

[1)] according to IEC publication 68-2-3.

5.2 Marking of E cores

As a general principle gapped E cores (dimensions *'g'*) are marked with the material and the size of the air gap (in mm), e.g. material N27; dimension *'g'* = 1.2 mm
Stamping: N27 1.20

Ungapped E cores are marked with the material designation only, e.g. N27.

6 Winding design

The usual litz wires and wires as well as nomograms for determining flux density and A_L value are listed on the following pages.

Litz wire table (extract from DIN 46447, part 1)

Litz wire	Nominal diameter of the copper enamel wire	Outer diameter of the insulated litz wire (max. dimension)			DC resistance at 20 °C/68 °F for 1 meter (nominal value)
		non-covered	covered: single natural silk (1 x 52)	covered: double natural silk (2 x 52)	
	mm	mm	mm	mm	Ω
1 x 12 x 0.04	0.04	0.208	0.243	0.278	1.156
1 x 15 x 0.04		0.229	0.269	0.299	0.925
1 x 20 x 0.04		0.264	0.304	0.334	0.694
1 x 30 x 0.04		0.323	0.363	0.393	0.462
1 x 45 x 0.04		0.395	0.435	0.465	0.308
3 x 20 x 0.04		0.460	0.500	0.530	0.231
3 x 30 x 0.04		0.565	0.605	0.645	0.154
3 x 45 x 0.04		0.690	0.730	0.770	0.103
1 x 10 x 0.05	0.05	0.231	0.271	0.301	0.888
1 x 15 x 0.05		0.283	0.323	0.353	0.592
1 x 20 x 0.05		0.327	0.367	0.397	0.444
1 x 30 x 0.05		0.401	0.441	0.471	0.296
1 x 45 x 0.05		0.490	0.530	0.560	0.197
3 x 20 x 0.05		0.570	0.610	0.650	0.148
3 x 30 x 0.05		0.701	0.741	0.781	0.099
3 x 40 x 0.05		0.806	0.846	0.886	0.074
1 x 3 x 0.071	0.07	0.189	0.224	0.259	1.468
1 x 6 x 0.071		0.254	0.294	0.324	0.734
1 x 10 x 0.071		0.328	0.368	0.398	0.440
1 x 15 x 0.071		0.402	0.442	0.472	0.294
1 x 20 x 0.071		0.464	0.504	0.534	0.220
1 x 30 x 0.071		0.568	0.608	0.648	0.147
1 x 45 x 0.071		0.696	0.736	0.776	0.098
3 x 20 x 0.071		0.810	0.850	0.890	0.073
3 x 30 x 0.071		0.994	1.034	1.094	0.0489
3 x 45 x 0.071		1.214	1.254	1.314	0.0326

Wire table (Extract from DIN 46 435 and DIN 46 436, part 2)

Nominal diameter (conductor diameter)	Outer diameter of the insulated wire (max. dimension)				DC resistance at 20 °C/68 °F for 1 meter (nominal value)
	enamelled according to degree 1 (L)	enamelled according to degree 2 (2 L)	enamelled according to degree 1 single-silk covered (1 x 52)	enamelled according to degree 1 double-silk covered (2 x 52)	
mm	mm	mm	mm	mm	Ω
● 0.02	0.025	0.027	–	–	54,88
● 0.025	0.031	0.034	–	–	35.12
0.03	0.038	0.041	0.073	0.108	24.39
● 0.032	0.040	0.043	0.077	0.112	21.44
0.036	0.045	0.049	0.081	0.116	16.94
● 0.04	0.050	0.054	0.085	0.120	13.72
0.045	0.056	0.061	0.091	0.126	10.84
● 0.05	0.062	0.068	0.097	0.132	8.781
0.056	0.069	0.076	0.104	0.139	7.000
0.06	0.074	0.081	0.109	0.144	6.098
● 0.063	0.078	0.085	0.113	0.148	5.531
● 0.071	0.088	0.095	0.123	0.158	4.355
● 0.08	0.098	0.105	0.133	0.168	3.430
● 0.09	0.110	0.117	0.145	0.180	2.710
● 0.1	0.121	0.129	0.156	0.191	2.195
● 0.112	0.134	0.143	0.169	0.204	1.750
● 0.125	0.149	0.159	0.184	0.219	1.405
● 0.14	0.166	0.176	0.201	0.236	1.120
0.15	0.177	0.187	0.212	0.247	0.9756
● 0.16	0.187	0.199	0.222	0.257	0.8575
0.17	0.198	0.210	0.233	0.268	0.7596
● 0.18	0.209	0.222	0.244	0.279	0.6775
0.19	0.220	0.233	0.255	0.290	0.6081
0.2	0.230	0.245	0.265	0.300	0.5488
● 0.224	0.256	0.272	0.296	0.326	0.4375
● 0.25	0.284	0.301	0.324	0.354	0.3512
● 0.28	0.315	0.334	0.355	0.385	0.2800
0.3	0.336	0.355	0.375	0.405	0.2439
● 0.315	0.352	0.371	0.392	0.422	0.2212
● 0.355	0.395	0.414	0.435	0.465	0.1742
● 0.4	0.442	0.462	0.482	0.512	0.1372
● 0.45	0.495	0.516	0.535	0.565	0.1084
● 0.5	0.548	0.569	0.588	0.618	0.08781
● 0.56	0.611	0.632	0.651	0.691	0.07000
0.6	0.654	0.674	0.693	0.733	0.06098
● 0.63	0.684	0.706	0.724	0.764	0.05531
● 0.71	0.767	0.790	0.807	0.847	0.04355
● 0.75	0.809	0.832	0.849	0.889	0.03903
● 0.8	0.861	0.885	0.901	0.941	0.03430
● 0.85	0.913	0.937	–	1.013	0.03038
● 0.9	0.965	0.990	–	1.065	0.02710
● 0.95	1.017	1.041	–	1.117	0.02432
● 1	1.068	1.093	–	1.168	0.02195

The nominal diameters marked by ● comply with the diameters of the IEC publication 182-1, 1st edition 1964, part 1: "Diameters of conductors for round winding wires" and are preferred diameters.

Table of
American Wire Gauges (AWG)

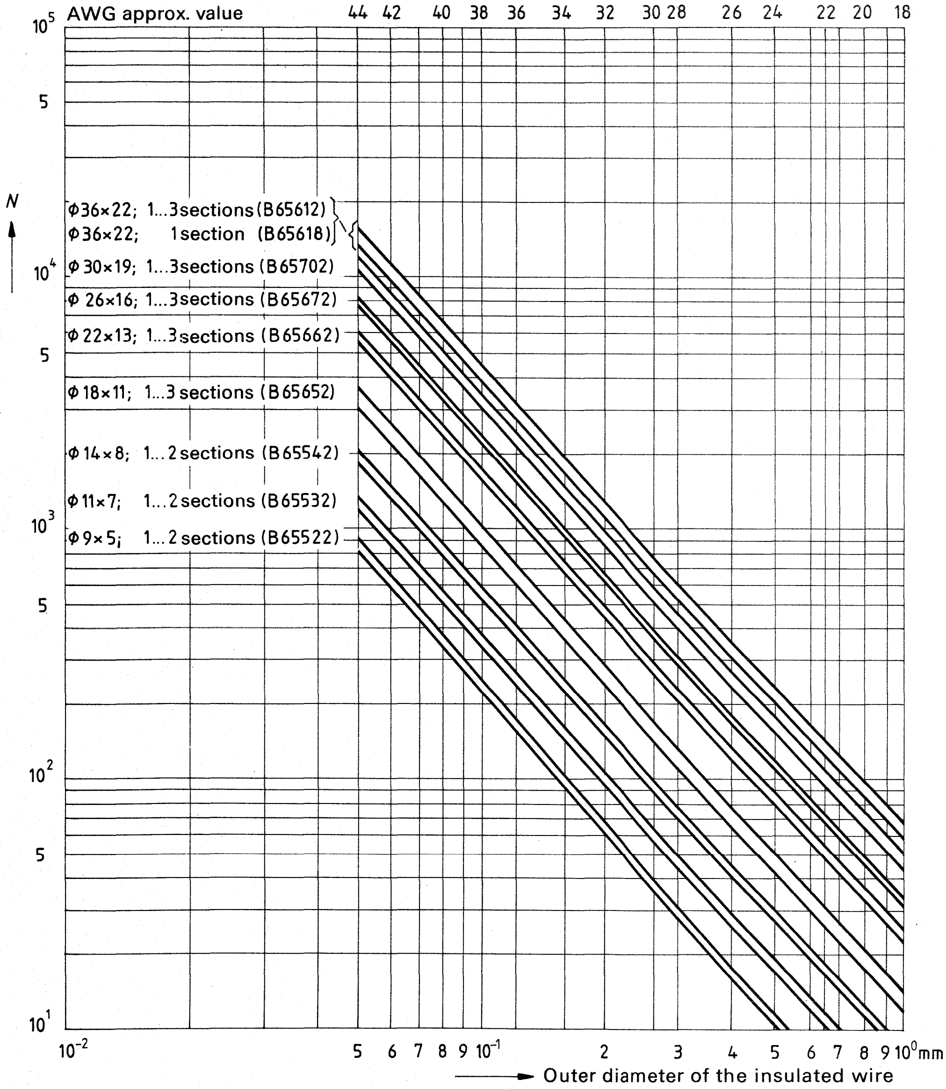
1 in. = 25.4 mm
1 mil = 1/1000 in.
1 mm = 0.03937 in.

Nominal diameter		Wire gauge No.		Nominal diameter		Wire gauge No.	
mm	mil	BG[1]	SWG[2]	mm	mil	BG[1]	SWG[2]
2.642	104	–	12	0.2870	11.3	29	–
2.591	102	10	–	0.2743	10.8	–	32
2.337	92	–	13	0.2540	10.0	30	33
2.311	91	11	–	0.2337	9.2	–	34
2.057	81	12	–	0.2261	8.9	31	–
2.032	80	–	14	0.2134	8.4	–	35
1.829	72	13	15	0.2007	7.9	32	–
1.626	64	14	16	0.1930	7.6	–	36
1.448	57	15	–	0.1803	7.1	33	–
1.422	56	–	17	0.1727	6.8	–	37
1.295	51	16	–	0.1600	6.3	34	–
1.219	48	–	18	0.1524	6.0	–	38
1.143	45	17	–	0.1422	5.6	35	–
1.016	40	18	19	0.1321	5.2	–	39
0.9144	36	19	20	0.1270	5.0	36	–
0.8128	32	20	21	0.1219	4.8	–	40
0.7239	28.5	21	–	0.1118	4.4	37	41
0.7112	28	–	22	0.1016	4.0	38	42
0.6426	25.3	22	–	0.09144	3.6	–	43
0.6096	24	–	23	0.08890	3.5	39	–
0.5740	22.6	23	–	0.08128	3.2	–	44
0.5588	22	–	24	0.07874	3.1	40	–
0.5105	20.1	24	–	0.07112	2.8	41	45
0.5080	20	–	25	0.0633	2.5	42	–
0.4572	18	–	26	0.06096	2.4	–	46
0.4547	17.9	25	–	0.0564	2.2	43	–
0.4166	16.4	–	27	0.05080	2.0	44	47
0.4039	15.9	26	–	0.0447	1.8	45	–
0.3759	14.8	–	28	0.04064	1.6	46	48
0.3607	14.2	27	–	0.0355	1.4	47	–
0.3454	13.6	–	29	0.03048	1.2	48	49
0.3200	12.6	28	–	0.0282	1.1	49	–
0.3150	12.4	–	30	0.02504	1.0	50	50
0.2946	11.6	–	31				

[1] BG ≙ Birmingham gauge
[2] SWG ≙ Standard wire gauge

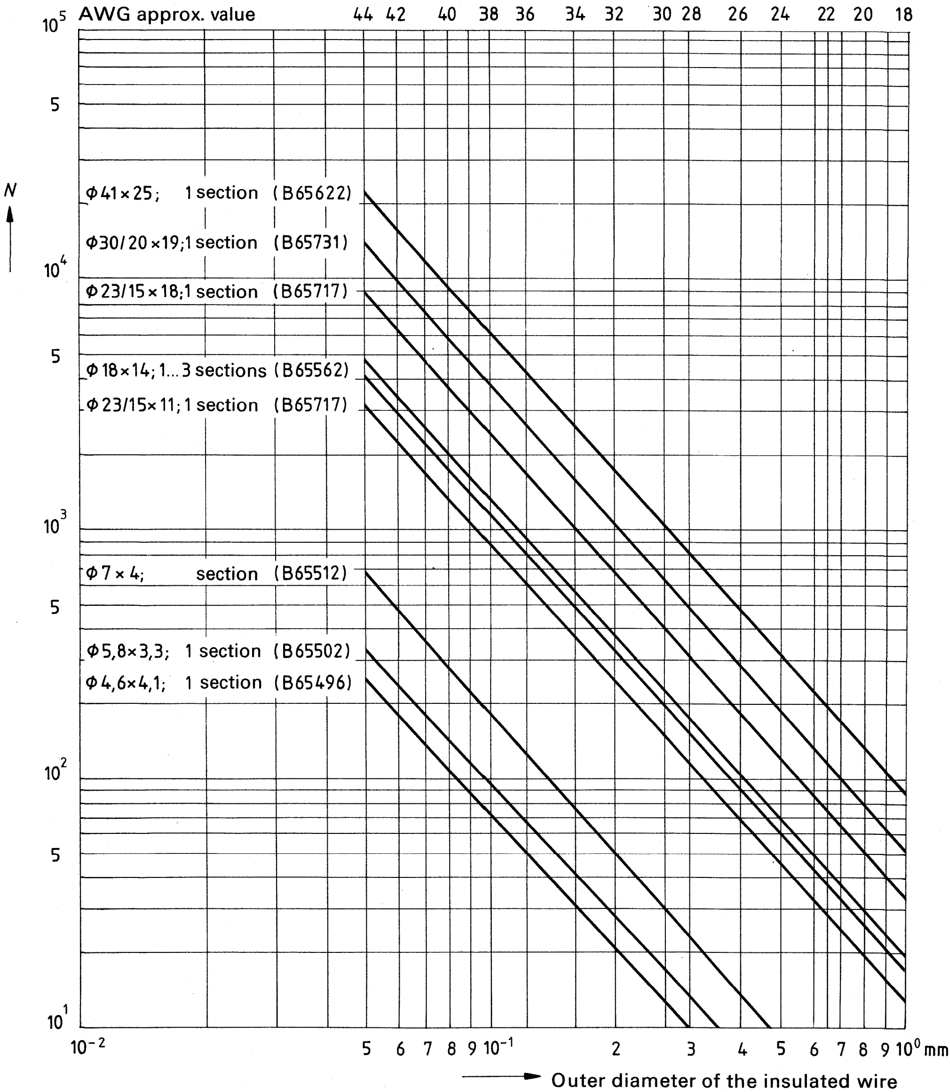
Standardized pot cores and 4-slot pot cores

Maximum number of turns *N* for coil formers



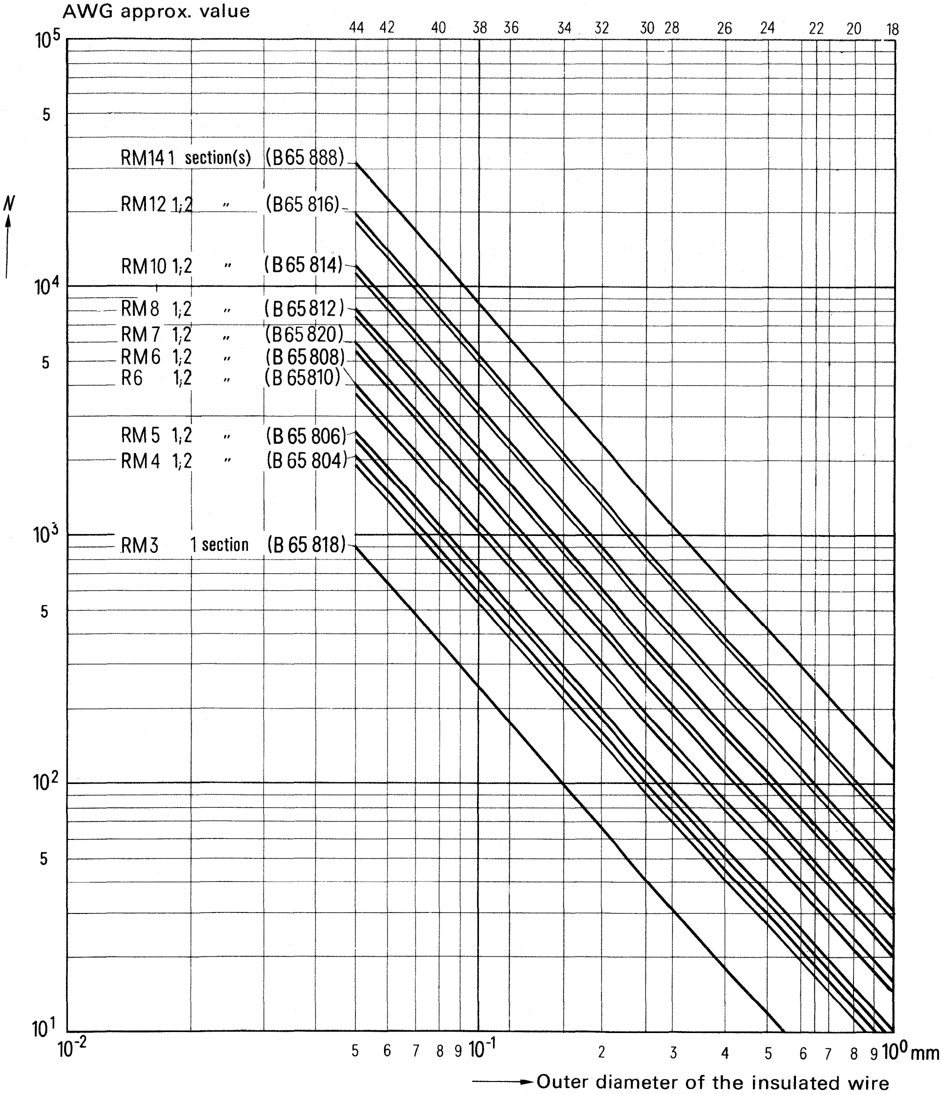
Non-standardized pot cores

Maximum number of turns *N* for coil formers



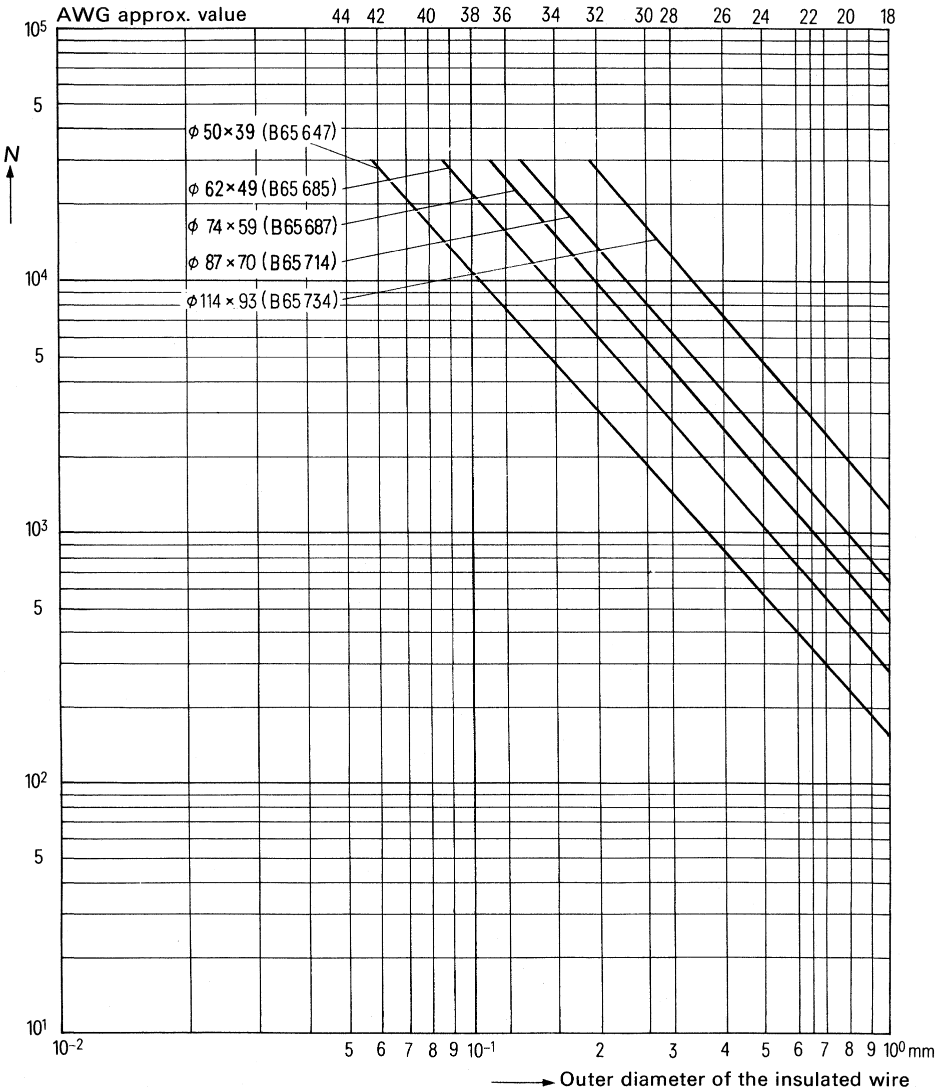
RM cores

Maximum number of turns *N* for coil formers



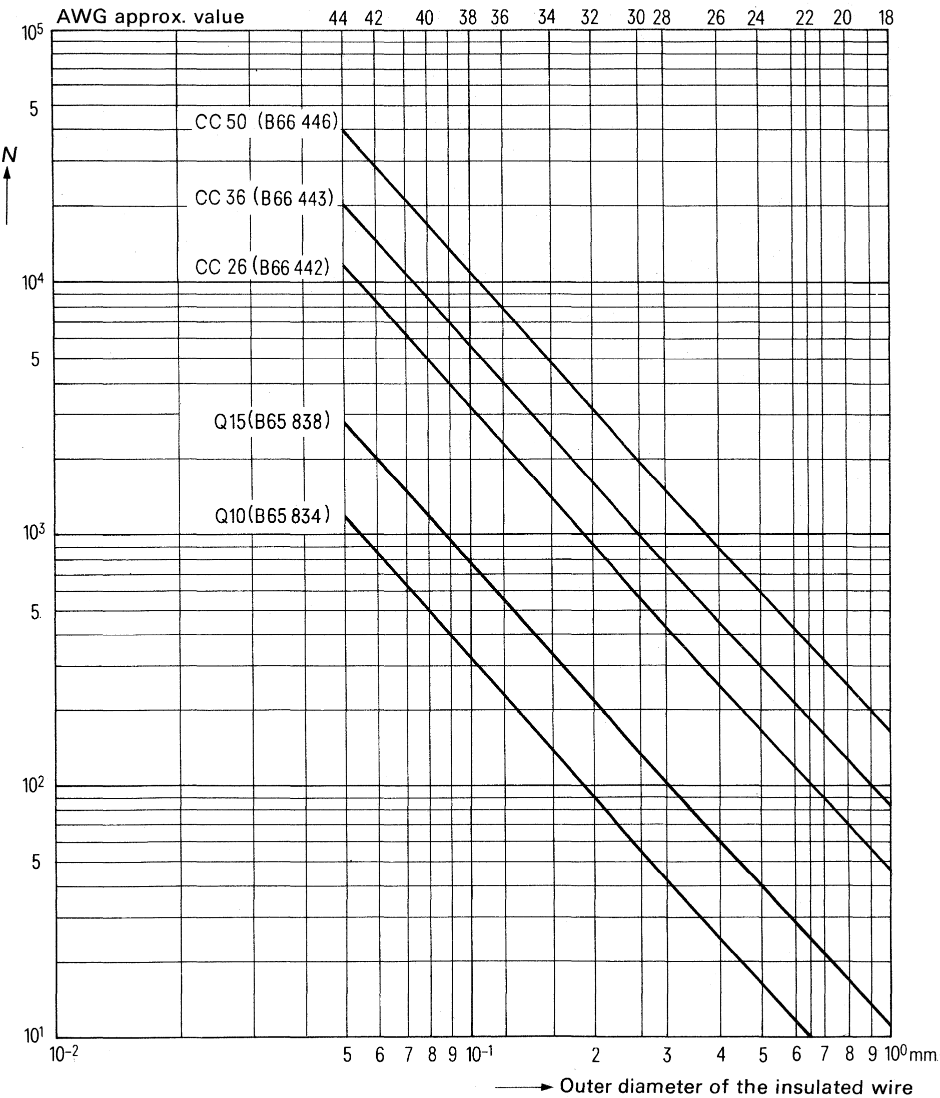
PM Cores

Maximum number of turns *N* for coil formers



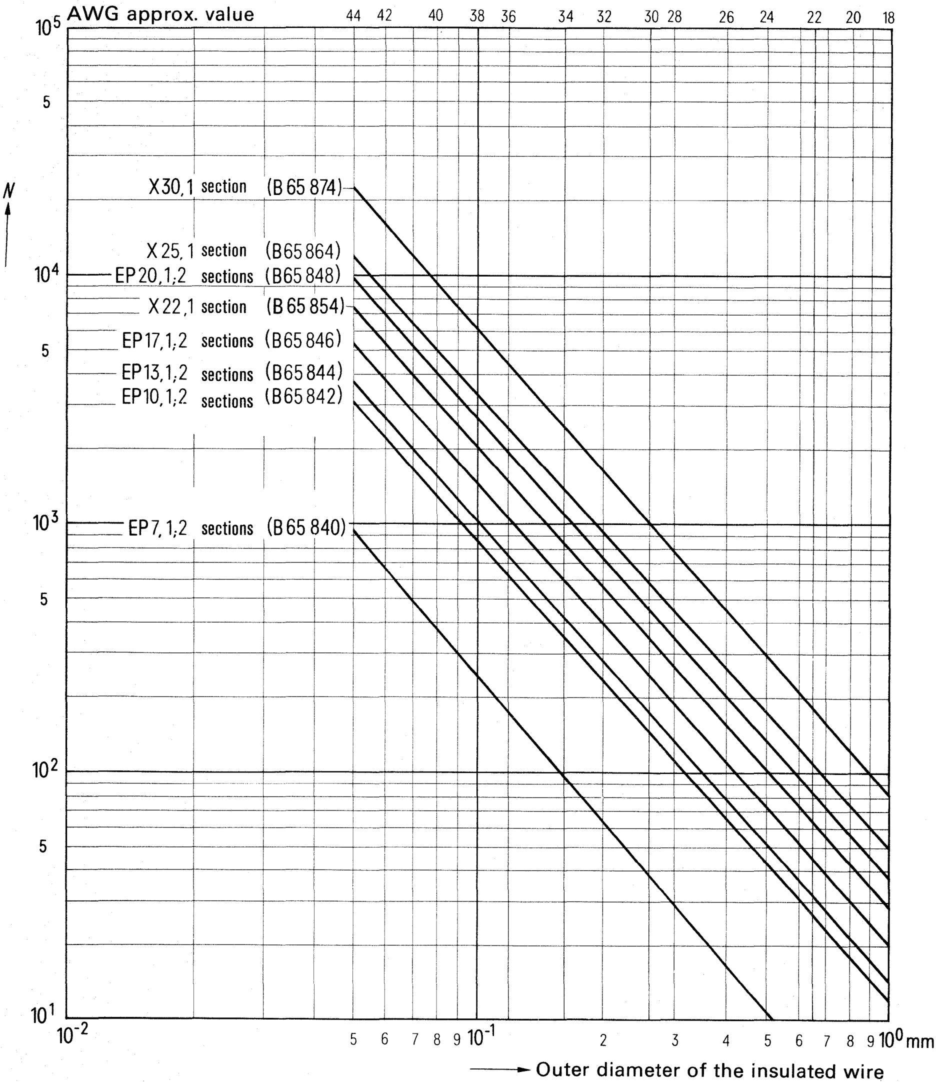
CC and Q cores

Maximum number of turns *N* for coil formers



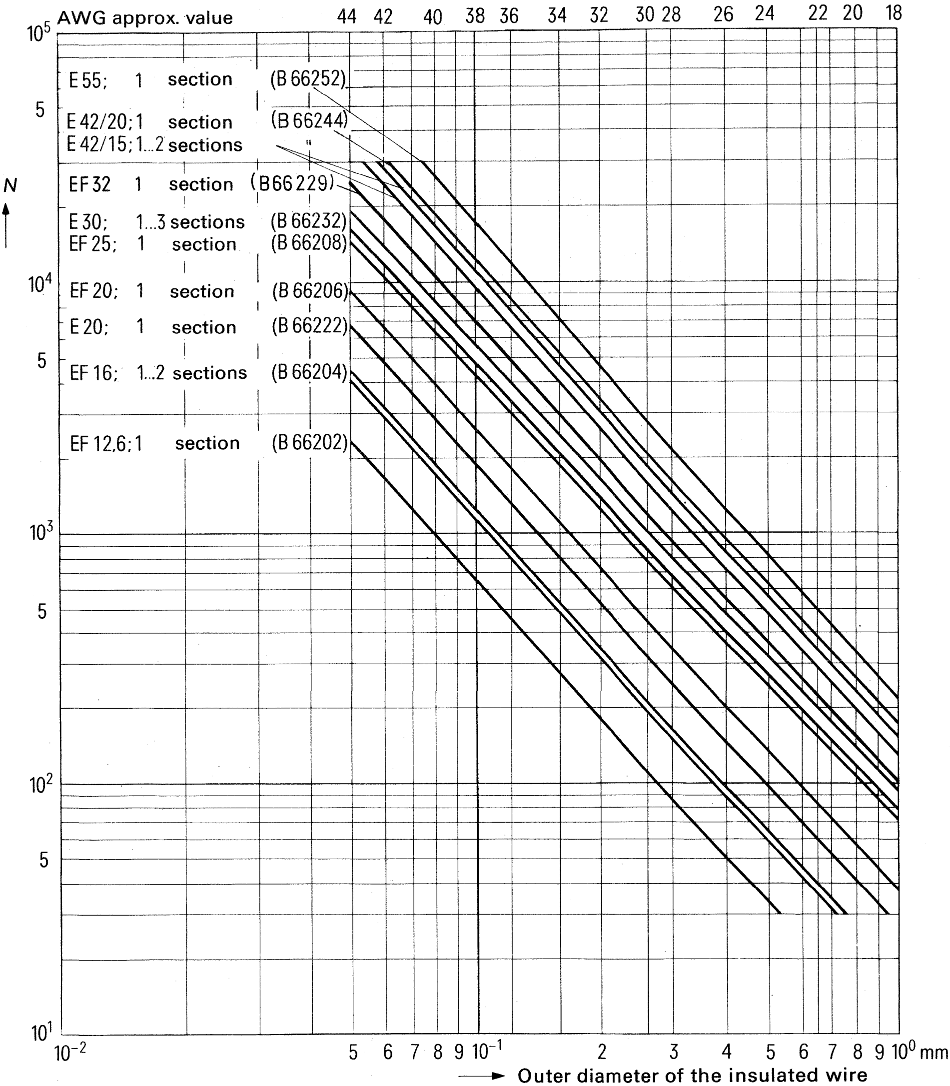
EP and X cores

Maximum number of turns *N* for coil formers



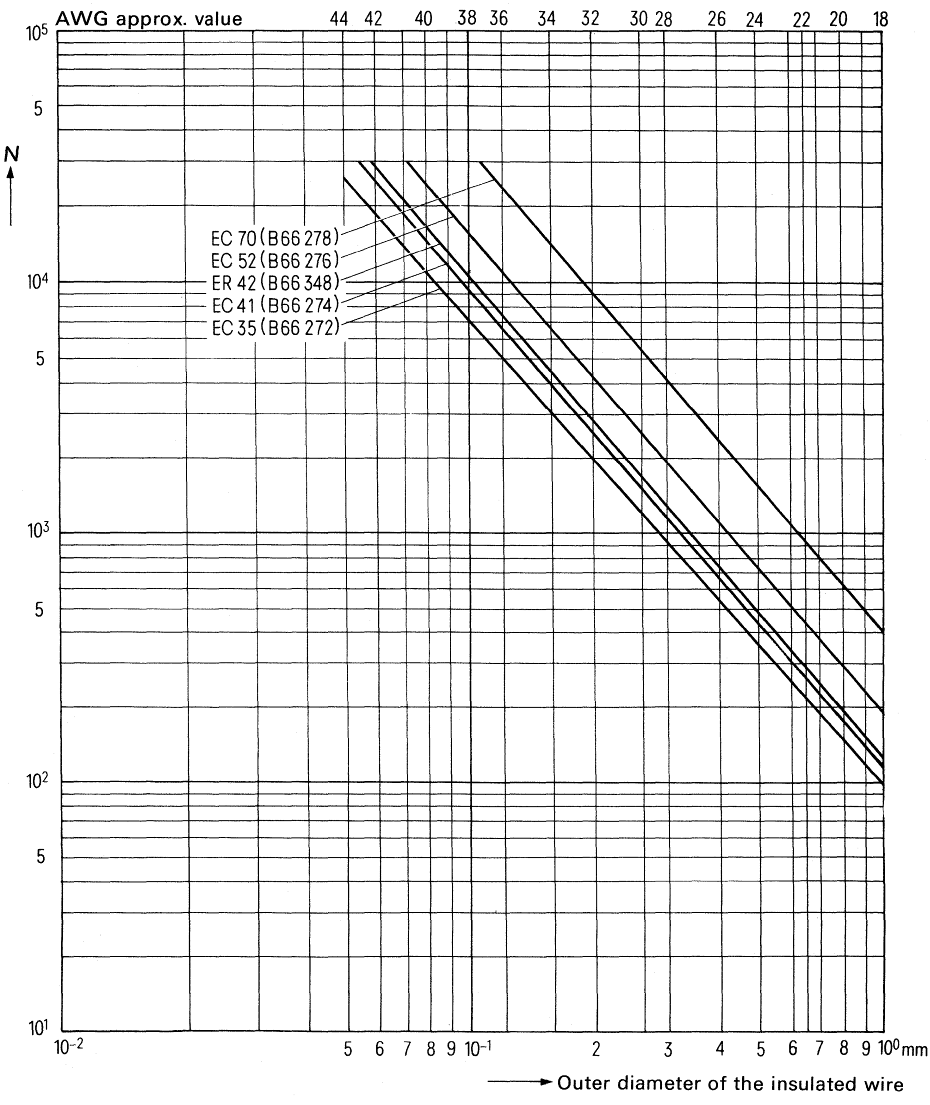
E and EF cores

Maximum number of turns *N* for coil formers



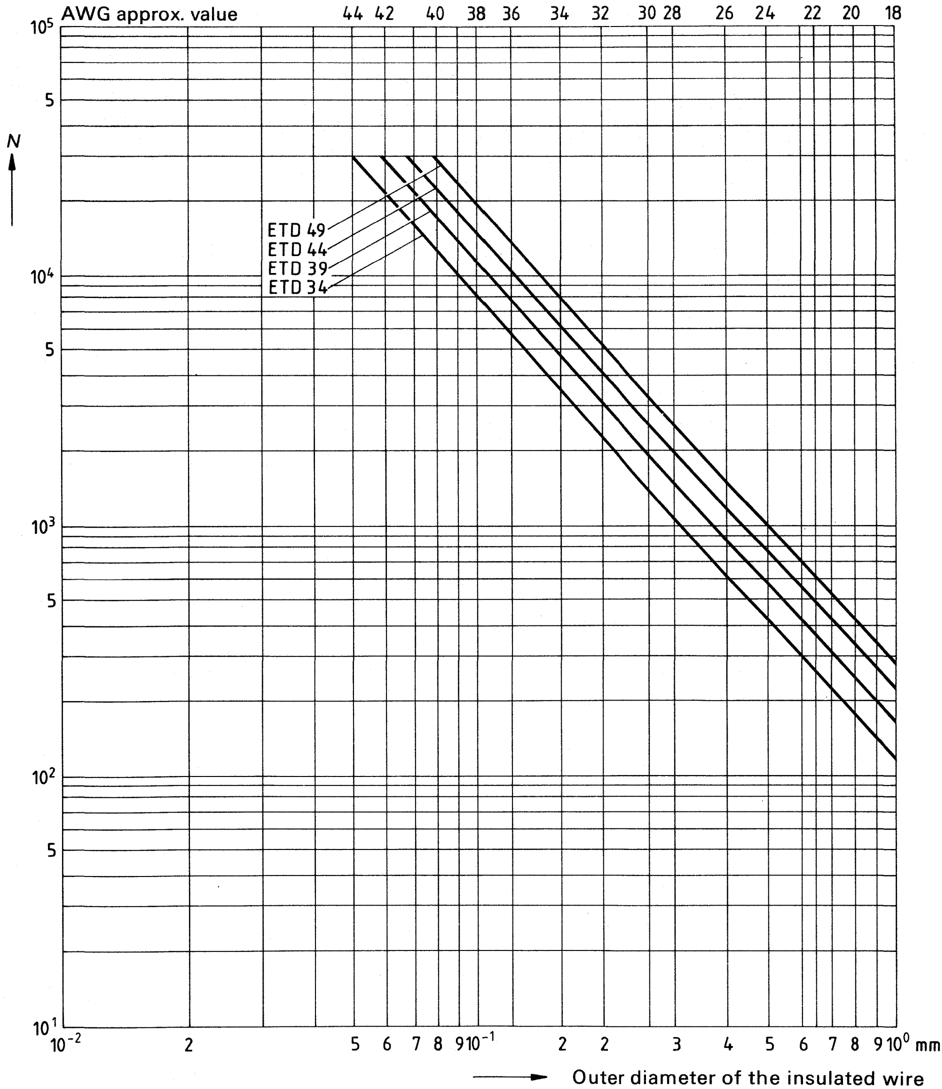
EC and ER cores

Maximum number of turns *N* for coil formers

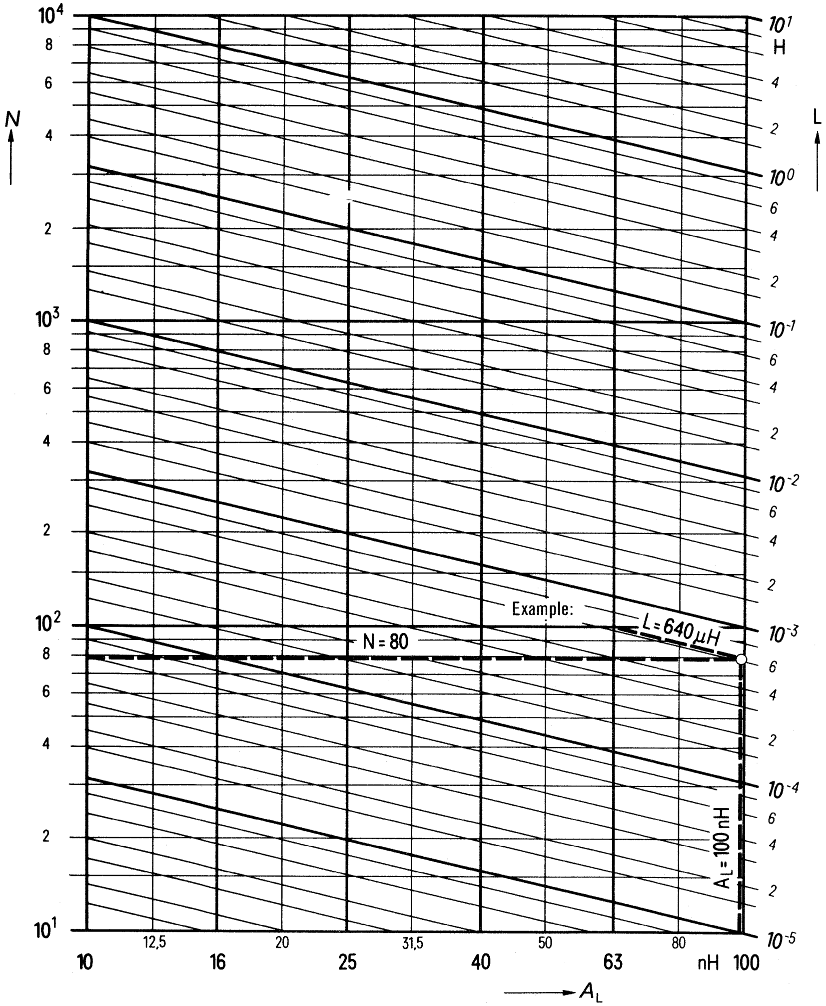


ETD cores

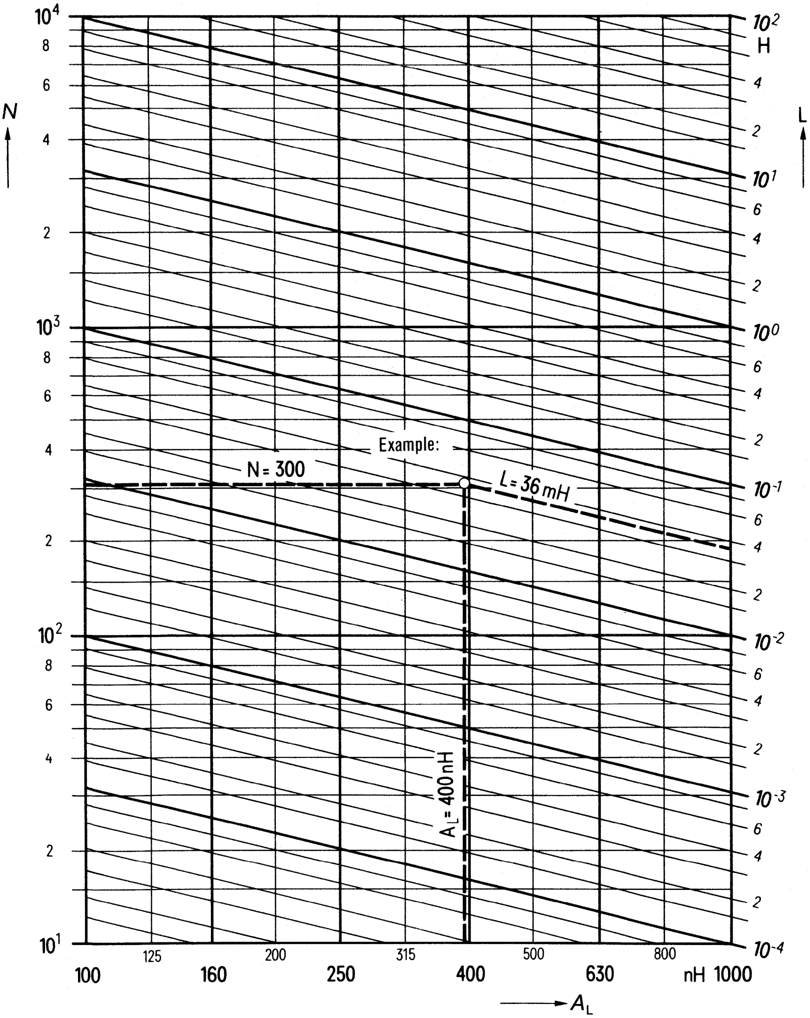
Maximum number of turns *N* for coil formers



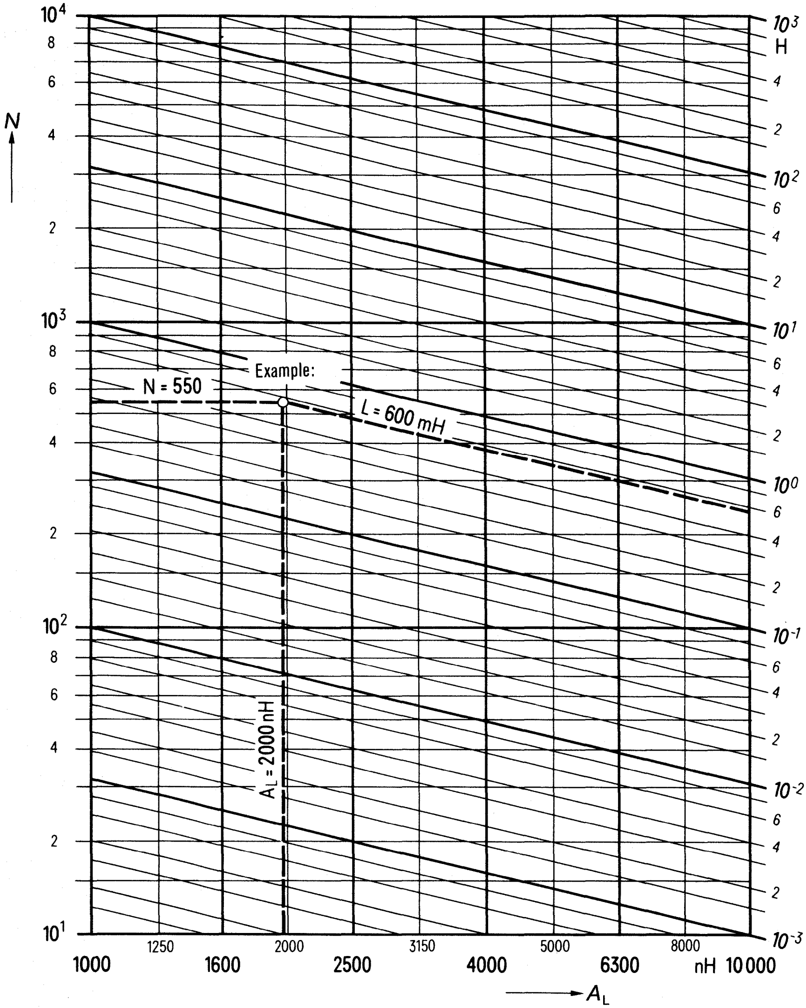
Nomogram for determining the number of turns *N*
from inductance *L* and inductance factor A_L for A_L values 10 to 100 nH



Nomogram for determining the number of turns N
from inductance L and inductance factor A_L for A_L values 100 to 1000 nH



Nomogram for determining the number of turns *N*
from inductance *L* and inductance factor A_L for A_L values 1000 to 10 000 nH



7 DC magnetic bias of pot, RM and PM cores

Definitions

$$\boxed{H_{-} = \frac{I_{-} \cdot N}{l_e}}$$

H_{-} = DC field strength in A/m
I_{-} = DC current in A
N = number of turns
l_e = effective length (in m)[1)]
For further definitions see pages 15 to 31.

Explanations to the graphs

The curves of $\mu_{rev} = f(H_{-})$ allow an approximate calculation of the variation in AC permeability (μ_{rev}) and A_L value due to magnetic bias. These curves are of particular interest for pot core inductors used as transformers, since magnetic bias should be avoided if possible with inductors requiring high stability (filter inductors etc.). In the case of geometrically similar pot cores, only the effective permeability of the actual pot core in question in conjunction with the given curves suffices in determining the reversible permeability to a close approximation.

In determining the variation of reversible permeability with magnetic bias DC field strength H_{-}, the effective permeability μ_e for the desired A_L value is taken from the appropriate pot core data. If the curve $\mu_{rev} = f(H_{-})$ for the actual effective permeability is not shown, this can be obtained by interpolation from two curves shown. The associated DC field strength H_{-} can be calculated from the above equation with the effective length l_e obtained from the data.

The following curves, measured at 20 °C/68 °F and 10 kHz apply to pot and RM cores with center hole. Cores without center hole (series RM 5 to RM 14) may be loaded by an approx. 10% higher DC field strength.
For DC magnetic bias for E cores see page 419.

Example

Pot core 26 x 16, B65671
Material ferrite N 48
A_L = 400 nH
μ_e = 127
l_e = 37.2 mm

The decrease in permeability caused by magnetic bias begins at a DC field strength of about 1000 A/m.

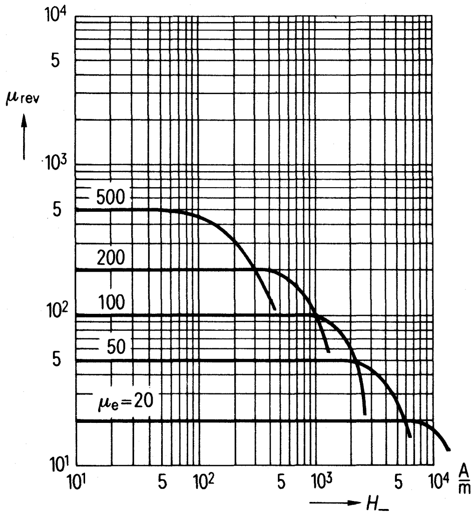
This corresponds to an ampere-turns value of

$I_{-} \cdot N = H_{-} \cdot l_e = 1000 \times 37.2 \times 10^{-3} = 37.2$ A.

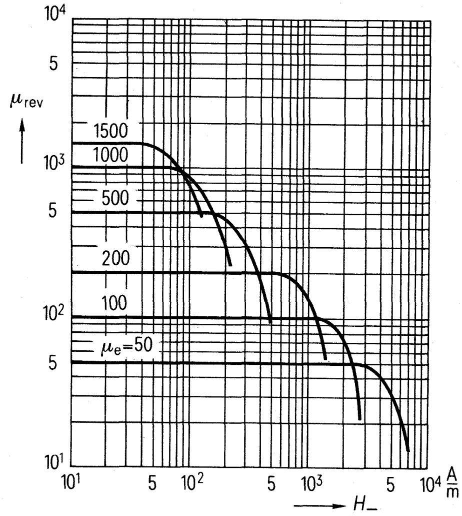
1) In practice l_e is indicated in mm.

DC magnetic bias of pot cores and RM cores

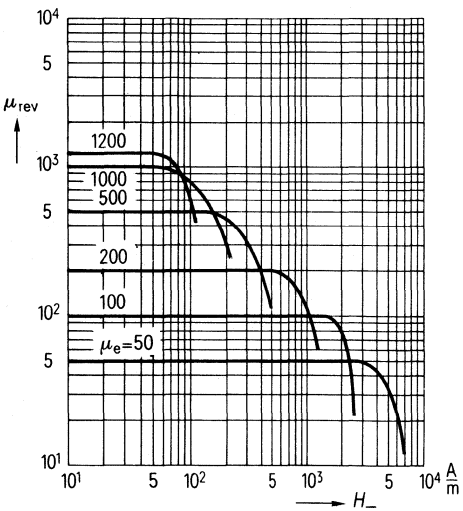
M 33



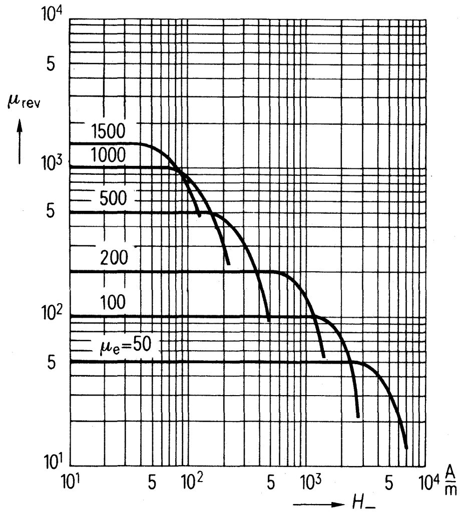
N 48



N 22

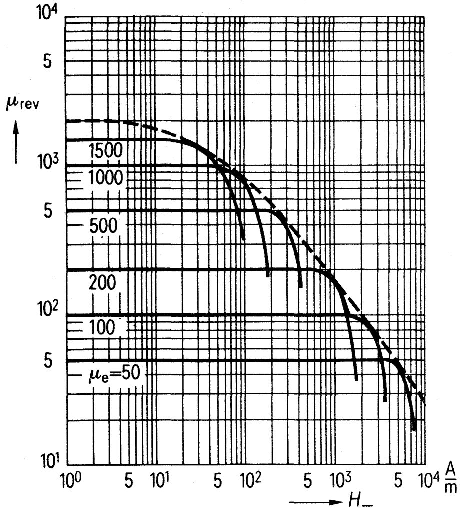


N 26

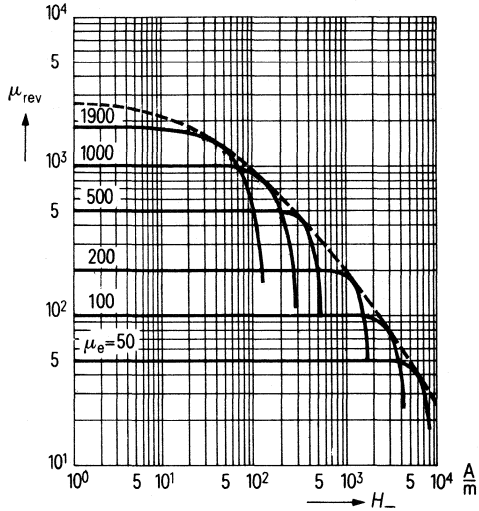


DC magnetic bias of pot, RM, and PM cores

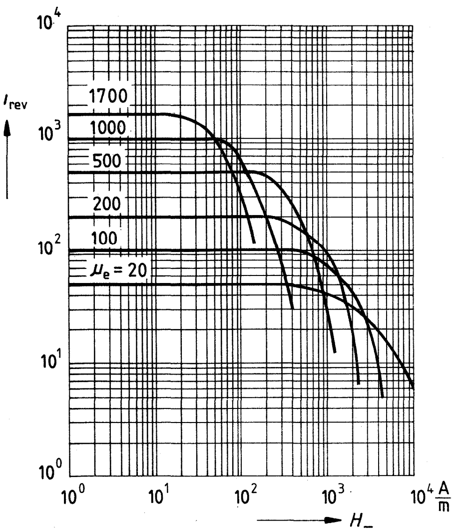
N 27



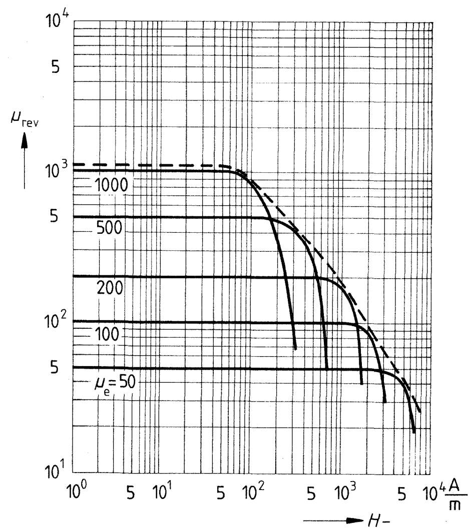
N 41



N 67



N 47



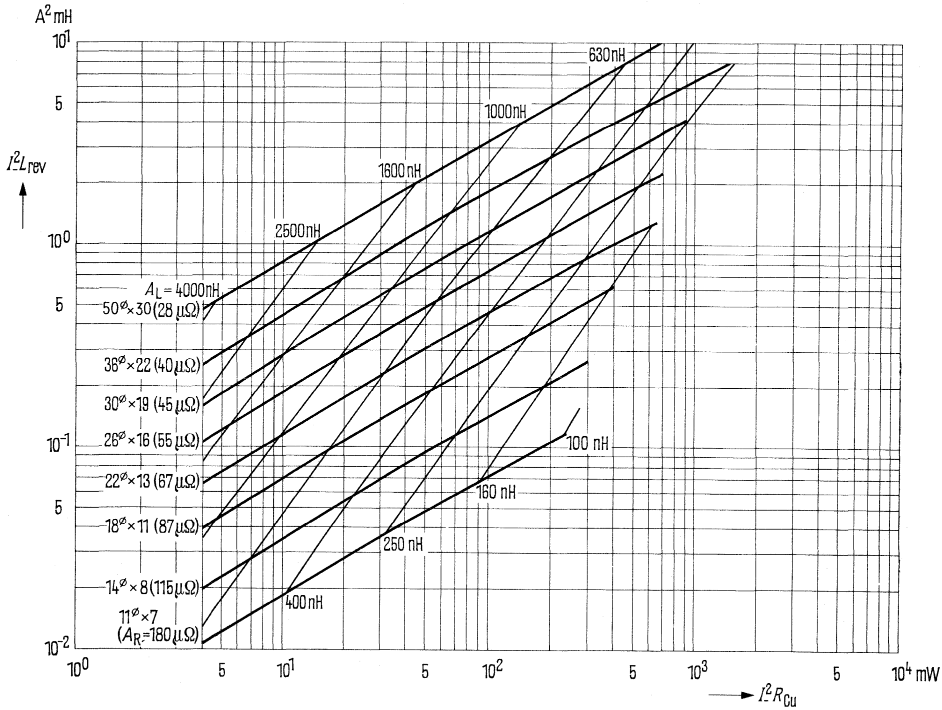
Optimum value of pot cores with dc magnetic bias, ferrite material N 48

The maximum value of the inductance L_{rev} (inductance corresponding to the reversible permeability) or the minimum value of the dc resistance R_{Cu} which can be obtained at a definite magnetic bias current I, are illustrated for ferrite N 48 pot cores in the following graph.

Example: at I = 0.1 A, L_{rev} > 10 mH and R_{Cu} < 1 Ω.

Desired: the smallest possible pot core

Solution: All core sizes contained in a rectangle limited at the bottom by the horizontal $I_{-}^{2} \cdot L_{rev}$ = 0.1 A² mH and at the right by the vertical $I_{-}^{2} \cdot R_{Cu}$ = 0.01 W are possibilities. Therefore, the size of the smallest possible pot core is 22 mm dia x 13 mm with A_L = 1000 nH, R_{Cu} approx. 0.86Ω, L_{rev} approx. 10.6 mH and $N = \sqrt{R_{Cu}/A_R}$ approx. 114, one-section coil former.



8 Typical calculation of a resonant circuit inductor

A ferrite pot core inductor is required with an inductance of 640 µH and a minimum Q of 400 ($\tan \delta_L = \frac{1}{Q} = 2.5 \times 10^{-3}$) for a frequency of 500 kHz. The temperature coefficient α_e of this inductor should be 100×10^{-6}/K in the temperature range 5 to 55 °C/ 41 to 131 °F.

a) Choice of material

According to the material survey on pages 42 and 43 and the curves $\tan \delta/\mu_i$ on page 45, the material M 33 for example, can be used for 500 kHz.

b) Choice of A_L value

The Q and temperature coefficient requirements demand a gapped pot core. The average relative temperature coefficient α/μ_i of ferrite M 33 according to the material survey is 1.6×10^{-6}/K. Since the required α_e value of the gapped core should be about 100×10^{-6}/K, the effective permeability is:

$$\frac{\alpha}{\mu_i} = \frac{\alpha_e}{\mu_e}; \quad \mu_e = \alpha_e \cdot \frac{\mu_i}{\alpha} = \frac{100 \cdot 10^{-6}}{\mathrm{K}} \cdot \frac{1 \cdot \mathrm{K}}{1.6 \cdot 10^{-6}} = 62.5$$

For pot core 18 x 11 (B65651) is $\mu_e = 47.9$ for $A_L = 100$ nH
For pot core 22 x 13 (B65661) is $\mu_e = 39.8$ for $A_L = 100$ nH

c) Choice of winding material

High frequency litz wire 20 x 0.05 with single natural silk covering (or 43/44 in AWG) is particularly suitable for frequencies around 500 kHz. The approximate overall diameter of the wire including insulation, say 0.367 mm (14 mils), and the average resistance per meter of say 0.444 Ω/m are obtained from the litz table (page 66). It is recommended that the actual overall diameter always be measured, and this value used for the calculation.

d) Number of turns and type of core

For an A_L value of 100 nH and an inductance of 640 µH the nomogram on page 78 shows that the number of turns required is approximately 80. The nomogram for formers on page 69 shows that for a wire with an external diameter of 0.367 mm the two-section former for core type 18 x 11 (B65651) can easily take 80 turns. This type can therefore be used with a two-section former.

e) Length of wire and dc resistance

The length of an average turn l_N on the above former is 35.6 mm (see page 174). The length of litz necessary for the coil is therefore 80 x 35.6 = 2848 mm plus say 2 x 10 cm for the connections, giving a total length of 3.04 m. The average resistance of this wire is 0.444 Ω/m; the total dc resistance R_{Cu} is thus 3.04 m x 0.444 Ω/m approx. 1.35 Ω. It should be noted that the length of an average turn l_N given in the table always refers to the fully wound former; an appropriate correction must be made where necessary.

f) Quality test

The mathematical calculation of the total loss, i.e. the loss from the core and windings, is very laborious and only approximate. At the specified frequency of 500 kHz considerable dielectric and eddy current losses occur in the winding. *Q* is therefore checked on a sample coil wound as specified above, in this case the value being about 550 as shown in the graphs on page 182.

g) Checking the temperature coefficient

Pot core 18 x 11 with A_L = 100 nH has an effective permeability μ_e of about 47.9. Ferrite M 33 has a relative temperature coefficient α/μ_i of approx. 1.6 x 10^{-6}/K; therefore the following temperature coefficient can be calculated:

$\alpha_e = \mu_e \cdot \alpha/\mu_i = 47.9 \times 1.6 \times 10^{-6}/K = 76.5 \times 10^{6}/K$;

Actual measurement showed 90 x 10^{-6}/K.

It must be pointed out here that when the magnetic flux lies almost entirely within the core, the temperature coefficient is only reduced slightly.

For effective permeabilities $\mu_e < 80$, however, due to the influence of the winding an additional temperature coefficient of approx. (10 to 30) x 10^{-6}/K has to be included in the calculation.

9 Assembly of inductors

Every pot core should always be used with its associated mounting assembly. The fixing parts are vibration-resistant. The pressure of the spring jig or the clamps is only exerted on the side wall of the pot core and not its middle part in order to prevent the sensitive air gap in the center stud from being affected.

Despite the reliable fixing, the pot core halves should also be glued, especially when gapped pot cores are used for resonant circuits, since the pot core halves can move slightly when subjected to strong vibration thus entailing undesired inductance changes.

9.1 Glueing of the core halves

From the numerous adhesives, epoxy resins with appropriate hardeners have proved particularly suitable, for example:

9.1.1 Adhesive preparation

A) for cores
100 g Araldite AY 103
16 g hardener HY 956
max. pot life 1 hour
hardening: 6 hours at 70 °C/158 °F
temperature stability of the glued joint 70 °C/158 °F
(for a short period 90 °C/194 °F)

B) for cores
100 g Araldite AY 103
7 g hardener HY 992
approx. pot life 8 hours
hardening: 6 hours at 100 °C/212 °F
temperature stability of the glued joint 90 °C/194 °F
(for a short period 120 °C/248 °F)

C) for coil formers
100 g adhesive A
200 cm^3 filler Aerosil 200
hardening procedure like A

D) for threaded sleeves of adjusting devices and for external glueing
100 g adhesive Araldite AW 134 B
40 g hardener HY 994
max. pot life 1 hour
hardening procedure for 24 hours at 25 °C/77 °F
or 4 hours at 70 °C/158 °F
temperature stability of the glued joint 80 °C/176 °F
(for a short period 100 °C/212 °F)

Adhesive A hardens even at room temperature, higher strength can be obtained with a hardening temperature of 70 °C/158 °F. Adhesive B only hardens at higher temperatures, with the advantage of a longer pot life, but its fluidity is higher than that of type A adhesives.

9.1.2 Cleaning and degreasing the pot cores

The mating surfaces must be free of dust, fat, and fibers. To degrease the mating surfaces a non-fluffy nylon coated stamp pad soaked in trichlorethylene can be used. A second pad can then be used to dry the surfaces. Any remanents impair the adhesion. To improve the evaporation of the trichlor the cores can be heated by suction up to about 35 °C/95 °F.

9.1.3 Applying the adhesive and glueing the halves together

The adhesive A or B is dabbed two to four times on the cleaned surface of the pot core side wall, but the center boss must remain clean. The two core halves without coil former are then placed on a mandrel and rotated against each other two or three times to spread the adhesive. A slight ring of adhesive extended around the edges indicates sufficient adhesive has been applied.

The adhesive should be applied and spread twice on the somewhat porous, low permeability ferrite materials (U and K types). The next step should follow immediately, since the adhesive film easily attracts dust and absorbs moisture. Therefore, the pot core pair with adhesive already applied must be opened for a short period and then the wound coil inserted without touching the mating surface.

The wound coil is then fixed in position by elasticized spacers, which must be inserted before the adhesive has been applied.

The spacers are available upon request.

The coil former can also be fixed by an adhesive solution (C), which should only be applied as dots in one position of the pot core bottom, to prevent any mechanical stresses between the plastic and the ferrite material because of their different thermal expansion. Adhesive D is also suitable for **external glueing,** i.e. only four glue dots at the joints on both sides of the openings. Because of the somewhat lower torsional strength, it should be noted that this kind of glueing should be used with mounted cores.

9.1.4 Holding jigs

The pot core assembly is cured under pressure in a centering jig. The pot core holes are used for centering and from two to eight can be held in one jig with a pressure spring. Spacers will ensure that the pressure is exerted only on the side wall of the pot core. Single jigs make the core inductance measurements easier. This technique has proved useful to control the pot cores, particularly those with small air gaps, before the adhesive has hardened. Small inductance corrections can be made by slightly turning the pot core halves relative to each other.

When pot core sets already mounted in the mounting assembly are to be cured, a good centering, possibly by mandrels with stepped diameters must be ensured. Furthermore, care should be taken that no hardener remains on parts of the mounting assembly. The devices should exert approximately the following pressure forces, corresponding to the holding forces of the listed mounting assemblies and clamps (per pair of clamps):

Pot core type	Pot core size	Pressure force in N (typ. values)	Pot core type	Pot core size	Pressure force in N (typ. values)
B65511	∅ 7 x 7	6	B65817	RM 3	10
B65517	∅ 9 x 5	10	B65803	RM 4	40
B65531	∅11 x 7	15	B65805	RM 5	40
B65541	∅14 x 8	25	B65807	RM 6	50
B65651	∅18 x 11	35	B65809	R 6	50
B65661	∅22 x 13	40	B65819	RM 7	50
B65671	∅26 x 16	45	B65811	RM 8	60
B65701	∅30 x 19	50	B65813	RM 10	60
B65611	∅36 x 22	60	B65815	RM 12	60
B65621	∅41 x 25	80	B65887	RM 14	70

9.1.5 Curing the assembled pot core

The curing process is more effective at an increased temperature even for adhesive A, for example at 70 °C/158 °F for 6 hours.

The cores should be placed quickly in the oven after the adhesive has been applied to prevent the adhesive from soaking into the porous ferrite material. The cores can be moved into and also removed from the warm oven (e.g. 70 °C/158 °F), however the holding jig should not be opened until the assembly has cooled down. With regard to the thermal expansion of the ferrite, its temperature change should not exceed approximately 1 K/min.

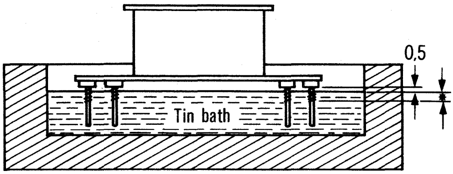
9.1.6 Thermal after-treatment

Any internal stresses can be relieved by subjecting the assembled pot core to a temperature cycle up to 70 °C/158 °F (cycle time 24 hours) with a slow warm up and cooling, lasting for a period of about 4 hours. The cycle should be best performed with completely mounted pot core inductors (including adjusting device when necessary).

9.2 Dip soldering of coil formers for all types with injection-molded pins

During dip soldering, care should be taken that only 2 to 3 turns of the wire are dipped into the tin bath (see * in the drawing) and soldered. Depending on the thickness of the wire more turns may have to be wrapped around the pin.

These limiting immersion depth prevents the solder pins from being heated up close to the pin embedding, moreover, formation of solder jumpers between the wire ends is avoided. Prior to every dip soldering process the oxide film has to be removed from the surface of the tin bath.



9.3 Solderability of the connections

The soldered connections of our components are tinned with a solder containing lead, such as Sn Pb 60/40, with a thickness of 5^{+5} µm in order to obtain soldered joints with the quality and reliability required for all the mainly used soldering procedures. The parts meet the requirements of the solderability test in accordance with DIN IEC 68, part 2-20, para 4, test Ta, testing method 1, aging 3.

9.4 Glueing of threaded sleeves for adjusting screws

Pot cores are available in which the threaded sleeve has already been glued in position (for ordering codes see the appropriate pages dealing with pot cores).

For 9 and 11 mm cores a thread for the adjusting screw is provided in the base plate of the mounting assembly.

A centering jig is necessary to press the flangeless threaded sleeve in the pot core hole, whereas threaded sleeves with a flange can be centered more easily. It is recommended to glue these sleeves in position without exception, especially because of expansion during large temperature changes. The adhesive D stated in para. 8.1.1 can be used. The threaded sleeves with a flange should be painted with adhesive on the inside ring.

The flangeless sleeves with spring crown type B65579-K1 can centrally be located in a less complicated way, however care should be taken to prevent the adhesive from flowing into the thread. Therefore, the pot cores should be located with their threaded parts downward during the curing period.

The threaded sleeves must be cured for at least 24 hours at room temperature, and it has been found practical to utilize the 24 hours waiting period between curing and thermal after-treatment.

9.5 Final adjustment

After each thermal or mechanical stress disaccommodation arises. The complete coils should therefore be stored for at least one day or better a week, before they are finally adjusted.

Automatic Processing and Assembly

Automatic Processing and Assembly

1 Automatic inductor manufacture

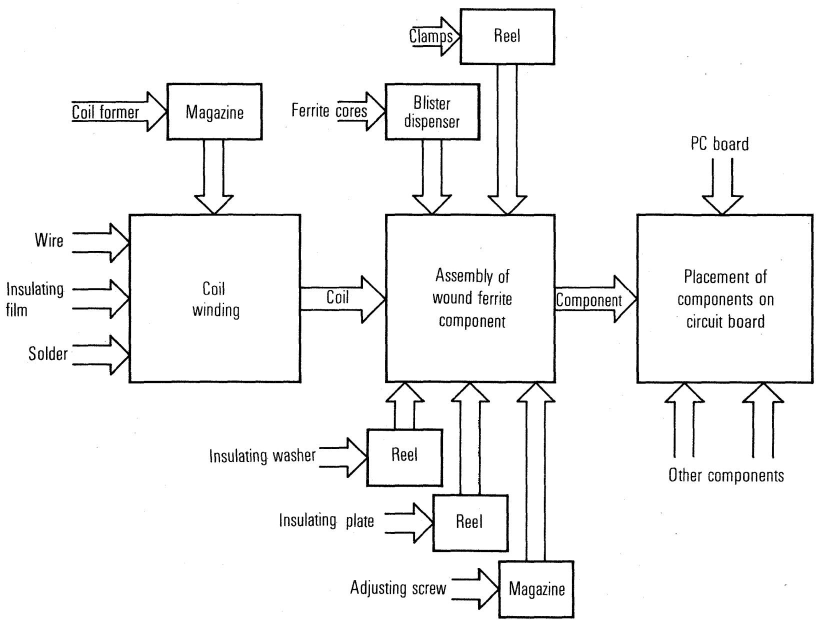
1.1 General

The parts for RM inductors which we have developed and describe here enable flexible automatic production machinery to be used. In addition to the automatic winding machines already in service, which can be combined with wrapping, fluxing and soldering stations, flexible and efficient assembly lines are now being introduced. The design and packing of our RM inductor parts – ferrite cores, coil formers, clamps, insulating washers and adjusting screws – have been optimized for this and facilitate easy supply to the individual production line stations.

The packing magazines of our RM4...RM10 coil formers are used for the safe transportation of these parts and can also be used for the transportation of wound coil formers and as very space-saving final packing of complete inductors. Our RM coil formers are designed above all for processing on automatic winding machines PRA 400 and PRA 600 by Meteor and Siemens/WMW – Berlin.

We supply ferrite cores blister-taped in dispenser boxes, coil formers in reusable stick magazines, clamps and insulating washers (2 types) taped and reeled, and adjusting screws already positioned in magazines. When the plate-shaped spring insulating washer, which is inserted between core and coil former, is used no glueing is required.

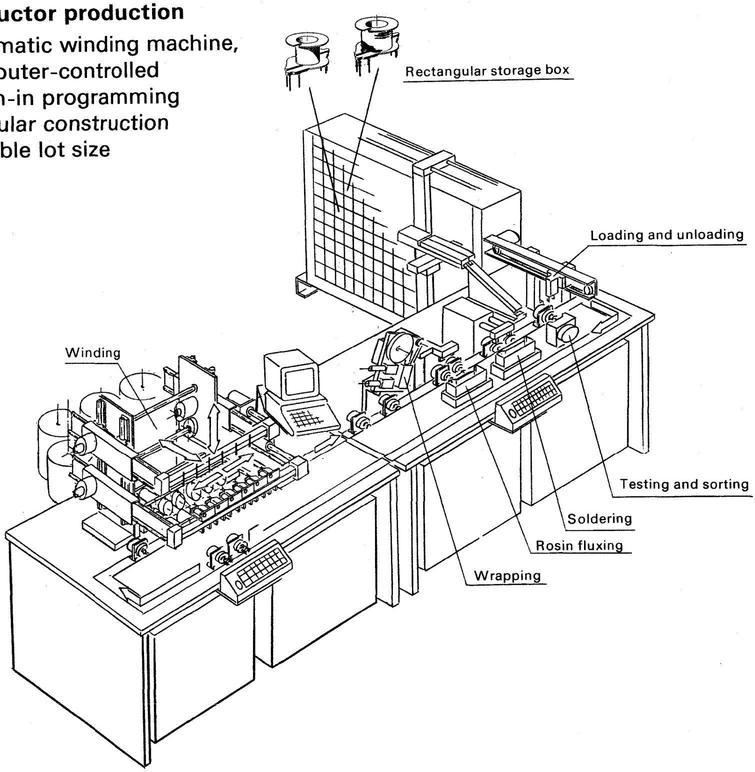
1.2 Production flow chart



2 Example of an automatic production line

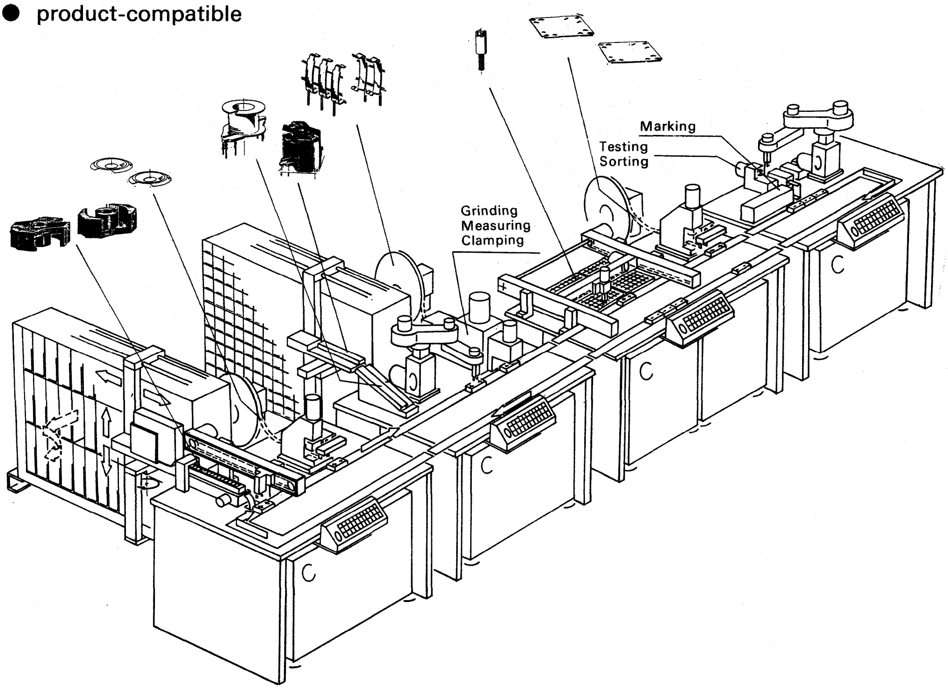
RM inductor production

- automatic winding machine, computer-controlled
- teach-in programming
- modular construction
- variable lot size



RM inductor assembly

- assembly booths interlinked
- component store programmable
- flexible marking
- product-compatible



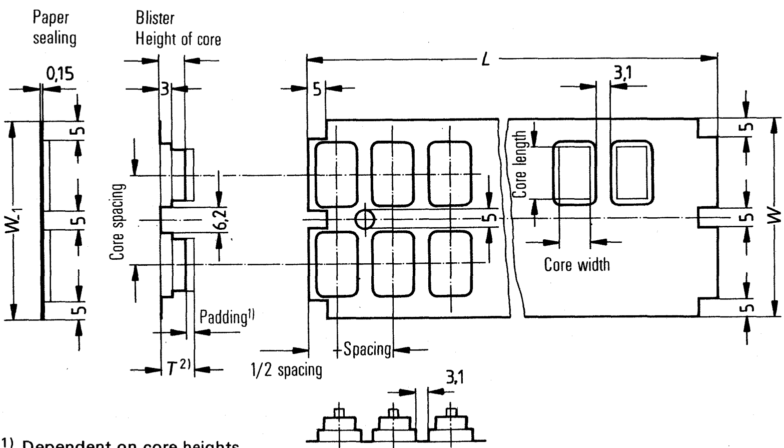
For further details please refer to the brochure "Ferrites and Accessories, Automatic Assembly Machine-Specific Components for RM Inductors" (at present still in preparation).

3 Blister-taped cores for automatic manufacture of inductors

3.1 Blister tape dimensions

Type	W x L x T[2]	Spacing	Core spacing	Remarks on blister taping
RM 4	60 x 340 x 8,0	17,0	27,5	available
RM 5	60 x 340 x 8,0	17,0	27,5	
RM 6	60 x 340 x 8,0	17,0	27,5	
R 6	60 x 340 x 8,0	17,0	27,5	
EP 10	60 x 340 x 8,0	17,0	27,5	
EP 13	60 x 340 x 8,0	17,0	27,5	
RM 7	82 x 295 x 12,0	29,5	38,5	available
RM 8	82 x 295 x 12,0	29,5	38,5	
RM 10	82 x 295 x 12,0	29,5	38,5	
Ø 22 x 13	82 x 295 x 12,0	29,5	38,5	
TT 23 x 11	82 x 295 x 12,0	29,5	38,5	
TT 23 x 18	82 x 295 x 12,0	29,5	38,5	
EP 17	82 x 295 x 12,0	29,5	38,5	
EP 20	82 x 295 x 12,0	29,5	38,5	
RM 12	112 x 370 x 17,8	37,0	53,0	in preparation
RM 14	112 x 370 x 17,8	37,0	53,0	
Ø 26 x 16	112 x 370 x 10,9	37,0	53,0	
Ø 30 x 19	112 x 370 x 10,9	37,0	53,0	
TT 30 x 19	112 x 370 x 10,9	37,0	53,0	

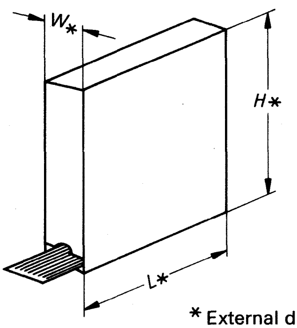
For ordering codes see individual data sheets.

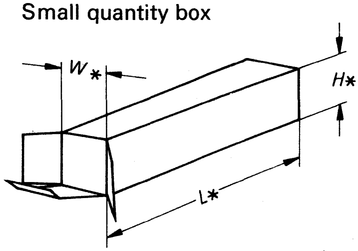


[1] Dependent on core heights
[2] Thickness with tape sealed

3.2 Types of packaging and packaging units

Type	Folding box (dispenser pack)					Small quantity box		
	Dimensions L x W x H	Sets/ Tapes	Tapes/ Box	Sets/ Box	Approx. weight	Dimensions L x W x H	Tapes	Sets
RM 4	349x63x203	20	25	500	1000	349x47x63	5	100
RM 5		20	25	500	1550		5	100
RM 6		20	25	500	2550		5	100
R 6		20	25	500	2550		5	100
EP 10		20	25	500	1375		5	100
EP 13		20	25	500	2550		5	100
RM 7	300x85x240	10	20	200	1440	300x62x85	5	50
RM 8		10	20	200	2600		5	50
RM 10		10	20	200	4600		5	50
Ø 22 x 13		10	25	250	3250		5	50
TT 23 x 11		10	25	250	3500		5	50
TT 23 x 18		10	20	200	3400		5	50
EP 17		10	20	200	2220		5	50
EP 20		10	20	200	5640		5	50
RM 12	380 x 115 x 183	10	10	100	4200	380 x 40 x 114	3	20
RM 14		10	10	100	6500		2	20
Ø 26 x 16	380x115x223	10	20	200	4200	380x57x114	5	50
Ø 30 x 19		10	20	200	7200		5	50
TT 30 x 19		10	20	200	6000		5	50



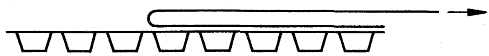


* External dimensions

Explanations

1. It is recommended not to guide and hold the individual blister tapes in automatic extractor devices by the outer cut edges but by the longitudinal web 6.2 mm wide and/or the transverse webs 3.1 mm wide.
2. The cores are packed in sets and correctly oriented for assembly, i.e. stamped core with bottom up, unstamped core with pole face up.

3. The sealing paper is to be peeled off along the tape surface easily, but not to quickly (paper turned through 180°).



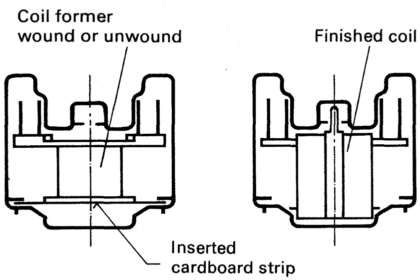
4. Ordering quantities which vary from the dispenser pack units are supplied in small quantity boxes.

4 Stick magazines for RM coil formers

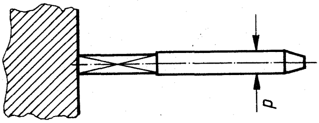
The RM coil formers come in so-called stick magazines made of PVC which are particularly suitable for feeding the coil formers into the automatic winding machine. For improved wrapping the pins have a square shape in the wrapping area (see illustration). When they are positioned at an angle of approximately 45°, the coil formers slide automatically for acceptance into the winding tool. After removal of the inserted cardboard strip the magazines can be reused as packing for the completely assembled coil.

Type	Length of magazine (mm)	Coil former with and without winding (items per magazine)	Finished parts (items per magazine)	Magazines per carton	Coil formers per carton	Ordering code*)
RM 4	520	80	40			B65804–M...
RM 5	520	60	30			B65806–M...
RM 6	520	50	25	upon request	upon request	B65808–M...
RM 8	520	40	20			B65812–M...
RM 10	520	30	17			B65814–M...

*) The ordering code is to be complemented by the data given in the corresponding data sheets.



Cross section of magazine



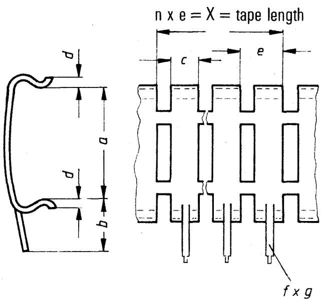
RM 5 and 6: $d = 0.55$
RM 8 and 10: $d = 0.65$

Pin with square in the wrapping area

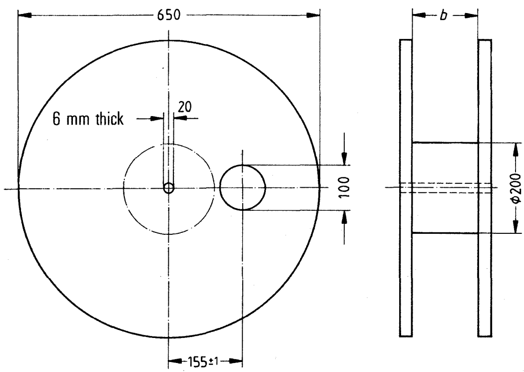
5 Taped and reeled clamps for RM cores

Stainless steel clamps with tinned ground tags are supplied on tapes for automatic assembly. There are two reels as a pair in each carton; one reel contains clamps with ground tags lying to the left, the other with ground tags lying to the right.

Type	Reel width b (mm)	Packaging unit[1] = minimum order quantity Items per reel pair	Ordering code
RM 4	15	72000	B65806–A2201
RM 5	15	72000	B65806–A2201
RM 6	17	48000	B65808–A2201
RM 8	21	30000	B65812–A2201
RM 10	24	24000	B65814–A2201



<table>
<tr><th>Dim.</th><th>a</th><th>b</th><th>c</th><th>d</th><th>e</th><th>f x g</th></tr>
<tr><td>RM 4</td><td rowspan="2">$8{,}3^{+0{,}2}$</td><td rowspan="2">$4{,}5_{-0{,}2}$</td><td rowspan="2">$2{,}1 \pm 0{,}1$</td><td rowspan="2">$0{,}6_{-0{,}2}$</td><td rowspan="2">3,3</td><td rowspan="2">0,7 x 0,3</td></tr>
<tr><td>RM 5</td></tr>
<tr><td>RM 6</td><td>$9{,}5^{+0{,}2}$</td><td>$4{,}5_{-0{,}2}$</td><td>$2{,}3 \pm 0{,}1$</td><td>$0{,}8_{-0{,}2}$</td><td>3,5</td><td>0,6 x 0,4</td></tr>
<tr><td>RM 8</td><td>$13{,}6^{+0{,}2}$</td><td>$4{,}5_{-0{,}2}$</td><td>$4{,}5 \pm 0{,}1$</td><td>$0{,}8_{-0{,}2}$</td><td>5,7</td><td>0,7 x 0,4</td></tr>
<tr><td>RM 10</td><td>$15{,}2^{+0{,}3}$</td><td>$5{,}2_{-0{,}2}$</td><td>$4{,}5 \pm 0{,}1$</td><td>$0{,}9_{-0{,}2}$</td><td>5,7</td><td>0,7 x 0,45</td></tr>
</table>



Dimensions in mm

[1] For packaging units for minimum order quantities (bag or box packaging) refer to individual data sheets.

6 Insulating parts

6.1 Insulating washers for compensating the tolerance between core and coil former

Polycarbonate film insulating washers, flame-retardant in accordance with UL 94 V-0, taped and reeled for automatic inductor manufacture.

for tubular pot cores

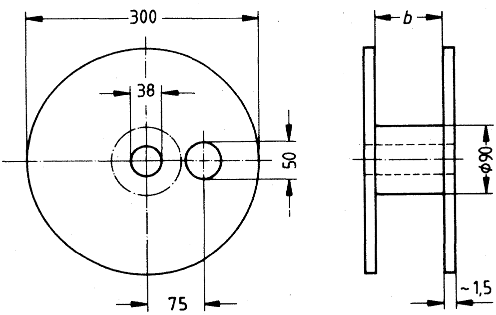
Type	Tape width (mm)	Reel[1] Dimension b (mm)	Packaging unit (items per reel)	Ordering code
Ø 9 x 5	20	20 +2	3500	B65522–A5000
Ø 11 x 7	20	20 +2	3000	B65532–A5000
Ø 14 x 8	20	20 +2	2500	B65542–A5000
Ø 18 x 11	27	27 +2	2000	B65652–A5000
Ø 18 x 14	27	27 +2	2000	B65562–A5000
Ø 22 x 13	32	32 +2	1400	B65662–A5000
Ø 26 x 16	40	40 +2	1000	B65672–A5000
Ø 30 x 19	40	40 +2	800	B65702–A5000
Ø 36 x 22	48	48 +2	500	B65612–A5000

In general 2 washers per pair of cores are used with tubular pot cores.

for RM cores

Type	Tape width (mm)	Reel[1] Dimension b (mm)	Packaging unit	Ordering code
RM 4	18	26	3000	B65804–A5000
RM 5	18	26	2500	B65806–A5000
RM 6	20	26	2500	B65808–A5000
RM 8	27	35	1200	B65812–A5000
RM 10	32	35	1000	B65814–B5000

In general only 1 washer per pair of cores is used with RM cores.



Dimensions in mm

For dimensional drawings of insulating washers see individual data sheets.

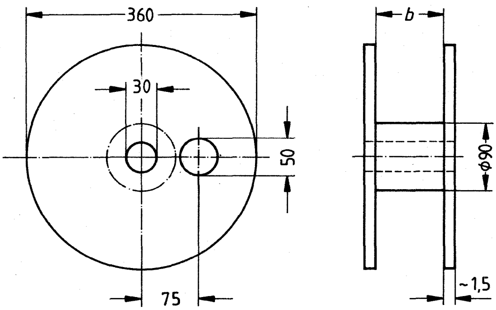
1) Reel dimension b = width of tape including allowance

6.2 Insulating washers between core and circuit board

Polycarbonate insulating washers 0.3 mm thick, flame-retardant in accordance with UL 94 V-0, taped and reeled for automatic inductor manufacture.

The automatic assembly machine must be equipped with a cutting device for separating the washers!

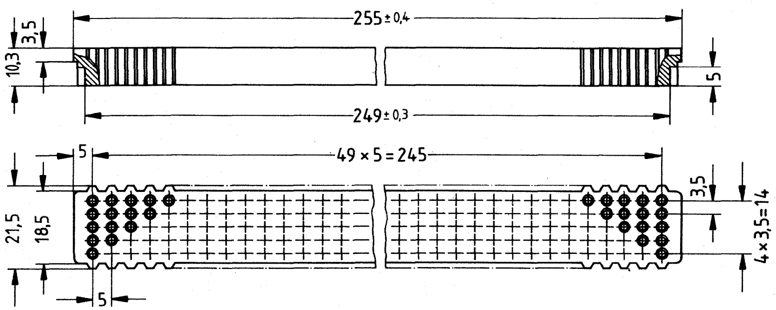
Type	Reel[1)] Dimension b (mm)	Packaging unit (items per reel)	Ordering code
RM 4	10 +2	20000	B65804–A2025
RM 5	13 +2	20000	B65806–A2025
RM 6	15 +2	20000	B65808–A2025
RM 8	20 +2	12000	B65812–A2025
RM 10	30 +2	10000	B65814–A2025



7 Adjusting screws

Adjusting screws are supplied in polyterephthalate magazines for processing on automatic machines. The magazines have lateral toothing for accurate feed and precise positioning. The magazines are accepted through central recesses in the front end.

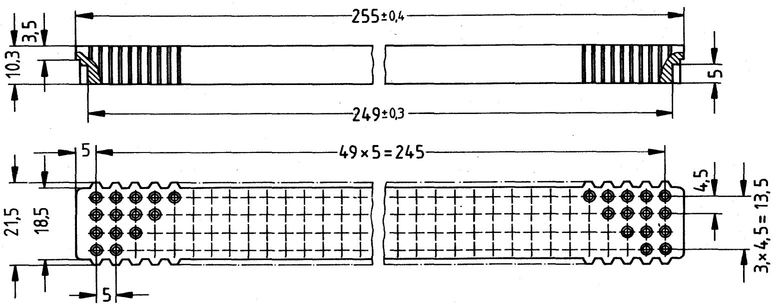
for RM 4 and RM 5



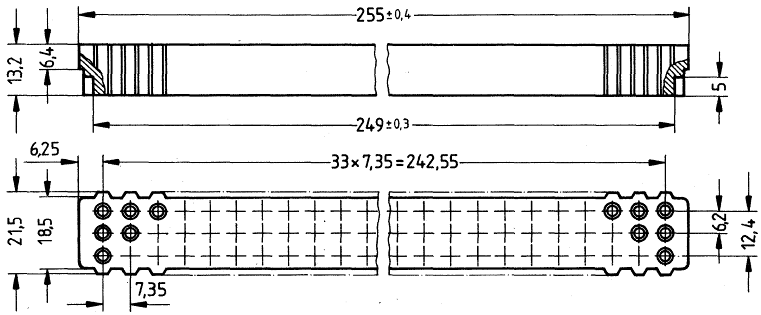
Dimensions in mm

[1)] Reel dimension b = width of tape including allowance

for RM 6



for RM 8



Dimensions in mm

Type	Items per magazine	Packaging unit	Ordering code[1]
RM 4	250	5 magazines ≙ 1250 items	B65539–M...
RM 5	250	5 magazines ≙ 1250 items	B65539–M... B65806–M...
RM 6	200	5 magazines ≙ 1000 items	B65659–M...
RM 8	100	4 magazines ≙ 400 items	B65812–M...

[1] The digits for complementing the ordering code are given on the individual data sheets.

Cores for Power Transmission

Cores for Power Transmission

1 General

The range of conventional ferrite cores has been continually expanded with special types for the diverse requirements of power electronics, the last of them being ETD cores. RM cores are used for power applications but without the central hole. RM 12 and RM 14 cores have been improved by slightly strengthening the bottom.

Because of the extensive range of available ferrite cores offered even unusual problems can be satisfactorily solved. The well-tried materials N 27 and N 41 are supplemented by the considerably lower loss material N 67. This material is especially suitable for frequencies ranging from 50 kHz to over 200 kHz. For still higher frequencies we recommend the already introduced material N 47.

Materials and frequency ranges

Material	Frequency range (approx.)
N 27, N 41	10 to 100 kHz
N 67	50 to 300 kHz
N 47	200 to 1000 kHz

Because of its high permeability the N 41 material has favorable magnetic biasing properties, otherwise it is comparable with N 27.

The stress on the application for switched-mode power supplies is now shifting to frequencies between 50 and 100 kHz. The N 67 material has been developed specifically for these applications. We offer this low loss material initially in RM and ETD cores, the coil formers and other accessories of which are designed for automatic winding and assembly.

The most important data for material selection may be obtained from the following descriptions. The table of materials on pages 42/43 and the pages of curves following them contain further details.

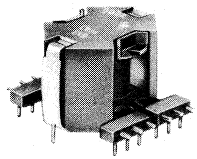
2 Types of cores

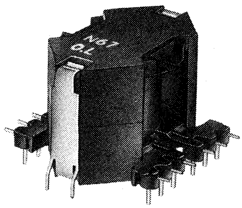
RM cores

The RM cores, which are used worldwide, are standardized in IEC publication 431 A and B. They are offered for power applications, preferably without the central hole. As "system cores" they can be processed on automatic machines from winding right through to assembly with all the individual parts (see "Automatic Processing and Assembly" section).

Cores for Power Transmission

Coil formers with wider pin spacing can be supplied for types RM 6, 8, 10, 12 and 14 (see illustration); for RM 12 also in pluggable housing technology. This is advantageous for connecting thicker wires or even litz wires such as are required for higher frequencies.



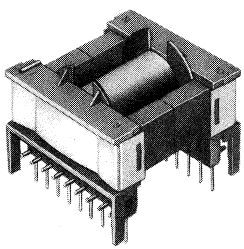


Type	Material	Ordering code	Number of terminals	Page
RM 5	N 47 N 41	B65805-C... B65805-J...	4 to 6 4 to 6	277
RM 6	N 47 N 41	B65807-C... B65807-J...	8 8	288
RM 8	N 47 N 41	B65811-J... B65811-J...	12 12	313
RM 10	N 47 N 41	B65813-J... B65813-J...	12 12	321
	N 41	B65813-S...	12	326
RM 12	N 67	B65815-E...	12	331
RM 14	N 67	B65887-E...	12	338

ETD cores

Those principles that have held good in the case of power transmitter cores are combined in the ETD series. Their construction also permits automatic processing from winding through to assembly.

Standardization in accordance with IEC or IEC-Q has been initiated.

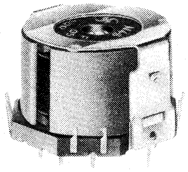


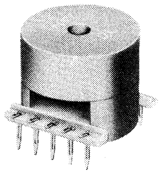
Type	Material	Ordering code	Number of terminals	Page
ETD 34	N 27 N 67	B66361-G... B66361-G...	14 14	464
ETD 39	N 27 N 67	B66363-G... B66363-G...	16 16	468
ETD 44	N 27 N 67	B66365-G... B66365-G...	18 18	471
ETD 49	N 27 N 67	B66367-G... B66367-G...	20 20	474

Cores for Power Transmission

Pot cores

The tubular pot cores preferably used in filter technique are also suitable for the design of transformers featuring low leakage flux.

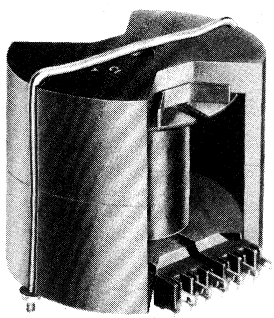




Type	Material	Ordering code	Number of terminals	Page
Pot cores				
Ø 14 x 8	N 41	B65541-K...	4/6	163
Ø 18 x 11		B65651-K...	8	173
Ø 22 x 13		B65661-L...	8	195
Ø 26 x 16		B65671-L...	8	206
Ø 30 x 19		B65701-L...	8	216
TT cores				
TT Ø 23/15x11	N 27	B65716-P...	10	256
TT Ø 23/15x18		B65716-A...	10	259
TT Ø 30/20x19		B65730-A...	10	261

PM cores

These cores are used where power in the range between 250 W and approx. 2 kW has to be transmitted. Due to their large effective magnetic area, they need only a few number of turns; leakage inductance and self-capacitance are low. Good shielding is obtained as a result of the compact design. If connection on the PCB by means of the pins becomes impossible due to the weight, the coil former can be mounted with its pins upwards.

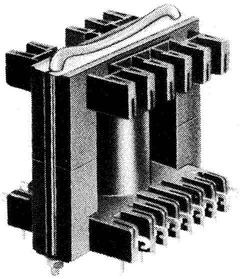


Type PM	Material	Ordering code	Number of terminals	Page
50/39	N 27	B65646-A...	14	346
62/49		B65684-A...	16	350
74/59		B65686-A...	18	353
87/70		B65713-A...	20	356
114/93		B65733-A...	–	359

EC and ER cores

The EC cores meeting the IEC standard permit large winding space and good lead connection. They can be mounted horizontally or vertically. Holding devices are available for both versions.

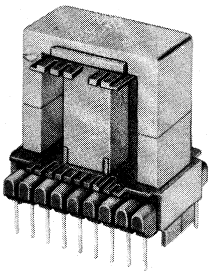
ER cores are of similar design, i.e. with round center leg. This round center leg enables compact windings. An 18-pin coil former in pluggable housing technology suitable for automatic processing and a sealing can are additionally available for the ER 42/15 type.



Type	Material	Ordering code	Number of terminals	Page
EC cores				
EC 35	N 27	B66337-G...	13	440
EC 41		B66339-G...	12	443
EC 52		B66341-G...	14	446
EC 70		B66343-G...	19	449
ER cores				
ER 42/15	N 27	B66347-G...	18	452
ER 48		B66333-G...	–	456

E cores

In connection with E cores having an angular cross section, the type E 42/20 with external air gap should be referred to. The leakage flux in the winding can, hence, remarkably be reduced.



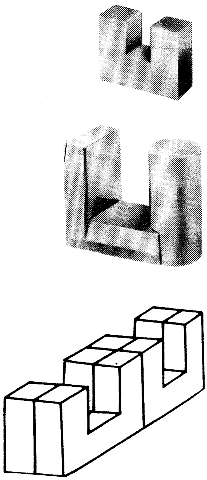
Type	Material	Ordering code	Number of terminals	Page
EF 12,6	N 27	B66305-G...	9/4	420
EF 16		B66307-G...	6	422
EF 20		B66311-G...	12/6	424
EF 25		B66317-G...	8/6	426
EF 32		B66229-G...	–	429
E 30	N 27	B66319-G...	10	430
E 42/15		B66325-G...	10	432
E 42/20		B66329-G...	12	434
E 55		B66335-G...	14	437

Cores for Power Transmission

U cores

The small U cores U 15 to U 25 with square cross section are mainly used for energy chokes and small transformers; coil formers with 4 pins can be supplied for this purpose.

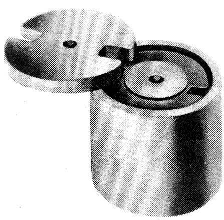
U cores with round legs are mainly used for line transformers. The large U 93 cores can be combined with large E cores to meet the requirements of transmitting high power; e.g. eight U 93 cores at 20 kHz enable transmission of 20 kW.



Type	Material	Ordering code	Page
U 15	N 27	B67350–A...	480
U 20		B67348–A...	480
U 25		B67352–A...	480
U 29		B67354–A...	484
U 37		B67356–A...	484
U 47		B67358–A...	485
U 93		B67345–A...	487
I 93		B67345–A...	487

CC cores

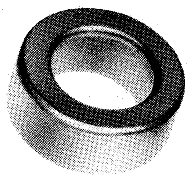
C cores (cup) are especially used for crossover networks in speaker systems. Together with the cap (CC cores) and a relatively large air gap, they are well suited for energy storage chokes. It should be mentioned that the contact surfaces are not ground. Thus, air gap and inductance may have somewhat greater tolerances.



Type	Material	Ordering code	Page
CC 26 (cup)	N 27	B66442–A...	375
CC 26 (cap)		B66442–J...	375
CC 36 (cup)		B66443–A...	377
CC 36 (cap)		B66443–J...	377
CC 50 (cup)		B66446–A...	379
CC 50 (cap)		B66446–J...	379

Toroids

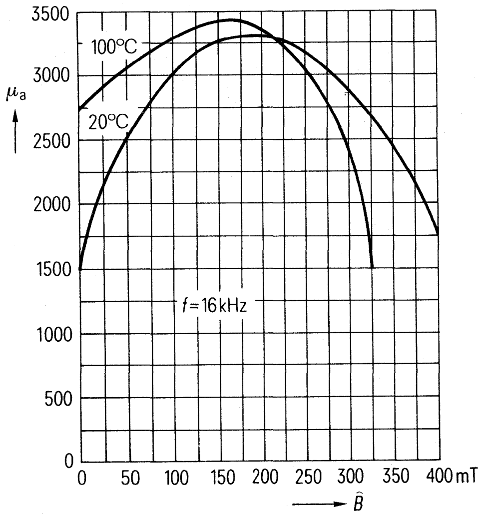
Owing to their low leakage inductance, transformers with toroids are frequently used in push-pull switched-mode power supplies.



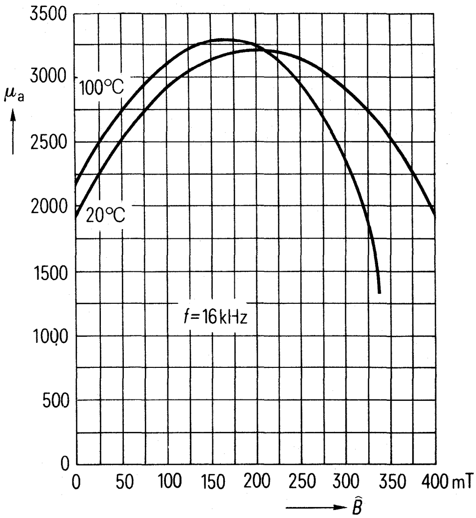
Type	Material	Ordering code	Page
R 12,5/5 R 16/6,3	N 47	B65290-K... B64290-K...	491
R 12,5/5 R 16/6,3 R 20/7 R 23/9 R 25/10 R 25/15 R 25/20 R 34/10 R 34/12,5	N 27	B64290-K... B64290-K... B64290-K... B64290-K... B64290-K... B64290-K... B64290-K... B64290-K... B64290-K...	

3 Amplitude permeability versus alternating field flux density $\hat{B}$
(measured with ungapped E cores)

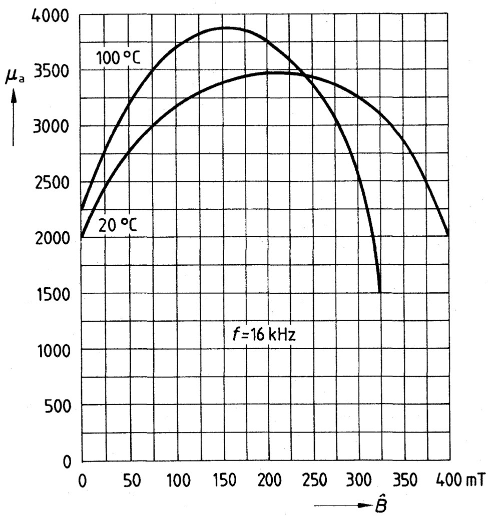
N 27



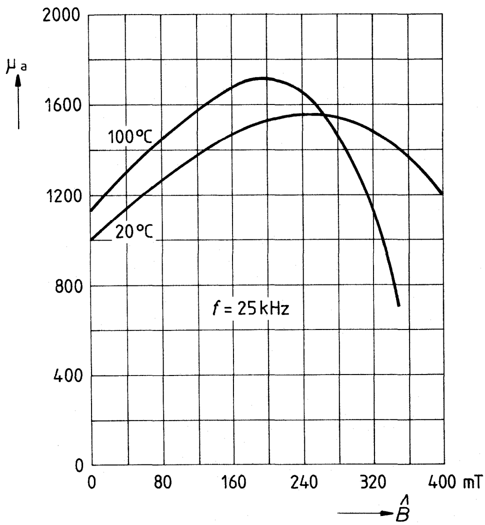
N 41



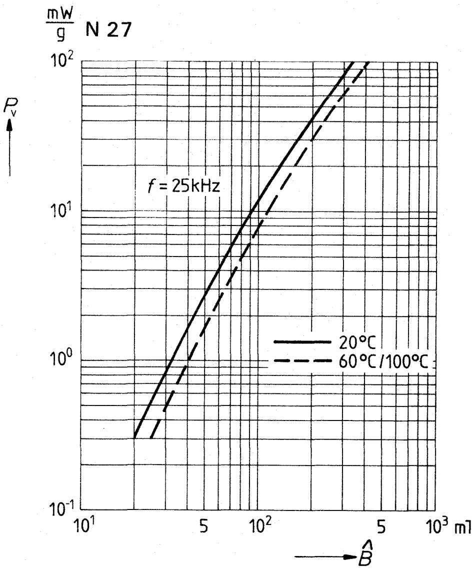
N67

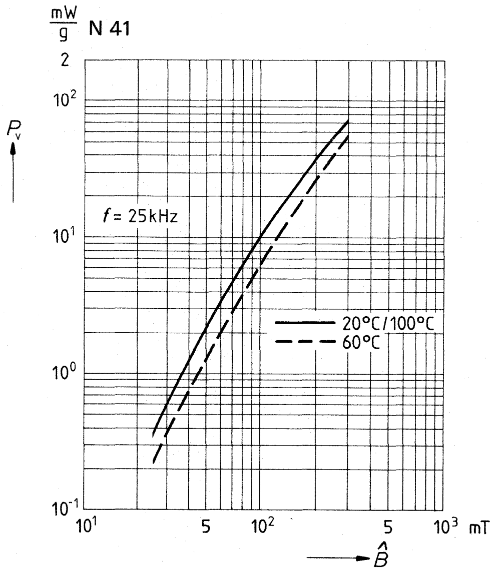


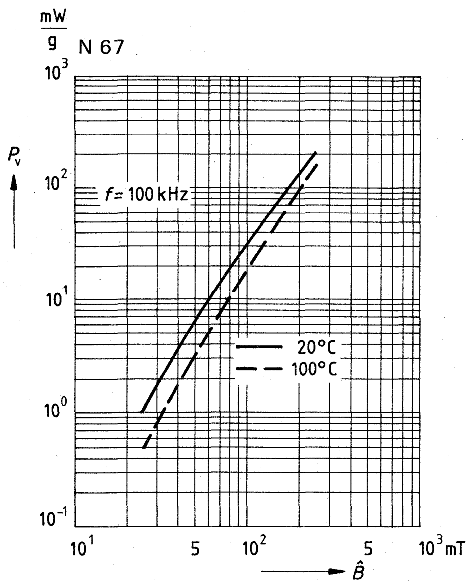
N 47

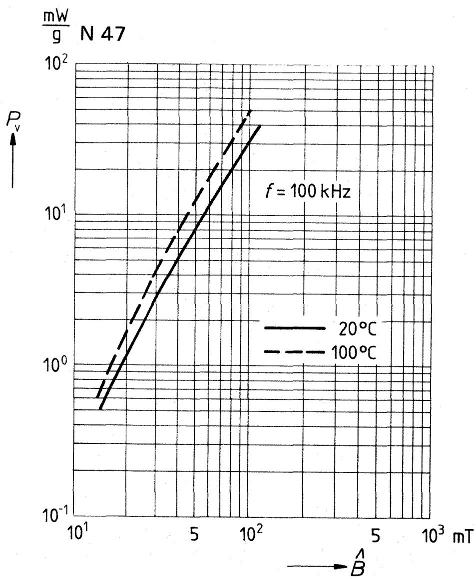


4 Relative power loss versus alternating field flux density $\hat{B}$
(measured with R 16 toroids)

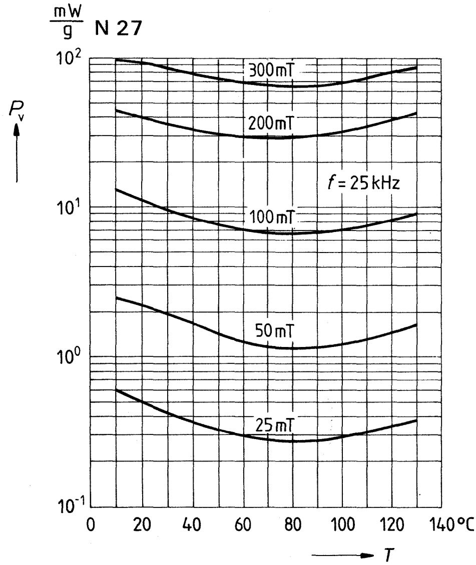


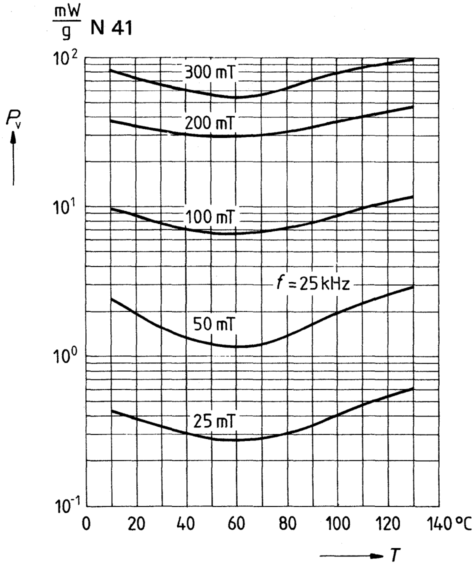


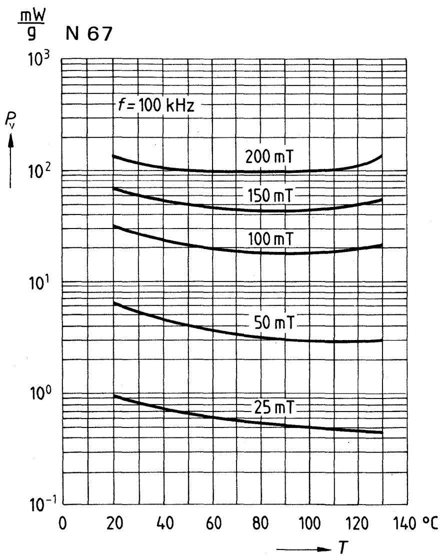


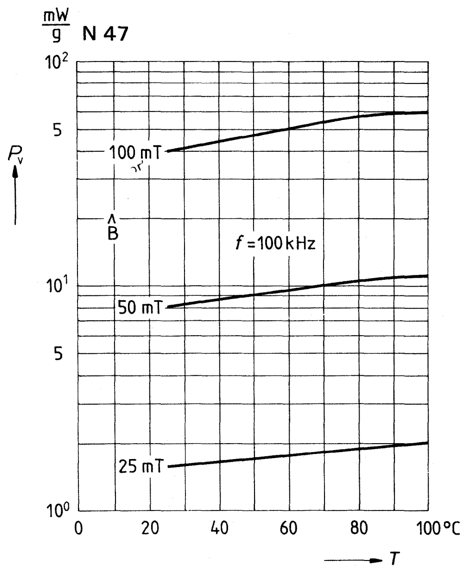


Relative power loss
versus temperature
(measured with R 16 toroids)

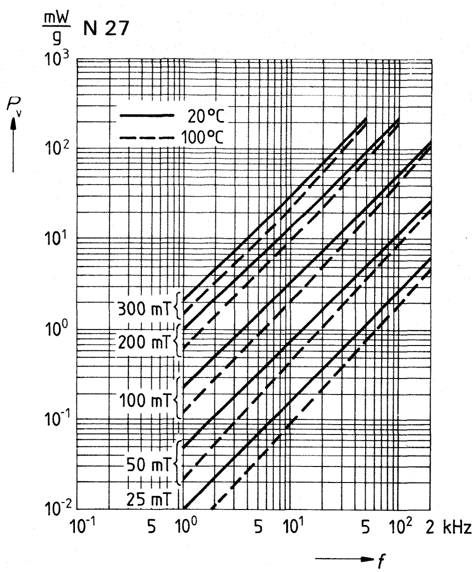


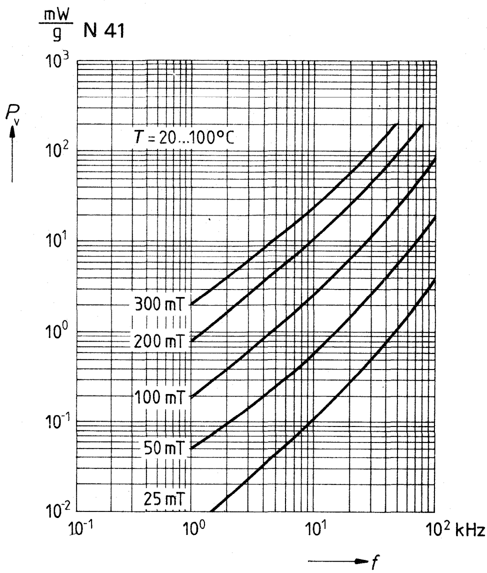


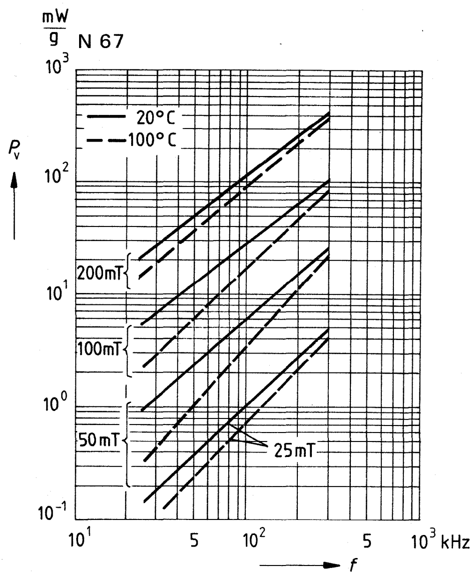


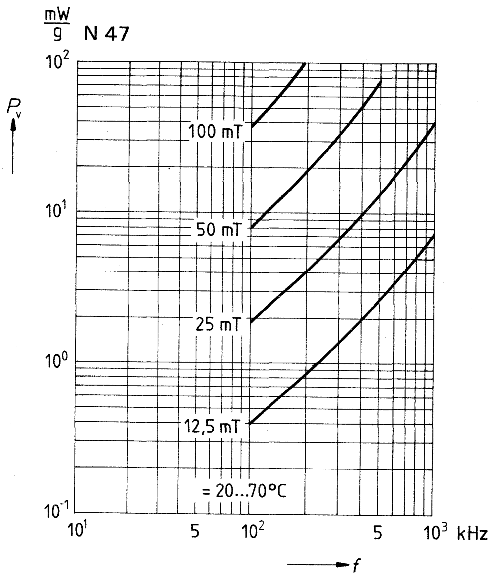


Relative power loss
versus frequency
(measured with R 16 toroids)









5 Typical values of transmissible power

The characteristic curves, figures 1 to 4, show the power that can be transmitted by the various core types. The power materials which can be supplied for each type of core and the ordering codes are to be found in the individual data sheets.

The powers P for the modes of operation commonly used in switched-mode power supplies, push-pull feed-forward, single-phase feed-forward and blocking operation, are plotted versus the volume of the component V[1]. Figure 1 applies to the majority of the types with N 27 and and N 41 ferrite cores, when they are operated at 20 kHz, an ambient temperature of 20 °C and an overtemperature ΔT = 30 K.

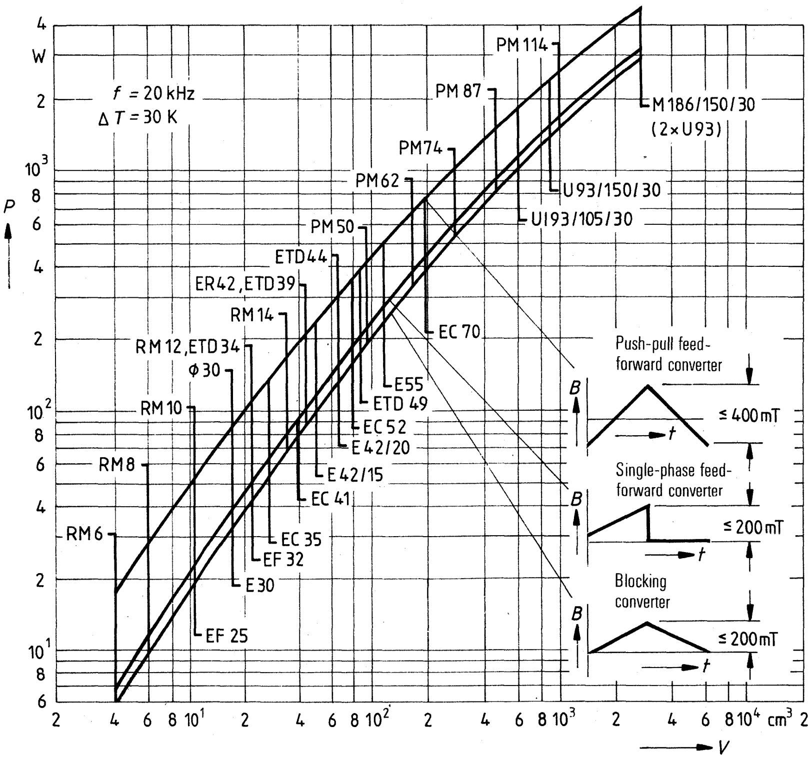


Figure 1
Transmissible power P versus volume V of transformers with N 27 and N 41 ferrite cores.

[1] The component volume V is to be understood as a cube including component and winding, but not the pins.

The transmissible power for frequencies of 50 and 100 kHz (depending on the operation mode) – also at an overtemperature of ΔT = 30 K – can be obtained from figure 2.

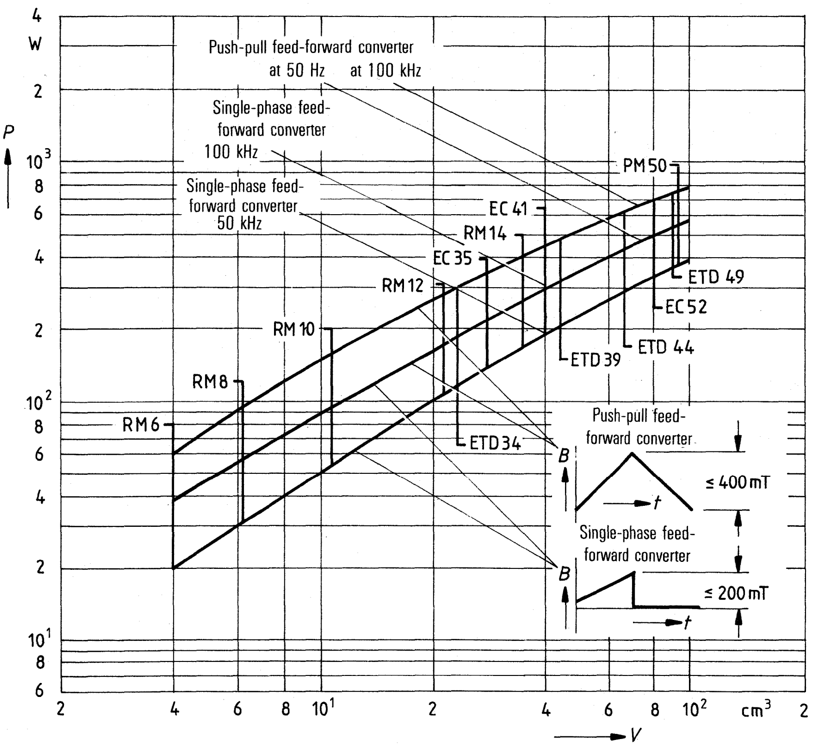


Figure 2
Transmissible power P versus volume V[1] of transformers with N27 and N41 ferrite cores at high frequencies (typical values)

The plotted core shapes generally meet the requirements of that frequency range. As today's switched-mode power supplies preferably operate at increasing frequencies, enhanced importance is attached to that frequency range. Thanks to the particular characteristics of RM cores (completed by some EC and PM types), their standardized compact design, as well as the suitability of coil formers for automatic winding machines, they are particularly suitable for use throughout the frequency range between 50 and 100 kHz.

[1] The component volume V is to be understood as a cube including component and winding, but not the pins.

Transmissible power *P* with N 27 ETD cores for single-phase feed-forward converters

The typical powers given in the table below apply e.g. to a single-phase feed-forward converter (without encapsulation), if the stringent insulation regulations laid down in IEC Publication 35 are to be met.

Type	Max. power at 50 kHz	Typical power at 50 kHz	100 kHz	Preferable frequency range
ETD 34	160 W	100 W	125 W	70 to 150 kHz
ETD 39	255 W	150 W	175 W	60 to 120 kHz
ETD 44	415 W	190 W	250 W	55 to 100 kHz
ETD 49	600 W	280 W	330 W	40 to 80 kHz

Transmissible power *P* with N 67 RM and ETD cores

A reduction of the surface leakage path is permissible with encapsulated components, i.e. with components protected against contamination and moisture. In addition they provide better heat dissipation. With an appropriate construction power transmission can be increased by at least 15%, merely due to improved heat dissipation; e.g. a value of 600 W could be obtained for an ETD 49 made of N 27.

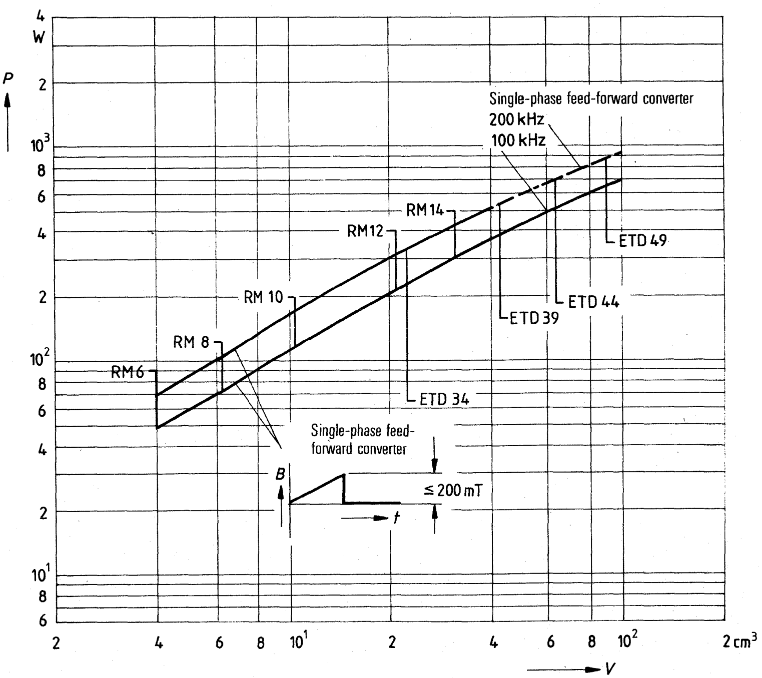


Figure 3
Transmission power *P* (typical values) versus volume *V* of transformers with N 67 ferrite cores. (The component volume *V* is to be understood as a cube including component and winding, but not the pins.)

The frequency range above 200 kHz is becoming more and more important for power supply units. For this reason, the material N 47 has been developed. The transmissible power for RM cores made of this material is shown in figure 4 for frequencies of 300 and 600 kHz (single-phase feed-forward and push-pull feed-forward converters).

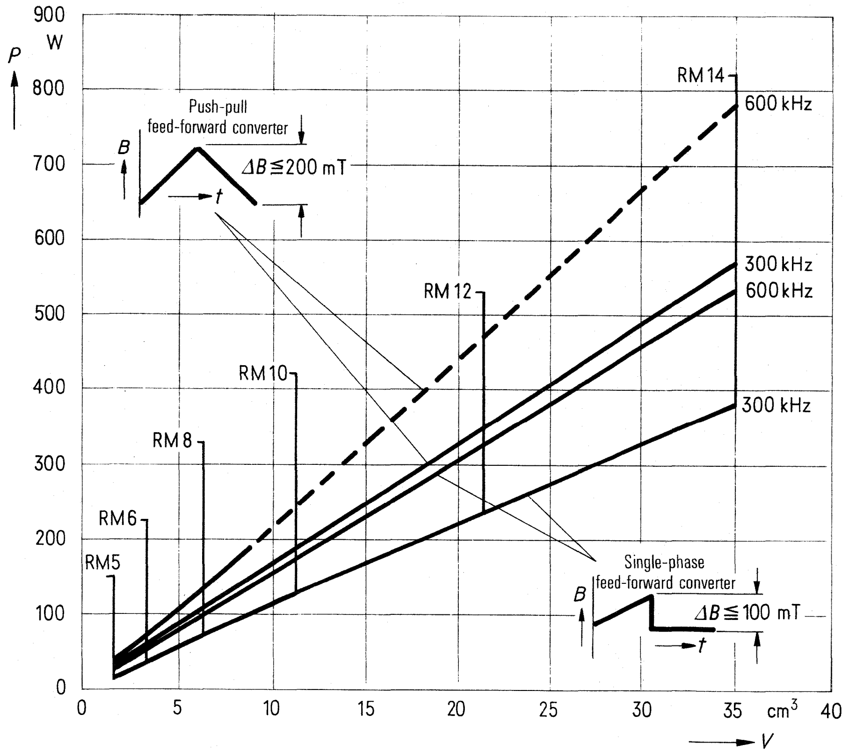


Figure 4
Transmissible power P (typical values) versus component volume V of transformers with N 47 ferrite cores.

[1] The component volume V is to be understood as a cube including component and winding, but not the pins.

6 Design of power transformers

The transmissible power P of transformers can be calculated in close approximation with the aid of the following equation:

$$P = C \cdot f \cdot \Delta B \cdot S \cdot f_{Cu} \cdot A_N \cdot A_e \tag{1}$$

This simple equation neglects voltage drops at the winding resistances, leakage inductances, as well as the magnetizing current of single-phase feed-forward converters. The constant C takes the operation mode into consideration, i.e.

$C = 1$ in push-pull feed-forward operation

$C = \frac{1}{2\sqrt{p}}$; i.e. $C = 0.71$ at the switching ratio $p = t_1 \cdot f = 0.5$ in single-phase feed-forward operation and

$C = 0.61$ in (single-phase) blocking operation

Further quantities in equation (1) are: switching frequency f, deviated magnetic flux density ΔB, current density S, copper factor f_{Cu}, winding cross section A_N, and effective area A_e.

The deviation in magnetic flux density ΔB is limited by the permissible heating ΔT_{Fe} of the core resulting from core losses and saturation phenomena which are due to the material used. It should, furthermore, be taken into consideration that the flux density in a core of unequal cross sections has to be designed according to the minimum core cross section A_{min}, since due to the flux concentration, the highest flux density is to be found in this area. Hence it follows:

$$\Delta B = \Delta B_{perm.} \frac{A_{min}}{A_e} \tag{2}$$

The smallest flux density deviation which has been determined according to the limitations mentioned above, is the flux density deviation ΔB, found for equation (1). The current density S is limited by the heating of the winding due to copper losses. The characteristic curves, plotted in the figures, are based on these considerations.

Comment on A_{min}

In addition to the effective area A_e, used for dimensioning at low excitation, the min. core cross section A_{min} is indicated for cores for power transformers with differing cross sections along the magnetic path.

In case of large excitations (approx. > 100 mT), the flux density should always be referred to A_{min}, as the smallest core cross section is mandatory for magnetic saturation and core heating. The data on P_v and μ_e was subject to corresponding considerations.

7 Design fundamentals for energy storage chokes[1]

The most important aspects for designing energy storage chokes are briefly explained, taking the most usual switched-mode power supply – step-down mode – as an example (figure 5).

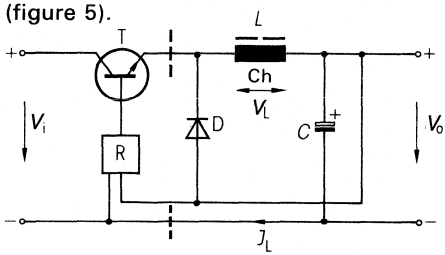
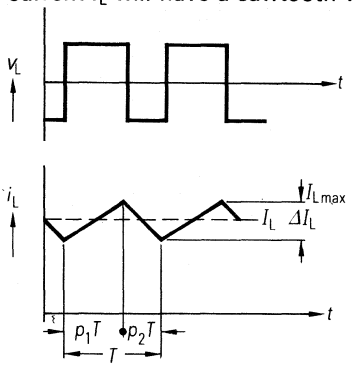


Figure 5
Switched-mode power supply incl. energy storage choke (step-down mode)
- - - interface for incorporating a transformer

If the response of the choke voltage V_L is of rectangular waveform, that of the choke current I_L will have a sawtooth waveform (figure 6):



p_1 = relation on-time versus cycle
p_2 = relation off-time versus cycle
T = cycle
V_L = voltage at the choke

Figure 6
Schematic for voltage V_L and current I_L of energy storage chokes

Depending on the current ripple ΔI_L – for step-down SMPS generally below 0.3 I_L – the maximum choke current $I_{Lmax} = I_L + 0.5\ \Delta I_L$.

The maximum magnetic biasing capability $(I^2L)_{max}$ of the core is obtained at optimum design. The inductance – under worst conditions (at maximum operating temperature) – must not decrease by more than 5%. The inductance for the step-down SMPS is calculated as follows:

$$L = \frac{(V_i - V_0)\ V_0}{\Delta I_L \cdot f \cdot V_i}$$

with the given operating conditions V_i = input voltage, V_0 = output voltage, f = switching frequency. As soon as the maximum magnetic biasing capability has been found out with the aid of I_{Lmax} and L, core type, core size, and air gap can be determined. With increasing air gap, the magnetic biasing capability rises, but also the pertinent copper loss I^2R and hence the heating of the choke. An optimum gapping is attained when the overtemperature ΔT just reaches the permissible value.

[1] An RM 10 and an RM 12 core with graded center boss for non-linear energy storage chokes have been newly included in the product line (see page 326). Other cores are in preparation.
For detailed information refer to the article "Non-linear energy storage chokes improve the operating behavior of switched-mode power supplies" in Siemens Components 23 (1985), issue 1.

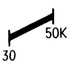
The relationship between magnetic biasing capability $(I^2L)_{max}$, copper loss I^2R, effective permeability μ_e (effect of air gap), and overtemperature ΔT between 30 and 50 K is shown in the nomograms of figure 7 for three different core series. Core losses due to ripple have not been taken into consideration. Type, size, and air gap can be chosen with the help of these nomograms.

Example

Given: $(I^2L)_{max}$ = 8 A^2 mH and ΔT approx. 40 K

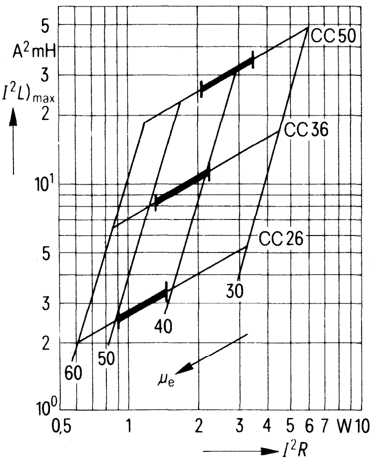
Required: Ferrite core and μ_e

Solution: An effective permeability μ_e of approximately 38 can be obtained from the nomogram for EC cores on the rising straight line of the EC41 core in the height of the ordinate 8 A^2 mH and in the middle of the plotted temperature range between 30 and 50 K.

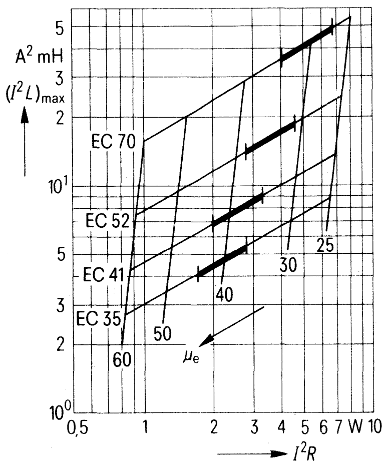


Operating range with 30 ... 50 K overtemperature ΔT due to copper losses

CC cores



EC cores



E and EF cores

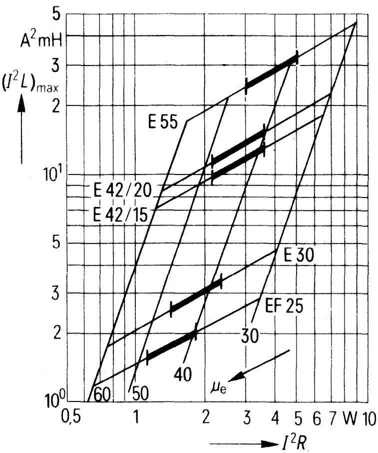
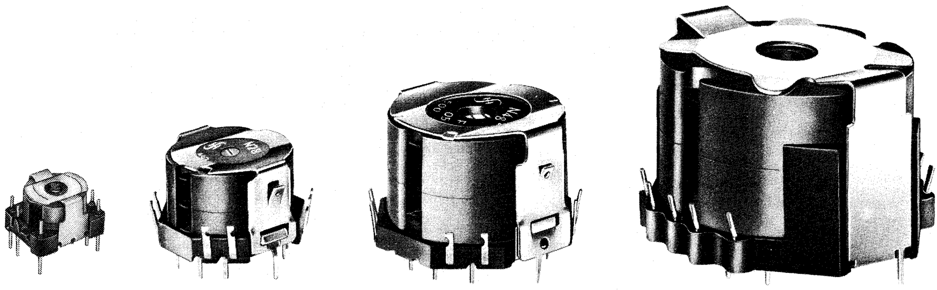


Figure 7
Magnetic biasing capability $(I^2L)_{max}$, copper loss I^2R, effective permeability μ_e, and overtemperatures ΔT of N 27 E and CC ferrite cores.

Pot Cores



Pot cores, general

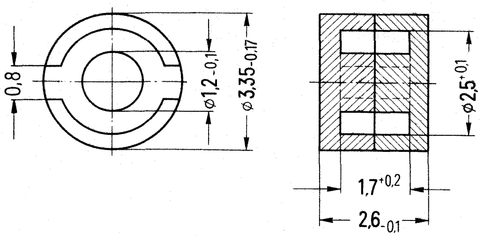
Pot cores complying with DIN 41 293, IEC 133, have a low stray field due to their closed form. They feature high Q and high stability along with very fine adjustment capability. In the course of time they have practically penetrated the entire electro-technical field. To meet the large application field, a comprehensive type spectrum with accessories is at the user's disposal. Standardized pot cores are to be preferred. Most of the types are available with inserted sleeves.

Coil formers with mounted pins are intended to be used for four-slot pot cores as well as for TT cores, which are particularly suitable for touch-tone telephone systems (see sections "4-Slot Pot Cores" and "Touch-Tone Pot Cores").

Survey

Approx. dimensions dia x height in mm	Drawing number	Part No.	Page
3,3 x 2,6	2 x C61035–A35–C1	B65491	125
4,6 x 4,1	1 x C61035–A41–C10 1 x C61035–A41–C11	B65495	126
5,8 x 3,3	2 x C60358–B3050–C1	B65501	133
7 x 4	2 x C61035–A15–C7	B65511	135
9 x 5 (standardized)[1]	2 x C61035–A18–C11	B65517	143
11 x 7 (standardized)[1]	2 x C61035–A14–C1	B65531	152
14 x 8 (standardized)[1]	2 x C60358–B3054–C3	B65541	161
18 x 11 (standardized)[1]	2 x C61035–A10–C1	B65651	171
18 x 14	2 x C60358–B3056–C6	B65561	183
22 x 13 (standardized)[1]	2 x C60358–B3185–C3	B65661	193
26 x 19 (standardized)[1]	2 x C60358–B3181–C1	B65671	204
30 x 19 (standardized)[1]	2 x C60358–B3186–C1	B65701	214
36 x 22 (standardized)[1]	2 x C61035–A16–C30	B65611	223
41 x 25	2 x C40330–A79–C1	B65621	231
Adjusting tools	–	B63399	340

[1] Dimensions in acc. with DIN 41293 or IEC 133. Quality specifications in acc. with the harmonized DIN 45970 quality assessment system.



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$	= 3.72 mm^{-1}
Effective length	l_e	= 5.1 mm
Effective area	A_e	= 1.37 mm^2
Effective volume	V_e	= 7.0 mm^3

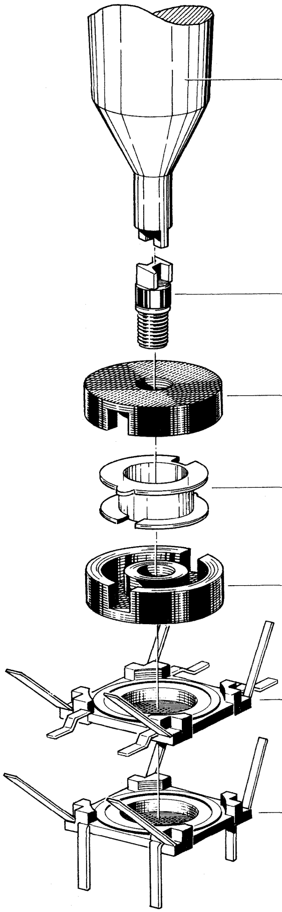
Approx. weight: 0.06 g/set

A_L value nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
Ungapped				
30	$^{+40}_{-30}$ % ≙ Y	K 1	89	B65491-B-Y1
500	$^{+40}_{-30}$ % ≙ Y	N 30	1480	B65491-B-Y30

Winding data

Useful winding cross section A_N without coil former mm^2	Average length of turn l_N mm	A_R value µΩ
0,65	5,8	310

Adjustable miniature type for film circuits and PC boards

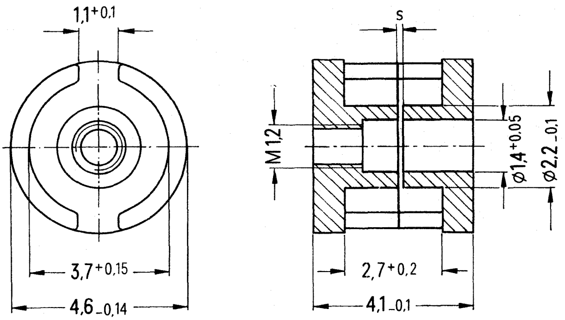


Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B 63 399	341, fig. 5
Adjusting screw	B 65496	130
Pot core	B 65495	127
Coil former	B 65496	128
Pot core with inside thread	B 65495	127
Connecting board for film circuits	B 65496	129
or		
Connecting board for printed circuits	B 65496	129

Miniature pot cores for adjustable miniature inductors

One pot core half carries the inside thread for guiding the adjusting screw. The pot core and the wound unit can be glued on a connecting board with 4 solder terminals.

Space requirements of the inductor (without terminals): 5 mm x 5 mm x 5.1 mm.



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma l/A$ =	2.6 mm^{-1}
Effective length	l_e =	7.6 mm
Effective area	A_e =	2.8 mm^2
Effective volume	V_e =	21.3 mm^3

Approx. weight 0.17 g/set

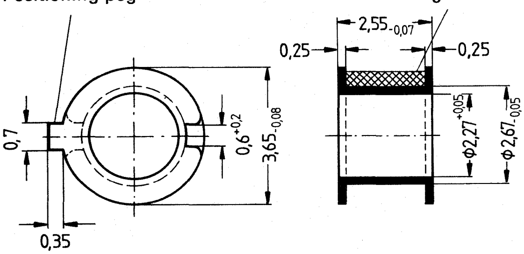
Version	Ordering code
with thread	B65495-**K**...
without thread	B65495-**B**...

A_L value nH	tolerance	SIFERRIT material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
Gapped					
16	±3% ≙ A	K 1	0,2	33	B65495-K16-A1
40	±3% ≙ A	M 33	0,07	83	B65495-K40-A33
63	±5% ≙ J	N 48	0,04	130	B65495-K63-J48
Ungapped					
40	$^{+40}_{-30}$ % ≙ Y	K 1		83	B65495-B-Y1
200	$^{+40}_{-30}$ % ≙ Y	M 33		620	B65495-B-Y33
800	$^{+40}_{-30}$ % ≙ Y	N 30		1660	B65495-B-Y30

Coil former B 65 496

Glass-fiber reinforced polyterephthalate coil former including positioning peg, flame-retardant in accordance with UL 94 V-0; color code black.

For winding details refer to page 70.



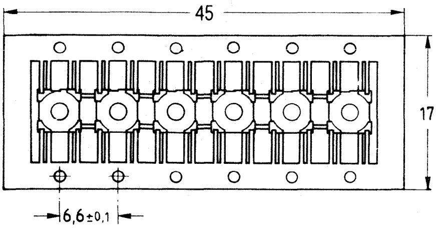
Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1) μΩ	Approx. weight g	**Ordering code** (PU: 500)
1	0,8	9,5	400	0,03	B65496–B1000–T1

1) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

Connecting board B65496

Made of glass-fiber reinforced thermosetting plastic, flame-retardant in accordance with UL 94V-0.
Max. permissible soldering temperature is 400 °C/752 °F, 2 s.
For an easier handling we offer 6 connecting boards in one mounting strip (17 mm x 45 mm).

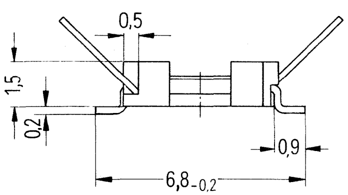


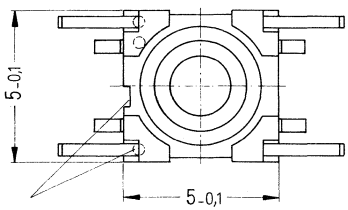
Ordering code
B 65 496–A2000
(PU: 100 mounting strips)

Individual connecting boards are also available.

Solder terminals for film circuits

Ordering code
B65496–A2003
(PU: 100)

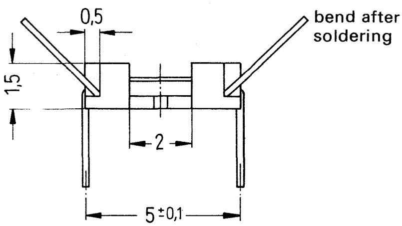


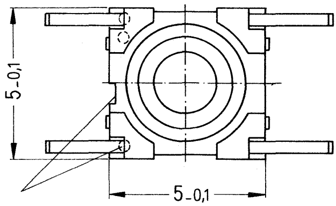


Marking for pin 1

Solder terminals for PC boards

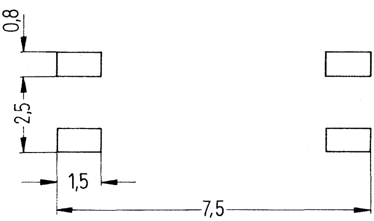
Ordering code
B65496–A2002
(PU: 100)





Marking for pin 1

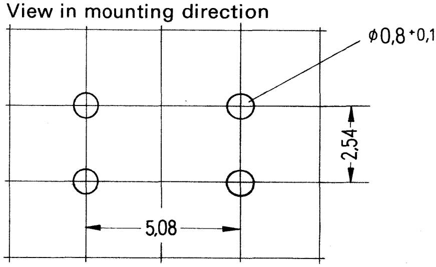
Solder terminals on film circuits



Dimensions in mm

Hole arrangement for PC boards

View in mounting direction



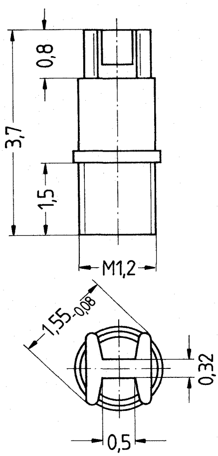
Adjusting Devices B 65496

Adjusting Screw B65496–A3001–X..., consisting of a ferrite tube core on which a polyacetal thread is molded and 4 cam profiles serving as core brake;

fits

the lower part of the pot core set B65495–K... into which a guiding thread is molded
Adjusting Screw Driver B63399–A1007

Adjusting screw

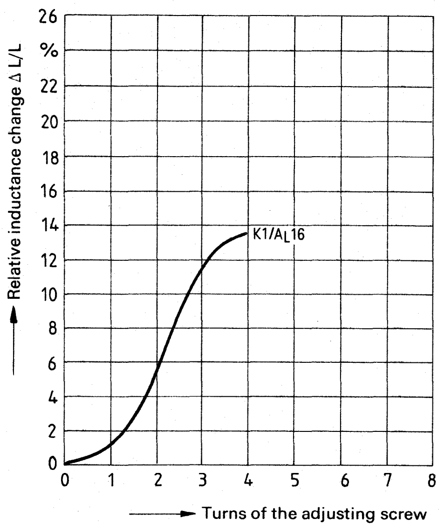


Dimensions in mm

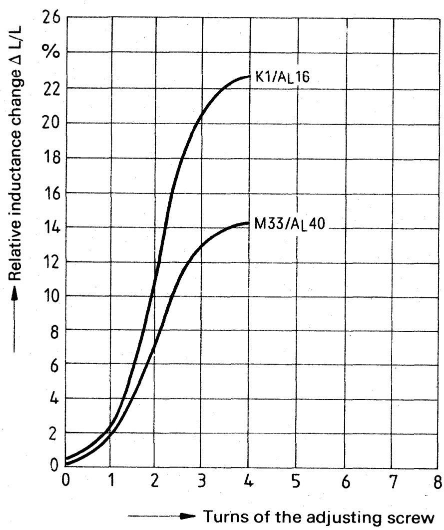
Pot cores B65495		Adjusting screw			
Material	A_L value nH	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 500)
K 1	16	1,25 x 1,2	U 17	brown	B65496–A3001–X17
M 33	40		K 1	blue	B65496–A3001–X1
N 48	63		N 22	green	B65496–A3001–X22

Inductance adjustment curves

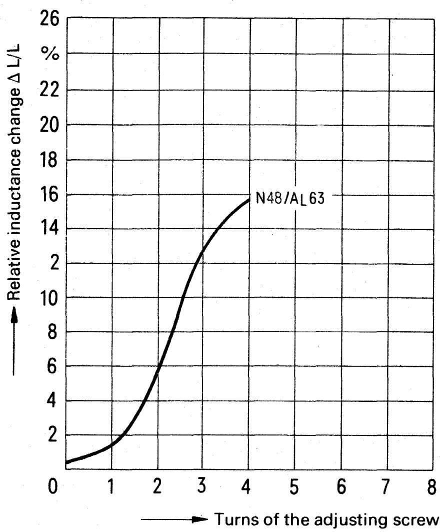
Adjusting screw B65496–A3001–X17
color code brown



Adjusting screw B65496–A3001–X1
color code brown



Adjusting screw B65496–A3001–X22
color code green

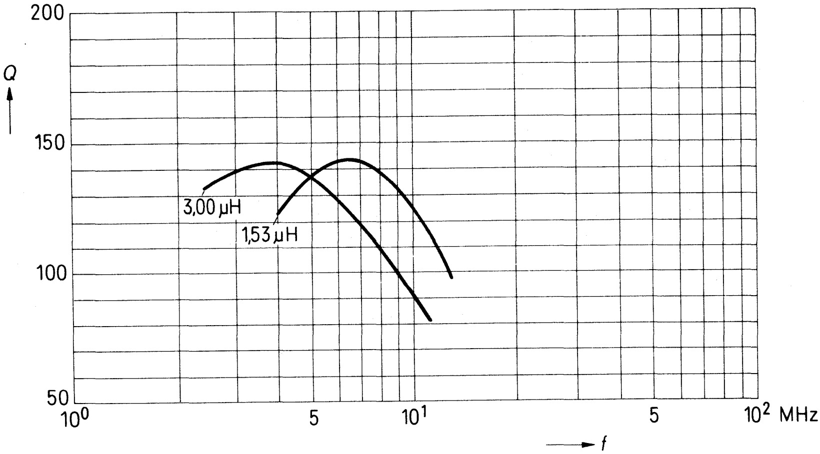


0 ≙ at least 1/2 to 1 turn engaged

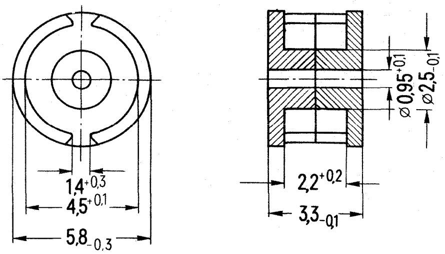
Q factor characteristics

Material K 1

L (μH)	A_L (nH)	Turns	Wire
1.53	16	9	32 x 0,025 CuLS
3.0	16	13	15 x 0,04 CuLS



Flux density in the core
$\hat{B}$ = < 1 mT



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A =$	1.68 mm^{-1}
Effective length	$l_e =$	7.9 mm
Effective area	$A_e =$	4.7 mm^2
Effective volume	$V_e =$	37 mm^3

Approx. weight 0.2 g/set

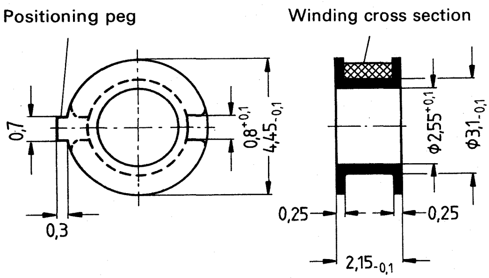
A_L value nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
Ungapped[1]				
60	$^{+40}_{-30}$ % ≙ Y	K 1	80	B65501–J–Y1
800		N 26	1070	B65501–J–Y26
1500		N 30	2000	B65501–J–Y30

[1] Gapped pot cores upon request.

Coil former B 65502

Glass-fiber reinforced polyterephthalate coil former with positioning peg, flame-retardant in accordance with UL 94 V-0; color code black.

For winding details refer to page 70.

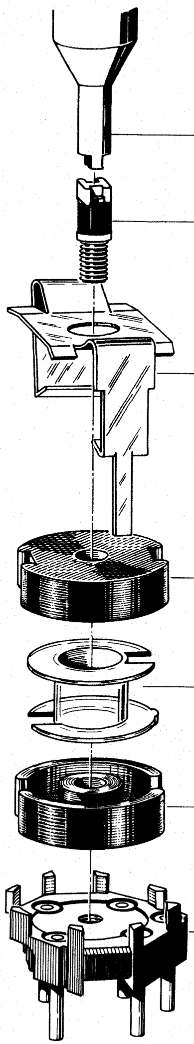


Dimensions in mm

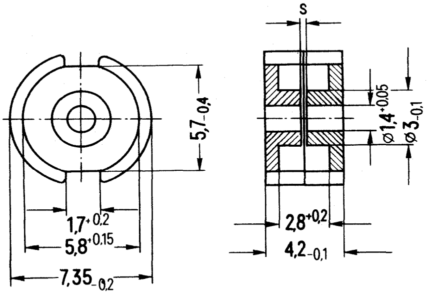
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 500)
1	0,95	11,7	433	0,03	B65502–B–T1

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns[2])

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	441, fig. 5
Adjusting screw	B65512	139
Yoke	B65512	138
Pot core	B65511	136
Coil former	B65512	137
Pot core	B65511	136
Connecting board with thread; 5 solder terminals	B65512	138
Centering pin		139



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ = 1.43	mm^{-1}
Effective length	l_e = 10	mm
Effective area	A_e = 7	mm^2
Effective volume	V_e = 70	mm^3

Approx. weight 0.5 g/set

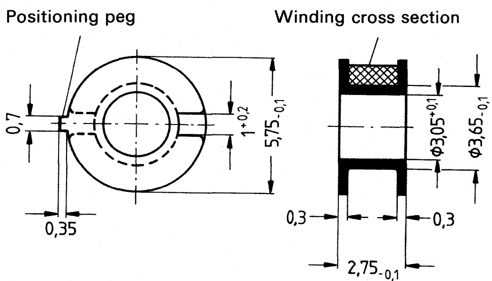
A_L value nH	tolerance	Ferrite material	Total air gap *s* in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
Gapped					
8	±3%≙A	U 17[1]	0,8	9,1	B65511–A08–A17 S
25		K 1	0,32	28,5	B65511–A25–A1 S
63		M 33	0,13	72	B65511–A63–A33
100		N 48	0,10	114	B65511–A100–A48
Ungapped					
70	$^{+40}_{-30}$%≙Y	K 1		80	B65511–A–Y1
1000		N 26		1140	B65511–A–Y26
2000		N 30		2280	B65511–A–Y30 S

[1] The dimensions may be exceeded by up to 10%
S Preferred products (refer to page 4)

Coil former B 65512

Glass-fiber reinforced polyterephthalate coil former with positioning peg, flame-retardant in accordance with UL 94V-0; color code black.

For winding details refer to page 70.



Dimensions in mm

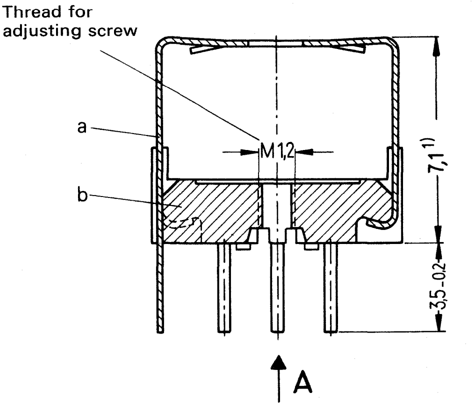
Number of sections	Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 500)
1	2,2	14,6	240	0,04	B65512-C-T1 **S**

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns^2)

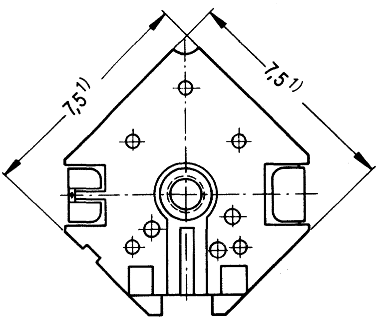
S Preferred products (refer to page 4)

Mounting assembly for PC mounting B 65512

Mounting assembly with snap-in connection.
Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94V-0, with 5 solder terminals.
Max. permissible soldering temperature is 400 °C/752 °F, 2 s.
0.2 mm thick nickel-silver spring yoke (tinned) with ground terminal.

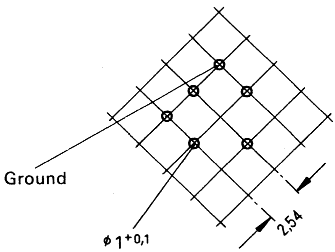


Approx. weight 0.4 g



View in direction A

Hole arrangement
View in mounting direction



Dimensions in mm

Ordering code B65512-C2001 S
(Complete mounting assembly with 5 solder terminals)
(PU: 500 sets)

Mounting parts		Ordering code
a	1 yoke	C61035-A15-C5
b	1 connecting board (with thread)	C61035-A15-B1

1) Max. dimensions
S Preferred products (refer to page 4)

Adjusting Devices B 65512

Adjusting Screw B65512–A3001–X..., consisting of a ferrite tube core on which a polyacetal thread is molded and 4 cam profiles serving as core brake;

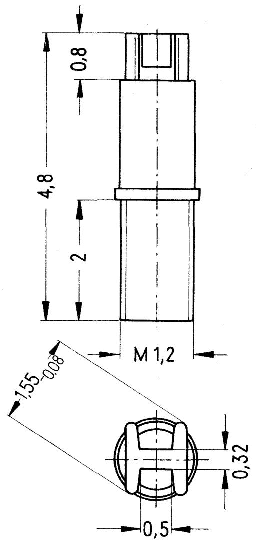
fits

glass-fiber reinforced polyterephthalate **Connecting Board** B65512–C2001 into which a guiding thread is molded

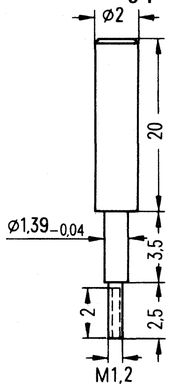
Centering Pin e.g. of brass (for design proposal see drawing)

Adjusting Screw Driver B63399–A1007

Adjusting screw



Centering pin



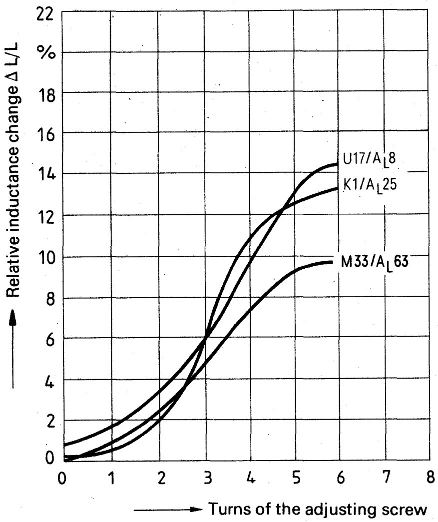
Dimensions in mm

Pot cores B65511		Adjusting screw			
Material	A_L value nH	Tube core dia. x length	Material	Color code	**Ordering code** (PU: 500)
U 17	8				
K 1	25		U 17	white	B65512–A3001–X17 S
M 33	63	1,25 x 1,8			
N 48	100		K 1	yellow	B65512–A3001–X1

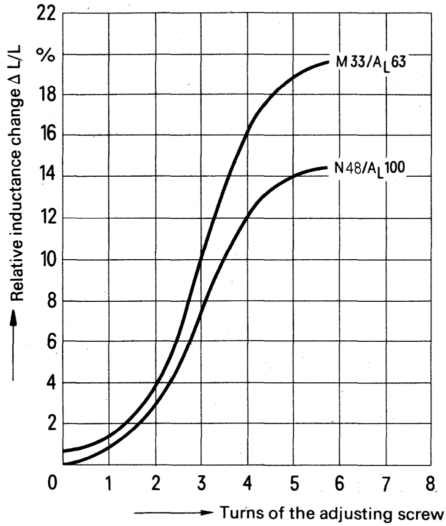
S Preferred products (refer to page 4)

Inductance adjustment curves

Adjusting screw B65512–A3001–X17
color code white



Adjusting screw B65512–A3001–X1
color code yellow



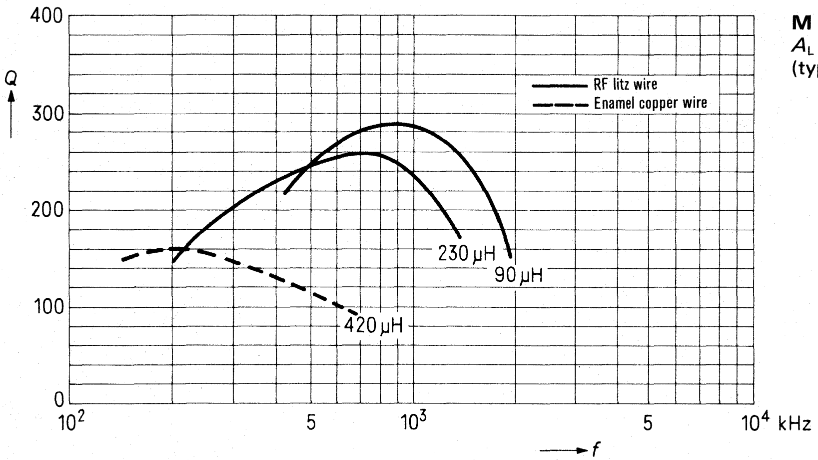
0 ≙ completely engaged screw!

Q factor characteristics

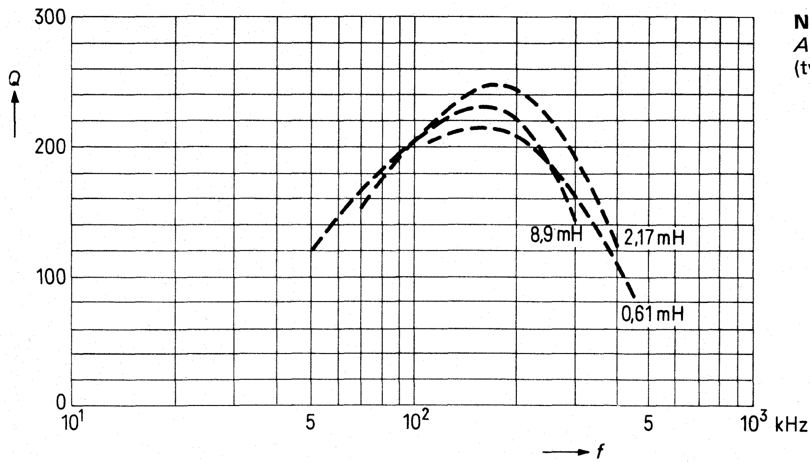
Materials M 33, N 48

Material	L	Turns	Wire; RF litz wire	Padding
M 33 A_L = 63 nH	420 µH	80	0,15 CuL	–
	230 µH	60	3 x 0,07 CuLS	–
	90 µH	37	12 x 0,04 CuLS	–
N 48 A_L = 100 nH	8,90 mH	300	0,07 CuL	–
	2,17 mH	150	0,10 CuL	–
	0,61 mH	80	0,15 CuL	–

Flux density in the core $\hat{B} < 1$ mT



M 33
A_L = 63 nH
(typical values)



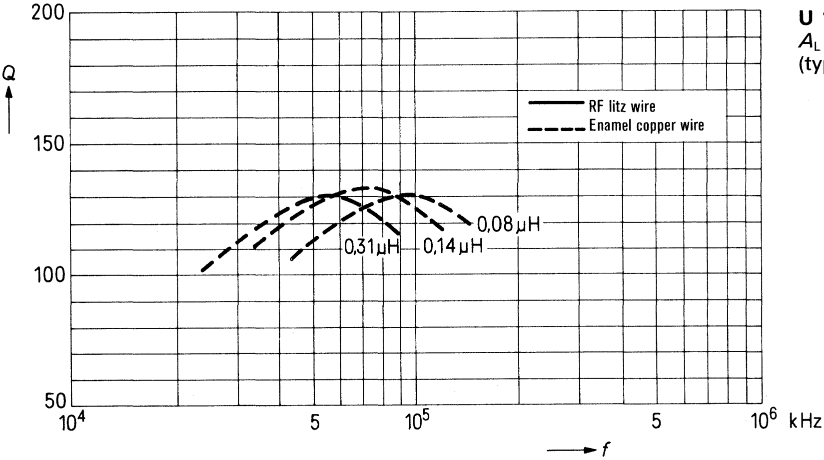
N 48
A_L = 100 nH
(typical values)

Q factor characteristics

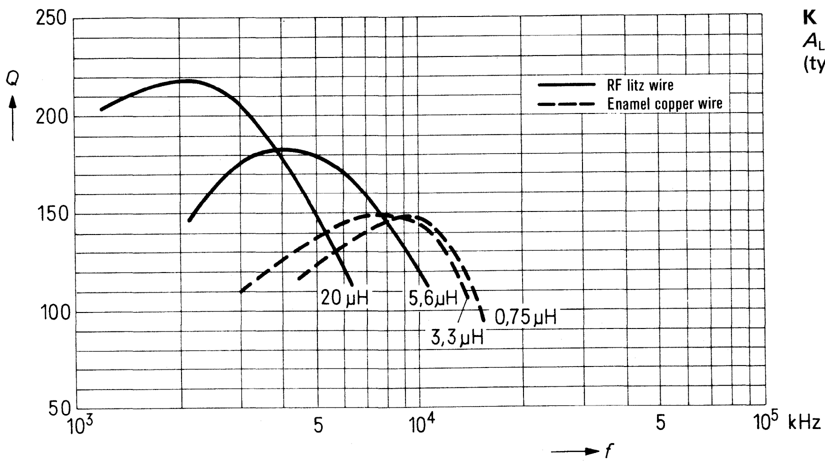
Materials U 17, K 1

Material	L (µH)	Turns	Wire; RF litz wire	Number of layers
U 17 A_L = 8 nH	0,31 0,14 0,08	6 4 3	0,25 CuL 0,30 CuL 0,30 CuL	1 1 1
K 1 A_L = 25 nH	20 5,6 3,3 0,75	28 15 11 5	15 x 0,04 CuLS 12 x 0,04 CuLS 0,3 CuL 0,4 CuL	4 2 2 1

Flux density in the core $\hat{B} < 2$ mT

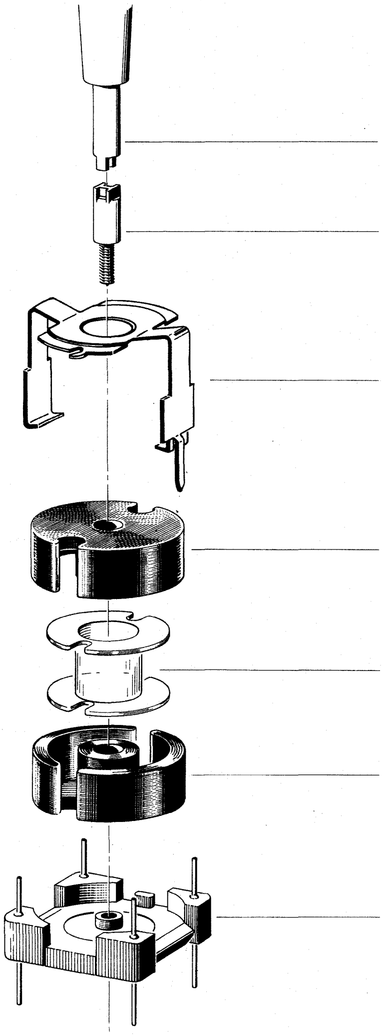


U 17
A_L = 8 nH
(typical values)



K 1
A_L = 25 nH
(typical values)

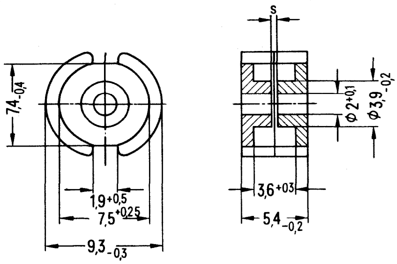
Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	341, fig. 6
Adjusting screw	B65518	147
Yoke	B65518	146
Pot core	B65517	144
Coil former with 1 or 2 sections	B65522	145
Pot core	B65517	144
Connecting board with thread; 4 or 6 solder terminals	B65518	146
Centering pin		147

Pot Cores 9 x 5 — B 65517

Pot cores complying with DIN 41293 or IEC publication 133



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	1.25	mm^{-1}
Effective length	l_e =	12.5	mm
Effective area	A_e =	10	mm^2
Effective volume	V_e =	125	mm^3

Approx. weight 0.8 g/set

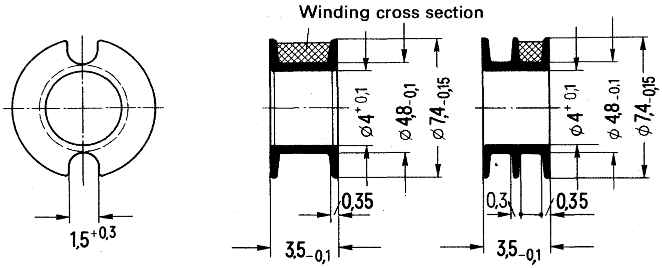
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 500 sets)	
Gapped						
10	±3% ≙ A	U 17[1]	1,2	10	B65517-A10-A17	
16		K 12	0,8	15,9	B65517-A16-A12	S
25 40		K 1	0,45 0,26	24,9 39,8	B65517-A25-A1 B65517-A40-A1	S S
40 63		M 33	0,37 0,2	39,8 63	B65517-A40-A33 B65517-A63-A33	
100 160 200		N 48	0,1 0,06 0,04	100 159 200	B65517-A100-A48 B65517-A160-A48 B65517-A200-A48	S S
250	±10% ≙ K	N 26	0,03	249	B65517-A250-K26	S
Ungapped						
95	$^{+30}_{-20}$ % ≙ R	K 1		95	B65517-A-R1	
1200		N26		1190	B65517-A-R26	S
2500		N 30		2490	B65517-A-R30	S
5000	$^{+40}_{-30}$ % ≙ Y	T 38		4970	B65517-A-Y38	S

[1] The dimensions may be exceeded by up to 10%

S Preferred products (refer to page 4)

Coil former and insulating washers B 65 522

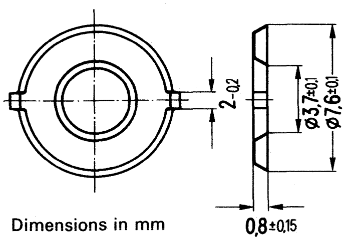
Glass-fiber reinforced polyterephthalate coil former, complying with DIN 41 294 or IEC publication 133, flame-retardant in accordance with UL 94V-0; color code black.
For winding details refer to page 69.



Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	Useful winding cross section A_N total mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 500)
1	2,8	2,8	18,5	220	0,05	B65522-B-T1 S
2	1,25	2,5		250	0,06	B65522-B-T2 S

0.04 mm thick insulating Makrofol spring washers for insulation and tolerance balancing between coil winding and pot core; delivered in tapes.



Dimensions in mm

Ordering code B65522-A5000 S
(PU: 1000)

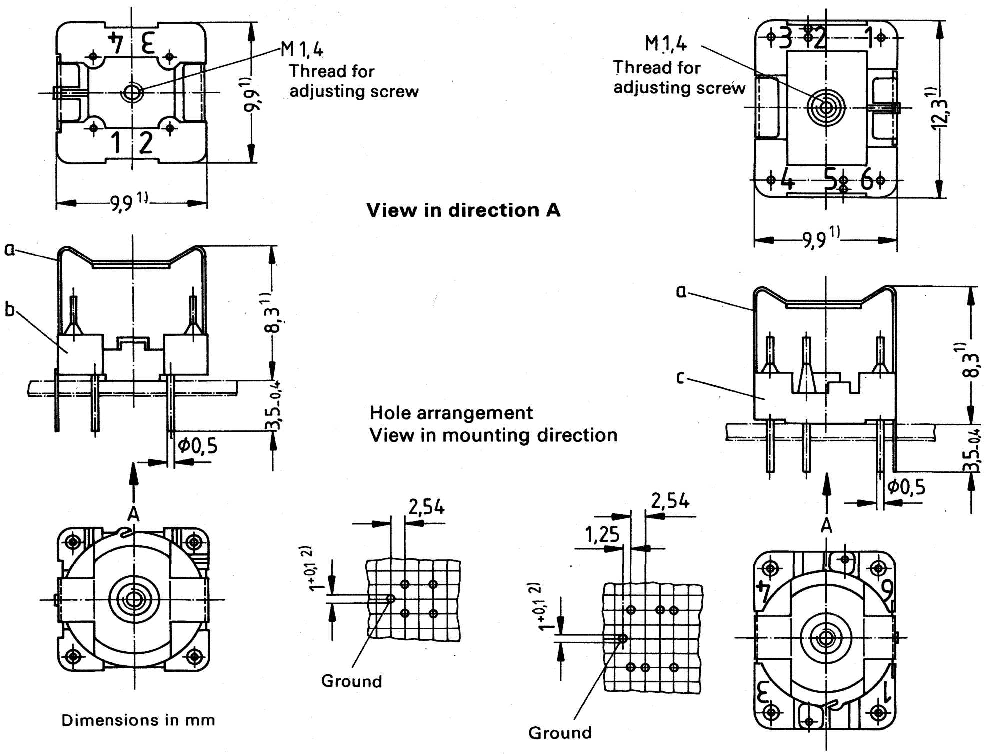
1) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

Mounting assemblies for PC mounting B 65518

Mounting assemblies with snap-in connection. Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94 V-0. Max. permissible soldering temperature is 400 °C/752 °F, 2 s. 0.25 mm thick nickel-silver spring yoke (tinned).
Approx. weight 0.6 g (4 solder terminals); 0.7 g (6 solder terminals)

B65518–D2001
(with 4 solder terminals)

B65518–D2002
(with 6 solder terminals)



Dimensions in mm

Ordering code B65518–D2001 S (Complete mount. assembly with 4 solder term.) (PU: 500 sets)			**Ordering code** B65518–D2002 S (Complete mount. assembly with 6 solder term.) (PU: 500 sets)		
Mounting parts		Ordering code	Mounting parts		Ordering code
a	1 yoke	C61035–A18–C30	a	1 yoke	C61035–A18–C30
b	1 connecting board (with thread)	C61035–A18–B10	c	1 connecting board (with thread)	C61035–A18–B11

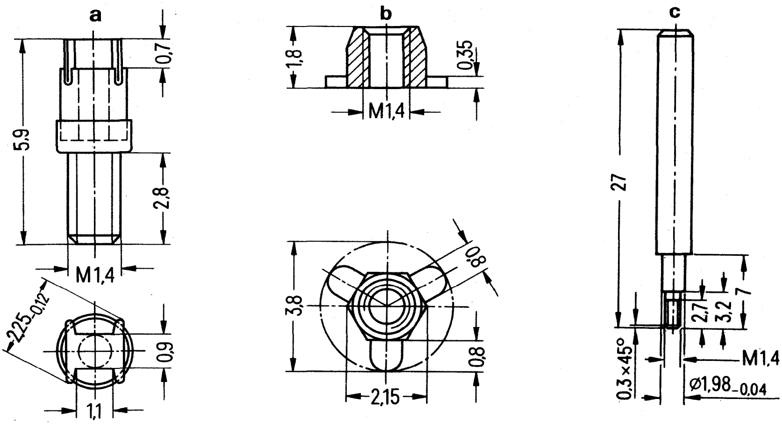
1) Max. dimension
2) 1.3 mm hole also permissible
S Preferred products (refer to page 4)

Adjusting Devices B 65518

Adjusting Screw (a) B65518–B3..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and 4 cam profiles serving as core brake;

fits

glass-fiber reinforced polyterephthalate **Connecting Board** B65518–B2... into which a guiding thread is molded
glass-fiber reinforced 11 polyamide **Threaded Flange** (b) B65539–J1001 (only needed, when no mounting assembly is used)
Centering Pin (c) e.g. of brass (for design proposal see drawing)
Adjusting Screw Driver B63399–B4



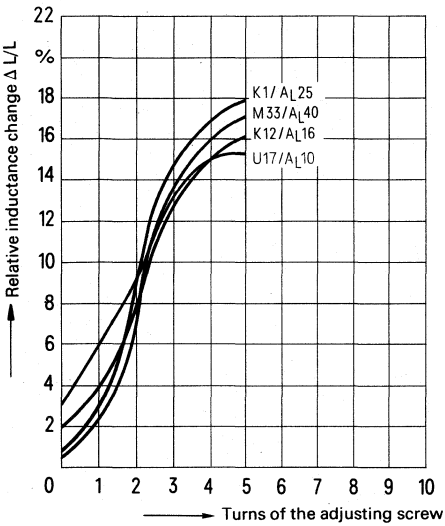
Dimensions in mm

Pot cores B65517		Adjusting screw			
Material	A_L value nH	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 500)
U 17	10	1,81 x 2	Si 1	brown	B65518–B3000–X101 S
K 12	16				
K 1	25				
	40		K 1	blue	B65518–B3000–X1 S
M 33	40		Si 1	brown	B65518–B3000–X101
	63		K 1	blue	B65518–B3000–X1
N 48	100				
	160		N 22	green	B65518–B3000–X22 S
	200				

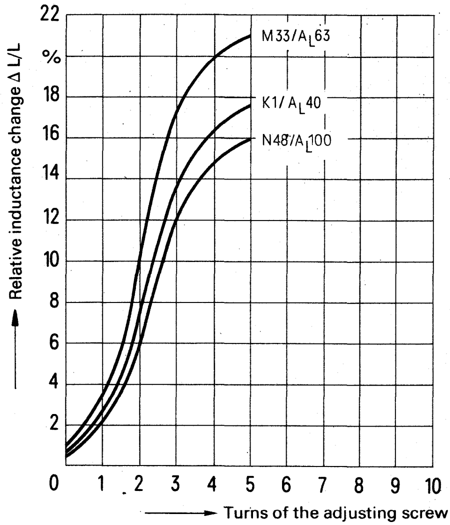
S Preferred products (refer to page 4)

Inductance adjustment curves

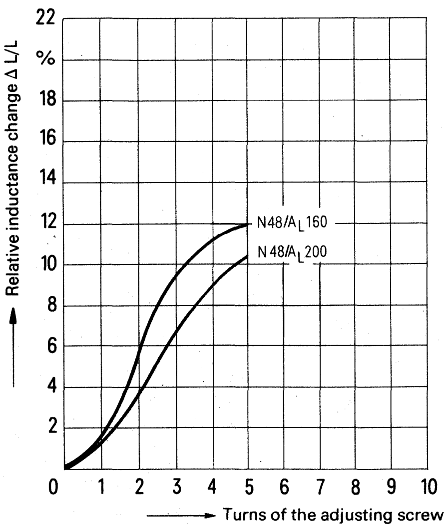
Adjusting screw B65518–B3000–X101
color code brown



Adjusting screw B65518–B3000–X1
color code blue



Adjusting screw B65518–B3000–X22
color code green



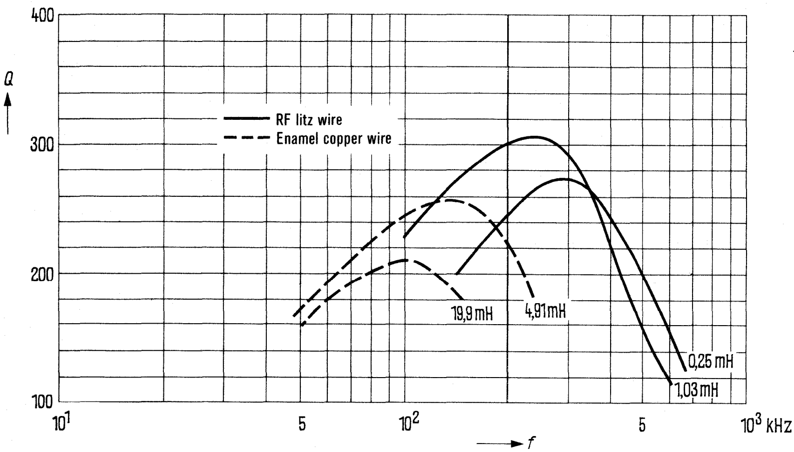
0 ≙ at least one turn engaged

Q factor characteristics

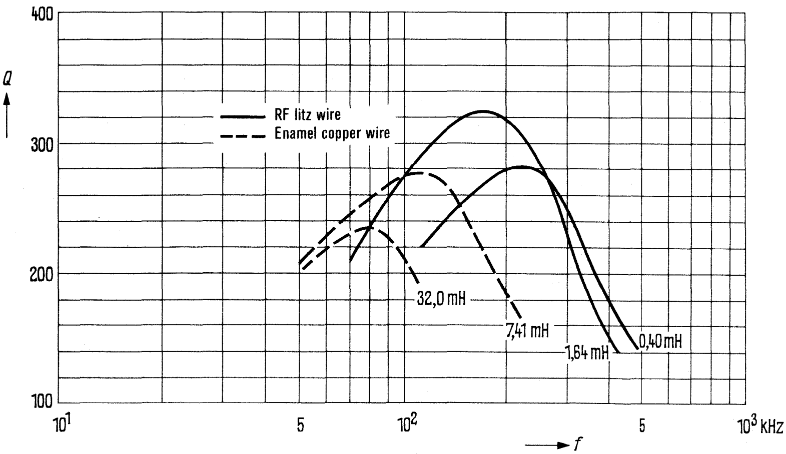
Material N 48

L (mH) for A_L = 100 nH	A_L = 160 nH	Turns	Wire; RF litz wire	Number of sections
19,9	32,0	450	0,07 CuL	1
4,91	7,41	250	0,1 CuL	1
1,03	1,64	100	1 x 12 x 0,04 CuL	1
0,25	0,40	50	1 x 15 x 0,04 CuLS	1

Flux density in the core $\hat{B} < 3$ mT



N 48
A_L = 100 nH
(typical values)



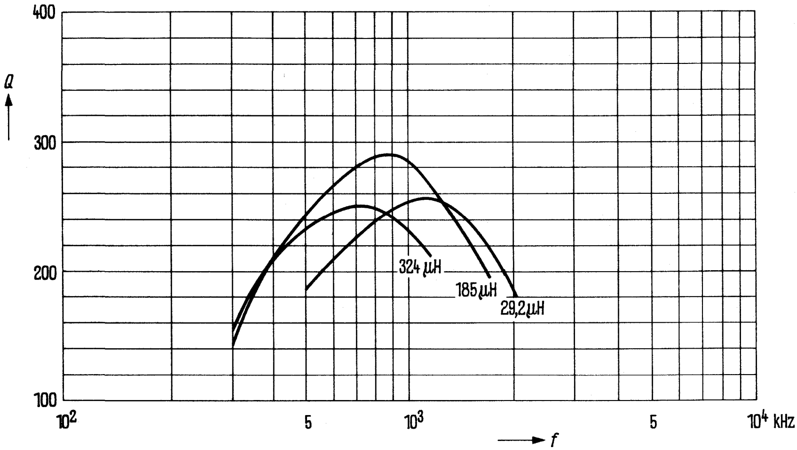
N 48
A_L = 160 nH
(typical values)

Q factor characteristics

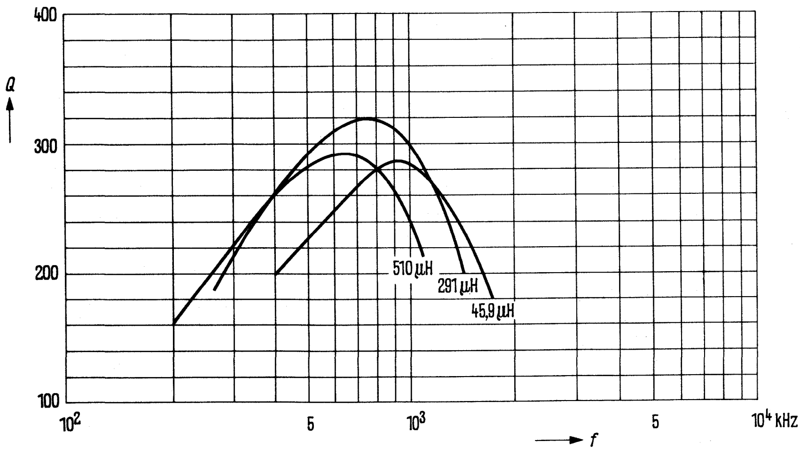
Material M 33

L (µH) for A_L = 40 nH	L (µH) for A_L = 63 nH	Turns	RF litz wire	Number of sections
324	510	90	1 x 5 x 0,05 CuLS	1
185	291	68	1 x 12 x 0,04 CuLS	1
29,2	45,9	27	1 x 30 x 0,04 CuLS	1

Flux density in the core $\hat{B} < 2$ mT



M 33
A_L = 40 nH
(typical values)

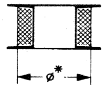


M 33
A_L = 63 nH
(typical values)

Q factor characteristics

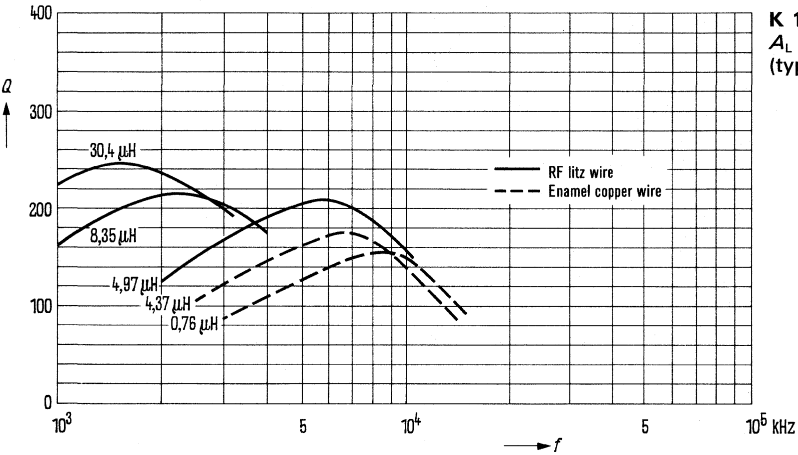
Material K 1

L (µH) for A_L = 25 nH	L (µH) for A_L = 40 nH	Turns	Wire; RF litz wire	Number of sections	∅* mm
4,37	6,21	12	0,20 CuL	1	6,7
0,76	1,08	5	0,50 CuL	1	6,0
30,4	47,3	35	1 x 20 x 0,04 CuLS	1	–
8,35	12,2	18	1 x 20 x 0,04 CuLS	1	–
4,97	7,2	13	1 x 12 x 0,04 CuLS	1	6,7

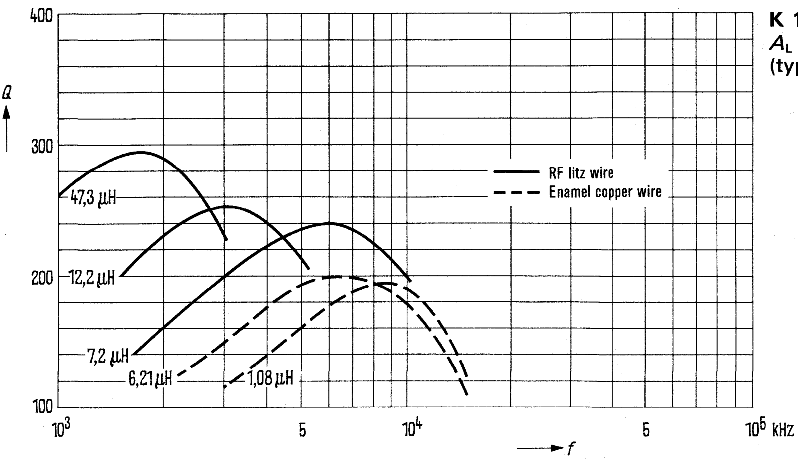


Pad of polystyrene tape up to the diameter

Flux density in the core $\hat{B} < 0.6$ mT

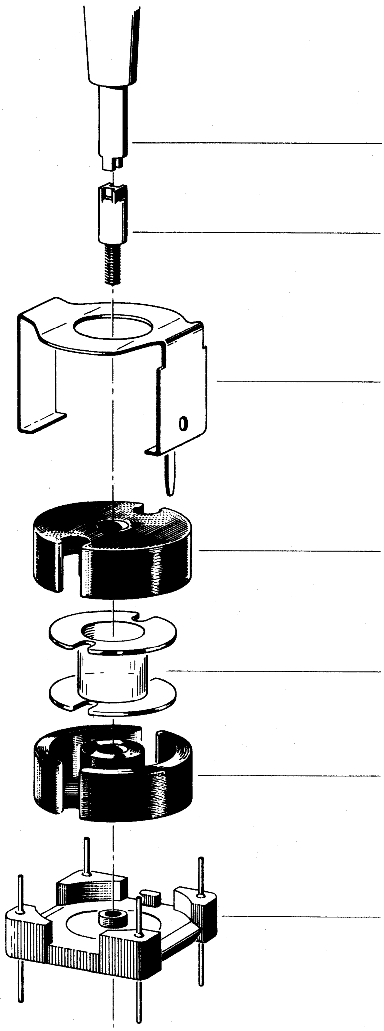


K 1
A_L = 25 nH
(typical values)



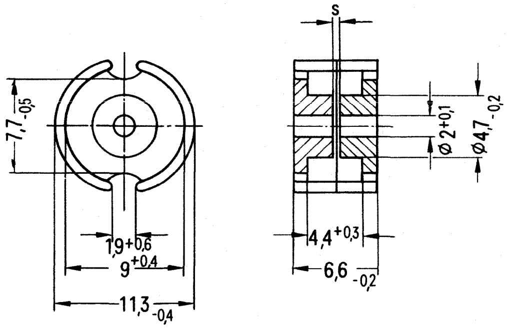
K 1
A_L = 40 nH
(typical values)

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65539	156
Yoke	B65535	155
Pot core	B65531	153
Coil former with 1 or 2 sections	B65532	154
Pot core	B65531	153
Connecting board with thread, 4 or 8 solder terminals	B65535	155
Centering pin		156

Pot cores complying with DIN 41 293 or IEC publication 133



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	1.0 mm^{-1}
Effective length	l_e =	15.9 mm
Effective area	A_e =	15.9 mm^2
Effective volume	V_e =	252 mm^3

Approx. weight 1.7 g/set

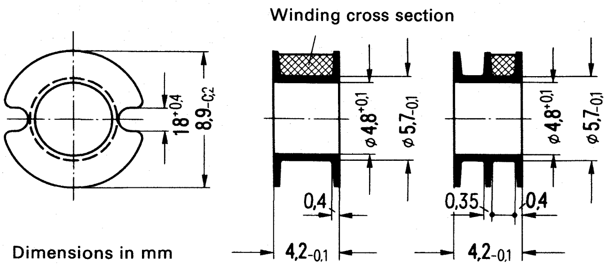
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	Ordering code (PU: 500 sets)	
Gapped						
16	±3%≙A	K 12	1,0	12,7	B65531-L16-A12	
25		K 1	1,0	19,1	B65531-L25-A1	S
40			0,41	31,8	B65531-L40-A1	S
40		M 33	0,64	31,8	B65531-L40-A33	
63			0,38	50	B65531-L63-A33	S
100		N 48	0,2	80	B65531-L100-A48	
160			0,1	127	B65531-L160-A48	S
250			0,06	199	B65531-L250-A48	S
400	±10%≙K	N26	0,03	318	B65531-L400-K26	
Ungapped						
115	$^{+30}_{-20}$%≙R	K 1		92	B65531-L-R1	
1600		N 26		1270	B65531-L-R26	S
3200		N 30		2550	B65531-L-R30	S
6500	$^{+40}_{-30}$%≙Y	T 38		5170	B65531-L-Y38	

S Preferred products (refer to page 4)

Coil former and insulating washers B 65 532

Glass-fiber reinforced polyterephthalate coil former, complying with DIN 41 294 or IEC publication 133, flame-retardant in accordance with UL 94V-0, color code black.

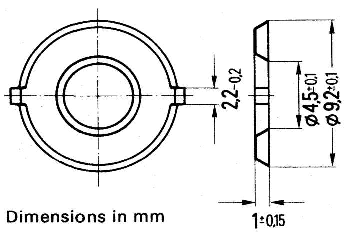
For winding details refer to page 69.



Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	Useful winding cross section A_N total mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	Ordering code (PU: 500)
1	4,2	4,2	22	180	0,1	B65532-B-T1 S
2	1,9	3,8		200		B65532-B-T2 S

0.04 mm thick insulating Makrofol spring washers for insulation and tolerance balancing between coil winding and pot core; delivered in tapes.



Dimensions in mm

Ordering code B65532-A5000 S
(PU: 1000)

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

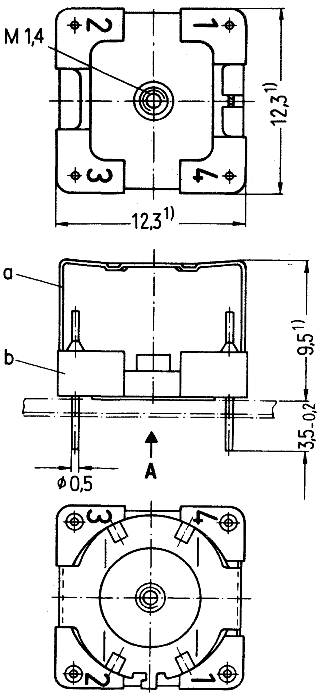
Mounting assemblies for PC mounting B 65 535

Mounting assemblies with snap-in connection. Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94V-0. Max. permissible soldering temperature is 400 °C/752 °F, 2 s. 0.25 mm thick nickel-silver spring yoke (tinned).

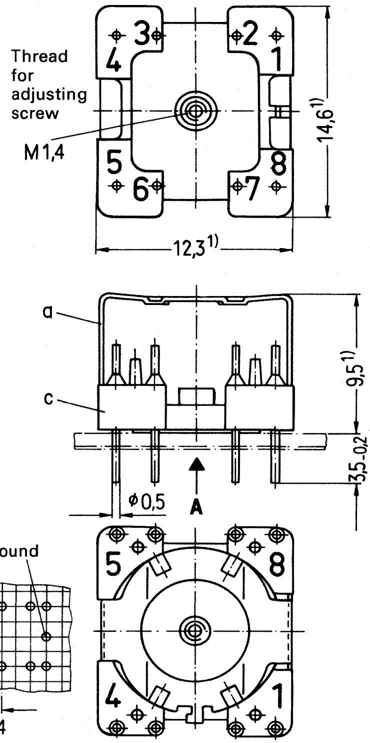
Approx. weight 1.1 g (4 solder terminals); 1.4 g (8 solder terminals).

B65535–B2
(with 4 solder terminals)

Thread for adjusting screw

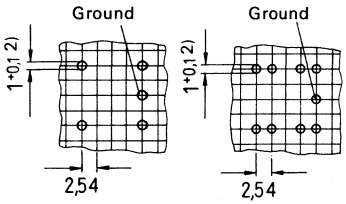


B65535–B3
(with 8 solder terminals)



View in direction A

Hole arrangement
View in mounting direction



Dimensions in mm

Ordering code B65535–B2 S
(Complete mounting assembly
with 4 solder terminals) (PU: 500 sets)

Mounting parts		Ordering code
a	1 yoke	C61035–A14–C24
b	1 connect. board (with 4 solder terminals)	C61035–A14–B20

Ordering code B65535–B3 S
(Complete mounting assembly
with 8 solder terminals) (PU: 500 sets)

Mounting parts		Ordering code
a	1 yoke	C61035–A14–C24
c	1 connect. board (with 8 solder terminals)	C61035–A14–B21

1) Max. dimension 2) 1.3 mm hole also permissible S Preferred products (refer to page 4)

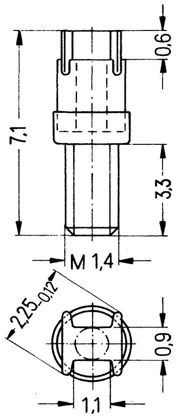
Adjusting Devices B 65539

Adjusting Screw (a, b) B65539–C1..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and 4 cam profiles serving as corebrake;

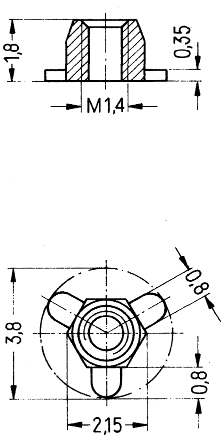
fits

polyterephthalate **Connecting Board** B65535–B... into which a guiding thread is molded
glass-fiber reinforced 11 polyamide **Threaded Flange** (c) B65539–J1001 S (only needed, when no mounting assembly is used)
Centering Pin (d) e.g. of brass (for design proposal see drawing)
Adjusting Screw Driver B63399–B4

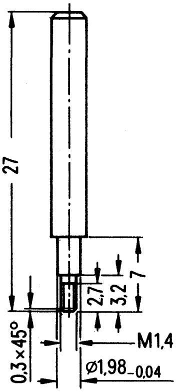
a, b



c



d



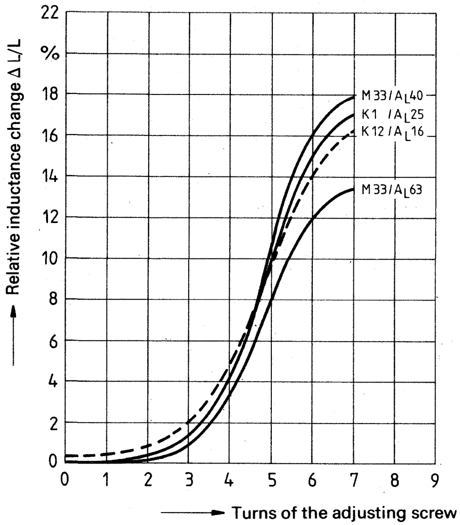
Dimensions in mm

Pot cores B65531		Adjusting screw				
Material	A_L value nH	Part	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 500)
K 12	16	a	1,81 x 2,0	Si 1	black	B65539–C1003–X101 S
K 1	25 40			K 1	yellow	B65539–C1003–X1 S
M 33	40 63			Si 1	black	B65539–C1003–X101 S
N 48	100	a	1,81 x 2,0	K 1	yellow	B65539–C1003–X1 S
	160 250	b	1,81 x 2,7	N 22	red	B65539–C1002–X22 S

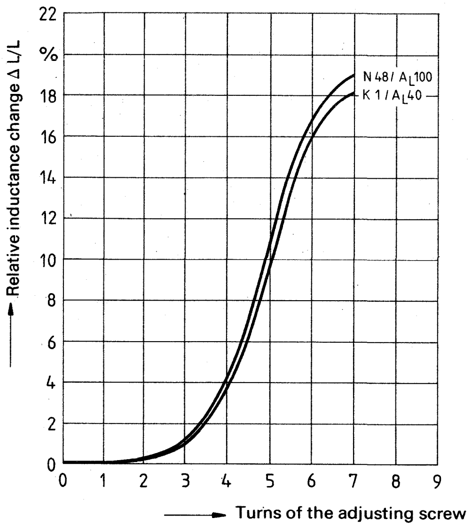
S Preferred products (refer to page 4)

Inductance adjustment curves

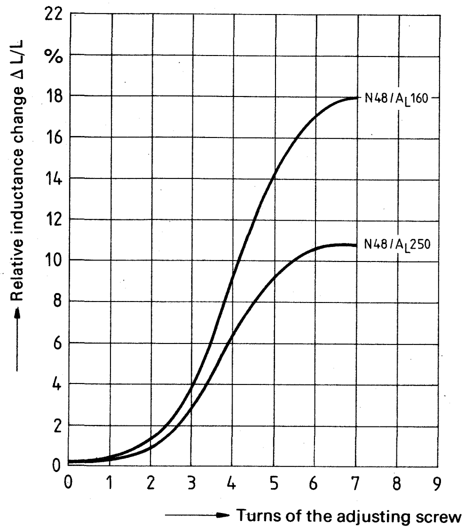
Adjusting screw B65539–C1003–X101
color code black



Adjusting screw B65539–C1003–X1
color code yellow



Adjusting screw B65539–C1002–X22
color code red



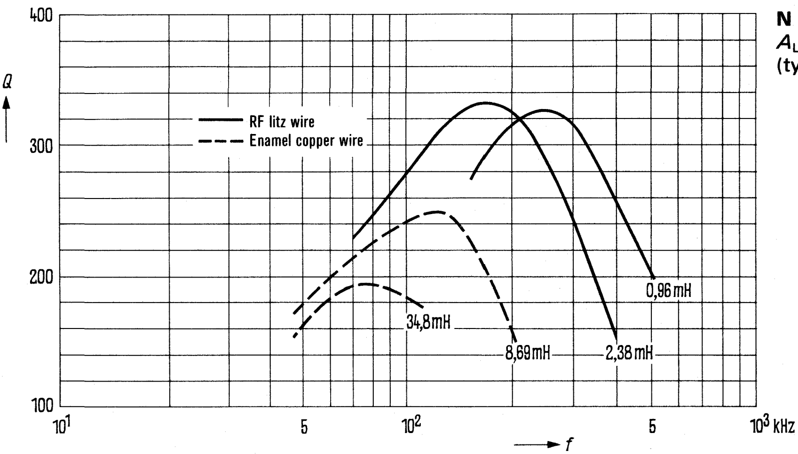
0 ≙ at least one turn engaged

Q factor characteristics

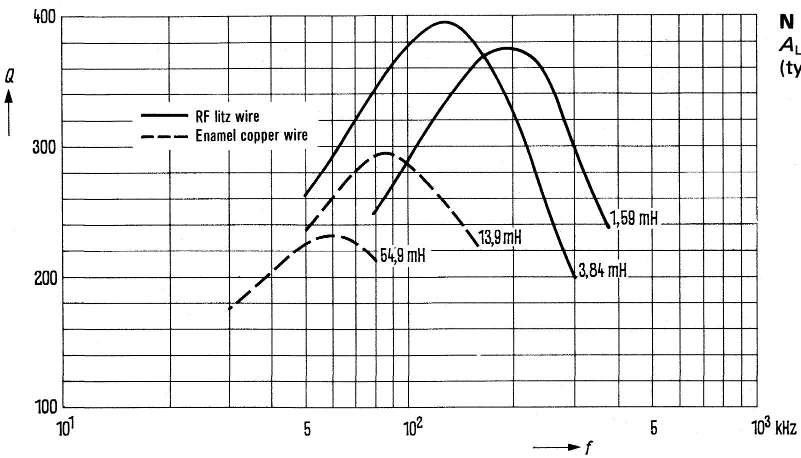
Material N 48

L (mH) for A_L = 100 nH	L (mH) for A_L = 160 nH	Turns	Wire; RF litz wire	Number of sections
34,8	54,9	600	0,07 CuL	1
8,69	13,9	300	0,10 CuL	1
2,38	3,84	160	1 x 12 x 0,04 CuLS	1
0,96	1,59	100	1 x 12 x 0,04 CuLS	1

Flux density in the core $\hat{B} < 1.5$ mT



N 48
A_L = 100 nH
(typical values)



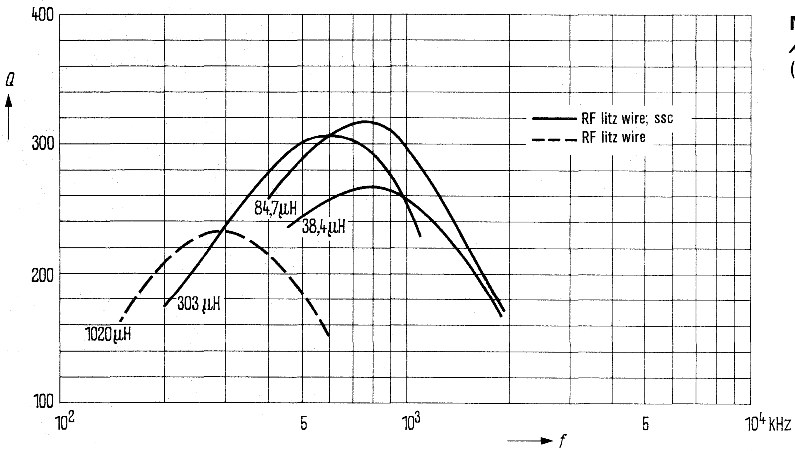
N 48
A_L = 160 nH
(typical values)

Q factor characteristics

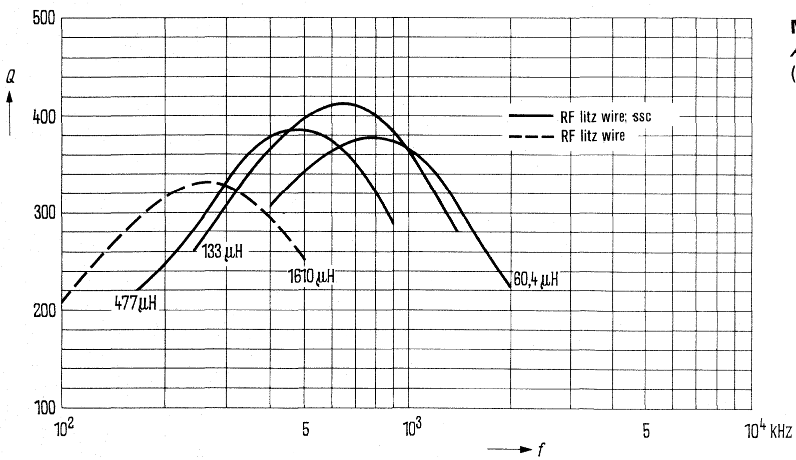
Material M 33

L (µH) for A_L = 40 nH	L (µH) for A_L = 63 nH	Turns	RF litz wire	Number of sections
1020	1610	160	1 x 12 x 0,04 CuL	1
303	477	87	1 x 15 x 0,04 CuLS	1
84,7	133	46	1 x 30 x 0,04 CuLS	1
38,4	60,4	31	1 x 45 x 0,04 CuLS	1

Flux density in the core $\hat{B} < 2$ mT



M 33
A_L = 40 nH
(typical values)

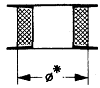


M 33
A_L = 63 nH
(typical values)

Q factor characteristics

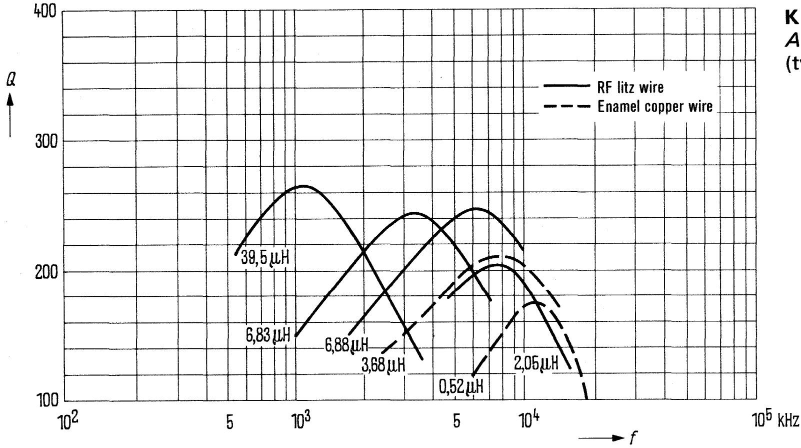
Material K 1

L (µH) for A_L = 25 nH	A_L = 40 nH	Turns	Wire; RF litz wire	Number of sections	mm diameter*
3,68	5,35	11	0,25 CuL	1	8,1
0,52	0,74	4	0,70 CuL	1	7,2
39,5	60,8	40	1 x 30 x 0,04 CuLS	1	–
6,88	9,73	15	1 x 12 x 0,04 CuLS	1	8,4
6,83	9,70	15	1 x 30 x 0,04 CuLS	1	6,9
2,05	2,92	8	1 x 30 x 0,04 CuLS	1	8,1

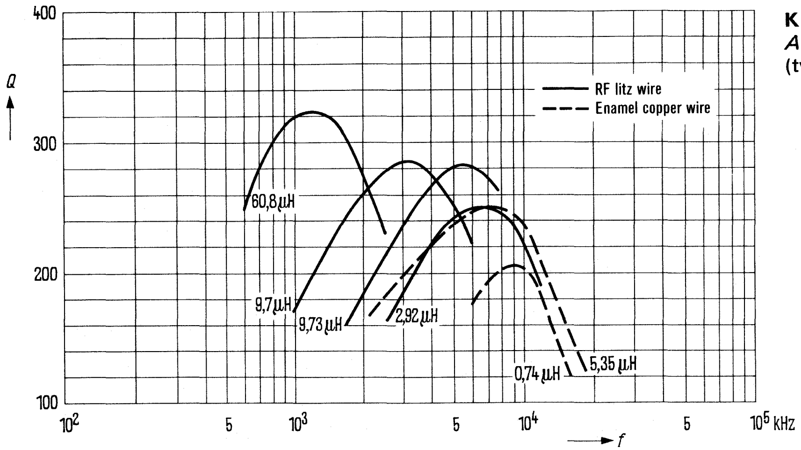


Pad of polystyrene tape up to the diameter*

Flux density in the core $\hat{B} < 0.6$ mT

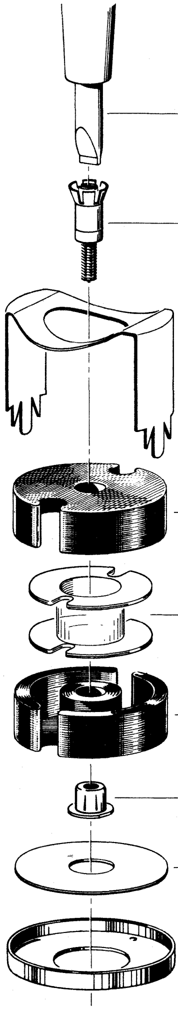


K 1
A_L = 25 nH
(typical values)



K 1
A_L = 40 nH
(typical values)

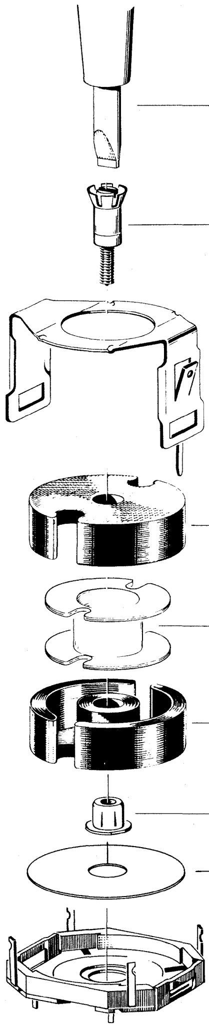
Type for chassis mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65549	167
Yoke	B65543	165
Pot core	B65541	163
Coil former with 1 or 2 sections	B65542	164
Pot core	B65541	163
Threaded sleeve threaded flange	B65808 B65549	167
Bakelized paper washer	B65543	165
Base plate	B65543	165

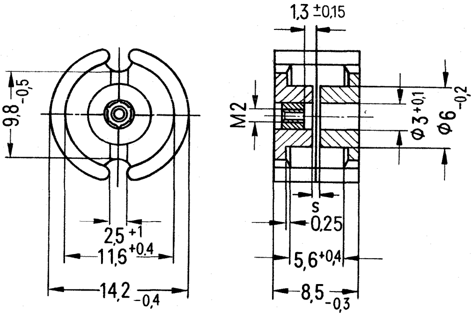
Pot Cores 14 x 8 B 65541

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver Matching handle	B63399 B63399	341, fig. 4 342, fig. 6
Adjusting screw	B65549	167
Yoke	B65545	166
Pot core	B65541	163
Coil former with 1 or 2 sections	B65542	164
Pot core	B65541	163
Threaded sleeve or threaded flange	B65808 B65549	167
Insulating washer	B65542	164
Connecting board with 4 or 6 solder terminals	B65545	166

Pot cores complying with DIN 41293 or IEC publication 133
For cores in acc. with DIN 45970, part 1116, refer to page 36.



Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.80	mm^{-1}
Effective length	l_e =	20	mm
Effective area	A_e =	25	mm^2
Min. core cross section[1]	A_{min} =	19	mm^2
Effective volume	V_e =	500	mm^3

Approx. weight 3.2 g/set

Dimensions in mm

Version	**Ordering code**[2]
with threaded sleeve (fig.)	B65541-**K**...
without threaded sleeve	B65541-**N**...

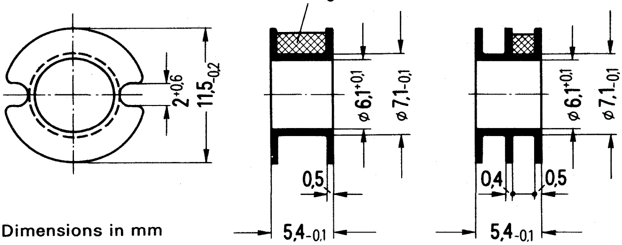
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code**[2] (PU: 500 sets)	
Gapped						
20	±3% ≙ A	K 12	2,0	12,7	B65541-+20-A12	
40	±3% ≙ A	K 1	1,0	25,4	B65541-+40-A1	S
40	±3% ≙ A	M 33	0,9	25,4	B65541-N40-A33	
100	±3% ≙ A	M 33	0,3	64	B65541-N100-A33	S
160	±2% ≙ G	N 48	0,16	102	B65541-N160-G48	S
250	±3% ≙ A	N 48	0,1	159	B65541-N250-A48	S
315	±3% ≙ A	N 48	0,08	201	B65541-N315-A48	S
400	±3% ≙ A	N 48	0,05	255	B65541-N400-A48	S
Ungapped						
140	$^{+30}_{-20}$% ≙ R	K 1		89	B65541-K-R1	
2100	$^{+30}_{-20}$% ≙ R	N 26		1340	B65541-K-R26	S
2800	$^{+30}_{-20}$% ≙ R	N 41		1780	B65541-K-R41	S
4200	$^{+30}_{-20}$% ≙ R	N 30		2670	B65541-K-R30	S
9000	$^{+40}_{-30}$% ≙ Y	T 38		5720	B65541-K-Y38	S

1) Necessary for the calculation of the max. flux density
2) + Insert appropriate code letter for requested version
S Preferred products (refer to page 4)

Coil former and insulating washers B 65542

Glass-fiber reinforced polyterephthalate coil former, complying with DIN 41 294 or IEC publication 133, flame-retardant in accordance with UL 94V-0, color code black.

For winding details refer to page 69.

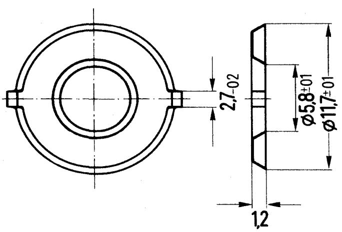


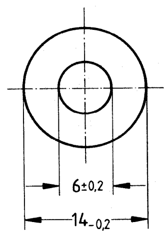
Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 500)
1	8,4	8,4	28	115	0,2	B65542-B-T1 S
2	3,8	7,6		127	0,3	B65542-B-T2 S

0.04 mm thick insulating Makrofol spring washers for insulation and tolerance balancing between coil winding and pot core; delivered in tapes.

0.05 mm thick insulating Teflon washers for increasing the dielectric strength between core and connecting board.





Dimensions in mm

Ordering code B65542-A5000 S
(PU: 1000)

Ordering code B65542-A5002
(PU: 500)

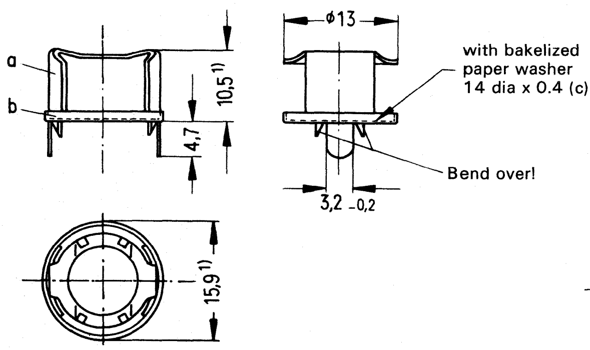
1) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

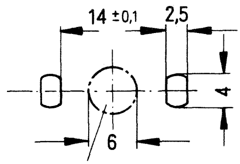
Mounting assembly for chassis mounting B 65 543

Mounting assembly with metal base plate; fixed by twist prongs.
0.3 mm thick nickel-silver spring yoke.

Approx. weight 1.5 g



Hole arrangement
View in mounting direction



Dimensions in mm

Ordering code B65543–A1 S
(Complete mounting assembly)
(PU: 500 sets)

Mounting parts		Ordering code
a	1 yoke	C40330–A82–C8
b	1 base plate	C40330–A82–C9
c	1 washer	C40330–A82–C7

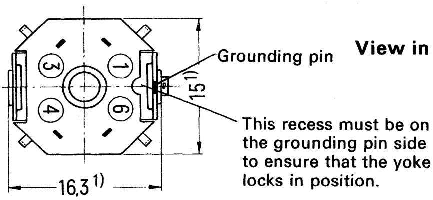
[1] Max. dimensions
S Preferred products (refer to page 4)

Mounting assemblies for PC mounting B 65 545

Mounting assemblies with snap-in connection.
Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94V-0. Max. permissible soldering temperature is 400 °C/752 °F, 2 s.
0.3 mm thick nickel-silver spring yoke (tinned).

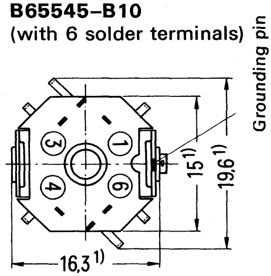
Approx. weight 1.3 g

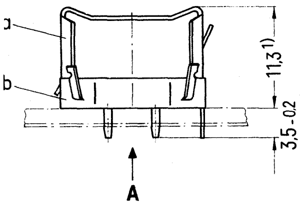
B65545–B9
(with 4 solder terminals)

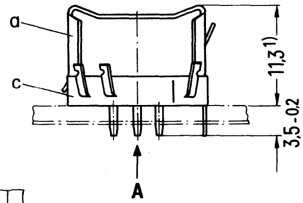


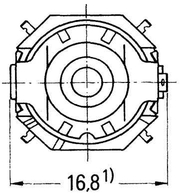
View in direction A

B65545–B10
(with 6 solder terminals)

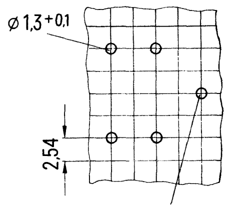


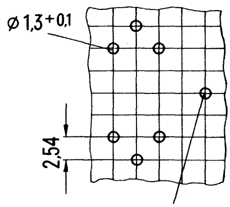


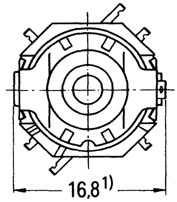




Hole arrangement
View in mounting direction







Dimensions in mm

Ground

Ground

<table>
<tr><td colspan="3">Ordering code B65545–B9 S
(Complete mounting assembly with
4 solder terminals)
(PU: 500 sets)</td><td colspan="3">Ordering code B65545–B10 S
(Complete mounting assembly with
6 solder terminals)
(PU: 500 sets)</td></tr>
<tr><td colspan="2">Mounting parts</td><td>Ordering code</td><td colspan="2">Mounting parts</td><td>Ordering code</td></tr>
<tr><td>a</td><td>1 yoke</td><td>C61035–A12–C28</td><td>a</td><td>1 yoke</td><td>C61035–A12–C28</td></tr>
<tr><td>b</td><td>1 connecting board (with 4 solder terminals)</td><td>C42035–A11–B4</td><td>c</td><td>1 connecting board (with 6 solder terminals)</td><td>C42035–A11–B3</td></tr>
</table>

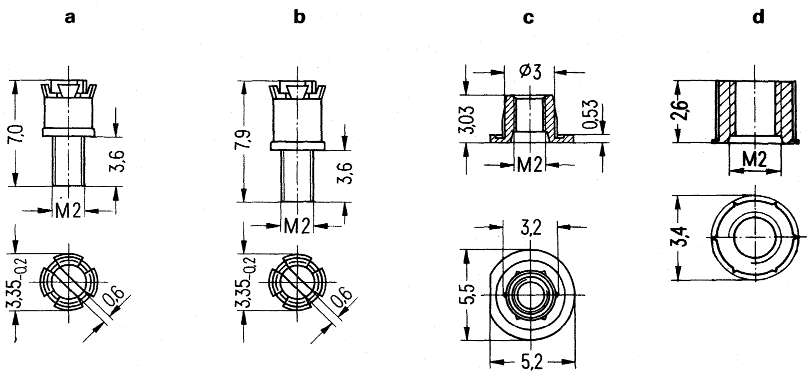
1) Max. dimension
S Preferred products (refer to page 4)

Adjusting Devices B 65549

Adjusting Screw (a, b) B65549–E..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

fits

glass-fiber reinforced 11 polyamide **Threaded Flange** (c) B65549–J2, color code black
glass-fiber reinforced 11 polyamide **Threaded Sleeve** (d) B65808–L3002
Adjusting Screw Driver B63399–B4



Dimensions in mm

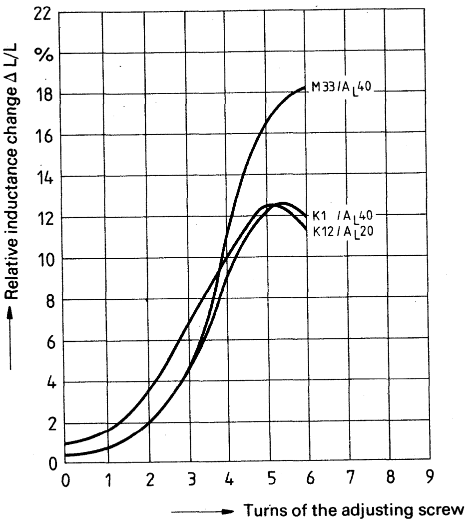
Pot cores B65541		Adjusting screw					
Material	A_L value nH	Part	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 500)	
K 12	20	a	2,6 x 2,0	Si 1	green	B65549–E3–X101	S
K 1	40						
M 33	40						
	100			N 22	white	B65549–E3–X23	
N 48	160	b	2,76 x 2,9	N 22	black	B65549–E4–X23	S
	250						
	315						
	400						

S Preferred products (refer to page 4)

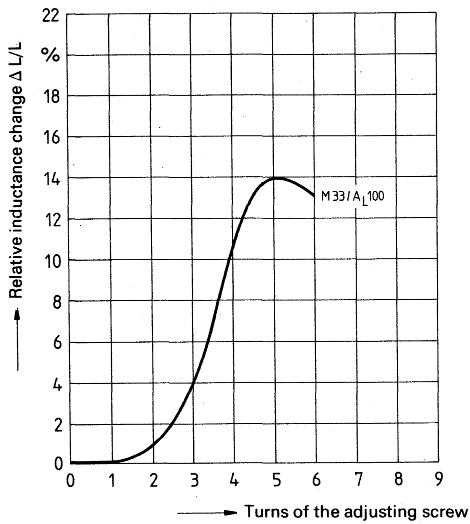
Inductance adjustment curves

Measured at cores with glued-in threaded sleeve B65808–L3002

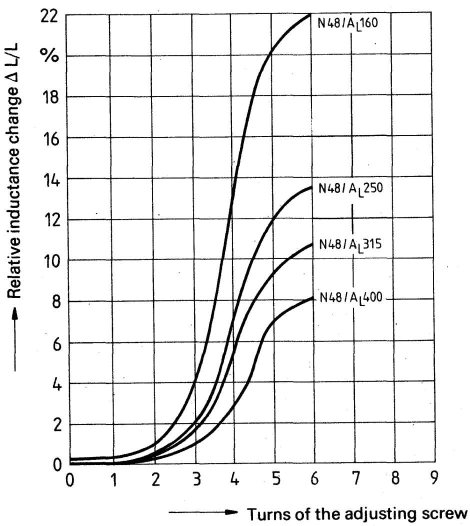
Adjusting screw B65549–E3–X101
color code green



Adjusting screw B65549–E3–X23
color code white



Adjusting screw B65549–E4–X23
color code black



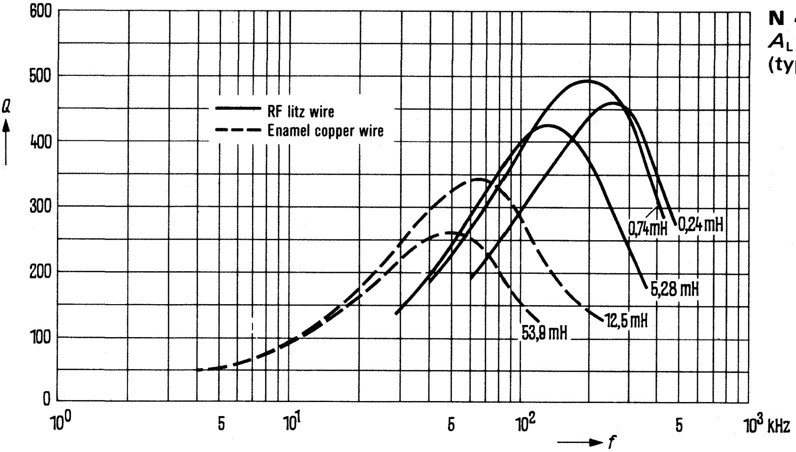
0 ≙ at least one turn engaged

Q factor characteristics

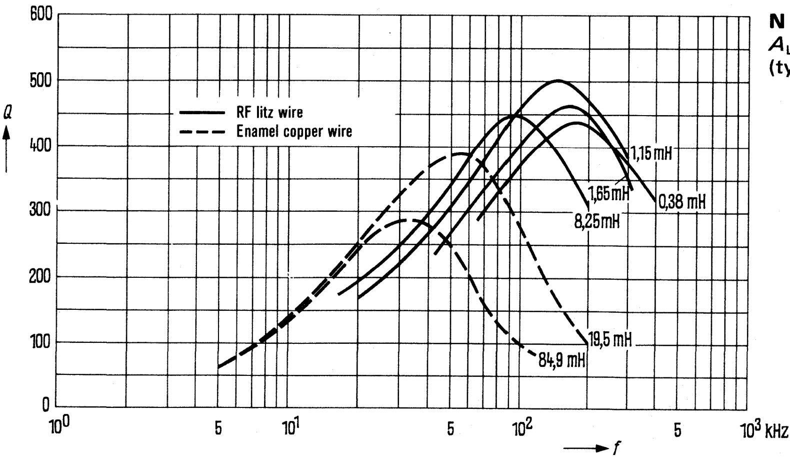
Material N 48

L (mH) for A_L = 160 nH	L (mH) for A_L = 250 nH	Turns	Wire; RF litz wire	Number of sections
53,9	84,9	580	0,10 CuL	1
12,5	19,5	280	0,15 CuL	1
5,28	8,25	182	1 x 12 x 0,04 CuLS	1
–	1,65	81	1 x 20 x 0,04 CuLS	2
0,74	1,15	68	1 x 20 x 0,05 CuLS	2
0,24	0,38	39	1 x 30 x 0,05 CuLS	2

Flux density in the core $\hat{B} < 1.5$ mT



N 48
A_L = 160 nH
(typical values)

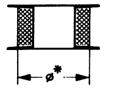


N 48
A_L = 250 nH
(typical values)

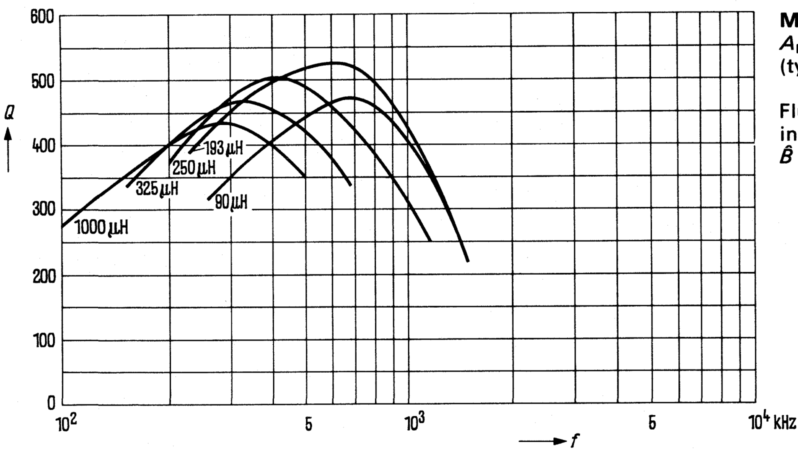
Q factor characteristics

Material M 33, K 1

Material	L (μH)	Turns	Wire; RF litz wire	No. of sections	Ø* mm
M 33	1000	100	1 x 15 x 0,04 CuLS	1	–
A_L = 100 nH	325	57	1 x 30 x 0,05 CuLS	1	–
	250	50	1 x 30 x 0,05 CuLS	1	–
	193	22 + 22	1 x 45 x 0,04 CuLS	2	–
	90	15 + 15	1 x 45 x 0,04 CuLS	2	–
K 1	2,23	7	0,55 CuL	1	10,1
A_L = 40 nH	0,68	4	1,0 CuL	1	9,2
	33,8	30	1 x 20 x 0,04 CuLS	1	9,5
	10,3	15	1 x 20 x 0,04 CuLS	1	10,8
	4,75	10	1 x 20 x 0,04 CuLS	1	10,8
	2,53	7	1 x 20 x 0,04 CuLS	1	10,8

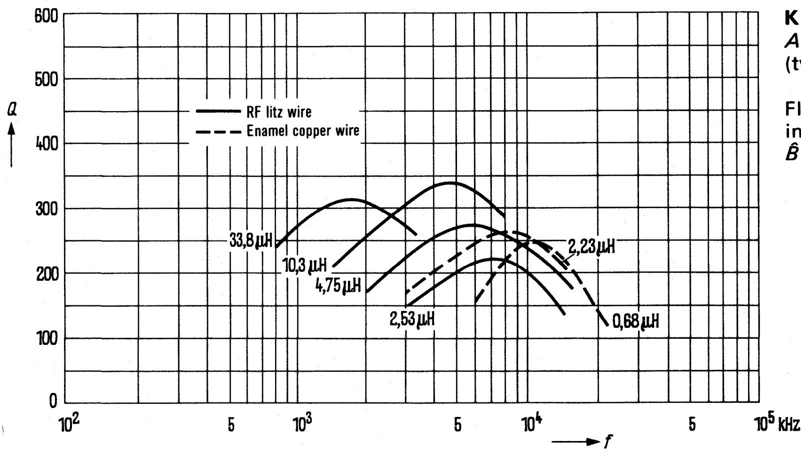


Pad of polystyrene tape up to the diameter*



M 33
A_L = 100 nH
(typical values)

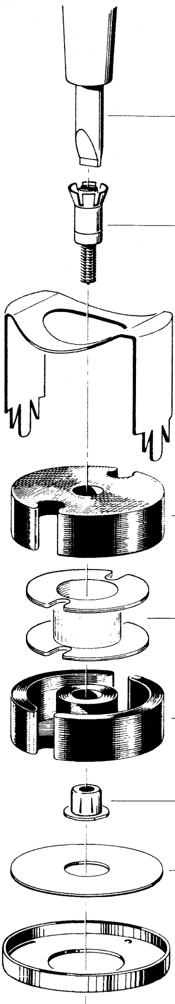
Flux density in the core
$\hat{B}$ < 2 mT



K 1
A_L = 40 nH
(typical values)

Flux density in the core
$\hat{B}$ < 0.6 mT

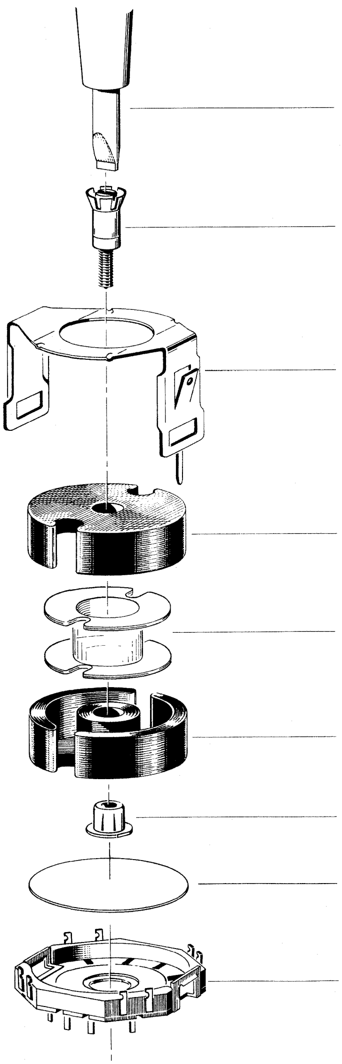
Type for chassis mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65659	177
Yoke	B65653	175
Pot core	B65651	173
Coil former with 1, 2, or 3 sections	B65652	174
Pot core	B65651	173
Threaded sleeve or threaded flange	B65808 B65659	177
Bakelized paper washer	B65653	175
Base plate	B65653	175

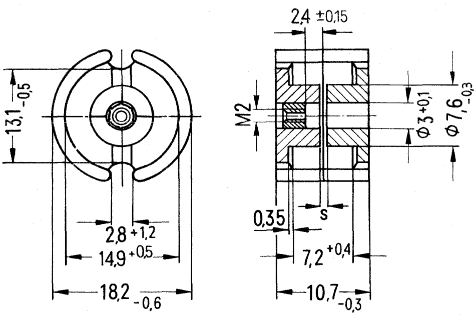
Pot Cores 18 x 11 B 65651

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65659	177
Yoke	B65655	176
Pot core	B65651	173
Coil former with 1, 2, or 3 sections	B65652	174
Pot core	B65651	173
Threaded sleeve or threaded flange	B65659 B65808	177
Insulating washer	B65652	174
Connecting board with 4 or 8 solder terminals	B65655	176

Pot cores complying with DIN 41 293 or IEC publication 133
For cores in acc. with DIN 45970, part 1116, refer to page 36.



Magnetic characteristics

Core factor	$\Sigma l/A$ =	0.60	mm^{-1}
Effective length	l_e =	25.9	mm
Effective area	A_e =	43	mm^2
Min. core cross section[1]	A_{min} =	35	mm^2
Effective volume	V_e =	1120	mm^3

Approx. weight 6 g

Dimensions in mm

Version	Ordering code[2]
with threaded sleeve (fig.)	B65651–**N**...
without threaded sleeve	B65651–**K**...

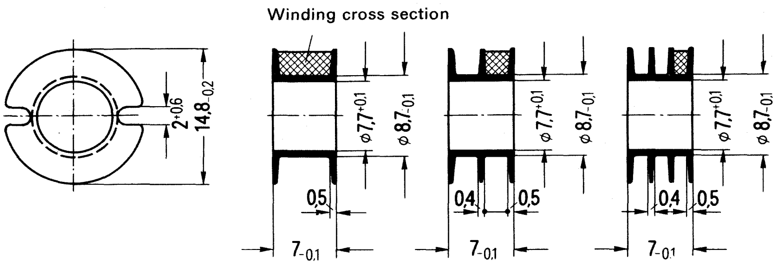
A_L value nH	tolerance	Ferrite material	Total air gap *s* in mm approx.	Effective permeability μ_e	Ordering code[2] (PU: 500 sets)	
Gapped						
25		K 12	2,35	12	B65651–+25–A12	
40	±3% ≙ A	K 1	1,6	19,2	B65651–+40–A1	S
63	±3% ≙ A	K 1	0,9	30,2	B65651–+63–A1	
63	±3% ≙ A	M 33	1,1	30,2	B65651–N63–A33	
100	±3% ≙ A	M 33	0,6	47,9	B65651–N100–A33	S
160	±3% ≙ A	M 33	0,25	77	B65651–N160–A33	
160	±2% ≙ G	N 48	0,32	77	B65651–N160–G48	S
250	±3% ≙ A	N 48	0,2	120	B65651–N250–A48	S
315	±3% ≙ A	N 48	0,15	151	B65651–N315–A48	S
400	±3% ≙ A	N 48	0,1	192	B65651–N400–A48	S
500	±3% ≙ A	N 48	0,07	240	B65651–N500–A48	
630	±10% ≙ K	N 26	0,05	302	B65651–K630–K26	S
Ungapped						
180	$^{+30}_{-20}$ % ≙ R	K 1		86	B65651–K–R1	
2800	$^{+30}_{-20}$ % ≙ R	N 26		1340	B65651–K–R26	S
3900	$^{+30}_{-20}$ % ≙ R	N 41		1860	B65651–K–R41	
5600	$^{+30}_{-20}$ % ≙ R	N 30		2670	B65651–K–R30	S
1200	$^{+40}_{-30}$ % ≙ Y	T 38		5730	B65651–K–Y38	S

[1] Necessary for the calculation of the max. flux density
[2] + Insert appropriate code letter for requested version
S Preferred products (refer to page 4)

Coil former and insulating washers B 65 652

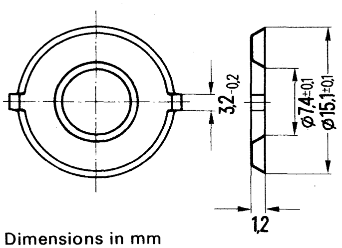
Glass-fiber reinforced polyterephthalate coil former, complying with DIN 41294 or IEC publication 133, flame-retardant in accordance with UL 94V-0, color code black.

For winding details refer to page 69.



Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	Ordering code (PU: 500)	
1	16	16		87	0,2	B65652-B	S
2	6,5	13	35,6	94	0,3	B65652-B-T2	S
3	4,0	12		101	0,4	B65652-B-T3	S

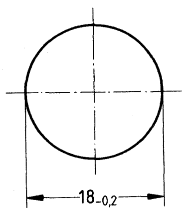
0.04 mm thick insulating Makrofol spring washers for insulation and tolerance balancing between coil winding and pot core; delivered in tapes.



Dimensions in mm

Ordering code B65652–A5000
(PU: 1000)

0.05 mm thick insulating Teflon washers for increasing the dielectric strength between core and connecting board.



Ordering code B65652–A5002
(PU: 500)

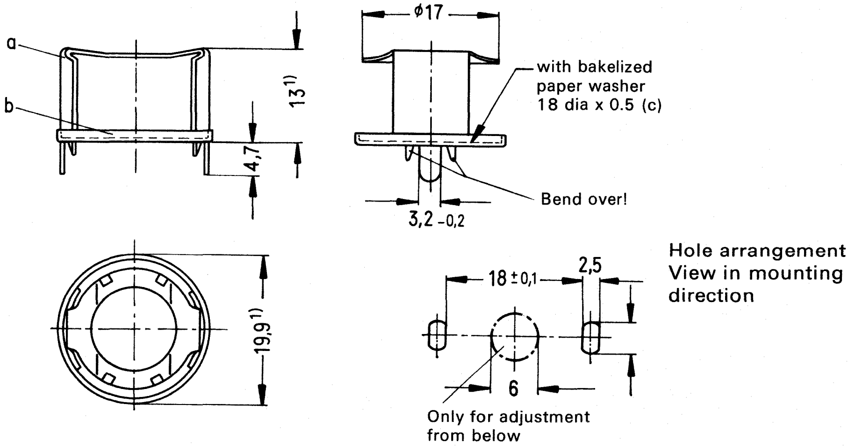
1) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

Mounting assembly for chassis mounting B 65 653

Mounting assembly with metal base plate; fixed by twist prongs.
0.3 mm thick nickel-silver spring yoke.

Approx. weight 2.3 g



Dimensions in mm

Ordering code B65653–A1 S
(Complete mounting assembly)
(PU: 500 sets)

Mounting parts		Ordering code
a	1 yoke	C40330–A75–C5
b	1 base plate	C61035–A10–C43
c	1 washer	C40330–B5–C33

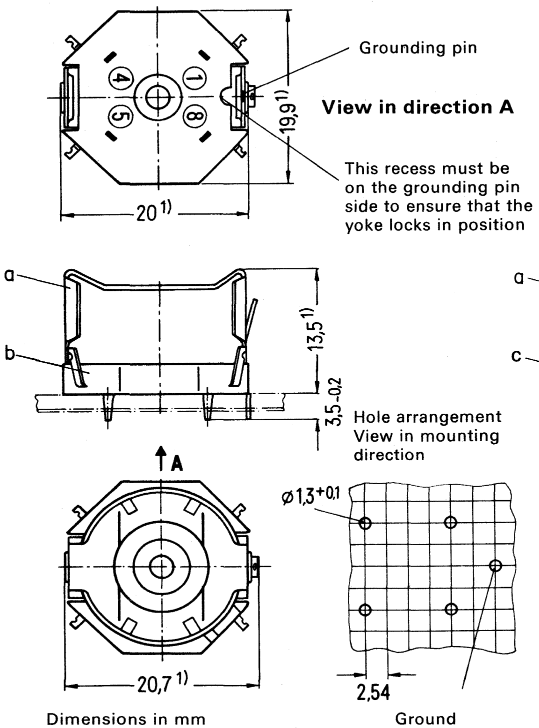
[1)] Max. dimension
S Preferred products (refer to page 4)

Mounting assemblies for PC mounting B 65 655

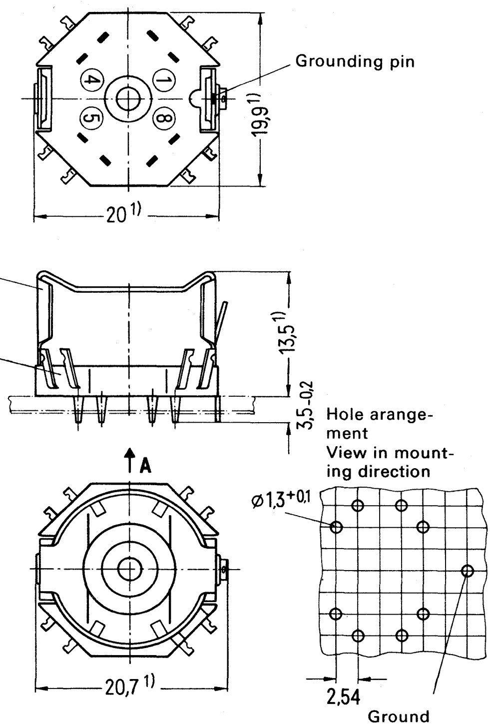
Mounting assemblies with snap-in connection. Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94 V-0. Max. permissible soldering temperature is 400 °C/752 °F, 2 s. 0.3 mm thick nickel-silver spring yoke (tinned).

Approx. weight 2.4 g

B65655–B9
(with 4 solder terminals)



B65655–B10
(with 8 solder terminals)



Ordering code B65655–B9 S
(Complete mounting assembly with 4 solder terminals) (PU : 500 sets)

Mounting parts		Ordering code
a	1 yoke	C61035–A10–C40
b	1 connecting board (with 4 solder terminals)	C42035–A10–B5

Ordering code B65655–B10 S
(Complete mounting assembly with 8 solder terminals) (PU : 500 sets)

Mounting parts		Ordering code
a	1 yoke	C61035–A10–C40
c	1 connecting board (with 8 solder terminals)	C42035–A10–B3

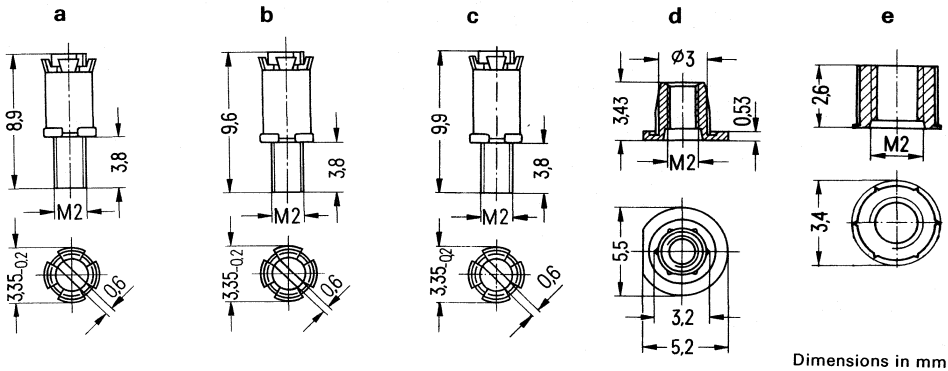
1) Max. dimension
S Preferred products (refer to page 4)

Adjusting Devices B 65659

Adjusting Screw (a, b, c) B65659–F..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

fits

glass-fiber reincorced 11 polyamide **Threaded Flange** (d) B65659–J2, color code: colorless
glass-fiber reinforced 11 polyamide **Threaded Sleeve** (e) B65808–L3002
Adjusting Screw Driver B63399–B4



Dimensions in mm

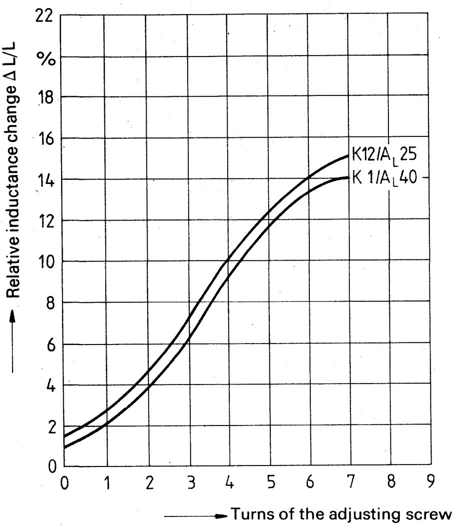
Pot cores B65651		Adjusting screw					
Material	A_L value nH	Part	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 500)	
K 12	25	a	2,6 x 3,7	Si 1	white	B65659–F1–X101	S
	40						
K 1	63	c	2,82 x 4,4	Si 1	brown	B65659–F4–X101	S
	63	a	2,6 x 3,7	K 1	green	B65659–F1–X1	
M 33	63	a	2,6 x 3,7	Si 1	white	B65659–F1–X101	
	100						
	100	c	2,82 x 4,4	Si 1	brown	B65659–F4–X101	
M 33, N 48	160	a	2,6 x 3,7	K 1	green	B65659–F1–X1	
N 48	160	c	2,82 x 4,4	Si 1	brown	B65659–F4–X101	
	250	a	2,6 x 3,7	N 22	red	B65659–F1–X23	S
	315	b	2,75 x 4,4	N 22	black	B65659–F3–X23	S
	400						
	400	c	2,82 x 4,4	N 22	yellow	B65659–F4–X23	
	500						

S Preferred products (refer to page 4)

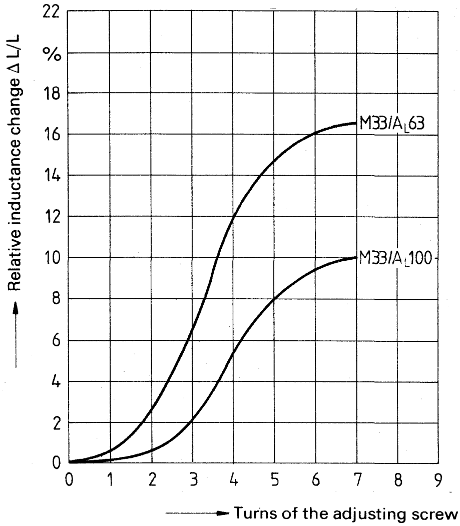
Inductance adjustment curves

Measured at cores with glued-in threaded sleeve B65808–L3002

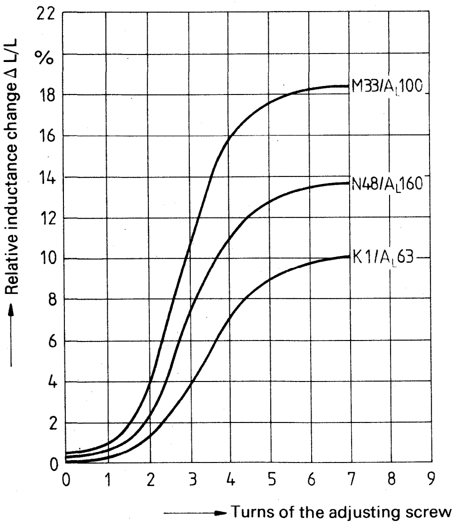
Adjusting screw B65659–F1–X101
color code white



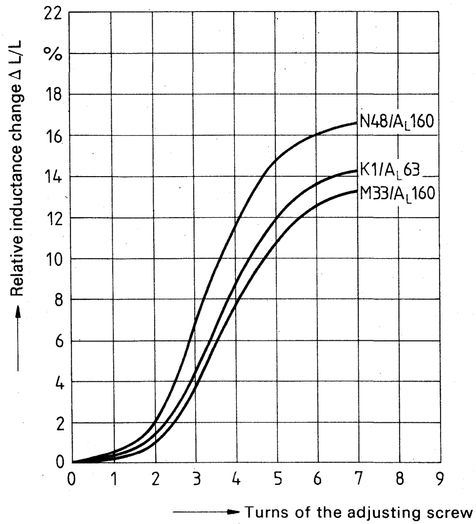
Adjusting screw B65659–F1–X101
color code white



Adjusting screw B65659–F4–X101
color code brown



Adjusting screw B65659–F1–X1
color code green

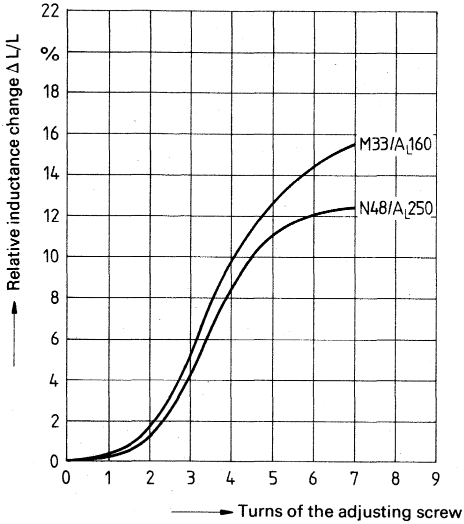


0 ≙ at least one turn engaged

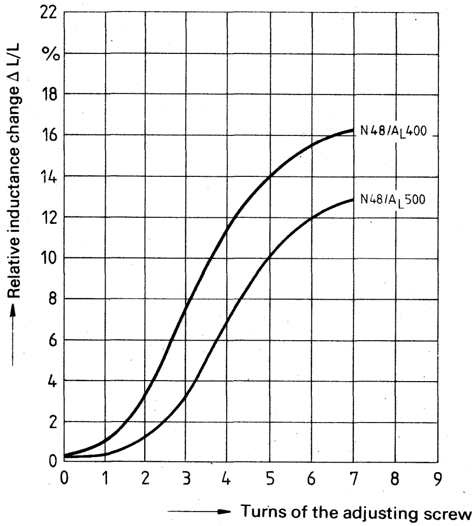
Inductance adjustment curves

Measured at cores with glued-in threaded sleeve B65808–L3002

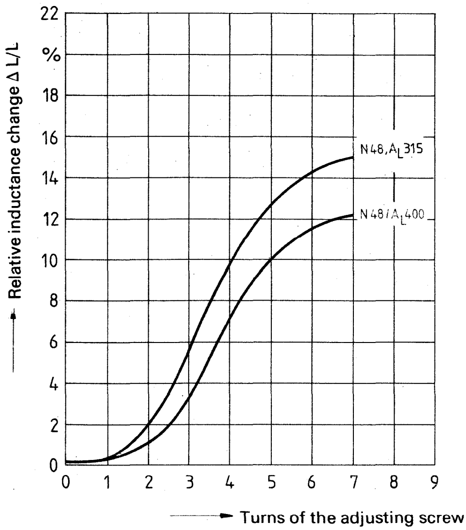
Adjusting screw B65659–F1–X23
color code red



Adjusting screw B65659–F3–X23
color code black



Adjusting screw B65659–F4–X23
color code yellow



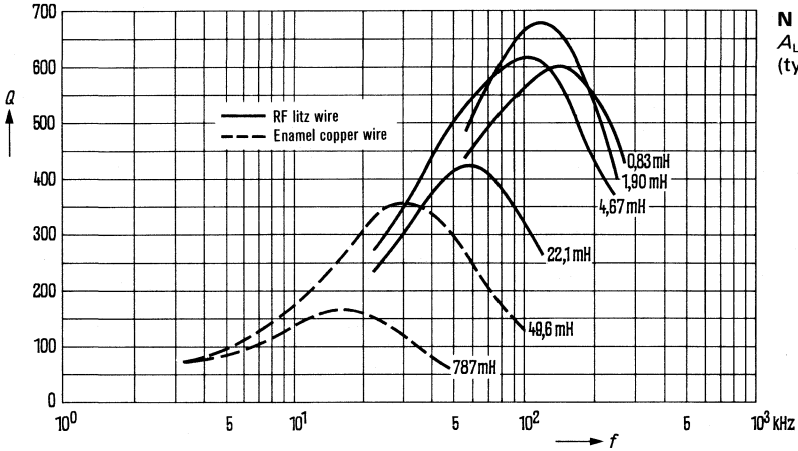
0 ≙ at least one turn engaged

Q factor characteristics

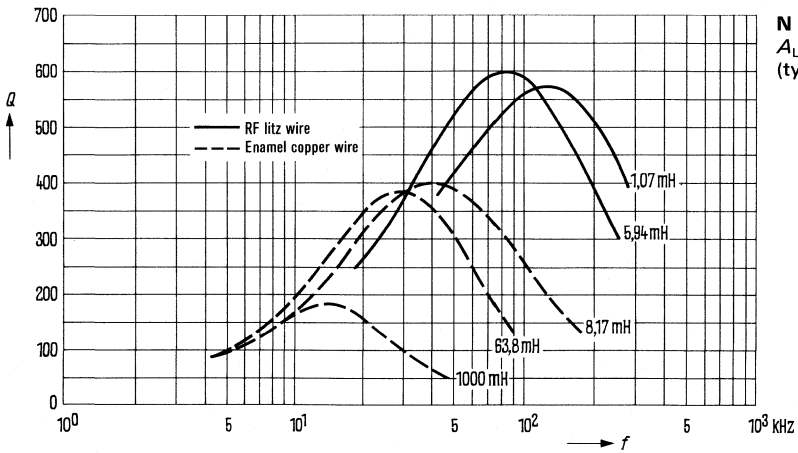
Material N 48

L (mH) for A_L = 250 nH	L (mH) for A_L = 315 nH	Turns	Wire; RF litz wire	Number of sections
787	1000	1790	0,07 CuL	1
49,6	63,8	450	0,15 CuL	1
22,1	–	301	1 x 20 x 0,04 CuLS	1
–	8,17	161	0,25 CuL	1
4,67	5,94	138	1 x 20 x 0,05 CuLS	1
1,90	–	87	1 x 45 x 0,04 CuLS	1
0,83	1,07	58	1 x 45 x 0,05 CuLS	1

Flux density in the core $\hat{B} < 1.5$ mT



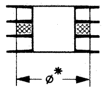
N 48
A_L = 250 nH
(typical values)



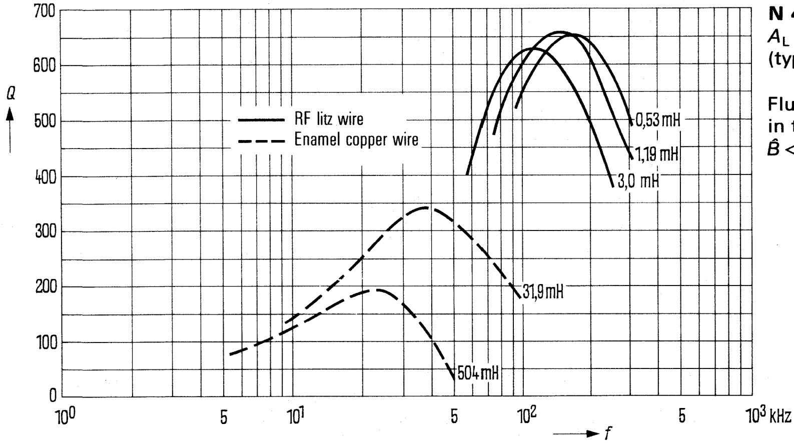
N 48
A_L = 315 nH
(typical values)

Q factor characteristics

Material	L	Turns	Wire; RF litz wire	Number of sections	Ø* mm
N 48 A_L = 160 nH	504 mH	1790	0,07 CuL	1	–
	31,9 mH	450	0,15 CuL	1	–
	3,0 mH	138	1 x 20 x 0,05 CuLS	1	–
	1,19 mH	8	1 x 45 x 0,04 CuLS	1	–
	0,53 mH	58	1 x 45 x 0,05 CuLS	1	–
M 33 A_L = 63 nH	1415 µH	150	1 x 30 x 0,04 CuLS	1	–
	630 µH	100	1 x 45 x 0,04 CuLS	1	–
	403 µH	40 + 40	1 x 45 x 0,04 CuLS	2	–
	198 µH	25 + 6 + 25	1 x 45 x 0,04 CuLS	3	11,7
	72,8 µH	15 + 4 + 15	1 x 45 x 0,04 CuLS	3	10,8
	49,4 µH	12 + 4 + 12	1 x 45 x 0,04 CuLS	3	10,8

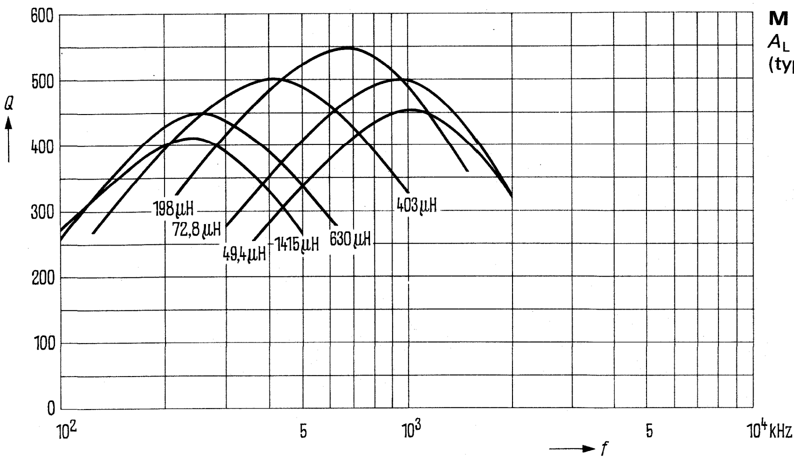


Pad of polystyrene tape up to the diameter*



N 48
A_L = 160 nH
(typical values)

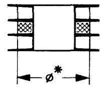
Flux density in the core
$\hat{B}$ < 1.5 mT



M 33
A_L = 63 nH
(typical values)

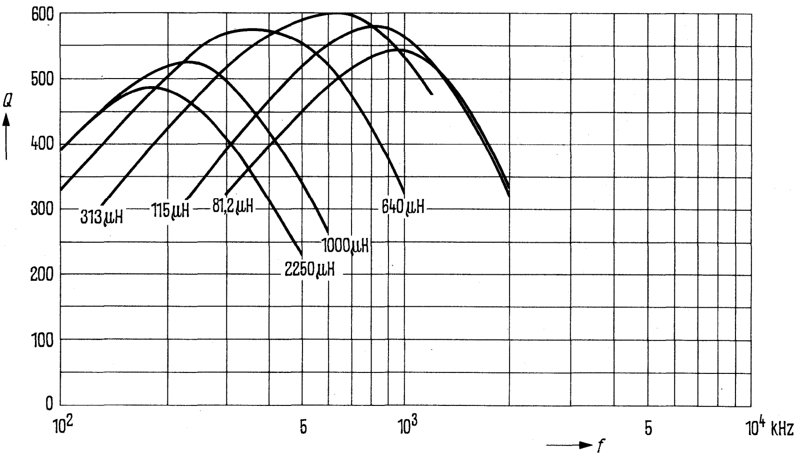
Q factor characteristics:

Material	L (µH)	Turns	Wire; RF litz wire	Number of sections	Ø* mm
M 33 A_L = 100 nH	2250	150	1 x 30 x 0,04 CuLS	1	–
	1000	100	1 x 45 x 0,04 CuLS	1	–
	640	40 + 40	1 x 45 x 0,04 CuLS	2	–
	313	25 + 6 + 25	1 x 45 x 0,04 CuLS	3	11,7
	115	15 + 4 + 15	1 x 45 x 0,04 CuLS	3	10,8
	81,2	12 + 4 + 12	1 x 45 x 0,04 CuLS	3	10,8
K 1 A_L = 40 nH	3,75	9	0,6 CuL	1	13,0
	0,49	3	1,0 CuL	1	12,2
	18,3	20	3 x 30 x 0,04 CuLS	1	12,8
	10,6	5 + 5 + 5	3 x 30 x 0,04 CuLS	3	12,8
	9,85	15	1 x 45 x 0,04 CuLS	1	13,5

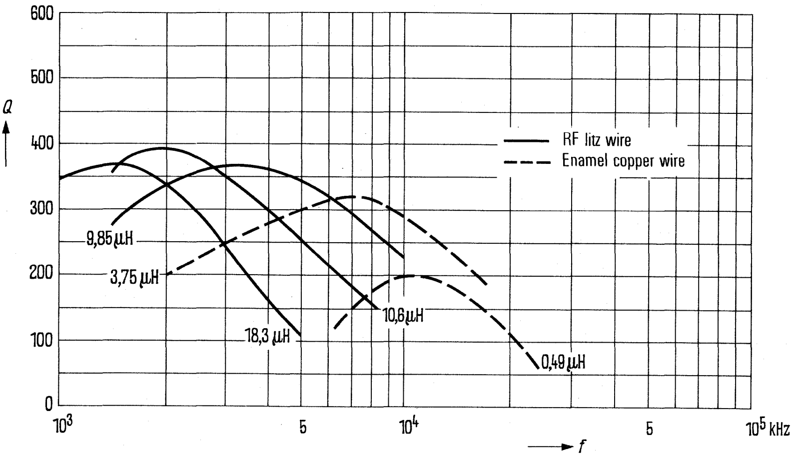


Pad of polystyrene tape up to the diameter*

Flux density in the core $\hat{B}$ < 1.6 mT

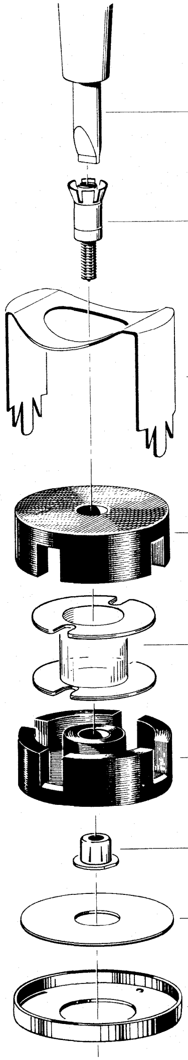


M 33
A_L = 100 nH
(typical values)



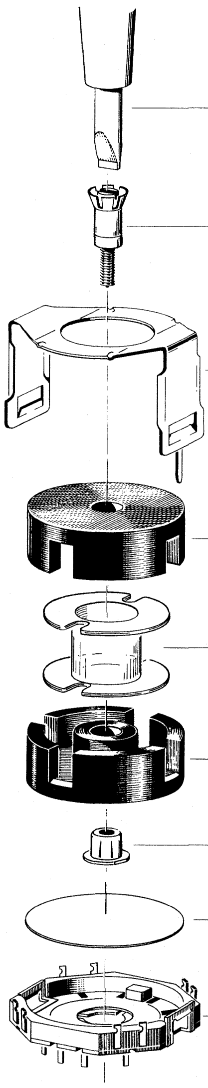
K 1
A_L = 40 nH
(typical values)

Type for chassis mounting

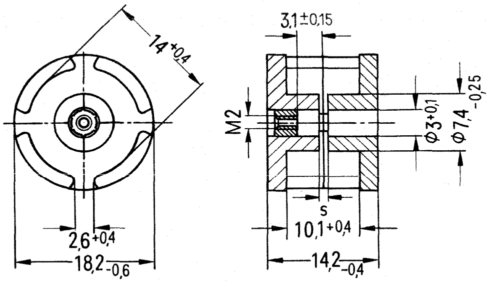


Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65569	189
Yoke	B65563	187
Pot core	B65561	185
Coil former with 1,2, or 3 sections	B65562	186
Pot core	B65561	185
Threaded sleeve or threaded flange	B65569 B65808	189
Bakelized paper washer	B65563	187
Base plate	B65563	187

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65569	189
Yoke	B65565	188
Pot core	B65561	185
Coil former with 1, 2, or 3 sections	B65562	186
Pot core	B65561	185
Threaded sleeve or threaded flange	B65569 B65808	189
Insulating washer	B65652	186
Connecting board with 4 or 8 solder terminals	B65565	188



Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.67	mm^{-1}
Effective length	l_e =	30.1	mm
Effective area	A_e =	45	mm^2
Effective volume	V_e =	1350	mm^3

Approx. weight 9.0 g/set

Dimensions in mm

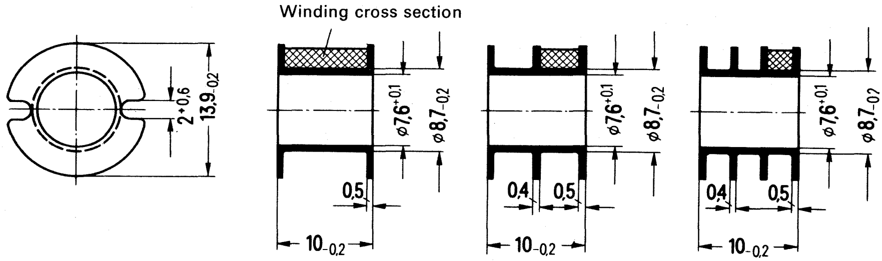
Version	**Ordering code**[1)]
with threaded sleeve (fig.)	B65561–**N**...
without threaded sleeve	B65561–**A**...

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code**[1)] (PU: 500 sets)
Gapped					
25	±3% ≙ A	K 12	1,5	13,5	B65561–+25–A12
25		K 1	2,7	13,5	B65561–+25–A1
40			1,3	21,6	B65561–+40–A1
40		M 33	2,0	21,6	B65561–N40–A33
63			1,1	34	B65561–N63–A33
100			0,6	54	B65561–N100–A33
100	±2% ≙ G	N 48	0,6	54	B65561–N100–G48
160			0,3	86,5	B65561–N160–G48
250	±3% ≙ A		0,17	135	B65561–N250–A48
315			0,14	170	B65561–N315–A48
400	± 5% ≙ J	N 26	0,1	216	B65561–A400–J26
630	±10% ≙ K		0,05	340	B65561–A630–K26
Ungapped					
160	$^{+30}_{-20}$% ≙ R	K 1		85	B65561–A–R1
2700		N 26		1440	B65561–A–R26
5300		N 30		2820	B65561–A–R30
11000	$^{+40}_{-30}$% ≙ Y	T 38		5860	B65561–A–Y38

1) + Insert appropriate code letter for requested version

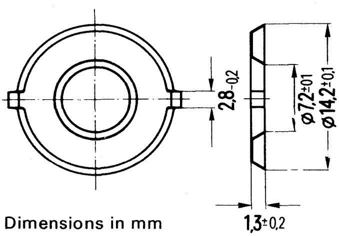
Coil former and insulating washers B 65562

Glass-fiber reinforced polyacetal or polycarbonate coil former.
For winding details refer to page 70.



Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	Material	**Ordering code** (PU: 500)
1	20	20	34	58	0,4	Polyacetal[2] Polycarbonate	B65562-A-H1 B65562-A-M1
2	8,5	17,0		68	0,4	Polyacetal[2] Polycarbonate	B65562-A-H2 B65562-A-M2
3	5,3	15,9		73	0,5	Polyacetal[2] Polycarbonate	B65562-A-H3 B65562-A-M3

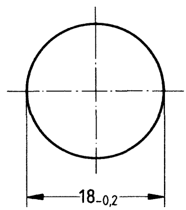
0.04 mm thick insulating Makrofol spring washers for insulation and tolerance balancing between coil winding and pot core; delivered in tapes.



Dimensions in mm

Ordering code B65562-A5000
(PU: 1000)

0.05 mm thick insulating Teflon washers for increasing the dielectric strength between core and connecting board.



Ordering code B65652-A5002
(PU: 500)

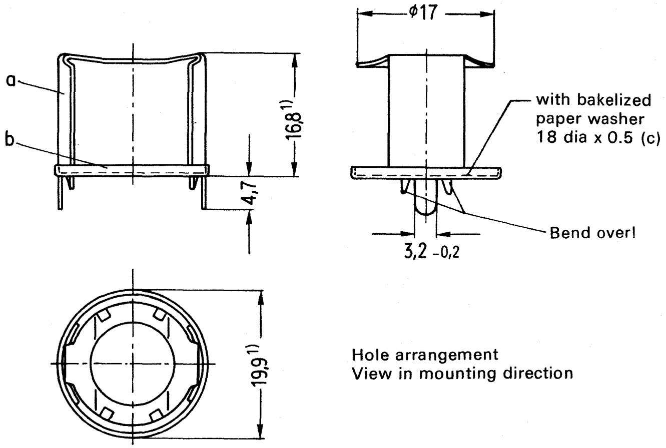
[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns[2])
[2] glass-fiber reinforced

Mounting assembly for chassis mounting B 65 563

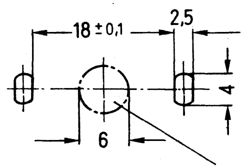
Mounting assembly with metal base plate; fixed by twist prongs.
0.3 mm thick nickel-silver spring yoke.

Approx. weight 2 g

B65563–A1



Hole arrangement
View in mounting direction



Dimensions in mm

Ordering code B65563–A1
(Complete mounting assembly)
(PU: 500 sets)

Mounting parts		Ordering code
a	1 yoke	C40330–B5–C27
b	1 base plate	C61035–A10–C43
c	1 washer	C40330–B5–C33

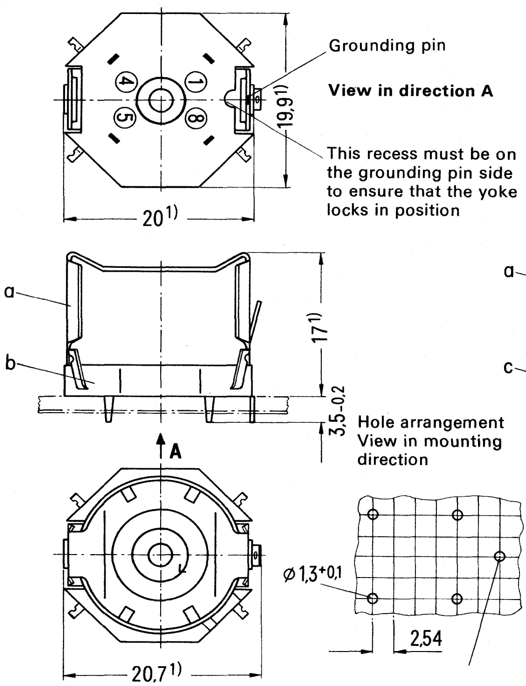
[1] Max. dimension

Mounting assemblies for PC mounting B 65 565

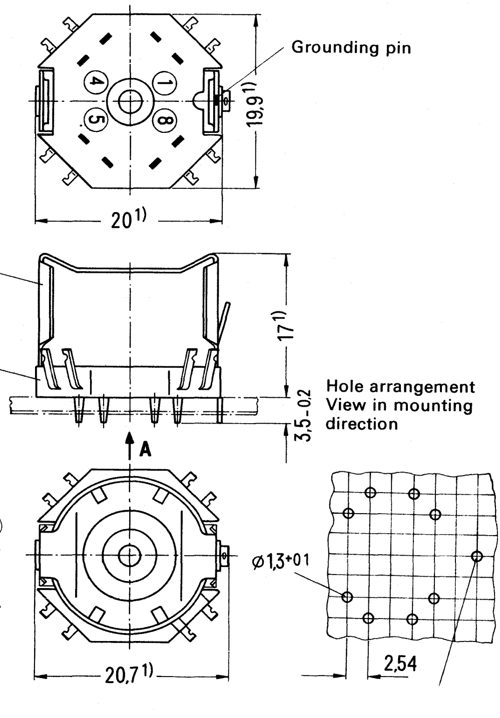
Mounting assemblies with snap-in connection. Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94V-0. Max. permissible soldering temperature is 400 °C/752 °F, 2 s. 0.3 mm thick nickel-silver spring yoke (tinned).

Approx. weight 2.5 g

B65565–B9
(with 4 solder terminals)



B65565–B10
(with 8 solder terminals)



Dimensions in mm

Ordering code B65565–B9 (Complete mounting assembly with 4 solder terminals) (PU: 500 sets)			**Ordering code** B65565–B10 (Complete mounting assembly with 8 solder terminals) (PU: 500 sets)		
Mounting parts		Ordering code	Mounting parts		Ordering code
a	1 yoke	C61035–A10–C41	a	1 yoke	C61035–A10–C41
b	1 connecting board (with 4 solder terminals)	C42035–A10–B5	c	1 connecting board (with 8 solder terminals)	C42035–A10–B3

1) Max. dimension

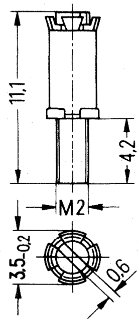
Adjusting Devices B 65569

Adjusting Screw (a) B65569–D..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

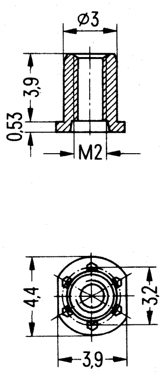
fits

glass-fiber reinforced 11 polyamide **Threaded Flange** (b) B65569–K2, color code white
glass-fiber reinforced 11 polyamide **Threaded Sleeve** (c) B65808–L3002
Adjusting Screw Driver B63399–B4

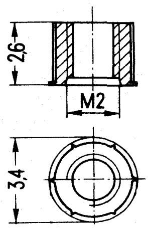
a



b



c

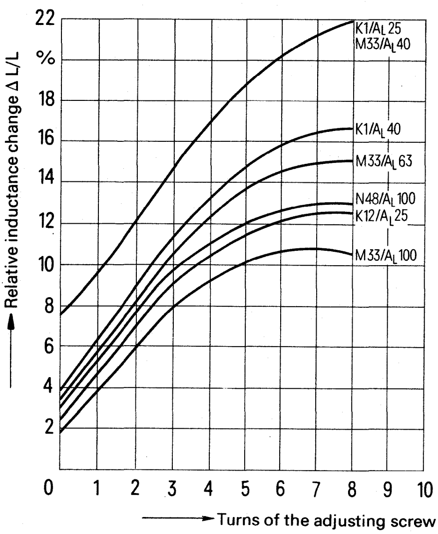


Dimensions in mm

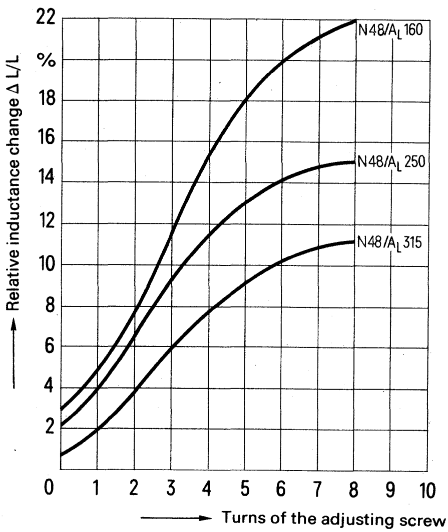
<table>
<tr><td colspan="2">Pot cores B65561</td><td colspan="5">Adjusting screw</td></tr>
<tr><td rowspan="2">Material</td><td rowspan="2">A_L value
nH</td><td colspan="2">Tube core</td><td rowspan="2">Color
code</td><td rowspan="2">Ordering code
(PU: 500)</td></tr>
<tr><td>dia. x length</td><td>Material</td></tr>
<tr><td>K 12</td><td>25</td><td rowspan="5">2,6 x 5,5</td><td rowspan="4">Si 1</td><td rowspan="4">white</td><td rowspan="4">B65569–D1–X101</td></tr>
<tr><td>K 1</td><td>25
40</td></tr>
<tr><td>M 33</td><td>40
63
100</td></tr>
<tr><td>N 48</td><td>100</td></tr>
<tr><td>N 48</td><td>160
250
315</td><td>N 22</td><td>red</td><td>B65569–D1–X23</td></tr>
</table>

Inductance adjustment curves

Adjusting screw B65569–D1–X101
color code white



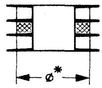
Adjusting screw B65569–D1–X23
color code red



0 ≙ at least two turns engaged

Q factor characteristics

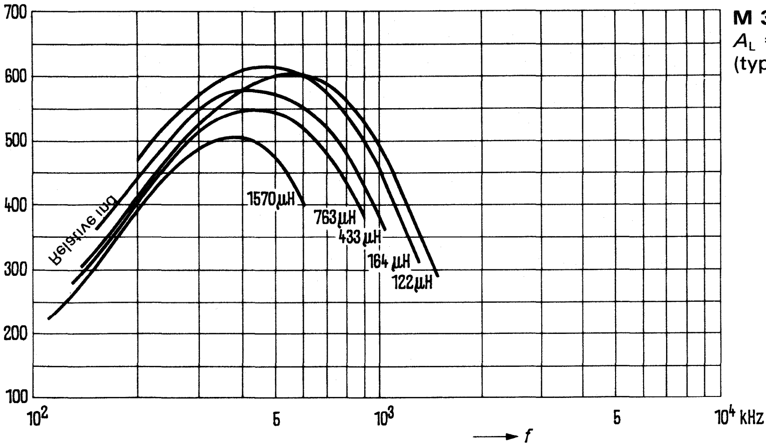
Material M 33



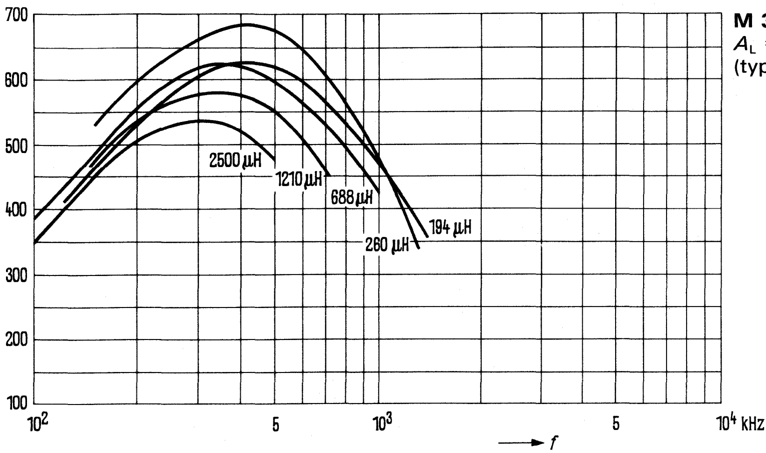
L (µH) for A_L = 63 nH	A_L = 100 nH	Turns	RF litz wire	Number of sections	ø* mm
1570	2500	65 + 38 + 65	1 x 20 x 0,04 CuLS	3	11,2
763	1210	50 + 10 + 50	1 x 30 x 0,04 CuLS	3	13,2
433	688	38 + 7 + 38	1 x 45 x 0,04 CuLS	3	11,8
164	260	20 + 11 + 20	2 x 30 x 0,04 CuLS	3	10,8
122	194	20 + 4 + 20	3 x 30 x 0,04 CuLS	3	11,5

Pad of polystyrene tape up to the diameter *

Flux density in the core $\hat{B}$ < 1.6 mT



M 33
A_L = 63 nH
(typical values)

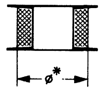


M 33
A_L = 100 nH
(typical values)

Q factor characteristics

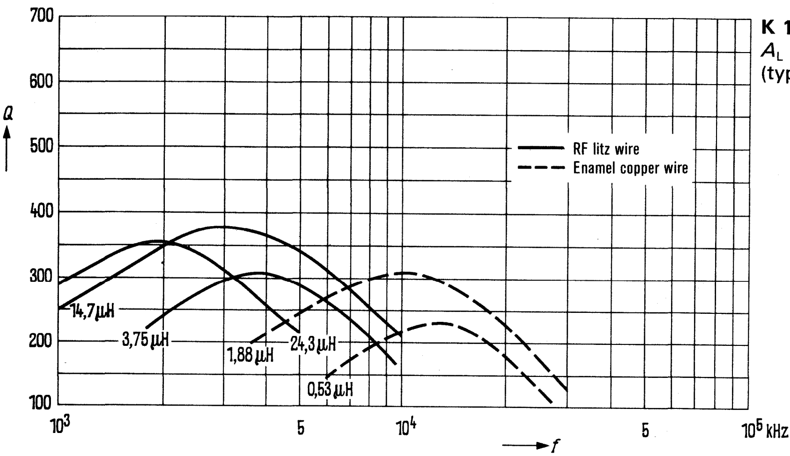
Material K 1

L(μH) for		Turns	Wire; RF litz wire	Number of sections	ø* mm
A_L = 25 nH	A_L = 40 nH				
1,88	2,92	8	1,0 CuL	1	11,5
0,53	0,78	4	1,2 CuL	1	11,2
24,3	38,8	10 + 10 + 10	1 x 45 x 0,04 CuLS	3	12,0
14,7	22,4	11	1 x 45 x 0,04 CuLS	1	12,8
3,75	5,65	22	3 x 30 x 0,04 CuLS	1	12,5

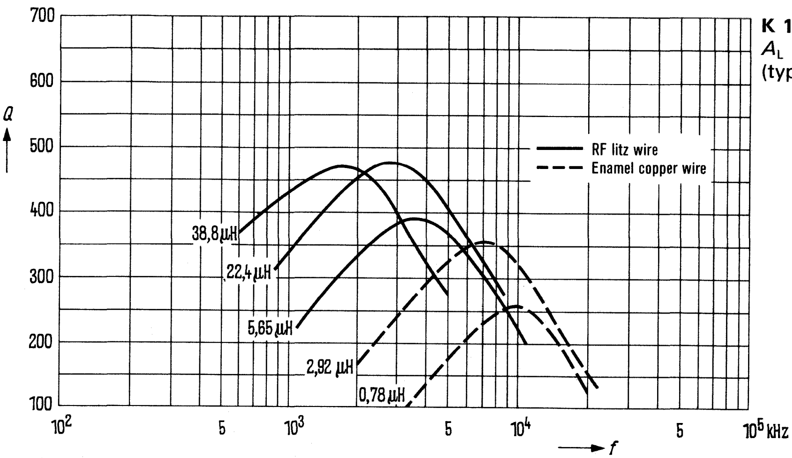


Pad of polystyrene tape up to the diameter * (valid for all sections)

Flux density in the core $\hat{B} < 0.6$ mT

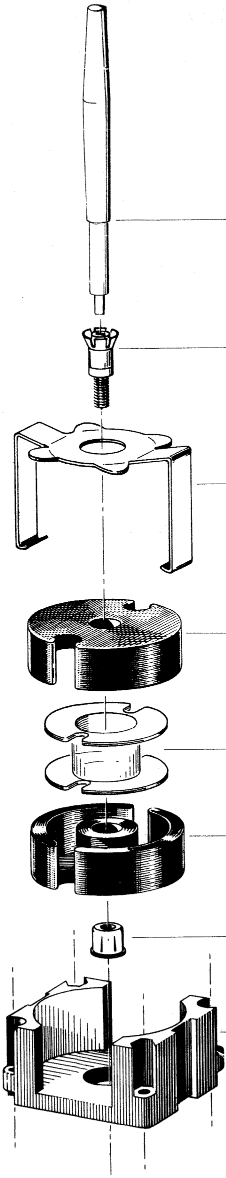


K 1
A_L = 25 nH
(typical values)



K 1
A_L = 40 nH
(typical values)

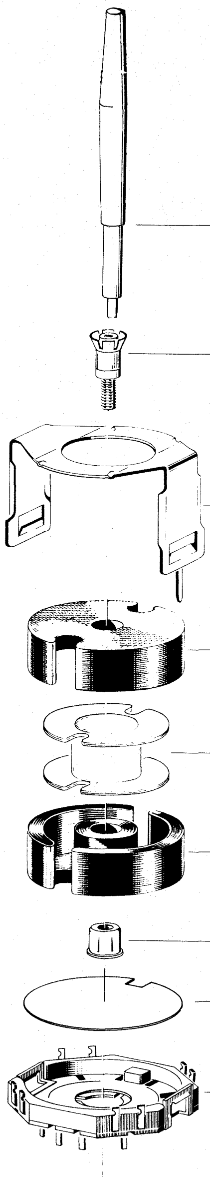
Type for chassis mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65669	199
Yoke	B65663	197
Pot core	B65661	195
Coil former with 1, 2, or 3 sections	B65662	196
Pot core	B65661	195
Threaded sleeve or threaded flange	B65669 B65669	199
Frame	B65663	197

Pot Cores 22 x 13 B 65661

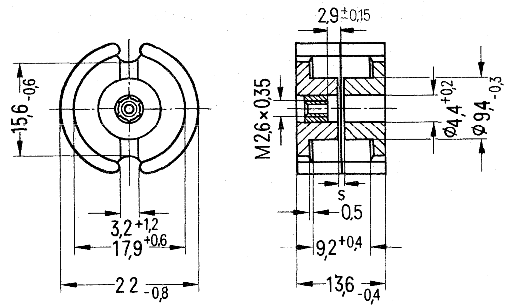
Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65669	199
Yoke	B65665	198
Pot core	B65661	195
Coil former with 1, 2, or 3 sections	B65662	196
Pot core	B65661	195
Threaded sleeve or threaded flange	B65669 B65669	199
Insulating washer	B65662	196
Connecting board with 8 solder terminals	B65665	198

Pot cores complying with DIN 41 293 or IEC publication 133

For cores in acc. with DIN 45 970, part 1118, refer to page 36.



Magnetic characteristics

Core factor	$\Sigma\, l/A =$	0.5 mm^{-1}
Effective length	$l_e =$	31.6 mm
Effective area	$A_e =$	63 mm^2
Min. core cross section[1]	$A_{min} =$	50 mm^2
Effective volume	$V_e =$	2000 mm^3

Approx. weight 13 g/set

Dimensions in mm

Version	Ordering code[2]
with threaded sleeve (fig.)	B65661–**N**...
without threaded sleeve	B65661–**L**...

A_L value nH	tolerance	Ferrite material	Total air gap *s* in mm approx.	Effective permeability μ_e	**Ordering code**[2] (PU: 250 sets)	
Gapped						
40	±3% ≙ A	K 1	1,4	15,9	B65661–+40–A1	
63			1,3	25	B65661–+63–A1	
100		M 33	0,9	39,8	B65661–N100–A33	
160			0,7	64	B65661–N160–A33	
160	±2% ≙ G	N 48	0,5	64	B65661–N160–G48	
250			0,26	100	B65661–N250–G48	
315	±3% ≙ A		0,22	125	B65661–N315–A48	
400			0,16	159	B65661–N400–A48	S
500			0,14	199	B65661–N500–A48	
630			0,10	250	B65661–N630–A48	S
1250	±10% ≙ K	N 26	0,05	498	B65661–L1250–K26	S
Ungapped						
9220	$^{+30}_{-20}$ % ≙ R	K 1		86	B65661–L–R1	
3800		N 26		1510	B65661–L–R26	S
4900		N 41		1950	B65661–L–R41	
7000		N 30		2780	B65661–L–R30	S
16000	$^{+40}_{-30}$ % ≙ Y	T 38		6360	B65661–L–Y38	S

[1] Necessary for the calculation of the max. flux density

[2] + Insert appropriate code letter for requested version

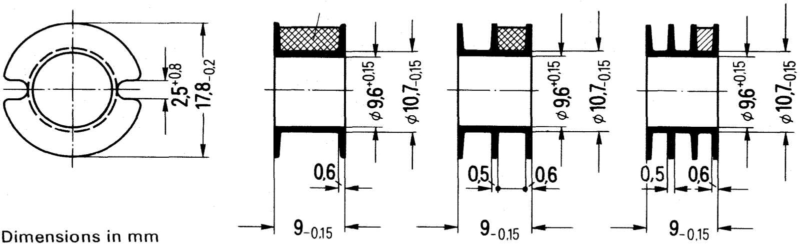
S Preferred types (refer to page 4)

Coil former and insulating washers B 65662

Glass-fiber reinforced polyterephthalate coil former, complying with DIN 41294 or IEC publication 133, flame-retardant in accordance with UL 94V-0, color code black.

For winding details refer to page 69

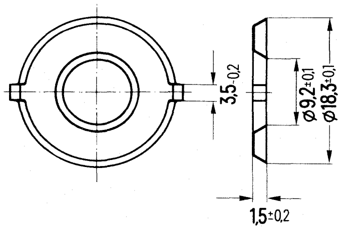
Winding cross section



Dimensions in mm

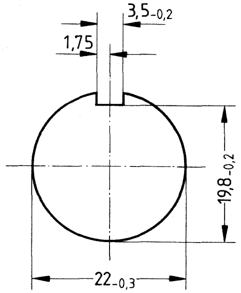
Number of sections	Useful winding cross section A_N of one section mm²	Useful winding cross section A_N total mm²	Average length of turn l_N mm	A_R value¹) µΩ	Approx. weight g	**Ordering code** (PU: 250 items)	
1	23,4	23,4	44	67	0,4	B65662–B–T1	S
2	11,0	22,0		69	0,45	B65662–B–T2	S
3	6,7	20,0		76	0,5	B65662–B–T3	S

0.06 mm thick insulating Makrofol spring washers for insulating and tolerance balancing between coil winding and pot core; delivered in tapes.



Ordering code B65662–A5000 S
(PU: 1000)

0.05 mm thick insulating Teflon washers for increasing the dielectric strength between core and connecting board.



Ordering code B65662–A5002
(PU: 500)

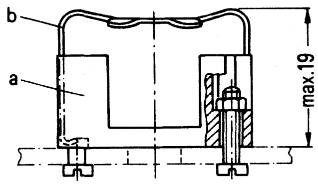
¹) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

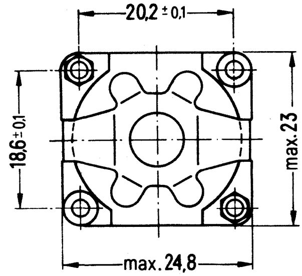
S Preferred products (refer to page 4)

Mounting assembly for chassis mounting B 65 663

Mounting assembly with glass-fiber reinforced polyterephthalate frame, flame-retardant in accordance with UL 94V-0; fixed by screws.
0.4 mm thick nickel-silver spring yoke.

Approx. weight 4 g





Dimensions in mm

Ordering code B65663–B1 S
(Complete mounting assembly for free terminals)
(PU: 250 sets)

Mounting parts		Ordering code
a	1 frame	C60358–B3185–C103
b	1 yoke	C60358–B3185–C105

2 hex. nuts M 2 DIN 934 m-5 S
2 cylindrical screws AM 2 x 10 DIN 84-5 S
(for ≤ 3 mm thick mounting plates)
} not included in delivery

S Preferred products (refer to page 4)

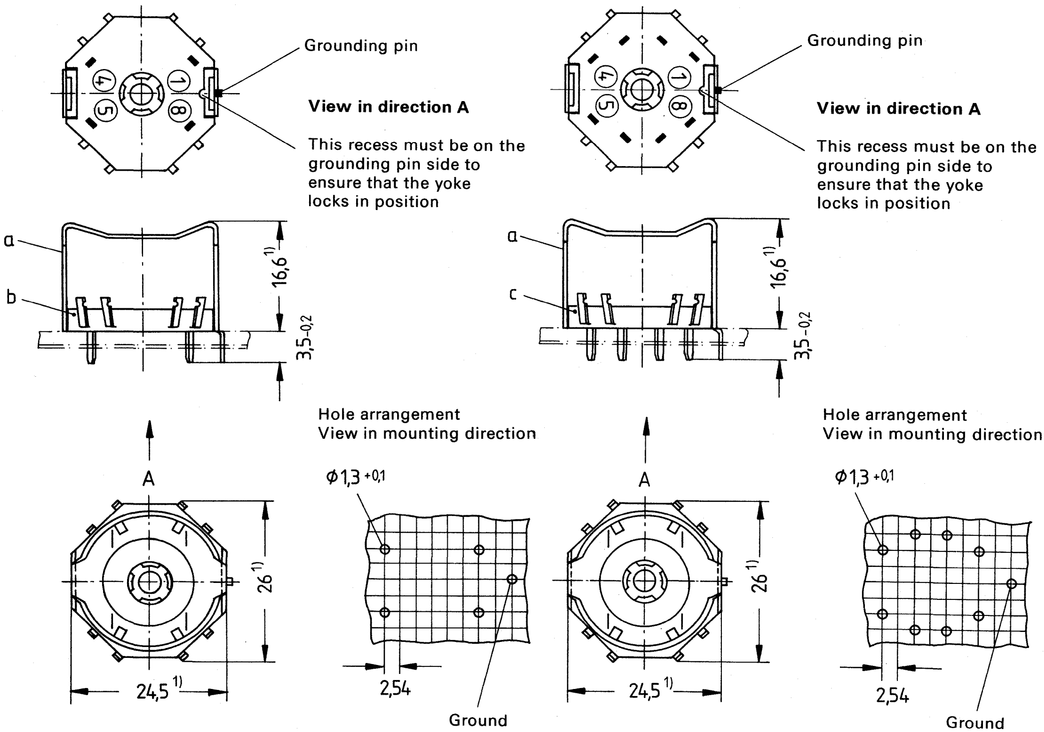
Mounting assemblies for PC mounting B 65665

Mounting assemblies with snap-in connection. Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94V-0. Max. permissible soldering temperature is 400 °C/752 °F, 2 s. 0.4 mm thick nickel-silver spring yoke (tinned).

Approx. weight 5 g

B65665–C5
(with 4 solder terminals)

B65665–C4
(with 8 solder terminals)



Dimensions in mm

Ordering code B65665–C5 (Complete mounting assembly with 4 solder terminals) (PU: 250 sets)		
Mounting parts		Ordering code
a	1 yoke	C61035–A17–C25
b	1 connecting board (with 4 solder terminals)	C61035–A17–B33

Ordering code B65665–C4 S (Complete mounting assembly with 8 solder terminals) (PU: 250 sets)		
Mounting parts		Ordering code
a	1 yoke	C61035–A17–C25
c	1 connecting board (with 8 solder terminals)	C61035–A17–B10

1) Max. dimension
S Preferred products (refer to page 4)

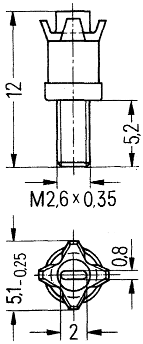
Adjusting Devices B 65669

Adjusting Screw (a, b, c, d, e) B65669–D (E)..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

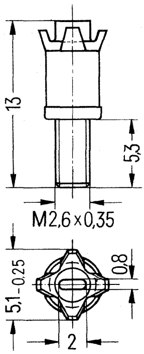
fits

glass-fiber reinforced 11 polyamide **Threaded Flange** (f) B65669–K2
glass-fiber reinforced 11 polyamide **Threaded Sleeve** (g) B65669–L4
Adjusting Screw Driver B63399–B1

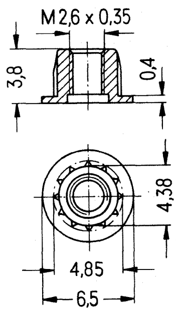
a to d



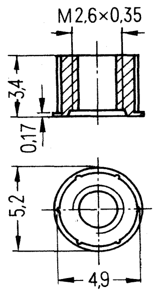
e



f



g



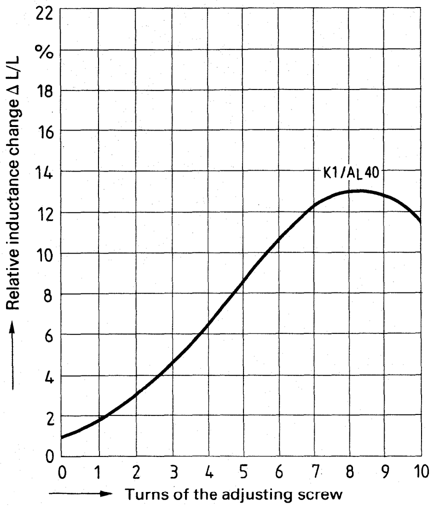
Dimensions in mm

Pot cores B65661		Adjusting screw				
Material	A_L value nH	Part	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 250)
K 1	40	a	3,5 x 3,6	Si 1	brown	B65669–D10–X101
	63	b	3,5 x 4,3	K 1	blue	B65669–D9–X1
M 33	100	a	3,5 x 3,6	K 1	green	B65669–D10–X1
	160	b	3,5 x 4,3	K 1	blue	B65669–D9–X1
M33,N48	160	b	3,5 x 4,3	M 25	black	B65669–D8–X25
N 48	250, 315	c	4,1 x 3,6	N 22	yellow	B65669–D11–X22
	400	d	4,1 x 4,3	N 22	red	B65669–D7–X22 S
	500, 630	e	4,18 x 5,0	N 22	white	B65669–E6–X22 S

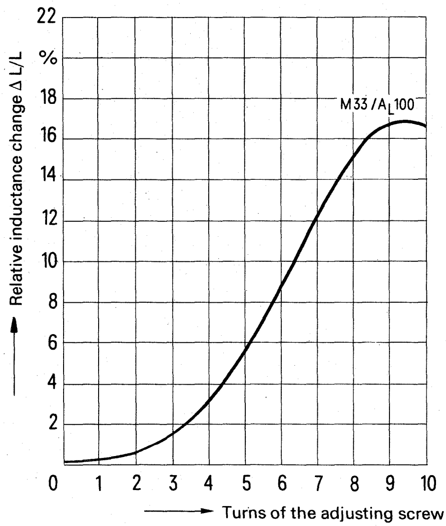
S Preferred products (refer to page 4)

Inductance adjustment curves

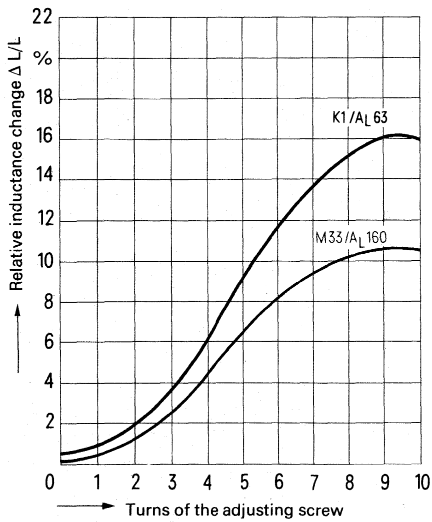
Adjusting screw B65669–D10–X101
color code brown



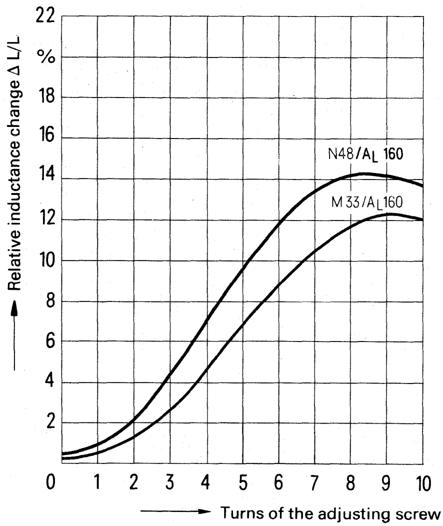
Adjusting screw B65669–D10–X1
color code green



Adjusting screw B65669–D9–X1
color code blue



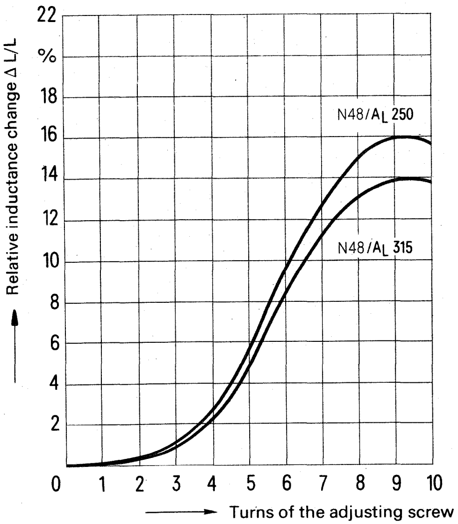
Adjusting screw B65669–D8–X25
color code black



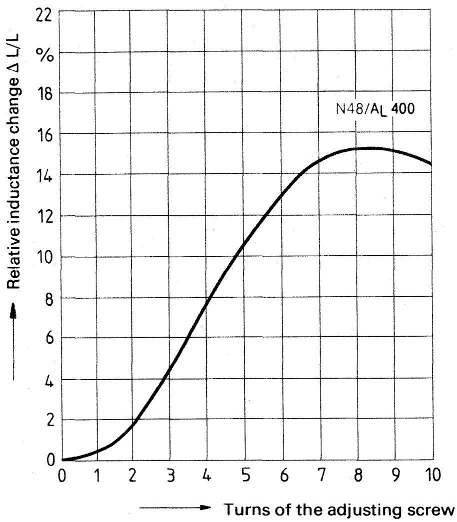
0 ≙ at least two turns engaged

Inductance adjustment curves

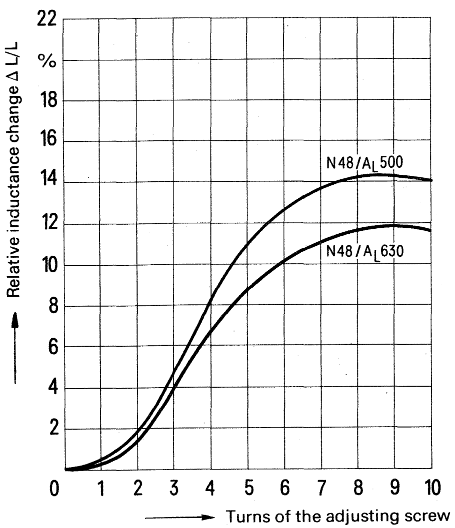
Adjusting screw B65669–D11–X22
color code yellow



Adjusting screw B65669–D7–X22
color code red



Adjusting screw B65669–E6–X22
color code white



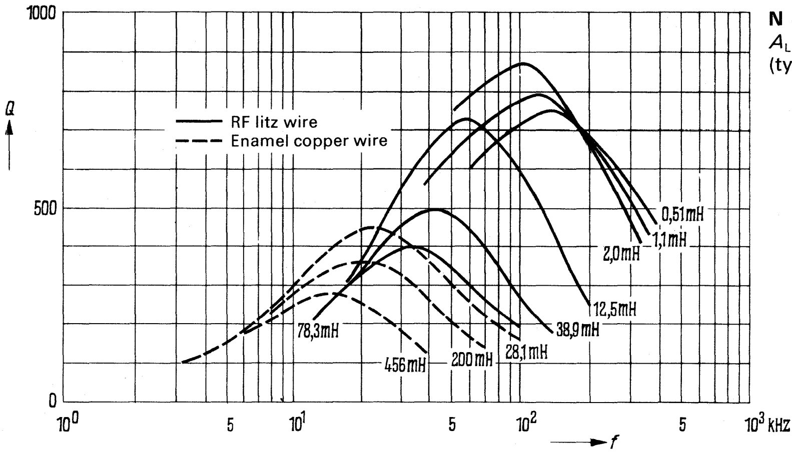
0 ≙ at least two turns engaged

Q factor characteristics

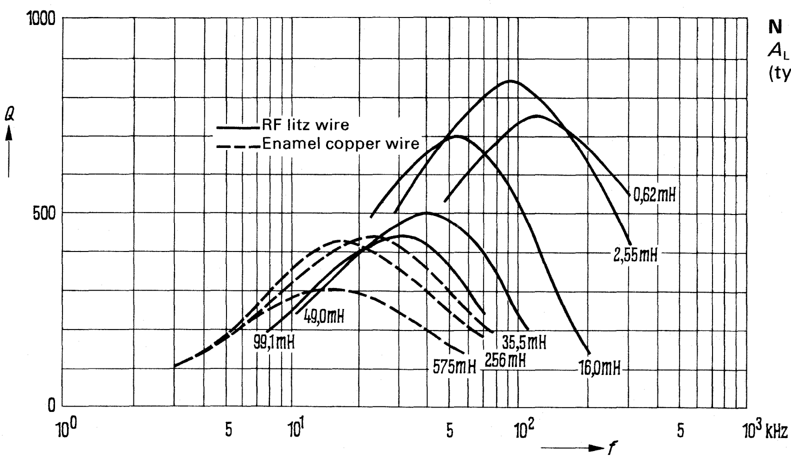
Material N 48

L (mH) for A_L = 315 nH	A_L = 400 nH	Turns	Wire; RF litz wire	Number of sections
456	575	1200	0,12 CuL	1
200	256	800	0,15 CuL	1
28,1	35,5	300	0,27 CuL	1
78,3	99,1	500	1 x 12 x 0,04 CuLS	1
38,9	49,0	350	1 x 15 x 0,04 CuLS	1
12,5	16,0	200	1 x 20 x 0,05 CuLS	1
2,0	2,55	80	3 x 20 x 0,05 CuLS	2
1,1	–	59	3 x 20 x 0,05 CuLS	3
0,51	–	40	3 x 20 x 0,05 CuLS	2
–	0,62	40	3 x 30 x 0,05 CuLS	2

Flux density in the core $\hat{B} < 1.5$ mT



N 48
A_L = 315 nH
(typical values)

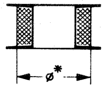


N 48
A_L = 400 nH
(typical values)

Q factor characteristics

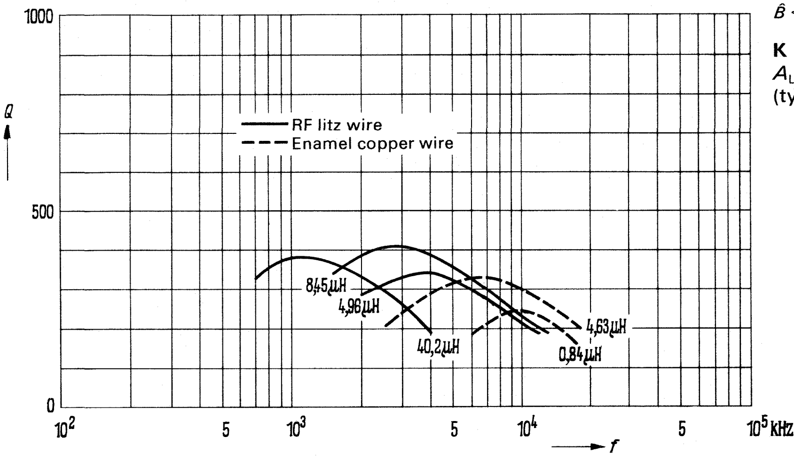
Material K 1

L (µH) for A_L = 40 nH	L (µH) for A_L = 63 nH	Turns	Wire; RF litz wire	Number of sections	∅* mm
4,63	6,74	10	0,7 CuL	1	16,1
0,84	1,17	4	1,0 CuL	1	15,5
40,2	58,0	10 + 10 + 10	1 x 45 x 0,04 CuLS	3	16,8
8,45	11,7	13	3 x 30 x 0,04 CuLS	1	16,5
4,96	7,0	10	3 x 30 x 0,04 CuLS	1	16,5

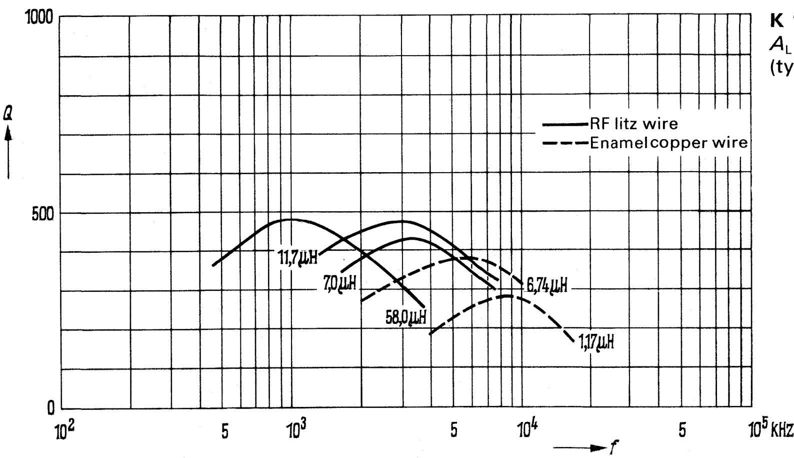


Pad of polystyrene tape up to the diameter * (valid for all sections)

Flux density in the core $\hat{B} < 0.6$ mT



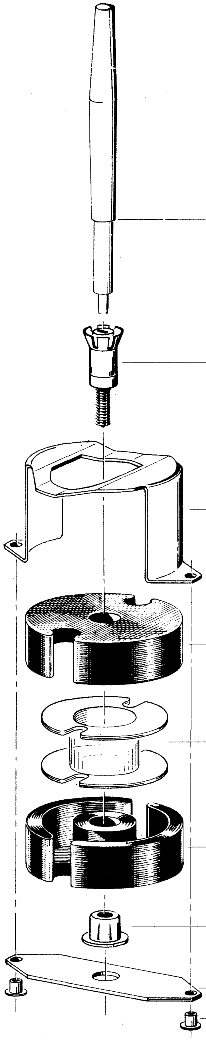
K 1
A_L = 40 nH
(typical values)



K 1
A_L = 63 nH
(typical values)

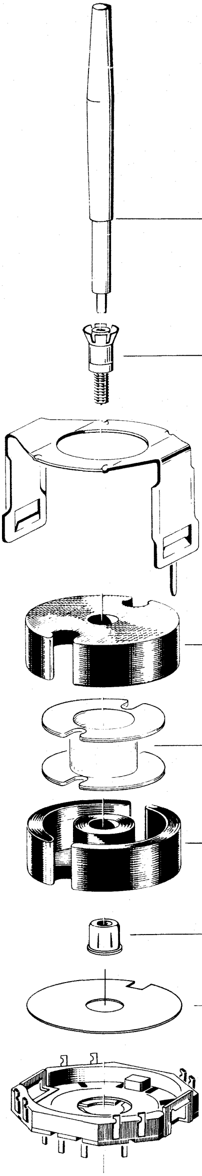
Pot Cores 26 x 16 B 65671

Type for chassis mounting



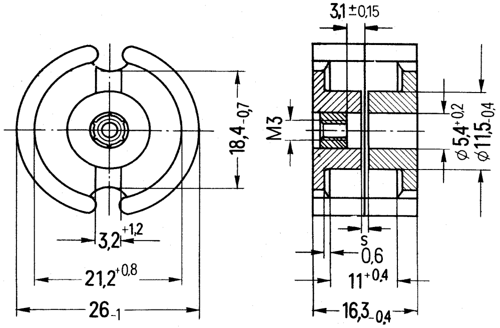
Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65679	210
Yoke	B65673	208
Pot core	B65671	206
Coil former with 1, 2, or 3 sections	B65672	207
Pot core	B65671	206
Threaded sleeve or threaded flange	B65679	210
Base plate	B65673	208
2 tubular rivets	B65673	208

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65679	210
Yoke	B65675	209
Pot core	B65671	206
Coil former with 1, 2, or 3 sections	B65672	207
Pot core	B65671	206
Threaded sleeve or threaded flange	B65679	210
Insulating washer	B65672	207
Connecting board with 8 solder terminals	B65675	209

Pot cores complying with DIN 41 293 or IEC publication 133



Magnetic characteristics

Core factor	$\Sigma\, l/A =$	0.4 mm^{-1}
Effective length	$l_e =$	37.2 mm
Effective area	$A_e =$	93 mm^2
Min. core cross section[1]	$A_{min} =$	74 mm^2
Effective volume	$V_e =$	3460 mm^3

Approx. weight 21 g/set

Dimensions in mm

Version	Ordering code[2]
with threaded sleeve (fig.)	B65671–**N**...
without threaded sleeve	B65671–**L**...

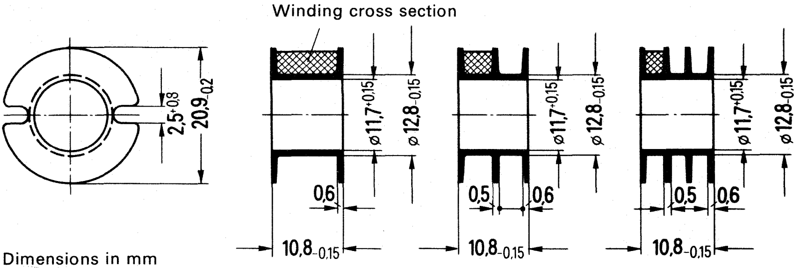
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	Ordering code[2] (PU: 200 sets)	
Gapped						
63	± 3% ≙ A	K 1	2,28	20,21	B65671–+63–A1	
100	± 3% ≙ A	K 1	0,90	31,9	B65671–+100–A1	
100	± 3% ≙ A	M 33	1,52	31,9	B65671–+100–A33	
160	± 3% ≙ A	M 33	0,78	51	B65671–+160–A33	
160	± 2% ≙ G	N 48	0,80	51	B65671–+160–G48	
250	± 2% ≙ G	N 48	0,40	80	B65671–+250–G48	
315	± 2% ≙ G	N 48	0,34	100	B65671–+315–G48	
400	± 3% ≙ A	N 48	0,24	127	B65671–+400–A48	S
630	± 3% ≙ A	N 48	0,15	201	B65671–+630–A48	S
800	± 3% ≙ A	N 48	0,11	255	B65671–+800–A48	
1000	± 5% ≙ J	N 26	0,10	319	B65671–L1000–J26	S
1600	± 10% ≙ K	N 26	0,05	510	B65671–L1600–K26	S
Ungapped						
270	$^{+30}_{-20}$ % ≙ R	K 1		86	B65671–L–R1	
4900	$^{+30}_{-20}$ % ≙ R	N 26		1560	B65671–L–R26	S
6300	$^{+30}_{-20}$ % ≙ R	N 41		2000	B65671–L–R41	
9000	$^{+30}_{-20}$ % ≙ R	N 30		2860	B65671–L–R30	S
20000	$^{+40}_{-30}$ % ≙ Y	T 38		6360	B65671–L–Y38	S

[1] Necessary for the calculation of the max. flux density
[2] + Insert appropriate code letter for requested version
S Preferred products (refer to page 4)

Coil former and insulating washers B 65 672

Glass-fiber reinforced polyterephthalate coil former, complying with DIN 41294 or IEC publication 133, flame-retardant in accordance with UL 94V-0, color code black.

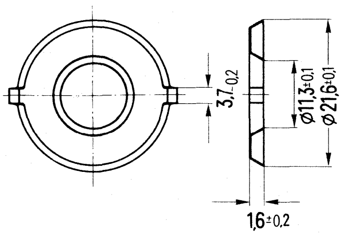
For winding details refer to page 69.



Dimensions in mm

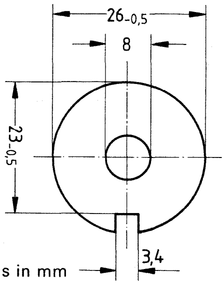
Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1]) µΩ	Approx. weight g	**Ordering code** (PU: 200)
1	32	32		55	0,4	B65672-B-T1 S
2	15	30	52	59	0,5	B65672-B-T2 S
3	9,6	28,8		61	0,6	B65672-B-T3

0.06 mm thick insulating Makrofol spring washers for insulation and tolerance balancing between coil winding and pot core; delivered in tapes.



Ordering code B65672-B5000 S
(PU: 400)

0.05 mm thick insulating Teflon washers for increasing the dielectric strength between core and connecting board.



Dimensions in mm

Ordering code B65672-A5002
(PU: 200)

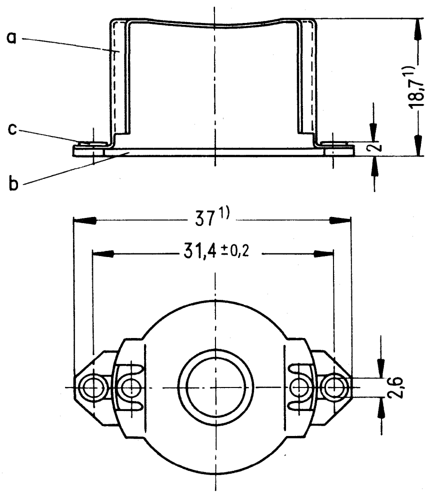
1) $R_{CU} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

Mounting assembly for chassis mounting B 65 673

Mounting assembly with metal base plate, without solder terminals (b); fixed by screws or rivets (c). 0.4 mm thick nickel-silver spring yoke (a).

Approx. weight 7 g



Dimensions in mm

Ordering code B65673-A6 S
(Complete mounting assembly without solder terminals)
(PU: 200 sets)

Mounting parts		Ordering code
a	1 yoke	C60358-B3181-C116
b	1 base plate	C60358-B3181-C117
c	2 tubular rivets	C60358-B3059-C106

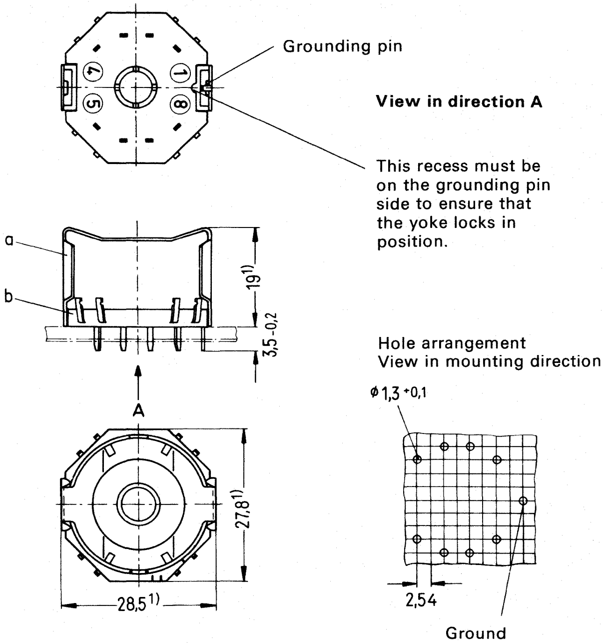
[1] Max. dimension
S Preferred products (refer to page 4)

Mounting assembly for PC mounting B 65 675

Mounting assembly with snap-in connection. Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94 V-0. Max. permissible soldering temperature is 400 °C/752 °F, 2 s. 0.4 mm thick nickel-silver spring yoke (tinned).

Approx. weight 7 g

B65675–B5
(with 8 solder terminals)



Dimensions in mm

Ordering code B65675–B5 **S**
(Complete mounting assembly with 8 solder terminals)
(PU: 200 sets)

Mounting parts		Ordering code
a	1 yoke	C61035–A11–C2
b	1 connecting board (with 8 solder terminals)	C61035–A11–B1

[1)] Max. dimension
S Preferred products (refer to page 4)

Pot Cores 26 x 16 Accessories

B 65671

Adjusting Devices B 65679

Adjusting Screw (a, b, c) B65679–E..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

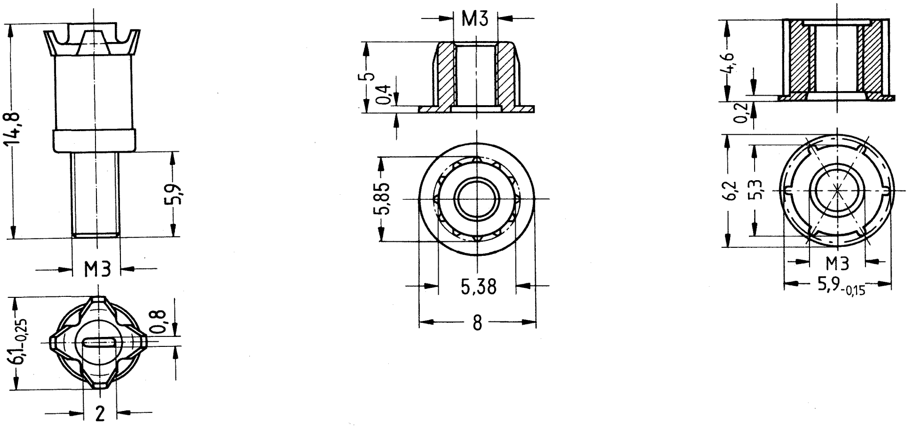
fits

glass-fiber reinforced 11 polyamide **Threaded Flange** (d) B65679–J1
glass-fiber reinforced 11 polyamide **Threaded Sleeve** (e) B65679–L3 **S**

Adjusting Screw Driver B63399–B1

Due to the limited distance between the adjusting core B65679–E... and the internal borehole, the complete assembly has to be centered accurately.

a, b, c **d** **e**



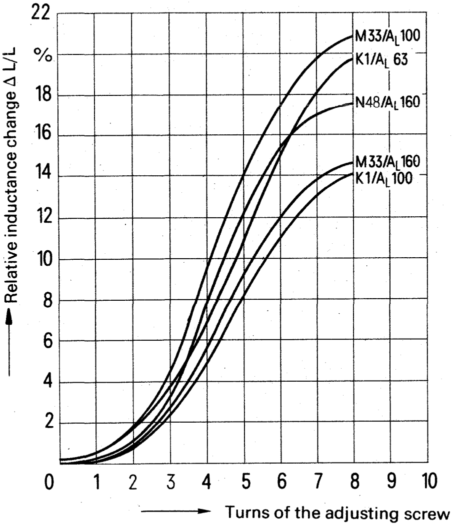
Dimensions in mm

Pot cores B65671 Material	A_L value nH	Adjusting screw Part	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 200)
K 1	63	b	4,98 x 6,3	Si 1	yellow	B65679–E2–X101
M 33, K 1	100					
M 33, N 48	160					
N 48	250	c	4,55 x 6,3	N 22	red	B65679–E3–X22
	315					
	315	b	4,98 x 6,3	N 22	black	B65679–E2–X22 **S**
	400					
	630	a	5,15 x 6,3	N 22	white	B65679–E1–X22 **S**
	800					

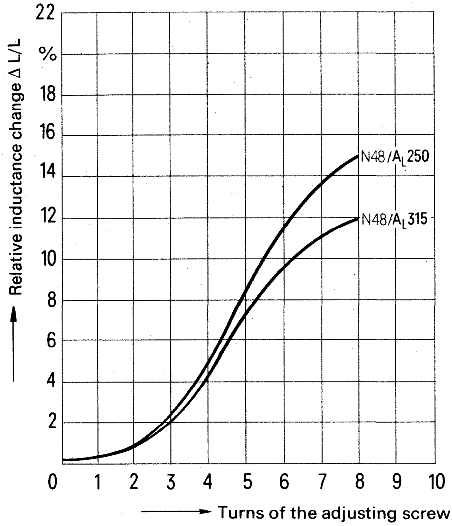
S Preferred products (refer to page 4)

Inductance adjustment curves

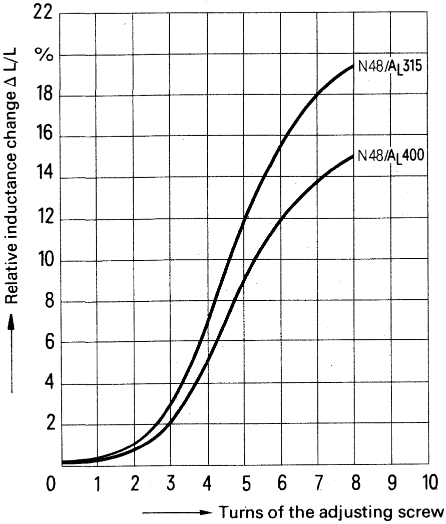
Adjustment screw B65679–E2–X101
color code yellow



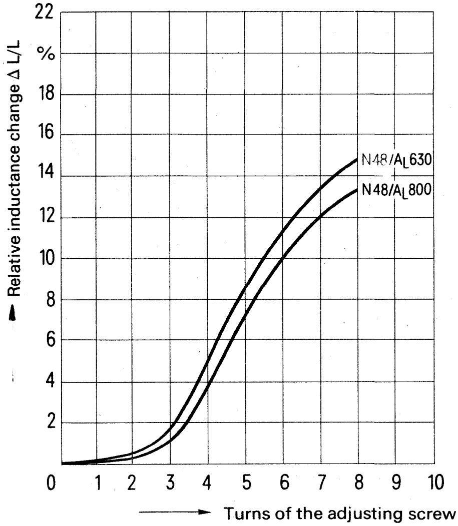
Adjusting screw B65679–E3–X22
color code red



Adjusting screw B65679–E2–X22
color code black



Adjusting screw B65679–E1–X22
color code white



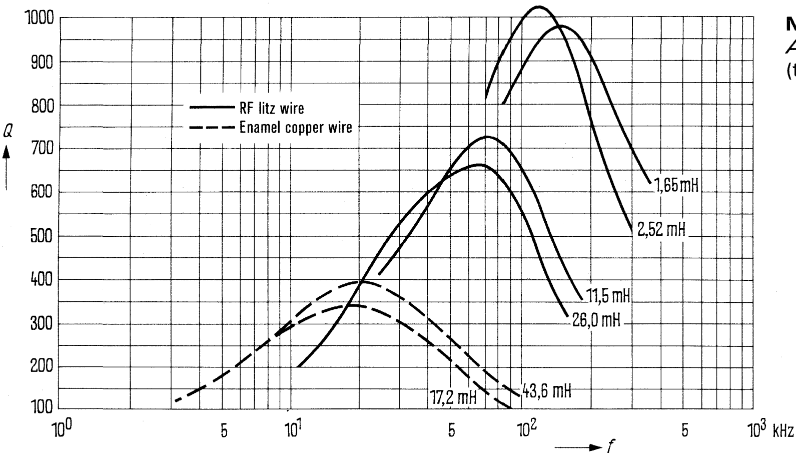
0 ≙ at least two turns engaged

Q factor characteristics

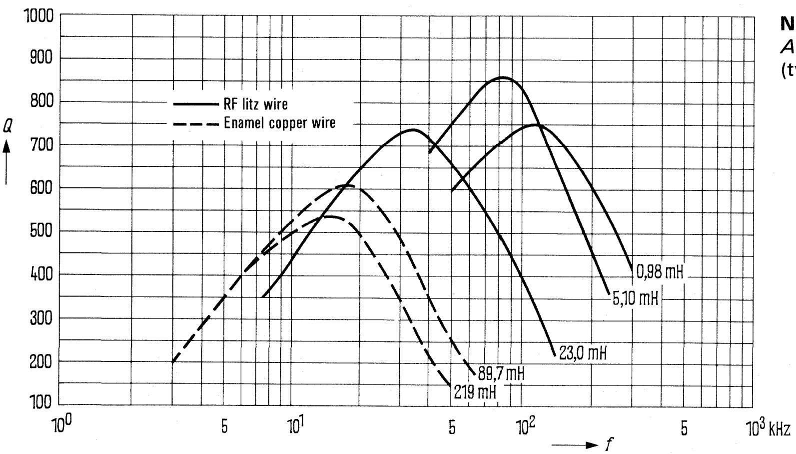
Material N 48

L (mH) for A_L = 315 nH	L (mH) for A_L = 630 nH	Turns	Wire; RF litz wire	Number of sections
–	219	600	0,20 CuL	1
43,6	89,7	385	0,27 CuL	1
17,2	–	235	0,35 CuL	1
26,0	–	290	1 x 20 x 0,05 CuLS	1
11,5	23,0	193	1 x 30 x 0,05 CuLS	1
2,52	5,10	90	3 x 30 x 0,04 CuLS	2
1,65	–	78	3 x 20 x 0,05 CuLS	3
–	0,98	39	3 x 20 x 0,07 CuLS	3

Flux density in the core $\hat{B} > 1.5$ mT



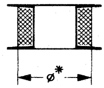
N 48
A_L = 315 nH
(typical values)



N 48
A_L = 630 nH
(typical values)

Q factor characteristics

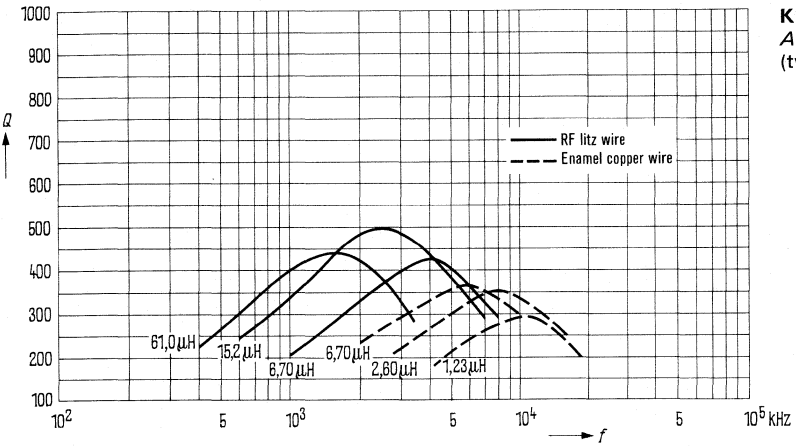
Material K 1



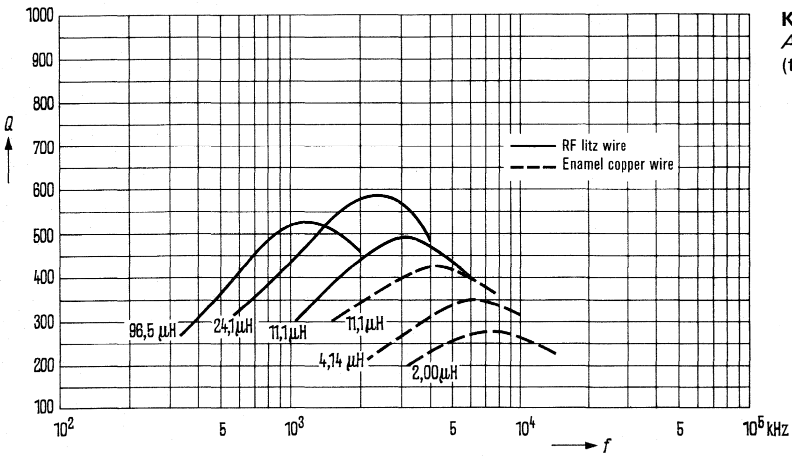
Pad of polystyrene tape up to the diameter * (valid for all sections)

Flux density in the core $\hat{B} < 0.6$ mT

L (µH) for A_L = 63 nH	A_L = 100 nH	Turns	Wire; RF litz wire	Number of sections	Ø* mm
6,70	11,1	10	0,7 CuL	1	18,0
2,60	4,14	6	1,0 CuL	1	17,5
1,23	2,00	4	1,0 CuL	1	17,5
61,0	96,5	10+10+10	1 x 45 x 0,04 CuLS	3	18,5
15,2	24,1	15	3 x 30 x 0,04 CuLS	1	18,0
6,70	11,1	3 + 4 + 3	3 x 30 x 0,04 CuLS	3	18,0

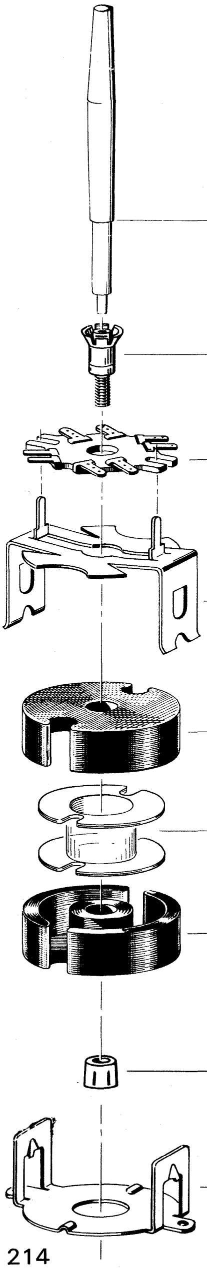


K 1
A_L = 63 nH
(typical values)



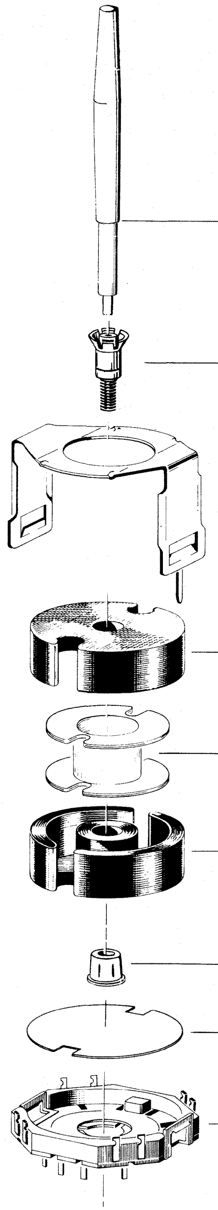
K 1
A_L = 100 nH
(typical values)

Type for chassis mounting



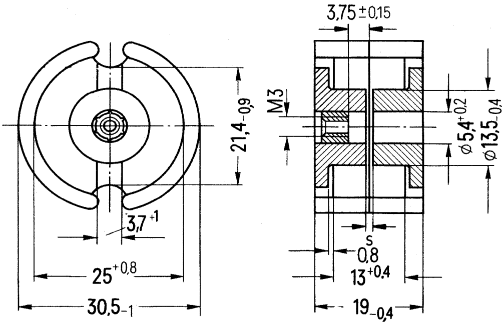
Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65679	220
Solder tag board with 8 solder terminals, if required	B65703	218
Yoke	B65703	218
Pot core	B65701	216
Coil former with 1, 2, or 3 sections	B65702	217
Pot core	B65701	216
Threaded sleeve	B65679	220
Base plate	B65703	218

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65679	220
Yoke	B65705	219
Pot core	B65701	216
Coil former with 1, 2, or 3 sections	B65702	217
Pot core	B65701	216
Threaded sleeve	B65679	220
Insulating washer	B65702	217
Connecting board with 8 solder terminals	B65705	219

Pot cores complying with DIN 41293 or IEC publication 133



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.33	mm^{-1}
Effective length	l_e =	45	mm
Effective area	A_e =	136	mm^2
Min. core cross section[1]	A_{min} =	112	mm^2
Effective volume	V_e =	6100	mm^3

Approx. weight 36 g/set

Version	**Ordering code**[2]
with threaded sleeve (fig.)	B65701–**N**...
without threaded sleeve	B65701–**L**...

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code**[2] (PU: 200 sets)	
Gapped						
250	± 2% ≙ G	N 48	0,72	66	B65701–+250–G48	
400	± 3% ≙ A	N 48	0,40	105	B65701–+400–A48	
630	± 3% ≙ A	N 48	0,22	166	B65701–+630–A48	
1000	± 3% ≙ A	N 48	0,12	263	B65701–+1000–A48	S
1250	± 5% ≙ J	N 26	0,10	328	B65701–L1250–J26	
2000	± 10% ≙ K	N 26	0,05	525	B65701–L2000–K26	S
Ungapped						
6200	$^{+30}_{-20}$ % ≙ R	N 26		1630	B65701–L–R26	S
7800	$^{+30}_{-20}$ % ≙ R	N 41		2050	B65701–L–R41	
10500	$^{+30}_{-20}$ % ≙ R	N 30		2760	B65701–L–R30	S
25000	$^{+40}_{-30}$ % ≙ Y	T 38		6560	B65701–L–Y38	S

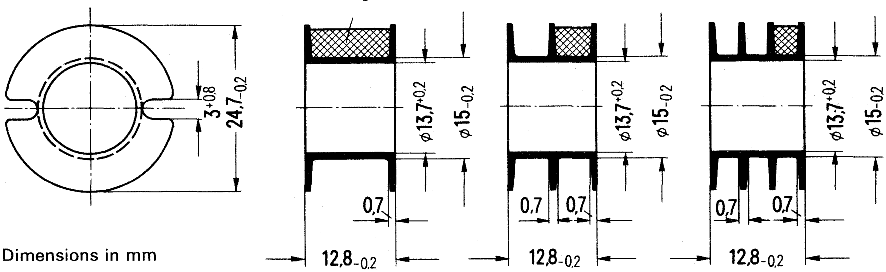
[1] Necessary for the calculation of the max. flux density
[2] + Insert appropriate code letter for requested version
S Preferred products (refer to page 4)

Coil former and insulating washers B 65 702

Glass-fiber reinforced polyterephthalate coil former, complying with DIN 41 294 or IEC publication 133, flame-retardant in accordance with UL 94V-0, color code black.

For winding details refer to page 69.

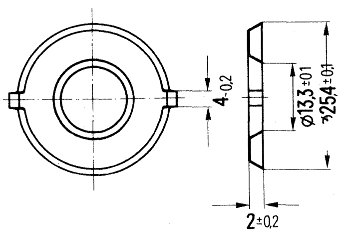
Winding cross section



Dimensions in mm

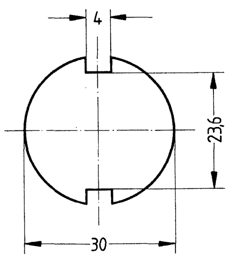
Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 200)
1	48	48	60	46	0,6	B65702-B-T1 S
2	22,5	45		49	0,7	B65702-B-T2 S
3	14	42		51	0,8	B65702-B-T3

0.06 mm thick insulating Makrofol spring washers for insulating and tolerance balancing between coil winding and pot core; delivered in tapes.



Ordering code B65702-A5000 S
(PU: 400)

0.05 mm thick insulating Teflon washers for increasing the dielectric strength between core and connecting board.



Ordering code B65702-A5002
(PU: 200)

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

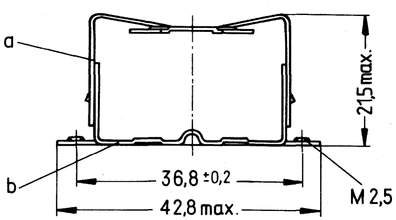
S Preferred products (refer to page 4)

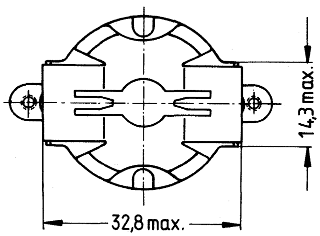
Mounting assemblies for chassis mounting B65703

Mounting assemblies with metal base plate;
fixed by M 2.3 screws.
0.5 mm thick nickel-silver spring yoke.
Types with or without solder tag board.

Approx. weight 8 g (without solder tag board)
9.5 g (with solder tag board)

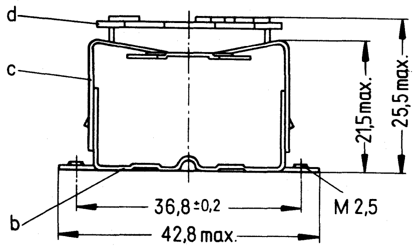
B65703–B5
(without solder tag board)

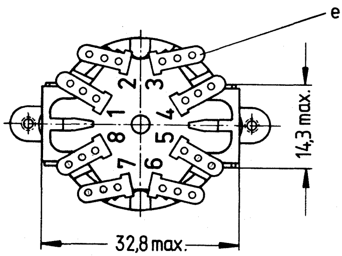




Dimensions in mm

B65703–B6
(solder tag board with 8 solder terminals)





Ordering code B65703–B5 S (Complete mounting assembly without solder tag board) (PU: 200 sets)			**Ordering code** B65703–B6 (Complete mounting assembly with solder tag board and 8 solder terminals) (PU: 200 sets)		
Mounting parts		Ordering code	Mounting parts		Ordering code
a	1 yoke	C61035–A22–C3	c	1 yoke	C61035–A22–C4
b	1 base plate	C61035–A22–C2	b	1 base plate	C61035–A22–C2
			d, e	1 solder tag board complete	C40330–A74–B15

2 cylindrical screws AM 2.5 x 15 DIN 84–5 S (not included in the delivery).

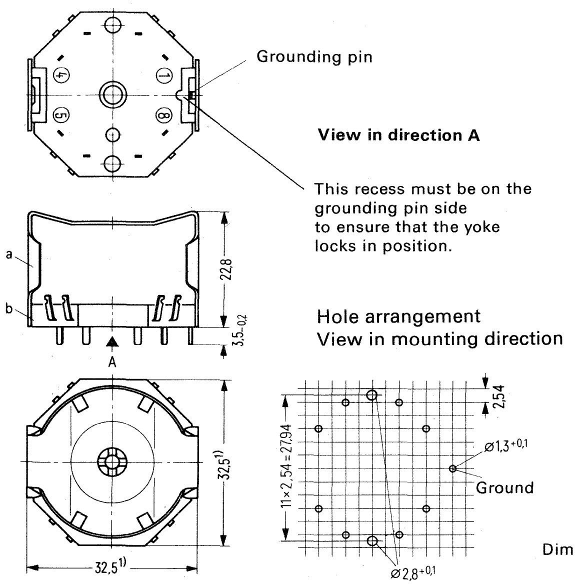
S Preferred products (refer to page 4)

Mounting assembly for PC mounting B 65705

Mounting assembly with snap-in connection. Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94V-0. Max. permissible soldering temperature is 400 °C/752 °F, 2s. 0.5 mm thick nickel-silver spring yoke.

Approx. weight 9 g

B65705–B3
(with 8 solder terminals)



Dimensions in mm

Ordering code B65705–B3 S
(Complete mounting assembly with 8 solder terminals)
(PU: 200 sets)

Mounting parts		Ordering code
a	1 yoke	C61035–A40–C4
b	1 connecting board (with 8 solder terminals)	C61035–A40–B1

The 2.8 mm dia hole is only necessary for additional screw mounting with M 2.5.

1) Max. dimension
S Preferred products (refer to page 4)

Adjusting Devices B 65679

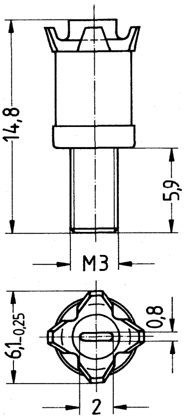
Adjusting Screw (a, b, c) B65679–E..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

fits

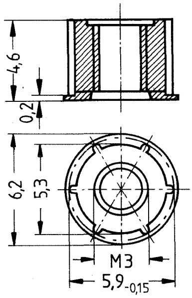
glass-fiber reinforced 11 polyamide **Threaded Sleeve** (d) B65679–L3 S
Adjusting Screw Driver B63399–B1

Due to the limited distance between the adjusting core B65679–E... and the internal borehole, the complete assembly has to be centered accurately.

a, b, c



d



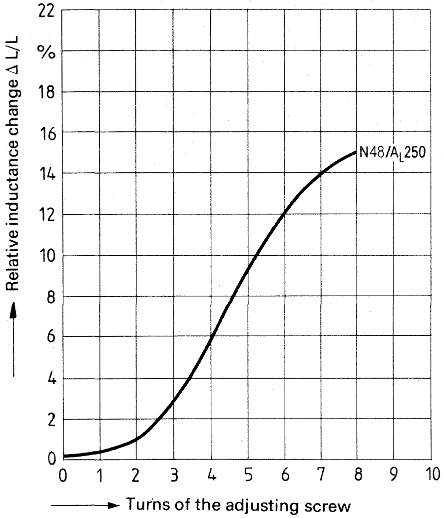
Dimensions in mm

Pot cores B65701		Adjusting screw				
Material	A_L value nH	Part	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 200)
N 48	250	c	4,55 x 6,3	N 22	red	B65679–E3–X22
	400 630	b	4,98 x 6,3	N 22	black	B65679–E2–X22
	630 1000	a	5,15 x 6,3	N 22	white	B65679–E1–X22 S

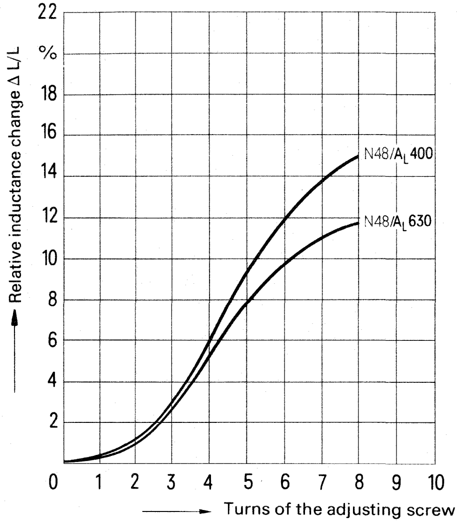
S Preferred products (refer to page 4)

Inductance adjustment curves

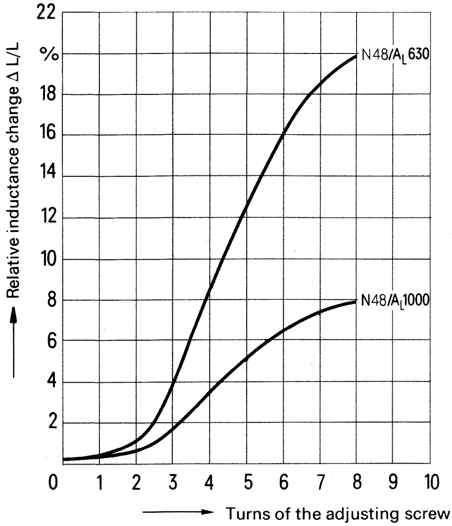
Adjusting screw B65679–E3–X22
color code red



Adjusting screw B65679–E2–X22
color code black



Adjusting screw B65679–E1–X22
color code white



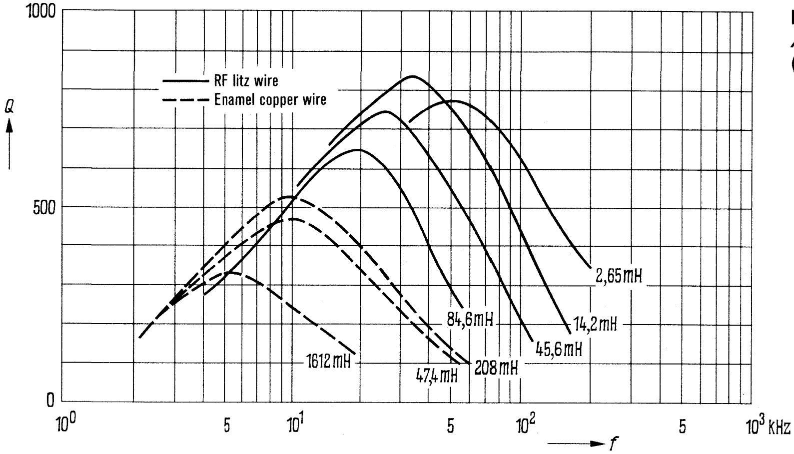
0 ≙ at least two turns engaged

Q factor characteristics

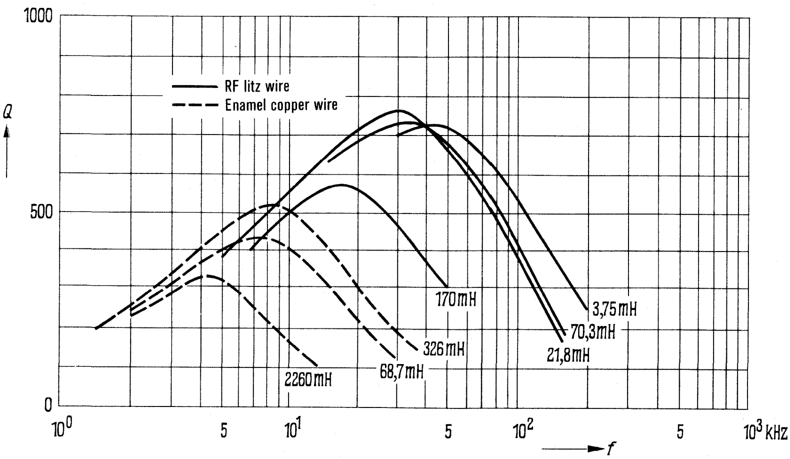
Material N 48

L (mH) for A_L = 630 nH	L (mH) for A_L = 1000 nH	Turns	Wire; RF litz wire	Number of sections
1612	2260	1600	0,15 CuL	1
208	326	570	0,25 CuL	1
47,4	68,7	350	0,40 CuL	1
–	170	420	1 x 12 x 0,04 CuLS	1
84,6	–	420	1 x 20 x 0,05 CuLS	1
45,6	70,3	270	1 x 30 x 0,05 CuLS	1
14,2	21,8	150	3 x 20 x 0,05 CuLS	1
2,65	3,75	65	3 x 20 x 0,07 CuLS	2

Flux density in the core $\hat{B} < 1.5$ mT

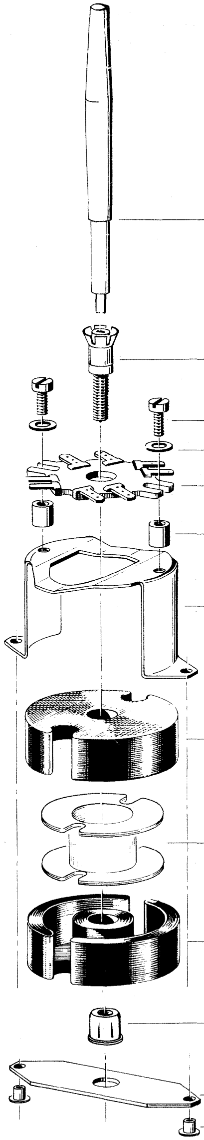


N 48
A_L = 630 nH
(typical values)



N 48
A_L = 1000 nH
(typical values)

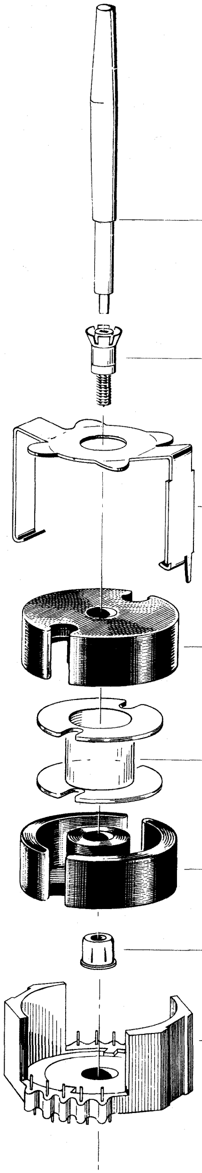
Type for chassis mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65679	229
Cylindrical screws[1]		
Washers[1]		
Solder tag board if required	B65613	227
Threaded bushes (only for type with solder tag board)		
Yoke	B65613	227
Pot core	B65611	225
Coil former with 1, 2, or 3 sections	B65612	226
Pot core	B65611	225
Threaded sleeve	B65679	229
Base plate with 2 tubular rivets	B65613	227

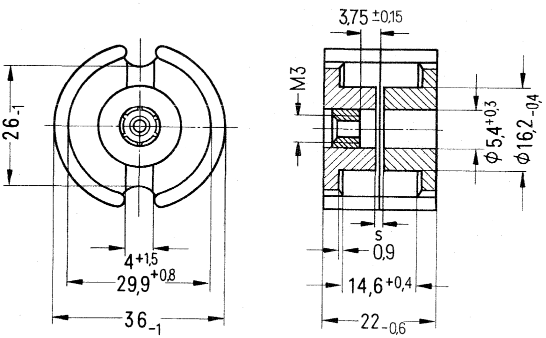
[1] These parts are included in delivery for types with solder tag board.

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65679	229
Yoke	B65615	228
Pot core	B65611	225
Coil former with 1, 2, or 3 sections	B65612	226
Pot core	B65611	225
Threaded sleeve	B65679	229
Connecting board with 10 solder terminals	B65615	228

Pot cores complying with DIN 41 293 or IEC publication 133



Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.26	mm^{-1}
Effective length	l_e =	52	mm
Effective area	A_e =	202	mm^2
Min. core cross section[1]	A_{min} =	173	mm^2
Effective volume	V_e =	10600	mm^3

Approx. weight 57 g/set

Dimensions in mm

Version	**Ordering code**[2]
with threaded sleeve (fig.)	B65611–**N**...
without threaded sleeve	B65611–**L**...

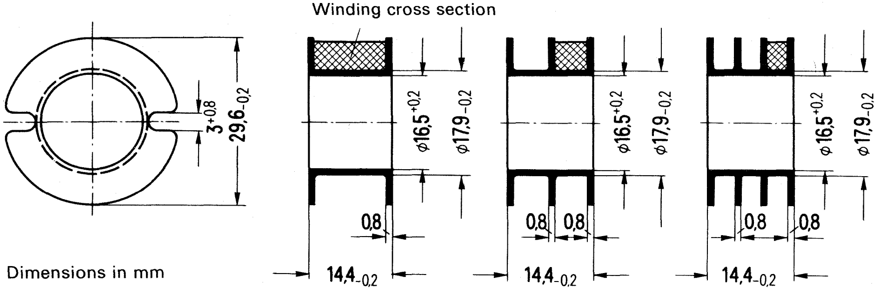
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code**[2] (PU: 100 sets)
Gapped					
250	± 2% ≙ G	N 48	1,2	52	B65611–+250–G48 S
400	± 2% ≙ G	N 48	0,62	83	B65611–+400–G48
630	± 3% ≙ A	N 48	0,35	130	B65611–+630–A48
800	± 3% ≙ A	N 48	0,3	166	B65611–+800–A48
900	± 3% ≙ A	N 48	0,26	186	B65611–+900–A48
1000	± 3% ≙ A	N 48	0,22	207	B65611–+1000–A48
1250	± 3% ≙ A	N 48	0,16	259	B65611–+1250–A48
1600	± 5% ≙ J	N 26	0,1	331	B65611–L1600–J26
2500	± 10% ≙ K	N 26	0,05	518	B65611–L2500–K26
Ungapped					
7600	$^{+30}_{-20}$% ≙ R	N 26		1570	B65611–L–R26 S
13500	$^{+30}_{-20}$% ≙ R	N 30		2790	B65611–L–R30 S

1) Necessary for the calculation of the max. flux density
2) + Insert appropriate code letter for requested version
S Preferred products (refer to page 4)

Coil former and insulating washers B 65612

Glass-fiber reinforced polyterephthalate coil former, complying with DIN 41 294 or IEC publication 133, flame-retardant in accordance with UL 94V-0, color code black.

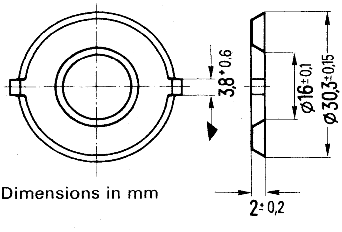
For winding details refer to page 69.



Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 100)
1	63	63		39	1,4	B65612–B–T1 S
2	29,5	59	73	42	1,7	B65612–B–T2 S
3	18,3	55		44	1,9	B65612–B–T3

0.08 mm thick insulating Makrofol spring washers for insulation and tolerance balancing between coil winding and pot core; delivered in tapes.



Dimensions in mm

Ordering code B65612–A5000 S
(PU: 200)

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

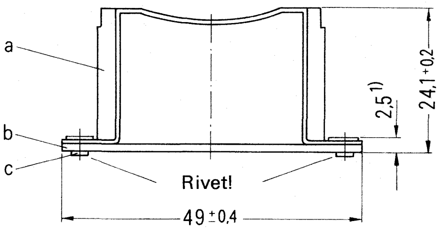
S Preferred products (refer to page 4)

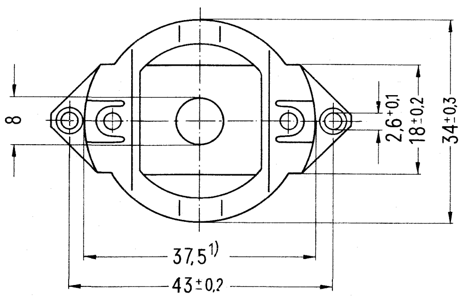
Mounting assemblies for chassis mounting B 65613

Mounting assemblies with metal base plate;
fixed by screws or rivets.
0.5 mm thick nickel-silver spring yoke.
Types with or without solder tag board.

Approx. weight 14.5 g (without solder tag board)
17.5 g (with solder tag board)

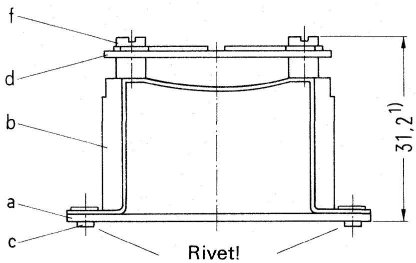
B65613–C1
(without solder tag board)

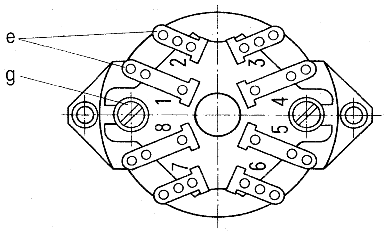




Dimensions in mm

B65613–C5
(solder tag board with 8 solder terminals)





Ordering code B65613–C1 S
(Complete mounting assembly
without solder tag board)
(PU: 100 sets)

Mounting parts		Ordering code
a	1 yoke	C61035-A16-C32
b	1 base plate	C61035–A16–C33
c	2 tubular rivets	C60358-B3059-C106

Ordering code B65613–C5
Complete mounting assembly
with solder tag board)
(PU: 100 sets)

Mounting parts		Ordering code
a	1 base plate	C61035–A16–C33
b	1 yoke complete	C61035–A16–B10
c	2 tubular rivets	C60358-B3059-C106
d+e	1 solder tag board complete	C40330–A78–B7
f	2 cylindrical screws	D84–H40–M37
g	2 washers	D125–A25–M37

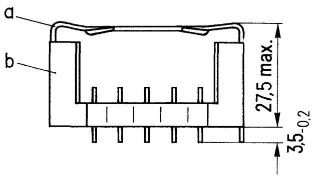
1) Max. dimension
S Preferred products (refer to page 4)

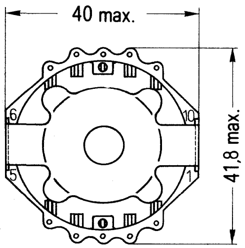
Mounting assembly for PC mounting B 65 615

Mounting assembly with snap-in connection. Glass-fiber reinforced polyterephthalate connecting board, flame-retardant in accordance with UL 94V-0.
Max. permissible soldering temperature is 400 °C/752 °F, 2 s.
0.5 mm thick nickel-silver spring yoke.

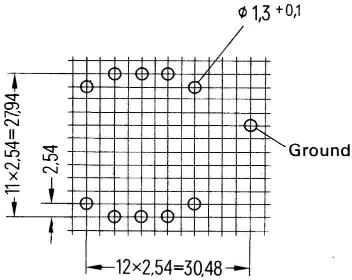
Approx. weight 11 g

B65615–B1
(with 10 solder terminals)





Hole arrangement
View in mounting direction



Dimensions in mm

Ordering code B65615–B1 S
(Complete mounting assembly with 10 solder terminals)
(PU: 100 sets)

Mounting parts		Ordering code
a	1 yoke	C61035–A16–C102
b	1 connecting board (with 10 solder terminals)	C61035–A16–B9

S Preferred products (refer to page 4)

Adjusting Devices B 65679

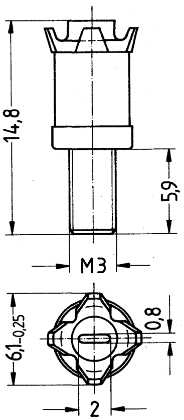
Adjusting Screw (a, b, c) B65679–E..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

fits

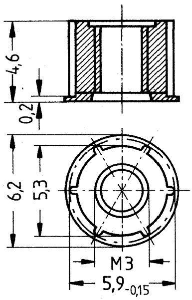
glass-fiber reinforced 11 polyamide **Threaded Sleeve** (d) B65679–L3 **S**
Adjusting Screw Driver B63399–B1

Due to the limited distance between the adjusting core B65679–E... and the internal borehole, the complete assembly has to be centered accurately.

a, b, c



d



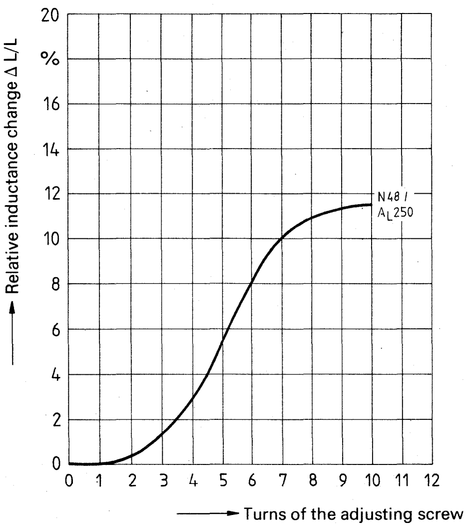
Dimensions in mm

Pot cores B65611		Adjusting screw				
Material	A_L value nH	Part	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 100)
N 48	250	b	4,98 x 6,3	Si 1	yellow	B65679–E2–X101
	250 400	c	4,55 x 6,3	N 22	red	B65679–E3–X22
	400 630	b	4,98 x 6,3	N 22	black	B65679–E2–X22
	630 800 900 1000 1250	a	5,15 x 6,3	N 22	white	B65679–E1–X22

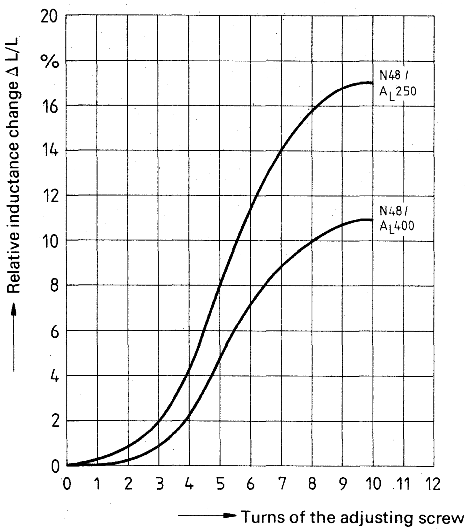
S Preferred products (refer to page 4)

Inductance adjustment curves

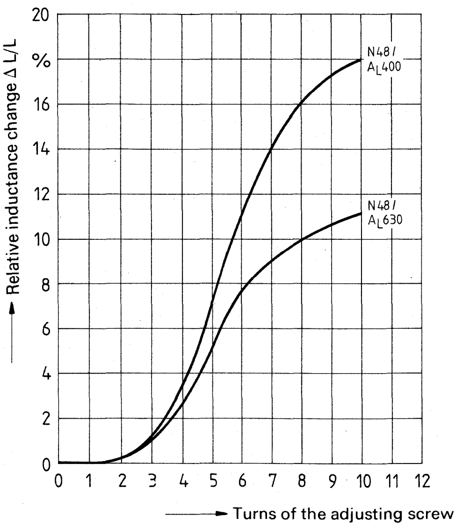
Adjusting screw B65679–E2–X101
color code yellow



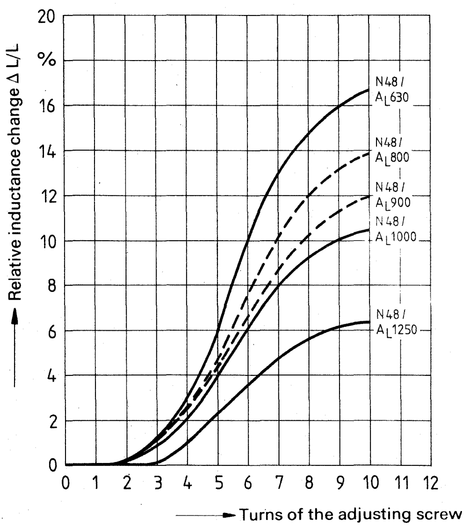
Adjusting screw B65679–E3–X22
color code red



Adjusting screw B65679–E2–X22
color code black

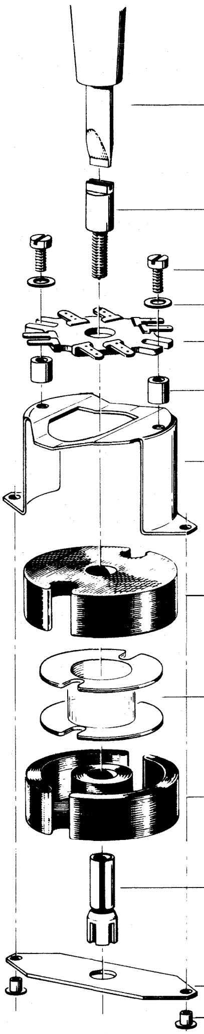


Adjusting screw B65679–E1–X22
color code white



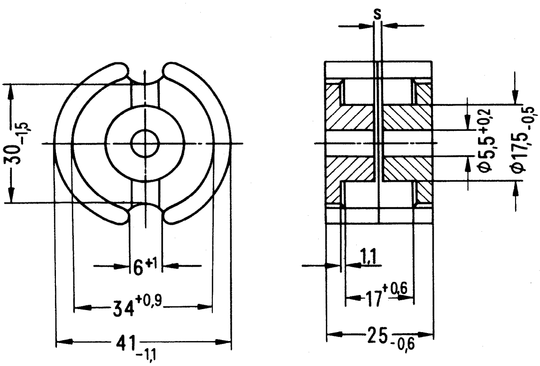
0 ≙ at least two turns engaged

Type for chassis mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only) or	B63399 B63399	341, fig. 4 340, fig. 1
Adjusting screw or screw core	B65579 B63310	235
Cylindrical screws[1]		
Washers[1]		
Solder tag board if required	B65623	234
Threaded bushes (only for type with solder tag board)		
Yoke	B65623	234
Pot core	B65621	232
Coil former with 1, 2, or 3 sections	B65622	233
Pot core	B65621	232
Threaded sleeve part "c" or "e"	B65579	235
Base plate with 2 tubular rivets	B65623	234

[1] These parts are included in delivery for types with solder tag board.



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.257	mm^{-1}
Effective length	l_e =	62.1	mm
Effective area	A_e =	242	mm^2
Min. core cross section[1]	A_{min} =	209	mm^2
Effective volume	V_e =	15000	mm^3

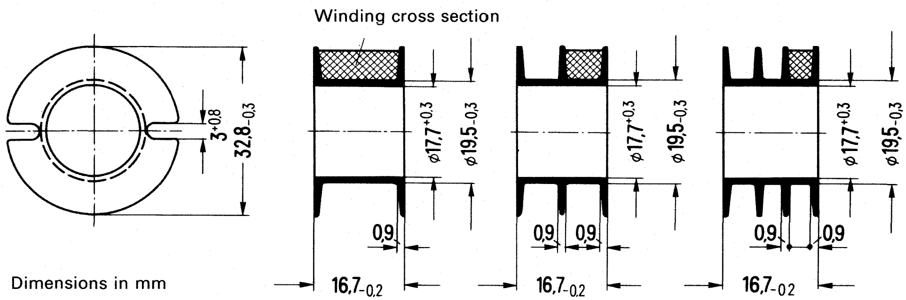
Approx. weight 90 g/set

A_L value nH	tolerance	Ferrite material	Total air gap *s* in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 100 sets)
Gapped					
250	± 3 % ≙ A	N 48	1,35	51	B65621-J250-A48
400	± 3 % ≙ A	N 48	0,78	82	B65621-J400-A48
630	± 3 % ≙ A	N 48	0,43	129	B65621-J630-A48
1250	± 3 % ≙ A	N 48	0,18	256	B65621-J1250-A48
2000	± 5 % ≙ J	N 26	0,1	408	B65621-J2000-J26
3150	± 10 % ≙ K	N 26	0,05	642	B65621-J3150-K26
Ungapped					
8400	$^{+30}_{-20}$ % ≙ R	N 26		1720	B65621-J-R26

[1] Necessary for the calculation of the max. flux density.

Coil former B 65 622

Glass-fiber reinforced polycarbonate coil former.
For winding details refer to page 70.



Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 100)
1	85	85		33	1,7	B65622-A-M1
2	40	80	81	35	2,0	B65622-A-M2
3	25	75		37	2,2	B65622-A-M3

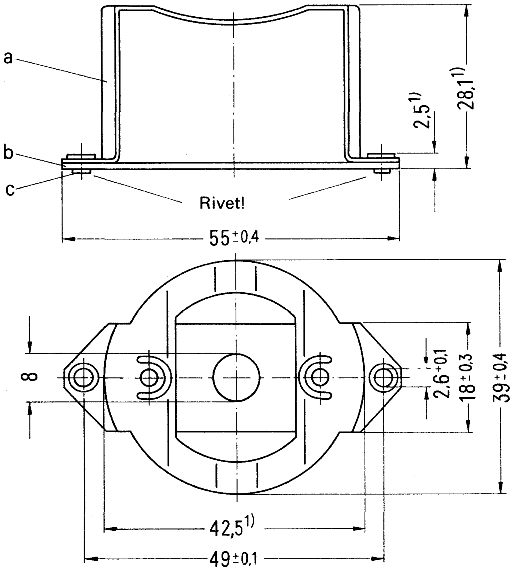
1) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

Mounting assemblies for chassis mounting B 65 623

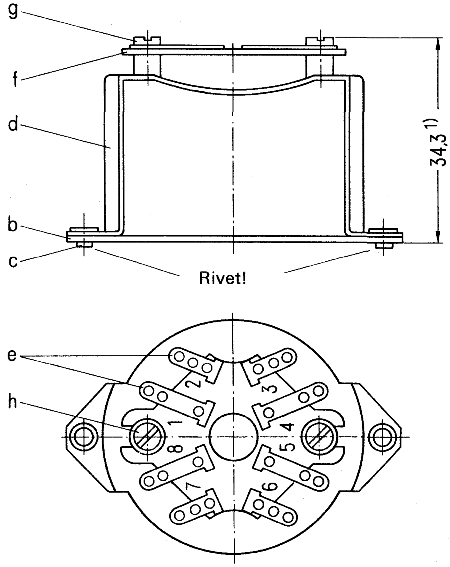
Mounting assemblies with metal base plate;
fixed by screws or rivets.
0.5 mm thick nickel-silver spring yoke.
Types with or without solder tag board.

Approx. weight 17.5 g (without solder tag board)
20.5 g (with solder tag board)

B65623–A1
(without solder tag board)



B65623–A5
(with solder tag board)



Dimensions in mm

Ordering code B65623–A1 (Complete mounting assembly without solder tag board) (PU: 100 sets)			**Ordering code** B65623–A5 (Complete mounting assembly with solder tag board) (PU: 100 sets)		
Mounting parts		Ordering code	Mounting parts		Ordering code
a	1 yoke	C40330–A79–C7	b	1 base plate	C40330–A79–C8
			c	2 tubular rivets	C60358–B3059–C106
b	1 base plate	C40330–A79–C8	d	1 yoke complete	C40330–A79–B3
			e+f	1 solder tag board complete	C40330–A78–B7
c	2 tubular rivets	C60358–B3059–C106	g	2 cylindrical screws	D84–H40–M37
			h	2 washers	D125–A25–M37

1) Max. dimension

Adjusting Devices B 65579

Adjusting Screw (a, b) B65579–B..., consisting of a ferrite tube core on which a thread of glass-fiber reinforced 11 polyamide is molded;

fits

glass-fiber reinforced polyterephthalate **Threaded Sleeve** (c) B 65679–K1 with slotted shank serving as core brake

Adjusting Screw Driver B63399–B4

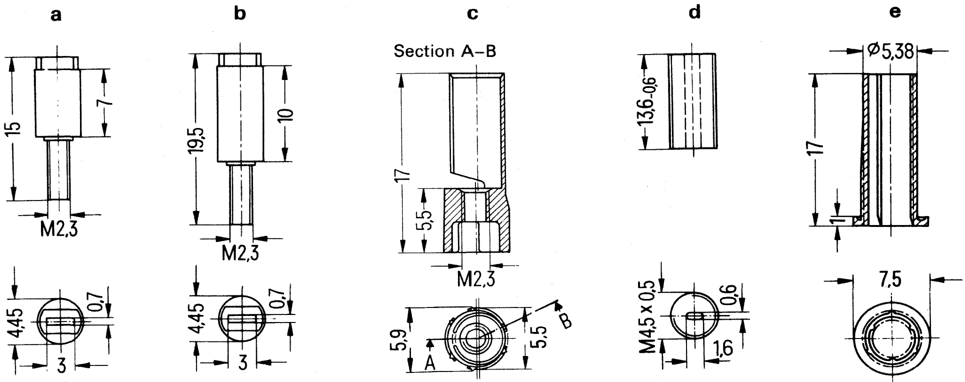
or, as required,

Adjusting Screw (d) B63310–A4009–X22, ferrite material; this screw core cuts its own thread into the sleeve;

fits

glass-fiber reinforced 11 polyamide **Threaded Sleeve** (e) B65579–J3

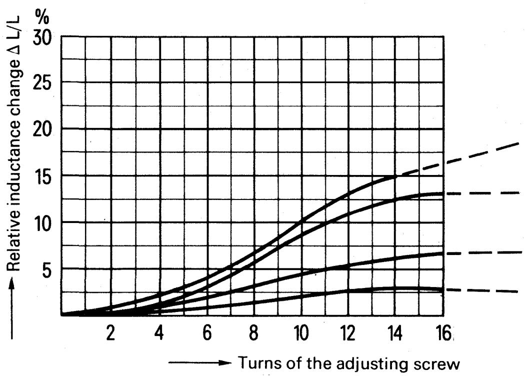
Adjusting Screw Driver B63399–A1



Dimensions in mm

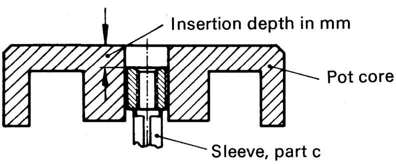
Adjusting devices	Part	Material of the adjusting core	Color code	**Ordering code** (PU: 100)
Threaded sleeve	c			B65579–K1
Associated adjusting screw as required	a	N 22	red	B65579–B1–X23
	b	N 22	red	B65579–B3–X23
Threaded sleeve	e			B65579–J3
Associated screw core	d	N 22	red	B63310–A4009–X22

Inductance adjustment curve



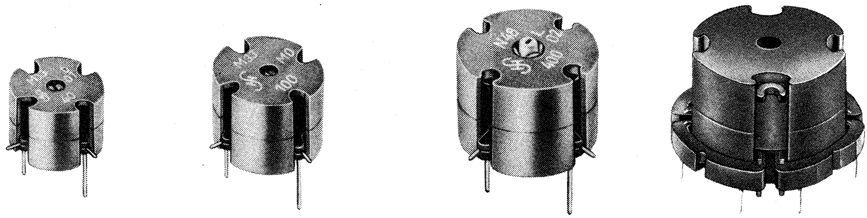
Pot core		Adjusting devices	
Mate-rial	A_L value	Adjusting screw	Inser-tion depth mm
N 48	250	a;B65579-B1-X23	3
N 48	400	b;B65579-B3-X23	3
N 48	630	b;B65579-B3-X23	3
N48	1250	b;B65579-B3-X23	3

Explanation of "insertion depth"



4-Slot Pot Cores

4-Slot Pot Cores



General

In addition to the series of pot cores with two slots complying with DIN 41 293 or IEC publication 133, the Siemens product range includes a further series with four slots for bringing out the leads. The associated four-pin coil formers (for the 14 to 26 mm diameter sizes) enable the ends of the windings to be directly wound on to the soldering pins without difficulty. A further advantage of this is that extra mounting parts are not needed.

Upon request, the material N48 can be supplied for adjustable inductors. The parts required for adjustment and alignment curves are to be found in the corresponding data sheets for two-slot cores. We supply cores made of materials N26, N30 and T38 for transformer applications.

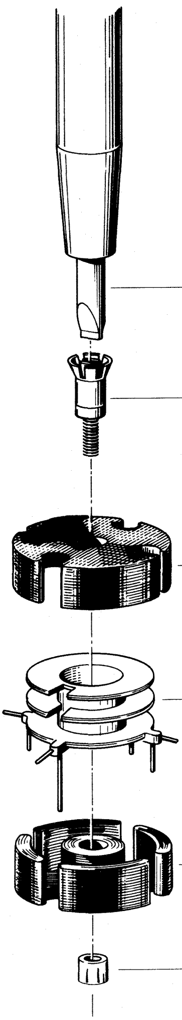
The newly adopted size 36 x 22 mm diameter with coil former for automatic processing is particularly suitable for the economical production of small-signal transformers.

Survey

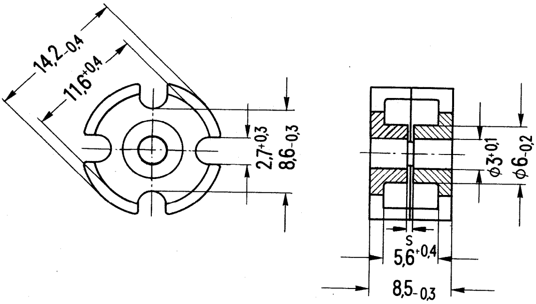
Approx. dimensions dia. x height (mm)	Drawing No.	Type	Page
14 x 8	2 x C61035-A12-C31	B65546	239
18 x 11	2 x C61035-A10-C33	B65656	242
22 x 13	2 x C61035-A17-C30	B65666	245
26 x 16	2 x C61035-A11-C21	B65676	248
36 x 22	2 x C61035-A70-C3	B65617	251
Adjusting tools	–	B63399	340

4-Slot Pot Cores 14 x 8 B 65546

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65549	167
Pot core	B65546	240
Coil former with 1 or 2 sections	B65547	241
Pot core	B65546	240
Threaded sleeve	B65808	167



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.867	mm^{-1}
Effective length	l_e =	20.4	mm
Effective area	A_e =	23.5	mm^2
Effective volume	V_e =	480	mm^3

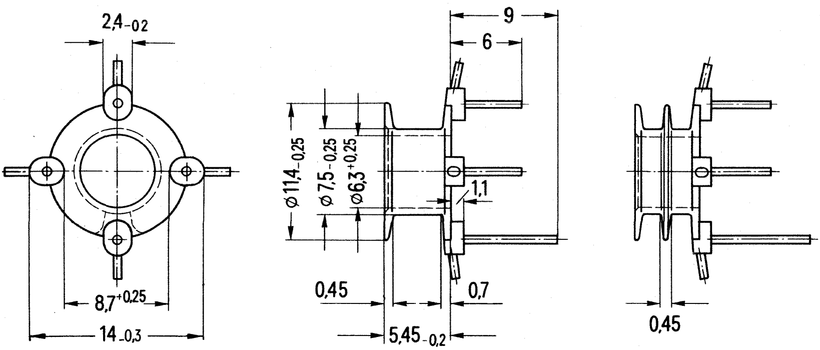
Approx. weight 3.2 g/set

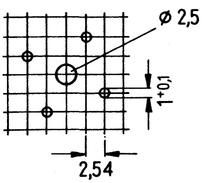
Version	**Ordering code**
without threaded sleeve	B65546–**A**...
with threaded sleeve	only upon request

A_L value nH	tolerance	Ferrite material	Total air gap *s* in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
Gapped					
160	± 3 % ≙ A	N 26	0,17	110	B65546–A160–A48
250			0,1	173	B65546–A250–A48
315			0,08	217	B65546–A315–A48
400			0,05	276	B65546–A400–A48
Ungapped					
2100	$^{+30}_{-20}$ % ≙ R	N 26		1450	B65546–A–R26
4000		N 30		2760	B65546–A–R30
8700	$^{+40}_{-30}$ % ≙ Y	T 38		6000	B65546–A–Y38

Coil former B 65547

Glass-fiber reinforced, thermosetting plastic coil former with 4 terminal pins, flame-retardant in accordance with UL 94 V-0. For solderability of terminal pins refer to page 89. For winding details refer to page 69.





Hole arrangement
View in mounting direction

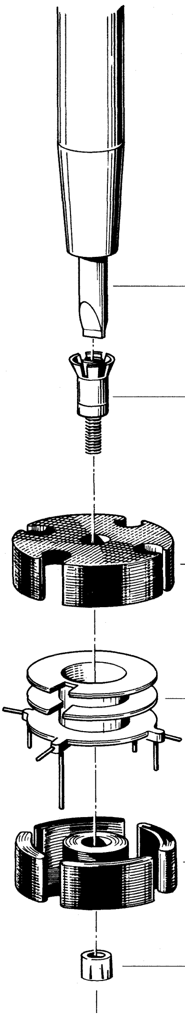
Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 500)
1	7,5	7,5	29,3	134	0,28	B65547-B1001-D1
2	3,3	6,6		153	0,3	B65547-B1001-D2

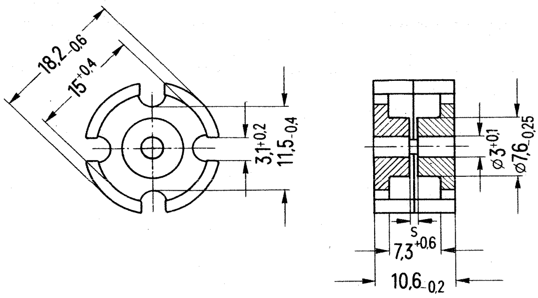
For adjusting devices and adjustment curves refer to page 167, 168.

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65659	177
Pot core	B65656	243
Coil former with 1 or 2 sections	B65657	244
Pot core	B65656	243
Threaded sleeve	B65808	177



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.678	mm^{-1}
Effective length	l_e =	26.5	mm
Effective area	A_e =	39.1	mm^2
Effective volume	V_e =	1040	mm^3

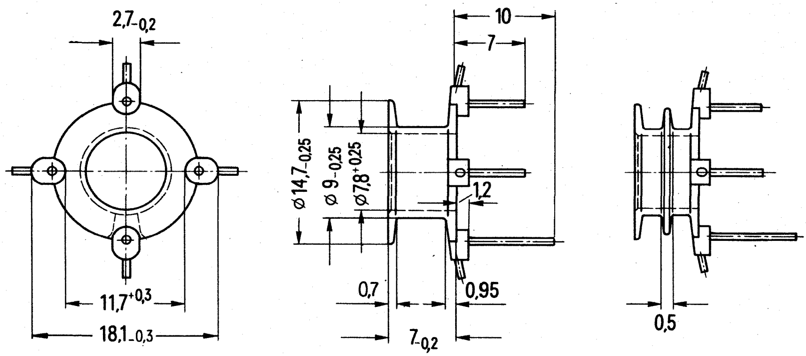
Approx. weight 6 g/set

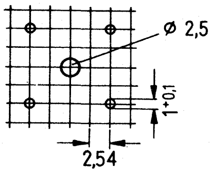
Version	**Ordering code**
without threaded sleeve	B65656–**A**...
with threaded sleeve	only upon request

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
Gapped					
160	±3% ≙ A	N 48	0,32	86	B65656–A160–A48
250			0,2	135	B65656–A250–A48
315			0,15	170	B65656–A315–A48
400			0,1	216	B65656–A400–A48
Ungapped					
2800	$^{+30}_{-20}$ % ≙ R	N 26		1510	B65656–A–R26
5000		N 30		2700	B65656–A–R30
11000	$^{+40}_{-30}$ % ≙ Y	T 38		5930	B65656–A–Y38

Coil former B 65657

Glass-fiber reinforced thermosetting plastic coil former with 4 terminal pins, flame-retardant in accordance with UL 94 V-0. For solderability of terminal pins refer to page 89. For winding details refer to page 69.





Hole arrangement
View in mounting direction

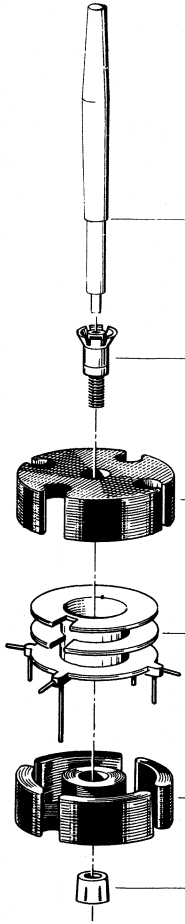
Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 500)
1	14	14	36,8	90,5	0,58	B65657-B1001-D1
2	6,1	12,2		104	0,6	B65657-B1001-D2

For adjusting devices and adjustment curves refer to page 177...179.

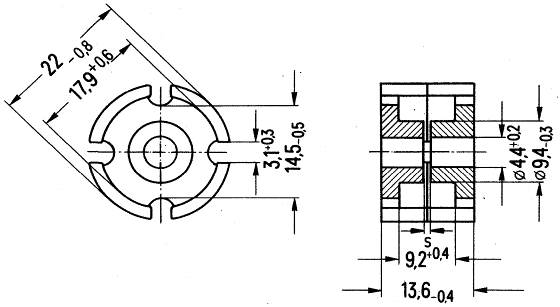
[1)] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65669	199
Pot core	B65666	246
Coil former with 1 or 2 sections	B65667	247
Pot core	B65666	246
Threaded sleeve	B65669	199

4-Slot Pot Cores 22 x 13



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma l/A$ =	0.525 mm^{-1}
Effective length	l_e =	32.1 mm
Effective area	A_e =	61.2 mm^2
Effective volume	V_e =	1970 mm^3

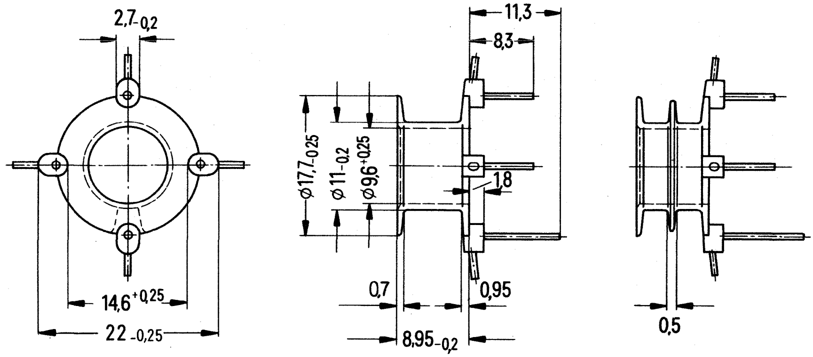
Approx. weight 13 g/set

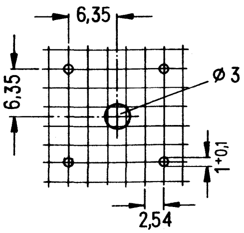
Version	**Ordering code**
without threaded sleeve	B65666–**A**...
with threaded sleeve (fig.)	only upon request

A_L value nH	tolerance	Ferrite material	Total ait gap *s* in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
Gapped					
250	± 3 % ≙ A	N 48	0,29	104	B65666–A250–A48
315			0,22	132	B65666–A315–A48
400			0,16	167	B65666–A400–A48
630			0,1	263	B65666–A630–A48
Ungapped					
3600	$^{+30}_{-20}$ % ≙ R	N 26		1500	B65666–A–R26
6500		N 30		2720	B65666–A–R30
14500	$^{+40}_{-30}$ % ≙ Y	T 38		6060	B65666–A–Y38

Coil former B 65667

Glass-fiber reinforced thermosetting plastic coil former with 4 terminal pins, flame-retardant in accordance with UL 94 V-0. For solderability of terminal pins refer to page 89. For winding details refer to page 69.





Hole arrangement
View in mounting direction

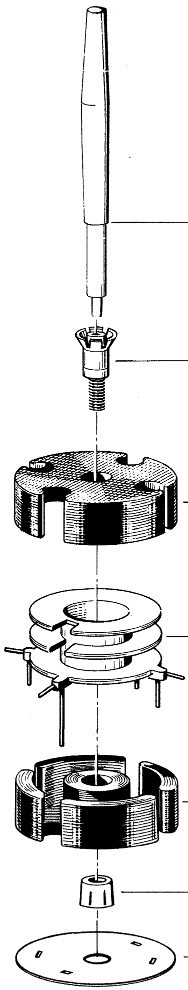
Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R[1] value μΩ	Approx. weight g	**Ordering code** (PU: 250)
1	23	23	44,6	66,7	0,92	B65667–B1001–D1
2	10,7	21,4		71,6	0,94	B65667–B1001–D2

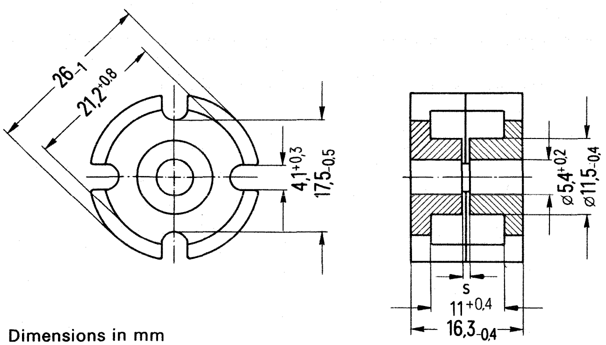
For adjusting devices and adjustment curves refer to page 199...201.

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

Type for PC mounting



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65679	210
Pot core	B65676	249
Coil former with 1 or 2 sections	B65677	250
Pot core	B65676	249
Threaded sleeve	B65679	210
Insulating washer	B65677	250



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma l/A$ =	0.436	mm^{-1}
Effective length	l_e =	38.7	mm
Effective area	A_e =	88.8	mm^2
Effective volume	V_e =	3430	mm^3

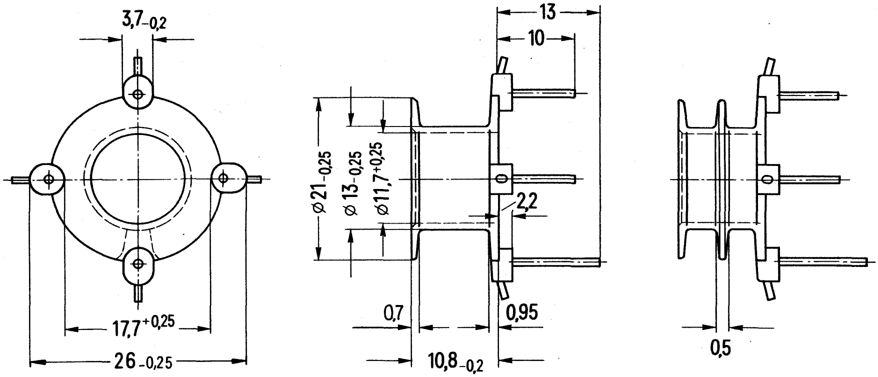
Approx. weight 21 g/set

Version	Ordering code
without threaded sleeve	B65676-**A**...
with threaded sleeve	only upon request

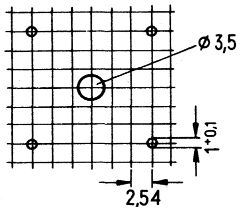
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 200 sets)
Gapped					
315	± 3 % ≙ A	N 48	0,34	109	B65676-A315-A48
400	± 3 % ≙ A	N 48	0,24	139	B65676-A400-A48
630	± 3 % ≙ A	N 48	0,15	219	B65676-A630-A48
800	± 3 % ≙ A	N 48	0,11	278	B65676-A800-A48
Ungapped					
4500	$^{+30}_{-20}$ % ≙ R	N 26		1560	B65676-A-R26
8000	$^{+30}_{-20}$ % ≙ R	N 30		2780	B65676-A-R30
18000	$^{+40}_{-30}$ % ≙ Y	T 38		6240	B65676-A-Y38

Coil former B 65677

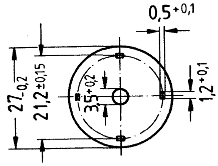
Glass-fiber reinforced thermosetting plastic coil former with 4 terminal pins, flame-retardant in accordance with UL 94 V-0. For solderability of terminal pins refer to page 89. For winding details refer to page 69.



Hole arrangement
View in mounting direction



0.2 mm thick insulating Makrofol washer
for double-clad PCBs

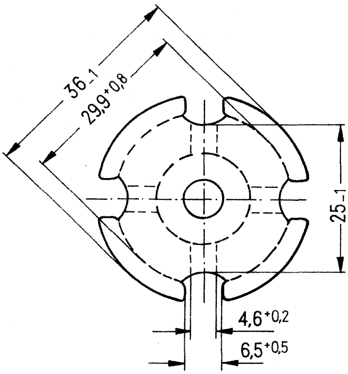


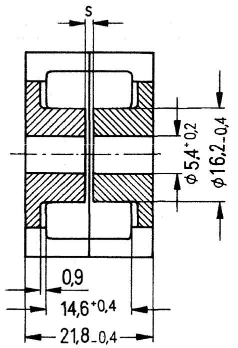
Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 200)
1	28	28	53	65	1,24	B65677-B1001-D1
2	13,2	26,4		69	1,26	B65677-B1001-D2
Insulating washer for double-clad PCBs						B65677-A2005

For adjusting devices and adjustment curves refer to pages 210, 211.

[1)] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)





Approx. weight 50 g/set

Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A =$	0.29 mm^{-1}
Effective length	$l_e =$	52 mm
Effective area	$A_e =$	180 mm^2
Min. core cross section[1]	$A_{min} =$	173 mm^2
Effective volume	$V_e =$	9400 mm^3

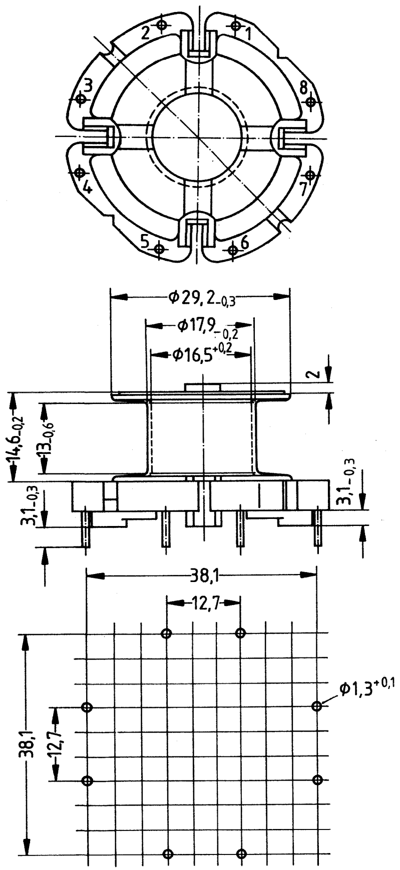
Version	Ordering code
without threaded sleeve	B65617–**A**...

A_L value nH	tolerance	Ferrite material	Total air gap *s* in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 100 sets)
Gapped					
1500	±5% ≙ J	N 30	0,13	346	B65617–A1500–J30
Ungapped					
11700	$^{+30}_{-20}$% ≙ R	N 30		2700	B65617–A–R30

[1] Necessary for the calculation of the max. flux density

Coil former B 65618

Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0.
Equipped with 8 terminals, also suitable for automatic winding.
For soldering of terminal pins refer to page 89.
For winding details refer to page 69.



Hole arrangement
View in mounting direction

Dimensions in mm

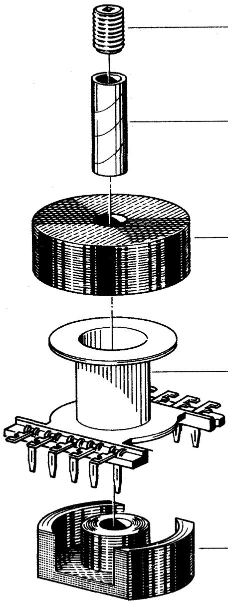
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R 1) value μΩ	Approx. weight g	**Ordering code** (PU: 100)
1	63	73	39	5	B65618–A1008–T1

1) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

Touch-Tone Pot Cores

Touch-Tone Pot Cores 23/15 x 11 — B 65716-P

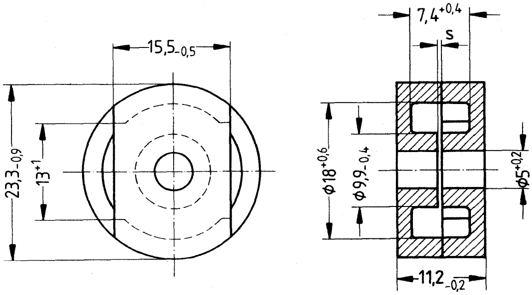
Type e.g. for use in telephone systems (push-button dialing)



Individual parts	Part No.	Page
Screw core	B63310	257
Sleeve	B65717	257
Pot core	B65716-P	256
Coil former, 1 section, with 10 pin terminals	B65717	257
Pot core	B65716-P	256

e.g. for use in telephone systems (push-button dialing)

Pot cores, suitable e.g. for application in push-button telephone sets. Because of the slots in the lower part a higher number of connections can be brought out.



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma l/A$ =	0.48 mm^{-1}
Effective length	l_e =	27 mm
Effective area	A_e =	56 mm^2
Effective volume	V_e =	1510 mm^3

Approx. weight 14 g/set

A_L value nH	tolerance	Ferrite material	Total air gap *s* in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 250 sets)
Gapped					
250	± 3% ≙ A	N 48	0,33	95	B65716-P250-A48
400	± 3% ≙ A	N 48	0,18	153	B65716-P400-A48
1000	± 5% ≙ J	N 27	0,06	382	B65716-P1000-J27
Ungapped					
4000	$^{+30}_{-20}$ % ≙ R	N 27		1530	B65716-P-R27
7200	$^{+30}_{-20}$ % ≙ R	N 30		2750	B65716-P-R30
10000	$^{+30}_{-20}$ % ≙ R	T 35		3820	B65716-P-R35
15000	$^{+40}_{-30}$ % ≙ Y	T 38		5730	B65716-P-Y38

Adjustment ranges

Material	A_L value nH	Screw core	Sleeve	Adjustment range
N 48	250 400	B63310-A4021-X22	B65717-Z3002	approx. 18...22% approx. 11...13%

Glass-fiber reinforced polyamide **Coil Former** (figure 1) with 10 terminal pins.
For solderability of terminal pins refer to page 89.
For winding details refer to page 70.
Polyester-paper **Sleeve** (figure 2), which is glued into the pot core hole.
N 22 ferrite **Screw Core** (figure 3), which cuts its own guiding thread into the cams of the sleeve.
Built-in dimensions for the transformer (basic area x height) 26 x 19.5 x 11.2.

Figure 1

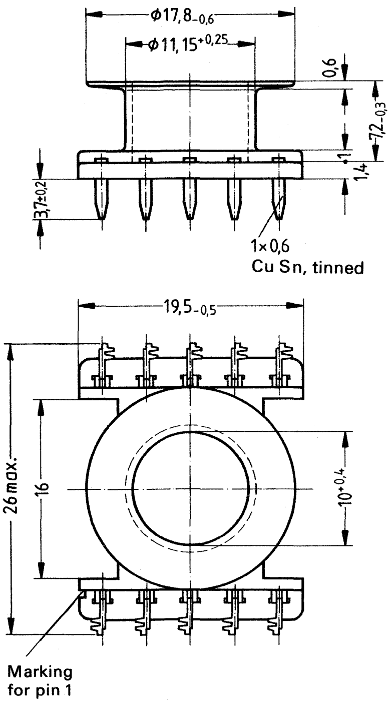
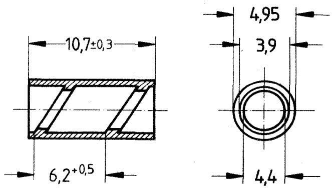


Figure 2



Hole arrangement
View in mounting direction

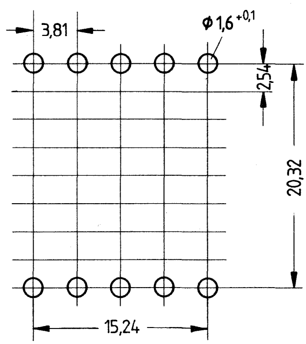
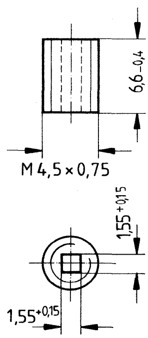


Figure 3



Dimensions in mm

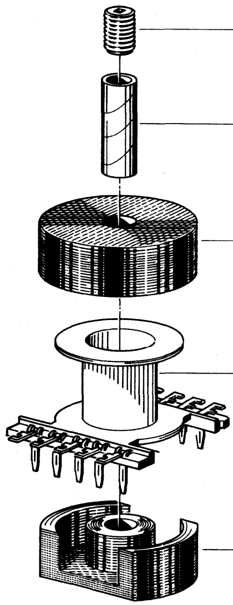
Coil former

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 250)
1	14	44,8	110	1,0	B65717-J1010-R1
Sleeve				0,1	B65717-Z3002
Screw core				0,6	B63310-A4021-X22

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

Touch-Tone Pot Cores 23/15 x 18 — B 65716–A

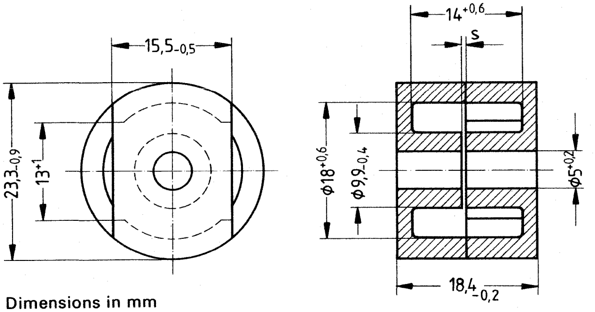
e.g. for use in telephone systems (push-button dialing)



Individual parts	Part No.	Page
Screw core	B63310	260
Sleeve	B65717	260
Pot core	B65716	259
Coil former, 1 section, with 10 pin terminals	B65717	260
Pot core	B65716	259

e.g. for use in telephone systems (push-button dialing)

Pot cores, suitable e.g. for application in push-button telephone sets. Because of the slots in the lower part a higher number of connections can be brought out.



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ = 0.73	mm^{-1}
Effective length	l_e = 41	mm
Effective area	A_e = 56	mm^2
Effective volume	V_e = 2300	mm^3

Approx. weight 17 g/set

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 200 sets)
Gapped					
250 315 400	± 3 % ≙ A	N 48	0,32 0,24 0,17	145 183 232	B65716–A250–A48 B65716–A315–A48 B65716–A400–A48
1000	±10%≙K	N 27	0,055	580	B65716–A1000–K27
Ungapped					
2500	$^{+30}_{-20}$ %≙R	N 27		1450	B65716–A–R27
4800		N 30		2790	B65716–A–R30
6700		T 35		3890	B65716–A–R35
10000	$^{+40}_{-30}$ % ≙ Y	T 38		5807	B65716–A–Y38

Adjustment ranges

Material	A_L value nH	Screw core	Sleeve	Adjustment range
N 48	250 315 400	B63310–A4020–X22	B65717–Z3001	approx. 22...25% approx. 18...20% approx. 13...15%

Glass-fiber reinforced polyamide **Coil Former** (figure 1) with 10 terminal pins.
For solderability of terminal pins refer to page 89. For winding details refer to page 70.
Polyester-paper **Sleeve** (figure 2), which is glued into the pot core hole.
N 22 ferrite **Screw Core** (figure 3), which cuts its own guiding thread into the cams of the sleeve.
Built-in dimensions for the transformer (basic area x height) 26 x 19.5 x 18.4

Figure 1

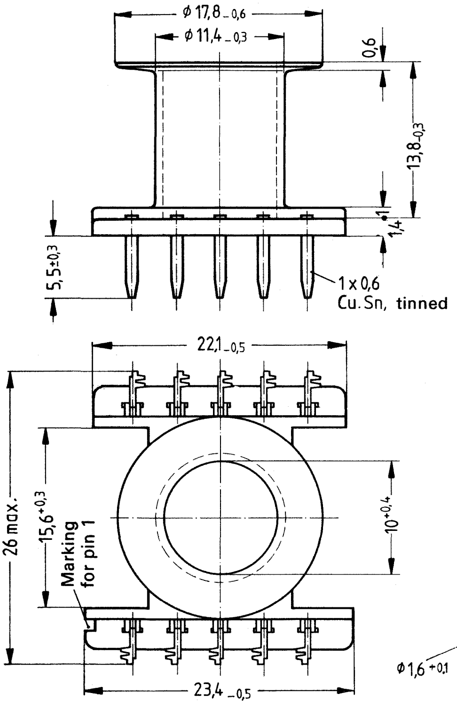
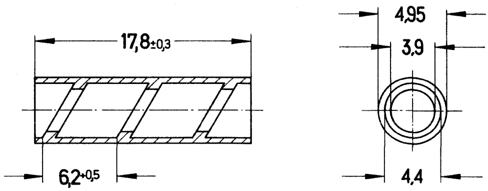


Figure 2



Hole arrangement
View in mounting direction

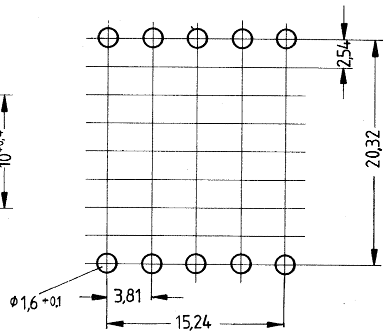
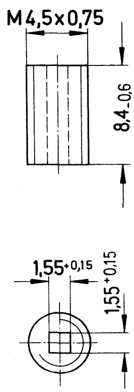


Figure 3



Dimensions in mm

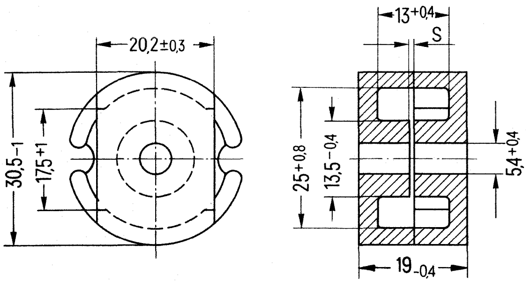
Coil former

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 200)
1	35,6	44,8	43,4	1,3	B65717–A1010–R1
Sleeve				0,2	B65717–Z3001
Screw core				1,0	B63310–A4020–X22

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

e.g. for use in telephone systems (push-button dialing)

Pot cores, suitable e.g. for application in push-button telephone sets. Because of the slots in the lower part, a higher number of terminals can be brought out.



Dimensions in mm

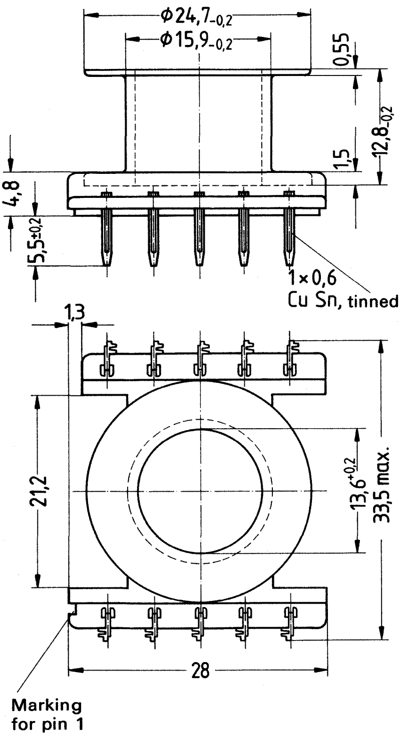
Magnetic characteristics

Core factor	$\Sigma l/A =$	0.45	mm^{-1}
Effective length	$l_e =$	45	mm
Effective area	$A_e =$	100	mm^2
Effective volume	$V_e =$	4500	mm^3

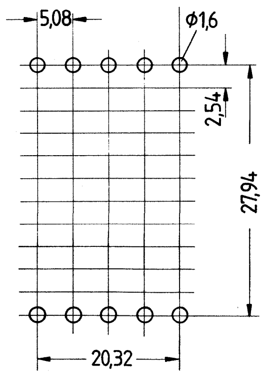
Approx. weight 30 g/set

A_L value		Ferrite material	Total air gap s in mm approx.	Effective permeability	**Ordering code** (PU: 200 sets)
nH	tolerance			μ_e	
Gapped					
400	± 3% ≙ A	N 27	0,40	143	B65730–A400–A27
630			0,24	225	B65730–A630–A27
1000	± 5% ≙ J		0,12	358	B65730–A1000–J27
Ungapped					
4700	$^{+30}_{-20}$% ≙ R	N 27		1680	B65730–A–R27

Glass-fiber reinforced polyamide **Coil Former** with 10 terminal pins.
For solderability of terminal pins refer to page 89.
For winding details refer to page 67.
For **Adjusting Devices** (screws and threaded sleeve) refer to pot cores 30 x 19 (page 220).



Hole arrangement
View in mounting direction

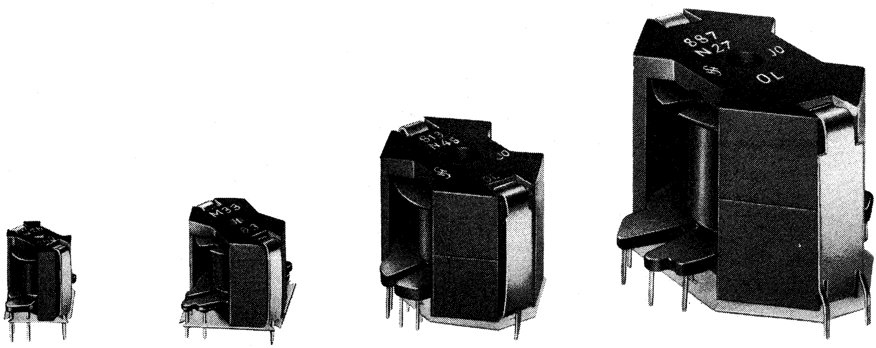


Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 200)
1	48	60	43	2,0	B65731-A1010-R1

[1)] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

RM Cores



RM cores for inductors and transformers, general

The demand for coil formers with directly attached terminal pins for the windings gave rise to the development of compact RM cores. Compared with round pot cores, the pins at the coil former require larger openings in the cores, thus ensuring an efficient winding method.

The coil formers for RM 4 to RM 14 are particularly suitable for automatic winding machines.

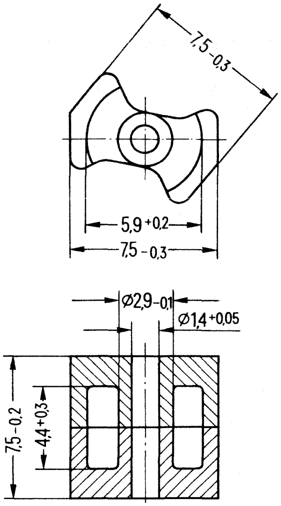
During assembly, RM cores – in addition to being well glued as recommended – are held together by means of clamps which engage in recesses in the base. The dimensions of the RM cores are matched to the hole arrangement of the printed circuit. RM 6 means, for example, that the core with coil former fills a square basic area of 6 x 6 modules (one module ≙ 2.54 mm) = 15.24 mm x 15.24 mm. The sizes which are mainly used, RM 4 to RM 14, are specified in IEC publication 431/431 A, DIN 41980, and the coil formers in DIN 41981.

RM Cores

Survey

Type of core	Standards	Mounting volume basic area x height (approx.) mm	Drawing number	Type No.	Page
RM 3	–	$7,5^2$ x 7,5	2 x C61035–A34–C9	B65817	267
RM 4	DIN 41980 IEC Publ. 431	10^2 x 10,5	2 x C61035–A32–C1	B65803	269
RM 5	DIN 41980 IEC Publ. 431	$12,5^5$ x 10,5	2 x C61035–A31–C8 2 x C61035–A31–C34[1]	B65805	276
RM 6	DIN 41980 IEC Publ. 431	15^2 x 12,5	2 x C61035–A26–C44 2 x C61035–A26–C57[1]	B65807	287
R 6	IEC Publ. 431	15^2 x 12,5	2 x C61035–A43–C1	B65809	299
RM 7	IEC Publ. 431	$17,5^2$ x 13,5	2 x C61035–A60–C1 2 x C61035–A60–C11[1]	B65819	306
RM 8	DIN 41980 IEC Publ. 431	20^2 x 16,5	2 x C61035–A28–C21 2 x C61035–A28–C20[1]	B65811	312
RM 10		25^2 x 19	2 x C61035–A50–C1 2 x C61035–A50–C8[1]	B65813	320
RM 12[2]	–	30^2 x 23,6	2 x C61035–A62–C5[1]	B65815-J	328
RM 12	Recommen- dation	30^2 x 24,6	2 x C61035–A62–C18[1]	B65815-E	331
RM 14[3]	–	35^2 x 29	2 x C61035–A44–C1	B65887-A	335
RM 14	Recommen- dation	35^2 x 30,2	2 x C61035–A44–C22[1]	B65887-E	338
Adjusting tools				B63399	340

[1] Without center hole
[2] Not for new design, replaced by B65815-E
[3] Not for new design, replaced by B65887-E



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	2.1 mm^{-1}
Effective length	l_e =	13.8 mm
Effective area	A_e =	6.5 mm^2
Effective volume	V_e =	90 mm^3

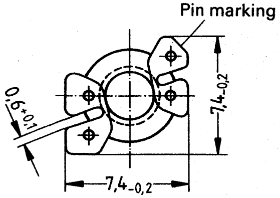
Approx. weight 0.5 g/set

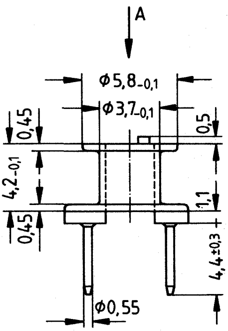
Accessory: Coil former

A_L value nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
Ungapped				
50	$^{+40}_{-30}$ % ≙ Y	K 1	84	B65817-K-Y1
700	$^{+40}_{-30}$ % ≙ Y	N 26	1170	B65817-K-Y26
1400	$^{+40}_{-30}$ % ≙ Y	N 30	2340	B65817-K-Y30

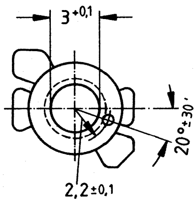
Coil former B 65 818

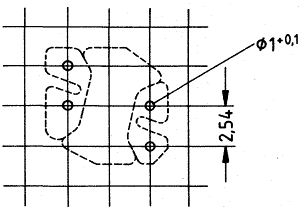
Glass-fiber reinforced polyterephthalate coil former with 4 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.
For winding details refer to page 71.





View A



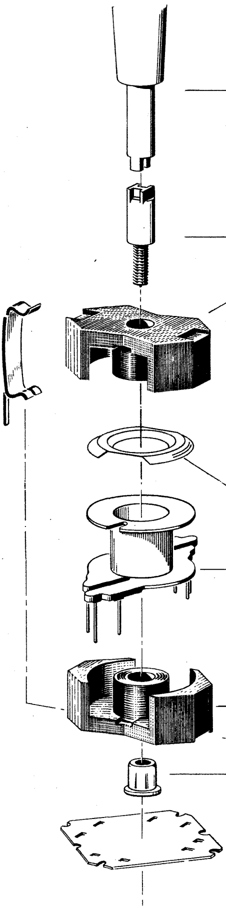


Hole arrangement
View in mounting direction

Dimensions in mm

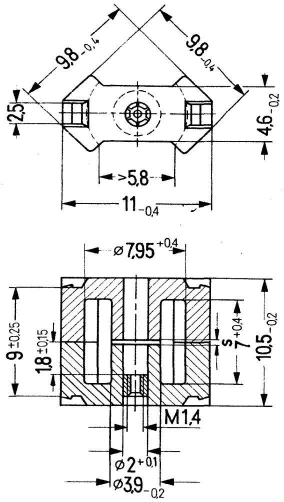
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 500)
1	3,2	14,7	147	0,1	B65818–C1001–D1

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65539	272
Core	B65803	270
Clamps	B65806	271
Insulating washer for coil	B65804	271
Coil former with 1 or 2 sections, 5 or 6 pins	B65804	271
Core	B65803	270
Threaded sleeve	B65806	272
Insulating washer for double-clad PCBs	B65804	271
Additionally available Centering pin	B65806	272

RM 4 cores complying with DIN 41 980 or IEC publication 431.



Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	1.9 mm^{-1}
Effective length	l_e =	21.0 mm
Effective area	A_e =	11.0 mm^2
Effective volume	V_e =	232.0 mm^3

Approx. weight 2 g/set

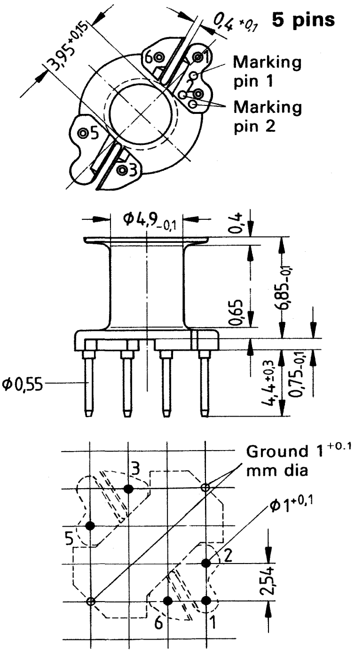
Version	Ordering code[1)]
without threaded sleeve	B65803-**A**...
with threaded sleeve (fig.)	B65803-**N**...

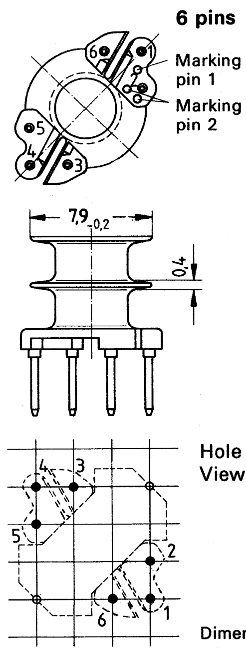
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code**[1)] (PU: 500 sets)
Gapped					
16	±3% ≙ A	K 1	1,0	24,2	B65803-+16-A1
25			0,40	37,8	B65803-+25-A1
40		M 33	0,36	60,4	B65803-+40-A33
63			0,18	95	B65803-+63-A33
63		N 48	0,16	95	B65803-+63-A48
100			0,10	151	B65803-+100-A48 S
160			0,06	242	B65803-+160-A48 S
Ungapped					
50	$^{+30}_{-20}$ % ≙ R	K 1		76	B65803-A-R1
800		N 26		1210	B65803-A-R26
1700		N 30		2570	B65803-A-R30 S
2500	$^{+40}_{-30}$ % ≙ Y	T 35		3780	B65803-A-Y35

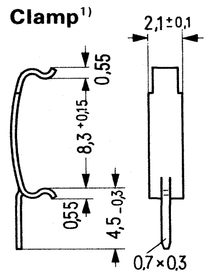
1) + Insert appropriate code letter for requested version
S Preferred products (refer to page 4)

Coil formers, insulating washers B65804, and clamps B65806

Glass-fiber reinforced thermosetting plastic **coil formers** with 5 or 6 terminal pins, complying with IEC publication 431 (DIN 41981), suitable for automatic winding machines, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.







Hole arrangement
View in mounting direction

Dimensions in mm

Coil former Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[2] µΩ	Approx. weight g	Number of pins	**Ordering code** (PU: 1000, insulating parts: 3000)
1	7,7	7,7	20	89	0,2	5	B65804–A1005–D1
						6	B65804–A1006–D1 S
2	3,65	7,3		94	0,23	5	B65804–A1005–D2
						6	B65804–A1006–D2
Clamp (approx. weight 0.1 g; ord. code for each clamp, 2 required)							B65806–B2001 S
Insulating washer for double clad PCBs; PU = 3000							B65804–C2005 S
Insulating washer between core and coil; PU = 1 reel ≙ 3000							B65804–A5000 S

[1] Pressure per clamp pair: 30 ... 45 N.

[2] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

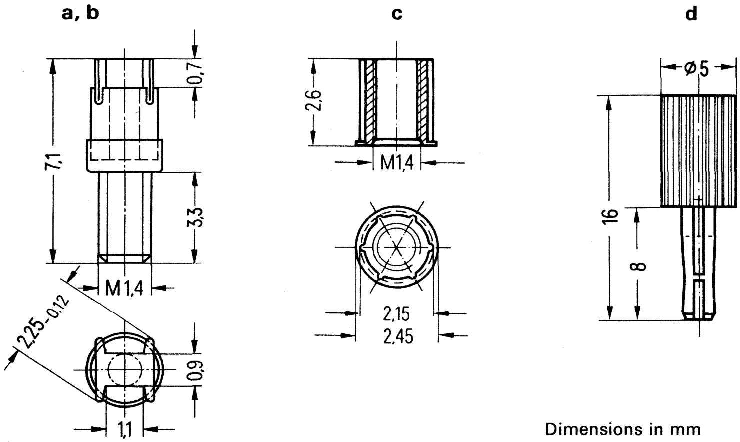
S Preferred products (refer to page 4)

Adjusting Devices B 65539, B 65806

Adjusting Screw (a, b) B65539–C1... consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and 4 cam profiles, serving as core brake;

fits:

glass-fiber reinforced 11 polyamide **Threaded Sleeve** (c) B65806–K3002, color code natural
Centering Pin (d) B65806–A2008 as mounting aid for RM core centering
Adjusting Screw Driver B63399–B4 S



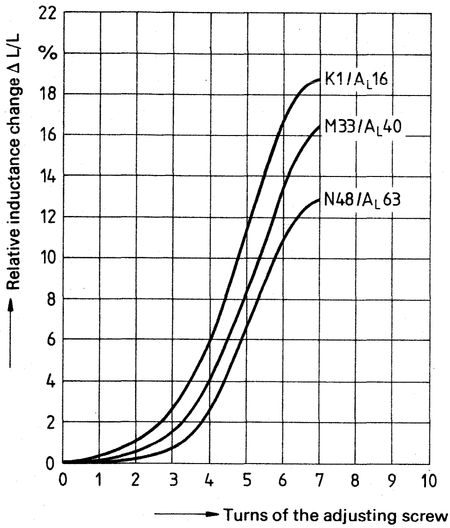
Dimensions in mm

RM 4 core B65803		Adjusting screw				
Material	A_L value nH	Part	Tube core dia. x length	Tube core Material	Color code	**Ordering code** (PU: 1000)
K 1	16	a	1,81 x 2,0	Si 1	black	B65539–C1003–X101
	25			K 1	yellow	B65539–C1003–X1
M 33	40			Si 1	black	B65539–C1003–X101
	63			K 1	yellow	B65539–C1003–X1
N 48	63			Si 1	black	B65539–C1003–X101
	100			K 1	yellow	B65539–C1003–X1 S
	160	b	1,81 x 2,7	N 22	red	B65539–C1002–X22 S

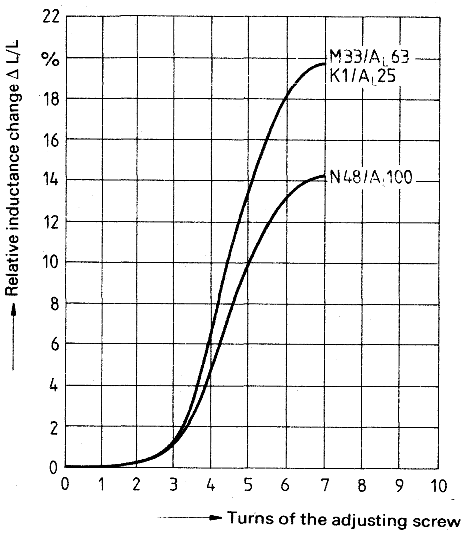
S Preferred products (refer to page 4)

Inductance adjustment curves

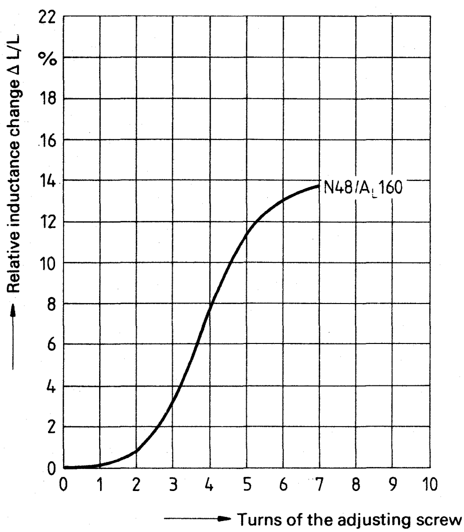
Adjusting screw B65539–C1003–X101
color code black



Adjusting screw B65539–C1003–X1
color code yellow



Adjusting screw B65539–C1002–X22
color code red



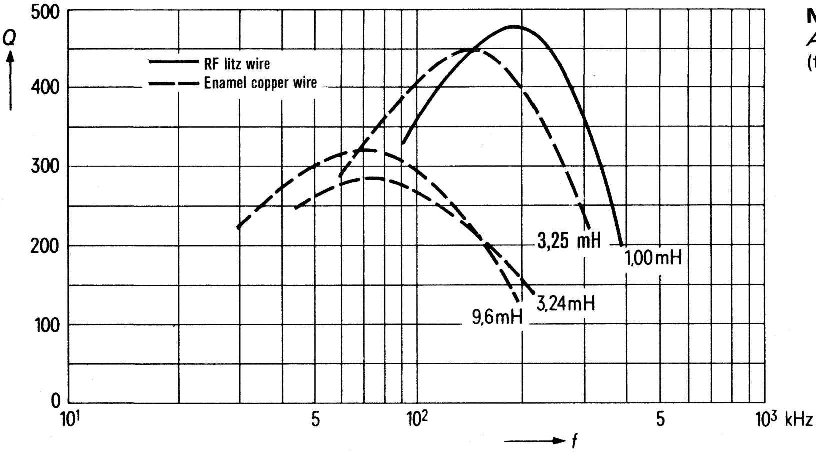
0 ≙ at least one turn engaged

Q factor characteristics

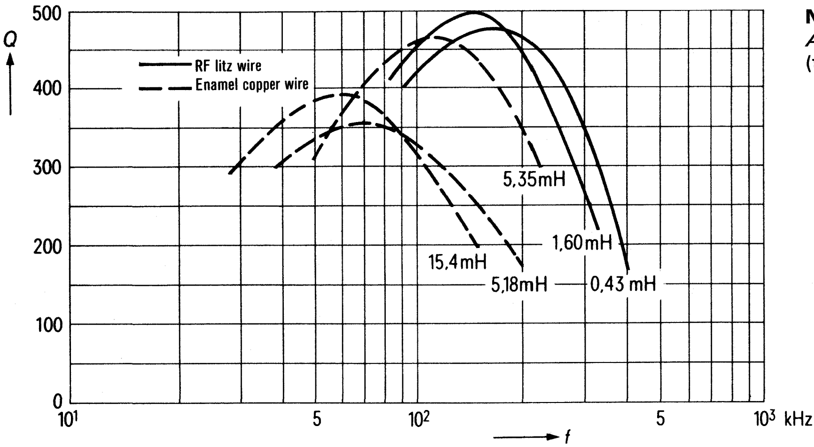
Material N 48

L (mH) for A_L = 100 nH	L (mH) for A_L = 160 nH	Turns	Wire; RF litz wire	Number of sections
–	0,43	52	45 x 0,04 CuLS	1
1,00	1,60	100	20 x 0,04 CuLS	1
3,24	5,18	180	0,18 CuL	1
9,6	15,4	310	0,14 CuL	1
3,25	5,35	183	10 x 0,05 CuL	1

Flux density in the core $\hat{B} < 1$ mT



N 48
A_L = 100 nH
(typical values)

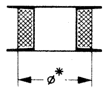


N 48
A_L = 160 nH
(typical values)

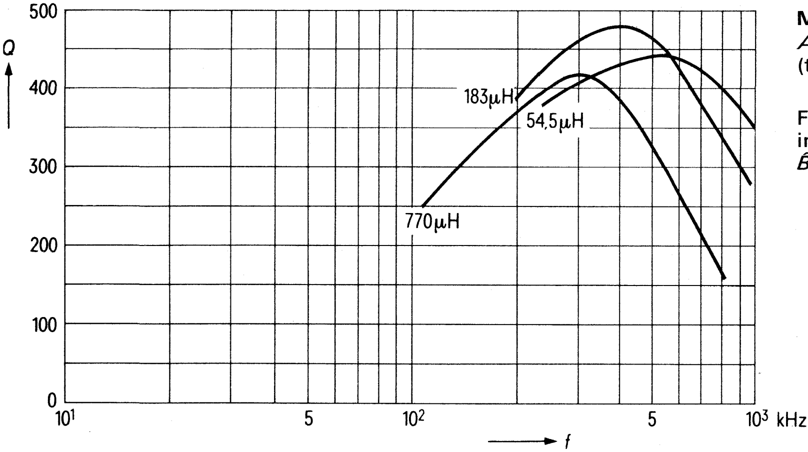
Q factor characteristics

Material M 33, K 1

L (µH) for		Turns	Wire; RF litz wire	Number of sections	∅* mm
M 33 A_L = 63 nH	770	100	20 x 0,04 CuL	1	–
	183	52	45 x 0,04 CuL	1	–
	54,5	29	90 x 0,04 CuL	1	–
K 1 A_L = 25 nH	5,20	14	45 x 0,04 CuLS	1	6,6
	2,65	10	0,5 CuL	1	6,6
	1,27	7	0,6 CuL	1	6,4

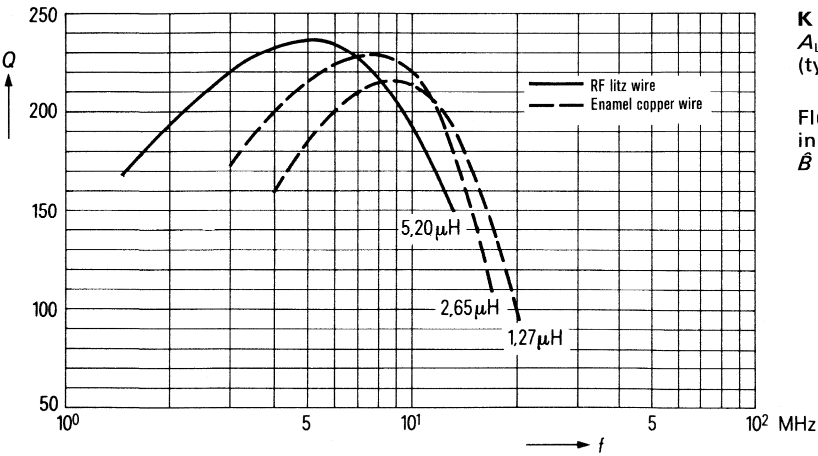


Pad of polystyrene tape up to the diameter*



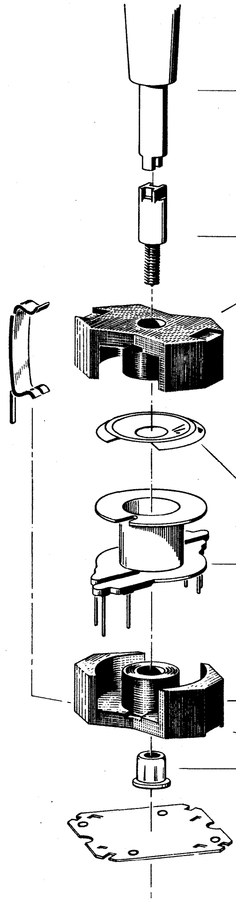
M 33
A_L = 63 nH
(typical values)

Flux density in the core $\hat{B} < 1$ mT



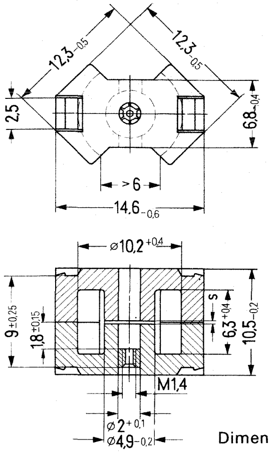
K 1
A_L = 25 nH
(typical values)

Flux density in the core $\hat{B} < 0.5$ mT



Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65539	280
Core	B65805	277
Clamps	B65806	278
Insulating washer for coil	B65806	278
Coil former with 1 or 2 sections, 4, 5, or 6 pins	B65806	278
Core	B65805	277
Threaded sleeve	B65806	280
Insulating washer for double clad PC boards	B65806	278
Additionally available		
Coil former with special solder tags for litz wires	B65806	279
Centering pin	B65806	280

RM 5 cores compyling with DIN 41980 or IEC publication 431. RM 5 cores are also available without center hole for use in transformers.
For cores with CECC quality assessment in accordance with DIN 45970, part 1112, refer to page 36.



Dimensions in mm

Magnetic characteristics

		with center hole	without center hole	
Core factor	$\Sigma l/A$ =	1.0	0.93	mm^{-1}
Effective length	l_e =	20.8	22.1	mm
Effective area	A_e =	20.8	23.8	mm^2
Min. core cross section[1]	A_{min} =	15	18	mm^2
Effective volume	V_e =	430	526	mm^3

Approx. weight 3.1 g/set

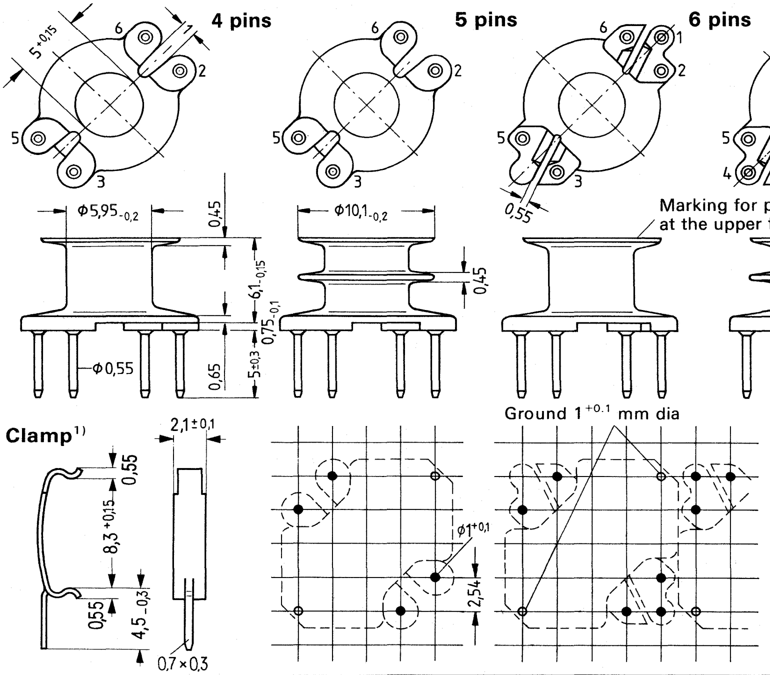
Version	Ordering code[2]
without threaded sleeve	B65807–**C**...
with threaded sleeve (fig.)	B65807–**N**...
without center hole	B65807–**J**...

A_L value nH	tolerance	Ferrite material	Total air gap s in mm (appr.)	Effective permeability μ_e	**Ordering code**[2] (PU: 500 sets)	
Gapped						
25	±3% ≙ A	K 1	1,0	19,9	B65805–+25–A1	
40			0,4	31,8	B65805–+40–A1	S
63		M 33	0,4	50,2	B65805–N63–A33	S
100			0,2	79,6	B65805–N100–A33	S
125	±2% ≙ G	N 48	0,16	100	B65805–N125–G48	
160	±3% ≙ A		0,12	128	B65805–N160–A48	S
200			0,09	159	B65805–N200–A48	
250			0,06	200	B65805–N250–A48	S
315			0,03	255	B65805–+315–A48	S
Ungapped						
100	$^{+30}_{-20}$% ≙ R	K 1		80	B65805–C–R1	
1400		N 47		1110	B65805–C–R47	S
1800		N 26		1430	B65805–C–R26	S
2600		N 41		1910	B65805–J–R41	
3500		N 30		2590	B65805–J–R30	S
5200		T 35		3850	B65805–J–R35	S
6700	$^{+40}_{-30}$% ≙ Y	T 38		4960	B65805–J–Y38	S
6700	$^{+80}_{-0}$% ≙ U	T 38		4960	B65805–J6700–U638	

[1] Necessary for the calculation of the max. flux density
[2] + Insert appropriate code letter for requested version
S Preferred products (refer to page 4)

Coil formers, insulating washers and clamps B 65806

Glass-fiber reinforced thermosetting plastic **coil formers** with 4, 5, or 6 terminal pins, complying with IEC publication 431 (DIN 41981), suitable for automatic winding machines, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.



Hole arrangement
View in mounting direction

Dimensions in mm

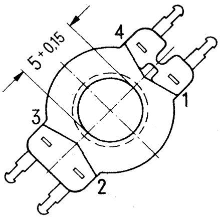
Coil former Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value²⁾ µΩ	Approx. weight g	Number of pins	**Ordering code** (PU: 500, insulating parts: 2500)
1	9,5	9,5	25	90	0,3	4	B65806-A1004-D1 S
						5	B65806-A1005-D1 S
						6	B65806-A1006-D1 S
2	4,35	8,7		94	0,4	4	B65806-A1004-D2
						5	B65806-A1005-D2
						6	B65806-A1006-D2
Clamp (approx. weight 0.1 g; ordering code for each clamp, two required)							B65806-B2001 S
Insulating washer for double clad PCBs; PU = 2500							B65806-D2005 S
Insulating washer between core and coil; PU = 1 reel ≙ 2500							B65806-A5000 S

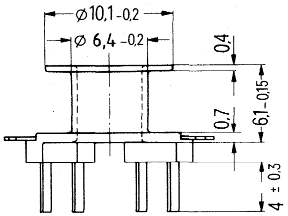
1) Pressure per clamp pair: 36 ... 45 N. 2) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

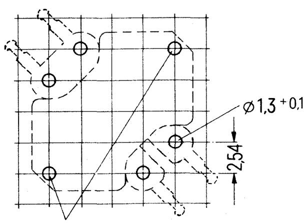
S Preferred products (refer to page 4)

Coil former B 65806–J

Glass-fiber reinforced polyterephthalate **coil former** with special solder terminals for litz wires, flame-retardant in accordance with UL 94-0.
For solderability of terminal pins refer to page 89.
For winding details refer to page 71.







Ground $1^{+0,1}$ mm dia

Hole arrangement
View in mounting direction

Dimensions in mm

Coil former							Ordering code (PU: 500)
Number of sections	Useful winding cross section A_N of one section mm²	Useful winding cross section A_N total mm²	Average length of turn l_N mm	A_R value[1)] µΩ	Approx. weight g	Number of pins	
1	9,5	9,5	25	90	0,4	4	B65806–J1003–T1

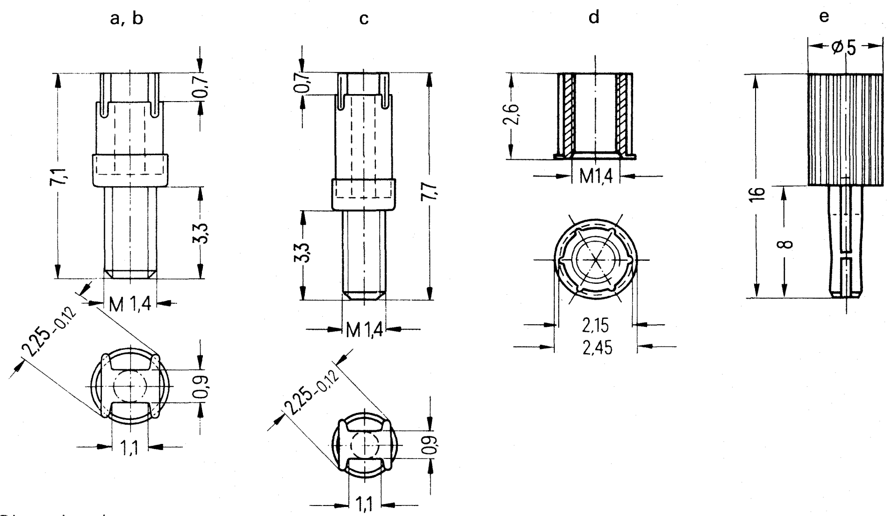
1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

Adjusting Devices B 65539, B 65806

Adjusting Screws (a, b) B65539–C1... and (c) B65806–C3... or B65806–A3..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and 4 cam profiles, serving as core brake;

fits:

glass-fiber reinforced 11 polyamide **Threaded Sleeve** (d) B65806–K3002, color code natural
Centering Pin (e) B65806–A2008 as mounting aid for RM core centering
Adjusting Screw Driver B63399–B4 S



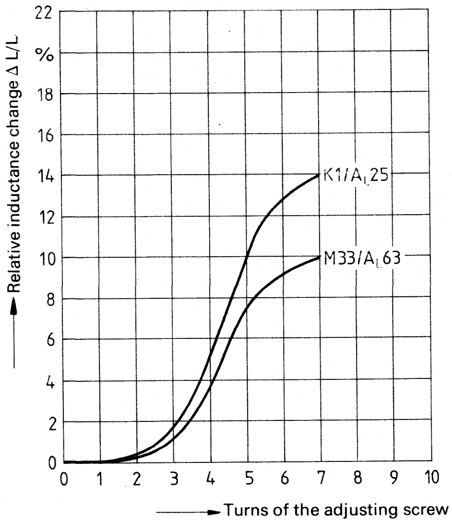
Dimensions in mm

RM 5 core B65805		Adjusting screw				
Material	A_L value nH	Part	Tube core dia x length	Tube core Material	Color code	**Ordering code** (PU: 500)
K 1	25	a	1,81 x 2,0	Si 1	black	B65539–C1003–X101
	40			K 1	yellow	B65539–C1003–X1 S
M 33	63	b	1,81 x 2,7	Si 1	white	B65539–C1002–X101 S
	100	a	1,81 x 2,0	K 1	yellow	B65539–C1003–X1 S
N 48	125					
	160 200	b	1,81 x 2,7	N 22	red	B65539–C1002–X22 S
	250 315	c	1,85 x 3,4		green	B65806–C3001–X22 S
	315		1,90 x 3,4		blue	B65806–A3002–X22

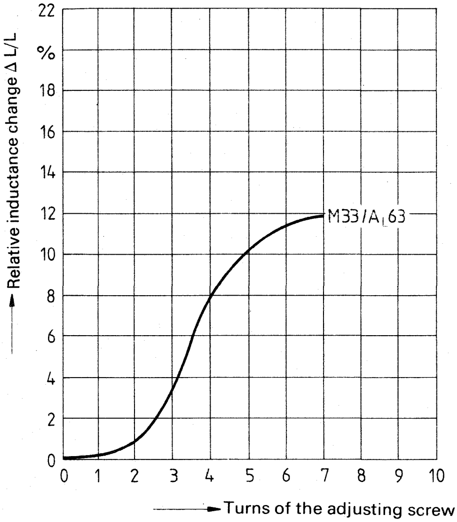
S Preferred products (refer to page 4)

Inductance adjustment curves

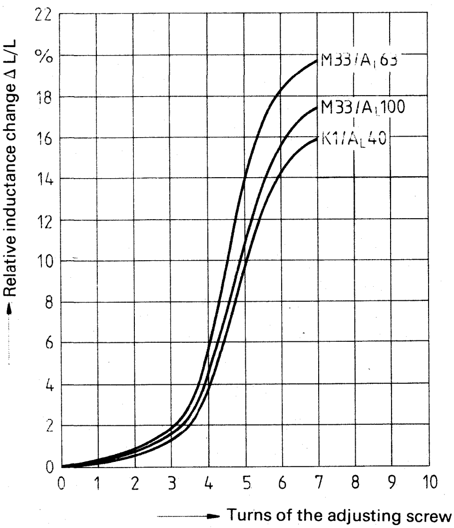
Adjusting screw B65539-C1003-X101
color code black



Adjusting screw B65539-C1002-X101
color code white



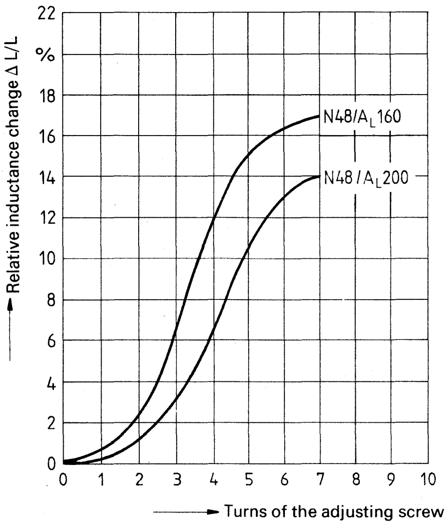
Adjusting screw B65539-C1003-X1
color code yellow



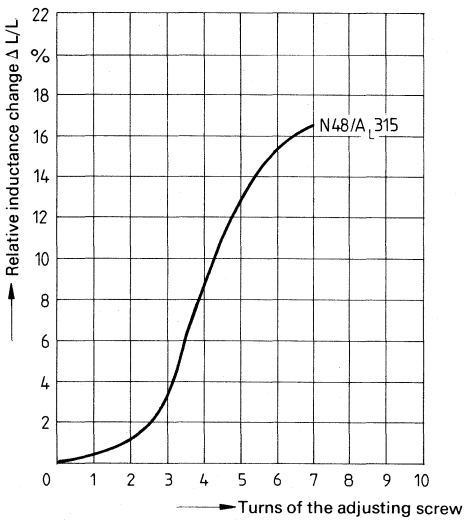
0 ≙ at least one turn engaged

Inductance adjustment curves

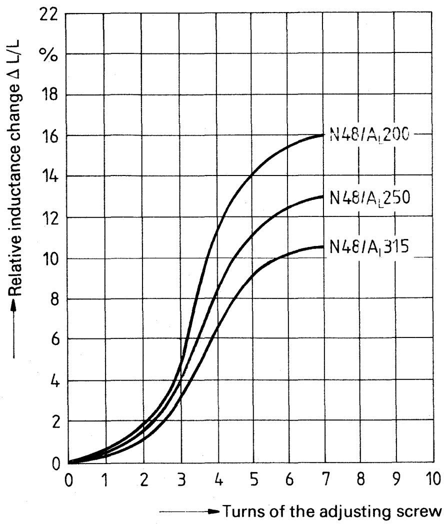
Adjusting screw B65539–C1002–X22
color code red



Adjusting screw B65806–A3002–X22
color code blue



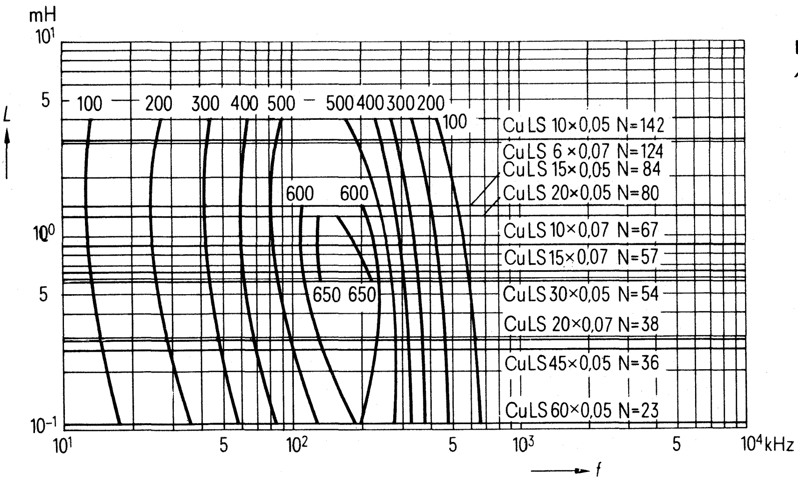
Adjusting screw B65806–C3001–X22
color code green



0 ≙ at least one turn engaged

ISO-Q curves
Material N 48

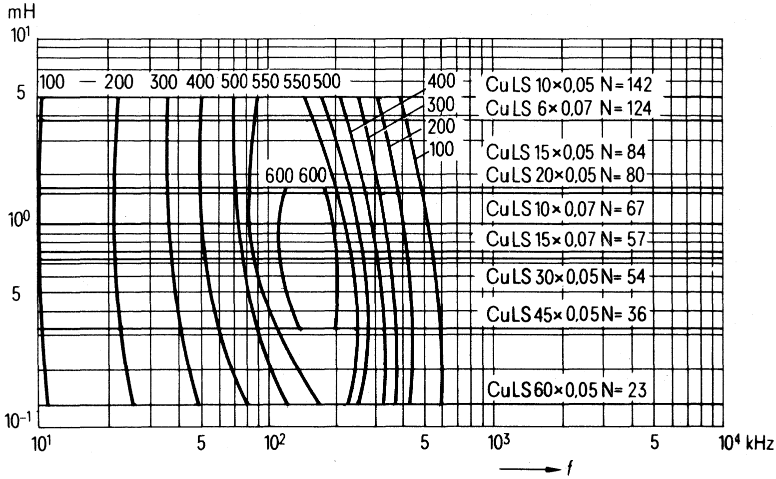
1-section winding with RF litz wire
Flux density in the core $\hat{B}$ < 1 mT



N 48
A_L = 200 nH

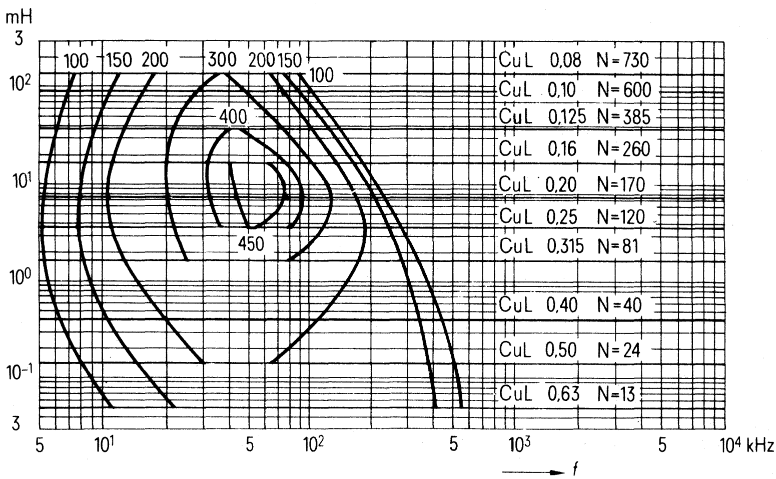
ISO-Q curves
Material N 48

1-section winding with litz wire
Flux density in the core $\hat{B} < 1$ mT



N 48
A_L = 250 nH

1-section winding with enamel copper wire
Flux density in the core $\hat{B} < 1$ mT

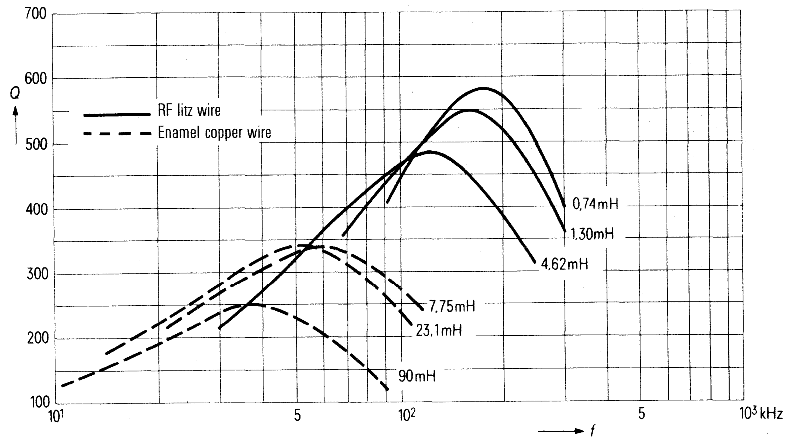


N 48
A_L = 250 nH

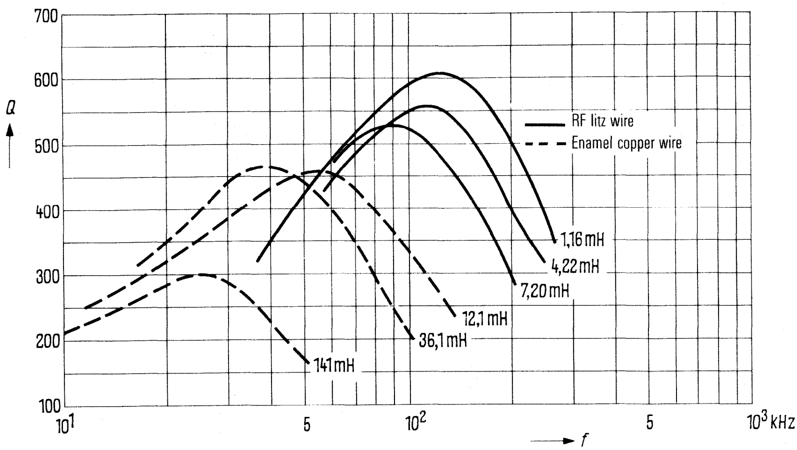
Q factor characteristics
Material N 48

L (mH) for A_L = 160 nH	L (mH) for A_L = 250 nH	Turns	Wire; RF litz wire	Number of sections
90	141	750	0,1 CuL	1
23,1	36,1	380	0,14 CuL	1
7,75	12,1	220	0,18 CuL	1
4,62	7,20	170	10 x 0,05 CuLS	1
–	4,22	130	20 x 0,04 CuLS	1
1,30	–	90	30 x 0,04 CuLS	1
0,74	1,16	68	45 x 0,04 CuLS	1

Flux density in the core $\hat{B}$ < 2 mT



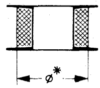
N 48
A_L = 160 nH
(typical values)



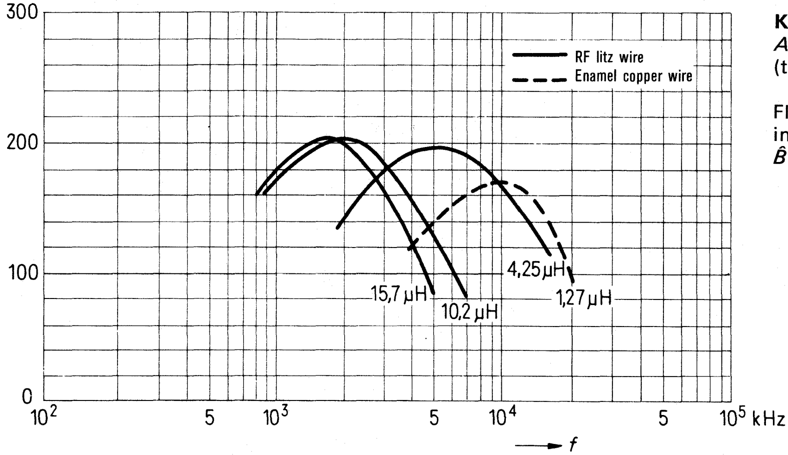
N 48
A_L = 250 nH
(typical values)

Q factor characteristics
Material K 1

L (µH) for A_L = 25 nH	A_L = 40 nH	Turns	Wire; litz wire	∅* mm
1,27	1,96	7	0,6 CuL	8,5
4,25	6,75	13	30 x 0,04 CuLS	9,0
15,7	25,0	25	30 x 0,04 CuLS	8,4
10,2	16,0	20	45 x 0,04 CuLS	8,2

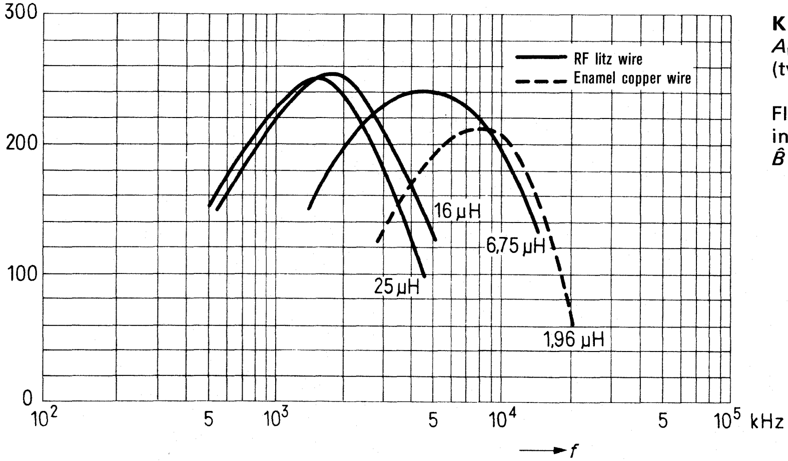


* Pad of polystyrene tape up to the diameter*
(valid for 1 section)



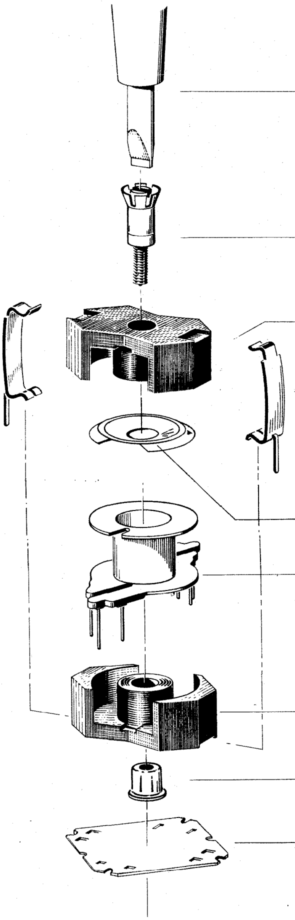
K 1
A_L = 25 nH
(typical values)

Flux density in the core
$\hat{B} < 0.5$ mT



K 1
A_L = 40 nH
(typical values)

Flux density in the core
$\hat{B} < 0.6$ mT

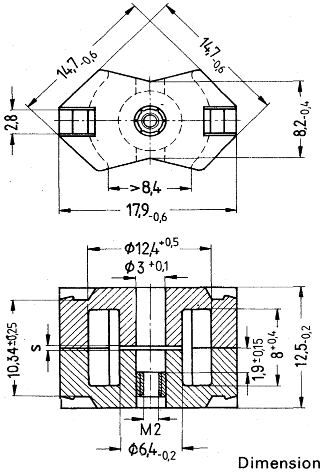


Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65659	292
Core	B65807	288
Clamps	B65808	289
Insulation washer for coil	B65808	289
Coil formers with 1 or 2 sections, 4, 5, or 6 pins	B65808	289
Core	B65807	288
Threaded sleeve	B65808	292
Insulating washer for double clad PC boards	B65808	289

Additionally available

Coil former with special solder tags for litz wires	B65808	290
Coil former for power transformers	B65808	291
Centering pin	B65808	292

RM 6 cores complying with DIN 41980 or IEC publication 431. RM 6 cores are also available without center hole for use in transformers.
For cores with CECC quality assessment in acc. with DIN 45970, part 1113, refer to page 36.



Dimensions in mm

Magnetic characteristics

		with center hole	without center hole	
Core factor	$\Sigma l/A$ =	0.86	0.78	mm^{-1}
Effective length	l_e =	26.9	28.6	mm
Effective area	A_e =	31.3	36.6	mm^2
Min. core cross section[1]	A_{min} =	–	31	mm^2
Effective volume	V_e =	840	1050	mm^3
Approx. weight/set		4.7	5.1	g

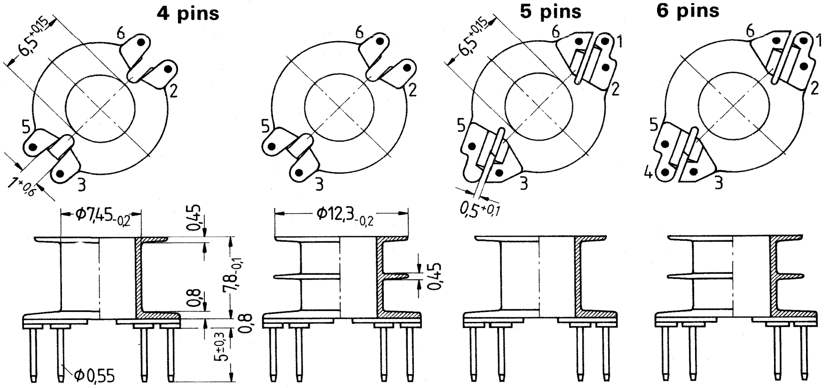
Version	Ordering code[2]
without threaded sleeve	B65807–**C**...
with threaded sleeve (fig.)	B65807–**N**...
without center hole	B65807–**J**...

A_L value nH	tolerance	Ferrite material	Total air gap s in mm (approx.)	Effective permeability μ_e	**Ordering code[2]** (PU: 500 sets)	
Gapped						
40	± 3% ≙ A	K 1	0,80	27,4	B65807–N40–A1	S
63		M 33	0,60	43,2	B65807–N63–A33	S
100			0,38	68,5	B65807–N100–A33	S
160	± 2% ≙ G	N 48	0,22	110	B65807–N160–G48	S
200	± 3% ≙ A		0,17	137	B65807–N200–A48	
250			0,12	171	B65807–N250–A48	S
315			0,08	216	B65807–N315–A48	S
400			0,05	274	B65807–+400–A48	S
1000	± 10% ≙ K	N 26	0,006	685	B65807–C1000–K26	S
Ungapped						
120	$^{+30}_{-20}$ % ≙ R	K 1		82	B65807–C–R1	
1700		N 47		1160	B65807–C–R47	S
2000		N 26		1370	B65807–C–R26	S
3100		N 41		1920	B65807–J–R41	
4300		N 30		2670	B65807–J–R30	S
6200		T 35		3850	B65807–J–R35	S
8600	$^{+40}_{-30}$ % ≙ Y	T 38		5340	B65807–J–Y38	S
8600	$^{+80}_{-0}$	T 38		5340	B65807–J8600–U638	

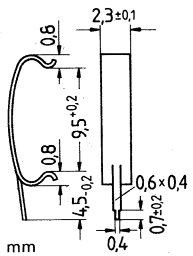
1) Necessary for the calculation of the max. flux density
2) + Insert code letter "C" or "N" for requested version
S Preferred products (refer to page 4)

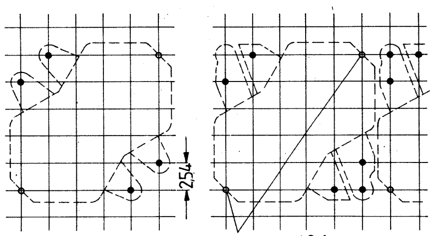
Coil formers, insulating washers, and clamps B 65 808

Glass-fiber reinforced thermosetting plastic **coil formers** with 4, 5, or 6 terminal pins, complying with IEC publication 431 (DIN 41 981), suitable for automatic winding machines, flame-retardant in accordance with UL 94 V-0. For solderability of terminal pins refer to page 89.
For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.



Clamp[1)]





Hole arrangement
View in mounting direction

Dimensions in mm

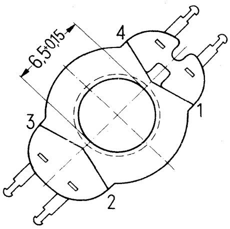
Coil former Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[2)] µΩ	Approx. weight g	Number of pins	Ordering code (PU: 500, insulating parts: 2500)	
1	15	15	30	69	0,4	4	B65808-A1004-D1	S
						5	B65808-A1005-D1	S
						6	B65808-A1006-D1	S
2	7	14		73	0,6	4	B65808-A1004-D2	S
						5	B65808-A1005-D2	
						6	B65808-A1006-D2	S
Clamp (approx. weight 0.12 g; ordering code for each clamp, two required)							B65808-C2002	S
Insulating washer for double clad PCBs; PU = 2500							B65808-C2005	S
Insulating washer between core and coil; PU = 1 reel ≙ 2500							B65808-A5000	S

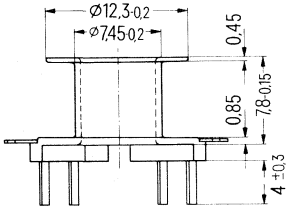
1) Pressure per clamp pair: 45 ... 60 N. 2) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

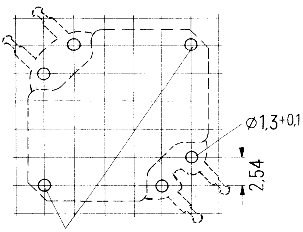
S Preferred products (refer to page 4)

Coil former B 65808–J

Glass-fiber reinforced polyterephthalate **coil former** with special solder terminals for litz wires, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.
For winding details refer to page 71.







Hole arrangement
View in mounting direction

Ground $1^{+0,1}$ mm dia

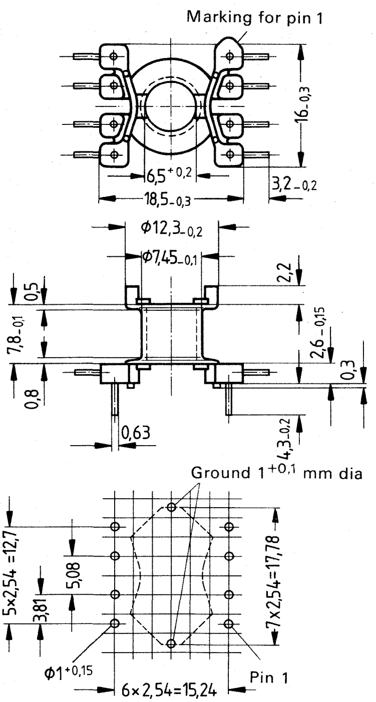
Dimensions in mm

Coil former						Ordering code (PU: 500)
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] µΩ	Approx. weight g	Number of pins	
1	15	30	69	0,5	4	B65808–J1003–T1

[1)] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

Coil former for power transformers B 65808

Glass-fiber reinforced polyterephthalate **coil former** with 8 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.



Hole arrangement
View in mounting direction
(intermediate spacing
should be considered!)

Dimensions in mm

Coil former							Ordering code (PU: 500)
Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	Number of pins	
1	15	15	30	6	2	8	B65808−B1508−T1 S

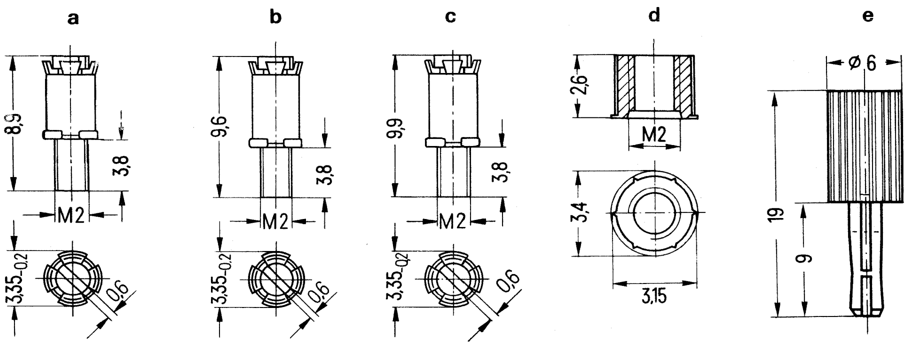
[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

Adjusting Devices B 65 659

Adjusting Screw (a, b, c) B65659–F... consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

fits:

glass-fiber reinforced 11 polyamide **Threaded Sleeve** (d) B65808–L3002
Centering Pin (e) B65808–A2008 as mounting aid for RM core centering
Adjusting Screw Driver B63399–B4 S



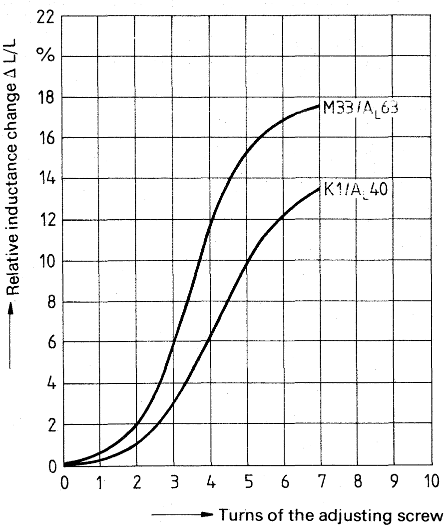
Dimensions in mm

RM 6 core B65807		Adjusting screw					
Material	A_L value nH	Part	Tube core dia x length	Tube core Material	Color code	**Ordering code** (PU: 500)	
K 1	40	a	2,62 x 3,7	Si 1	white	B65659–F1–X101	S
M 33	63						
	100	c	2,82 x 4,4		brown	B65659–F4–X101	S
N 48	160	a	2,62 x 3,7	K 1	green	B65659–F1–X1	
N 48	200 250	a	2,62 x 3,7	N 22	red	B65659–F1–X23	S
	315	b	2,75 x 4,4		black	B65659–F3–X23	S
	400	c	2,82 x 4,4		yellow	B65659–F4–X23	S

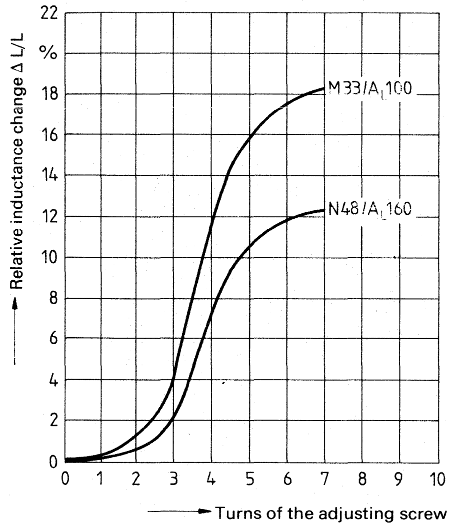
S Preferred products (refer to page 4)

Inductance adjustment curves

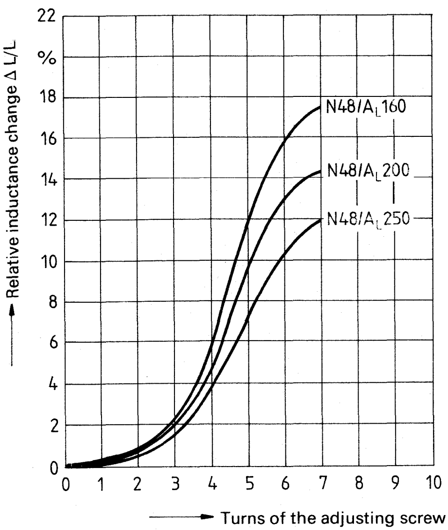
Adjusting screw B65659–F1–X101
color code white



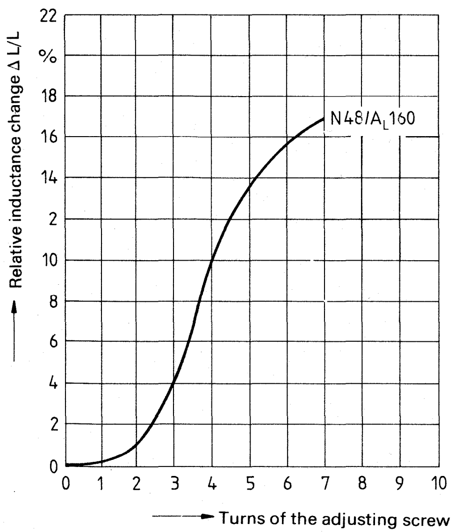
Adjusting screw B65659–F4–X101
color code brown



Adjusting screw B65659–F1–X23
color code red



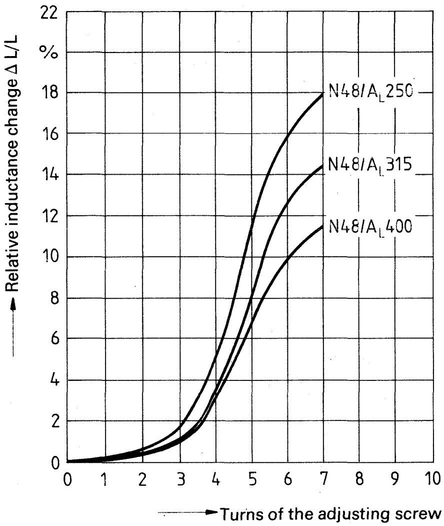
Adjusting screw B65659–F1–X1
color code green



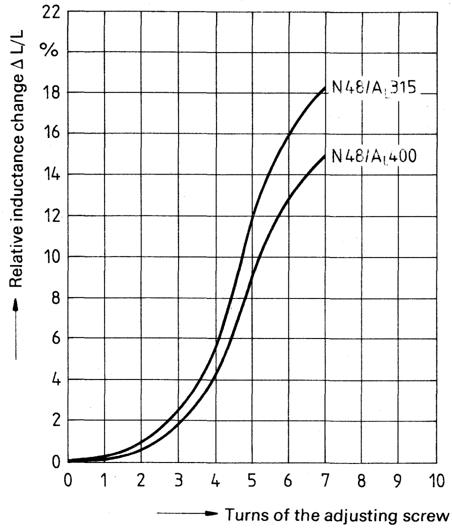
0 ≙ at least one turn engaged

Inductance adjustment curves

Adjusting screw B65659–F3–X23
color code black



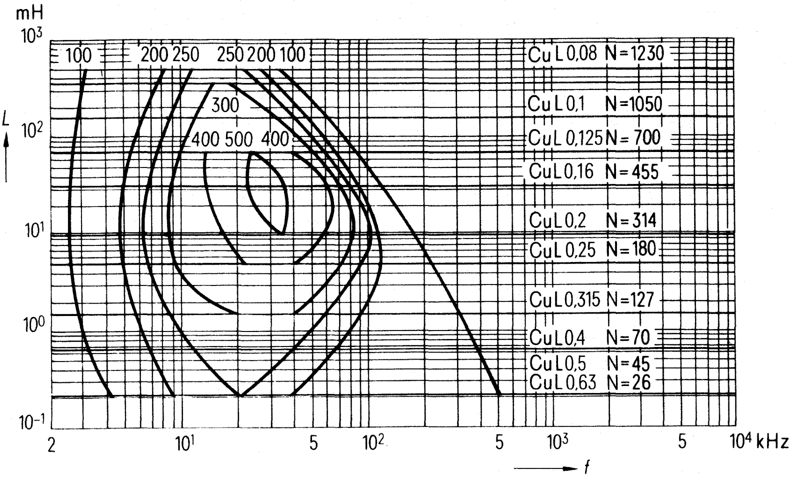
Adjusting screw B65659–F4–X23
color code yellow



0 ≙ at least one turn engaged

ISO-Q curves
Material N 48

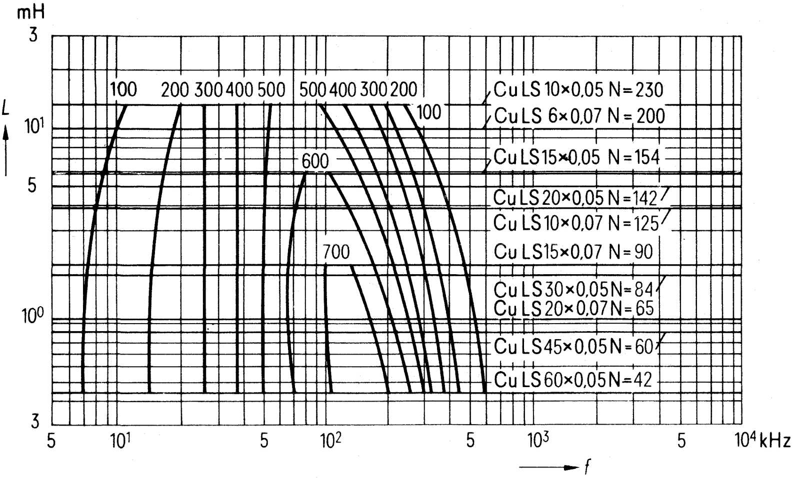
1-section winding with enamel copper wire
Flux densitiy in the core $\hat{B} < 1$ mT



N 48
A_L = 315 nH

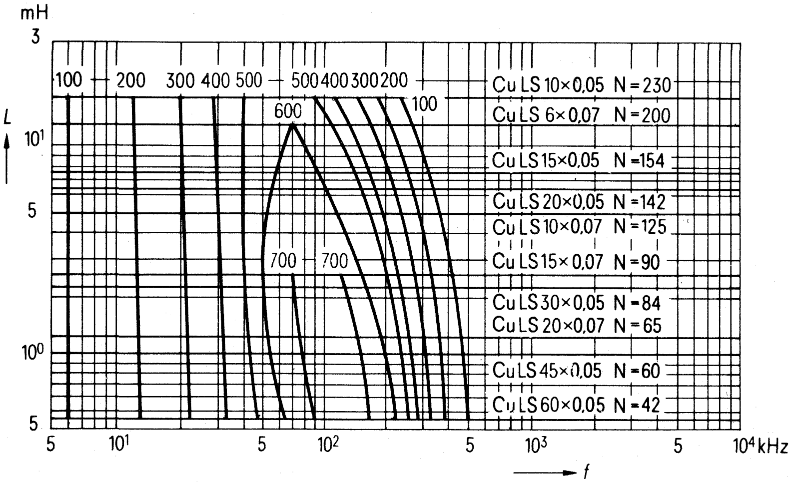
ISO-Q curves
Material N 48

1-section winding with RF litz wire
Flux density in the core $\hat{B} < 1$ mT



N 48
$A_L = 250$ nH

1-section winding with RF litz wire
Flux density in the core $\hat{B} < 1$ mT

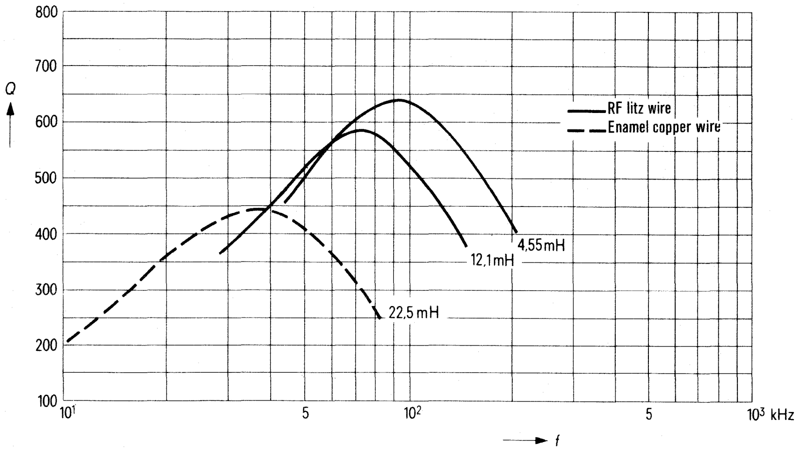


N 48
$A_L = 315$ nH

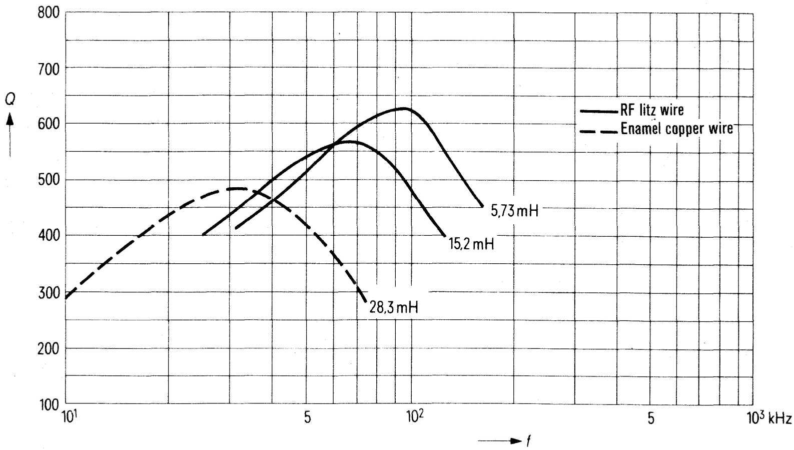
Q factor characteristics
Material N 48

L (mH) for A_L = 250 nH	A_L = 315 nH	Turns	Wire; RF litz wire	Number of sections
22,5	28,3	300	0,20 CuL	1
12,1	15,2	220	6 x 0,07 CuLS	1
4,55	5,73	135	20 x 0,05 CuLS	1

Flux density in the core $\hat{B} < 2$ mT



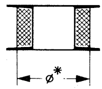
N 48
A_L = 250 nH
(typical values)



N 48
A_L = 315 nH
(typical values)

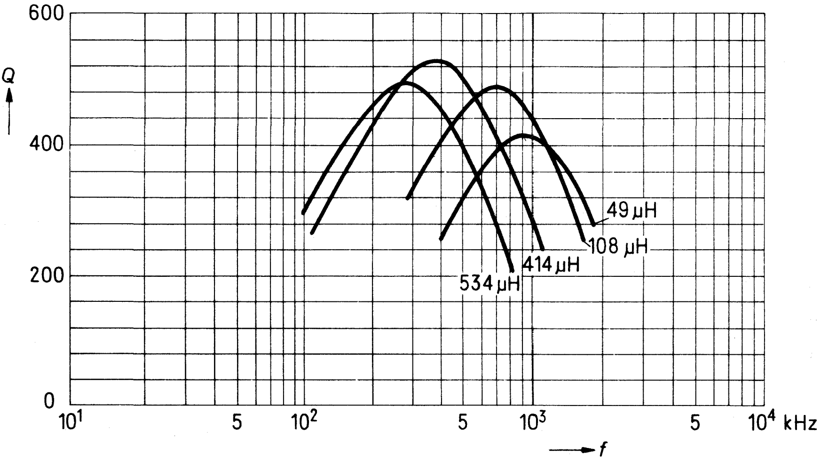
Q factor characteristics
Material M 33

L (µH) for A_L = 63 nH	A_L = 100 nH	Turns	RF litz wire	Number of sections	∅* mm
534	847	92	45 x 0,04 CuLS	1	–
414	657	81	45 x 0,04 CuLS	2	–
108	168	41	45 x 0,04 CuLS	2	9,8
49	75	27	45 x 0,04 CuLS	2	10,6

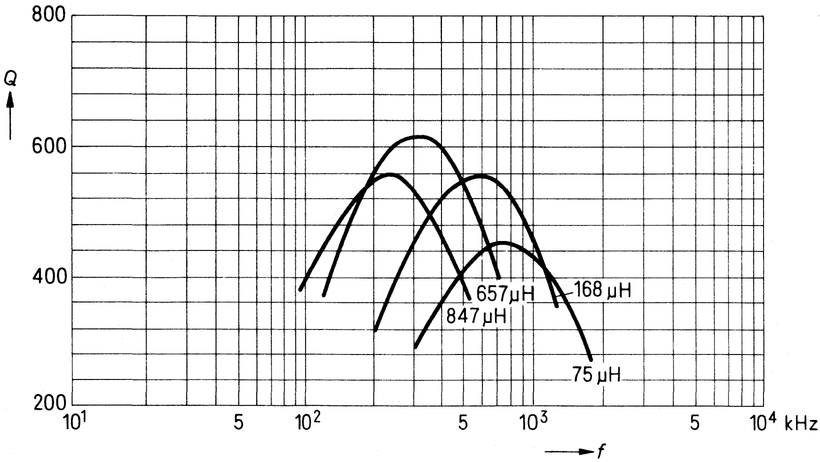


Pad of polystyrene tape up to the diameter ∅* (valid for all sections)

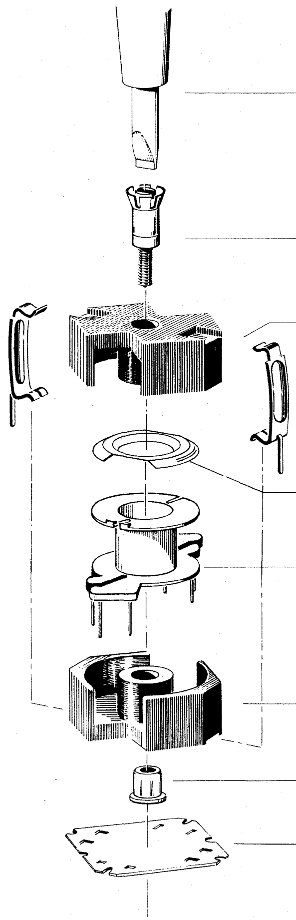
Flux density in the core $\hat{B} < 2$ mT



M 33
A_L = 63 nH
(typical values)



M 33
A_L = 100 nH
(typical values)

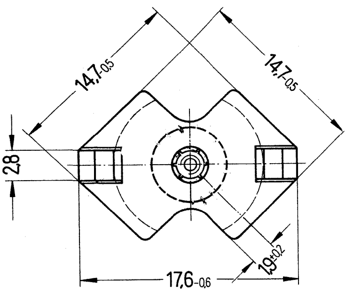


Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65810	302
Core	B65809	300
Clamps	B65808	301
Insulating washer for coil	B65808	301
Coil former with 1 or 2 sections 4, 5, or 6 pins	B65810	301
Core	B65809	300
Threaded sleeve	B65810	302
Insulating washer for double clad PC boards	B65808	301

Additionally available

Individual parts	Part No.	Page
Centering pin	B65808	302

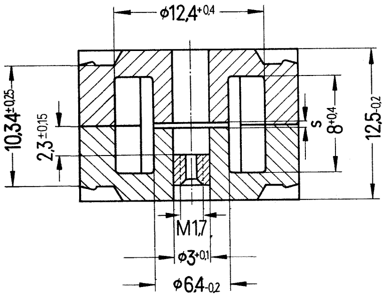
R 6 cores complying with IEC publication 431



Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.8 mm^{-1}
Effective length	l_e =	25.6 mm
Effective area	A_e =	32 mm^2
Effective volume	V_e =	820 mm^3

Approx. weight 5.1 g/set



Version	Ordering code[1)]
without threaded sleeve	B65809–**A**...
with threaded sleeve (fig.)	B65809–**F**...

Dimensions in mm

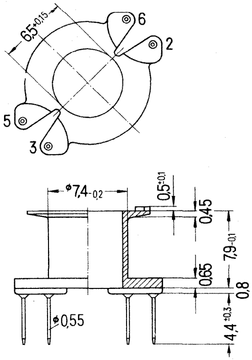
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code**[1)] (PU: 500 sets)
Gapped					
63	± 3% ≙ A	M 33	0,60	40	B65809–+ 63–A33
100			0,38	64	B65809–+100–A33
160		N 48	0,20	102	B65809–+160–A48
200			0,16	127	B65809–+200–A48
250			0,11	159	B65809–+250–A48
315			0,08	201	B65809–+315–A48
400			0,05	255	B65809–+400–A48
1000	±10% ≙ K	N 26	0,006	637	B65809–A1000–K26
Ungapped					
2300	$^{+30}_{-20}$% ≙ R	N 26		1460	B65809–A–R26
4300		N 30		2740	B65809–A–R30
6000		T 35		3820	B65809–A–R35
8600	$^{+40}_{-30}$% ≙ Y	T 38		5470	B65809–A–Y38

1) + Insert appropriate code letter for requested version

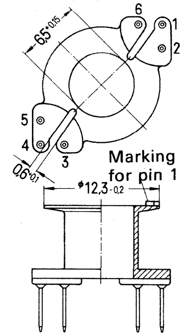
Coil formers B 65810, clamps and insulating washers B 65808

Glass-fiber reinforced thermosetting plastic **coil formers** with 4, 5, or 6 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.

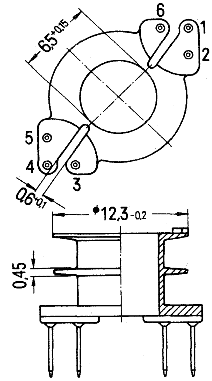
4 pins



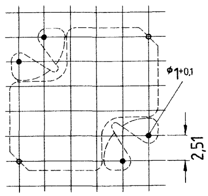
5 or 6 pins[1]



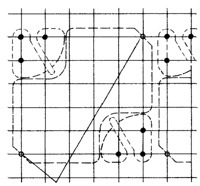
5 or 6 pins[1]
2 sections



Hole arrangement, view in mounting direction

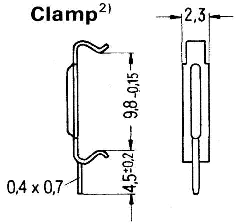


Dimensions in mm



Ground $1^{+0.1}$ mm dia

Clamp[2]



Coil former							Ordering code (PU: 500, insulating parts: 2500)
Number of sections	Useful winding cross section A_N of one section mm^2	total mm^2	Average length of turn l_N mm	A_R value[3] µΩ	Approx. weight g	Number of pins	
1	15,5	15,5	30,0	67	0,4	4	B65810-C1003-D1
						5	B65810-B1002-D1
						6	B65810-B1001-D1
2	7,25	14,5		71	0,6	5	B65810-B1002-D2
						6	B65810-B1001-D2
Clamp (Approx. weight 0.12 g; ordering code for each clamp, 2 required)							B65808-B2003
Insulating washer for double clad PCB; PU = 2500							B65808-C2005
Insulating washer between core and coil; PU = 1 reel ≙ 2500							B65808-A5000

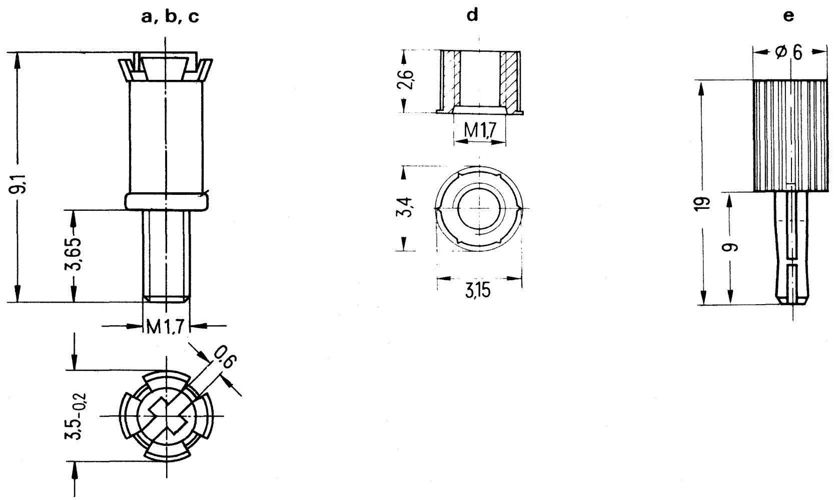
1) Version with 5 pins without pin 4
2) Pressure per clamp pair: 45 ... 60 N
3) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

Adjusting Devices B 65810

Adjusting Screw (a, b, c) consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

fits:

glass-fiber reinforced 11 polyamide **Threaded Sleeve** (d) B65810–L3002 (color code yellow)
Centering Pin (e) B65808–A2008 as mounting aid for R core centering
Adjusting Screw Driver B63399–B4

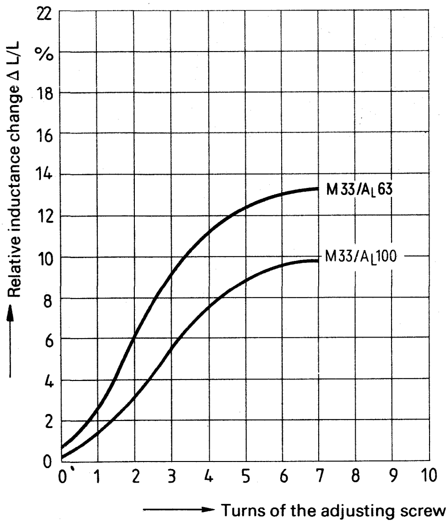


Dimensions in mm

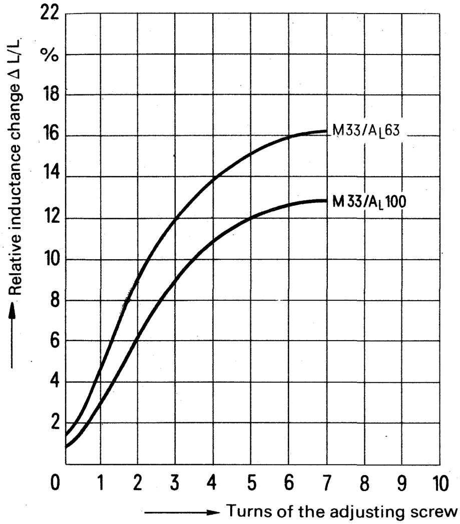
R 6 cores B65809		Adjusting screw				
Material	A_L value nH	Part	Tube core dia x length	Tube core Material	Color code	**Ordering code** (PU: 500)
M 33	63	b	2,85 x 4,05	Si 35	green	B65810–C3001–X135
	100	a	2,73 x 4,05	Si 31	red	B65810–C3002–X131
N 48	160			Si 1	yellow	B65810–C3002–X101
	200	b	2,85 x 4,05		white	B65810–C3001–X101
	250	c	2,73 x 3,45	N 22	brown	B65810–C3003–X22
	315	a	2,73 x 4,05		black	B65810–C3002–X22
	400					

Inductance adjustment curves

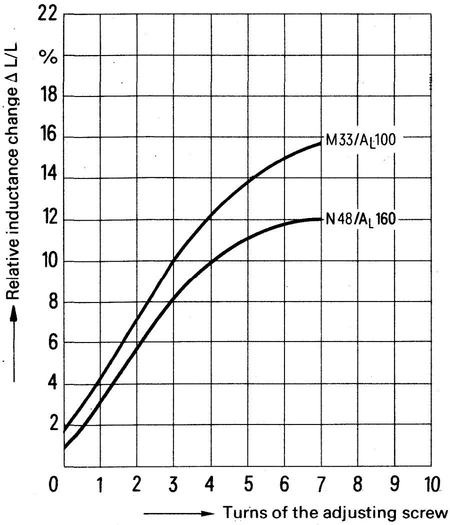
Adjusting screw B65810–C3001–X135
color code green



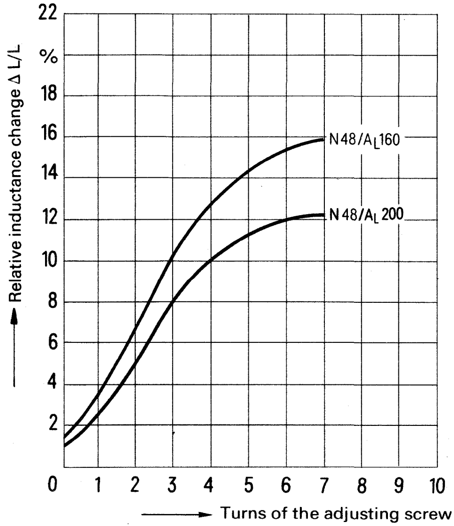
Adjusting screw B65810–C3002–X131
color code red



Adjusting screw B65810–C3002–X101
color code yellow

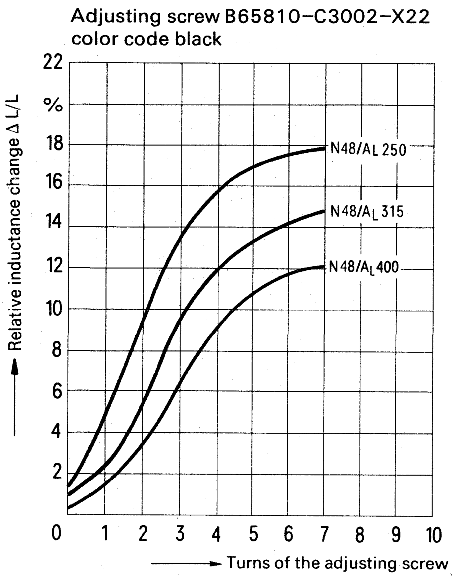


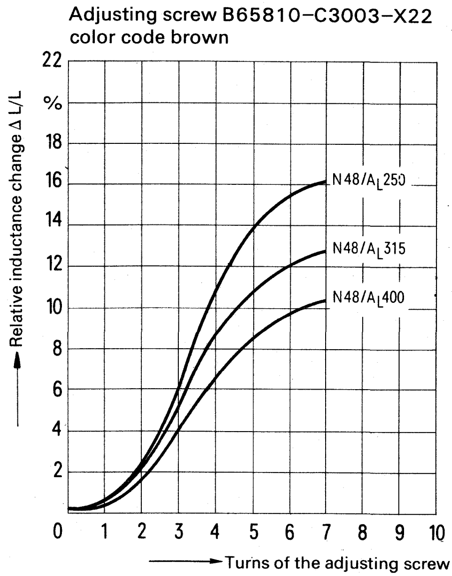
Adjusting screw B65810–C3001–X101
color code white



0 ≙ at least one turn engaged

Inductance adjustment curves

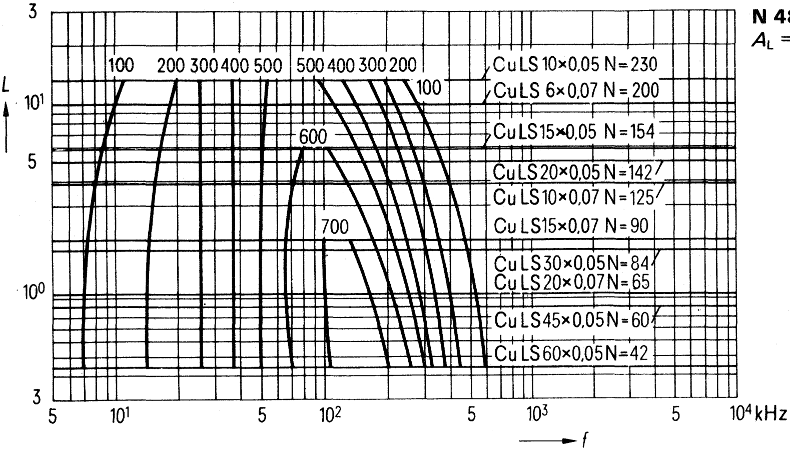




0 ≙ at least one turn engaged

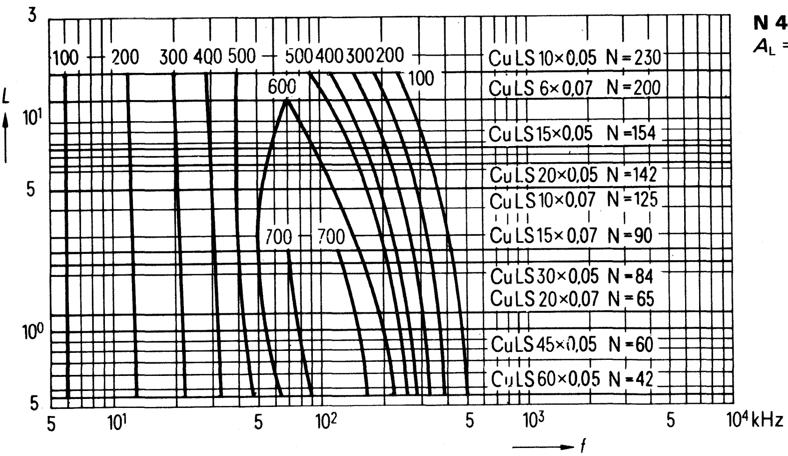
ISO-Q curves
Material N 48

1-section winding with RF litz wire
Flux density in the core $\hat{B} < 1$ mT

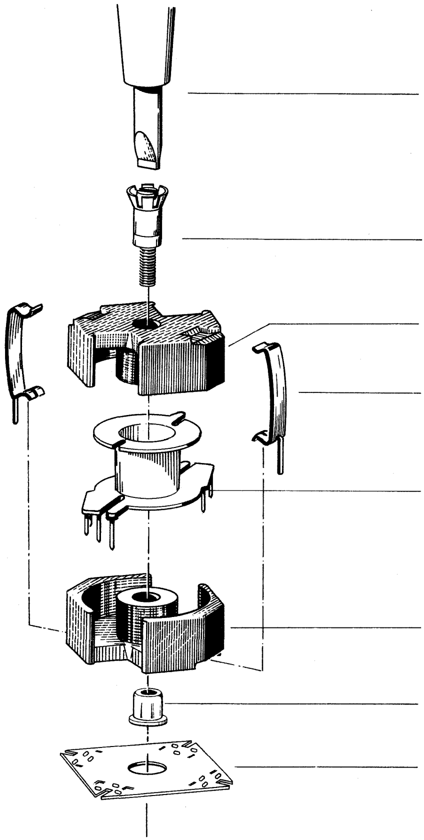


N 48
A_L = 250 nH

1-section winding with RF litz wire
Flux density in the core $\hat{B} < 1$ mT



N 48
A_L = 315 nH

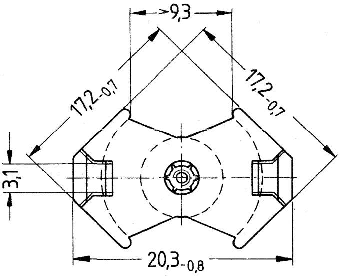


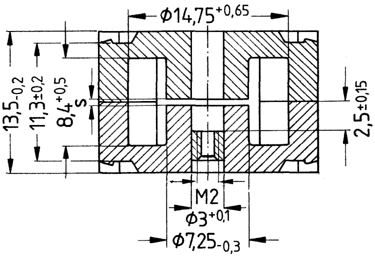
Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	341, fig. 4
Matching handle	B63399	342, fig. 6
Adjusting screw	B65659	309
Core	B65819	307
Clamps	B65820	308
Coil former with 1 or 2 sections 4, 5, or 8 pins	B65820	308
Core	B65819	307
Threaded sleeve	B65808	309
Insulating washer for double clad PC boards	B65820	308

Additionally available

Centering pin	B65808	309

RM 7 cores complying with IEC publication 431





Dimensions in mm

Magnetic characteristics

		with center hole	without center hole	
Core factor	$\Sigma l/A$ =	0.74	0.7	mm^{-1}
Effective length	l_e =	29.8	30.4	mm
Effective area	A_e =	40	43	mm^2
Min. core cross section[1]	A_{min} =	–	39	mm^2
Effective volume	V_e =	1200	1340	mm^3
Approx. weight		7.2	7.7	g/set

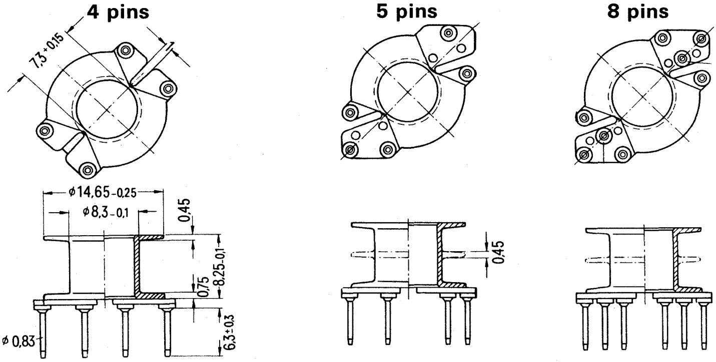
Version	**Ordering code**[2]
without threaded sleeve	B65819-**A**...
with threaded sleeve (fig.)	B65819-**N**...
without center hole	B65819-**J**...

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 200 sets)
Gapped					
63	± 3% ≙ A	M 33	0,7	37,1	B65819-N63-A33
100	± 3% ≙ A	M 33	0,4	58,9	B65819-N100-A33
250	± 3% ≙ A	N 48	0,16	147	B65819-N250-A48
315	± 3% ≙ A	N 48	0,12	186	B65819-N315-A48
160	± 5% ≙ J	N 41	0,3	89	B65819-J160-J41
250	± 5% ≙ J	N 41	0,18	39	B65819-J250-J41
Ungapped					
2800	$^{+30}_{-20}$ % ≙ R	N 26		1650	B65819-A-R26
3400	$^{+30}_{-20}$ % ≙ R	N 41		1900	B65819-J-R41
5000	$^{+30}_{-20}$ % ≙ R	N 30		2780	B65819-J-R30
7000	$^{+30}_{-20}$ % ≙ R	T 35		3900	B65819-J-R35
10000	$^{+40}_{-30}$ % ≙ Y	T 38		5570	B65819-J-Y38

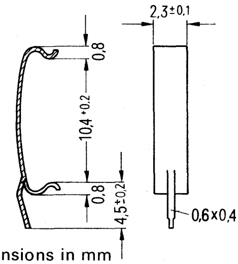
Coil formers, clamps, and insulating washers B 65820

Glass-fiber reinforced thermosetting plastic **coil formers** with 4, 5, or 8 terminal pins, flame-retardant in in accordance with UL 94 V-0. The version with 5 or 8 terminal pins is also available with two sections.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.

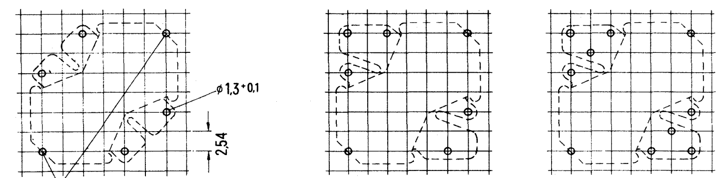
4 pins **5 pins** **8 pins**



Clamp[1)]



Hole arrangement
View in mounting direction



Ground $1^{+0.1}$ mm dia

Dimensions in mm

Coil former							Ordering code (PU: 200)
Number of sections	Useful winding cross section A_N one section mm²	total mm²	Average length of turn l_N mm	A_R value[2)] µΩ	Approx. weight g	Number of pins	
1	21,4	21,4	35,6	56	0,6	4	B65820-B1001-D1
						5	B65820-B1002-D1
						8	B65820-B1003-D1
2	10,05	20,1		60	0,7	5	B65820-B1002-D2
						8	B65820-B1003-D2
Clamp (approx. weight 0.15 g; ordering code for each clamp, two required)							B65820-B2001
Insulating washer for double clad PC boards							B65820-B2005

1) Pressure per clamp pair: 50 ... 70 N
2) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

Adjusting Devices B 65659

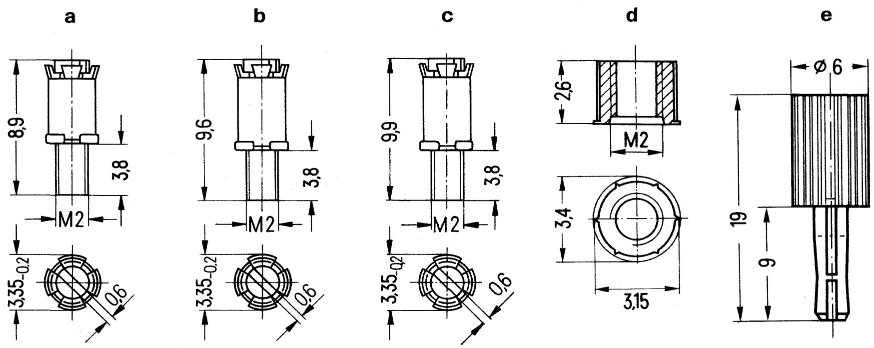
Adjusting Screw (a, b, c) B65659–F..., consisting of a ferrite tube core on which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

fits:

glass-fiber reinforced 11 polyamide **Threaded Sleeve** (d) B65808–L3002

Centering Pin (e) B65808–A2008 as mounting aid for RM core centering

Adjusting Screw Driver B63399–B4

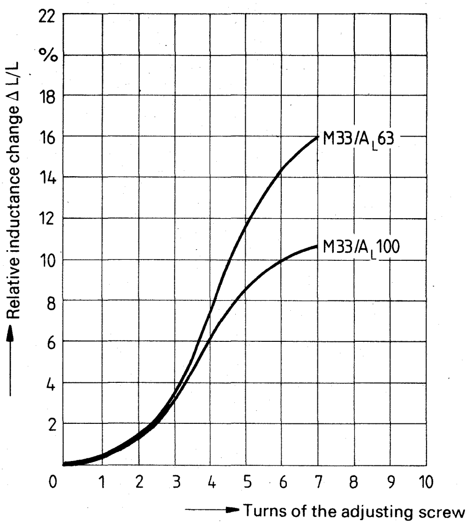


Dimensions in mm

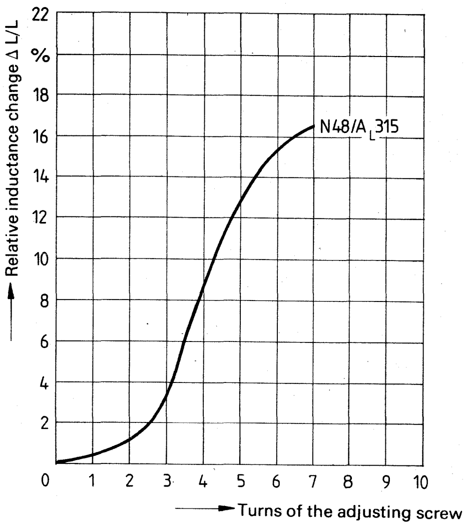
RM 7 core B65819		**Adjusting screw**				
Material	A_L value nH	Part	Tube core dia. x length	Material	Color code	**Ordering code** (PU: 200)
M 33	63	a	2,6 x 3,7	SI 1	white	B65659–F1–X101
	100	c	2,82 x 4,4		brown	B65659–F4–X101
N 48	250	a	2,6 x 3,7	N 22	red	B65659–F1–X23
	315	b	2,75 x 4,4		black	B65659–F3–X23

Inductance adjustment curves

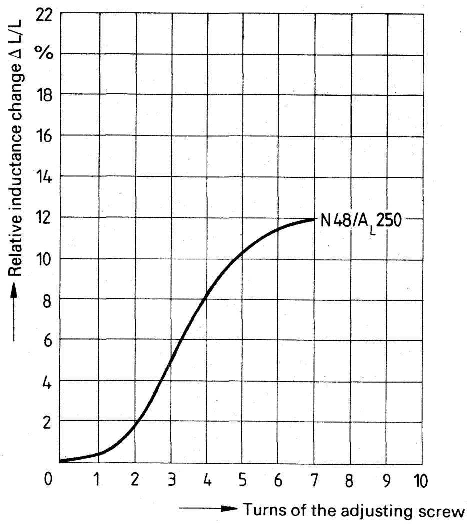
Adjusting screw B65659−F1−X101
color code white



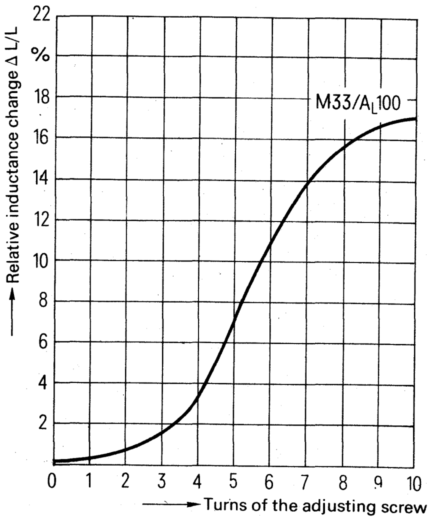
Adjusting screw B65659−F4−X101
color code brown



Adjusting screw B65659−F1−X23
color code red



Adjusting screw B65659−F3−X23
color code black

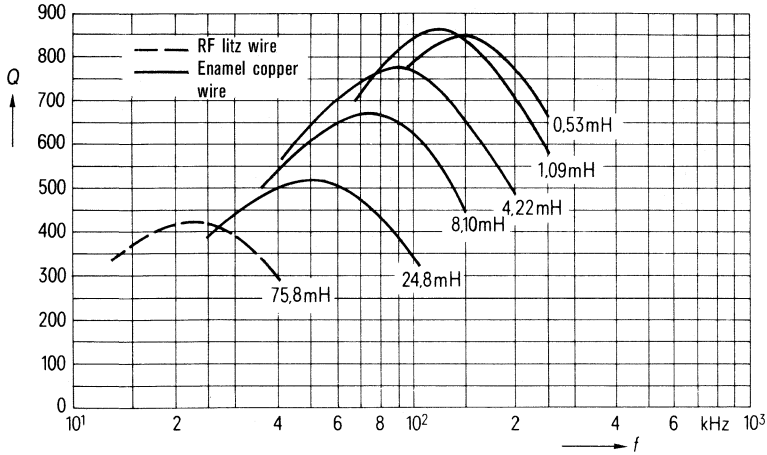


0 ≙ at least two turns engaged

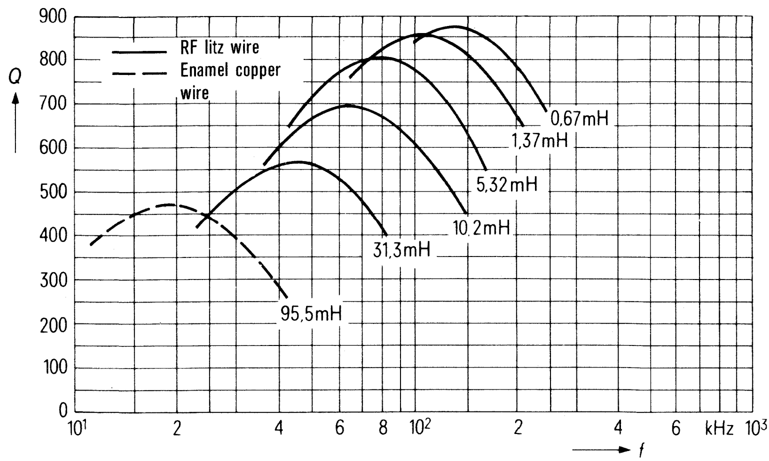
Q factor characteristics;
material N 48

L (mH) for A_L = 250 nH	A_L = 315 nH	Turns	Wire; RF litz wire	Number of sections
75,8	95,5	550	0,18 CuL	1
24,8	31,3	315	6 x 0,07 CuLS	1
8,10	10,2	180	20 x 0,05 CuLS	1
4,22	5,32	130	45 x 0,04 CuLS	1
1,09	1,37	66	90 x 0,04 CuLS	1
0,53	0,67	46	120 x 0,04 CuLS	1

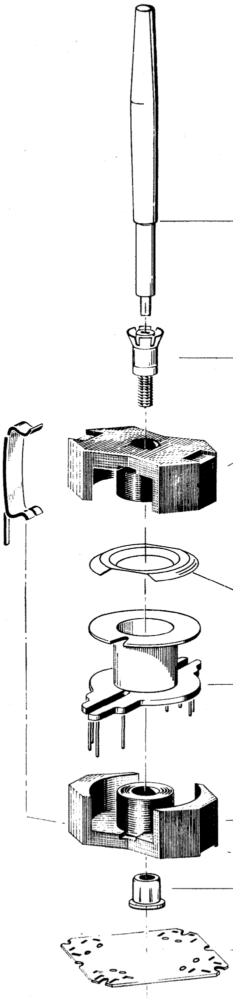
Flux density in the core $\hat{B} < 1.5$ mT



N 48
A_L = 250 nH
(typical values)



N 48
A_L = 315 nH
(typical values)

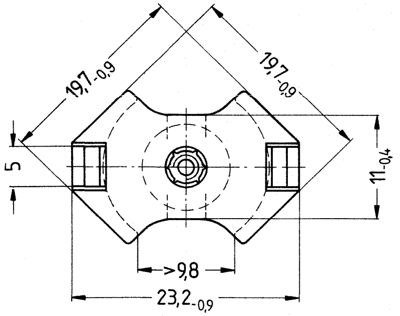


Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65812	316
Core	B65811	313
Clamps	B65812	314
Insulating washer for coil	B65812	314
Coil formers with 1 or 2 sections 5, 8, or 12 pins	B65812	314
Core	B65811	313
Threaded sleeve	B65812	316
Insulating washer for double clad PC boards	B65812	314

Additionally available

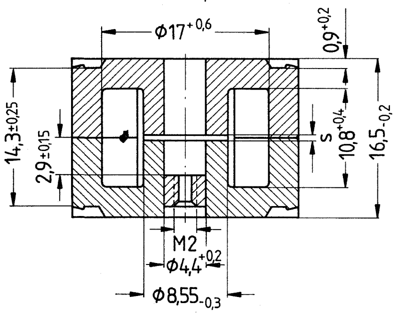
Coil former for power transformers	B65812	315

RM 8 cores complying with DIN 41980 or IEC publication 431.
For transformer applications, RM 8 cores are available without center hole.
For cores with CECC quality assessment in acc. with DIN 45970, part 1114, refer to page 36.



Magnetic characteristics

		with center hole	without center hole	
Core factor	$\Sigma l/A$ =	0.67	0.59	mm^{-1}
Effective length	l_e =	35.1	38.0	mm
Effective area	A_e =	52	64	mm^2
Min. core cross section[1]	A_{min} =	–	55	mm^2
Effective volume	V_e =	1840	2430	mm^3
Approx. weight		10.3	13	g/set



Dimensions in mm

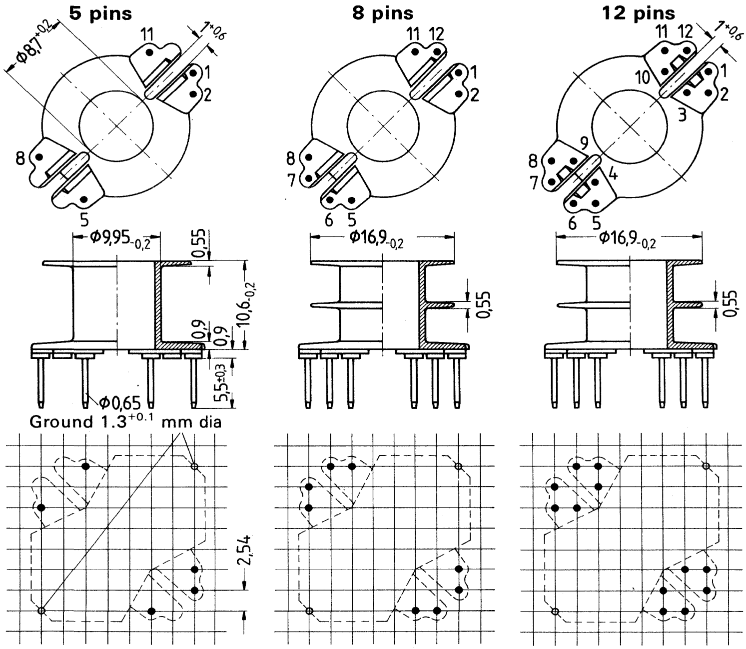
Version	Ordering code[2)]
without threaded sleeve	B65811–**D**...
with threaded sleeve (fig.)	B65811–**F**...
without center hole	B65811–**J**...

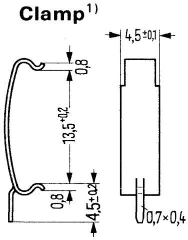
A_L value nH	tolerance	Ferrite material	Total air gap s in mm (approx.)	Effective permeability μ_e	**Ordering code**[2)] (PU: 200 sets)	
Gapped						
100	± 3% ≙ A	M 33	0,6	53	B65811–+100–A33	
250		N 48	0,23	133	B65811–+250–A48	S
315			0,18	168	B65811–+315–A48	S
400			0,14	213	B65811–+400–A48	S
500			0,12	267	B65811–+500–A48	
630	± 5% ≙ J		0,1	336	B65811–+630–J48	
250		N 41	0,24	117	B65811–J250–J41	S
1600	± 10% ≙ K	N 41	0,04	752	B65811–J1600–K41	S
Ungapped						
2400	$^{+30}_{-20}$ % ≙ R	N 47		1130	B65811–J–R47	S
2500		N 26		1330	B65811–D–R26	S
4100		N 41		1920	B65811–J–R41	S
5700		N 30		2680	B65811–J–R30	S
8400		T 35		3940	B65811–J–R35	
12500	$^{+40}_{-30}$ % ≙ Y	T 38		5870	B65811–J–Y38	S

1) Necessary for the calculation of the max. flux density
2) + Insert code letter "D" or "F" for requested version
S Preferred products (refer to page 4)

Coil formers, clamps, and insulating washers B 65812

Glass-fiber reinforced thermosetting plastic **coil formers** with 5, 8, or 12 terminal pins, complying with IEC publication 431 (DIN 41981), suitable for automatic winding machines, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.





A slot in the upper flange identifies the position of pin 1 and 2.

Hole arrangement
View in mounting direction

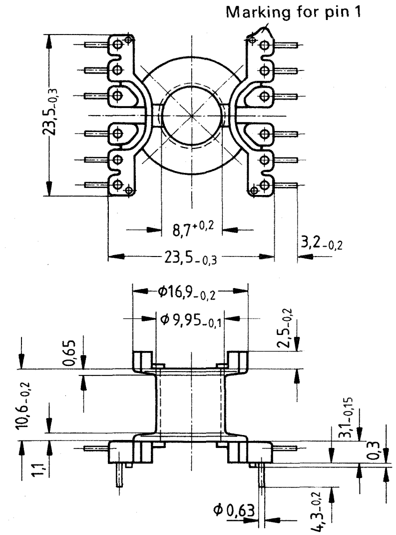
Dimensions in mm

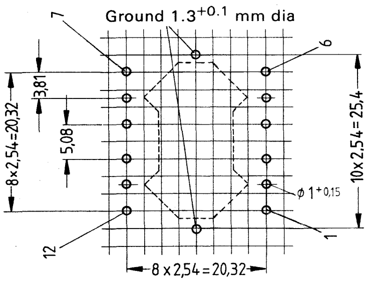
Coil former Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value²⁾ µΩ	Approx. weight g	Number of pins	Ordering code (PU: 200, insulating parts: 1000)
1	30	30	42	47	0,8	5	B65812–A1005–D1 S
						8	B65812–A1008–D1 S
						12	B65812–A1012–D1 S
2	14,2	28,4		50	0,9	5	B65812–A1005–D2 S
						8	B65812–A1008–D2 S
						12	B65812–A1012–D2
Clamp (approx. weight 0.3 g; ordering code for each clamp, two required)							B65812–B2001 S
Insulating washer for double clad PC board; PU = 1000							B65812–C2005 S
Insulating washer between core and coil; PU = 1 reel ≙ 1000							B65812–A5000 S

1) Pressure per clamp pair: 50 ... 70 N.
2) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²).
S Preferred products (refer to page 4)

Coil former for power transformers B 65812

Glass-fiber reinforced polyterephthalate **coil former** with 12 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.





Hole arrangement
View in mounting direction
(Intermediate spacing should be considered.)

Dimensions in mm

Coil former							Ordering code (PU: 200)
Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	Number of pins	
1	30	30	42	47	2,5	12	B65812–B1512–T1 **S**

[2] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns[2])
S Preferred products (refer to page 4)

Adjusting Devices B 65812

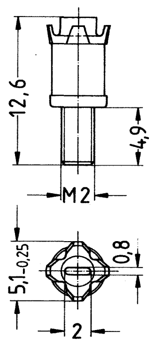
Adjusting Screw (a, b, c) B65812–B3..., consisting of a ferrite tube core onto which a glass-fiber reinforced polyterephthalate thread is molded and a spring crown serving as core brake;

fits:

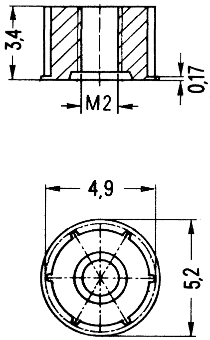
glass-fiber reinforced 11 polyamide **Threaded Sleeve** (d) B65812–A3001 (color code yellow)

Adjusting Screw Driver B63399–B1 S

a, b, c



d



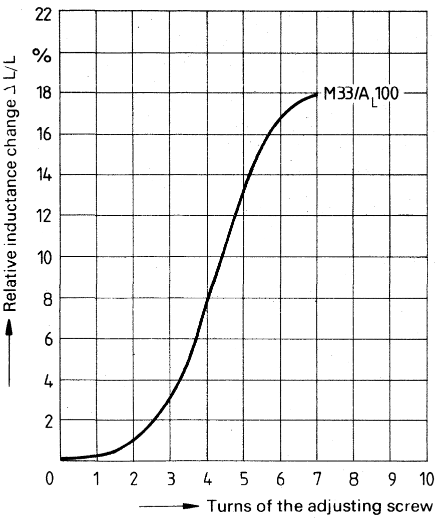
Dimensions in mm

RM 8 core B65811		Adjusting screw				
Material	A_L value nH	Part	Tube core dia x length	Tube core Material	Color code	**Ordering code** (PU: 200)
M 33	100	c	3,85 x 5	Si 1	yellow	B65812–B3003–X101
				Si 31	red	B65812–B3003–X131
N 48	250	a	4,18 x 5	Si 1	white	B65812–B3001–X101 S
	315	c	3,85 x 5	N 22	grey	B65812–B3003–X22 S
	400	b	4,18 x 4	N 22	brown	B65812–B3002–X22 S
N 48	500 630	a	4,18 x 5	N 22	black	B65812–B3001–X22 S

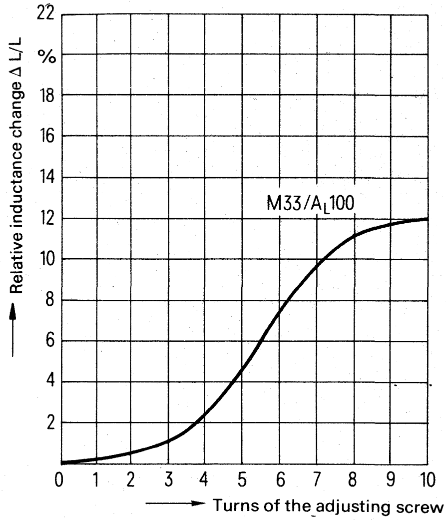
S Preferred products (refer to page 4)

Inductance adjustment curves

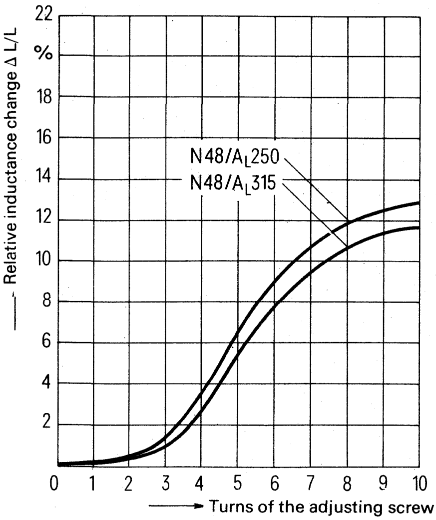
Adjusting screw B65812–B3003–X101
color code yellow



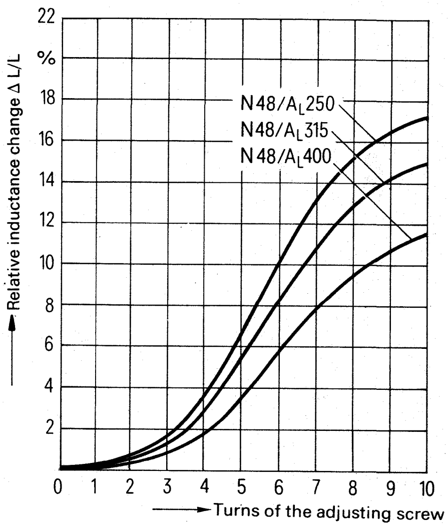
Adjusting screw B65812–B3003–X131
color code red



Adjusting screw B65812–B3001–X101
color code white



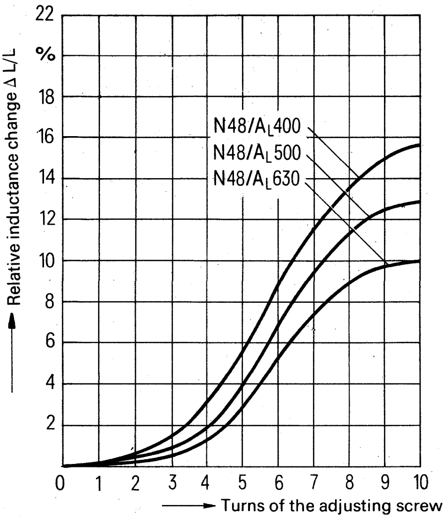
Adjusting screw B65812–B3003–X22
color code grey



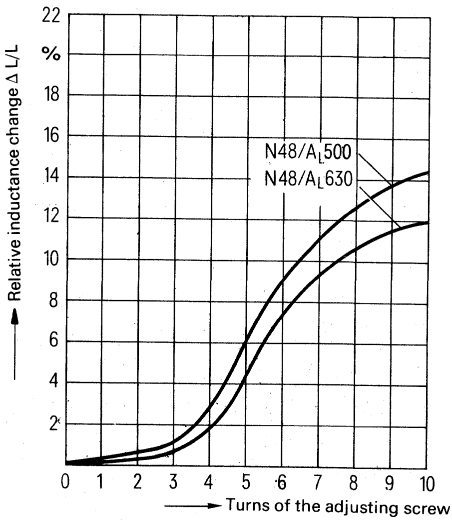
0 ≙ at least two turns engaged

Inductance adjustment curves

Adjusting screw B65812–B3002–X22
color code brown



Adjusting screw B65812–B3001–X22
color code black



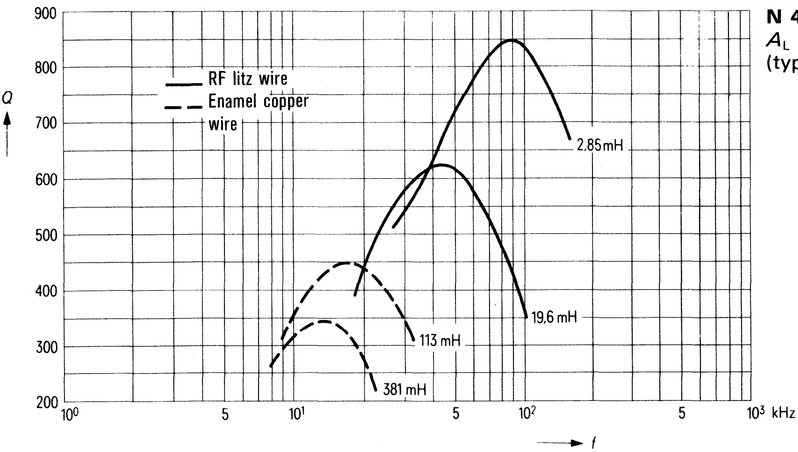
O ≙ at least two turns engaged

Q factor characteristics

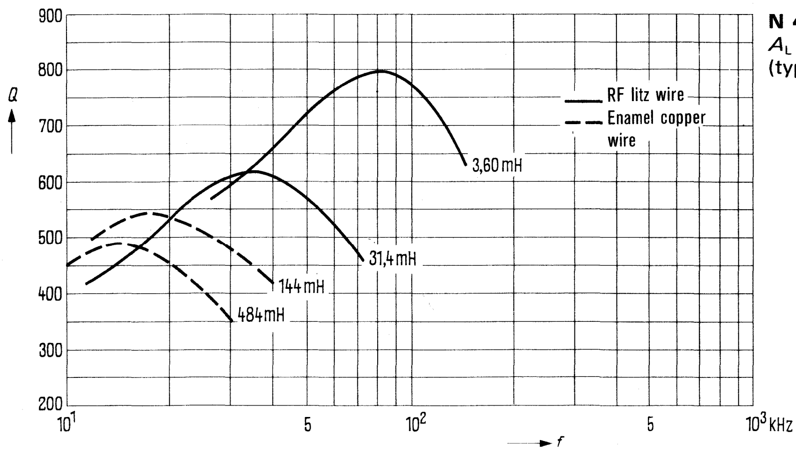
Material N 48

L (mH) for A_L = 315 nH	L (mH) for A_L = 400 nH	Turns	Wire; RF litz wire	Number of sections
381	484	1100	0,15 CuL	1
113	144	600	0,2 CuL	1
19,6	31,4	280	20 x 0,05 CuLS	1
2,85	3,60	95	60 x 0,05 CuLS	1

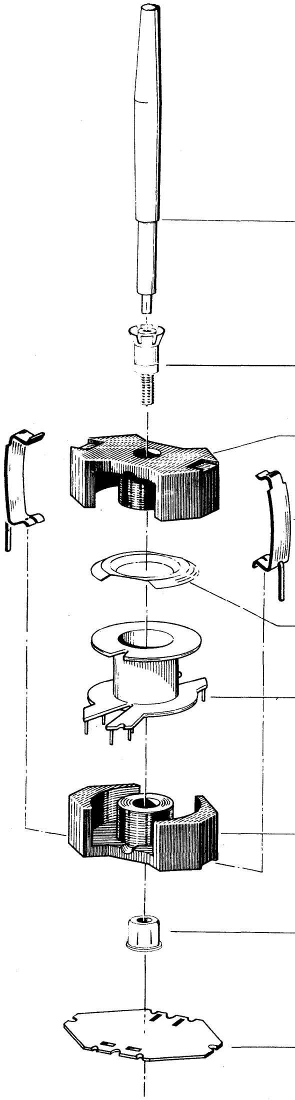
Flux density in the core $\hat{B} < 2$ mT



N 48
A_L = 315 nH
(typical values)



N 48
A_L = 400 nH
(typical values)

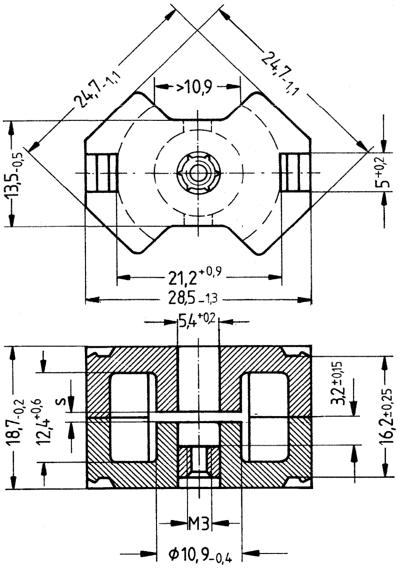


Individual parts	Part No.	Page
Adjusting screw driver (for assembly only)	B63399	340, fig. 3
Matching handle	B63399	342, fig. 6
Adjusting screw	B65679	324
Core	B65813	321
Core for choke coil	B65813-S	326
Clamps	B65814	322
Insulating washer for coil	B65814	322
Coil former with 1 or 2 sections 11 or 12 pins	B65814	322
Core	B65813	321
Core for choke core	B65813-S	326
Threaded sleeve	B65679	324
Insulating washer for double clad PC boards	B65814	322

Additionally available

Coil former for power transformers	B65814	323
for choke coil	B65814	327

RM 10 cores complying with DIN 41980 or IEC publication 431.
For transformer applications RM 10 cores are available without center hole.



Dimensions in mm

Magnetic characteristics

		with center hole	without center hole	
Core factor	$\Sigma\, l/A$ =	0.50	0.45	mm^{-1}
Effective length	l_e =	42	44	mm
Effective area	A_e =	83	98	mm^2
Min. core cross section[1]	A_{min} =	–	90	mm^2
Effective volume	V_e =	3470	4310	mm^3
Approx. weight		20	23	g/set

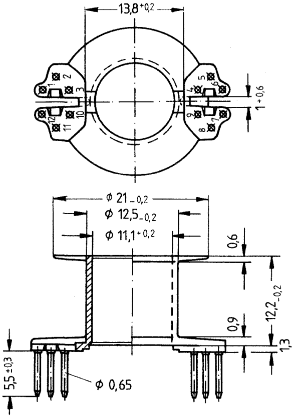
Version	Ordering code[2]
without threaded sleeve	B65813-**A**...
with threaded sleeve	B65813-**N**...
without center hole	B65813-**J**...

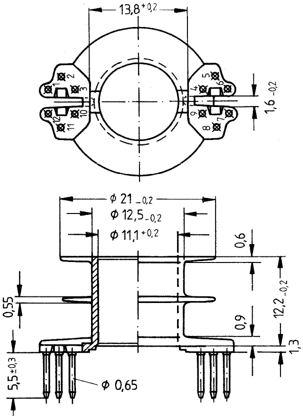
A_L value nH	tolerance	Ferrite material	Total air gap *s* in mm approx.	Effective permeability μ_e	**Ordering code**[2] (PU: 200 sets)
Gapped					
315	± 3% ≙ A	N 48	0,28	125	B65813–+315–A48
400	± 3% ≙ A	N 48	0,21	160	B65813–+400–A48 **S**
630	± 3% ≙ A	N 48	0,13	250	B65813–+630–A48 **S**
250	± 3% ≙ A	N 41	0,44	90	B65813–J250–A41 **S**
630	± 5% ≙ J	N 41	0,13	226	B65813–J630–J41
1600	± 10% ≙ K	N 41	0,04	573	B65813–J1600–K41
Ungapped					
3100	+30 −20 % ≙ R	N 47		1110	B65813–J–R47 **S**
4000	+30 −20 % ≙ R	N 27		1430	B65813–J–R27
5500	+30 −20 % ≙ R	N 41		1970	B65813–J–R41 **S**
7600	+30 −20 % ≙ R	N 30		2720	B65813–J–R30 **S**
11000	+30 −20 % ≙ R	T 35		3940	B65813–J–R35 **S**
16000	+40 −30 % ≙ Y	T 38		5730	B65813–J–Y38 **S**

[1] Necessary for the calculation of the max. flux density
[2] + Insert code letter "A" or "N" for requested version
S Preferred products (refer to page 4)

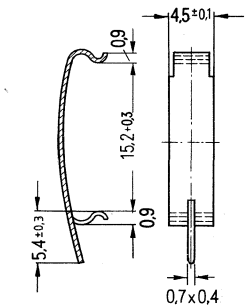
Coil formers, clamps, and insulating washers B 65814

Glass-fiber reinforced thermosetting plastic **coil formers** with 5, 8, 10, 11, or 12 terminal pins complying with IEC publication 431 (DIN 41981), suitable for automatic winding machines, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.

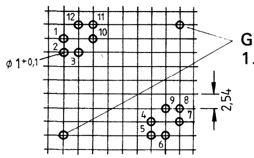




Clamp[1)]



Dimensions in mm



Hole arrangement
View in mounting direction

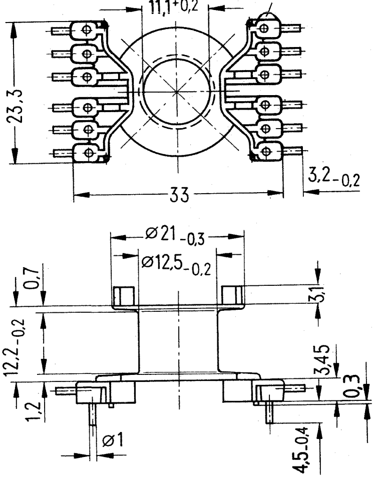
Version	Omitted pin
11 pins	9
10 pins	2; 11
8 pins	2; 5; 8; 11
5 pins	1; 2; 5; 7; 8; 11; 12

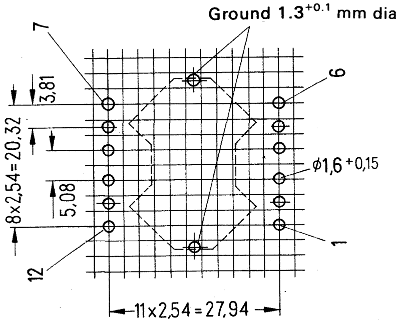
Coil former Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[2)] µΩ	Approx. weight g	Number of pins	**Ordering code** (PU: 200, insulating parts: 1000)
1	41,5	41,5	52	43	1,5	5	B65814–A1005–D1
						8	B65814–A1008–D1
						10	B65814–A1010–D1
						11	B65814–A1011–D1 S
						12	B65814–A1012–D1 S
2	19,5	39	52	46	1,7	5	B65814–A1005–D2
						8	B65814–A1008–D2
						10	B65814–A1010–D2
						11	B65814–A1011–D2
						12	B65814–A1012–D2 S
Clamp (approx. weight 0.37 g; ordering code for each clamp, two required)							B65814–A2001 S
Insulating washer for double clad PC boards; PU = 1000							B65814–B2005 S
Insulating washer between core and coil; PU = 1 reel ≙ 1000							B65814–B5000 S

1) Pressure per clamp pair: 50 ... 65 N
2) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

Coil former for power transformers B 65 814

Glass-fiber reinforced polyterephthalate **coil former** with 12 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.





Hole arrangement
View in mounting direction
(Intermediate spacing should be considered.)

Dimensions in mm

Coil former							Ordering code (PU: 200)
Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	Number of pins	
1	41 5	41 5	52	43	1,5	12	B65814–A1512–T S

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

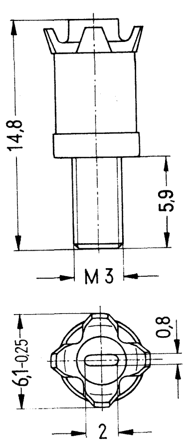
Adjusting Devices B 65 679

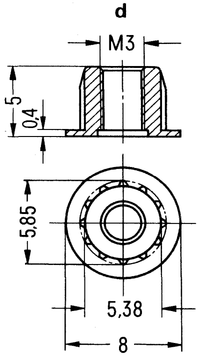
Adjusting Screw (a, b, c) B65679–E... consisting of a ferrite tube core on which a polyterephthalate thread is molded and a spring crown serving as core brake;

fits:

glass-fiber reinforced 11 polyamide **Threaded Sleeve** (d) B65679–L3
Adjusting Screw Driver B63399–B1 S

Due to the limited distance between the adjusting core B65679–E... and the internal borehole the total assembly must be centered accurately.





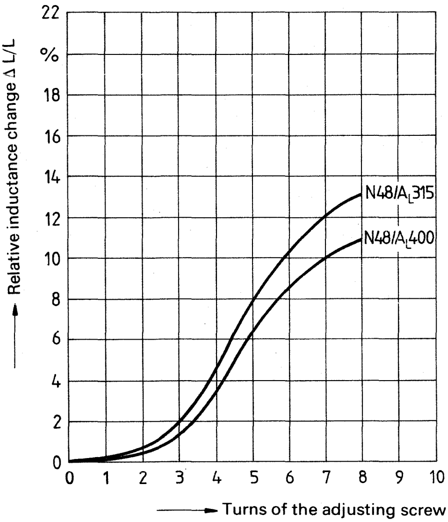
Dimensions in mm

RM 10 cores B65813		Adjusting screw				
Material	A_L value nH	Part	Tube core dia x length	Tube core Material	Color code	**Ordering code** (PU: 200)
N 48	315 400	c	4,55 x 6,3	N 22	red	B65679–E3–X22
	400 630	b	4,98 x 6,3	N 22	black	B65679–E2–X22 S
	630	a	5,15 x 6,3	N 22	white	B65679–E1–X22 S

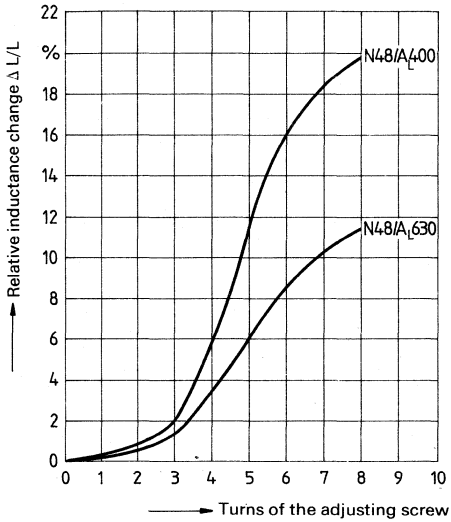
S Preferred products (refer to page 4)

Inductance adjustment curves

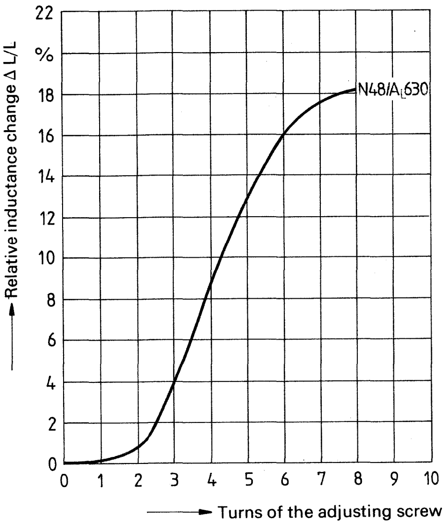
Adjusting screw B65679–E3–X22
color code red



Adjusting screw B65679–E2–X22
color code black



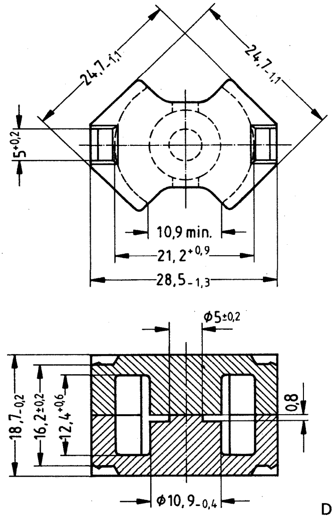
Adjusting screw B65679–E1–X22
color code white



0 ≙ at least two turns engaged

Preliminary data

RM 10 cores for designing chokes in switched-mode power supplies, particularly for feed-forward converters and buck converters.[1] The diagram below shows the interrelation between A_L value and ampere-turns.



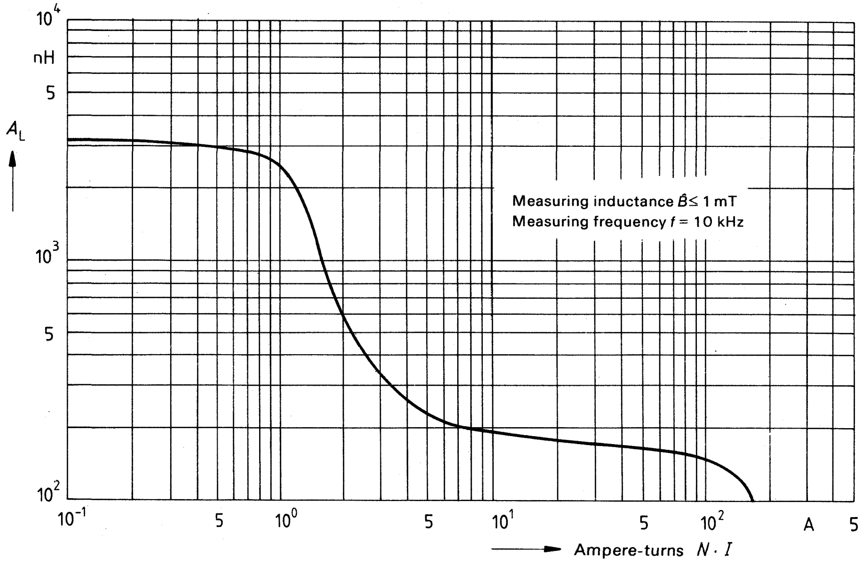
Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A =$	0.45	mm^{-1}
Effective length	$l_e =$	44	mm
Effective area	$A_e =$	98	mm^2
Min. core cross section[2]	$A_{min} =$	90	mm^2
Effective volume	$V_e =$	4310	mm^3

A_L value nH	tolerance	Ferrite material
3200	$^{+30}_{-20}$ %	N 41

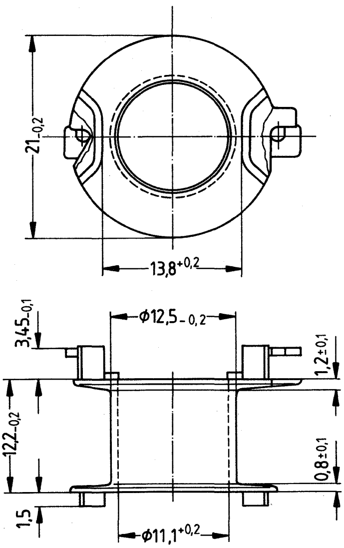
Ordering code B65813-S-X5
(PU: 200 sets)



[1] For detailed information refer to the article "Non-linear energy storage chokes improve the operating behavior of switched-mode power supplies" in Siemens Components 23 (1985), issue 1.
[2] Necessary for calculating the max. flux density.

Coil former B 65814-J

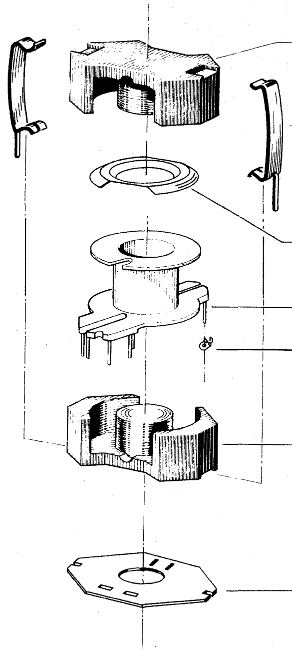
Glass-fiber reinforced polyterephthalate coil former without terminal pins for designing non-linear chokes, flame-retardant in accordance with UL 94 V-0. Suitable for automatic winding.
For winding data refer to page 71.



Dimensions in mm

Coil former						**Ordering code** (PU: 200)
Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	
1	41,5	41,5	52	43	1,5	B65814–J1000–T1

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns^2)

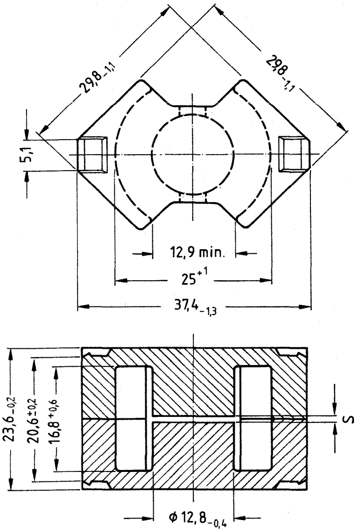


Individual parts	Part No.	Page
Core	B65815-J B65815-E	329 331
Clamps	B65816	330
Insulating washer for coil	B65816	330
Coil former, 1 or 2 sections, 11 or 12 pins	B65816	330
Sliding-on solder clip for soldering thick wires	B65888	330
Core	B65815-J B65815-E	329 331
Insulating washer for double clad PC boards	B65816	330

Additionally available

Individual parts	Part No.	Page
Coil former for power transformers	B65816	332
Coil former with pluggable housing	B65816	333
Cores for choke coils	B65815-S	334

RM 12 cores for use in transformers and chokes, covering both small-signal and power applications.



Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.40 mm^{-1}
Effective length	l_e =	56.9 mm
Effective area	A_e =	140 mm^2
Min. core cross section[1]	A_{min} =	107 mm^2
Effective volume	V_e =	7960 mm^3

Approx. weight 42 g/set

Dimensions in mm

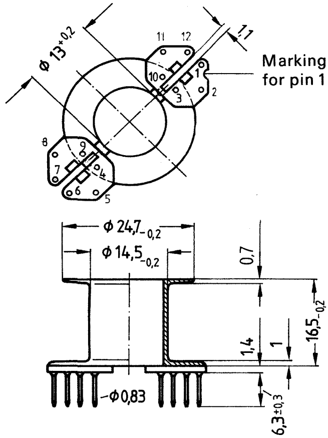
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	Ordering code (PU: 100 sets)
Gapped					
160	± 3% ≙ A	N41	1,2	51	B65815-J160-A41
250			0,65	80	B65815-J250-A41 S
400	± 5% ≙ J	N 47	0,3	127	B65815-J400-J47
1000		N 41	0,10	320	B65815-J1000-J41 S
2000	± 10% ≙ K		0,04	640	B65815-J2000-K41
Ungapped					
3400	$^{+30}_{-20}$% ≙ R	N 47		1080	B65815-J-R47
4400		N 27		1400	B65815-J-R27
6000		N 41		1910	B65815-J-R41 S
8400		N 30		2670	B65815-J-R30 S
12300		T 35		3910	B65815-J-R35

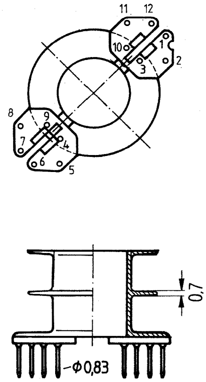
[1] Necessary for calculating the max. flux density

S Preferred products (refer to page 4)

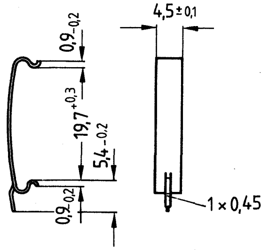
Coil formers, clamps, and insulating washers B 65816

Glass-fiber reinforced thermosetting plastic **coil formers** with 11 or 12 terminal pins, suitable for automatic winding machines, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.



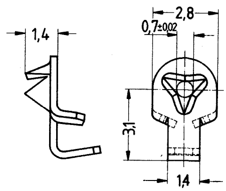


Clamp[1]

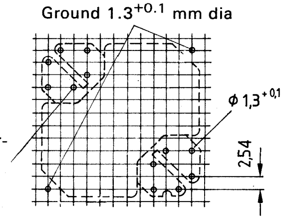


Dimensions in mm

Solder clip



Ground 1.3$^{+0.1}$ mm dia



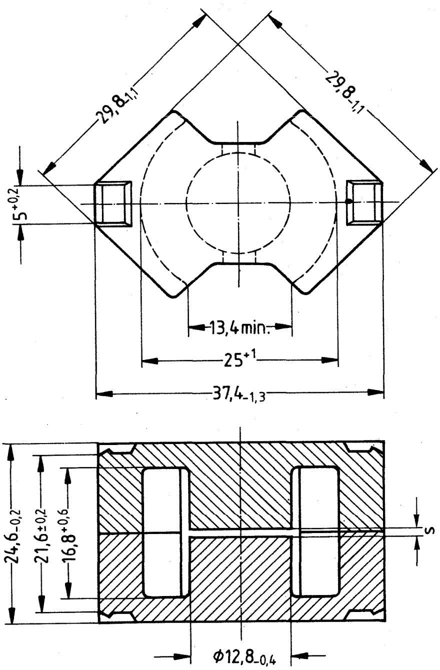
For the 11-pin version, pin No. 9 is omitted

Hole arrangement
View in mounting direction

Coil former Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[2] µΩ	Approx. weight g	Number of pins	**Ordering code** (PU: 100)
1	73	73	61	28,7	2,5	11	B65816-A1011-D1 S
						12	B65816-A1012-D1 S
2	35	70		30	2,7	11	B65816-A1011-D2
						12	B65816-A1012-D2 S
Clamp (approx. weight 0.5 g; ordering code for each clamp, two required)							B65816-A2001 S
Insulating washers for double clad PC boards							B65816-B2005
Sliding-on **solder clip** for soldering thick wires							B65888-A2004
Insulating washer between core and coil							B65816-A5000

[1] Pressure per clamp pair: 55 ... 70 N
[2] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns^2)
S Preferred products (refer to page 4)

RM 12 cores preferably for power applications



Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.39	mm^{-1}
Effective length	l_e =	57	mm
Effective area	A_e =	146	mm^2
Min. core cross section[1]	A_{min} =	125	mm^2
Effective volume	V_e =	8340	mm^3

Approx. weight 44 g/set

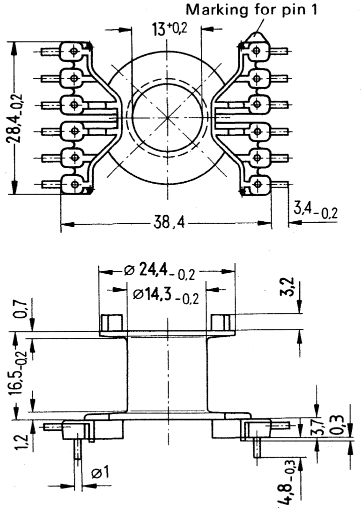
Dimensions in mm

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 100 sets)
Gapped					
1000	± 5% ≙ J	N 67	0,14	310	B65815–E1000–J67
2500	±10% ≙ K	N 67	0,04	776	B65815–E2500–K67
Ungapped					
5300	$^{+30}_{-20}$ % ≙ R	N 67		1640	B65815–E–R67
8400	$^{+30}_{-20}$ % ≙ R	N 30		2610	B65815–E–R30

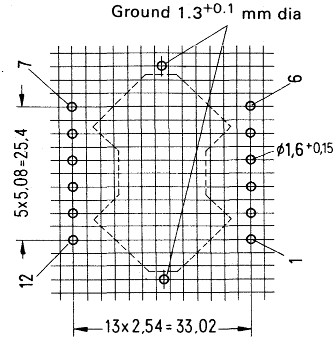
1) Necessary for calculating the max. flux density

Coil formers, clamps, and insulating washers B 65816

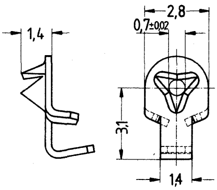
Glass -fiber reinforced thermosetting plastic **coil formers** for power transformers with 12 terminal pins, suitable for automatic winding machines, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.

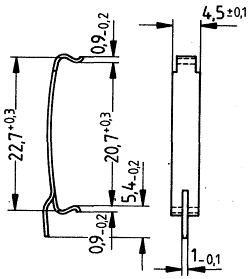


Hole arrangement
View in mounting direction
(Intermediate spacing should be considered!)



Solder clip





Clamp[1]

Dimensions in mm

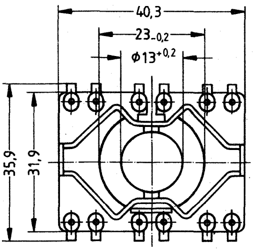
Coil former							Ordering code (PU: 100)
Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	Number of pins	
1	72	72	61	28,7	2,5	12	B65816–B1512–T1 S
Clamp (approx. weight 0.5 g; ordering code for each clamp, two required)							B65816–A2002
Insulating washers for double clad PC boards							B65816–B2005
Sliding-on **solder clip** for soldering thick wires							B65888–A2004
Insulating washer between core and coil							B65816–A5000

[1] Pressure per clamp pair: 55...70 N

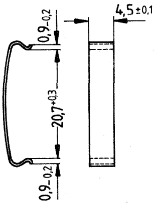
[2] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns[2])

S Preferred products (refer to page 4)

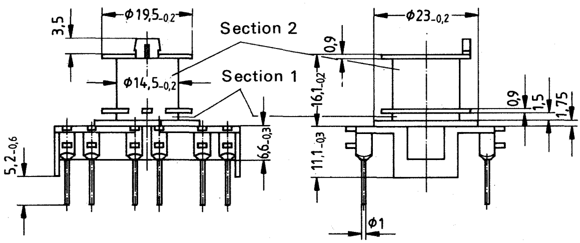
Glass-fiber reinforced polyterephthalate **coil former** B 65816 with 12 pins and pluggable housing for power applications, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding data refer to page 71.
Spring steel **clamp** without ground terminal.



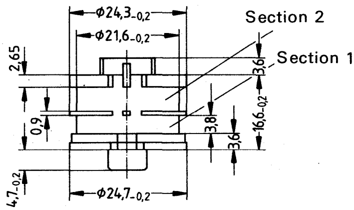
Clamp

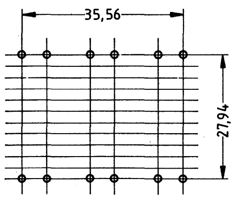


Winding former I

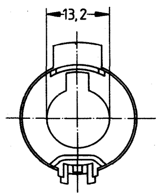


Winding former II





Hole arrangement
View in mounting direction
Mounting hole 1.6$^{+0.15}$ mm dia



Dimensions in mm

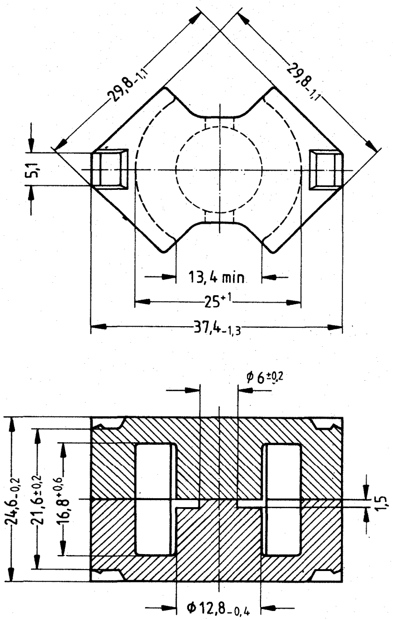
Ordering code B65816-A1212-T102 for complete set (PU: 100)

Winding former	Winding section	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** for winding former
I	1 2	3,6 26	53,4 53,4	510 71	6,1	C61035–A62–B17
II	1 2	2,9 4	73,5 73,5	872 632	2,6	C61035–A62–C17
Clamp (approx. weight 0.5 g; ordering code for each clamp, two required)						B65816–A2204
Sealing can						upon request

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

Preliminary data

RM 12 cores for designing chokes in switched-mode power supplies, particularly for feed-forward converters and buck converters.[1] The diagram below shows the interrelation between A_L value and ampere-turns.



Dimensions in mm

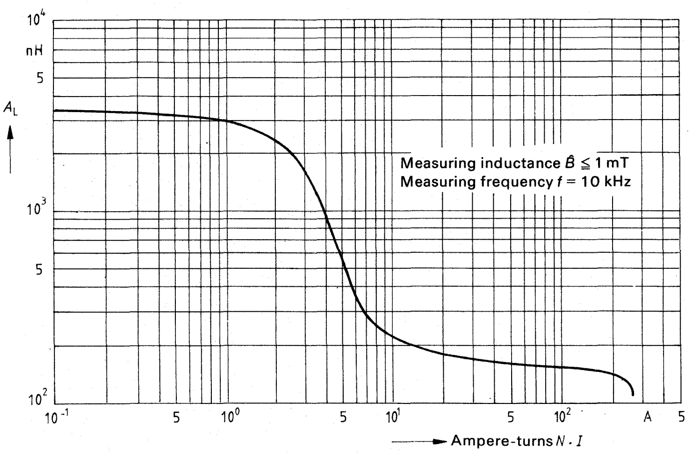
Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.39 mm^{-1}
Effective length	l_e =	57 mm
Effective area	A_e =	146 mm^2
Min. core cross section[1]	A_{min} =	125 mm^2
Effective volume	V_e =	8340 mm^3

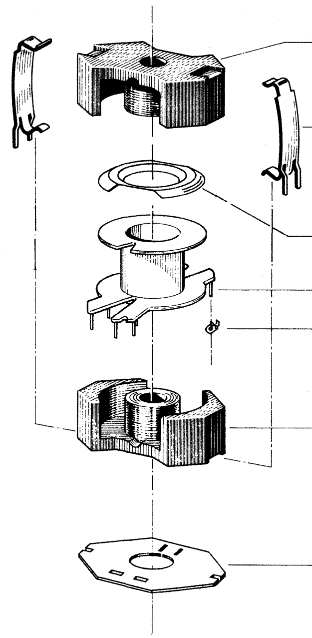
Approx. weight 44 g/set

A_L value		Ferrite material
nH	tolerance	
3500	±30%	N 41

Ordering code 65815–S–X2
PU: 100 sets
Accessories Coil former in preparation



[1] For detailed information refer to the article "Non-linear energy storage chokes improve the operating behavior of switched-mode power supplies" in Siemens Components 23 (1985), issue 1.
[2] Necessary for calculating the max. flux density

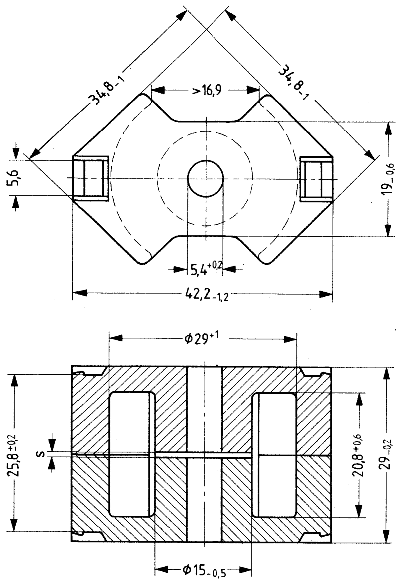


Individual parts	Part No.	Page
Core (with center hole)	B65887-A	336
Core (without center hole)	B65887-E	338
Clamps	B65888	337
Insulating washer for coil	B65888	337
Coil former with 1 section, 10 or 12 pins	B65888	337
Sliding-on solder clip for soldering thick wires	B65888	337
Core (with center hole)	B65887-A	336
Core (without center hole)	B65887-E	338
Insulating washer for double clad PC boards	B65888	337

Additionally available

Coil former for power transformers	B65888	339

RM 14 cores complying with DIN 41980 or IEC publication 431.



Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.40	mm^{-1}
Effective length	l_e =	71	mm
Effective area	A_e =	178	mm^2
Min. core cross section[1]	A_{min} =	147	mm^2
Effective volume	V_e =	12600	mm^3

Approx. weight 65 g/set

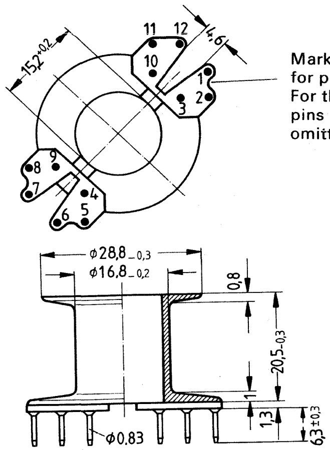
Dimensions in mm

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	Ordering code (PU: 100 sets)
Gapped					
160	± 3% ≙ A	N 41	1,9	51	B65887–A160–A41
250	± 3% ≙ A	N 41	1,0	80	B65887–A250–A41 **S**
400	± 3% ≙ A	N 41	0,5	127	B65887–A400–A41
630	± 3% ≙ A	N 41	0,3	201	B65887–A630–A41
1000	± 3% ≙ A	N 41	0,15	318	B65887–A1000–A41
1600	± 5% ≙ J	N 41	0,07	510	B65887–A1600–J41 **S**
2500	± 10% ≙ K	N 41	0,04	800	B65887–A2500–K41
Ungapped					
4500	$^{+30}_{-20}$ % ≙ R	N 27		1430	B65887–A–R27
6000	$^{+30}_{-20}$ % ≙ R	N 41		1910	B65887–A–R41 **S**
8700	$^{+30}_{-20}$ % ≙ R	N 30		2770	B65887–A–R30

[1] Necessary for calculating the max. flux density
S Preferred products (refer to page 4)

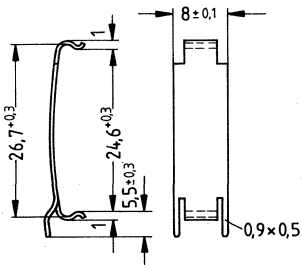
Coil formers, clamps, and insulating washers B 65888

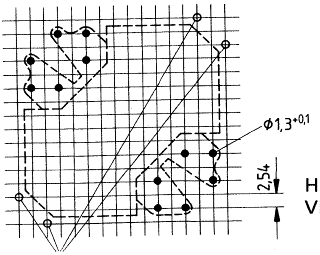
Glass-fiber reinforced thermosetting plastic **coil former** with 10 or 12 terminal pins, complying with DIN 41981 or IEC 431, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.



Marking groove for pin 1
For the 10 pin-version pins No. 5 and 8 are omitted

Clamp[1)]

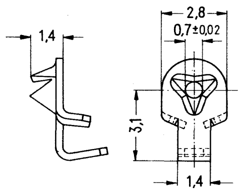




Ground

Hole arrangement
View in mounting direction

Solder clip



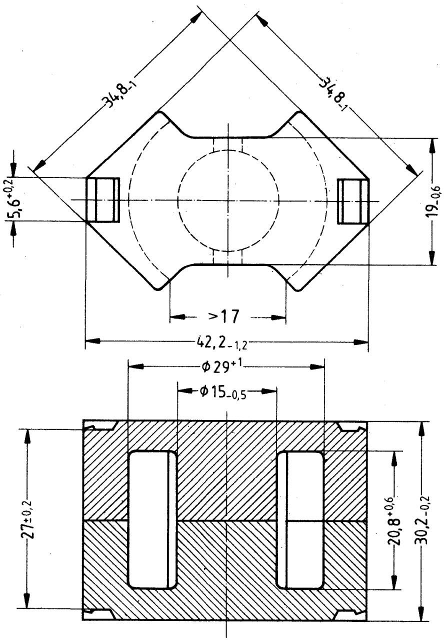
Dimensions in mm

Coil former						Ordering code (PU: 100)	
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[2)] μΩ	Approx. weight g	Number of pins		
1	107	71,5	23	3	10	B65888-B1001-D1	S
					12	B65888-B1002-D1	S
Clamp (approx. weight 1.0 g; ordering code for each clamp, two required)						B65888-A2001	S
Insulating washer for double clad PC boards						B65888-A2005	
Sliding-on **solder clip** for soldering thick wires						B65888-A2004	
Insulating washer between core and coil						B65888-A5000	

1) Pressure per clamp pair: 65 … 80 N
S Preferred products (refer to page 4)

2) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

RM 14 cores preferably for power applications



Magnetic characteristics

Core factor	$\Sigma l/A$ =	0.35	mm^{-1}
Effective length	l_e =	70	mm
Effective area	A_e =	200	mm^2
Min. core cross section[1]	A_{min} =	170	mm^2
Effective volume	V_e =	14000	mm^3

Approx. weight 72 g/set

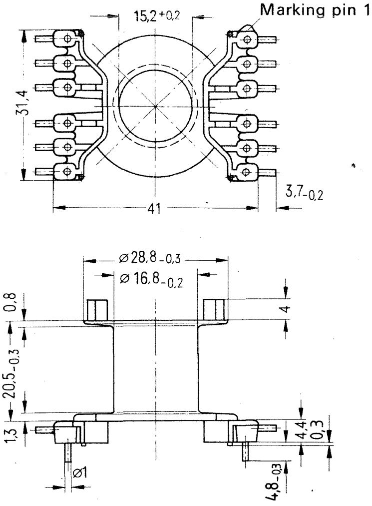
Dimensions in mm

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 100 sets)
Gapped					
400	± 5% ≙ J	N 47	0,4	111	B65887–E400–J47
1600	± 5% ≙ J	N 67	0,11	446	B65887–E1600–J67
3150	±10% ≙ K	N 67	0,04	877	B65887–E3150–K67
Ungapped					
3900	+30 −20 % ≙ R	N 47		1690	B65887–E–R47
6000	+30 −20 % ≙ R	N 67		1670	B65887–E–R67
9500	+30 −20 % ≙ R	N 30		2650	B65887–E–R30

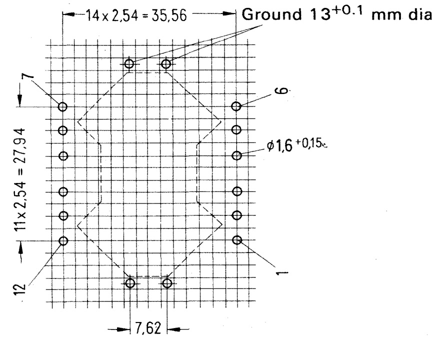
[1] Necessary for calculating the max. flux density

Coil formers, clamps, and insulating washers B 65888

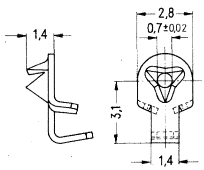
Glass -fiber reinforced polyterephthalate **coil former** with 12 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 71.
Spring steel **clamps** (tinned) with ground terminal.



Hole arrangement
View in mounting direction
(Intermediate spacing
should be considered)

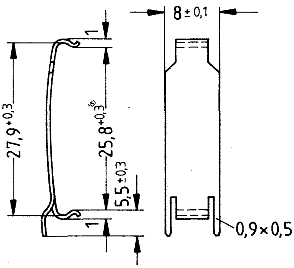


Solder clip



Dimensions in mm

Clamp[1]

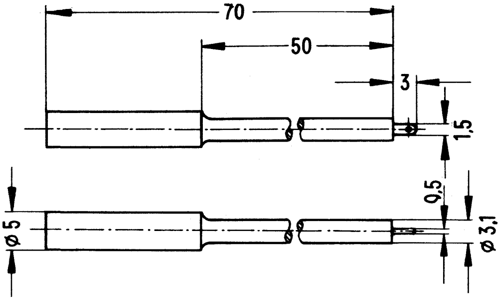


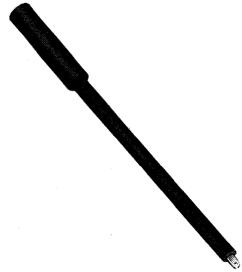
Coil former						**Ordering code** (PU: 100)
Number of sections	Uselful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	Number of pins	
1	106	71,5	23	3	12	B65888–B1512–T1 **S**
Clamp (approx. weight 1.0 g; ordering code for each clamp, two required)						B65888–A2002
Insulating washer for double clad PC boards						B65888–A2005
Sliding-on **solder clip** for soldering thick wires						B65888–A2004
Insulating washer between core and coil						B65888–A5000

[1] Pressure per clamp pair: 65 ... 80 N
S Preferred products (refer to page 4)

[2] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns[2])

Figure 1

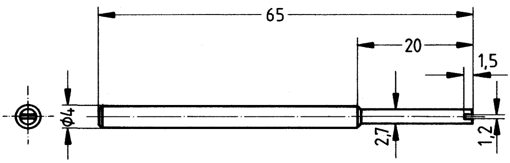


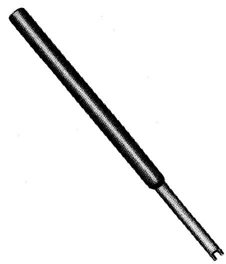


Thermosetting plastic **adjusting screw driver** with injection-molded blade for slotted screw cores.

Ordering code B63399–A1

Figure 2 Not for new design!

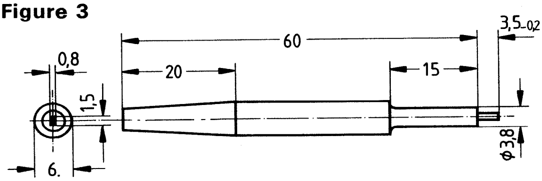


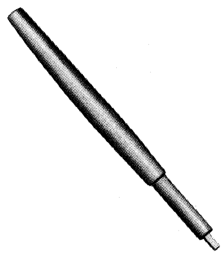


Thermosetting plastic **adjusting screw driver** for screw cores with leg.

Ordering code B63399–A2

Figure 3





Dimensions in mm

Thermosetting plastic **adjusting screw driver** with injection-molded blade for adjusting screws fitting core holes 4.4 mm and 5.4 mm according to sizes 22 dia. x 13 up to 36 dia. x 22, as well as RM 8 and RM 10.

Ordering code B63399–B1 S

S Preferred products (refer to page 4)

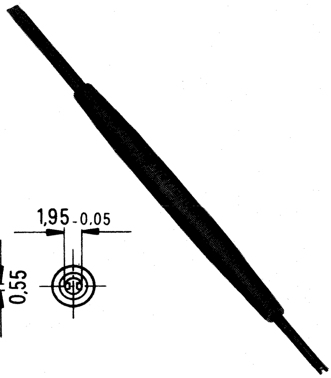
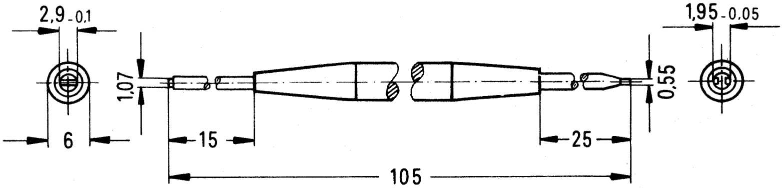


Figure 4



Thermosetting plastic **adjusting screw driver** for adjusting screws fitting core holes 2 mm dia. (thin end) according to core sizes 9 dia. x 5 and 11 dia. x 7, as well as RM 4 and RM 5.
The thicker end fits core holes 3 mm dia. according to the core sizes 14 dia. x 8 up to 18 dia. x 14 as well as RM 6, R 6, and RM 7.

Ordering code B63399–B0004–B4 S

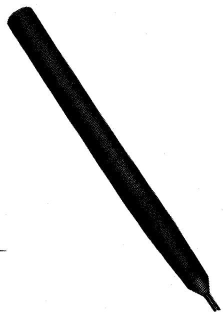
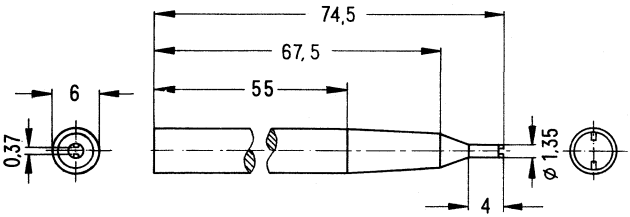


Figure 5



Dimensions in mm

Thermosetting plastic **adjusting screw driver**, the thinner end fitting miniature adjusting screws of core size 4.6 dia. x 4.1 and 7 dia. x 4.

Ordering code B63399–A1007 S

S Preferred products (refer to page 4)

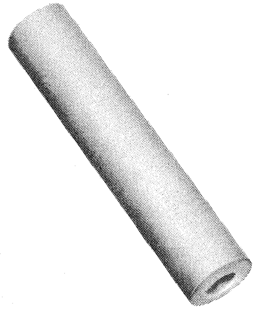
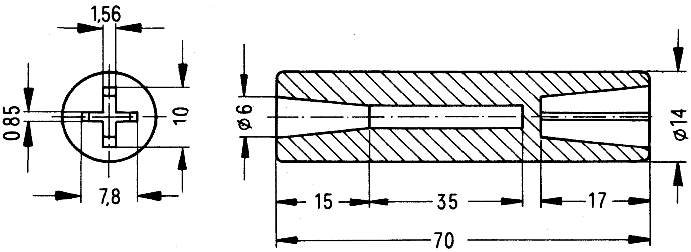


Figure 6



Dimensions in mm

Thermosetting plastic **handle**, fitting adjusting screw drivers of figure 3, 4 and 5.

Ordering code B63399–B5 **S**

PM Cores

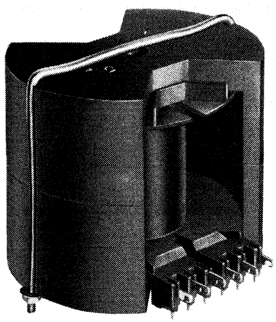


Figure 1

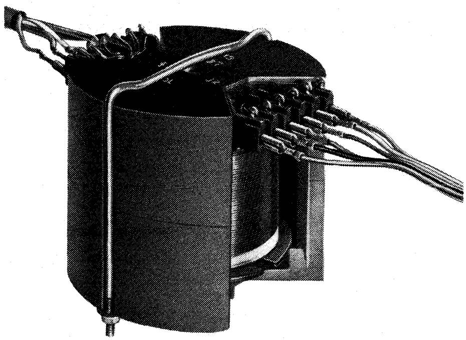


Figure 2

General

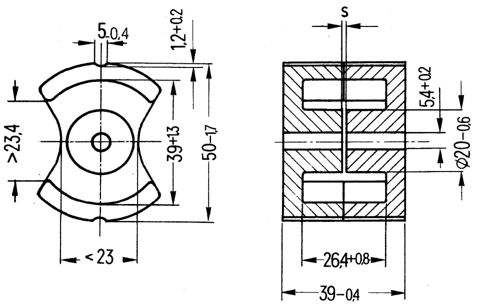
In power electronics, transformers are increasingly used for handling high powers in the medium and high frequency range, not only in switched-mode power supplies and other forms of dc/dc converters. For numerous design tasks in telecommunications and industrial electronics (e.g. power pulse transformers in radar transmitters, antenna matching networks, machine control systems, thyristor firing transformers and others), the pot core shape offers various advantages: wide flux area for high power at a minimum number of turns, thus causing only low magnetic leakage and stray capacitance; the closed form provides good shielding and precisely ground air gaps, moreover, straightforward assembly and economic mounting.

A family of large pot cores, briefly designated "PM" cores (for **P**ot core **M**odule) are introduced in the following.

Due to the weight of the fully wound transformer choke, mounting on usual PC boards may in some cases require additional mechanical support, particularly if a large core, such as the 87/70, is used. In such cases, the coil former should be mounted with its terminals upwards (refer to figure 2). Depending on the kind of equipment, the terminals may be solder tags or plug-in sleeves as flat plug terminals. Coil formers with AMP plugs, for example, are particularly recommended at high currents or for thick leads.

PM cores complying with DIN 41989

Owing to their large apertures for bringing out the leads, these cores are particularly suitable for power transformers. For design details refer to chapter "Cores for power transmission".



Approx. weight 140 g/set

Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A =$	0.255	mm^{-1}
Effective length	$l_e =$	87	mm
Effective area	$A_e =$	340	mm^2
Min. core cross section[1]	$A_{min} =$	280	mm^2
Effective volume	$V_e =$	29600	mm^3

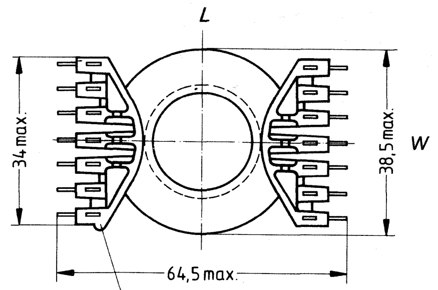
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 20 sets)
Gapped					
250	± 3% ≙ A	N 27	2,0	51	B65646–A250–A27
630	± 3% ≙ A	N 27	0,63	128	B65646–A630–A27
1600	± 5% ≙ J	N 27	0,20	325	B65646–A1600–J27
3150	± 15% ≙ L	N 27	0,08	639	B65646–A3150–L27
Ungapped					
7400	$^{+30}_{-20}$ % ≙ R	N 27		1500	B65646–A–R27 S

[1] Necessary for calculating the max. flux density

S Preferred products (refer to page 4)

Coil former B 65647 complying with DIN 41990 (magnetic axis vertical)

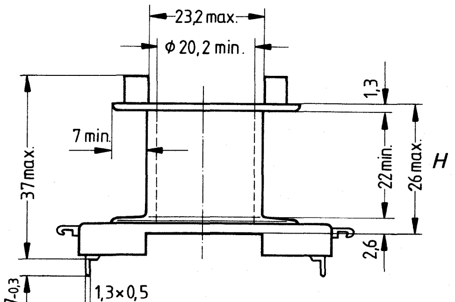
Glass-fiber reinforced polyterephthalate coil former with 14 solder terminals[1], flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 72.

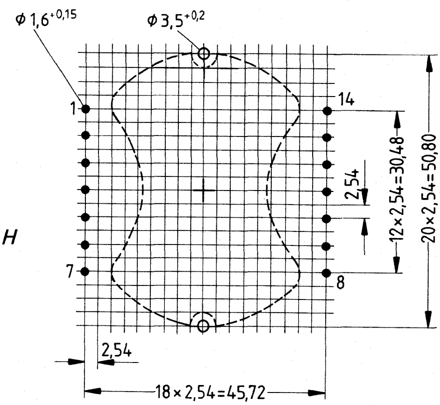


Marking for solder tag 1

Built-in dimensions
for the transformer
L = 65 mm
W = 59 mm
H = 45 mm

Hole arrangement
View in mounting direction





Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[2] μΩ	Approx. weight g	**Ordering code** (PU: 20)
1	154	96,8	21,6	6	B65647–B1014–T1 **S**

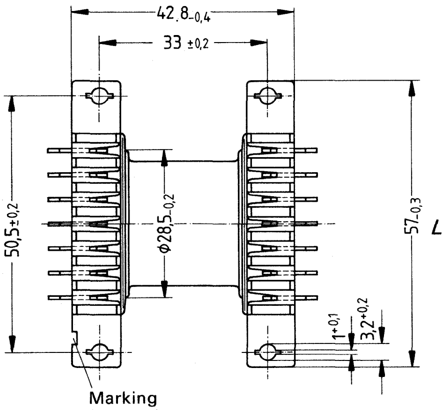
[1] This coil former is also available with 14 flat plugs 2.8 x 0.6 mm Ordering code B65647–A1114–T1
or without terminals Ordering code B65647–A1000–T1

[2] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns[2])

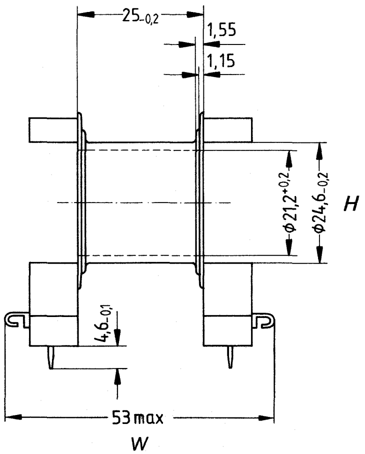
S Preferred products (refer to page 4)

Coil former B 65647 complying with DIN 41990 (magnetic axis horizontal)

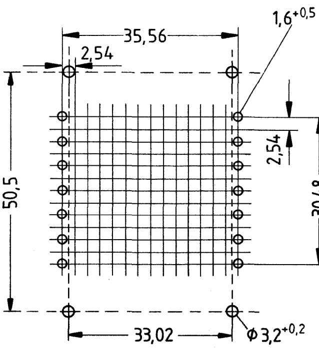
Glass-fiber reinforced polyterephthalate coil former with 14 solder terminals, flame-retardant in accordance with UL 94 V-0. Additional fixing by screws and nuts M3 is possible.
For solderability of terminal pins refer to page 89. For winding details refer to page 72.



Built-in dimensions
for the transformer
L = 62 mm
W = 55 mm
H = 45 mm



Hole arrangement
View in mounting direction



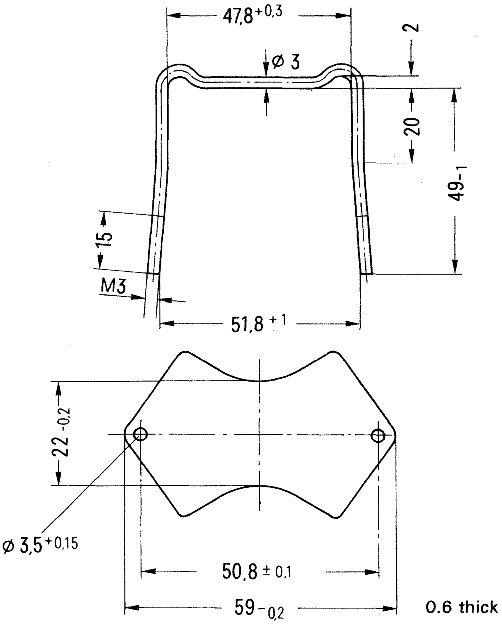
Dimensions in mm

Number of sections	Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 20)
1	136	97	24,5	19,5	B65647–J1014–T1

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns^2)

Mounting **yoke and base plate B 65647** (for chassis mounting or PC mounting). This mounting assembly should only be used with the coil former B65647–B... (magnetic axis vertical).

The mounting assembly comprises a 3 mm dia. brass clamping yoke with thread and a 0.6 mm thick aluminum base plate. Fixing nuts M 3 and washers are included in delivery. For chassis mounting, the coil former has to be mounted with its pins upwards.



Approx. weight 15 g

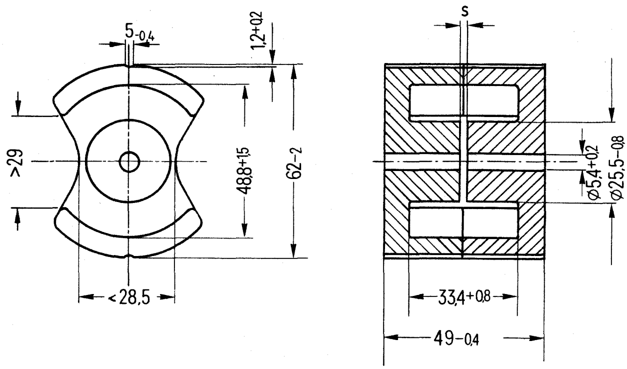
Dimensions in mm

Mounting assembly B65647	Ordering code (PU: 20 sets)
Complete mounting assembly incl. nuts and washers	B65647–A2000 S

S Preferred products (refer to page 4)

PM cores complying with DIN 41989

Owing to their large apertures for bringing out the leads, these cores are particularly suitable for power transformers. For design details refer to chapter "Cores for power transmission".



Approx. weight 280 g/set

Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A =$	0.205	mm^{-1}
Effective length	$l_e =$	113	mm
Effective area	$A_e =$	550	mm^2
Min. core cross section[1]	$A_{min} =$	470	mm^2
Effective volume	$V_e =$	62200	mm^3

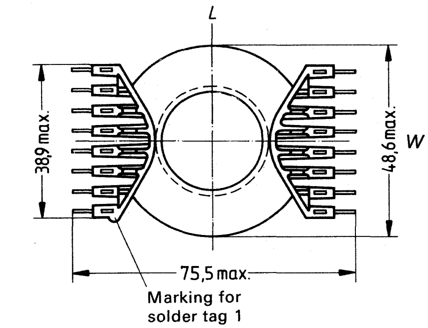
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 20 sets)
Gapped					
315	± 3% ≙ A	N 27	2,6	51	B65684–A315–A27
630			1,1	103	B65684–A630–A27
1600	± 5% ≙ J		0,34	261	B65684–A1600–J27
4000	± 15% ≙ L		0,1	652	B65684–A4000–L27
Ungapped					
9200	$^{+30}_{-20}$ % ≙ R	N 27		1500	B65684–A–R27 **S**

[1] Necessary for calculating the max. flux density

S Preferred products (refer to page 4)

Coil former B 65685 complying with DIN 41990

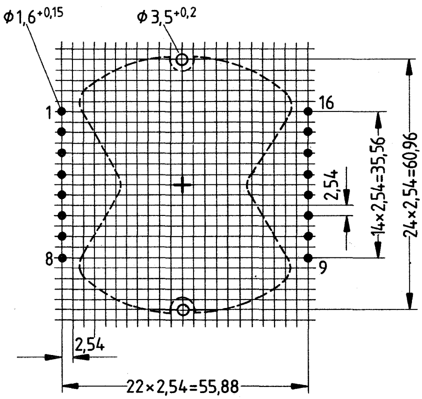
Glass-fiber reinforced polyterephthalate coil former with 16 solder terminals[1], flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 72.

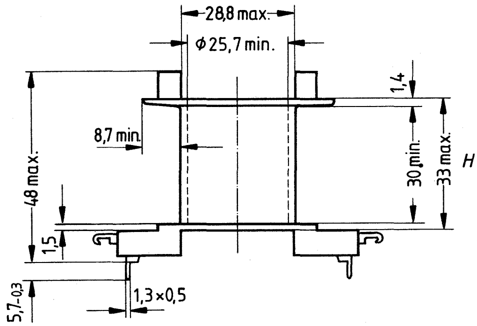


Built-in dimensions
for the transformer

L = 76 mm
W = 69 mm
H = 55 mm

Hole arrangement
View in mounting direction





Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[2] μΩ	Approx. weight g	**Ordering code** (PU: 20)
1	270	120	15,4	10	B65685–B1016–T1 S

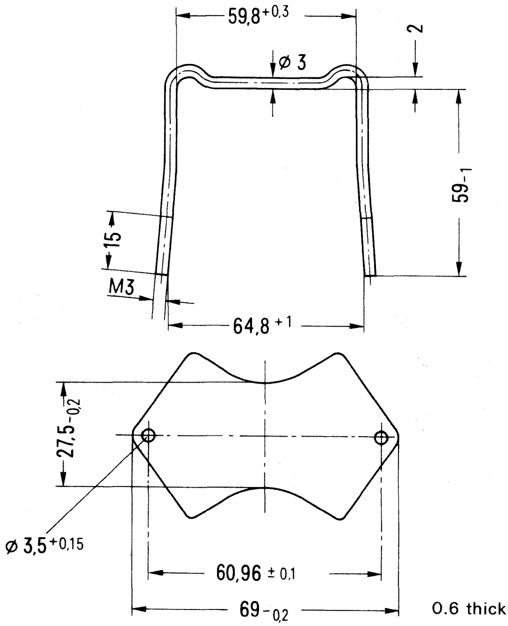
[1] This coil former is also available with 16 flat plugs 2.8 x 0.6 mm — Ordering code B65685–A1116–T1
or without terminals — Ordering code B65685–A1000–T1

[2] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

Mounting yoke and base plate B 65 685 (for chassis mounting or PC mounting).

The mounting assembly comprises a 3 mm dia. brass clamping yoke with thread and a 0.6 mm thick aluminum base plate. Fixing nuts M 3 and washers are included in delivery. For chassis mounting, the coil former has to be mounted with its pins upwards.



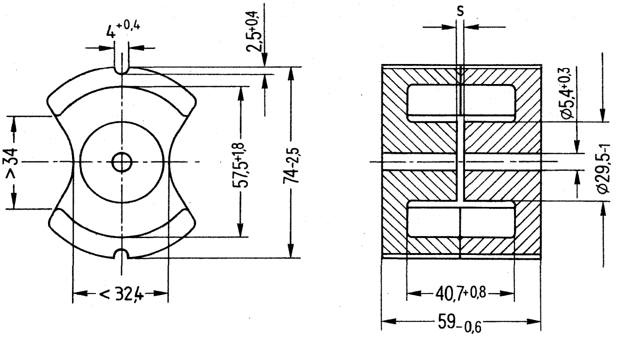
Approx. weight 19 g

Dimensions in mm

Mounting assembly B65685	Ordering code (PU: 20 sets)
Complete mounting assembly incl. nuts and washers	B65685–A2000

PM cores complying with DIN 41989

Owing to their large apertures for bringing out the leads, these cores are particularly suitable for power transformers. For design details refer to chapter "Cores for power transmission".



Dimensions in mm

Approx. weight 460 g/set

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.18 mm^{-1}
Effective length	l_e =	133 mm
Effective area	A_e =	740 mm^2
Min. core cross section[1]	A_{min} =	630 mm^2
Effective volume	V_e =	98000 mm^3

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 10 sets)
Gapped					
315	± 3% ≙ A	N 27	3,8	45	B65686-A315-A27
630	± 3% ≙ A	N 27	1,5	90	B65686-A630-A27
2500	± 5% ≙ J	N 27	0,26	358	B65686-A2500-J27
4000	± 15% ≙ L	N 27	0,14	573	B65686-A4000-L27
Ungapped					
10000	+30/−20 % ≙ R	N 27		1430	B65686-A-R27 S

[1] Necessary for calculating the max. flux density

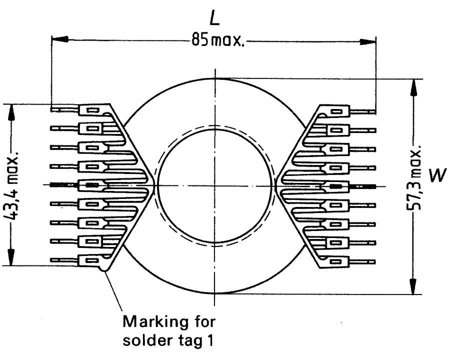
S Preferred products (refer to page 4)

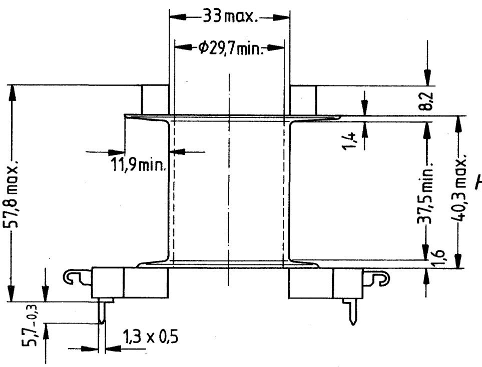
Coil former B 65687 complying with DIN 41990

Glass-fiber reinforced polyterephthalate coil former with 18 solder terminals[1], flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 72.

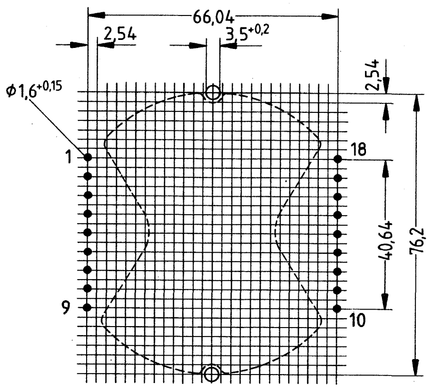
Built-in dimensions for the transformer

L = 85.5 mm
W = 83.5 mm
H = 65 mm





Hole arrangement
View in mounting direction



Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[2] µΩ	Approx. weight g	**Ordering code** (PU: 10)
1	442	140	10,9	20	B65687–A1018–T1 S

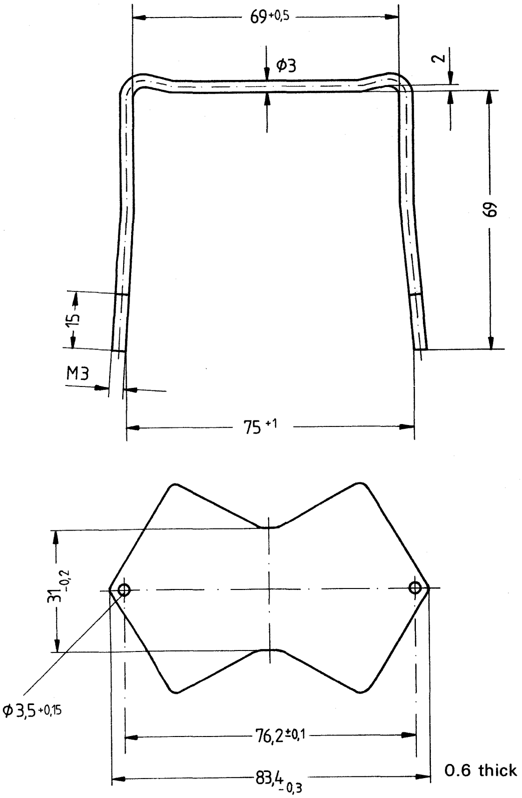
[1] This coil former is also available with 18 flat plugs 2.8 x 0.6 mm Ordering code B65687–A1118–T1
or without terminals Ordering code B65687–A1000–T1

[2] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

Mounting yoke and base plate B 65 687 (for chassis mounting or PC mounting).

The mounting assembly comprises a 3 mm dia. brass clamping yoke with thread and a 0.6 mm thick aluminum base plate. Fixing nuts M 3 and washers are included in delivery. For chassis mounting, the coil former has to be mounted with its pins upwards.



Approx. weight 19 g

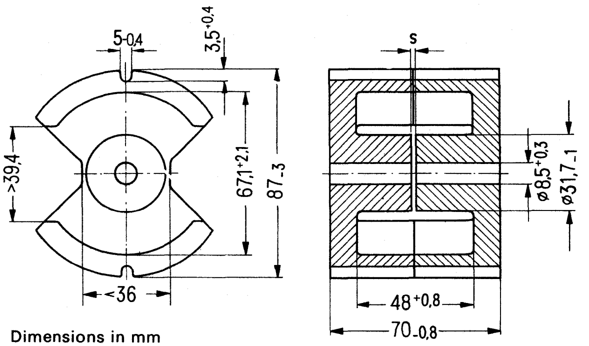
Dimensions in mm

Mounting assembly B65687	Ordering code (PU: 10 sets)
Complete mounting assembly incl. nuts and washers	B65687–A2000 S

S Preferred products (refer to page 4)

PM cores complying with DIN 41989

Owing to their large apertures for bringing out the leads, these cores are particularly suitable for power transformers. For design details refer to chapter "Cores for power transmission".



Dimensions in mm

Approx. weight 770 g/set

Magnetic characteristics

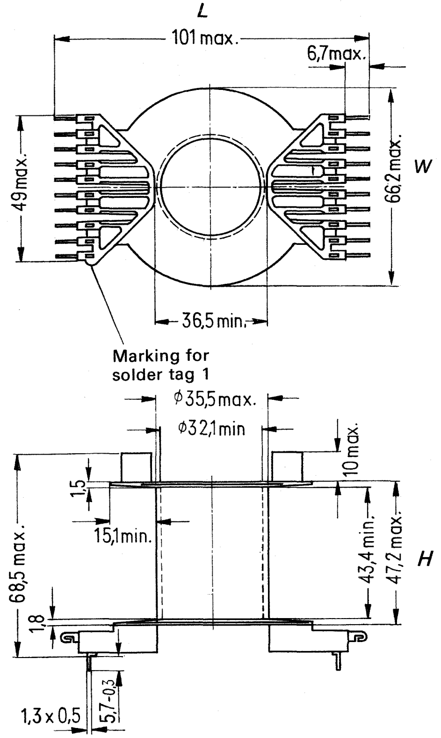
Core factor	$\Sigma\, l/A$ =	0.167	mm^{-1}
Effective length	l_e =	153	mm
Effective area	A_e =	915	mm^2
Min. core cross section[1]	A_{min} =	700	mm^2
Effective volume	V_e =	140000	mm^3

A_L value nH	tolerance	Ferrite material	Total air gap *s* in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 2 sets)
Gapped					
400	± 3% ≙ A	N 27	3,5	53	B65713-A400-A27
1000	± 3% ≙ A	N 27	1,1	133	B65713-A1000-A27
2500	± 5% ≙ J	N 27	0,34	332	B65713-A2500-J27
5000	± 15% ≙ L	N 27	0,14	664	B65713-A5000-L27
Ungapped					
12000	$^{+30}_{-20}$% ≙ R	N 27		1590	B65713-A-R27 S

[1] Necessary for calculating the max. flux density
S Preferred products (refer to page 4)

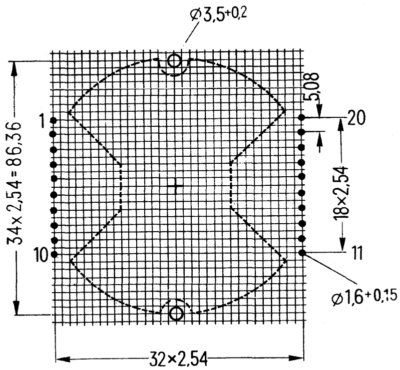
Coil former B 65714 complying with DIN 41990

Glass-fiber reinforced polyterephthalate coil former with 20 solder terminals[1], flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 72.



Built-in dimensions
for the transformer
L = 103 mm
W = 95 mm
H = 76 mm

Hole arrangement
View in mounting direction



Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[2] µΩ	Approx. weight g	**Ordering code** (PU: 10)
1	657	158	8,27	31	B65714-K1020-T1 S

[1] This coil former is also available with 20 flat plugs 2.8 x 0.6 mm Ordering code B65714-J1120-T1
or without terminals Ordering code B65714-J1000-T1

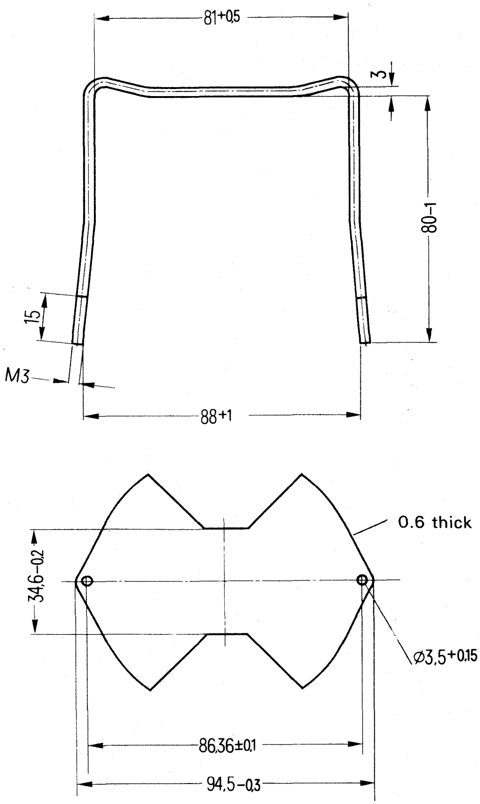
[2] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

Mounting yoke and **base plate B 65 714** (for chassis mounting or PC mounting).

The mounting assembly comprises a 3 mm dia. brass clamping yoke with thread and a 0.6 mm thick aluminum base plate. Fixing nuts M 3 and washers are included in delivery.

For chassis mounting, the coil former has to be mounted with its pins upwards.



Approx. weight 20 g

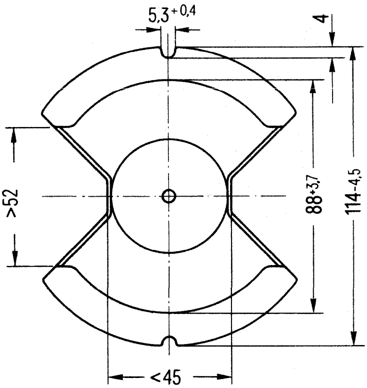
Dimensions in mm

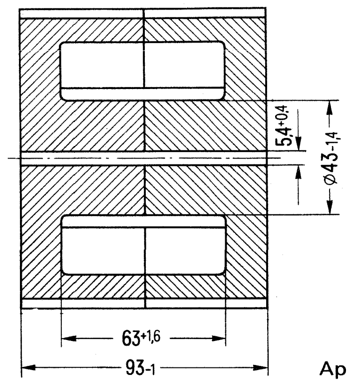
Mounting assembly B65714	Ordering code (PU: 10 sets)
Complete mounting assembly incl. nuts and washers	B65714–A2000 S

S Preferred products (refer to page 4)

PM cores complying with DIN 41989

Owing to their large apertures for bringing out the leads, these cores are particularly suitable for power transformers. For design details refer to chapter "Cores for power transmission".





Dimensions in mm

Approx. weight 1940 g/set

Magnetic characteristics

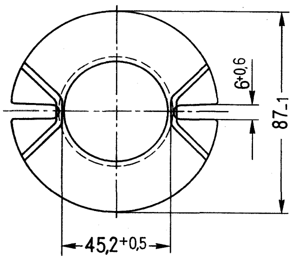
Core factor	$\Sigma\, l/A$ =	0.12	mm^{-1}
Effective length	l_e =	208	mm
Effective area	A_e =	1730	mm^2
Min. core cross section[1]	A_{min} =	1380	mm^2
Effective volume	V_e =	360000	mm^3

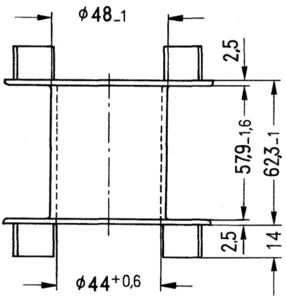
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 1 set)
Gapped					
630	± 3% ≙ A	N 27	3,8	60	B65733–A630–A27
1000	± 3% ≙ A	N 27	2,4	96	B65733–A1000–A27
2500	± 5% ≙ J	N 27	0,70	239	B65733–A2500–J27
6300	± 15% ≙ L	N 27	0,22	600	B65733–A6300–L27
Ungapped					
16000	$^{+30}_{-20}$ % ≙ R	N 27		1530	B65733–A–R27 S

[1] Necessary for calculating the max. flux density
S Preferred products (refer to page 4)

Coil former B 65734 complying with DIN 41990

Glass-fiber reinforced 11 polyamide coil former without solder terminals.
For winding details refer to page 72.





Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 5)
1	1070	210	6,75	42	B65734–B1000–T1 **S**

$R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

Pot Cores for Proximity Switches

Pot Cores for Proximity Switches

General

It is the proximity switch which permits contactless handling of motions and switching functions. Application examples are: logging of the final position of conveyer belts, counting facilities at rotary parts, powerless sensing of indicating instruments in measuring and control technique.

In addition to bouncefree switching and resistance to mechanical wear – the decisive advantages of all contactless switches – inductive switches, moreover, feature insensitivity to contamination and recognition of metallic parts.

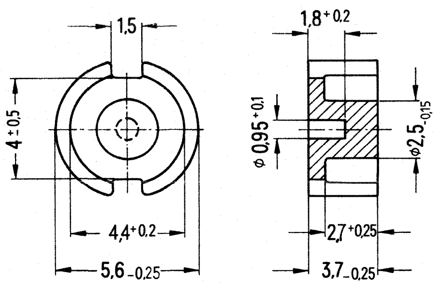
Pot cores and coil formers

A series of pot cores with diameters between 5.6 and 70 mm is available for inductive proximity switches. Their dimensions match the standardized switches. Maximum response distances can thus be achieved for the various pot core sizes. The ferrite material N22 is particularly suitable for applications in the main frequency range between 100 kHz and 1 MHz. The ferrite material M33 is available for higher frequencies, meeting the small pot core sizes 5.6 mm dia. to 9.0 mm. For the pot core sizes 7 mm dia. to 70 mm matching thermoplastic coil formers can be delivered. The operating temperature range of these coil formers covers −60 °C to +120 °C/−76 °F to +248 °F. During the potting, the temperature may not exceed 120 °C/248 °F.

Survey

Pot core[1]			Coil former	Suitable for standard size as per EN 50008
Size (mm) dia. x height	Material	Ordering code	Ordering code	
5,6 x 3,7	N 22, M 33	B65931-C-X**	–	M 8 x 1
7,35 x 3,6	N 22, M 33	B65933-A-X**	B65512-C-T1	–
9 x 2,8	N 22, M 33	B65935-J-X**	B65936-A-T1	M 12 x 1
9,4 x 4,6	N 22, M 33	B65935-A-X**	B65522-B-T1	M 12 x 1
14,4 x 7,5	N 22	B65937-A-X22	B65542-B-T1	M 18 x 1
25 x 8,9	N 22	B65939-A-X22	B65940-A-M1	M 30 x 1,5
30,5 x 10,2	N 22	B65941-A-X22	B65942-A-M1	M 40 x 1,5
35 x 10,8	N 22	B65947-A-X22	–	–
47 x 14,9	N 22	B65943-A-X22	B65944-A-M1	–
70 x 14,5	N 22	B65945-A-X22	B65946-A-M1	–

[1] The quantity ordered does not include a pot core set (two halves) but only refers to one pot core half.
** Insert "22" or "33" for requested material N22 or M33, respectively.



Ferrite materials N 22, M 33

Approx. weight 0.15 g

Dimensions in mm

Ordering code

B65931–C–X22 (for material N22)
B65931–C–X33 (for material M33)

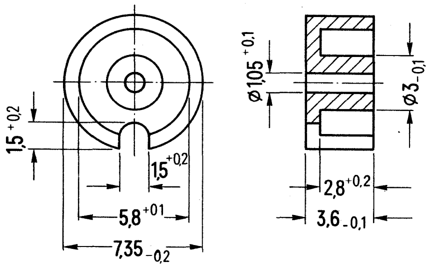
(PU: 1000)

For these cores we recommend that the coil be manufactured by a formerless technique, e.g. using a lacquer-insulated wire coated with thermoplastic (self bonding wire).

Winding data for "winding without former"

Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_R value[1] µΩ
approx. 2,08	9,7	160

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns[2])



Ferrite materials N22, M33

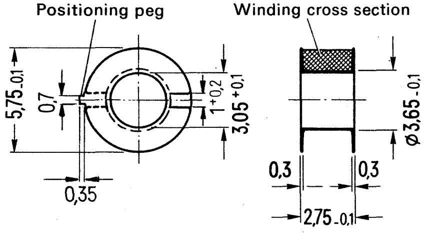
Approx. weight 0.3 g

Dimensions in mm

Ordering code
B65933–A–X22 (for material N22) **S**
B65933–A–X33 (for material M33) **S**
(PU: 1000)

Glass-fiber reinforced polyterephthalate coil former B 65512

flame-retardant in acc. with UL 94 V-0



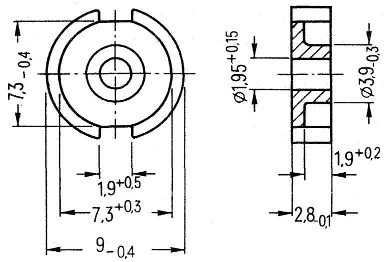
Dimensions in mm

Winding data

Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value1) μΩ	Approx. weight g	**Ordering code** (PU: 1000)
2,2	14,6	240	0,04	B65512–C–T1

1) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)



Ferrite materials N22, M33

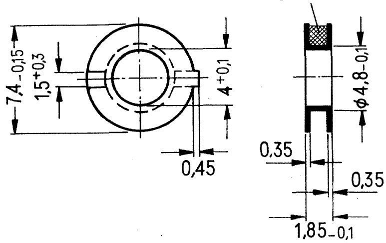
Approx. weight 0.6 g

Dimensions in mm

Ordering code
B65935–J–X22 (for material N22)
B65935–J–X33 (for material M33)
(PU: 1000)

Glass-fiber reinforced polyterephthalate coil former B 65936

flame-retardant in acc. with UL 94 V-0



Dimensions in mm

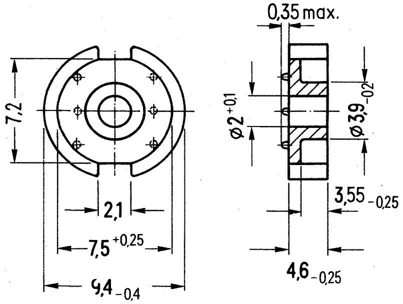
Winding data

Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 1000)
1,36	18,6	470	0,03	B65936–A–T1

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

Pot Core Halves 9.4 x 4.6 — B 65935-A

Pot core halves with 9.4 x 4.6 mm dia. with coil former for inductive proximity switches; suitable for switches complying with EN 50008. The core halves have cams max. 0.35 mm in height at the front ends (see dimensional drawing).



Ferrite materials N22, M33

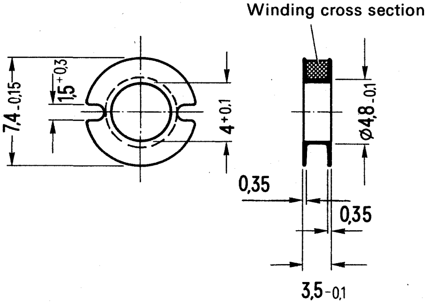
Approx. weight 0.6 g

Dimensions in mm

Ordering code
B65935–A–X22 (for material N22) S
B65935–A–X33 (for material M33) S
(PU: 1000)

Glass-fiber reinforced polyterephthalate coil former — B 65522

flame-retardant in acc. with UL 94 V-0



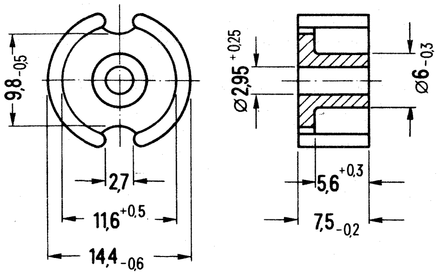
Dimensions in mm

Winding data

Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 500)
2,8	18,5	220	0,05	B65522–B–T1

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns^2)

S Preferred products (refer to page 4)



Ferrite material N22

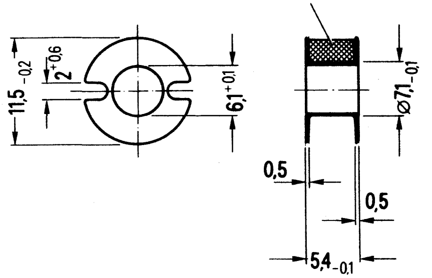
Approx. weight 2.5 g

Dimensions in mm

Ordering code
B65937–A–X22 S
(PU: 1000)

Glass-fiber reinforced polyterephthalate coil former B 65542

flame-retardant in acc. with UL 94 V-0



Dimensions in mm

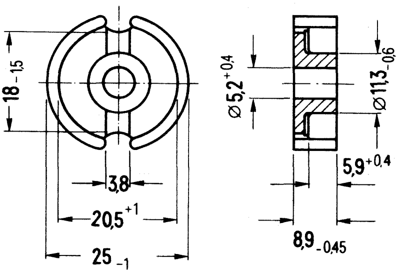
Winding data

Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 1000)
8,4	28	115	0,2	B65542–B–T1

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

Pot Cores Halves 25 x 8.9 with Coil Former

B 65939



Ferrite material N22

Approx. weight 9 g

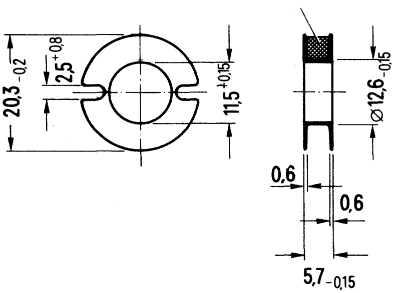
Dimensions in mm

Ordering code
B65939–A–X22 S
(PU: 200)

Glass-fiber reinforced polyterephthalate coil former

B 65940

flame-retardant in acc. with UL 94 V-0



Dimensions in mm

Winding data

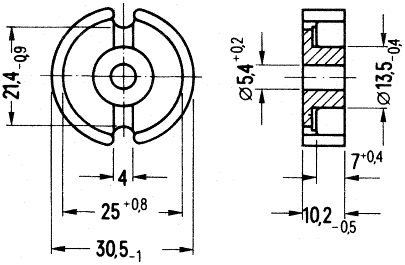
Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 200)
16,7	51	105	0,5	B65940–B–T1 S

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

Pot Core Halves 30.5 x 10.2 with Coil former

B 65941



Ferrite material N22

Approx. weight 18 g

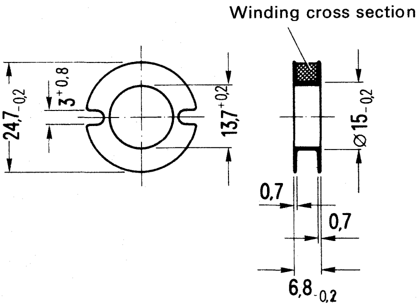
Dimensions in mm

Ordering code
B65941–A–X22 S
(PU: 200)

Glass-fiber reinforced polyterephthalate coil former

B 65942

flame-retardant in acc. with UL 94 V-0



Dimensions in mm

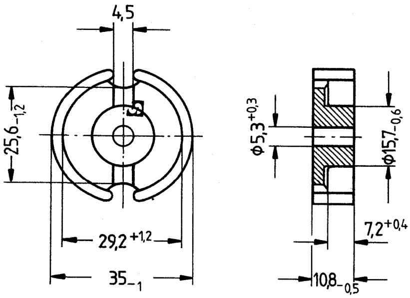
Winding data

Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 250)
24,4	62	87	0,65	B65542–B–T1 S

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

Pot Core Halves 35 x 10.8 B 65 947



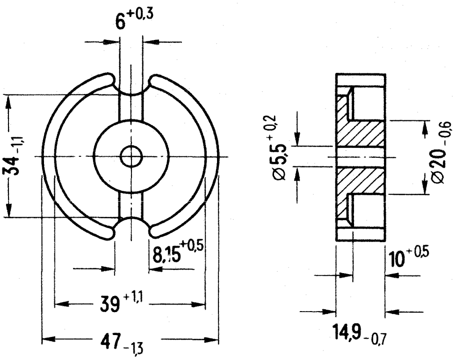
Ferrite material N22

Approx. weight 28 g

Dimensions in mm

Ordering code
B65947−A−X22 S
(PU: 200)

S Preferred products (refer to page 4)



Ferrite material N22

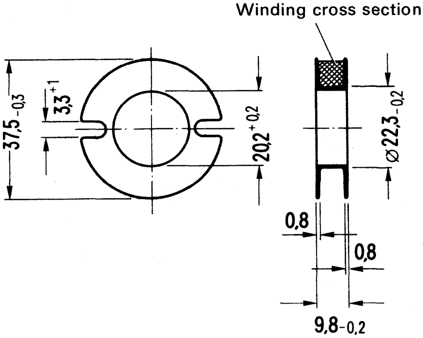
Approx. weight 62 g

Dimensions in mm

Ordering code
B65943–A–X22 S
(PU: 50)

Glass-fiber reinforced polyterephthalate coil former B 65944

flame-retardant in acc. with UL 94 V-0



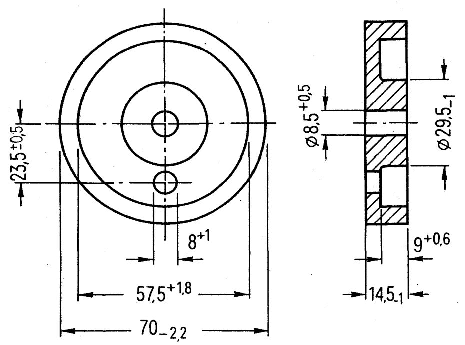
Dimensions in mm

Winding data

Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 50)
62	95	52,5	2,5	B65944–B–T1 S

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)



Ferrite material N22

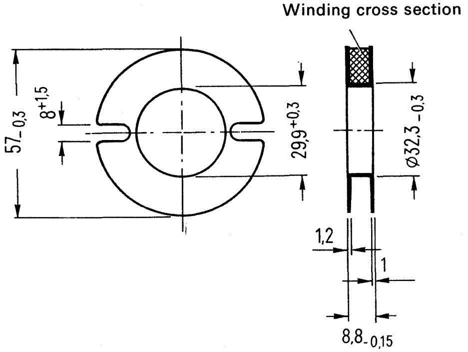
Approx. weight 130 g

Dimensions in mm

Ordering code
B65945–A–X22 🅂
(PU: 20)

Glass-fiber reinforced polyterephthalate coil former **B 65946**

flame-retardant in acc. with UL 94 V-0



Dimensions in mm

Winding data

Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 20)
77	140	62	5	B65946–B–T1 🅂

[1] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

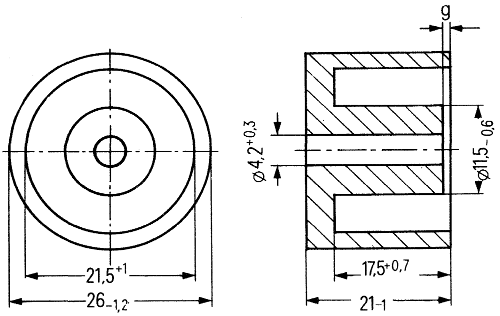
🅂 Preferred products (refer to page 4)

CC Cores

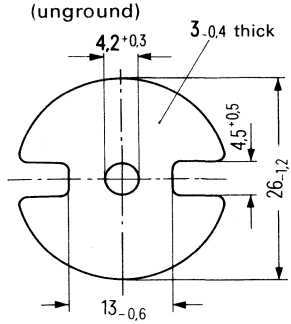
CC 26 cores with cap are particularly suitable for the construction of energy storage chokes of low leakage flux. For power applications, e.g. crossover networks in hi-fi speaker systems, the cores can also be used without cap (as C cores).

M4 screws made of non magnetic material (brass, plastic) are used for fixing the cores at their center hole.

Cup core
(unground)



Cap
(unground)



Dimensions in mm

Approx. weight:

with cap	29 g
without cap	24 g

Magnetic characteristics[1]

Core factor	$\Sigma l/A$ =	0.50	mm^{-1}
Effective length	l_e =	52	mm
Effective area	A_e =	103	mm^2
Min. core cross section[2]	A_{min} =	84	mm^2
Effective volume	V_e =	5350	mm^3

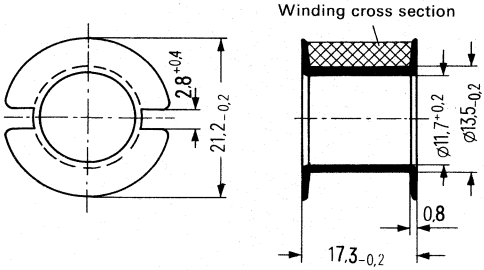
Version	Air gap g mm	A_L value[1] approx. nH	Ferrite material	**Ordering code** (PU: 200)
Cup with air gap "g"	1 ± 0,3	210		B66442–A1000–X27
	2 ± 0,3	140		B66442–A2000–X27
	3 ± 0,3	100	N 27	B66442–A3000–X27
Cup without air gap	0			B66442–A–X27
Cap	–			B66442–J–X27

[1] with cap
[2] Necessary for calculating the max. flux density

Coil former for CC 26 cores

Glass-fiber reinforced polyterephthalate coil former; flame-retardant in accordance with UL 94 V-0.

For winding details refer to page 73.



Dimensions in mm

Winding data[1] for the coil former

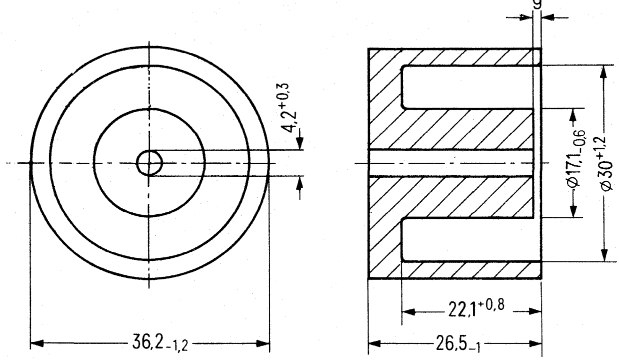
Number of sections	Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_R value[2] µΩ	Approx. weight g	**Ordering code** (PU: 200)
1	50	54	33	0,7	B66442–B1001–T1

[1] The values also apply to C cores
[2] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns^2)

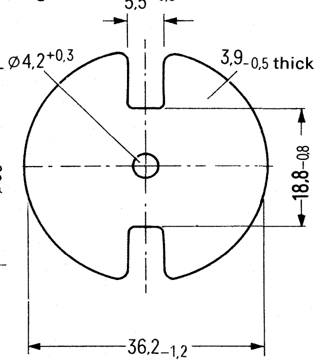
CC 36 cores with cap are particularly suitable for the construction of energy storage chokes of low leakage flux. For power applications, e.g. crossover networks in hi-fi speaker systems, the cores can also be used without cap (as C cores).

M4 screws made of non magnetic material (brass, plastic) are used for fixing the cores at their center hole.

Cup core
(unground)



Cap
(unground)



Dimensions in mm

Approx. weight:
with cap 80 g
without cap 65 g

Magnetic characteristics[1]

Core factor	$\Sigma\, l/A =$	0.30 mm^{-1}
Effective length	$l_e =$	69 mm
Effective area	$A_e =$	230 mm^2
Min. core cross section[2]	$A_{min} =$	204 mm^2
Effective volume	$V_e =$	15870 mm^3

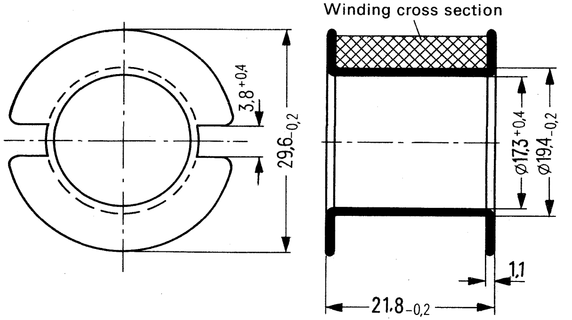
Version	Air gap g mm	A_L value[1] approx. nH	Ferrite material	**Ordering code** (PU: 100)
Cup with air gap "g"	1 ± 0,3	400	N 27	B66443–A1000–X27
	2 ± 0,3	250		B66443–A2000–X27
	3 ± 0,3	190		B66443–A3000–X27
	4 ± 0,3	150		B66443–A4000–X27
Cup without air gap	0			B66443–A–X27
Cap	–			B66443–J–X27

[1] with cap
[2] Necessary for calculating the max. flux density

Coil former for CC 36 cores

Glass-fiber reinforced polyterephthalate coil former; flame-retardant in accordance with UL 94 V-0.

For winding details refer to page 73.



Dimensions in mm

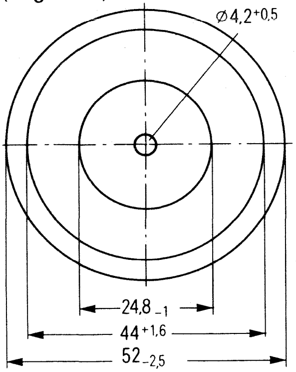
Winding data[1] for the coil former

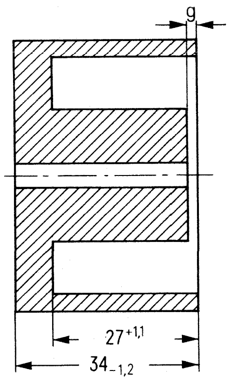
Number of sections	Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_R value[2] µΩ	Approx. weight g	**Ordering code** (PU: 100)
1	95	77	28	2,8	B66443–B1001–T1

[1] The values also apply to C cores
[2] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns^2)

CC 50 cores with cap are particularly suitable for the construction of energy storage chokes of low leakage flux. For power applications, e.g. crossover networks in hi-fi speaker systems, the cores can also be used without cap (as C cores).
M4 screws made of non magnetic material (brass, plastic) are used for fixing the cores at their center hole.

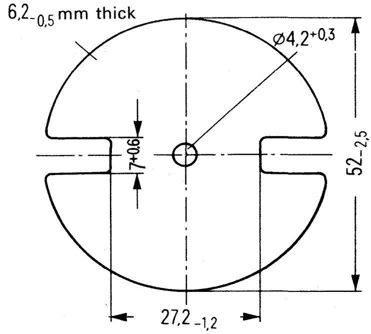
Cup core
(unground)





Approx. weight:
with cap 220 g
without cap 165 g

Cap
(unground)



Dimensions in mm

Magnetic characteristics[1]

Core factor	$\Sigma l/A =$	$0.19\ mm^{-1}$
Effective length	$l_e =$	91 mm
Effective area	$A_e =$	$480\ mm^2$
Min. core cross section[2]	$A_{min} =$	$448\ mm^2$
Effective volume	$V_e =$	$43680\ mm^3$

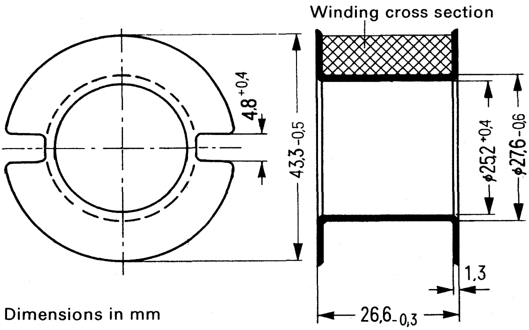
Version	Air gap *g* mm	A_L value[1] approx. nH	Ferrite material	**Ordering code** (PU: 50)
Cup with air gap "g"	1 ± 0,3	730	N 27	B66446–A1000–X27
	2 ± 0,3	440		B66446–A2000–X27
	3 ± 0,3	320		B66446–A3000–X27
	4 ± 0,3	250		B66446–A4000–X27
Cup without air gap	0			B66446–A–X27
Cap	–			B66446–J–X27

[1] with cap
[2] Necessary for calculating the max. flux density

Coil former for CC 50 cores

Glass-fiber reinforced polyterephthalate coil former; flame-retardant in accordance with UL 94 V-0.

For winding details refer to page 73.



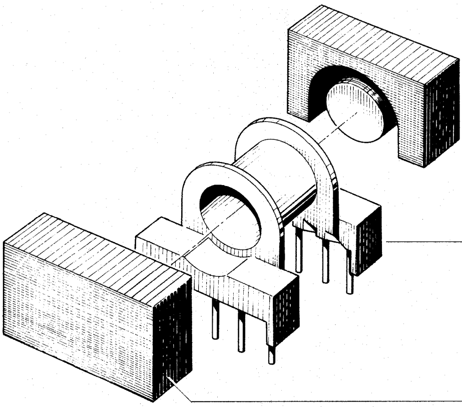
Dimensions in mm

Winding data[1] for the coil former

Number of sections	Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_R value[2] μΩ	Approx. weight g	**Ordering code** (PU: 50)
1	178	111	21,5	7,4	B66446-B1001-T1

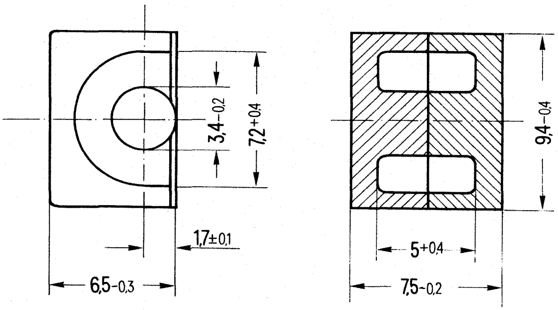
[1] The values also apply to C cores
[2] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns^2)

EP and Q Cores



Individual parts	Part No.	Page
Core	B65839	383
Coil former with 1 or 2 sections and 6 pins	B65840	384
Core	B65839	383

EP 7 cores of high permeability materials are suitable for the design of high inductance transformers at high packing density. They are particularly suitable for transformers in printed circuits with up to 6 terminals. The wire ends of the winding are directly connected to the solder pins of the coil former.



Approx. weight 1.4 g/set

Dimensions in mm

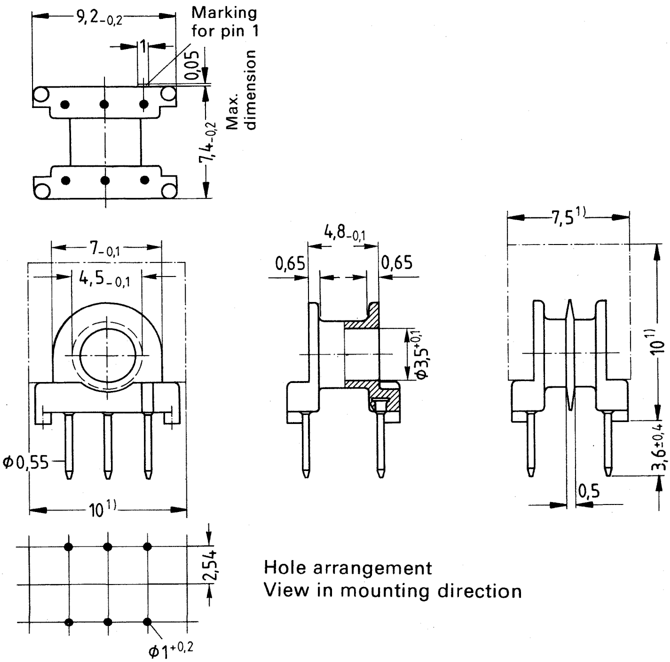
Magnetic characteristics

Core factor	$\Sigma\, l/A =$	1.52 mm^{-1}
Effective length	$l_e =$	15.7 mm
Effective area	$A_e =$	10.3 mm^2
Effective volume	$V_e =$	162 mm^3

A_L value Ungapped nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 1000 sets)
1100	$^{+30}_{-20}$ % ≙ R	N 26	1330	B65839-A-R26
2000		N 30	2420	B65839-A-R30
5200	$^{+40}_{-30}$ % ≙ Y	T 38	6290	B65839-A-Y38

Coil former B 65 840

Glass-fiber reinforced thermosetting plastic coil former with 6 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 74.

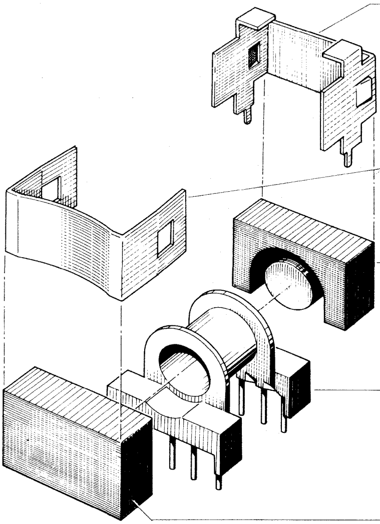


Hole arrangement
View in mounting direction

Dimensions in mm

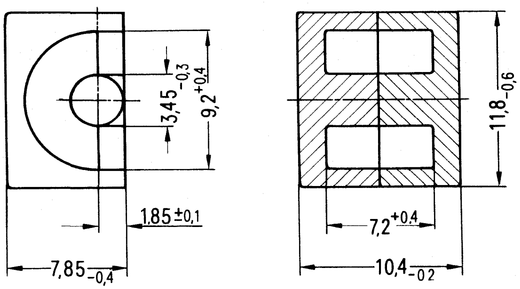
Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[2] μΩ	Approx. weight g	**Ordering code** (PU: 1000)
1	3,7	3,7	17 9	166	0,3	B65840-A1000-D1
2	1,6	3,2	17 9	192	0,4	B65840-A1000-D2

[1] Built-in dimension for the transformer
[2] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)



Individual parts	Part No.	Page
Yoke	B65842	388
Clamp	B65842	388
Core	B65841	386
Coil former with 1 or 2 sections, and 8 pins	B65842	387
Core	B65841	386

EP 10 cores of high permeability materials are suitable for the design of high inductance transformers at high packing density. They are particularly suitable for transformers in printed circuits with up to 8 terminals. The wire ends of the winding are directly connected to the solder pins of the coil former.



Approx. weight 2.75 g/set

Dimensions in mm

Magnetic characteristics

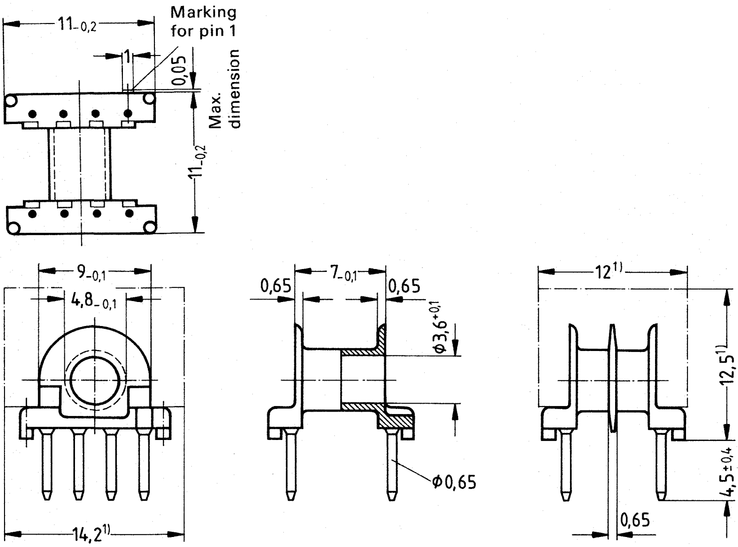
Core factor	$\Sigma\, l/A =$	1.7 mm^{-1}
Effective length	$l_e =$	19.2 mm
Effective area	$A_e =$	11.3 mm^2
Effective volume	$V_e =$	217 mm^3

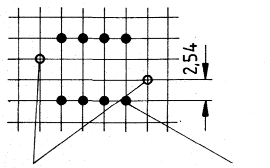
A_L value Ungapped nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 500 sets)	
1100	$^{+30}_{-20}$ % ≙ R	N 26	1490	B65841-A-R26	
2000		N 30	2700	B65841-A-R30	S
3200		T 35	4330	B65841-A-R35	
4800	$^{+40}_{-30}$ % ≙ Y	T 38	6490	B65841-A-Y38	S
4800	$^{+80}_{-0}$ % ≙ U	T 38	6490	B65841-A4800-U638	

S Preferred products (refer to page 4)

Coil former B 65842

Glass-fiber reinforced thermosetting plastic coil former with 8 terminal pins, flame-retardant in accordance with 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 74.





Hole arrangement
View in mounting direction

Dimensions in mm

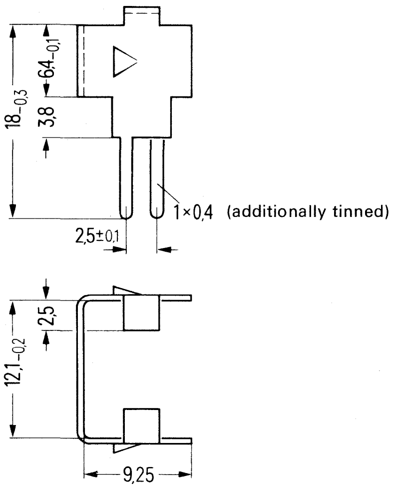
Number of sections	Useful winding cross section A_N of one section mm^2	Useful winding cross section A_N total mm^2	Average length of turn l_N mm	A_R value[2] µΩ	Approx. weight g	**Ordering code** (PU: 500)
1	11,4	11,4	21,5	65	0,6	B65842-A1000-D1 S
2	5,0	10,0		74	0,65	B65842-A1000-D2 S

[1] Built-in dimension for the transformer
[2] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns^2)
S Preferred products (refer to page 4)

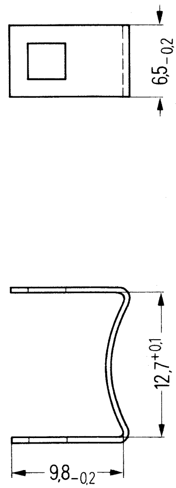
Mounting assembly B 65842

consisting of a yoke and a spring clamp.

Yoke
made of 0.4 mm thick nickel silver



Clamp
made of 0.3 mm thick nickel silver

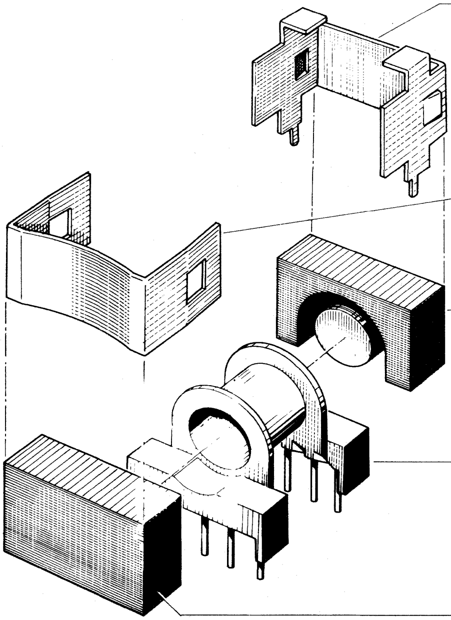


Dimensions in mm

Approx. weight (yoke and clamp) 1.4 g

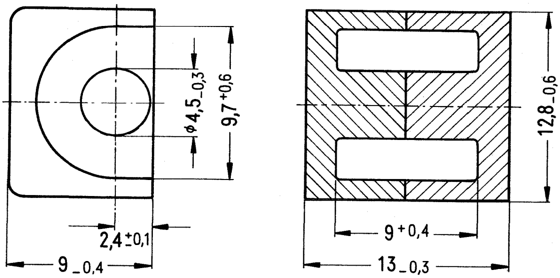
Ordering code (complete assembly) B65842–A2000 S
(PU: 500)

S Preferred products (refer to page 4)



Individual parts	Part No.	Page
Yoke	B65844	392
Clamp	B65844	392
Core	B65843	390
Coil former with 1 or 2 sections, and 10 pins	B65844	391
Core	B65843	390

EP 13 cores made of high permeability materials, are suitable for the design of high inductance transformers at high packing density. These cores are particularly suitable for transformers in printed circuits with up to 10 terminals. The wire ends of the winding are directly connected to the solder pins of the coil former.



Approx. weight 5.1 g/set

Dimensions in mm

Magnetic characteristics

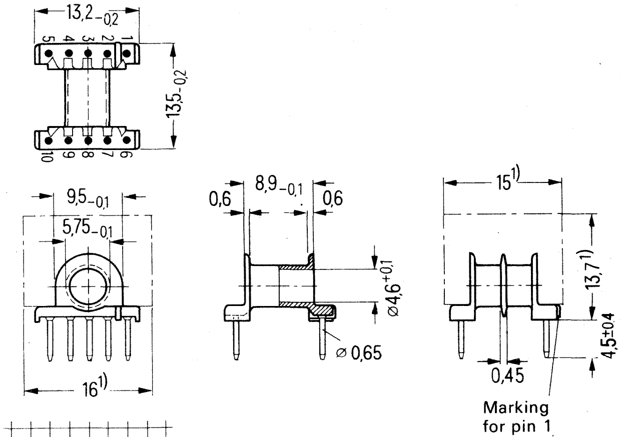
Core factor	$\Sigma l/A$ =	1.24 mm^{-1}
Effective length	l_e =	24.2 mm
Effective area	A_e =	19.5 mm^2
Effective volume	V_e =	472 mm^3

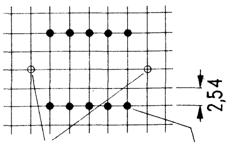
A_L value Ungapped nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 500 set)	
1400	$^{+30}_{-20}$ % ≙ R	N 26	1380	B65843-A-R26	
2800		N 30	2760	B65843-A-R30	S
4400		T 35	4340	B65843-A-R35	
7000	$^{+40}_{-30}$ % ≙ Y	T 38	6910	B65843-A-Y38	S
7000	$^{+80}_{-0}$ % ≙ U	T 38	6910	B65843-A7000-U638	

S Preferred products (refer to page 4)

Coil former B 65844

Glass-fiber reinforced thermosetting plastic coil former with 10 terminal pins, flame-retardant in accordance with 94 V-0.
For solderability of terminal pins refer to page 89.
For winding details refer to page 74.





Hole arrangement
View in mounting direction

Dimensions in mm

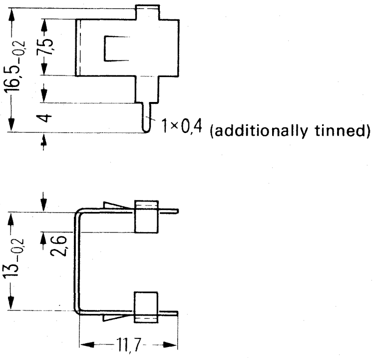
Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[2)] µΩ	Approx. weight g	**Ordering code** (PU: 500)
1	13,8	13 8	23 8	59,4	0 5	B65844–A1000–D1 S
2	6,5	13,0		63,2	0 6	B65844–A1000–D2 S

1) Built-in dimension for the transformer
2) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

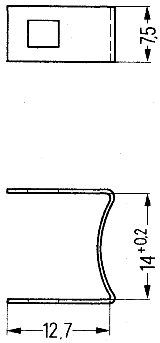
Mounting assembly B 65844

Mounting assembly consisting of a yoke and a spring clamp.

Yoke
made of 0.4 mm thick nickel silver



Clamp
made of 0.4 mm thick nickel silver

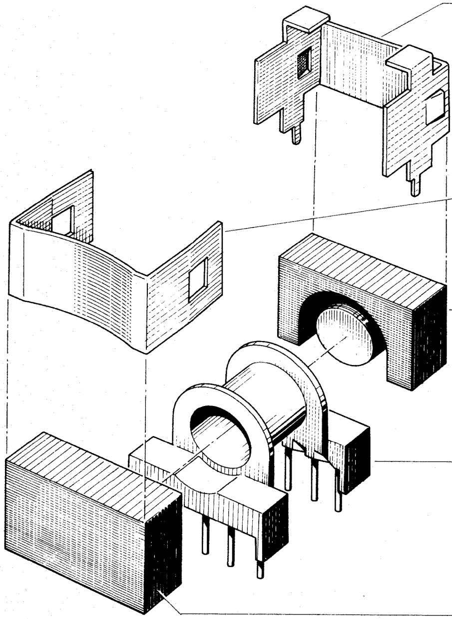


Dimensions in mm

Approx. weight (yoke and clamp) 1.9 g

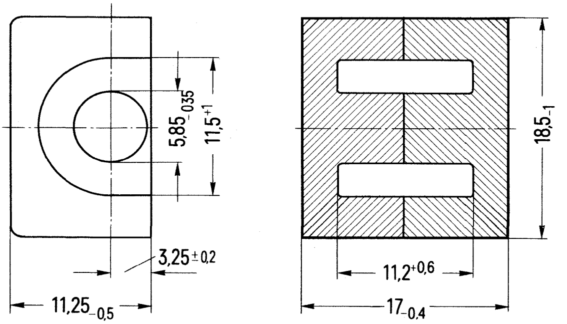
Ordering code (complete assembly) B65844–A2000 S
(PU: 500)

S Preferred products (refer to page 4)



Individual parts	Part No.	Page
Yoke	B65846	396
Clamp	B65846	396
Core	B65845	394
Coil former with 1 or 2 sections, and 8 pins	B65846	395
Core	B65845	394

EP 17 cores of high permeability materials are suitable for the design of high inductance transformers at high packing density. They are especially suitable for transformers in printed circuits with up to 8 terminals. The wire ends of the winding are directly connected to the solder pins of the coil former.



Approx. weight 11.1 g/set

Dimensions in mm

Magnetic characteristics

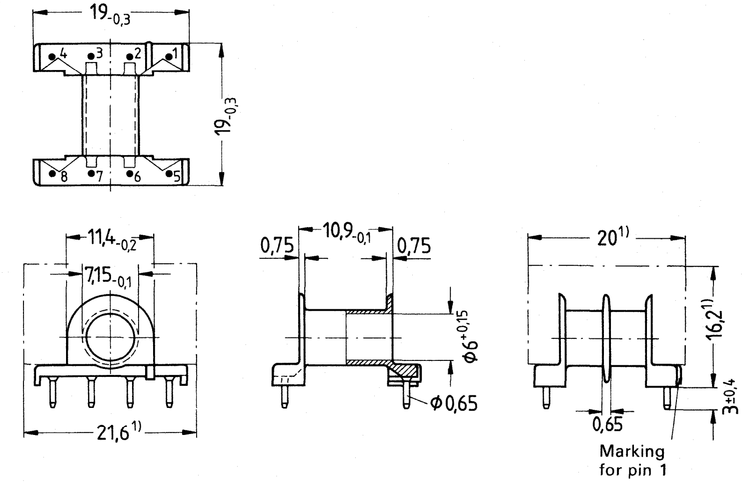
Core factor	$\Sigma l/A =$	0.84 mm^{-1}
Effective length	$l_e =$	28.5 mm
Effective area	$A_e =$	33.9 mm^2
Effective volume	$V_e =$	966 mm^3

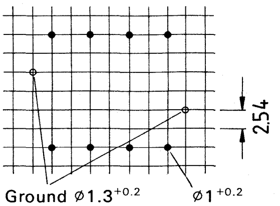
A_L value Ungapped nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 200 sets)	
2400		N 26	1600	B65845-J-R26	
4300	$^{+30}_{-20}$ % ≙ R	N 30	2870	B65845-J-R30	S
6900		T 35	4610	B65845-J-R35	
11400	$^{+40}_{-30}$ % ≙ Y	T 38	7620	B65845-J-Y38	S
11400	$^{+80}_{-0}$ % ≙ U	T 38	7620	B65845-J-U638	

S Preferred products (refer to page 4)

Coil former B 65846

Glass-fiber reinforced thermosetting plastic coil former with 8 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.
For winding details refer to page 74.





Hole arrangement
View in mounting direction

Dimensions in mm

Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[2)] μΩ	Approx. weight g	**Ordering code** (PU: 200)
1	18,8	18,8	28,8	52,7	1,3	B65846-L1000-D1 S
2	8,85	17,7		55,9	1,4	B65846-L1000-D2 S

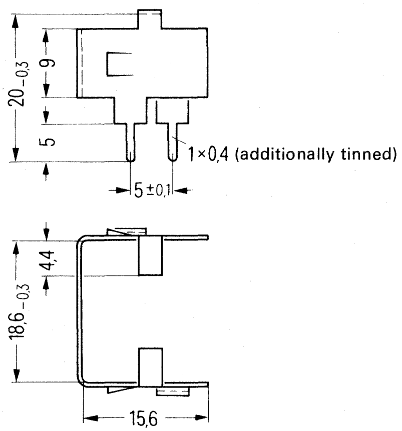
1) Built-in dimension for the transformer
2) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

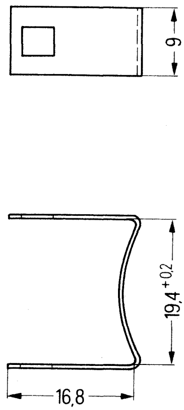
Mounting assembly B 65846

Mounting assembly consisting of a yoke and a spring clamp.

Yoke
made of 0.4 mm thick nickel silver



Clamp
made of 0.4 mm thick nickel silver

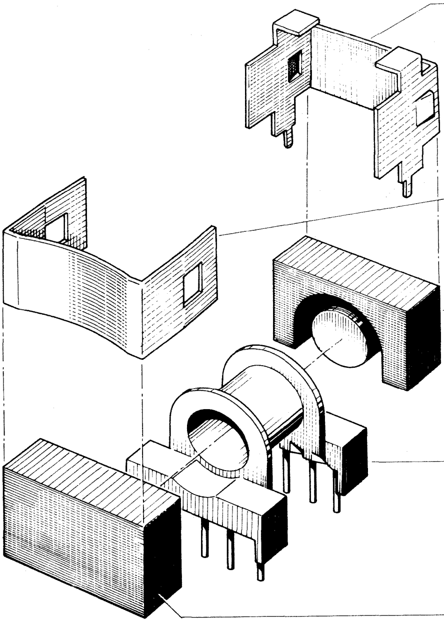


Dimensions in mm

Approx. weight (yoke and clamp) 3.6 g

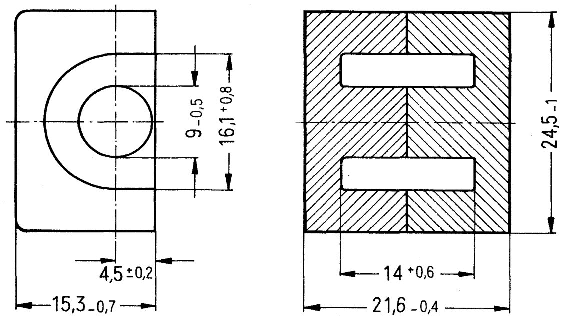
Ordering code (complete assembly) B65846–J2000 S
(PU: 200)

S Preferred products (refer to page 4)



Individual parts	Part No.	Page
Yoke	B65848	400
Clamp	B65848	400
Core	B65847	398
Coil former with 1 or 2 sections, and 10 pins	B65848	399
Core	B65847	398

EP 20 cores of high permeability materials are suitable for the design of high inductance transformers at high packing density. They are especially suitable for transformers in printed circuits with up to 10 terminals. The wire ends of the winding are directly connected to the solder pins of the coil former.



Approx. weight 28.2 g/set

Dimensions in mm

Magnetic characteristics

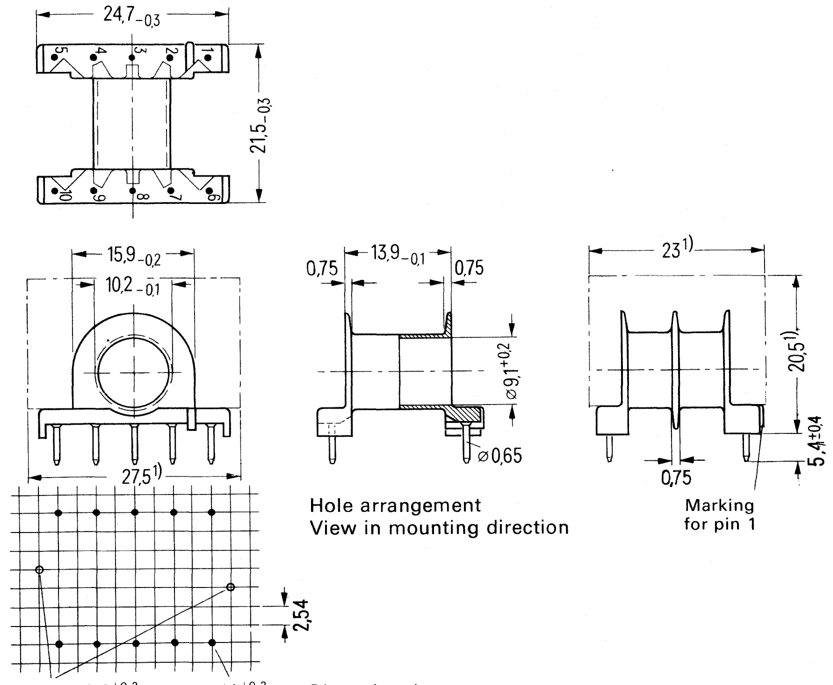
Core factor	$\Sigma\, l/A$ =	0.51	mm^{-1}
Effective length	l_e =	40	mm
Effective area	A_e =	78	mm^2
Effective volume	V_e =	3120	mm^3

A_L value Ungapped nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 200 sets)	
3500	$^{+30}_{-20}$ % ≙ R	N 26	1420	B65847-A-R26	
6700		N 30	2720	B65847-A-R30	**S**
11200		T 35	4540	B65847-A-R35	**S**
19300	$^{+40}_{-30}$ % ≙ Y	T 38	7830	B65847-A-Y38	**S**

S Preferred products (refer to page 4)

Coil former B 65 848

Glass-fiber reinforced thermosetting plastic coil former with 10 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 74.



Hole arrangement
View in mounting direction

Dimensions in mm

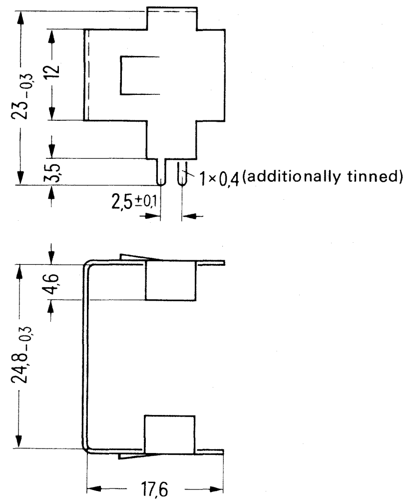
Number of sections	Useful winding cross section A_N of one section	total	Average length of turn l_N	A_R value[2)]	Approx. weight	**Ordering code** (PU: 200)
	mm²	mm²	mm	μΩ	g	
1	33,8	33,8	38,9	39,6	1,6	B65848–B1001–D1 S
2	15,9	31,8		42,1	1,7	B65848–B1001–D2 S

1) Built-in dimension for the transformer
2) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

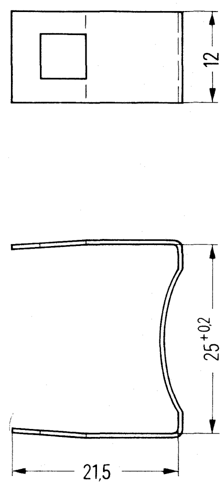
Mounting assembly B 65848

Mounting assembly consisting of a yoke and a spring clamp.

Yoke
made of 0.4 mm thick nickel silver



Clamp
made of 0.4 mm thick nickel silver

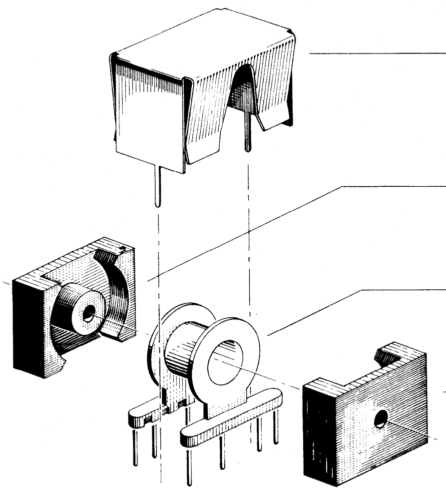


Dimensions in mm

Approx. weight (yoke and clamp) 5.7 g

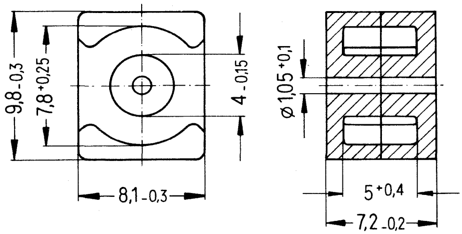
Ordering code (complete assembly) B65848−A2000 S
(PU: 200)

S Preferred products (refer to page 4)



Individual parts	Part No.	Page
Cover	B65834	403
Cube core	B65833	402
Coil former with 7 pins	B65834	403
Cube core	B65833	402

Compact cube cores of high permeability materials are suitable for the design of high inductance transformers at high packing density. They are especially suitable for transformers used in printed circuits with up to 7 terminals. The wire ends of the winding are directly connected to the solder pins of the coil former.



Approx. weight 1.5 g/set

Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	1.25 mm^{-1}
Effective length	l_e =	16.5 mm
Effective area	A_e =	13.2 mm^2
Min. core cross section[1]	A_{min} =	11.2 mm^2
Effective volume	V_e =	217 mm^3

A_L value Ungapped nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
1500	$^{+30}_{-20}$ % ≙ R	N 26	1490	B65833–A–R26
2500		N 30	2490	B65833–A–R30
5000	$^{+40}_{-30}$ % ≙ Y	T 38	4970	B65833–A–Y38

[1] Necessary for calculating the max. flux density

Coil formers and cover B 65834

Glass-fiber reinforced thermosetting plastic coil former (fig. 1), with 7 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 73.

Figure 1

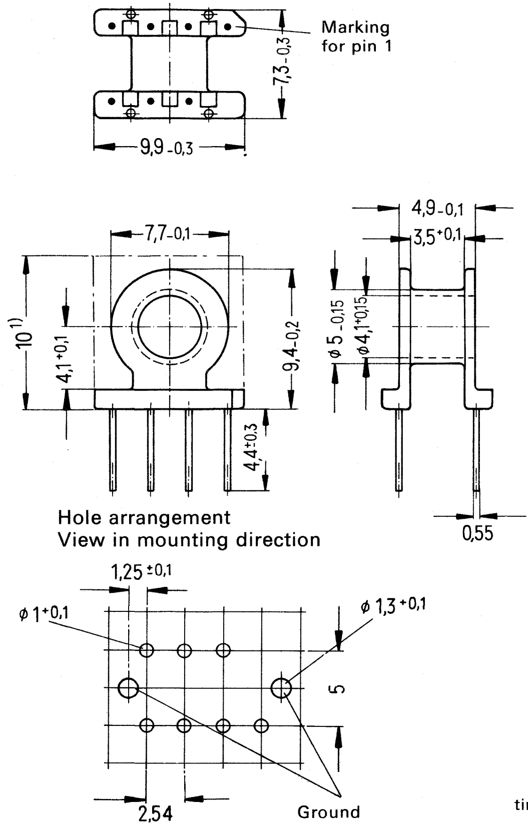
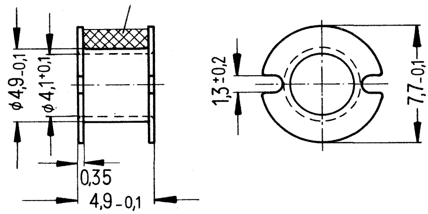


Figure 2 (no longer available)



Dimensions in mm

Figure 3

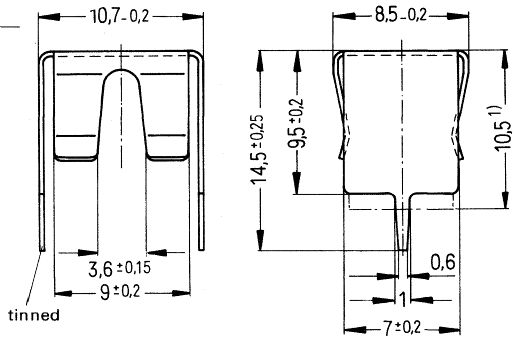
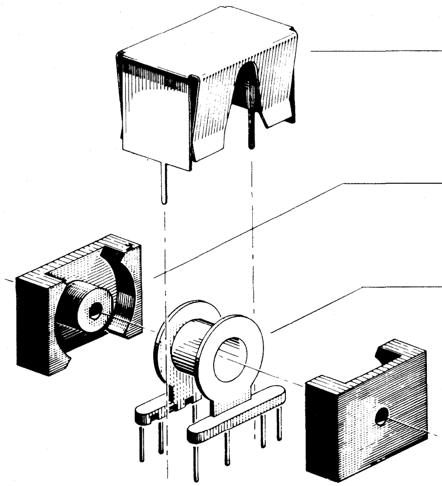


Figure	Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_L value[2)] μΩ	Approx. weight g	**Ordering code** (PU: 500)
1	4,7	19	143	0,25	B65834–B1001–D1
2				0,1	(no longer available)
3	0,3 mm thick nickel-silver **cover**			2	B65834–A2000

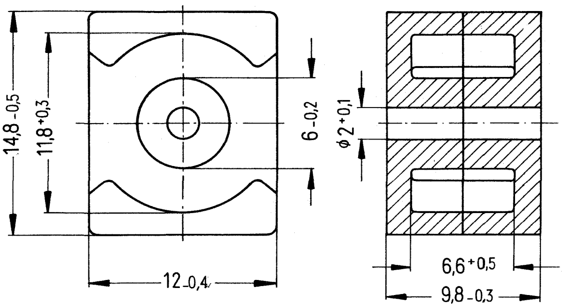
1) Max. coil height (with core), without or with cover
2) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns^2)



Individual parts	Part No.	Page
Cover	B65838	406
Cube core	B65837	405
Coil former with 8 pins	B65838	406
Cube core	B65837	405

Cube Cores Q 15 Not for new design! Recommended replacement: EP 13 cores B 65 837

Compact cube cores of high permeability materials are suitable for the design of high inductance transformers at high packing density. They are especially suitable for transformers used in printed circuits with up to 8 terminals. The wire ends of the winding are directly connected to the solder pins of the coil former.



Approx. weight 4.4 g/set

Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.8 mm^{-1}
Effective length	l_e =	22.9 mm
Effective area	A_e =	28.6 mm^2
Min. core cross section[1]	A_{min} =	24 mm^2
Effective volume	V_e =	656 mm^3

A_L value Ungapped nH	tolerance	Ferrite material	Effective permeability μ_e	**Ordering code** (PU: 500 sets)
2100	$^{+30}_{-20}$ % ≙ R	N 26	1340	B65837–A–R26
4200		N 30	2670	B65837–A–R30
8500	$^{+40}_{-30}$ % ≙ Y	T 38	5410	B65837–A–Y38

[1] Necessary for calculating the max. flux density

Coil formers and cover B 65 838

Glass-fiber reinforced thermosetting plastic coil former (fig. 1), with 8 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 73.

Figure 1

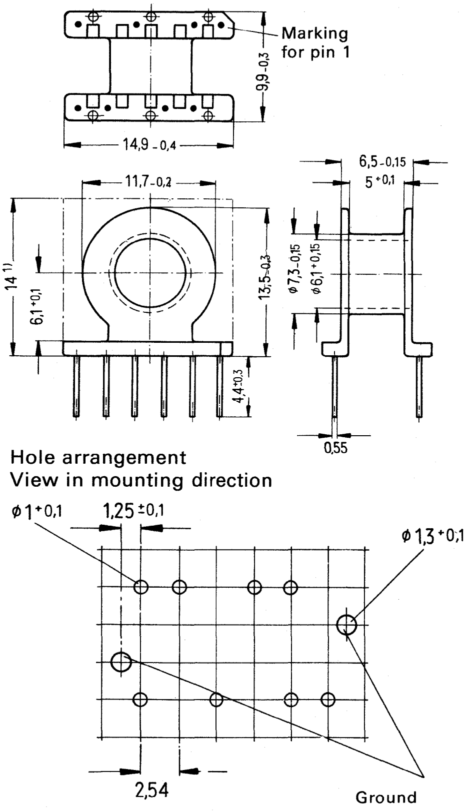
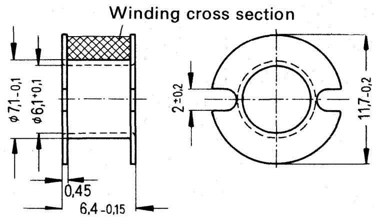


Figure 2 (no longer available)



Dimensions in mm

Figure 3

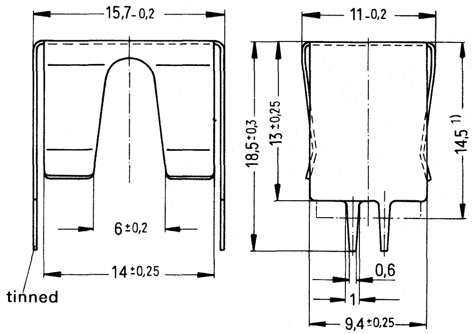


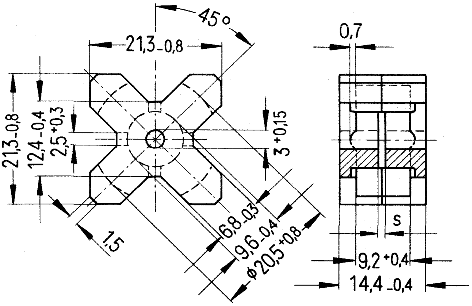
Figure	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[2] μΩ	Approx. weight g	**Ordering code** (PU: 500)
1	11,0	29	92	0,52	B65838-B1001-D1
2				0,2	(no longer available)
3	0,3 mm thick nickel-silver **cover**			3	B65838-A2000

[1] Maximum coil height (with core), without or with cover
[2] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

X Cores

In accordance with DIN 41 299, sheet 1, and IEC publication 226.

X 22 cores are particularly suitable for transformers used in printed circuits. They are provided with up to 8 terminals. The lead ends are directly connected to the coil former pins.



Appprox. weight 12.5 g/set

Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A =$	0.58	mm^{-1}
Effective length	$l_e =$	38	mm
Effective area	$A_e =$	66	mm^2
Effective volume	$V_e =$	2510	mm^3

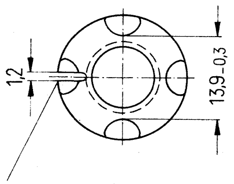
Accessories

Coil former

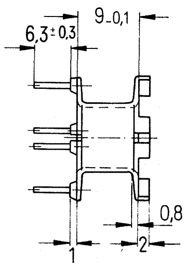
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 200 sets)
Gapped					
1000	±10% ≙ K	N 26	0,06	462	B65851–A1000–K26
1250	±10% ≙ K	N 26	0,05	577	B65851–A1250–K26
Ungapped					
3200	$^{+30}_{-20}$% ≙ R	N 26		1480	B65851–A–R26
5000	$^{+30}_{-20}$% ≙ R	N 30		2310	B65851–A–R30

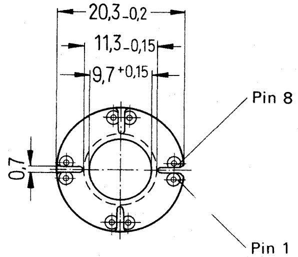
Coil former B 65 854

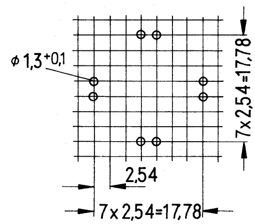
Glass-fiber reinforced thermosetting plastic coil former in accordance with DIN 41 277 or IEC publication 226, with 8 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.
For winding details refer to page 74.



Marking groove
assigned to pin 1
pin diameter 0.83 mm







Hole arrangement
View in mounting direction

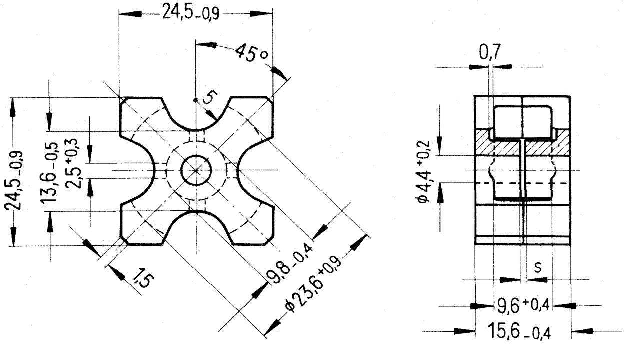
Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 200)
1	30	49	56	1	B65854–A–D1
Insulating washer for double clad PC boards					B65854–A2005

1) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

In accordance with DIN 41 299, sheet 1, and IEC publication 226.

X 25 cores are particularly suitable for transformers used in printed circuits, they are provided with up to 8 fixed terminals. The lead ends are directly connected to the coil former pins.



Approx. weight 16.5 g/set

Dimensions in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.57 mm^{-1}
Effective length	l_e =	41.5 mm
Effective area	A_e =	73 mm^2
Effective volume	V_e =	3030 mm^3

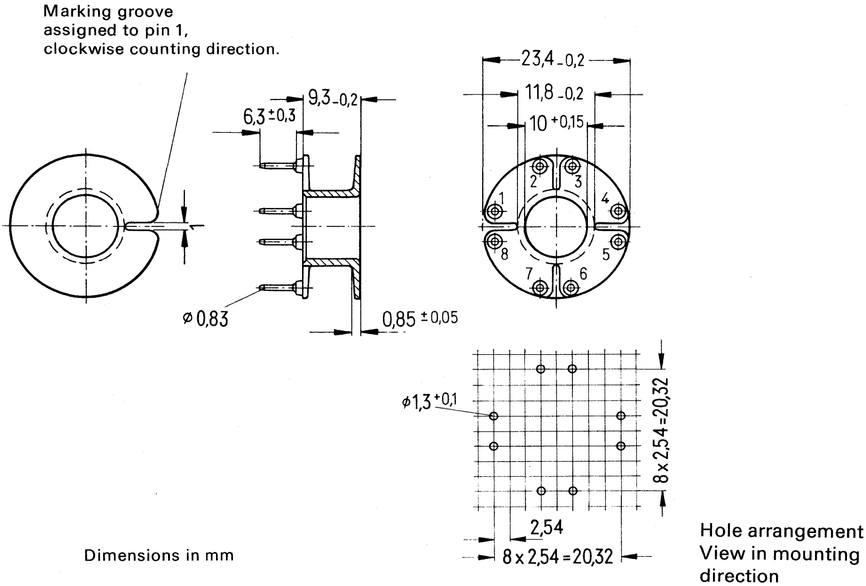
Accessories

Coil former

A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 200 sets)
Gapped					
1000	±10% ≙ K	N 26	0,05	455	B65861–J1000–K26
1600			0,04	725	B65861–J1600–K26
Ungapped					
3300	$^{+30}_{-20}$ % ≙ R	N 26		1500	B65861–J–R26
5500		N 30		2490	B65861–J–R30

Coil former B 65864

Glass-fiber reinforced thermosetting plastic coil former in accordance with DIN 41277 or IEC publication 226, with 8 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.
For winding details refer to page 74.



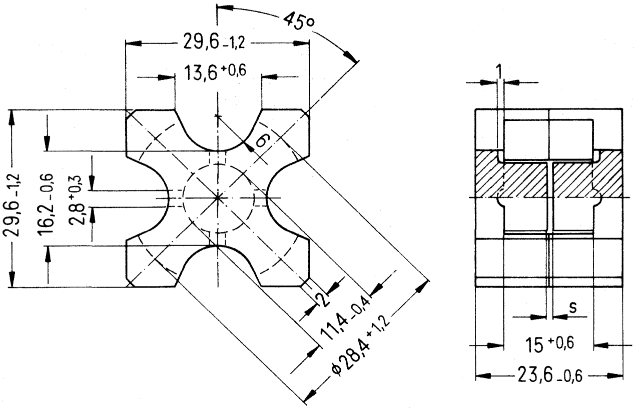
Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight	**Ordering code** (PU: 200)
1	41	55	46	1,5	B65864–A–D1

2) $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

In accordance with DIN 41 299, sheet 1, and IEC pulication 226.

X 30 cores are particularly suitable for transformers used in printed circuits, they are provided with up to 12 fixed terminals. The lead ends are directly connected to the coil former pins.



Approx. weight 39 g/set

Dimension in mm

Magnetic characteristics

Core factor	$\Sigma\, l/A$ =	0.49 mm^{-1}
Effective length	l_e =	55 mm
Effective area	A_e =	112 mm^2
Effective volume	V_e =	6160 mm^3

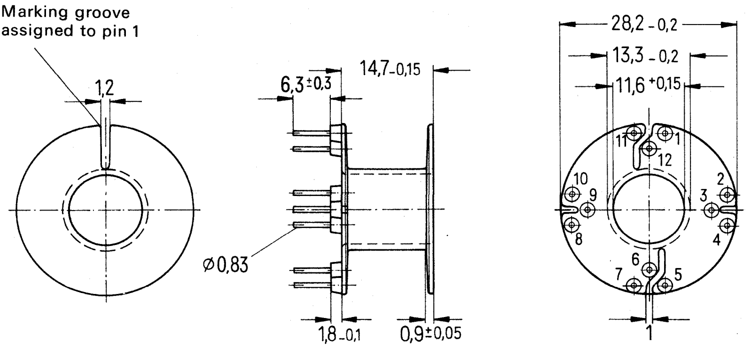
Accessories

Coil former

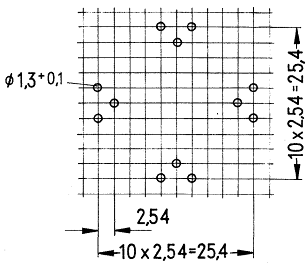
A_L value nH	tolerance	Ferrite material	Total air gap s in mm approx.	Effective permeability μ_e	**Ordering code** (PU: 100 sets)
Gapped					
1000	±10% ≙ K	N 26	0,09	421	B65871–A1000–K26
2000	±10% ≙ K	N 26	0,04	822	B65871–A2000–K26
Ungapped					
4200	$^{+30}_{-20}$% ≙ R	N 26		1640	B65871–A–R26
6000	$^{+30}_{-20}$% ≙ R	N 30		2340	B65871–A–R30

Coil former B 65874

Glass-fiber reinforced thermosetting plastic coil former in accordance with DIN 41277 or IEC publication 226, with 12 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.
For winding details refer to page 74.



Hole arrangement
View in mounting direction



Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] µΩ	Approx. weight g	**Ordering code** (PU: 100)
1	81	64	26	3	B65874–B–D1

[1)] $R_{Cu} = A_R \cdot N^2$
(dc resistance = A_R · number of turns²)

E, EF, EC, and ER Cores

General

For definitions, ferrite materials and inductor design refer to page 15 ff.

1 Core shape and material

E cores are made of the ferrite materials N27 and N30. They are available with or without a ground air gap.

The types specified on the following pages comprise E cores (DIN 41 295) with dimensions according to the laminations type M (DIN 41 302), and EF cores (DIN 41 985) with dimensions according to laminations type EE (DIN 41 302). The cores manufactured in material N27, feature high saturation magnetization and low power loss. They are particularly suitable for use in dc converters in electronic flash devices, voltage converters in switched-mode power supplies (refer also to data in the chapter "Cores for power transmission").

2 Ordering and delivery

E cores are delivered individually (not as sets). The indicated packaging units (PU) should be taken into consideration. Each packaging unit only contains cores of uniform design, either with shortened or with unshortened center leg. The nominal A_L value, quoted in the individual data sheets, always refers to a combination of the ordered core with a core with unshortened center leg (dimension "g" = 0). The curve "A_L versus total air gap", specified in the individual data sheets, aids the designer in choosing additional A_L values by appropriate combinations of gapped cores.

3 Ungapped E cores

Even with the best grinding methods known today, a certain degree of roughness on ground surfaces cannot be avoided, thus, the usual term "ungapped" does not in fact imply no air gap at all. In the A_L values specified, a certain amount of roughness of grinding, e.g. R_t 6 $\triangleq$ 6 μm, has been taken into account for the gaps. The A_L value tolerance of ungapped E and EF cores is +30/−20%, that of EC and ER cores approx. ±25%.

4 Winding design

Nomograms for the number of turns, inductance, and A_L values are given on page 80 to 76; the data for the usual wires and litz wires is tabulated on page 66 to 68.

The maximum number of turns for coil formers are indicated on page 75, 76, and data on winding cross sections and average lengths of turns on the appropriate pages on coil formers.

Note on the winding design

If coil formers are used for cores with square or rectangular cross sections, indication of the minimum winding height only represents a theoretical value. The use of thicker leads or litz wires results in a gradual rounding of the winding; it is thus recommended to verify the planned winding design by a winding test.

5 Effective magnetic characteristics

For the values of $\Sigma l/A$, l_e, A_e, A_{min}, V_e (applying to E core sets) required for calculation of field strength, flux density, and hysteresis losses refer to the core types.

6 Power loss P_v and amplitude permeability μ_e for E, EF, EC, and ER cores

Test data (per set), material N27, for ungapped cores.

Power loss P_v: F = 25 kHz; T = 60...100 °C/140...212 °F, and $\hat{B}$ = 200 mT, sinusoidal.

Type	Max. power loss P_v W/set	**Ordering code**	Approx. weight g
EF 32	1,3	B66229-G-X127	34
E 42/15	3,3	B66325-G-X127	88
E 42/20	4,4	B66329-G-X127	116
E 55	8,5	B66335-G-X127	216
EC 35/17/10	1,1	B66337-G-X127	36
EC 41/19/12	1,8	B66339-G-X127	52
EC 52/24/14	2,4	B66341-G-X127	110
EC 70/34/17	4,8	B66343-G-X127	252
ER 42/22/15	3,1	B66347-G-X127	84
ER 48/21/21	4,9	B66333-G-X127	130

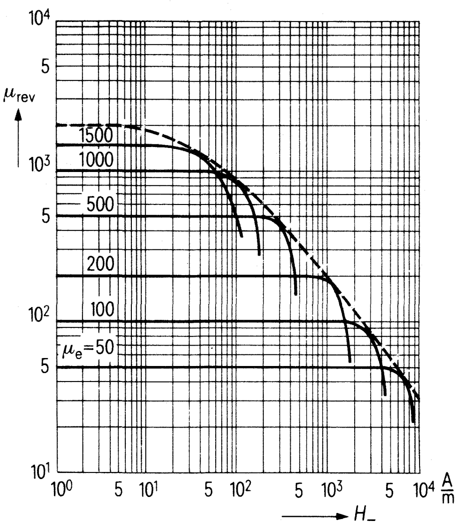
Amplitude permeability μ_e, for E, EF, EC, and ER cores

Temperature T °C/°F	Flux density $\hat{B}$ mT	Field strength $\hat{H}$ A/m	Amplitude permeability μ_a
20/68	400	≤ 212	≥ 1500
100/212	320	≤ 204	≥ 1250

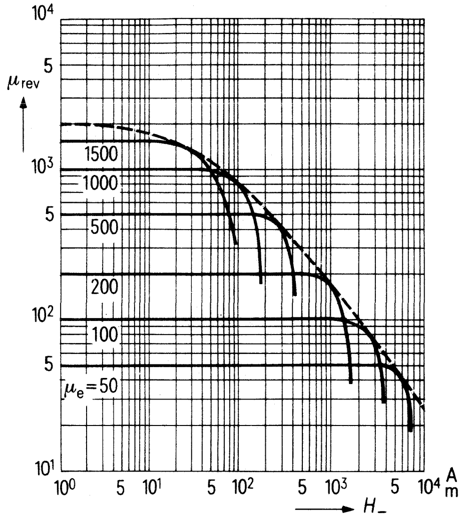
Test frequency: ≤ 10 kHz

7 DC magnetic bias; material N 27

EF cores, E 42, E 55 cores
ER 42/15, ER 48/21, ETD cores



EC cores
E 20, E 30 cores



Measuring temperature 20 °C/68 °F
$\hat{B} < 1$ mT

Example

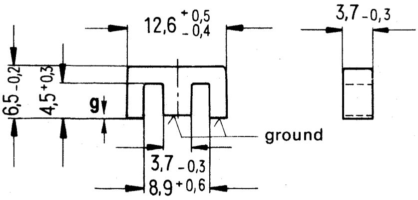
E core E 42/15 (B66325–G500–X127 combined with B66325–G–X127)

g = (0.5 ± 0.05) mm
μ_e = 205
l_e = 97 mm

A higher decrease in permeability caused by premagnetization begins at a dc field strength of about 1000 A/m. This corresponds to an ampere-turns value of

$I_- \cdot N = H_- \cdot l_e = 1000 \cdot 97 \cdot 10^{-3} = 97$ A.

in accordance with DIN 41 985 (corresponding to the electrical sheet-steel lamination EE 12.6)

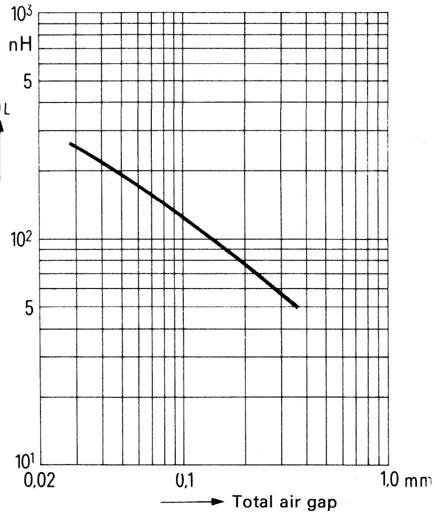


Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core B66305–G (g appr. 0) and
one core B66305–G.... ($g > 0$)
or
two cores B66305–G... ($g > 0$)

Material N 27



Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A$ =	2.28 mm^{-1}
Effective length	l_e =	29.6 mm
Effective area	A_e =	13.0 mm^2
Effective volume	V_e =	384 mm^3

Approx. weight 1 g/item

E cores are delivered individually according to the dimension "g" (shortened center leg).
The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66305–G).

Ferrite material	Dimension "g" mm	tolerance mm	A_L value nH	Effective permeability μ_e	Ordering code (per item) (PU: 1000 items)	
N 30	appr. 0	–	1000^{+30}_{-20} %	approx. 1810	B66305–G–X130	S
N 27		–	800^{+30}_{-20} %	approx. 1450	B66305–G–X127	S
N 27	0,04	± 0,01	approx. 250	approx. 454	B65305–G40–X127	S

S Preferred products (refer to page 4)

Coil formers and yoke B 66202

Glass-fiber reinforced polycarbonate **coil former** (fig. 1); 9 terminal pins, 1 section.
Glass-fiber reinforced polyterephthalate **coil former** (fig. 3), 4 terminal pins, 2 sections, flame-retardant in accordance with UL 94 V-0.
0.2 mm thick nickel-silver spring **yoke** (fig. 2).
For solderability of terminal pins refer to page 89.
For winding details refer to page 75.

Figure 1

View in direction A

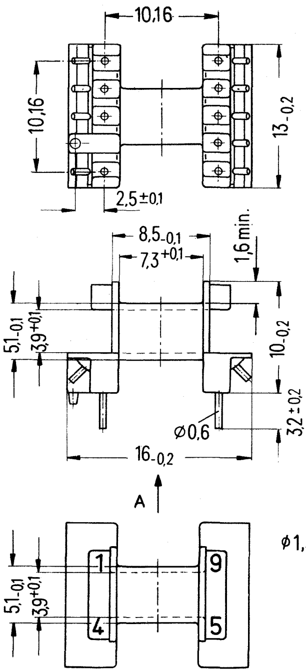


Figure 2

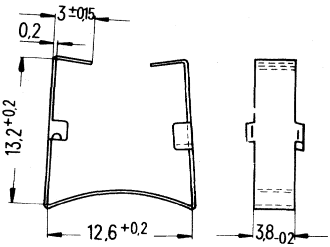
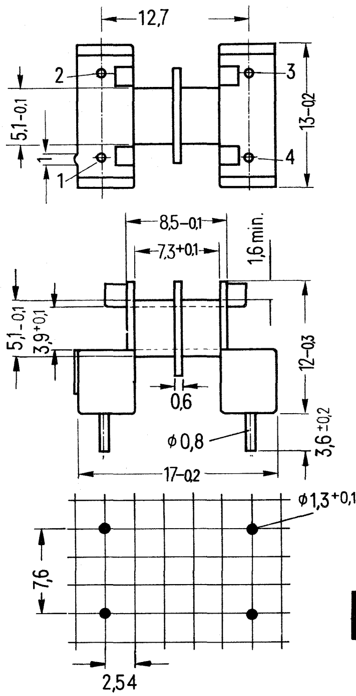
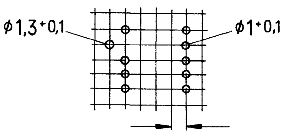


Figure 3



Hole arrangement
View in mounting direction



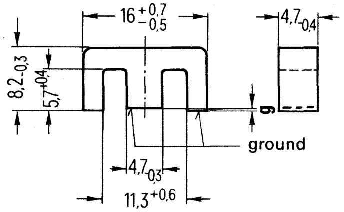
Dimensions in mm

Coil former								Ordering code (PU: 500)
Figure	Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] μΩ	Number of pins	Approx. weight g	
1	1	11,6	11,6	27 2	80,6	9	0,7	B66202–A1001–M1
3	2	5,35	10,7		87,5	4	1,3	B66202–A1002–T2 S
2	**Yoke**						1,2	B66202–A2001 S

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

in accordance with DIN 41 985 (corresponding to the electrical sheet-steel lamination EE 16).



Dimensions in mm

Magnetic characteristics (per set)

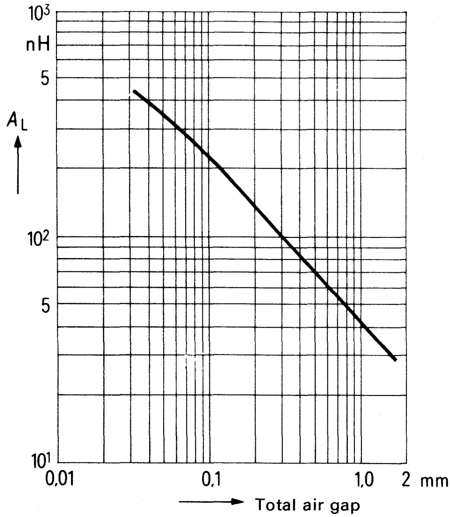
Core factor	$\Sigma l/A =$	1.87 mm^{-1}
Effective length	$l_e =$	37.6 mm
Effective area	$A_e =$	20.1 mm^2
Effective volume	$V_e =$	754 mm^3

Approx. weight 2.3 g/item

A_L value versus total air gap
for a set consisting of

one core B66307−G (g appr. 0) and
one core B66307−G... ($g > 0$)
or
two cores B66307−G... ($g > 0$)

Material N 27



E cores are delivered individually according to the dimension "g" (shortened center leg).
The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66307−G).

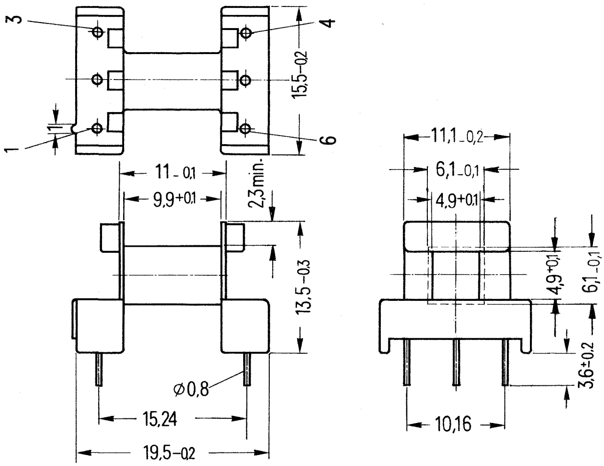
Ferrite material	Dimension "g" mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (per item) (PU: 1000 items)
N 30	appr. 0	–	1400 $^{+30}_{-20}$%	approx. 2080	B66307−G−X130 S
N 27		–	1000 $^{+30}_{-20}$%	approx. 1490	B66307−G−X127 S
N 27	0,06	±0,01	approx. 315	approx. 469	B66307−G60−X127
	0,10	±0,02	approx. 220	approx. 328	B66307−G100−X127
	0,50	±0,05	approx. 70	approx. 104	B66307−G500−X127

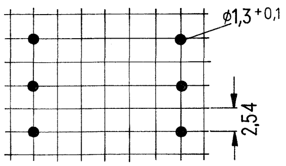
S Preferred products (refer to page 4)

Coil former and yoke B 66308

Glass-fiber reinforced polyterephthalate **coil former**, with 6 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 75.
0.3 mm thick nickel-silver spring **yoke.**

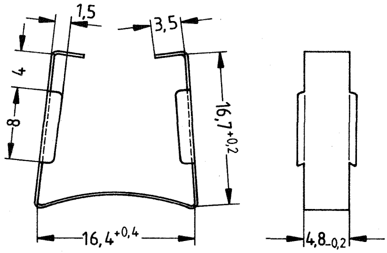
Coil former





Hole arrangement
View in mounting direction

Yoke

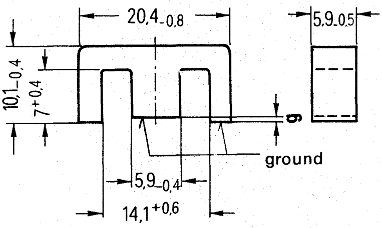


Dimensions in mm

Coil former					Ordering code (PU: 500)
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] µΩ	Approx. weight g	
1	22,3	34	52,4	1,5	B66308-A1000-T1 S
Yoke				1,8	B66308-A2001

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns[2)])
S Preferred products (refer to page 4)

in accordance with DIN 41 985 (corresponding to the electrical sheet-steel lamination EE 20).

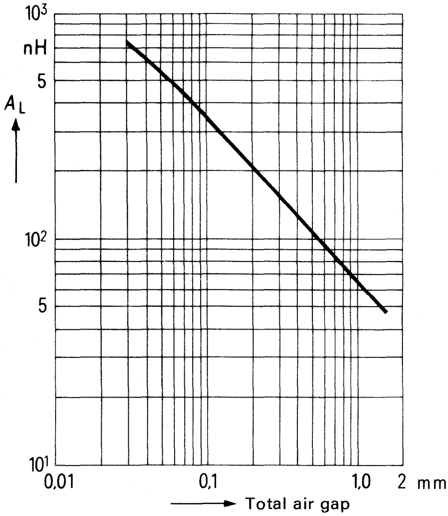


Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core B66311–G (g appr. 0) and
one core B66311–G.... ($g > 0$)
or
two cores B66311–G.... ($g > 0$)

Material N 27



Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A$ =	1.34 mm^{-1}
Effective length	l_e =	44.9 mm
Effective area	A_e =	33.5 mm^2
Effective volume	V_e =	1500 mm^3

Approx. weight 3.7 g/item

E cores are delivered individually according to the dimension "g" (shortened center leg).
The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66311–G).

Ferrite material	Dimension "g" mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (per item) (PU: 1000 items)	
N 30	appr. 0	–	2500^{+30}_{-20} %	approx. 2670	B66311–G–X130	S
N 27		–	1300^{+30}_{-20} %	approx. 1390	B66311–G–X127	S
N 27	0,09	±0,01	approx. 400	approx. 429	B66311–G90–X127	S
	0,17	±0,02	approx. 250	approx. 268	B66311–G170–X127	S
	0,25	±0,03	approx. 180	approx. 192	B66311–G250–X127	
	0,50	±0,05	approx. 110	approx. 117	B66311–G500–X127	S

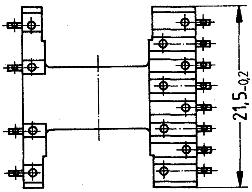
S Preferred products (refer to page 4)

Coil formers and yoke B 66206

Coil former horizontal (fig. 1) with 12 terminal pins,
Coil former vertical (fig. 3), with 6 terminal pins,
made of glass-fiber reinforced polyterephthalate, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 75.
0.3 mm thick nickel-silver spring **yoke** (fig. 2).

Figure 1

View in mounting direction A



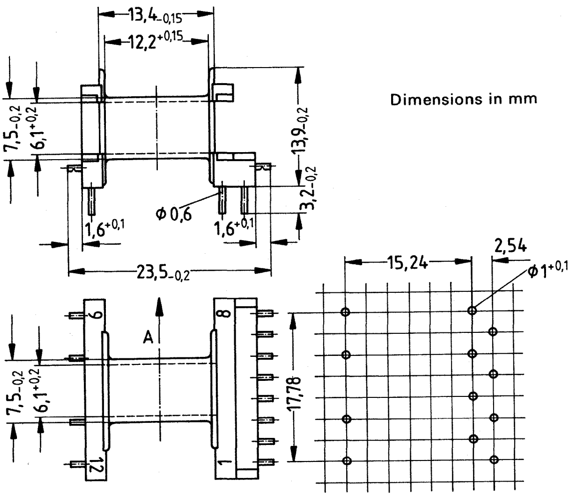


Figure 2

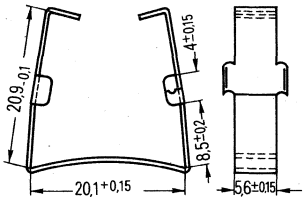
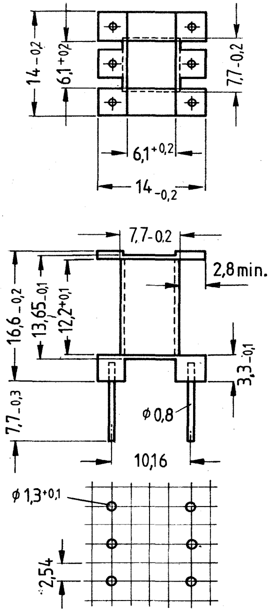


Figure 3



Dimensions in mm

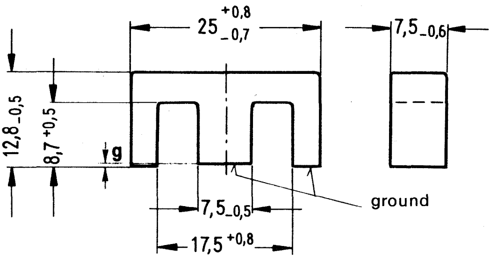
Hole arrangement
View in mounting direction

Coil former							Ordering code (PU: 500)	
Fig.	Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value¹⁾ µΩ	Number of pins	Approx. weight g		
1	1	34	41,2	42	12	1,6	B66206-B1012-T1	S
3					6	1,4	B66206-B1006-T1	S
2	Yoke					2,2	B66206-A2001	S

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns[2])

S Preferred products (refer to page 4)

in accordance with DIN 41 985 (corresponding to the electrical sheet-steel lamination EE 25).

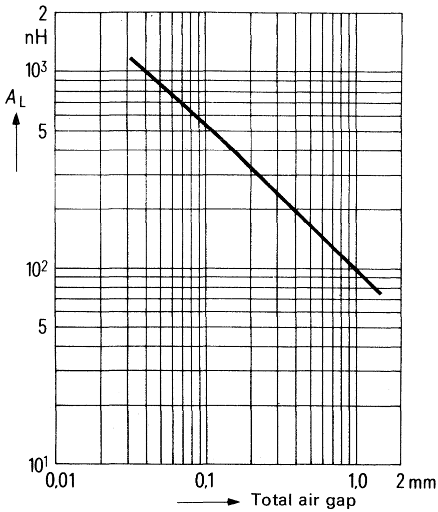


Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core	B66317–G	(g appr. 0) and
one core	B66317–G....	($g > 0$)
or		
two cores	B66317–G....	($g > 0$)

Material N 27



Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A$ =	1.09 mm^{-1}
Effective length	l_e =	57.5 mm
Effective area	A_e =	52.5 mm^2
Effective volume	V_e =	3020 mm^3

Approx. weight 8 g/item

E cores are delivered individually according to the dimension *"g"* (shortened center leg).
The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66317–G).

Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (per item) (PU: 500 items)	
N 30	appr. 0	–	$3100\,^{+30}_{-20}\,\%$	appr. 2330	B66317–G–X130	S
N 27	appr. 0	–	$1750\,^{+30}_{-20}\,\%$	appr. 1520	B66317–G–X127	S
N 27	0,10	±0,02	approx. 550	approx. 477	B66317–G100–X127	S
	0,16	±0,02	approx. 400	approx. 347	B66317–G160–X127	S
	0,25	±0,03	approx. 270	approx. 234	B66317–G250–X127	
	0,50	±0,05	approx. 165	approx. 143	B66317–G500–X127	S
	1,00	±0,1	approx. 100	approx. 87	B66317–G1000–X127	S

S Preferred products (refer to page 4)

Coil former and yoke B 66208

Glass-fiber reinforced polyterephthalate **coil former,** horizontal (fig. 1), with 8 terminal pins, flame-retardant in accordance with UL 94 V-0.
Glass-fiber reinforced thermosetting plastic **coil former,** vertical (fig. 3), with 6 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89. For winding details refer to page 75.
0.3 mm thick nickel-silver spring **yoke** (fig. 2) with 2 ground terminals.

Figure 1
View in direction A

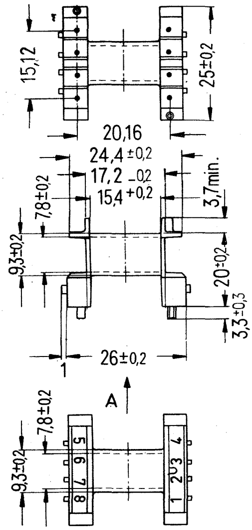
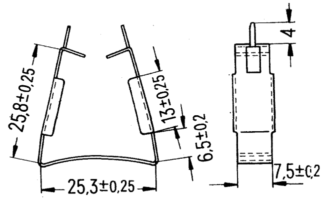


Figure 2



Hole arrangement
View in mounting direction

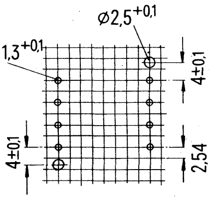
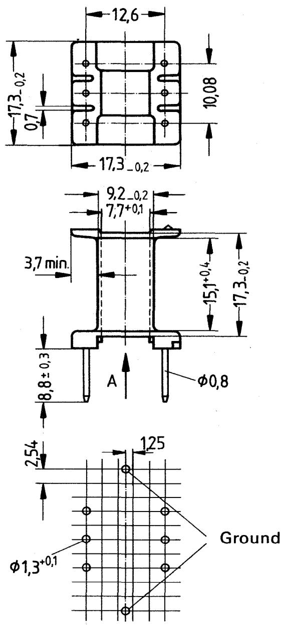


Figure 3
View in direction A



Dimensions in mm

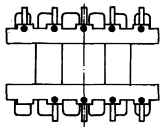
Coil former							Ordering code (PU: 250)
Fig.	Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value¹⁾ μΩ	Number of pins	Approx. weight g	
1	1	56	52	32	8	1,5	B66208–A1008–T1 S
3					6	3	B66208–J1006–D1 S
2	**Yoke**					2,5	B66208–A2001 S

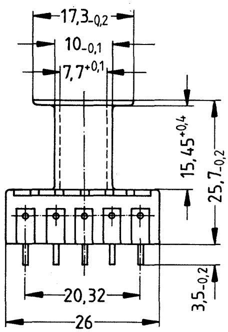
1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

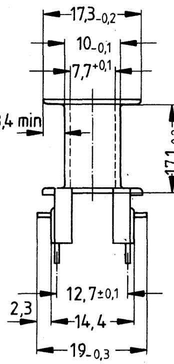
Coil former for automatic winding and yoke B 66208

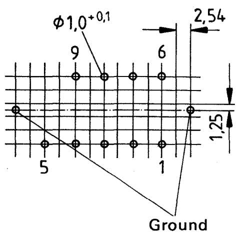
Glass-fiber reinforced polyterephthalate **coil former** with 9 pins, for vertical mounting, flame-retardant in accordance with UL 94 V-0. The design of surface leakage paths and air gaps permits use in transformers for switched-mode power supplies with line isolation.
For solderability of terminal pins refer to page 89. For winding details refer to page 75.
0.3 mm thick silver-nickel spring **yoke.** This yoke has longer ground terminals than the B66208–A2001.

Coil former



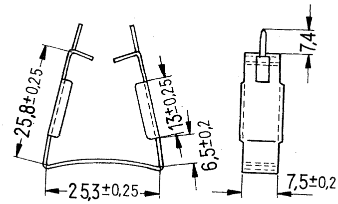






Dimensions in mm

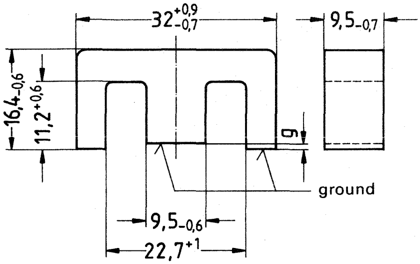
Yoke



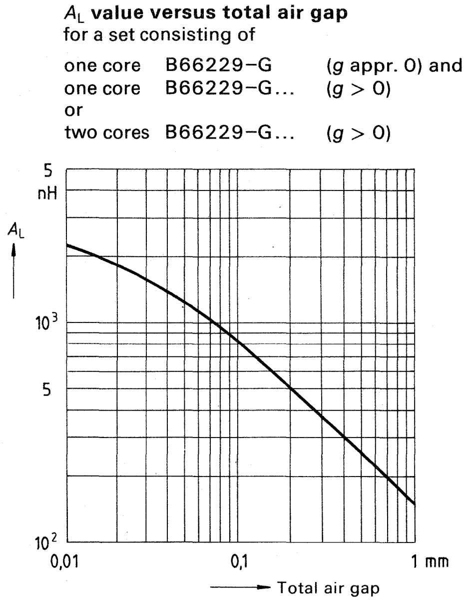
Coil former

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value µΩ	Number of pins	Approx. weight g	**Ordering code** (PU: 250)
1	56	52	32	9	4	B66208–J1009–T1
Yoke						B66208–A2003

in accordance with DIN 41 985 (corresponding to the electrical sheet-steel lamination EE 32)



Dimensions in mm



Magnetic characteristics (per set)

Core factor	$\Sigma l/A$ =	0.894	mm^{-1}
Effective length	l_e =	74	mm
Effective area	A_e =	83	mm^2
Effective volume	V_e =	6180	mm^3

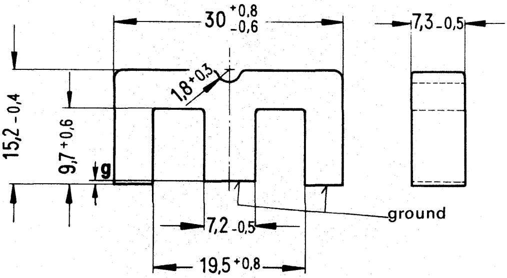
Approx. weight 17 g/item

E cores are delivered individually according to the dimension *"g"* (shortened center leg).
The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66229–G).

Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (per item) (PU: 200 items)
N 27	appr. 0	–	$2200^{+30}_{-20}\%$	approx. 1570	B66229–G–X127
N 27	0,50	±0,05	approx. 247	approx. 175	B66229–G500–X127
	1,00	±0,1	approx. 150	approx. 105	B66229–G1000–X127

For power loss P_v and amplitude permeability μ_a refer to page 418.

in accordance with DIN 41 295 (corresponding to the electrical sheet-steel lamination M 30)

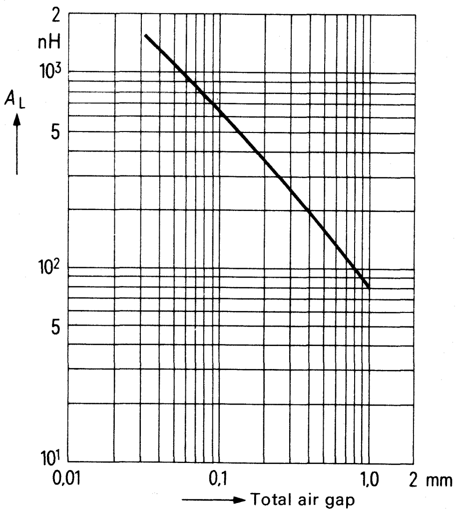


Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core B66319–G (*g* appr. 0) and
one core B66319–G... ($g > 0$)
or
two cores B66319–G... ($g > 0$)

Material N 27



Magnetic characteristics (per set)

Core factor	$\Sigma l/A$ =	1.12	mm^{-1}
Effective length	l_e =	67	mm
Effective area	A_e =	60	mm^2
Min. core cross section[1]	A_{min} =	49	mm^2
Effective volume	V_e =	4000	mm^3

Approx. weight 11 g/item

E cores are delivered individually according to the dimension *"g"* (shortened center leg). The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66319–G).

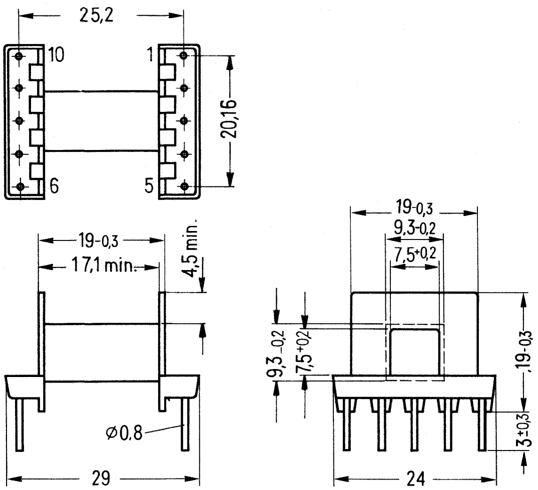
Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (PU: 200 items)	
N 30	appr. 0	–	3300^{+30}_{-20} %	approx. 2940	B66319–G–X130	S
N 27		–	1800^{+30}_{-20} %	approx. 1600	B66319–G–X127	S
N 27	0,10	±0,02	approx. 630	approx. 562	B66319–G100–X127	S
	0,18	±0,02	approx. 400	approx. 353	B66319–G180–X127	
	0,34	±0,03	approx. 200	approx. 179	B66319–G340–X127	S

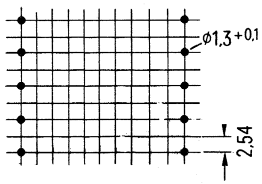
[1] Necessary for calculating the max. flux. density

S Preferred products (refer to page 4)

Coil former B 66232

Glass-fiber reinforced thermosetting plastic coil former with 10 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.
For winding details refer to page 74.





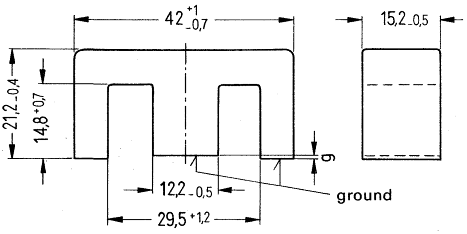
Hole arrangement
View in mounting direction

Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 100)
1	77	44	20	2,5	B66232–A1001–D1 S

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

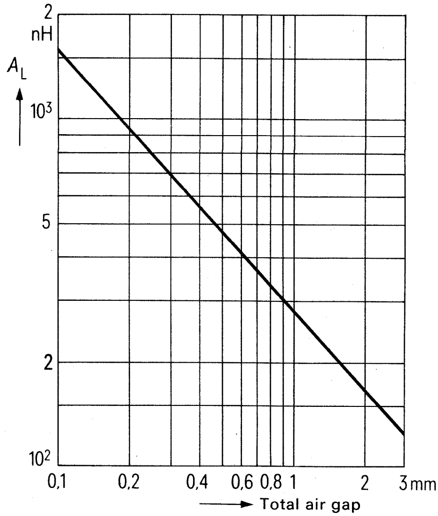
in accordance with DIN 41 295



Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core B66325–G appr. 0) and
one core B66325–G... ($g > 0$)
or
two cores B66325–G... ($g > 0$).
Material N 27



Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A =$	0.535	mm^{-1}
Effective length	$l_e =$	97	mm
Effective area	$A_e =$	181	mm^2
Effective volume	$V_e =$	17600	mm^3

Approx. weight 44 g/item

E cores are delivered individually according to the dimension *"g"* (shortened center leg). The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66325–G).

Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (PU: 200 items)	
N 27	appr. 0	–	3500 $^{+30}_{-20}$ %	approx. 1490	B66325–G–X127	S
N 27	0,10	±0,02	approx. 1600	approx. 680	B66325–G100–X127	
	0,25	±0,03	approx. 800	approx. 340	B66325–G250–X127	S
	0,50	±0,05	approx. 480	approx. 205	B66325–G500–X127	S
	0,64	±0,05	approx. 400	approx. 170	B66325–G640–X127	S
	1,00	±0,1	approx. 280	approx. 119	B66325–G1000–X127	S
	1,5	±0,1	approx. 200	approx. 85	B66325–G1500–X127	

For power loss P_v and amplitude permeability μ_a refer to page 418.

S Preferred products (refer to page 4)

Coil former B 66242

Glass-fiber reinforced 6 polyamide coil former (fig. 1) with 10 terminal pins.
For solderability of terminal pins refer to page 89.
Glass-fiber reinforced polyterephthalate coil former (fig. 2) without terminal pins, flame-retardant in accordance with UL 94 V-0, color code black.
For winding details refer to page 75.

Figure 1 (B66242–J...)

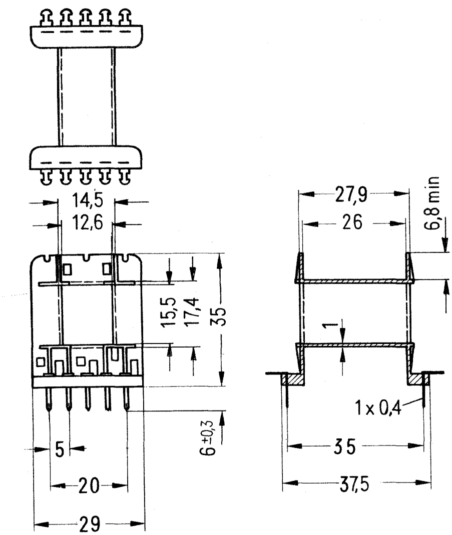
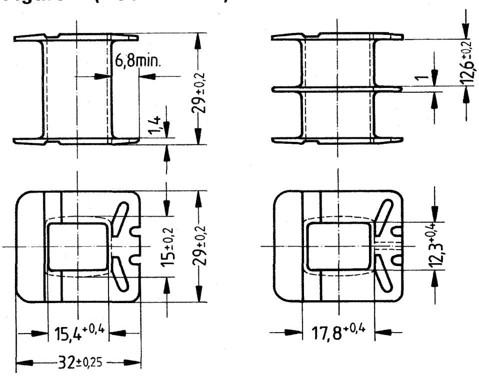
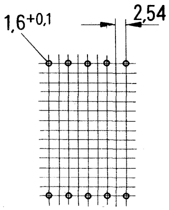


Figure 2 (B66242–B...)





Hole arrangement
View in mounting direction

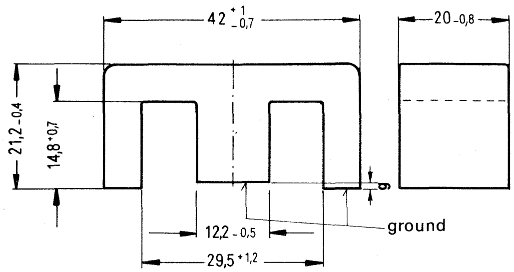
Dimensions in mm

Fig.	Number of sections	Useful winding cross section A_N of one section mm²	total mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 100)
1	1	177	177	87	17	7,5	BB242–J1000–R1 S
2	1	177	177		17	4,5	B66242–B–T1
	2	85	170		18	5,3	B66242–B–T2

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

in accordance with DIN 41 295

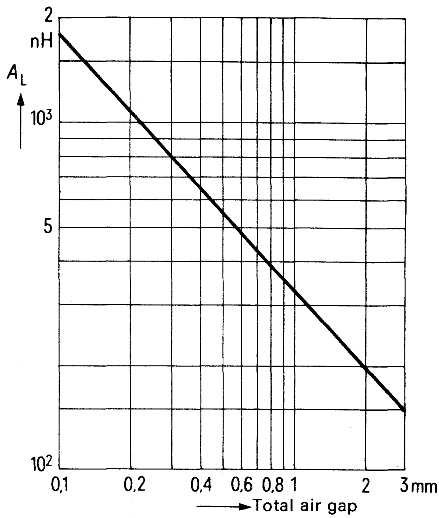


Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core	B66329–G...	(g appr. 0) and
one core	B66329–G...	($g > 0$)
or		
two cores	B66329–G...	($g > 0$)

Material N 27



Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A$ =	0.405	mm^{-1}
Effective length	l_e =	97	mm
Effective area	A_e =	240	mm^2
Effective volume	V_e =	23300	mm^3

Approx. weight 58 g/item

E cores are delivered individually according to the dimension "g" (shortened center leg). The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66329–G).

Ferrite material	Dimension "g" mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (PU: 120 items)	
N 27	appr. 0	–	4750^{+30}_{-20}%	approx. 1530	B66329–G–X127	S
N 27	0,25	±0,03	approx. 925	approx. 298	B66329–G250–X127	
	0,50	±0,05	approx. 560	approx. 180	B66329–G500–X127	S
	1,00	±0,1	approx. 340	approx. 110	B66329–G1000–X127	S
	1,50	±0,1	approx. 250	approx. 81	B66329–G1500–X127	S

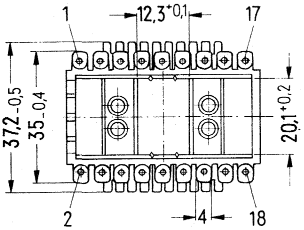
For power loss P_v and amplitude permeability μ_a refer to page 418.

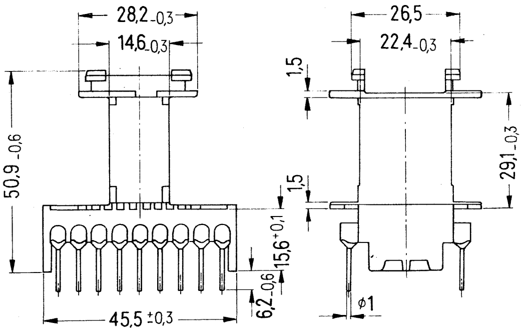
S Preferred products (refer to page 4)

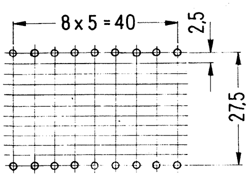
Coil former B 66243 for automatic winding

Glass-fiber reinforced polyterephthalate coil former with 18 terminal pins, flame-retardant in accordance with UL 94 V-0; suitable for automatic winding.

For solderability of terminal pins refer to page 89. For winding details refer to page 75.







Mounting hole Ø 1,6$^{+0,15}$
Hole arrangement
View in mounting direction

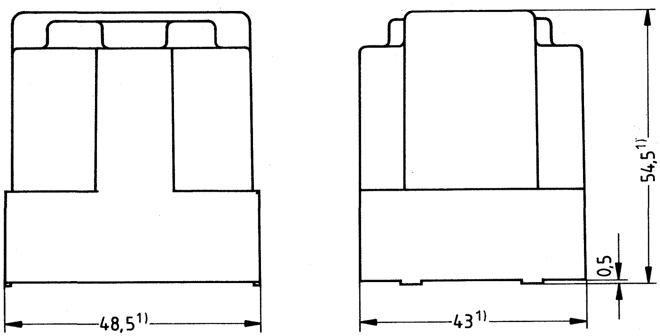
Dimensions in mm

Number of sections	Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	Number of pins	**Ordering code** (PU: 100)
1	172	100	20	14,5	18	B66243–A1018–T1

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance $= A_R \cdot$ number of turns^2)

Sealing can B 66243

Polyterephthalate can (flame-retardant in accordance with UL 94 V-0) for sealing transformers with cores E 42/20 and coil formers B66243–A1018–T1.

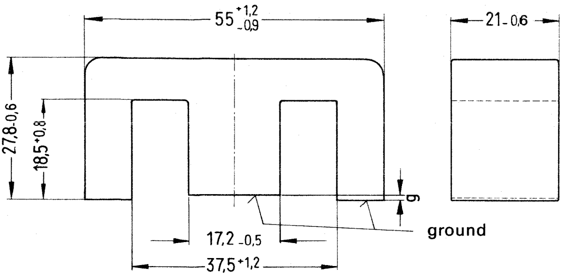


[1)] Max. dimension

Dimensions in mm

Ordering code B66243–A2001–T
(PU: 50)

in accordance with DIN 41 295 (corresponding to the electrical sheet-steel lamination M 55)

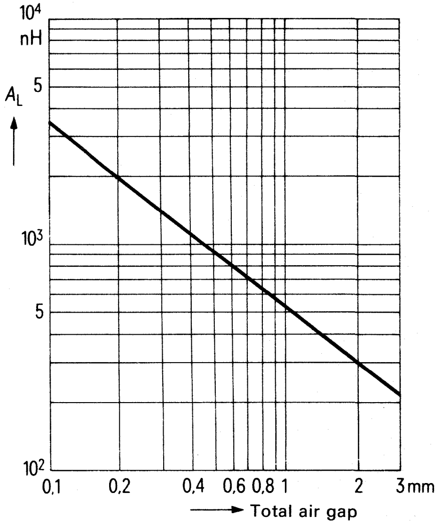


Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core B66335−G (g appr. 0) and
one core B66335−G... ($g > 0$)
or
two cores B66335−G... ($g > 0$)

Material N 27



Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A$ =	0.34	mm^{-1}
Effective length	l_e =	120	mm
Effective area	A_e =	354	mm^2
Effective volume	V_e =	42500	mm^3

Approx. weight 108 g/item

E cores are delivered individually according to the dimension "g" (shortened center leg). The tabulated A_L values apply to wire sets comprising the indicated core and a core without shortened center leg (B66335−G).

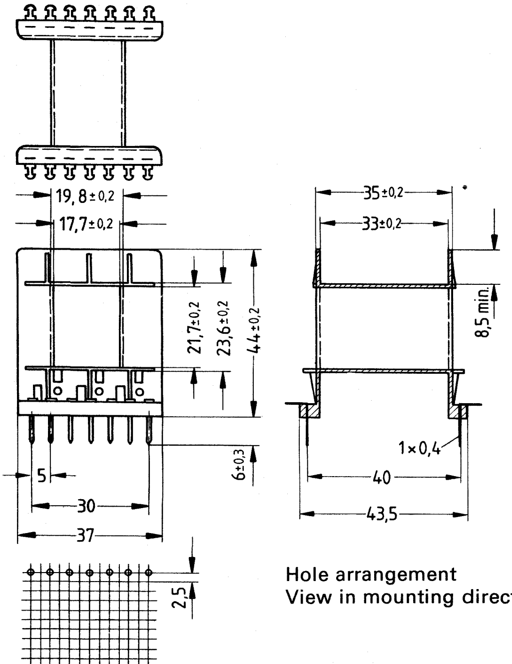
Ferrite material	Dimension "g" mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (PU: 50 items)
N 27	appr. 0	–	5800^{+30}_{-20}%	approx. 1570	B66335−G−X127 S
N 27	0,50	±0,05	approx. 930	approx. 252	B66335−G500−X127 S
	1,00	±0,1	approx. 520	approx. 141	B66335−G1000−X127 S
	1,50	±0,1	approx. 380	approx. 103	B66335−G1500−X127 S
	2,00	±0,15	approx. 300	approx. 81	B66335−G2000−X127

For power loss P_v and amplitude permeability μ_a refer to page 418.

S Preferred products (refer to page 4)

Coil former B 66252

Glass-fiber reinforced 6 polyamide coil former with 14 terminal pins.
For solderability of terminal pins refer to page 89.
For winding details refer to page 75.



Hole arrangement
View in mounting direction

Dimensions in mm

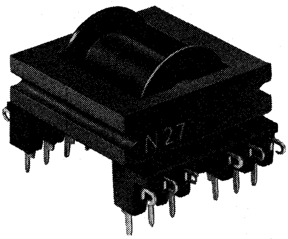
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] µΩ	Approx. weight g	**Ordering code** (PU: 50)
1	280	113	14	10,0	B66252-B-M1 **S**

[1)] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

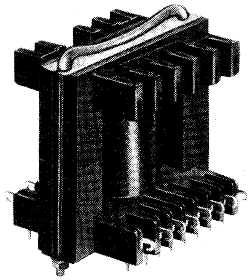
S Preferred products (refer to page 4)

General

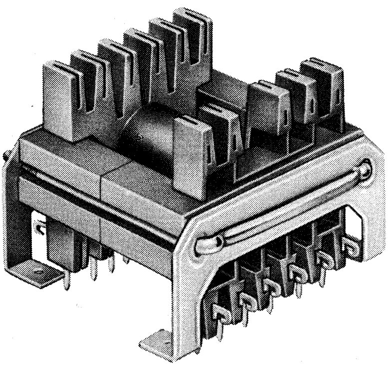
These E cores with round center leg provide a large space for the windings and permit even thick wires to be brought out conveniently. Owing to the large width for the winding good coupling between the windings is obtained. Coil formers with solder tags for vertical or horizontal magnetic axes are available.



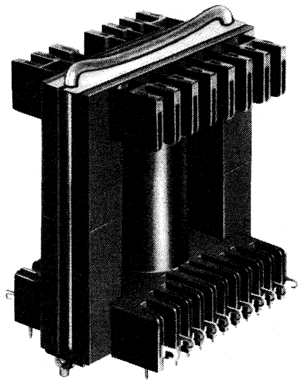
EC 35, magnetic axis horizontal



EC 41, EC 52
magnetic axis vertical



EC 41, EC 52, EC 70
magnetic axis horizontal

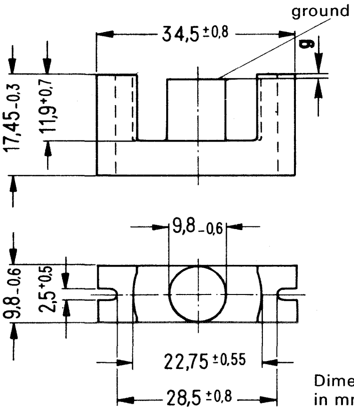


EC 70, magnetic axis vertical

Coil formers for EC cores

The coil formers, made of glass-fiber reinforced polyterephthalate, are flame-retardant in accordance with UL 94 V-0. They are available for the EC 35 core as horizontal version, for the EC 41, 52, and 70 cores also as vertical version with differing numbers of terminals (see following pages). Operating temperature range: between −60 °C/−76 °F and +120 °C/+248 °F.

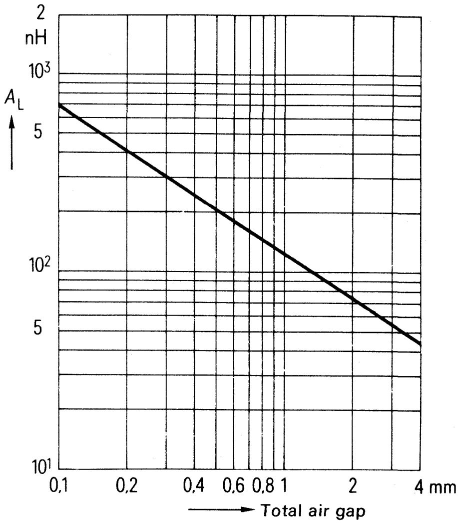
Cores in accordance with IEC publication 647



Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core B66337–G... (g approx. 0)
and
one core B66337–G... (g > 0)
or
two cores B66337–G... (g > 0)



Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A$ =	0.918	mm^{-1}
Effective length	l_e =	77.4	mm
Effective area	A_e =	84.3	mm^2
Min. core cross section[1]	A_{min} =	66	mm^2
Effective volume	V_e =	6530	mm^3

Approx. weight 18 g/item

EC cores are delivered individually according to the dimension *"g"* (shortened center leg). The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66337–G).

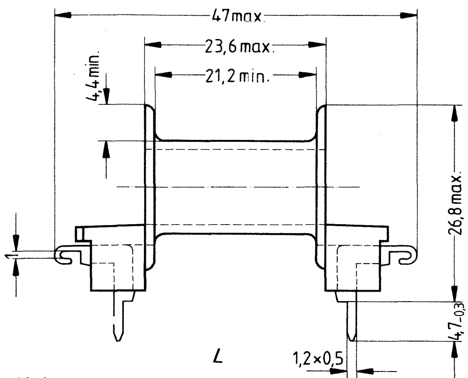
Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (PU: 200 items)	
N 27	appr. 0	–	approx. 2100	approx. 1530	B66337–G–X127	S
N 27	0,10	±0,02	approx. 680	approx. 500	B66337–G100–X127	S
	0,25	±0,03	approx. 340	approx. 249	B66337–G250–X127	S
	0,50	±0,05	approx. 205	approx. 150	B66337–G500–X127	S
	1,00	±0,1	approx. 122	approx. 89	B66337–G1000–X127	

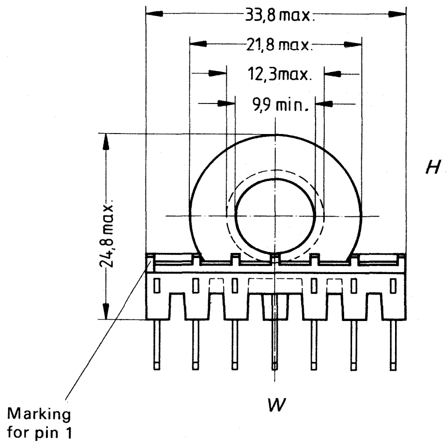
For power loss P_v and amplitude permeability μ_a refer to page 418.

1) Necessary for calculating the max. flux density
S Preferred products (refer to page 4)

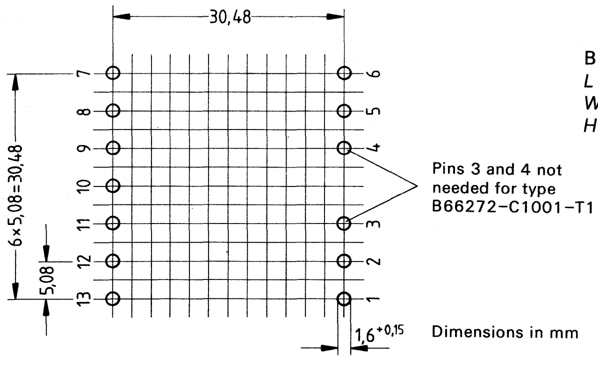
Coil former B 66272

Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0. Optionally with 11, 13 or without solder terminals. Solder tags with plumbic tin solder, hot-dip tinned. For solderability of terminal pins refer to page 89. For winding details refer to page 76.





Hole arrangement
View in mounting direction



Built-in dimensions for the transformer
L = 47 mm
W = 36 mm
H = 26 mm

Dimensions in mm

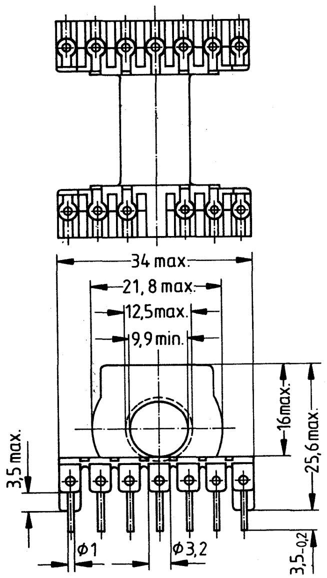
Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value¹⁾ µΩ	Approx. weight g	Number of terminals	**Ordering code** (PU: 100)
97	53	18,8	7	11	B66272-C1001-T1 S
				13	B66272-C1002-T1 S
			5	–	B66272-A1000-T1

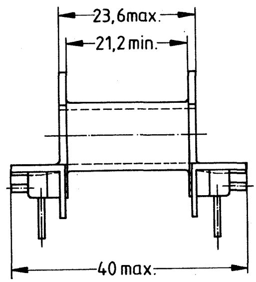
1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)
S Preferred products (refer to page 4)

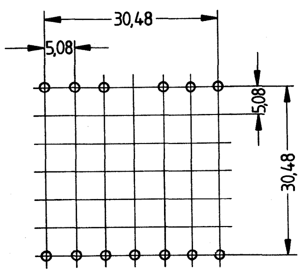
Coil former B 66272-J for automatic winding

Glass-fiber reinforced polyterephthalate coil former with 13 terminal pins, flame-retardant in accordance with UL 94 V-0; suitable for automatic winding.

For solderability of terminal pins refer to page 89. For winding details refer to page 76.







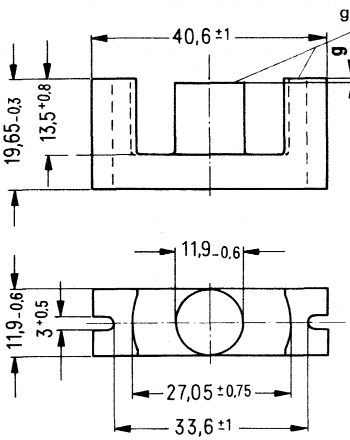
Hole arrangement
View in mounting direction
Mounting hole Ø $1{,}6^{+0{,}15}$

Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] µΩ	Approx. weight g	**Ordering code** (PU: 100)
1	97	53	18,8	7	B66272–J1013–T1

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance $= A_R \cdot$ number of turns²)

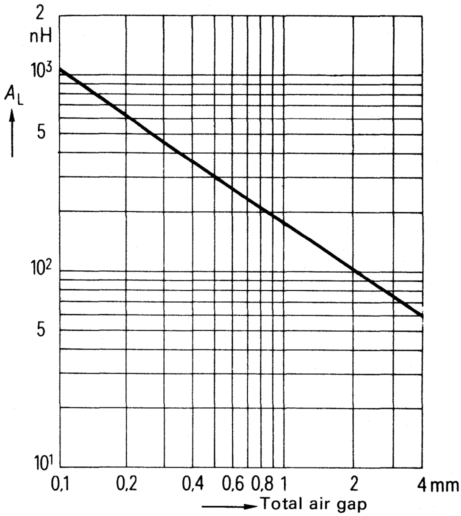
Cores in accordance with IEC publication 647



Dimensions in mm

A_L **value versus total air gap**
for a set consisting of

one core B66339–G (*g* approx. 0)
and
one core B66339–G... (*g* > 0)
or
two cores B66339–G... (*g* > 0)



Magnetic characteristics (per set)

Core factor	$\Sigma l/A$ =	0.735	mm^{-1}
Effective length	l_e =	89.3	mm
Effective area	A_e =	121	mm^2
Min. core cross section[1]	A_{min} =	100	mm^2
Effective volume	V_e =	10800	mm^3

Approx. weight 26 g/item

E cores are delivered individually according to the dimension *"g"* (shortened center leg). The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66339–G).

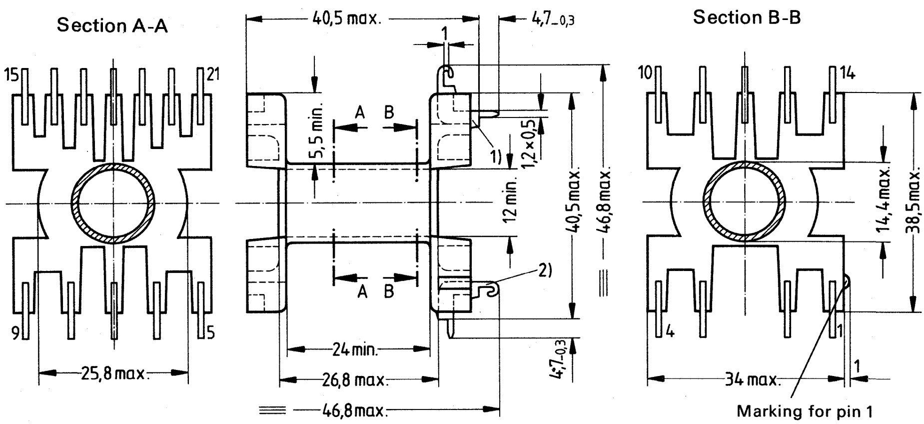
Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	Ordering code (PU: 200 items)	
N 27	appr. 0	–	approx. 2700	approx. 1580	B66339–G–X127	S
N 27	0,10	±0,02	approx. 1100	approx. 644	B66339–G100–X127	S
	0,25	±0,03	approx. 530	approx. 310	B66339–G250–X127	S
	0,50	±0,05	approx. 305	approx. 179	B66339–G500–X127	S
	1,00	±0,1	approx. 180	approx. 105	B66339–G1000–X127	S

For power loss P_v and amplitude permeability μ_a refer to page 418.

1) Necessary for calculating the max. flux density
S Preferred products (refer to page 4)

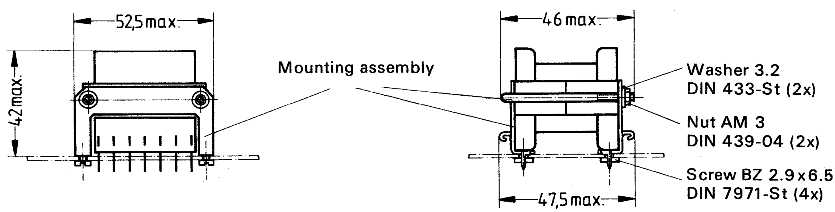
Coil former and mounting assembly B 66274

Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0. Optionally horizontal or vertical version, with 9, 12, or without solder terminals. Solder tags with plumbic tin solder, hot-dip tinned.
For solderability of terminal pins refer to page 89. For winding details refer to page 76.

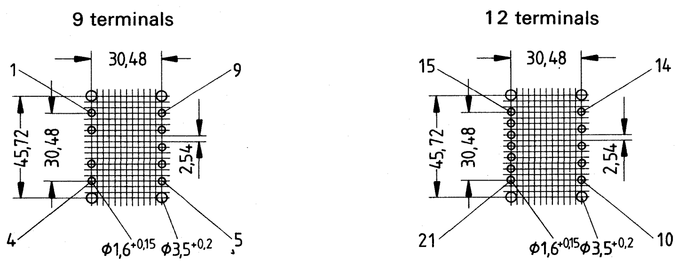


1) Installation of solder tag for vertical version   2) Installation of solder tag for horizontal version

Horizontal version: cores with accessories assembled

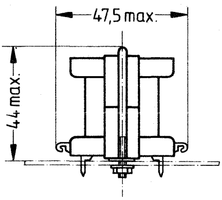


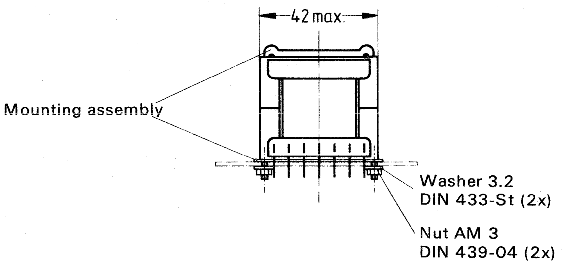
Hole arrangement, view in mounting direction



Dimensions in mm

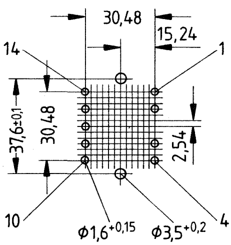
Vertical version: cores with accessories assembled



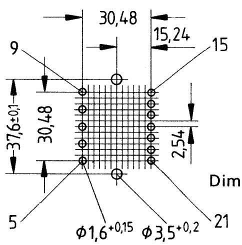


Hole arrangements, view in mounting direction

9 terminals



12 terminals



Dimensions in mm

Coil former B 66274

Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	Version	Number of terminals	**Ordering code** (PU: 100)
134	62	15,9	12	horizontal	9	B66274–B1001–T1 S
					12	B66274–B1002–T1 S
				vertical	9	B66274–B1011–T1
					12	B66274–B1012–T1 S
				–	–	B66274–A1000–T1

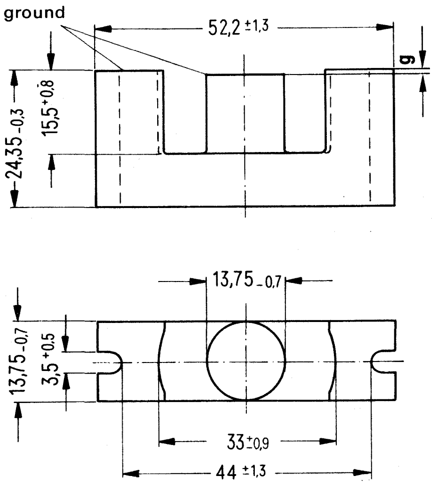
Mounting assembly B 66274		**Ordering code** (PU: 100)
Horizontal	Complete mounting assembly with hex nuts and washers	B66274–B2001 S
Vertical	Complete mounting assembly with hex nuts and washers	B66274–B2002 S

The max. torque for screwing the mounting assembly onto the PC board is 0.6 Nm per thread

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance $= A_R \cdot$ number of turns²)

S Preferred products (refer to page 4)

Cores in accordance with IEC publication 647



Dimensions in mm

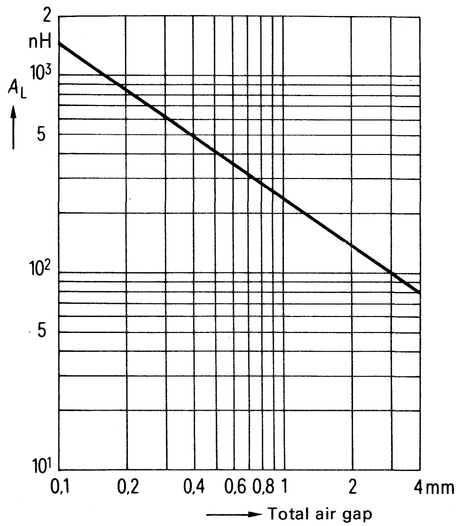
Magnetic characteristics (per set)

Core factor	$\Sigma l/A$ =	0.58	mm^{-1}
Effective length	l_e =	105	mm
Effective area	A_e =	180	mm^2
Min. core cross section[1]	A_{min} =	134	mm^2
Effective volume	V_e =	18800	mm^3

Approx. weight 55 g/item

A_L value versus total air gap
for a set consisting of

one core B66341–G (g approx. 0)
and
one core B66341–G... (g > 0)
or
two cores B66341–G... (g > 0)



E cores are delivered individually according to the dimension *"g"* (shortened center leg). The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66341–G).

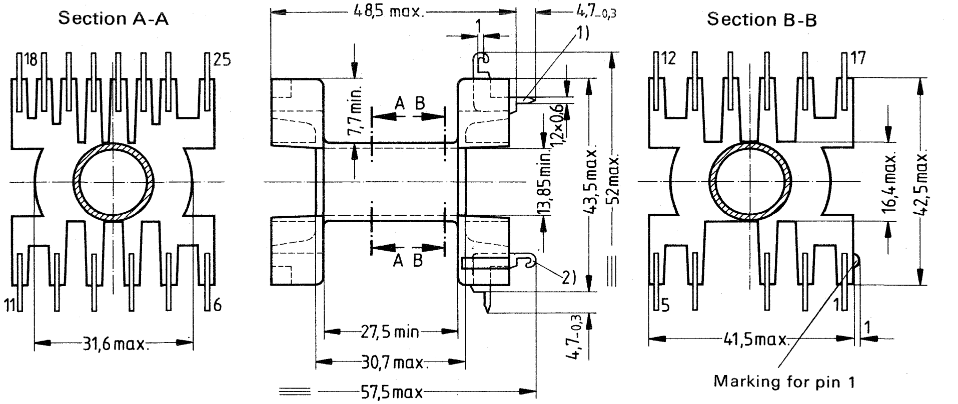
Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (PU: 100 items)	
N 27	appr. 0	–	approx. 3400	approx. 1570	B66341–G–X127	S
N 27	0,25	±0,03	approx. 725	approx. 335	B66341–G250–X127	S
	0,50	±0,05	approx. 420	approx. 194	B66341–G500–X127	S
	1,00	±0,1	approx. 240	approx. 111	B66341–G1000–X127	S
	1,50	±0,1	approx. 175	approx. 81	B66341–G1500–X127	

For power loss P_v and amplitude permeability μ_a refer to page 418.

[1] Necessary for calculating the max. flux density
S Preferred products (refer to page 4)

Coil former and mounting assembly B 66276

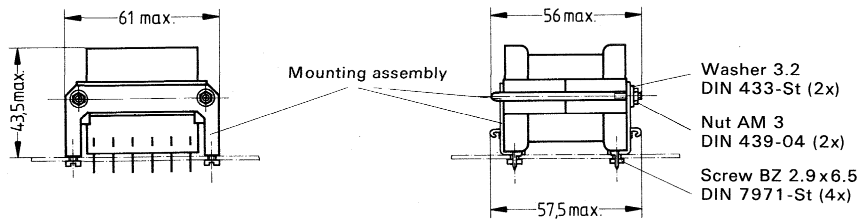
Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0. Optionally horizontal or vertical version, with 11, 14 or without terminal pins. Solder tags with plumbic tin solder, hot-dip tinned.
For solderability of terminal pins refer to page 89. For winding details refer to page 76.



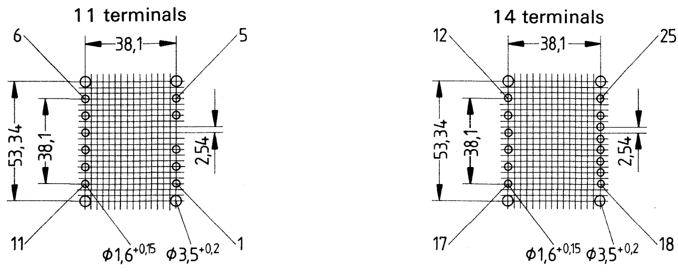
1) Installation of solder tag for vertical version

2) Installation of solder tag for horizontal version

Horizontal version: cores with accessories assembled

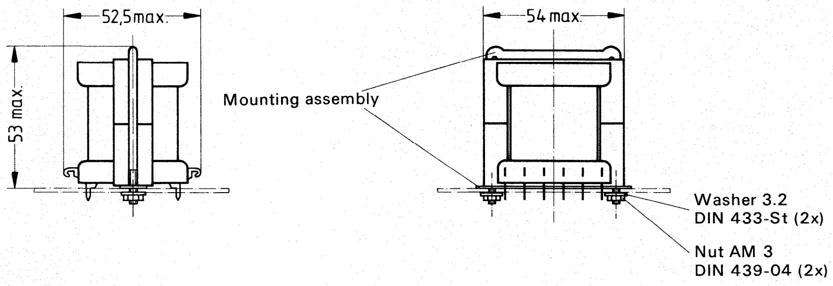


Hole arrangement, view in mounting direction



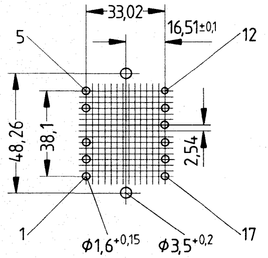
Dimensions in mm

Vertical version: cores with accessories assembled

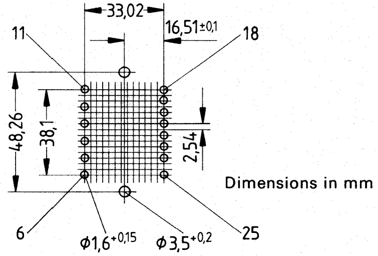


Hole arrangements, view in mounting direction

11 terminals



14 terminals



Coil former B 66276

Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value¹⁾ µΩ	Approx. weight g	Version	Number of terminals	**Ordering code** (PU: 50)
212	74	12,0	18	horizontal	11	B66276-B1001-T1 **S**
					14	B66276-B1002-T1 **S**
				vertical	11	B66276-B1011-T1 **S**
					14	B66276-B1012-T1 **S**
				–	–	B66276-A1000-T1

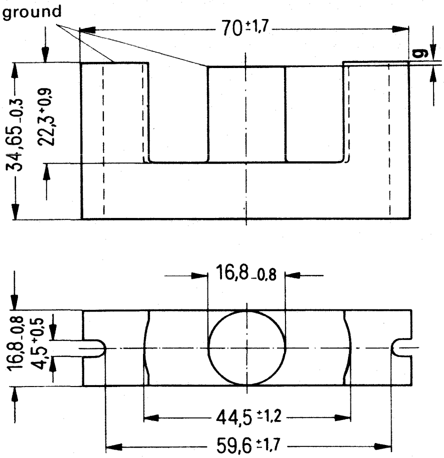
Mounting assembly B 66276		**Ordering code** (PU: 50)
Horizontal	Complete mounting assembly with hex nuts and washers	B66276-B2001 **S**
Vertical	Complete mounting assembly with hex nuts and washers	B66276-B2002 **S**

The max. torque for screwing the mounting assembly onto the PC board is 0.8 Nm per thread

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

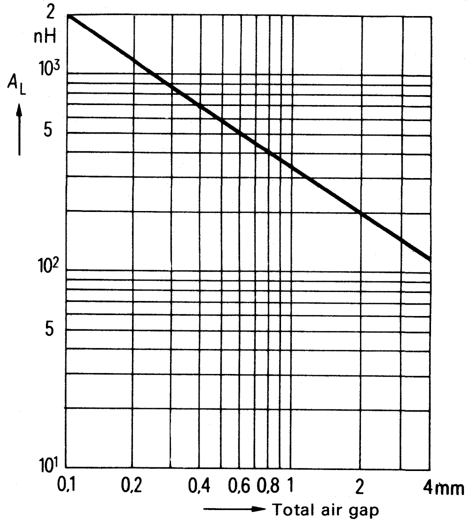
in accordance with IEC publication 647



Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core B66343-G (*g* approx. 0)
and
one core B66343-G... ($g > 0$)
or
two cores B66343-G... ($g > 0$)



Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A$ =	0.514	mm^{-1}
Effective length	l_e =	144	mm
Effective area	A_e =	279	mm^2
Min. core cross section[1]	A_{min} =	201	mm^2
Effective volume	V_e =	40100	mm^3

Approx. weight 126 g/item

E cores are delivered individually according to the dimension *"g"* (shortened center leg). The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66343-G).

Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (PU: 20 items)
N 27	appr. 0	–	approx. 3900	approx. 1590	B66343-G-X127 S
N 27	0,25	±0,03	approx. 1000	approx. 409	B66343-G250-X127
	0,50	±0,05	approx. 580	approx. 237	B66343-G500-X127
	1,00	±0,1	approx. 340	approx. 139	B66343-G1000-X127
	2,00	±0,15	approx. 200	approx. 82	B66343-G2000-X127

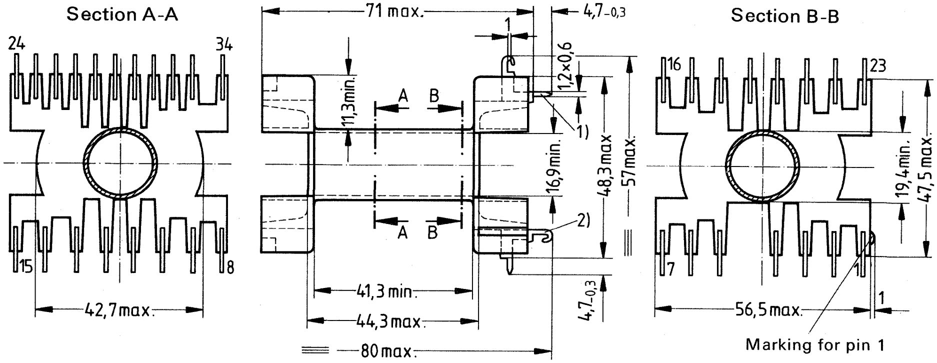
For power loss P_v and amplitude permeability μ_a see page 418.

[1] Necessary for calculating the max. flux density

S Preferred products (refer to page 4)

Coil former and mounting assembly B 66278

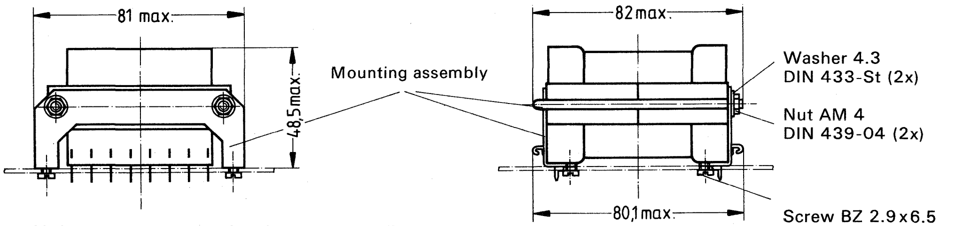
Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0. Optionally horizontal or vertical version, with 15, 19 or without terminal pins. Solder tags with plumbic tin solder, hot-dip tinned.
For solderability of terminal pins refer to page 89. For winding details refer to page 76.



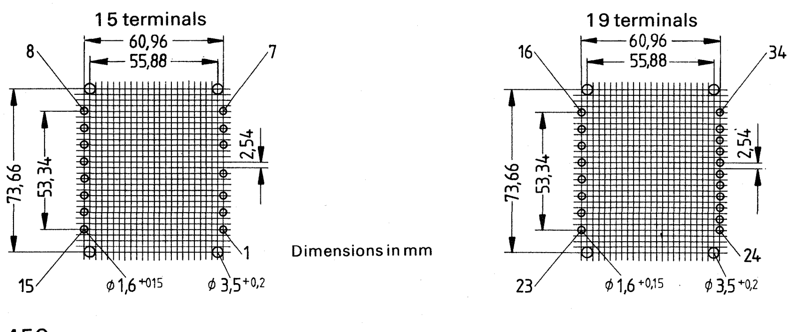
1) Installation of solder tag for vertical version

2) Installation of solder tag for horizontal version

Horizontal version: cores with accessories assembled

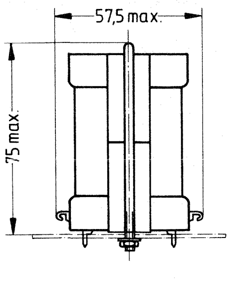


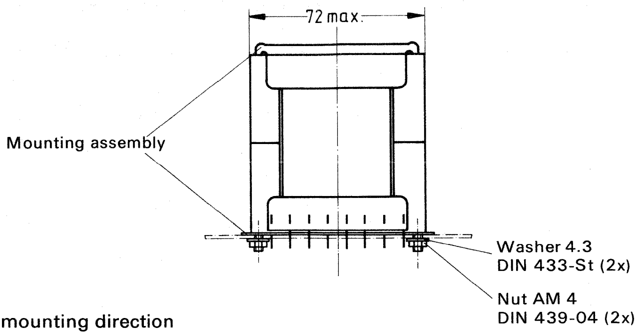
Hole arrangements, view in mounting direction



Dimensions in mm

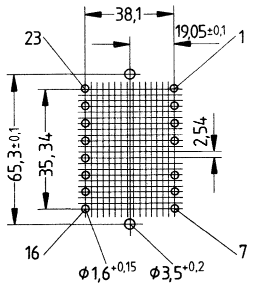
Vertical version: cores with accessories assembled



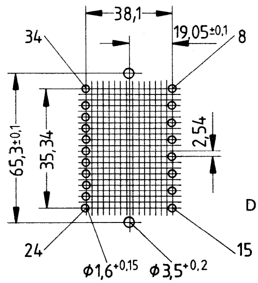


Hole arrangements, view in mounting direction

15 terminals



19 terminals



Dimensions in mm

Coil former B 66278

Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] µΩ	Approx. weight g	Version	Number of terminals	**Ordering code** (PU: 10)
469	97	7,1	30	horizontal	15	B66278–B1001–T1 **S**
					19	B66278–B1002–T1 **S**
				vertical	15	B66278–B1011–T1 **S**
					19	B66278–B1012–T1 **S**
				–	–	B66278–A1000–T1

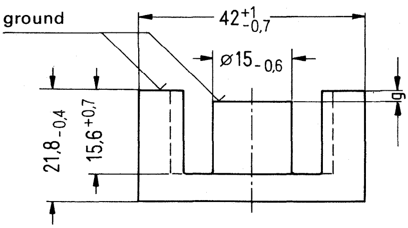
Mounting assembly B 66278		**Ordering code** (PU: 10)
Horizontal	Complete mounting assembly with hex nuts and washers	B66278–B2001 **S**
Vertical	Complete mounting assembly with hex nuts and washers	B66278–B2002 **S**

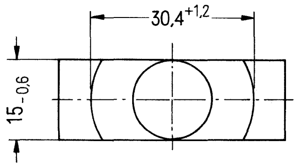
The max. torque for screwing the mounting assembly onto the PC board is 1.2 Nm per thread

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

S Preferred products (refer to page 4)

The round center leg of these E cores is of particular advantage when thick wires or tapes are used. Their application results in a compact winding design featuring low stray inductances.





Dimensions in mm

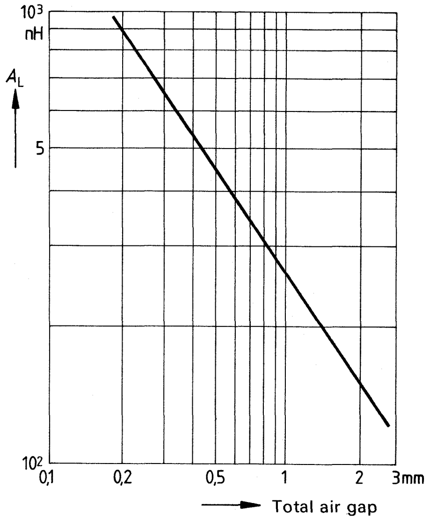
Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A$ =	0.58	mm^{-1}
Effective length	l_e =	99	mm
Effective area	A_e =	170	mm^2
Effective volume	V_e =	16800	mm^3

Approx. weight 42 g/item

A_L value versus total air gap
for a set consisting of

one core B66347–G (*g* approx. 0)
and
one core B66347–G... ($g > 0$)
or
two cores B66347–G... ($g > 9$)



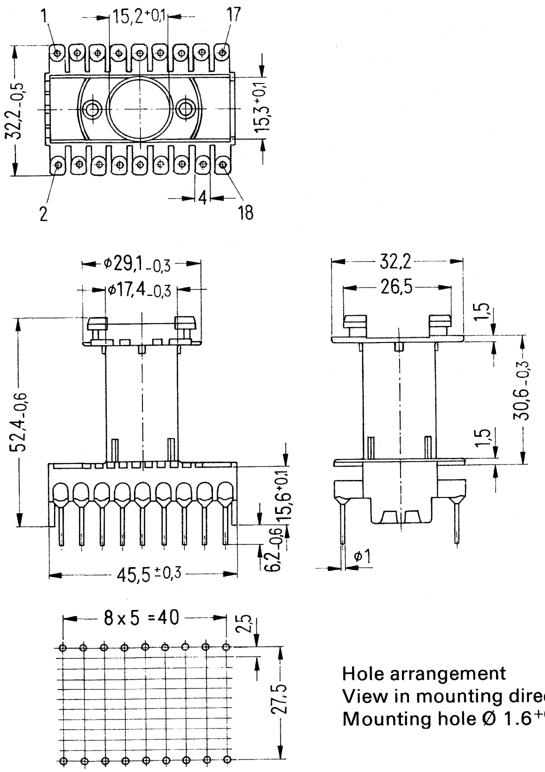
E cores are delivered individually according to the dimension *"g"* (shortened center leg). The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66347–G).

Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (PU: 200 items)
N 27	appr. 0	–	approx. 3200	approx. 1480	B66347–G–X127
N 27	1	±0,1	approx. 260	approx. 120	B66347–G1000–X127
	1,5	±0,1	approx. 190	approx. 88	B66347–G1500–X127

For power loss P_v and amplitude permeability μ_a refer to page 418.

Coil former B 66348 for automatic winding

Glass-fiber reinforced polyterephthalate coil former with 18 terminal pins, flame-retardant in accordance with UL 94 V-0; suitable for automatic winding.
For solderability of terminal pins refer to page 89. For winding details refer to page 76.



Hole arrangement
View in mounting direction
Mounting hole Ø $1.6^{+0,15}$

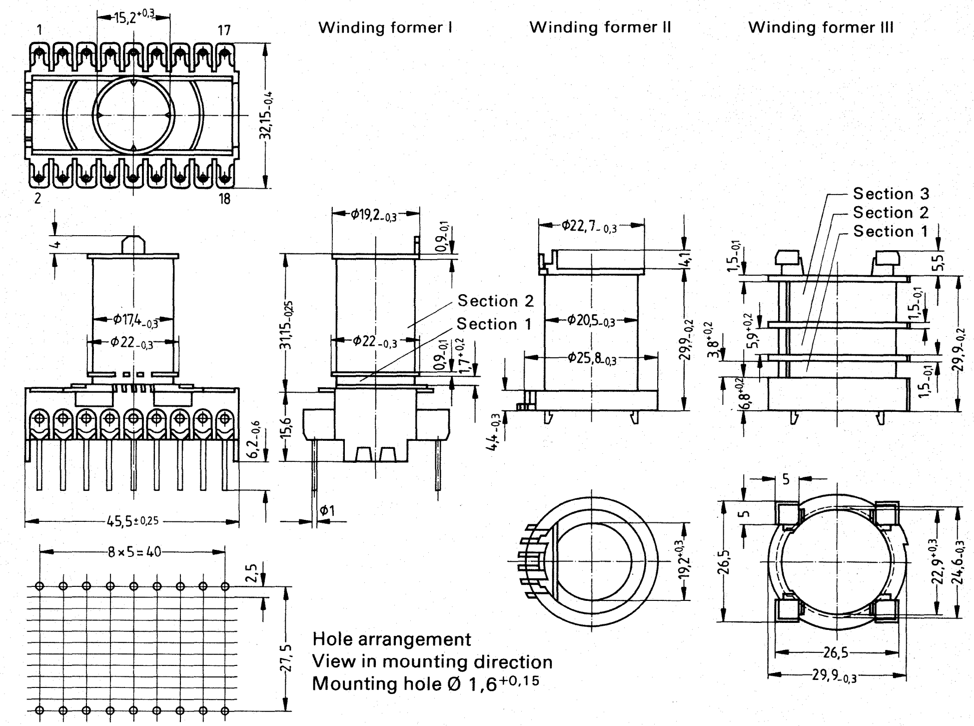
Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 100)
1	127	68,5	18,6	13,2	B66348–A1018–T1

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance $= A_R$ · number of turns^2)

Coil former B 66348 with pluggable housing

Glass-fiber reinforced polyterephthalate coil former with 18 terminal pins, flame-retardant in accordance with UL 94 V-0; suitable for automatic winding.
For solderability of terminal pins refer to page 89.



Ordering code B66348–A1018–T103
for complete set
(PU: 100)

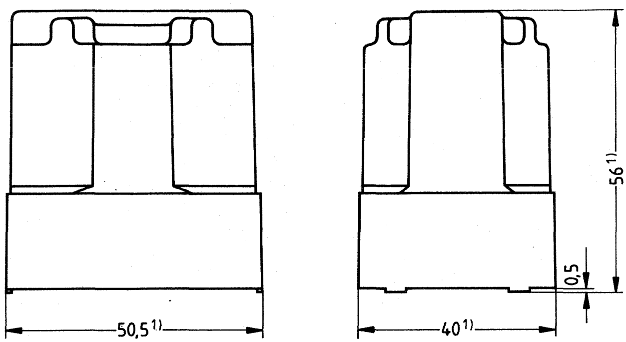
Dimensions in mm

Winding former	Winding section	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** for winding formers
I	1 2	4 24,5	61,5 57,5	529 81	9,3	C61036–A102–B3
II	1	24,1	67,5	96	3,0	C61036–A102–C6
III	1 2 3	8,4 12,6 42,2	85,5 85,5 85,5	350 233 70	5,9	C61036–A102–C7

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

Sealing can B 66348

Polyterephthalate can (flame-retardant in accordance with UL 94 V-0) for sealing transformers with cores ER 42/22/15 and coil formers B66348–A1018–T1.

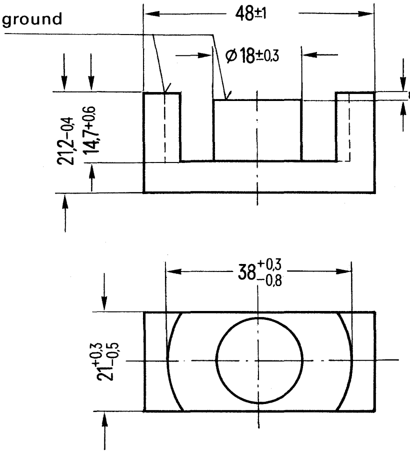


Dimensions in mm

1) Max. dimension

Ordering code B66348–A2001–T1
(PU: 100)

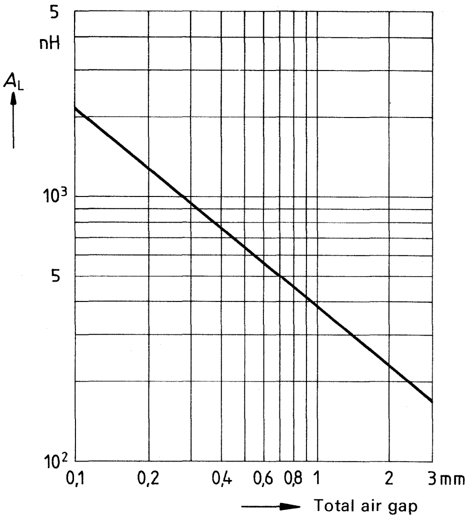
The round center leg of these E cores is of particular advantage when thick wires or tapes are used. Their application results in a compact winding design featuring low stray inductances.



Dimensions in mm

A_L value versus total air gap
for a set consisting of

one core B66333–G (g approx. 0)
and
one core B66333–G... ($g > 0$)
or
two cores B66333–G... ($g > 0$)



Magnetic characteristics (per set)

Core factor	$\Sigma l/A$ =	0.394	mm^{-1}
Effective length	l_e =	100	mm
Effective area	A_e =	254	mm^2
Effective volume	V_e =	25400	mm^3

Approx. weight 65 g/item
Accessories: coil former in preparation

E cores are delivered individually according to the dimension *"g"* (shortened center leg). The tabulated A_L values apply to core sets comprising the indicated core and a core without shortened center leg (B66333–G).

Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value nH	Effective permeability μ_e	**Ordering code** (PU: 100)
N 27	appr. 0	–	approx. 4800	approx. 1500	B66333–GX127
N 27	1,2	±0,1	approx. 320	approx. 101	B66333–G1200–X127
	1,5	±0,1	approx. 270	approx. 85	B66333–G1500–X127

For power loss P_v and amplitude permeability μ_a refer to page 418.

ETD Cores

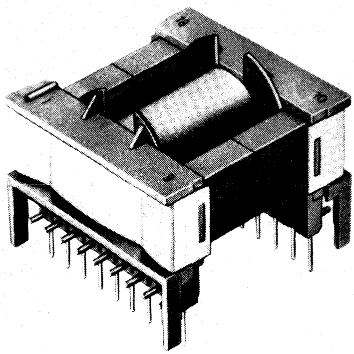
E Cores ETD 34, 39, 44, 49
ETD Sample Set

These sample sets comprise only ungapped ETD cores and their accessories. The cores are available either made of ferrite material N27 or N67.

Type	Ferrite material	Ordering code	
ETD core sample set	N 27	B66360–X1	S
	N 67	B66360–X67	S

S Preferred products (refer to page 4)

ETD Cores



General

The ETD line combines a number of proven power transformer core principles. As can be gathered from the designation (ETD = **e**conomic **t**ransformer **d**esign) economic considerations played a key role during the design. Standardization in accordance with IEC has been initiated.

The most important features can be summed up as follows.

1. The round center leg cross section which facilitates coil production – especially for thick wires – already proved to be an advantage in the predecessor versions (EC and ER core line).
2. The cores feature a constant cross section along the magnetic flux, i.e. the magnetic flux density is constant across the entire core volume. This prevents bottlenecks which could lead to hot spots at high excitation. This is a very important requirement especially for high frequencies, at which the remagnetization losses make up a substantial portion of the transformer losses considering that the core loss increases with more than the second power of the inductance B. This even load distribution of the ferrite produces a core with minimum weight at a given power loss.
3. The square base results in favorable built-in dimensions. In addition, a compromise was found between the requirement for long legs, which enable windings with a low leakage flux, and the production problems caused by legs that are too long.
4. The ratio of the core width (= diameter of the center hole) to the length of one side of the square is approx. 1 : 3. At this ratio, core volume and coil volume are approximately equal. This facilitates the application of the rule that in a well-designed transformer the losses should be distributed evenly among core and windings.
5. An additional requirement that was considered during the development of the ETD cores was compactness in conjunction with a large coil aperture. This large aperture implements a large number of possible coil winding variations (e.g. multiple outputs, line separation, foil windings, thick wires or litz wires respectively, flat copper strip for high currents).

6. The size differences in the product line consisting of four core types were selected such that the mounting area requirement for the ETD 49, the largest core, is approx. twice that for the ETD 34, the smallest core. For the intermediate sizes, the 15 mm difference in core width was divided linearly, resulting in 5 mm steps to the ETD 39 and ETD 44. For the user, this means that he can select the optimum core for his application without having to accept over- or under-dimensioning. The finally leads to a minimum requirement of cost and space.
7. The coil formers for this line of cores are especially suited for automatic winding (e.g. owing to special wire holding pins) and final transformer assembly (e.g. unsymmetrical arrangement of the identifying fins). They are also suited for simple manual winding.

   The coil formers consist of proven glass-fiber reinforced polyterephthalate, flame-retardant according to UL 94 V-0. Solid pins with a circular cross section (1 mm), and 2.54 mm lead spacing, are fixed in the coil former. The number of pins (14 to 20 according to the version) and their arrangement permit a multiple output arrangement for line separation.

   The two core halves are joined to the coil former by means of two easily engaging metal clamps without any additional parts.

   The core is connected to ground by means of a ground clamp that connects both core halves.
8. The transformer can be soldered to PC boards under normal soldering conditions. For solderability of terminal pins refer to page 89. The transformer meets the mechanical test in accordance with IEC 68-2-6, or DIN 40046 respectively.

   The core line can, of course, also be used for other user-specific coil formers.

Materials for ETD Cores

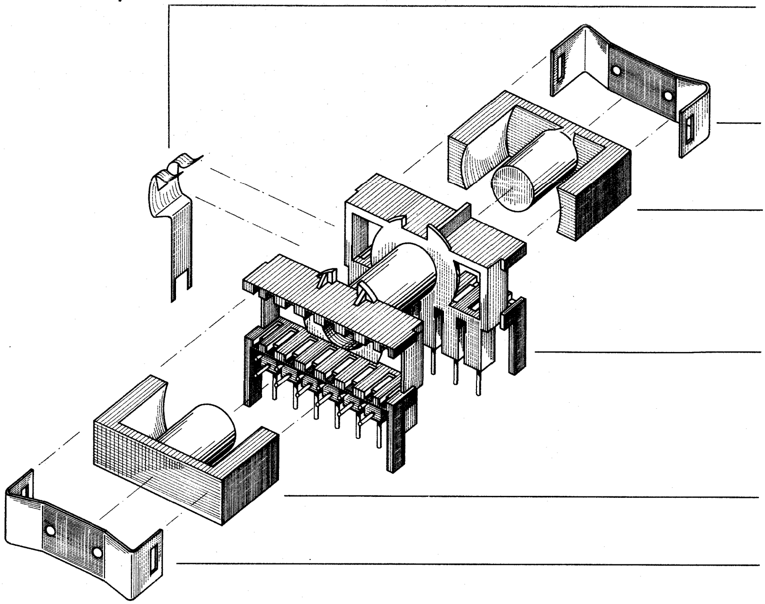
Apart from the well-tried and continually improved material N27, the new material N67 developed specifically for power electronics is used for the ETD series of cores.

Owing to its extremely low core power loss, this material is especially suitable for converters in switched-mode power supplies with operating frequencies > 50 kHz.

The data required for power transmission may be found in the material table, pages 42/43, and the chapter on "Cores for power transmission".

ETD Cores

Individual parts



Survey

Size	Built-in dimensions $L \times W \times H$ (approx.) mm	Max. power dissipation[1] Material N 27 25 kHz; 200 mT; 100°C W/Set	Material N 67 100 kHz; 100 mT; 100°C W/Set	Type	Page
ETD 34/17/11	horizontal: 43 x 40 x 35 vertical: 27,5 x 38,5 x 45,5	1,6	1,3	B66361	464
ETD 39/20/13	48 x 45 x 38	2,2	2,0	B66363	468
ETD 44/22/15	53 x 50 x 41	3,6	3,1	B66365	471
ETD 49/25/16	58 x 55 x 43,5	4,6	4,1	B66367	474

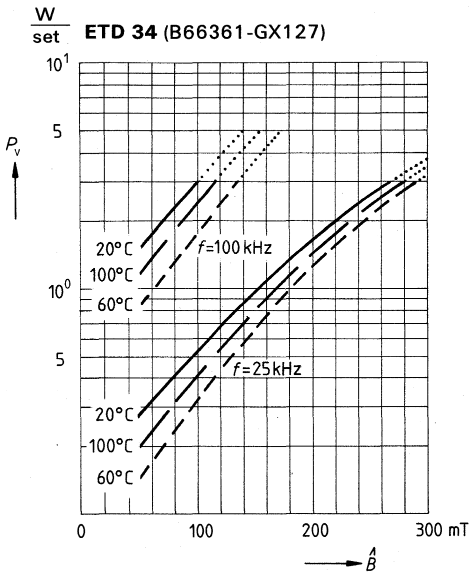
Amplitude permeability μ_a for ETD Cores[1]
Test frequency $\leq$ 16 kHz

Material	Temperature T °C	Induction $\hat{B}$ mT	Magn. field strength $\hat{H}$ A/m	Amplitude permeability μ_a
N27	20	400	$\leq$ 212	$\geq$ 1500
	100	320	$\leq$ 204	$\geq$ 1250
N67	20	400	$\leq$ 265	$\geq$ 1200
	100	320	$\leq$ 283	$\geq$ 900

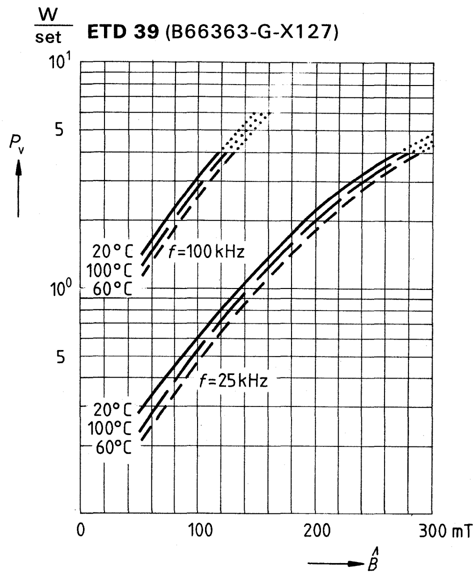
[1] Sinusoidal test flux density, referred to A_{min}.

Power loss for cores made of ferrite material N27 versus alternating flux density at various frequencies and temperatures (measured with ungapped core sets). Measuring method in accordance with IEC publ. 367-1.

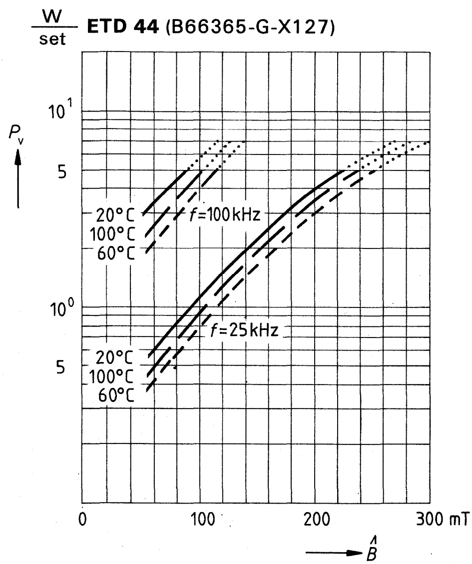
ETD 34 (B66361-GX127)



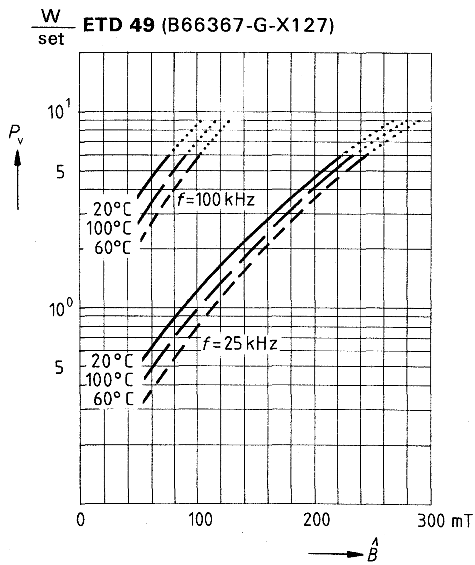
ETD 39 (B66363-G-X127)



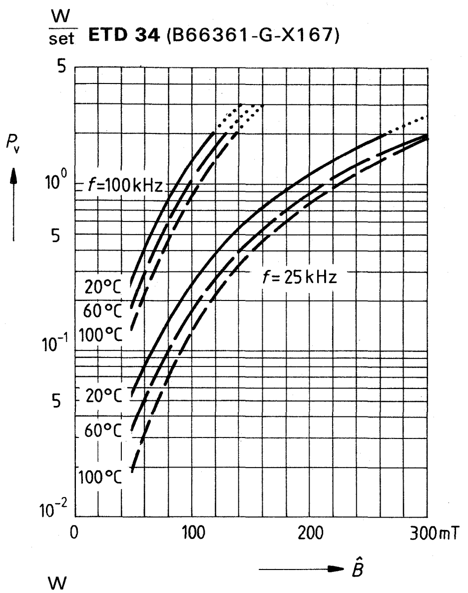
ETD 44 (B66365-G-X127)

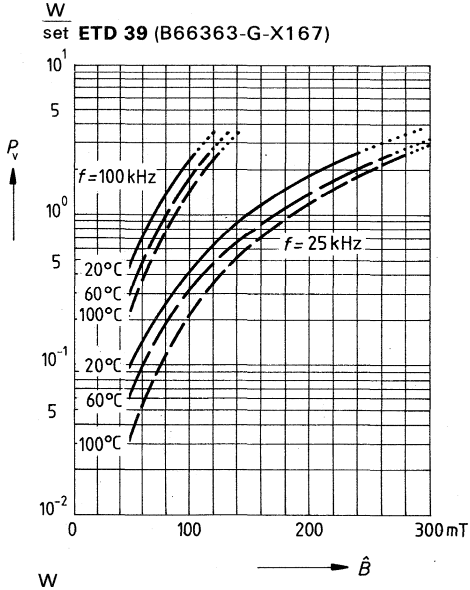


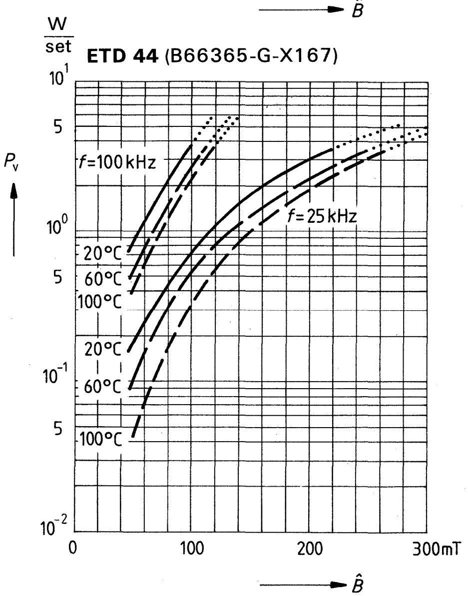
ETD 49 (B66367-G-X127)

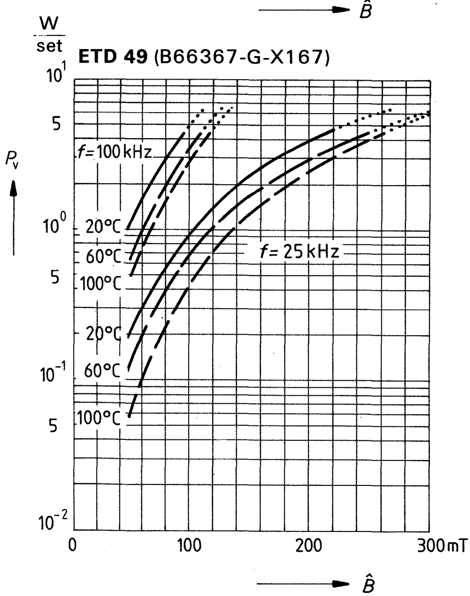


Power loss for cores made of ferrite material N67 versus alternating flux density at various frequencies and temperatures (measured with ungapped core sets). Measuring method in accordance with IEC publ. 367-1.

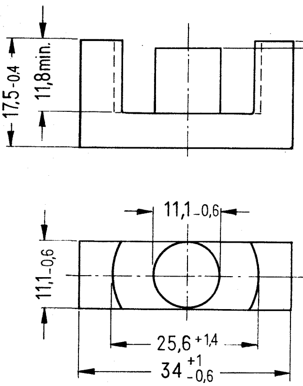








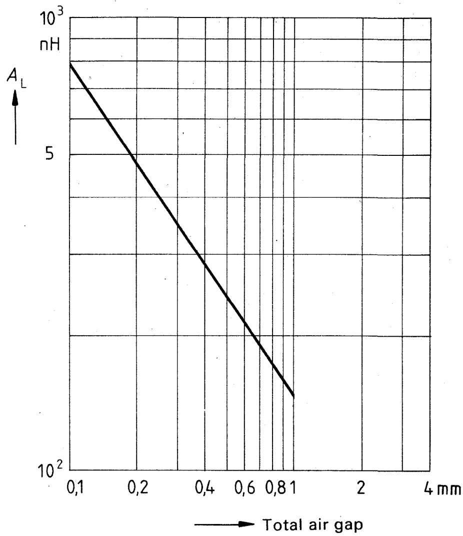
ETD cores are intended for SMPS transformer design with optimum weight-referred power at small volume.



Dimensions in mm

A_L value versus total air gap
for a set consisting of

1 core B66361−G−X1*7 (*g* appr. 0) and
1 core B66361−G... (*g* > 0)
or
2 cores B66361−G... (*g* > 0)



Magnetic characteristics (per set)

Core factor	$\Sigma l/A$ =	0.81	mm^{-1}
Effective area	A_e =	97.1	mm^2
Min. core cross-section[1]	A_{min} =	91.6	mm^2
Effective length	l_e =	78.6	mm
Effective volume	V_e =	7640	mm^3

Approx. weight 20 g/item

ETD cores are delivered individually and according to dimension *"g"* (shortened center leg). Dimension *"g"* applies to a core set comprising one core with *"g"* approximately 0 and one core with shortened center leg.

Ferrite material	Dimension "g" mm	tolerance mm	A_L value[2] (approx.) nH	Effective permeability (approx.) μ_e	**Ordering code** (PU: 200 items)	
N27	appr.0	–	2400	1550	B66361−G−X127	S
N67	appr.0	–	2600	1680	B66361−G−X167	
N27	0,1	±0,02	800	515	B66361−G100−X127	
	0,2	±0,03	480	309	B66361−G200−X127	
	0,5	±0,05	230	148	B66361−G500−X127	S
	1,0	±0,1	140	90	B66361−G1000−X127	S
N67	0,5	±0,05	230	148	B66361−G500−X167	
	1,0	±0,1	140	90	B66361−G1000−X167	

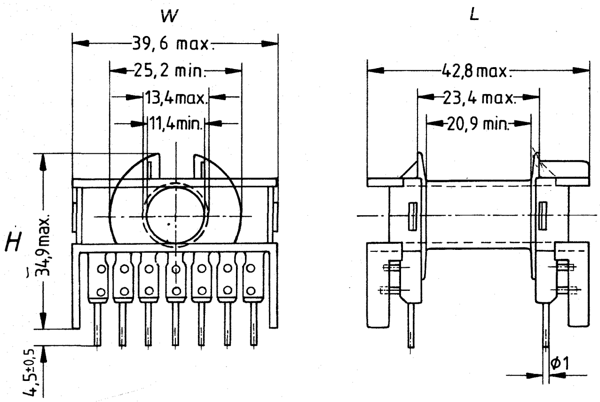
For power loss P_v and amplitude permability μ_a refer to page 461.

1) Required to calculate the max. flux density
2) Measuring temperature 25 °C, measuring flux density $\hat{B} \leq 1$ mT
S Preferred products (refer to page 4)

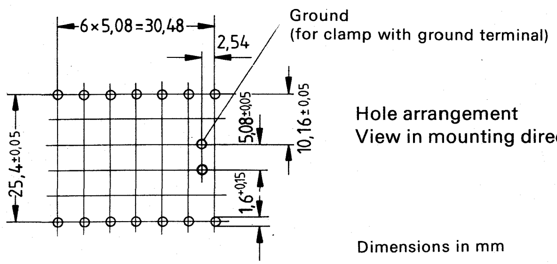
Coil former B 66362–A... (magnetic axis horizontal)

Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0. Available with 14 solder terminals, also suitable for automatic winding.

For solderability of terminal pins refer to page 89. For winding details refer to page 77.



Built-in dimensions für the transformer (approx.)
L = 43 mm
W = 40 mm
H = 35 mm



Hole arrangement
View in mounting direction

Dimensions in mm

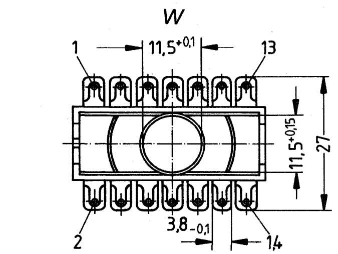
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 100)
1	122	60,5	17	15	B66362–A1014–T1 S

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns^2)
S Preferred products (refer to page 4)

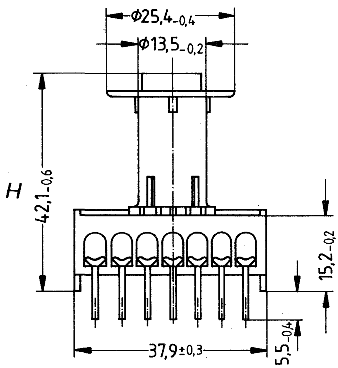
Coil former B 66362–J... (magnetic axis vertical)

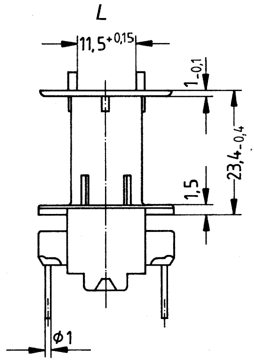
Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0. Available with 14 solder terminals, also suitable for automatic winding.

For solderability of terminal pins refer to page 89. For winding details refer to page 77.

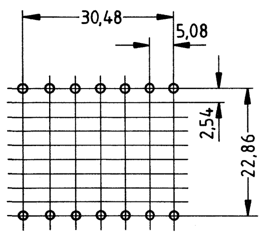


Built-in dimensions for the transformer (approx.)
L = 27.5 mm
W = 38.5 mm
H = 45.5 mm





Dimensions in mm



Hole arrangement
View in mounting direction
Mounting hole Ø $1{,}6^{+0{,}15}$

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 100)
1	122	60,5	17	15	B66362–A1014–T1

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

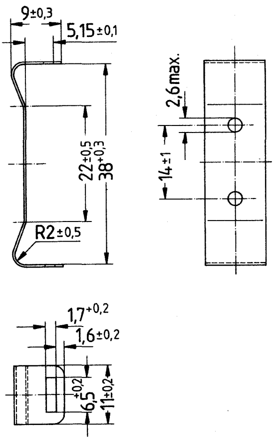
Mounting assembly and clamp with ground terminal B 66362

The mounting assembly comprises two stainless steel yokes.

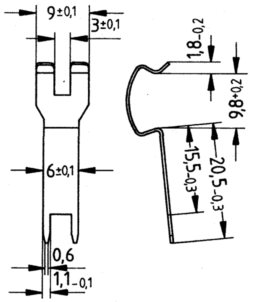
Clamp with ground terminal made of 0.4 mm thick nickel silver incl. tinned ground pins; necessary if the core must be grounded. It can be plugged upon the core, thus comprising both core halves.

Insulating washer made of PVC, band-shaped, flame-retardant.

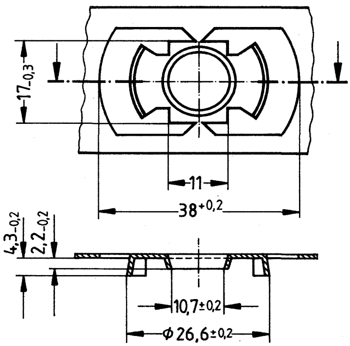
Yoke



Clamp with ground terminal



Insulating washer



Dimensions in mm

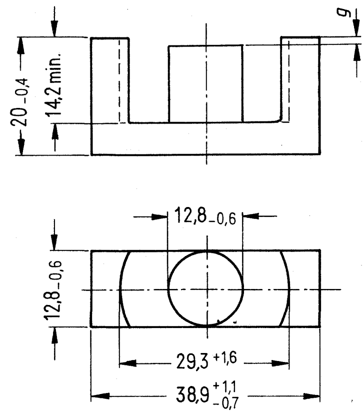
	Ordering code	PU: Items
Yoke (ordering code for individual yoke; 2 are required)	B66362–A2000	200 S
Clamp with ground terminal	B66362–A2001	100
Insulating washer between core and coil	B66362–A5000	200
Sealing can	upon request	

S Preferred products (refer to page 4)

E Cores ETD 39/20/13

B 66363

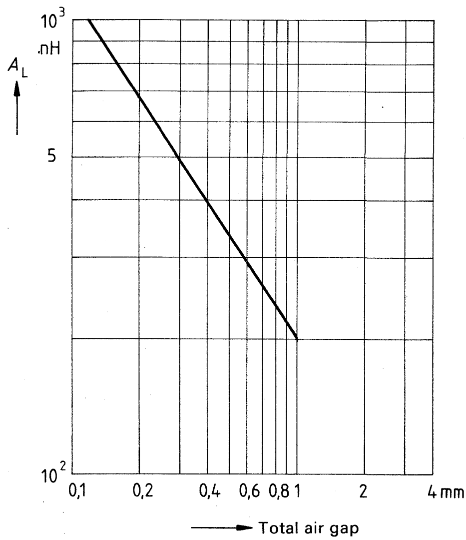
ETD cores are intended for SMPS transformer design with optimum weight-referred power at small volume.



Dimensions in mm

A_L value versus total air gap
for a set consisting of

1 core	B66363–G–X1*7	(g appr. 0) and
1 core	B66363–G…	(g > 0)
or		
2 cores	B66363–G…	(g > 0)



Magnetic characteristics (per set)

Core factor	$\Sigma l/A$ =	0.74	mm^{-1}
Effective area	A_e =	125	mm^2
Min. core cross-section[1]	A_{min} =	123	mm^2
Effective length	l_e =	92.2	mm
Effective volume	V_e =	11500	mm^3

Approx. weight 30 g/item

ETD cores are delivered individually and according to dimension "g" (shortened center leg). Dimension "g" applies to a core set comprising one core with "g" approximately 0 and one core with shortened center leg.

Ferrite material	Dimension "g" mm	tolerance mm	A_L value[2] (approx.) nH	Effective permeability (approx.) μ_e	**Ordering code** (PU: 200 items)	
N27	appr.0	–	2700	1590	B66363–G–X127	S
N67	appr.0	–	2800	1650	B66363–G–X167	
N27	0,1	±0,02	1050	618	B66363–G100–X127	
	0,2	±0,03	660	389	B66363–G200–X127	
	0,5	±0,05	340	200	B66363–G500–X127	S
	1,0	±0,1	200	118	B66363–G1000–X127	S
N67	0,5	±0,05	340	200	B66363–G500–X167	
	1,0	±0,1	200	118	B66363–G1000–X167	

For power loss P_v and amplitude permeability μ_a refer to page 461.

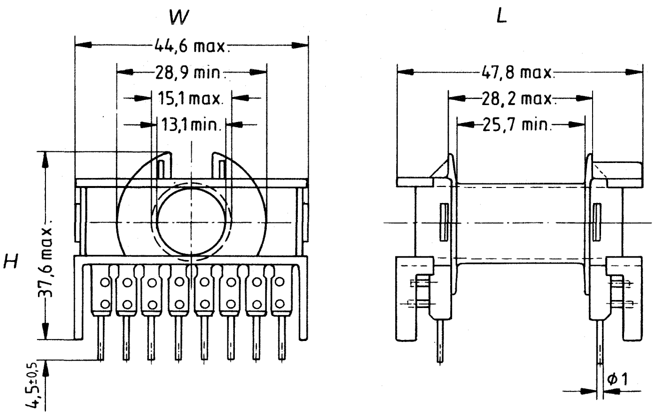
1) Required to calculate the max. flux density 2) Measuring temperature 25 °C, measuring flux density $\hat{B} \leq 1$ mT

S Preferred products (refer to page 4)

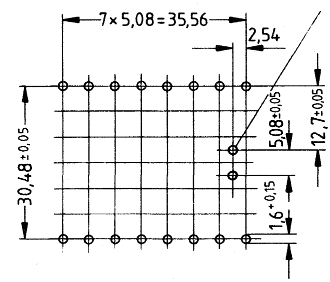
Coil former B 66364

Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0. Available with 16 solder terminals, also suitable for automatic winding.

For solderability of terminal pins refer to page 89. For winding details refer to page 77.



Built-in dimensions for the transformer (approx.)
L = 48 mm
W = 45 mm
H = 38 mm



Ground
(for clamp with ground terminal)

Hole arrangement
View in mounting direction

Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 100)
1	178	69	13,3	18	B66364–A1016–T1 S

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

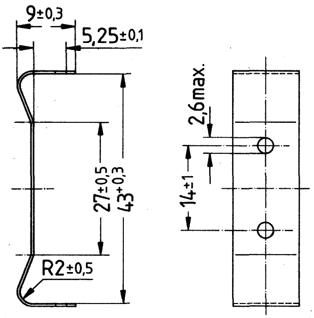
S Preferred products (refer to page 4)

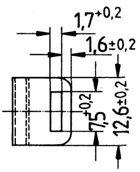
Mounting assembly and clamp with ground terminal B 66364

The mounting assembly comprises two stainless steel yokes.

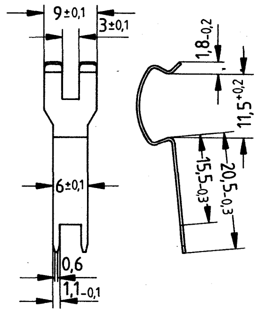
Clamp with ground terminal made of 0.4 mm thick nickel silver incl. tinned ground pins; necessary if the core must be grounded. It can be plugged upon the core, thus comprising both core halves.

Yoke





Clamp with ground terminal

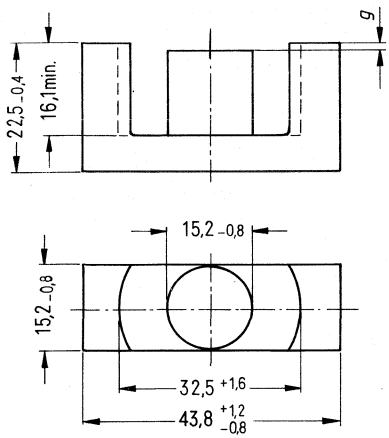


Dimensions in mm

	Ordering code	PU: Items
Yoke (ordering code for individual yoke; 2 are required)	B66364–A2000 S	200
Clamp with ground terminal	B66364–A2001	100
Sealing can	upon request	

S Preferred products (refer to page 4)

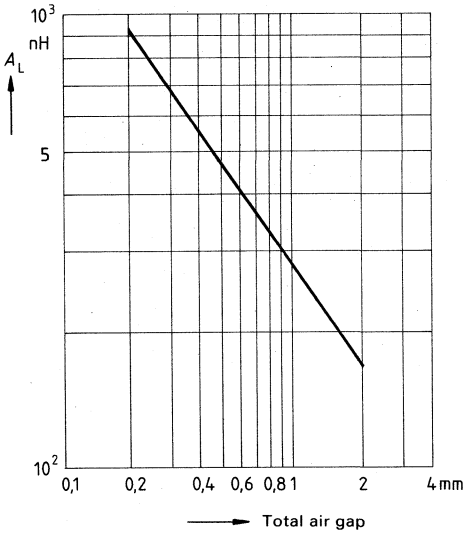
ETD cores are intended for SMPS transformer design with optimum weight-referred power at small volume.



Dimensions in mm

A_L value versus total air gap
for a set consisting of

1 core	B66365–G–X1*7	(g appro. 0) and
1 core	B66365–G...	($g > 0$)
or		
2 cores	B66365–G...	($g > 0$)



Magnetic characteristics (per set)

Core factor	$\Sigma\, l/A$ =	0.60	mm^{-1}
Effective area	A_e =	173	mm^2
Min. core cross-section[1]	A_{min} =	172	mm^2
Effective length	l_e =	103	mm
Effective volume	V_e =	17800	mm^3

Approx. weight 47 g/item

ETD cores are delivered individually and according to dimension "g" (shortened center leg). Dimension "g" applies to a core set comprising one core with "g" approximately 0 and one core with shortened center leg.

Ferrite material	Dimension "g" mm	tolerance mm	A_L value[2] (approx.) nH	Effective permeability (approx.) μ_e	Ordering code (PU: 100 items)
N27	appr.0	–	3300	1575	B66365–G–X127 S
N67	appr.0	–	3500	1670	B66365–G–X167
N27	0,2	±0,03	900	429	B66365–G200–X127
	0,5	±0,05	460	219	B66365–G500–X127 S
	1,0	±0,1	270	129	B66365–G1000–X127 S
	1,5	±0,15	200	95	B66365–G1500–X127
N67	0,5	±0,05	460	219	B66365–G500–X167
	1,0	±0,1	270	129	B66365–G1000–X167

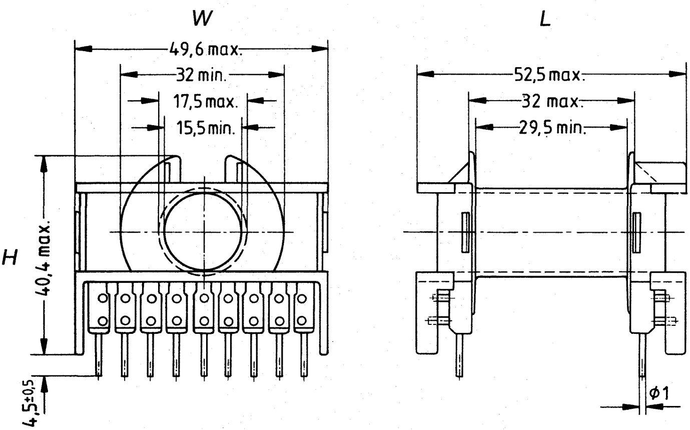
For power loss P_v and amplitude permeability μ_a refer to page 461.

1) Required to calculate the max. flux density 2) Measuring temperature 25 °C, measuring flux density $B \leq 1$ mT
S Preferred products (refer to page 4)

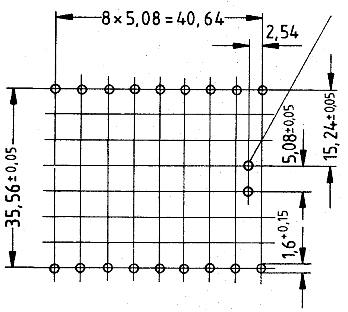
Coil former B 66366

Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0. Available with 18 solder terminals, also suitable for automatic winding.

For solderability of terminal pins refer to page 89. For winding details refer to page 77.



Built-in dimensions for the transformer (approx.)
L = 53 mm
W = 50 mm
H = 41 mm



Ground
(for clamp with ground terminal)

Hole arrangement
View in mounting direction

Dimensions in mm

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] µΩ	Approx. weight g	**Ordering code** (PU: 100)
1	210	77,7	12,7	20	B66366–A1018–T1 S

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns^2)

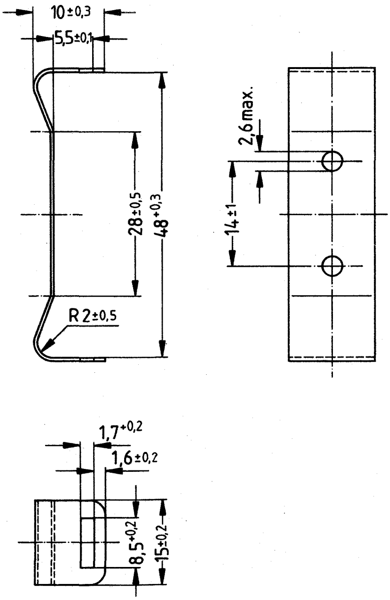
S Preferred products (refer to page 4)

Mounting assembly and clamp with ground terminal B 66366

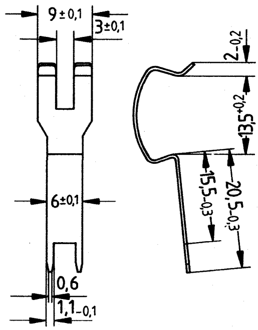
The mounting assembly comprises two stainless steel yokes.

Clamp with ground terminal made of 0.4 mm thick nickel silver incl. tinned ground pins; necessary if the core must be grounded. It can be plugged upon the core thus comprising both core halves.

Yoke



Clamp with ground terminal

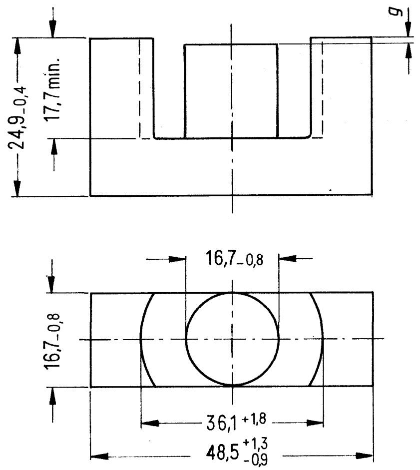


Dimensions in mm

	Ordering code	PU: Items
Yoke (ordering code for individual yoke; 2 are required)	B66366–A2000 S	100
Clamp with ground terminal	B66366–A2001	50
Sealing can	upon request	

S Preferred products (refer to page 4)

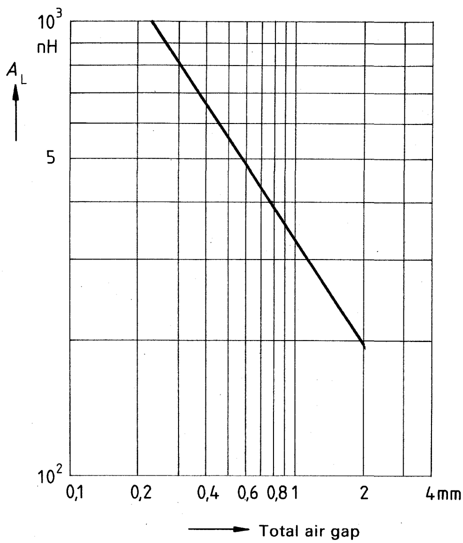
ETD cores are intended for SMPS transformer design with optimum weight-referred power at small volume.



Dimensions in mm

A_L value versus total air gap
for a set consisting of

1 core	B66367–G–X1*7	(g appr. 0) and
1 core	B66367–G...	(g > 0)
or		
2 cores	B66367–G...	(g > 0)



Magnetic characteristics (per set)

Core factor	$\Sigma l/A$ =	0.54	mm^{-1}
Effective area	A_e =	211	mm^2
Min. core cross-section[1]	A_{min} =	209	mm^2
Effective length	l_e =	114	mm
Effective volume	V_e =	24000	mm^3

Approx. weight 62 g/item

ETD cores are delivered individually and according to dimension *"g"* (shortened center leg). Dimension *"g"* applies to a core set comprising one core with *"g"* approximately 0 and one core with shortened center leg.

Ferrite material	Dimension *"g"* mm	tolerance mm	A_L value[2] (approx.) nH	Effective permeability (approx.) μ_e	**Ordering code** (PU: 100 items)	
N27	appr. 0	–	3700	1590	B66367–G–X127	S
N67	appr. 0	–	3800	1630	B66367–G–X167	
N27	0,2	±0,03	1100	473	B66367–G200–X127	
	0,5	±0,05	540	232	B66367–G500–X127	S
	1,0	±0,1	310	133	B66367–G1000–X127	S
	2,0	±0,2	190	82	B66367–G2000–X127	
N67	0,5	±0,05	540	232	B66367–G500–X167	
	1,0	±0,1	310	133	B66367–G1000–X167	

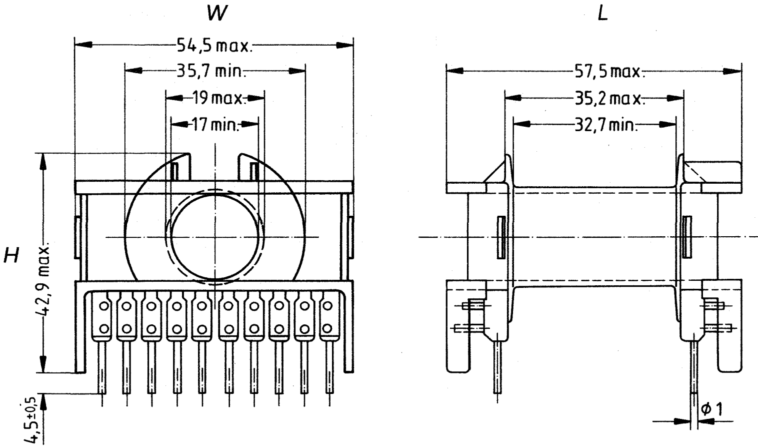
For power loss P_v and amplitude permeability μ_a refer to page 461.

1) Required to calculate the max. flux density
2) Measuring temperature 25 °C, measuring flux density $\hat{B} \leq 1$ mT
S Preferred products (refer to page 4)

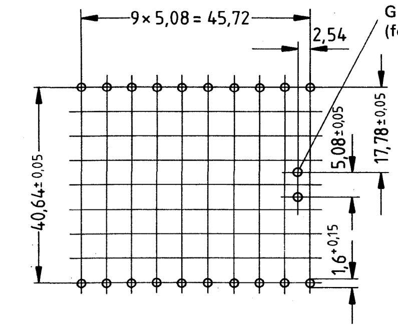
Coil former B 66368

Glass-fiber reinforced polyterephthalate coil former, flame-retardant in accordance with UL 94 V-0. Available with 20 solder terminals, also suitable for automatic winding.

For solderability of terminal pins refer to page 89. For winding details refer to page 77.



Built-in dimensions for the transformer (approx.)
L = 58 mm
W = 55 mm
H = 43.5 mm



Ground
(for clamp with ground terminal)

Hole arrangement
View in mounting direction

Dimensions in mm

Number of sections	Useful winding cross section A_N mm^2	Average length of turn l_N mm	A_R value[1)] µΩ	Approx. weight g	**Ordering code** (PU: 50)
1	269,4	86	11	27	B66368–A1020–T1 S

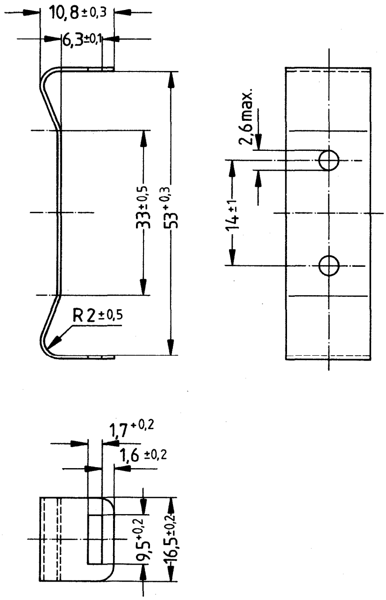
1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns^2)
S Preferred products (refer to page 4)

Mounting assembly and clamp with ground terminal B 66368

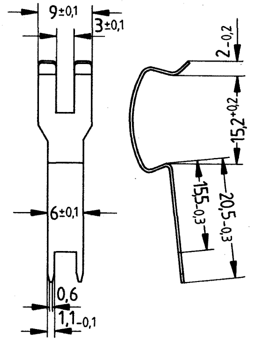
The mounting assembly comprises two stainless steel yokes.

Clamp with ground terminal made of 0.4 mm thick nickel silver incl. tinned ground pins; necessary if the core must be grounded. It can be plugged upon the core thus comprising both core halves.

Yoke



Clamp with ground terminal



Dimensions in mm

	Ordering code	PU: Items
Yoke (ordering code for individual yoke; 2 are required)	B66368–A2000 S	100
Clamp with ground terminal	B66368–A2001	50
Sealing can	upon request	

S Preferred products (refer to page 4)

U and UI Cores

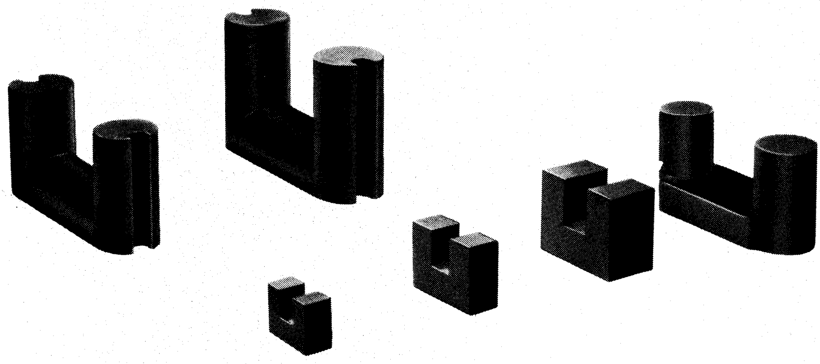


Figure 1

General

By virtue of their high saturation flux density level, high Curie temperature, and low power losses, U and UI cores made of ferrite material N27 are suitable for use in power, pulse, and high-voltage transformers, e.g. in line deflection transformers for black-and-white and color TVs, in energy storage chokes, ignition transformers, etc.

Relevant ferrite material data and general information on power dissipation and amplitude permeability versus temperature, magnetic flux density, and frequency may be obtained from the material table and from the relevant curves.

Power transformers with UI and UU cores

For transformers with high power ratings (> 1 kW) we manufacture U and I cores of rectangular section which can be combined in various ways like building blocks to form UU cores of larger cross section or EE-shapes that are suitable for transformers in the kilowatt range (fig. 2).

U and UI Cores

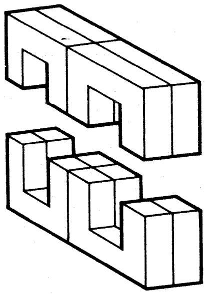


Figure 2

For information on the design of power transformers and energy storage chokes see chapter "Cores for power transmission".

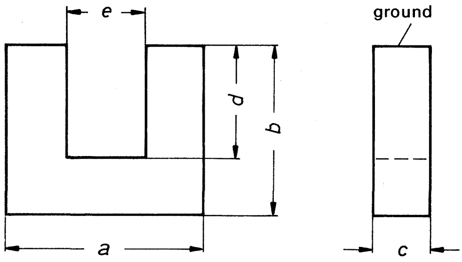
Survey

Core type	Ordering code Core	 Coil former	Main application
U15 U20 U25	B67350–A1–X27 B67348–A1–X27 B67352–A1–X27	B67350–A1004–T1 B67348–A1004–T1 B67352–A1004–T1	Energy storage chokes and transformers for TV sets
U29/18/16 U37/25/18 U37/29/18 U47/25/18 U57/28/16	B67354–A1–X27 B67356–A1–X27 B67358–A1–X27 B67353–Z1–X43 B67334–Z1–X43		Line deflection transformers for TV sets
U93/76/30 U93/76/16 I 93/28/30 I 93/28/16	B67345–A1–X27 B67345–A3–X27 B67345–A2–X27 B67345–A4–X27	B67345–A1000–T1	for power ratings ≥ 1.5 kW

U Cores U 15; U 20; U 25

B 67348; B 67350 B 67352

U cores of rectangular cross section in acc. with DIN 41296, sheet 7, are preferably available made of the ferrite material N 27.

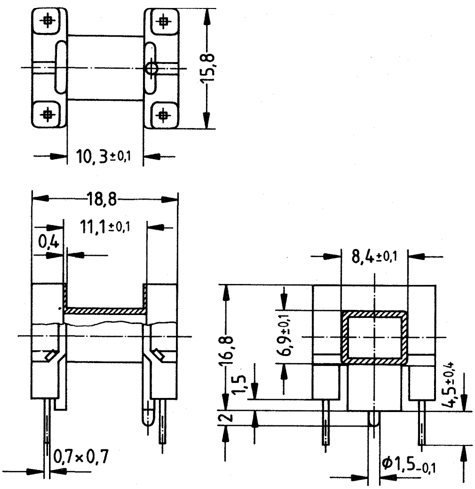


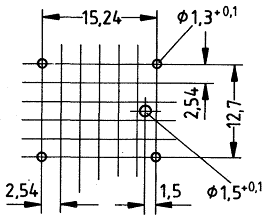
		U 15	U 20	U 25
Dimensions (mm)	a	15,2 ± 0,7	20,8 ± 0,6	24,8 ± 0,7
	b	11,7 – 1	15,9 – 0,6	20 – 1
	c	6,7 – 0,5	7,8 – 0,5	13 – 0,5
	d	5,7 + 0,7	8 + 0,6	11 + 0,5
	e	5,2 ± 0,3	6,3 ± 0,3	8,2 ± 0,3
Magnetic characteristics per set				
Effective length	l_e mm	48	68	86
Effective area	A_e mm^2	32	55	105
Effective volume	V_e mm^3	1540	3750	9030
Core factor	$\sum \frac{l_e}{A_e}$ mm^{-1}	1,5	1,24	0,82
Test data[1] at 16 kHz $P_V\left[\frac{W}{set}\right]$ $\hat{B}$ = 200 mT/60 ... 100 °C		≤ 0,19	≤ 0,42	≤ 1
μ_a $\hat{B}$ = 400 mT/ 20 °C $\hat{B}$ = 320 mT/100 °C			> 1330 > 1000	
Approx. weight	g/item	approx. 4,3	approx. 9,5	approx. 23
Ordering code		B67350–A1–X27	B67348–A1–X27	B67352–A1–X27
PU: items		1000	500	200

[1] Sinusoidal test voltage

Coil former B 67 350

Glass-fiber reinforced 6 polyamide coil former with 4 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.





Dimensions in mm

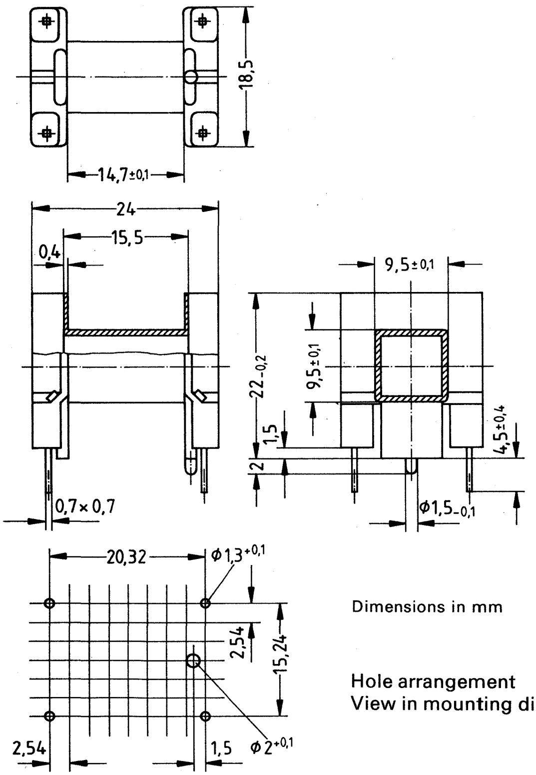
Hole arrangement
View in mounting direction

Number of sections	Uselful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1] μΩ	Approx. weight g	**Ordering code** (PU: 500)
1	37	45	42	1,5	B67350–A1004–T1

[1] $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

Coil former B 67 348

Glass-fiber reinforced 6 polyamide coil former with 4 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.



Dimensions in mm

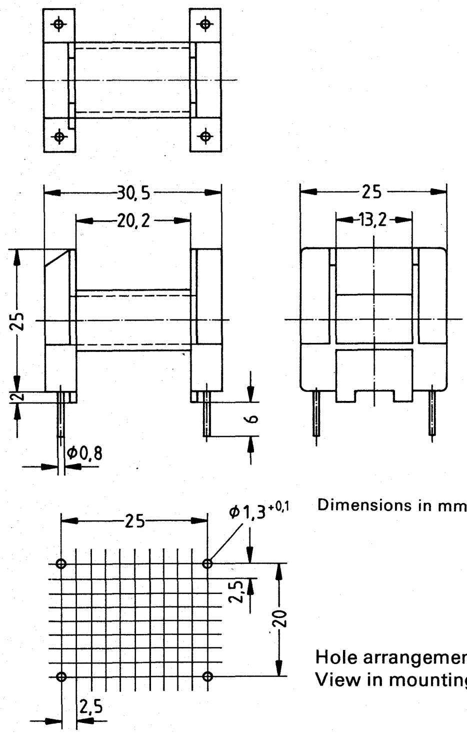
Hole arrangement
View in mounting direction

Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] µΩ	Approx. weight g	**Ordering code** (PU: 250)
1	70	60	30	2	B67348–A1004–T1

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance $= A_R \cdot$ number of turns^2)

Coil former B 67 352

Glass-fiber reinforced 6 polyamide coil former with 4 terminal pins, flame-retardant in accordance with UL 94 V-0.
For solderability of terminal pins refer to page 89.



Dimensions in mm

Hole arrangement
View in mounting direction

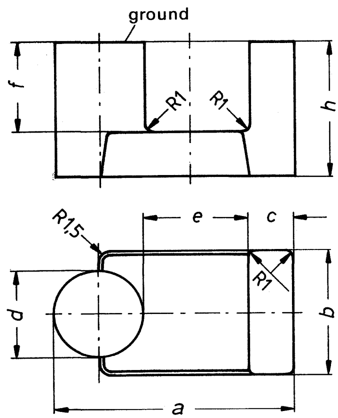
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 100)
1	138	67	17	2,5	B67352–A1004–T1

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance $= A_R \cdot$ number of turns^2)

U Cores U 29/18/16
U 37/25/18; U 37/29/18

B 67354
B 67356; B 67358

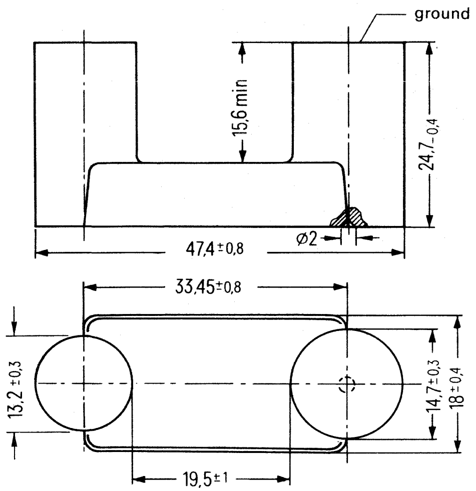
U cores made of ferrite material N27 with round center leg for attaching the coil former and the winding. They are particularly suitable for the construction of high voltage and line transformers.



		U 29/18/16	U 37/25/18	U 37/29/18
Dimensions (mm)	a	29 ± 0,7	36,9 ± 0,8	36,9 ± 0,8
	b	16 ± 0,4	18 ± 0,4	18 ± 0,4
	c	5,8 ± 0,2	7,3 ± 0,2	7,3 ± 0,2
	d	11 ± 0,3	14,7 ± 0,3	14,7 ± 0,3
	e	> 11	> 13,9	> 13,9
	f	> 11,5	> 16,3	> 19,9
	h	18 – 0,4	25,4 – 0,4	29 – 0,4
Magnetic characteristics per set Effective length	l_e mm	95	125	140
Effective area	A_e mm²	94	150	150
Effective volume	V_e mm³	8930	18750	21000
Test data[1] at 16 kHz $P_V \left[\frac{W}{set}\right]$ $\hat{B}$ = 200 mT/60…100 °C		≤0,95	≤2,1	≤2,3
μ_a $\hat{B}$ = 400 mT/ 20 °C $\hat{B}$ = 320 mT/100 °C			 > 1500 > 1250	
Approx. weight	g/item	approx. 22	approx. 48	approx. 54
Ordering code		B67354–A1–X27	B67356–A1–X27	B67358–A1–X27
(PU: items)		250	100	125

[1] Sinusoidal test voltage

U cores of round cross section, without hole, without notch, made of ferrite material N 43 for line deflection transformers in color TV sets.



Dimensions in mm

Magnetic characteristics (per set)

Effective length l_e = 145 mm
Effective area[1] A_e = 153 mm^2
Effective volume V_e = 22190 mm^3

Approx. weight 56 g/item

Ordering code B67353–Z1–X43
(PU: 192 items)

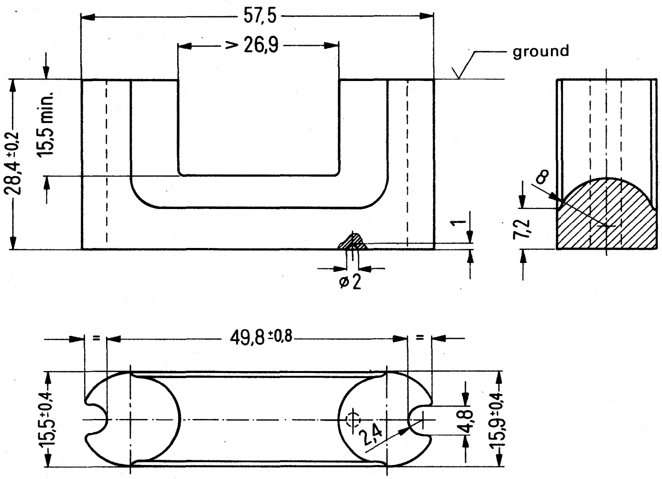
Test data (per set)
Measuring frequency 16 kHz
Test voltage: sinusoidal

Ferrite material	Temperature T °C	Flux density $\hat{B}$ mT	Field strength $\hat{H}$ A/m	Amplitude permeability μ_a	Power loss P_v W/set
N 43[2]	20	400	≤240	>1330	–
	100	320	≤270	> 950	–
	60 . . . 100	200	–	–	≤2,7

[1] The smallest core cross section of 137 mm^2 is decisive for the test flux density.
[2] Curie temperature T_c > 190 °C/374 °F.

U Cores U 57/28/16 B 67 334

U cores of round cross section complying with DIN 41 296, page 2, made of ferrite material N 43 for line deflection transformers in color TV sets.



Dimensions in mm

Magnetic characteristics (per set)

Effective length l_e = 163 mm
Effective area A_e = 171 mm^2
Effective volume V_e = 27900 mm^3

Approx. weight 70 g/item

Ordering code B67334–Z1–X43
(PU: 180 items)

Test data (per set)
Measuring frequency 16 kHz
Test voltage: sinusoidal

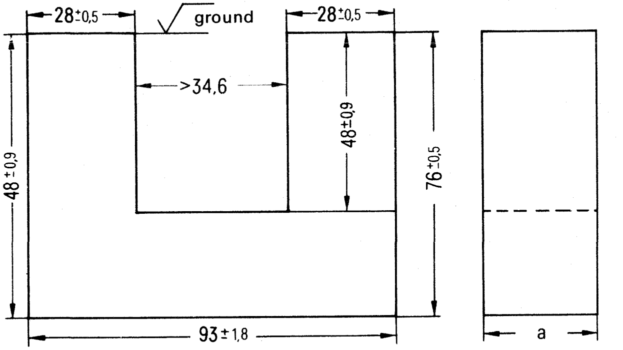
Ferrite material	Temperature T °C	Flux density $\hat{B}$ mT	Field strength $\hat{H}$ A/m	Amplitude permeability μ_a	Power loss P_v W/set
	20	400	≤ 240	≥ 1330	–
N 43[1])	100	320	≤ 270	≥ 950	–
	60 . . . 100	200	–	–	≤ 3,4

[1]) Curie temperature $T_c > 190$ °C/374 °F.

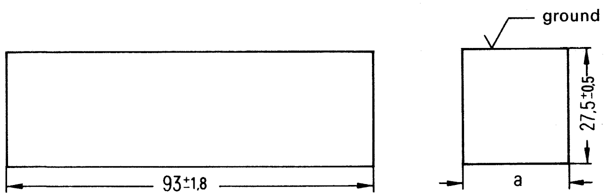
U Cores UU 93/152/30 UU 93/152/16 — UI Cores UI 93/104/30 UI 93/104/16 — B 67345

with rectangular cross-section

In addition to PM 87 cores and PM 114 cores, these U and UI cores made of ferrite material N 27 are suitable for the construction of power transformers > 1 kW (20 kHz). They are delivered individually, either as U cores or as I cores, and may also be combined to E cores or M cores (refer to "General" on U cores).



U core



I core

Dimensions in mm

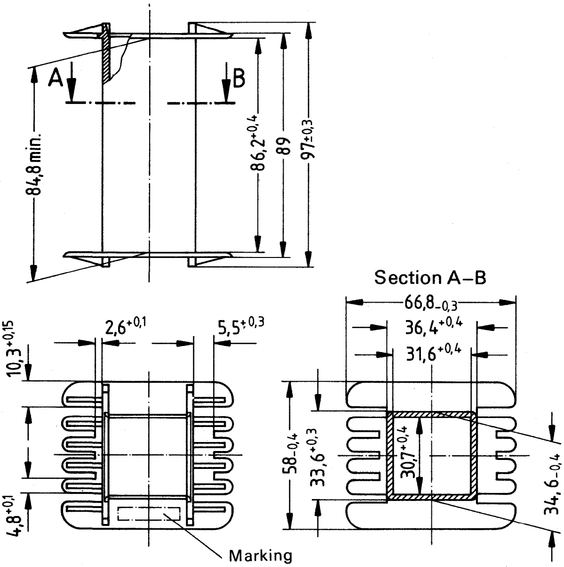
Magnetic characteristics (per set)

		UU 93/152/30	UI 93/104/30	UU 93/152/16	UI 93/104/16	
Effective length	l_e	345	259	345	259	mm
Effective area	A_e	826	826	441	441	mm^2
Effective volume	V_e	285 000	214 000	152 000	114 000	mm^3
Approx. weight/set		1 500	1 100	800	600	g

Type		Dim. a	**Ordering code** (per item) (PU: 24 items)	
U core	U 93/76/30	30 ± 0,6	B67345-A1-X27	S
I core	I 93/28/30		B67345-A2-X27	S
U core	U 93/76/16	16 ± 0,5	B67345-A3-X27	
I core	I 93/28/16		B67345-A4-X27	

S Preferred products (refer to page 4)

Glass-fiber reinforced 6 polyamide coil former for core sets UU 93/152/30, natural colored, flame-retardant in accordance with UL 94 HB.



Dimensions in mm

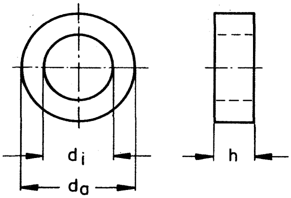
Number of sections	Useful winding cross section A_N mm²	Average length of turn l_N mm	A_R value[1)] μΩ	Approx. weight g	**Ordering code** (PU: 24)
1	1052	195	6,4	43	B67345–A1000–T1

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance = A_R · number of turns²)

Toroids and Double-Aperture Cores; Shielding Beads

Ferrite toroids are mainly used for transformers, such as pulse, broadband, and power transformers, balanced mixers, and chokes.

The higher permeability of the magnetically closed circuit results in high inductance at low volume; the stray field is negligible.



Survey

Type	Dimensions[1] d_a mm	d_i mm	h mm	Approx. weight g	Technical data l_e/A_e mm^{-1}	l_e mm	A_e mm^2	V_e mm^2
R 2,5	2,5±0,12	1,5±0,1	1,0±0,1	0,02	12,20	6,1	0,5	3,0
R4 [2]	4,0±0,15	2,4±0,15	1,6±0,1	0,07	7,65	9,7	1,27	12,3
R6,3	6,3±0,2	3,8±0,15	2,5±0,12	0,3	4,95	15,3	3,1	47,5
R10	10,0±0,25	6,0±0,15	4,0±0,15	0,9	3,06	24,5	8,0	196
R12,5	12,5±0,3	7,5±0,2	5,0±0,15	2	2,45	30,4	12	380
R16[2]	16,0±0,4	9,6±0,3	6,3±0,2	3	1,95	38,7	20	770
R20/7	20,0±0,4	10,0±0,25	7,0±0,3	8	1,30	45,3	35	1580
R23/9	22,7±0,5	14,7±0,4	9,2±0,2	10	1,60	56,4	36	2030
R25/10	25,3±0,7	14,8±0,5	10,0±0,2	16	1,17	60,0	51	3060
R25/15	25,3±0,7	14,8±0,5	15,0±0,4	24	0,83	63,0	76	4780
R25/20	25,3±0,7	14,8±0,5	20,0±0,5	32	0,62	63,0	102	6420
R34/10	34,0±0,7	20,5±0,5	10,0±0,3	26	1,24	82,0	66	5400
R34/12,5	34,0±0,7	20,5±0,5	12,5±0,3	33	0,99	82,0	83,0	6800
R42	41,8±1	26,2±0,6	12,5±0,3	45	1,08	102,5	95	9750
R58	58,3±1	40,8±0,8	17,6±0,4	110	1,00	153,0	153	23400

Surface protection	**Ordering code**
without surface protection	B64290–**A**...
lacquer protected, thickness of layer < 0.1 mm (only R 2.5)	B64290–**J**...
plastic coated, thickness of coat 0.3...0.5 mm, depending on core size	B64290–**K**...

The appropriate surface available is indicated for the individual types.

[1] Dimensions for uncoated cores

[2] External and internal diameter in accordance with IEC publication 525, core height, however, deviating as follows:

	IEC	Siemens
Core height h	$\frac{d_i}{2}$	$\frac{d_i}{1.5}$

Measuring flux density $\hat{B} < 1$ mT

Ferrite material	Initial permeability μ_i	Core type	A_L value nH	tolerance	Ordering code without surface protection	Ordering code with surface protection	PU
K 1[1]	80	R4/1,6	13		B64290-A36-X1		1000
		R6,3/2,5	20	±25%	B64290-A37-X1		1000
		R10/4	33		B64290-A38-X1		500
M 33	750	R4/1,6	123			B64290-K36-X33	1000
		R6,3/2,5	190	±25%		B64290-K37-X33	1000
		R10/4	308			B64290-K38-X33	500
N 47	1400	R6,3/2,5	> 270			B64290-K37-X47	1000
		R10/4	> 430			B64290-K38-X47	500
		R12,5/5	> 540	–		B64290-K44-X47	500
		R16/6,3	> 670			B64290-K45-X47	500
N 27	2000	R12,5/5	> 770			B64290-K44-X27	500
		R16/6,3	> 970			B64290-K45-X27	500
		R20/7	>1450			B64290-K632-X27	200
		R23/9	>1180			B64290-K626-X27	100
		R25/10	>1520	–		B64290-K618-X27	100
		R25/15	>2270			B64290-K615-X27	100
		R25/20	>3040			B64290-K616-X27	100
		R34/10	>1520			B64290-K58-X27	100
		R34/12,5	>1900			B64290-K48-X27	100
N 30	4300	R2,5/1	440			B64290-J35-X830 S	1000
		R4/1,6	710		B64290-A36-X830	B64290-K36-X830 S	1000
		R6,3/2,5	1090		B64290-A37-X830	B64290-K37-X830 S	1000
		R10/4	1760		B64290-A38-X830	B64290-K38-X830 S	500
		R12,5/5	2210		B64290-A44-X830	B64290-K44-X830 S	500
		R16/6,3	2770		B64290-A45-X830	B64290-K45-X830 S	500
		R20/7	4100		B64290-A632-X830	B64290-K632-X830 S	200
		R23/9	3400	±25%	B64290-A626-X830	B64290-K626-X830	100
		R25/10	4600		B64290-A618-X830	B64290-K618-X830 S	100
		R25/15	7000		B64290-A615-X830	B64290-K615-X830	100
		R25/20	9400		B64290-A616-X830	B64290-K616-X830	100
		R34/10	4700		B64290-A58-X830	B64290-K58-X830 S	100
		R34/12,5	5300		B64290-A48-X830	B64290-K48-X830 S	100
		R42/12,5	5000		B64290-A22-X830	B64290-K22-X830 S	50
		R58/17,6	5400		B64290-A40-X830	B64290-K40-X830 S	20

[1] The dimensions for toroids made of K 1, indicated on page 490, may be by approx. 5% larger.

S Preferred products (refer to page 4)

Measuring flux density $\hat{B} < 1$ mT

Ferrite material	Initial permeability μ_i	Core type	A_L value[1)] nH	tolerance	Ordering code without surface protection	Ordering code with surface protection	PU
T 35	6000	R2,5/1	620	±25%		B64290-J35-X35	1000
		R4/1,6	980		B64290-A36-X35	B64290-K36-X35	1000
		R6,3/2,5	1520		B64290-A37-X35	B64290-K37-X35	1000
		R10/4	2470		B64290-A38-X35	B64290-K38-X35	500
		R12,5/5	3080		B64290-A44-X35	B64290-K44-X35	500
		R16/6,3	3870		B64290-A45-X35	B64290-K45-X35 S	500
		R20/7	5800		B64290-A632-X35	B64290-K632-X35 S	200
		R23/9	4720		B64290-A626-X35	B64290-K626-X35	100
		R25/10	6100		B64290-A618-X35	B64290-K618-X35 S	100
T 38	10000	R2,5/1	1030	±30%		B64290-J35-X38	1000
		R4/1,6	1640		B64290-A36-X38	B64290-K36-X38 S	1000
		R6,3/2,5	2540		B64290-A37-X38	B64290-K37-X38 S	1000
		R10/4	4100		B64290-A38-X38	B64290-K38-X38 S	500
		R12,5/5	5130		B64290-A44-X38	B64290-K44-X38	500
		R16/6,3	6440		B64290-A45-X38	B64290-K45-X38	500

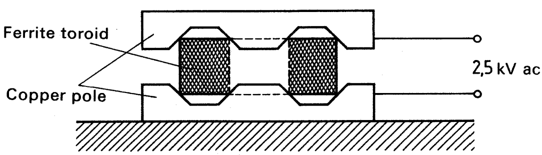
Dielectric strength test of coated toroids

The dielectric strength of the insulating coating is tested as follows:

A copper ring is pressed to the top and bottom edges of the toroid (see schematic).
Test duration is 10 s, ac test voltage (V_{rms}) is

for toroids R 2.5 to R 16 1.5 kV
for toroids R 20 to R 58 2.0 kV

Test frequency: 50 Hz



1) The A_L values may be up to 15% lower with plastic coated (B64290–K...) T 35 toroids and up to 20% lower with T 38 toroids. Thus, the lower tolerance limit may be −40% for material T 35 and −50% for material T 38, respectively.

S Preferred products (refer to page 4)

Toroids for chokes and broadband transformers

The materials and core shapes listed on page 490 to 492 are also suitable for use in chokes and broadband transformers.
Materials of lower permeability are applicable at frequencies above 1 MHz, e.g. R 6.3 ring cores are preferably available (refer to page 491).

Material	μ_i	A_L value nH	tolerance	**Ordering code** (PU: 1000)
K 1	80	20	±25 %	B64290–K37–X1
M 33	750	190		B64290–K37–X33

Toroids for pulse transformers

The main field of application for toroids are pulse transformers.
Some definitions and design principles are described in the following:

Definitions

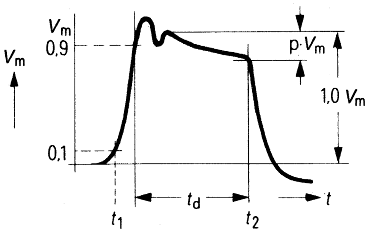


Figure 1 Voltage shape of a primary pulse

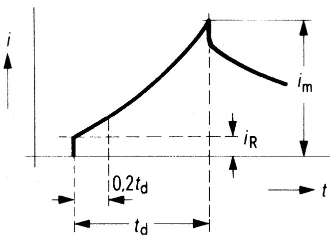


Figure 2 Current shape of a primary pulse

Pulse permeability

$$\mu_p = \frac{1}{\mu_0} \cdot \frac{\Delta B}{\Delta H}$$

$$\Delta B = \frac{t \int^{t_2} V \cdot d_t}{N \cdot A_e} \approx \frac{V_m \cdot t_d}{N \cdot A_e}$$

$$\Delta H = \frac{\Delta i \cdot N}{l_e}$$

$$L_p = \mu_p \cdot \mu_0 \cdot \frac{N^2 \cdot A_e}{l_e} = \frac{V_m \cdot t_d}{\Delta i}$$

From this equation one obtains μ_p as permeability determined by flux density and field strength deviations at pulse operation. The magnetizing current pulse – shown in fig. 2 – has in its initial and final part a current step, generated by the core losses, and an inductive current step $i_m - i_R$ with an approx. linearly rising characteristic.

Since in many cases the current step i_R can be neglected for pulse permeability calculations, the peak value of the magnetizing current i_m can be introduced as the current difference Δ_i when the field strength deviaton ΔH should be calculated.

When the value of ΔB increases, mainly at higher pulse repetition frequencies and an increasing pulse duty factor, the current step i_R – as a proportion of the total current – may be of greater importance.

Figure 5 shows, therefore, $\mu_{p\ 0.2}$ referred to a flux density ΔB during the interval $t_d - 0.2\ t_d$ and an accordingly increasing magnetizing current $\Delta i = i_m - i_{0.2}\ t_d$ (disregarding the current step at the beginning of the pulse).

Test conditions

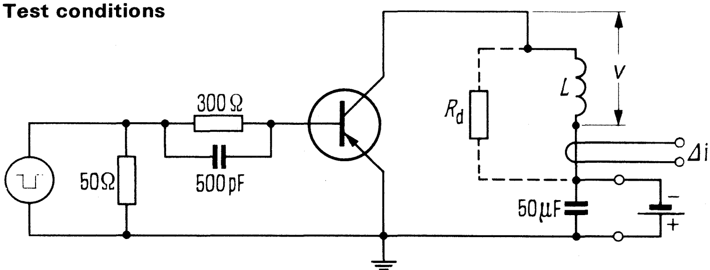


Figure 3 Measuring circuit

For a specified material, the pulse permeability depends upon the flux density deviation, the pulse repetition frequency, and the core temperature. Preferred test operation conditions are as follows:

T = 25 °C/77 °F

f_p	10 kHz	100 kHz	1 MHz
t_d	1 µs	1 µs	0.5 µs

The time constant of the circuit (figure 3) has been determined such that the pulse current of the preceding pulse has approximately decayed to zero when the next pulse starts to rise. The resistance R_d causes the voltage peak value to decrease when the current has been disconnected.

The core heating mainly depends on the heat conductive medium, e.g. copper winding, mounting, encapsulation etc. The data in the test curve for continuous operation and short term measurement refers to 6.3 mm diameter toroids with N approx. 20/CuL, freely suspended.

Material data

Pulse permeability versus flux density deviation

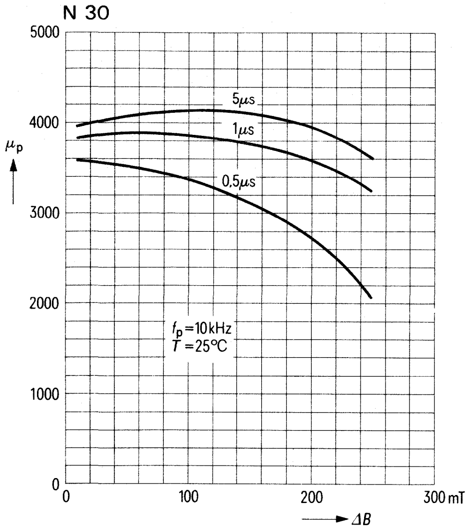


Figure 4

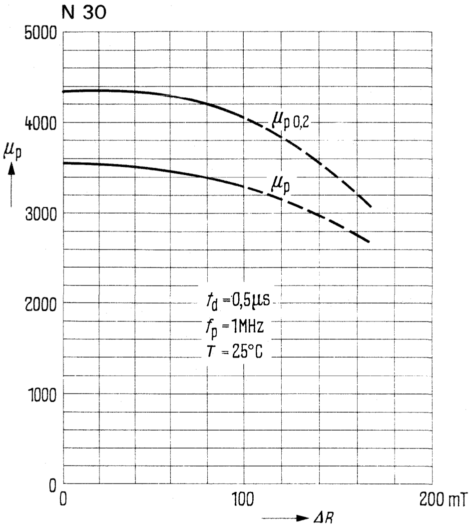


Figure 5 – – – only intermittent operation possible (dependent on the heat conductivity)

Variation of pulse permeability with temperature at various flux density deviations

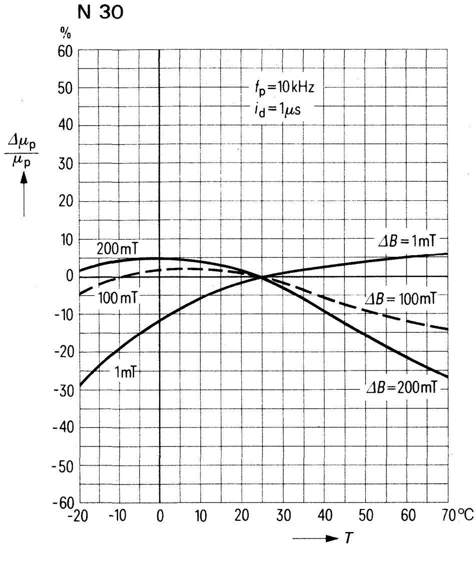


Figure 6

Material data – calculation

Pulse permeability versus flux density deviation

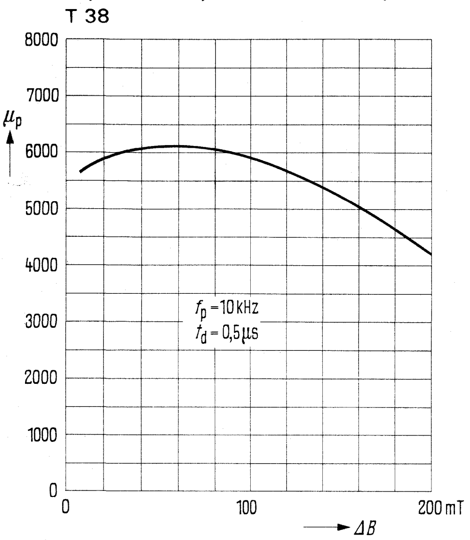


Figure 7

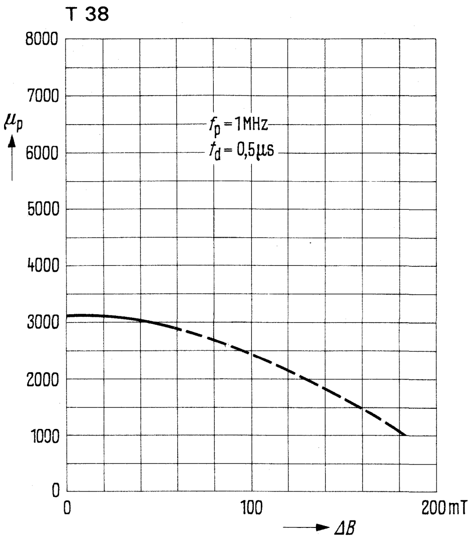


Figure 8 – – – only intermittent operation possible (depending on the heat conductivity)

Example

The required secondary pulses must have an amplitude I_2 = 120 mA, a duration t_d = 0.5 μs, and a maximum tilt of ρ = 5%. The terminating resistance R_2 is 50 Ω, the source resistance R_i = 200 Ω and the turns ratio n = 2 : 1. The maximum core temperature is 70 °C/158 °F. (For calculation see page 497).

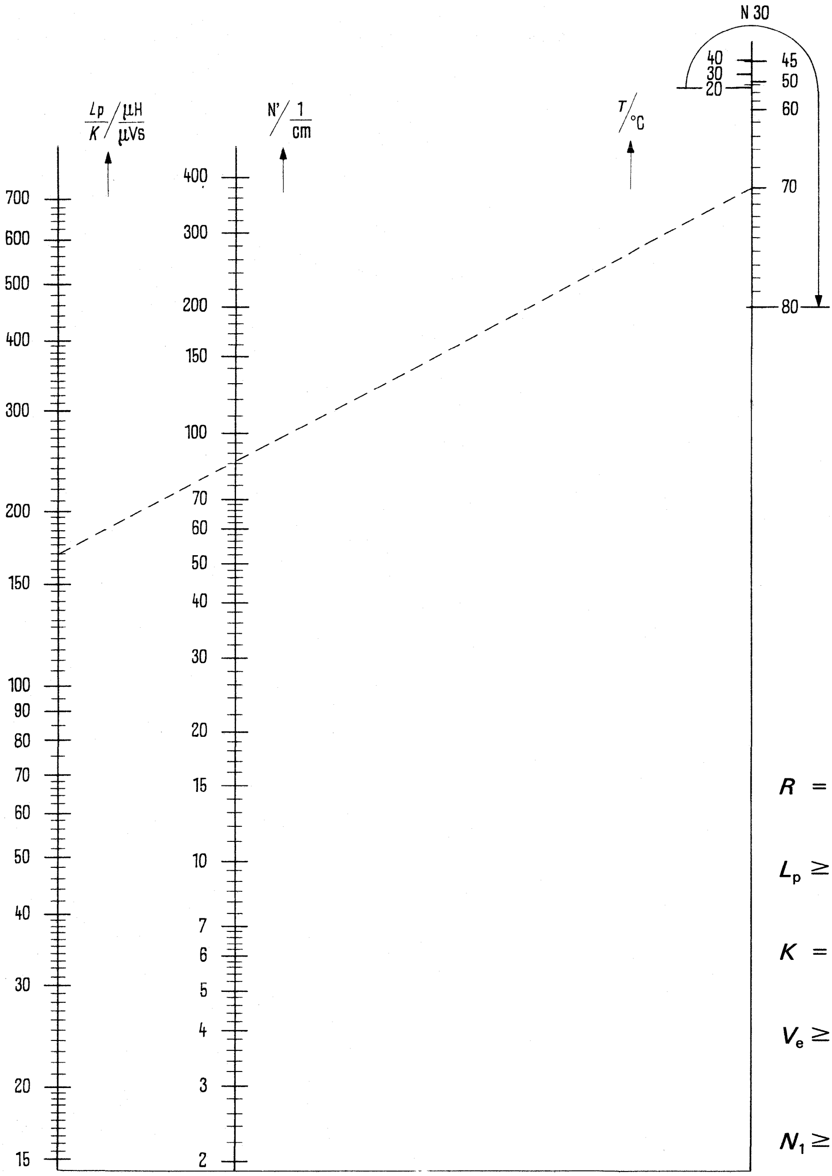
The provided material is ferrite N 30.

Equation (1) yields R = 100 Ω, equation (2) L_p = 1000 µH and equation (3) K = 6.0 µVs and hence L_p/ K = 167 µH/µVs. From the nomogram one obtains N′ = 85 cm^{-1}. As shown in figure 4, a permeability µ of approx. 1800 can be assumed for ferrite N 30 at t_d = 0.5 µs. Equation (4) yields V_e = 0.006 cm^3, i.e. the toroid R 4 having a V_e = 12.3 mm^3 can be chosen. N_1 = 58 is calculated form equation (5). The magnetic field constant $\mu_0 = 4\pi \cdot 10^{-9}$ Vs/Acm.

Hence the transformer can be designed as follows:

Toroidal ferrite core R 4, N 30 material, N_1 = 58, N_2 = 29.

Nomogram for the calculation of pulse transformers



$$R = \frac{n^2 R_i R_2}{R_i + n^2 R_2} \quad (1)$$

$$L_p \geq \frac{t_d R}{p} \quad (2)$$

$$K = n I_2 R_2 t_d \quad (3)$$

$$V_e \geq \frac{L_p}{\mu \mu_0 N'^2} \quad (4)$$

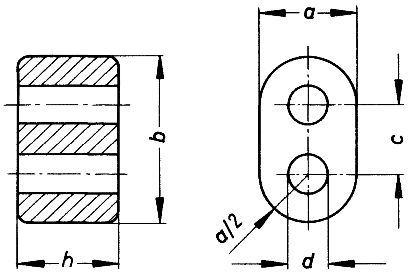
$$N_1 \geq \sqrt{\frac{L_p \cdot l_e}{\mu \mu_0 A_e}} \quad (5)$$

Double-aperture cores are used for broadband transformers up to high frequencies, e.g. made of the materials

Ferrite K 1 for matching transformers and balanced mixers up to 250 MHz in antenna feeders or in input circuits of VHF and TV receivers

Ferrite U 17 for the same applications up to 500 MHz

Ferrite N 30 for lower frequencies and pulse applications



Dimensions in mm

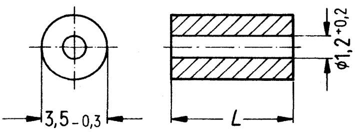
Dimensions *h* mm	*b* mm	*a* mm	*c* mm	*d* mm	Appr. weight g	Material	Ordering code (PU = packaging unit)	PU
$14{,}5_{-1}$ [1]	$14{,}5_{-1}$	$8{,}5_{-0{,}5}$	$5{,}85 \pm 0{,}25$	$3{,}4^{+0{,}8}$	4,0	K 1	B62152–A1–X1 S	200
$8{,}3_{-0{,}6}$ [1]	$14{,}5_{-1}$	$8{,}5_{-0{,}5}$	$5{,}85 \pm 0{,}25$	$3{,}4^{+0{,}6}$	2,5	U 17	B62152–A4–X17 S	500
						K 1	B62152–A4–X1 S	500
						N 30	B62152–A4–X30 S	500
$6{,}2_{-0{,}5}$ [1]	$7{,}25_{-0{,}5}$	$4{,}2_{-0{,}4}$	$2{,}9 \pm 0{,}15$	$1{,}7^{+0{,}3}$	0,4	U 17	B62152–A7–X17 S	2000
						K 1	B62152–A7–X1 S	2000
						N 30	B62152–A7–X30 S	2000
$2{,}5_{-0{,}3}$	$3{,}6_{-0{,}3}$	$2{,}1_{-0{,}2}$	$1{,}45 \pm 0{,}1$	$0{,}8^{+0{,}15}$	0,1	U 17	B62152–A8–X17 S	2500
						N 30	B62152–A8–X30 S	2500

[1] In accordance with DIN 41279, shape G

S Preferred products (refer to page 4)

Shielding beads are made of ferrite N 22 and are suitable for use in the short-wave range as well as up to the ultrashort-wave range.

Slipped over a conductor, the beads generate a shielding effect, which increases with the number of beads. Premagnetization of the beads reduces the shielding effect.



Dimensions in mm

L mm	Ordering code (PU: 5000)	
$3,3_{-0,5}$	B62110–A3011–X22	S
$5,2_{-0,5}$	B62110–A3007–X22	S
$8_{-0,6}$	B62110–A3063–X22	S
$16_{-0,8}$	B62110–A3064–X22	

S Preferred products (refer to page 4)

Screw Cores, Cores for RF Choke Coils

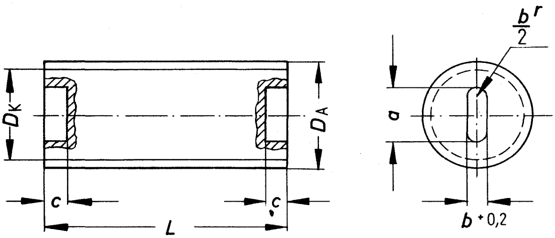
Ground thread

Screw cores are available made of the materials U17, K1, M33, if a minimum quantity of 100000 items is ordered.

For preferred core lengths see table.

Tolerance of the apparent permeability μ_{app}: ±5% (typical value); lower μ_{app} tolerance upon request.

Testing of magnetic characteristics in accordance with DIN 41 276, sheet 1.



Dimensions in mm

Dimensions

Screw core suitable for nut-thread DIN 13, 518; 519	Core length L	Thread limit dimensions			Slot dimensions		
		$D_{A\ max.}$	$D_{A\ min.}$	$D_{K\ max.}$	a	b	c min. dimension
	mm	mm	mm	mm	mm	mm	mm
3 x 0,5	$6,3_{-0,6}$	2,7	2,65	2,25	$1,3^{+0,2}$	0,5	1
	$8,3_{-0,6}$						
3,5 x 0,5	$6,3_{-0,6}$	3,20	3,15	2,75	$1,7^{+0,2}$	0,6	1,2
	$8,3_{-0,6}$						
	$10,3_{-0,6}$						
4 x 0,5	$6,3_{-0,6}$	3,7	3,65	3,20	$2^{+0,2}$	0,7	1,2
	$8,3_{-0,6}$						
	$10,3_{-0,6}$						
	$12,3_{-0,6}$						
5 x 0,75	$8,3_{-0,6}$	4,6	4,55	3,9	$2,5^{+0,3}$	1	1,2
	$13,3_{-0,6}$						
6 x 0,75	$13,3_{-0,6}$	5,6	5,55	4,9	$3^{+0,3}$	1	1,2

Ground thread

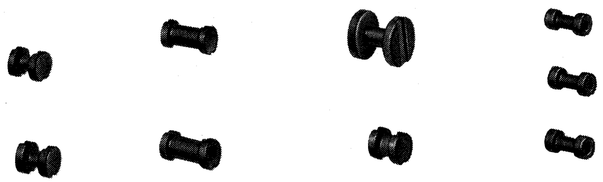
The screw cores comply with DIN 41286, sheet 1 to 3. The thread dimensions include the usual elastic inserts (core brake) between nut thread and screw core.

To avoid damaging the slot, the insulating screw driver B63399–A1 (with flat blade, refer to page 340) should be used.

Ordering codes and weights for screw cores

Screw core suitable for nut thread DIN 13, 518, 519	Core length L mm	Approx. weight g	**Ordering code**	PU
3 x 0,5	$6{,}3_{-0{,}6}$	0,25	B63310–B2009–X**	2500
	$8{,}3_{-0{,}6}$	0,3	B63310–B2008–X**	
3,5 x 0,5	$6{,}3_{-0{,}6}$	0,3	B63310–B3028–X**	
	$8{,}3_{-0{,}6}$	0,33	B63310–B3029–X**	
	$10{,}3_{-0{,}6}$	0,35	B63310–B3021–X**	
4 x 0,5	$6{,}3_{-0{,}6}$	0,35	B63310–B3030–X**	
	$8{,}3_{-0{,}6}$	0,4	B63310–B3020–X**	
	$10{,}3_{-0{,}6}$	0,45	B63310–B3019–X**	
	$12{,}3_{-0{,}6}$	0,6	B63310–B3018–X**	
5 x 0,75	$8{,}3_{-0{,}6}$	0,75	B63310–B4017–X**	1000
	$13{,}3_{-0{,}6}$	1,1	B63310–B4018–X**	
6 x 0,75	$13{,}3_{-0{,}6}$	2,4	B63310–B5019–X**	

** Here the symbol for the desired ferrite material should be inserted:
for U17 = 17; for K1 = 1 and for M 33 = 33.



Apart from adjustable inductors as used for IF filter coils, filters for oscillator circuits etc., fixed inductors are also applied in electronic equipment in order to suppress undesired RF interference. The frequency range of such choke coils approximately covers 10^3 to 10^8 Hz. In most cases, the basic shapes include cylindrical cores featuring a single layer winding and axial leads. Cores with side flanges (yarn roller core) which can be wound in multilayer construction are in particular available for higher inductance values.

Figure 1

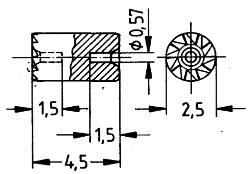


Figure 2

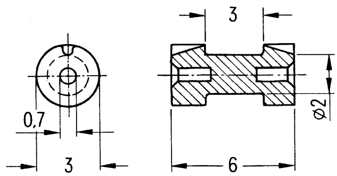
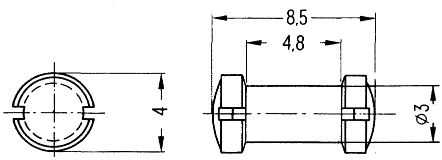


Figure 3



Dimensions in mm

Figure	Type	Typical values for A_L value nH	A_R value[1] µΩ	**Ordering code**	PU
1	Drum core	10	1000	B67416-C10-X2	5000
2	Drum core	13	200	B67416-C5-X2	5000
3	Drum core	15	200	B67416-C1-X2	5000

The self-capacitance of coils with drum cores is approx. 0.5 pF, measured between the terminals.

1) $R_{Cu} = A_R \cdot N^2$ (dc resistance $= A_R$ · number of turns^2)

Rods for RF Welding Apparatus; Unground Blocks

Rods made of ferrite material N 27 meet the high magnetic and thermal stress in RF welding apparatus.

This material features high saturation flux density at high operating temperatures (> 80 °C), low alternating field losses and high permeability (μ_i approx. 2000).

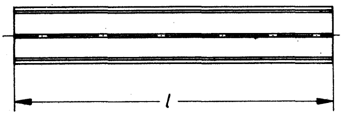
Two versions are available:

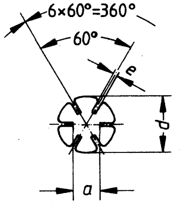
Type A with slots for reducing eddy current losses (additionally, they have a cooling effect);

Type B with internal hole for cooling water flow.

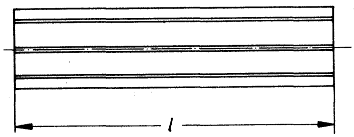
Type A

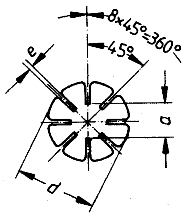
d = 8 and 10 mm





d = 15 mm

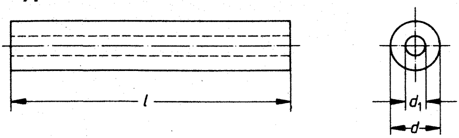




Dimensions in mm

Diameter d mm	dim. a mm	Slot width e mm	Length l mm	**Ordering code** (PU: 500)	Approx. weight g/mm	Tubular gauge
$8_{-0,4}$	4,5	0,5	200 ± 4	B61611-A8002-X27	≈ 0,2	Ø 9^{E8} x200
$10_{-0,5}$	4,5	0,5	200 ± 4	B61611-J1002-X27	≈ 0,3	Ø 11^{E8} x200
$15_{-0,6}$	7	0,75	200 ± 4	B61611-J5002-X27	≈ 0,5	Ø 16^{E8} x200

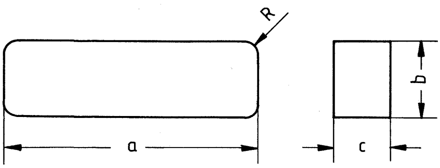
Type B



Diameter d mm	Diameter d_1 mm	Length l mm	**Ordering code** (PU: 500)	Approx. weight g/mm	Tubular gauge
$8_{-0,4}$	$4^{+0,2}$	200 ± 4	B61621-A8002-X27	0,2	Ø 9^{E8} x 200
$10_{-0,4}$	$5^{+0,2}$	200 ± 4	B61621-J1002-X27	0,3	Ø 11^{E8} x 200
$15_{-0,6}$	$7^{+0,3}$	200 ± 4	B61621-J5002-X27	0,5	Ø 16^{E8} x 200

Certain applications require plate- or quad-shaped ferrites, also as unground blocks for shaped grinded parts. For these requirements cores made of N 26 are available in the following sizes.

Other materials are supplied upon request.



Dimensions a mm	b mm	c mm	*R* approx. mm	Approx. weight g	**Ordering code**
82 ± 2	27,6 ± 0,6	$10{,}5_{-0{,}4}$	1,3	110	B67499–A19–X26
82 ± 2	9,9 ± 0,2	$9{,}2_{-0{,}4}$	1,3	34	B67499–A25–X26

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